

[MS-SSAS-Diff]:

SQL Server Analysis Services Protocol

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Revision Summary

| Date | Revision History | Revision Class | Comments |
|------------|------------------|----------------|--|
| 8/7/2009 | 0.1 | Major | First release. |
| 11/6/2009 | 0.2 | Minor | Clarified the meaning of the technical content. |
| 3/5/2010 | 1.0 | Major | Updated and revised the technical content. |
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| 6/4/2010 | 2.1 | Minor | Clarified the meaning of the technical content. |
| 9/3/2010 | 2.2 | Minor | Clarified the meaning of the technical content. |
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Table of Contents

| | | |
|-------------------|---|-----------|
| 1 | Introduction | 14 |
| 1.1 | (Updated Section) Glossary | 14 |
| 1.2 | References | 17 |
| 1.2.1 | Normative References | 17 |
| 1.2.2 | (Updated Section) Informative References | 18 |
| 1.3 | Overview | 19 |
| 1.4 | Relationship to Other Protocols | 20 |
| 1.5 | Prerequisites/Preconditions | 21 |
| 1.6 | Applicability Statement | 21 |
| 1.7 | Versioning and Capability Negotiation | 21 |
| 1.7.1 | Versioning | 21 |
| 1.7.2 | Capability Negotiation | 21 |
| 1.8 | Vendor-Extensible Fields | 22 |
| 1.9 | Standards Assignments | 22 |
| 2 | Messages | 23 |
| 2.1 | Transport | 23 |
| 2.1.1 | TCP | 23 |
| 2.1.2 | HTTP/HTTPS | 25 |
| 2.1.3 | Encryption | 25 |
| 2.1.4 | Compression | 26 |
| 2.1.5 | (Updated Section) Binary XML | 26 |
| 2.2 | Common Message Syntax | 27 |
| 2.2.1 | Namespaces | 27 |
| 2.2.2 | Messages | 28 |
| 2.2.3 | Elements | 28 |
| 2.2.4 | Complex Types | 28 |
| 2.2.4.1 | Return Value Complex Types | 29 |
| 2.2.4.1.1 | xmldata:dataset Complex Type | 29 |
| 2.2.4.1.1.1 | xmldata:OlapInfo Complex Type | 29 |
| 2.2.4.1.1.1.1 | xmldata:CubeInfo | 30 |
| 2.2.4.1.1.1.1.1 | OlapInfoCube | 30 |
| 2.2.4.1.1.1.2 | xmldata:AxesInfo | 31 |
| 2.2.4.1.1.1.2.1 | xmldata:AxisInfo Complex Type | 31 |
| 2.2.4.1.1.1.2.1.1 | xmldata:HierarchyInfo Complex Type | 31 |
| 2.2.4.1.1.1.3 | xmldata:CellInfo Complex Type | 32 |
| 2.2.4.1.1.2 | xmldata:Axes Complex Type | 32 |
| 2.2.4.1.1.2.1 | (Updated Section) Axis | 33 |
| 2.2.4.1.1.2.1.1 | SetType Model Group | 33 |
| 2.2.4.1.1.2.1.1.1 | MembersType Complex Type | 34 |
| 2.2.4.1.1.2.1.1.2 | MemberType Complex Type | 34 |
| 2.2.4.1.1.2.1.1.3 | TuplesType Complex Type | 35 |
| 2.2.4.1.1.2.1.1.4 | TupleType Complex Type | 35 |
| 2.2.4.1.1.2.1.1.5 | SetListType Complex Type | 35 |
| 2.2.4.1.1.2.1.1.6 | (Updated Section) msxmldata:NormTupleSet Complex Type | 35 |
| 2.2.4.1.1.2.1.2 | NormType Model Group | 36 |
| 2.2.4.1.1.2.1.2.1 | MetadatasType Complex Type | 36 |
| 2.2.4.1.1.2.1.2.2 | (Updated Section) MetadataType Complex Type | 37 |
| 2.2.4.1.1.2.1.2.3 | (Updated Section) TuplesNormType Complex Type | 38 |
| 2.2.4.1.1.2.1.2.4 | KeysNormType Complex Type | 38 |
| 2.2.4.1.1.2.1.2.5 | (Updated Section) KeyNormType Complex Type | 38 |
| 2.2.4.1.1.2.1.2.6 | MeasureFormatStringsNormType Complex Type | 39 |
| 2.2.4.1.1.2.1.2.7 | MeasureFormatStringNormType Complex Type | 39 |
| 2.2.4.1.1.3 | (Updated Section) xmldata:CellData Complex Type | 40 |
| 2.2.4.1.1.3.1 | xmldata:CellType ComplexType | 40 |

| | | |
|-----------------|---|-----|
| 2.2.4.1.1.3.1.1 | Cell Value Errors..... | 41 |
| 2.2.4.1.1.3.1.2 | CellOrdinal Attribute..... | 41 |
| 2.2.4.1.1.3.2 | (Updated Section) CellSetType ComplexType..... | 42 |
| 2.2.4.1.2 | xmla-e:emptyresult Complex Type..... | 43 |
| 2.2.4.1.3 | xmla-rs:rowset Complex Type..... | 43 |
| 2.2.4.1.3.1 | xmla-rs:row Complex Type..... | 44 |
| 2.2.4.1.3.1.1 | Nested Rowsets..... | 44 |
| 2.2.4.1.4 | xmla-m:results Complex Type..... | 44 |
| 2.2.4.1.5 | Error and Warning Complex Types..... | 45 |
| 2.2.4.1.5.1 | xmla-x:Exception..... | 45 |
| 2.2.4.1.5.2 | xmla-x:Messages..... | 45 |
| 2.2.4.1.5.2.1 | WarningType..... | 46 |
| 2.2.4.1.5.2.2 | ErrorType..... | 46 |
| 2.2.4.1.5.2.3 | MessageLocation..... | 47 |
| 2.2.4.2 | Object Definition Complex Types..... | 48 |
| 2.2.4.2.1 | Rules that Apply to All Complex Types..... | 48 |
| 2.2.4.2.1.1 | Name, ID, and Description..... | 49 |
| 2.2.4.2.1.2 | String Elements..... | 49 |
| 2.2.4.2.1.3 | Versioning..... | 49 |
| 2.2.4.2.1.4 | Optional Element Usage..... | 50 |
| 2.2.4.2.2 | Complex Type Definitions for Server Object Hierarchy..... | 50 |
| 2.2.4.2.2.1 | (Updated Section) MajorObject..... | 51 |
| 2.2.4.2.2.2 | Server..... | 52 |
| 2.2.4.2.2.2.1 | ServerProperty..... | 55 |
| 2.2.4.2.2.3 | Assembly..... | 55 |
| 2.2.4.2.2.3.1 | ComAssembly..... | 56 |
| 2.2.4.2.2.3.2 | ClrAssembly..... | 57 |
| 2.2.4.2.2.3.2.1 | ClrAssemblyFile..... | 58 |
| 2.2.4.2.2.3.2.2 | DataBlock..... | 58 |
| 2.2.4.2.2.4 | Trace..... | 59 |
| 2.2.4.2.2.4.1 | Event..... | 60 |
| 2.2.4.2.2.4.1.1 | EventColumnID..... | 61 |
| 2.2.4.2.2.4.2 | TraceFilter..... | 61 |
| 2.2.4.2.2.4.3 | (Updated Section) event_session..... | 62 |
| 2.2.4.2.2.4.3.1 | (Updated Section) event..... | 64 |
| 2.2.4.2.2.4.3.2 | (Updated Section) action..... | 64 |
| 2.2.4.2.2.4.3.3 | (Updated Section) target..... | 65 |
| 2.2.4.2.2.4.3.4 | (Updated Section) objectNames..... | 65 |
| 2.2.4.2.2.4.3.5 | (Updated Section) parameter..... | 66 |
| 2.2.4.2.2.4.3.6 | unary_expr..... | 66 |
| 2.2.4.2.2.5 | Database..... | 67 |
| 2.2.4.2.2.5.1 | Account..... | 73 |
| 2.2.4.2.2.6 | DataSource..... | 75 |
| 2.2.4.2.2.6.1 | RelationalDataSource..... | 77 |
| 2.2.4.2.2.6.2 | OlapDataSource..... | 77 |
| 2.2.4.2.2.6.3 | PushedDataSource..... | 77 |
| 2.2.4.2.2.7 | DataSourceView..... | 78 |
| 2.2.4.2.2.8 | (Updated Section) Dimension..... | 79 |
| 2.2.4.2.2.8.1 | (Updated Section) DimensionAttribute..... | 86 |
| 2.2.4.2.2.8.1.1 | AttributeRelationship..... | 97 |
| 2.2.4.2.2.8.1.2 | DimensionAttributeVisualizationProperties..... | 99 |
| 2.2.4.2.2.8.2 | (Updated Section) Hierarchy..... | 102 |
| 2.2.4.2.2.8.2.1 | Level..... | 105 |
| 2.2.4.2.2.8.2.2 | (Added Section) HierarchyVisualizationProperties..... | 106 |
| 2.2.4.2.2.8.3 | Relationship..... | 107 |
| 2.2.4.2.2.9 | (Updated Section) Cube..... | 110 |
| 2.2.4.2.2.9.1 | CubeDimension..... | 114 |
| 2.2.4.2.2.9.2 | (Updated Section) CubeAttribute..... | 117 |

| | | |
|--------------------|--|-----|
| 2.2.4.2.2.9.3 | CubeHierarchy | 118 |
| 2.2.4.2.2.9.4 | Kpi | 119 |
| 2.2.4.2.2.9.5 | Action | 120 |
| 2.2.4.2.2.9.5.1 | StandardAction | 122 |
| 2.2.4.2.2.9.5.2 | ReportAction | 123 |
| 2.2.4.2.2.9.5.2.1 | ReportParameter | 125 |
| 2.2.4.2.2.9.5.2.2 | ReportFormatParameter | 125 |
| 2.2.4.2.2.9.5.3 | DrillThroughAction | 126 |
| 2.2.4.2.2.10 | MdxScript | 127 |
| 2.2.4.2.2.10.1 | CalculationProperty | 128 |
| 2.2.4.2.2.10.2 | CalculationPropertiesVisualizationProperties | 130 |
| 2.2.4.2.2.10.3 | Command | 132 |
| 2.2.4.2.2.11 | MeasureGroup | 133 |
| 2.2.4.2.2.11.1 | MeasureGroupDimension | 136 |
| 2.2.4.2.2.11.1.1 | ManyToManyMeasureGroupDimension | 136 |
| 2.2.4.2.2.11.1.2 | RegularMeasureGroupDimension | 137 |
| 2.2.4.2.2.11.1.3 | ReferenceMeasureGroupDimension | 138 |
| 2.2.4.2.2.11.1.4 | DegenerateMeasureGroupDimension | 140 |
| 2.2.4.2.2.11.1.5 | DataMiningMeasureGroupDimension | 141 |
| 2.2.4.2.2.11.2 | MeasureGroupAttribute | 141 |
| 2.2.4.2.2.11.3 | Measure | 142 |
| 2.2.4.2.2.12 | AggregationDesign | 144 |
| 2.2.4.2.2.12.1 | AggregationDesignDimension | 145 |
| 2.2.4.2.2.12.1.1 | AggregationDesignAttribute | 146 |
| 2.2.4.2.2.12.2 | Aggregation | 146 |
| 2.2.4.2.2.12.2.1 | AggregationDimension | 147 |
| 2.2.4.2.2.12.2.1.1 | AggregationAttribute | 148 |
| 2.2.4.2.2.13 | Partition | 148 |
| 2.2.4.2.2.13.1 | AggregationInstance | 152 |
| 2.2.4.2.2.13.1.1 | AggregationInstanceDimension | 153 |
| 2.2.4.2.2.13.1.2 | AggregationInstanceAttribute | 154 |
| 2.2.4.2.2.13.1.3 | AggregationInstanceMeasure | 154 |
| 2.2.4.2.2.14 | Perspective | 155 |
| 2.2.4.2.2.14.1 | PerspectiveDimension | 156 |
| 2.2.4.2.2.14.1.1 | (Updated Section) PerspectiveAttribute | 157 |
| 2.2.4.2.2.14.1.2 | PerspectiveHierarchy | 157 |
| 2.2.4.2.2.14.2 | PerspectiveMeasureGroup | 158 |
| 2.2.4.2.2.14.2.1 | PerspectiveMeasure | 158 |
| 2.2.4.2.2.14.3 | PerspectiveCalculation | 159 |
| 2.2.4.2.2.14.4 | PerspectiveKpi | 160 |
| 2.2.4.2.2.14.5 | PerspectiveAction | 160 |
| 2.2.4.2.2.15 | MiningStructure | 161 |
| 2.2.4.2.2.15.1 | MiningStructureColumn | 163 |
| 2.2.4.2.2.15.1.1 | ScalarMiningStructureColumn | 163 |
| 2.2.4.2.2.15.1.2 | (Updated Section) TableMiningStructureColumn | 166 |
| 2.2.4.2.2.16 | MiningModel | 167 |
| 2.2.4.2.2.16.1 | MiningModelingFlag | 169 |
| 2.2.4.2.2.16.2 | MiningModelColumn | 169 |
| 2.2.4.2.2.16.3 | AlgorithmParameter | 171 |
| 2.2.4.2.2.16.4 | FoldingParameters | 171 |
| 2.2.4.2.2.17 | Annotation | 172 |
| 2.2.4.2.2.17.1 | LinguisticSchemas Annotation | 172 |
| 2.2.4.2.2.17.1.1 | LinguisticSchema | 173 |
| 2.2.4.2.2.17.1.1.1 | Entity | 174 |
| 2.2.4.2.2.18 | Translation | 174 |
| 2.2.4.2.2.18.1 | AttributeTranslation | 175 |
| 2.2.4.2.2.19 | DataItem | 175 |
| 2.2.4.2.2.20 | Binding | 178 |

| | | |
|-------------------|--|-----|
| 2.2.4.2.2.20.1 | ColumnBinding | 178 |
| 2.2.4.2.2.20.2 | RowBinding | 178 |
| 2.2.4.2.2.20.3 | DataSourceViewBinding | 179 |
| 2.2.4.2.2.20.4 | MeasureBinding | 179 |
| 2.2.4.2.2.20.5 | AttributeBinding | 179 |
| 2.2.4.2.2.20.6 | UserDefinedGroupBinding | 180 |
| 2.2.4.2.2.20.6.1 | Group | 181 |
| 2.2.4.2.2.20.7 | CubeAttributeBinding | 181 |
| 2.2.4.2.2.20.8 | DimensionBinding | 182 |
| 2.2.4.2.2.20.9 | CubeDimensionBinding | 183 |
| 2.2.4.2.2.20.10 | MeasureGroupBinding | 184 |
| 2.2.4.2.2.20.11 | MeasureGroupDimensionBinding | 185 |
| 2.2.4.2.2.20.12 | TimeBinding | 185 |
| 2.2.4.2.2.20.13 | TimeAttributeBinding | 188 |
| 2.2.4.2.2.20.14 | InheritedBinding | 188 |
| 2.2.4.2.2.20.15 | TabularBinding | 188 |
| 2.2.4.2.2.20.16 | TableBinding | 188 |
| 2.2.4.2.2.20.17 | QueryBinding | 189 |
| 2.2.4.2.2.20.18 | DSVTableBinding | 189 |
| 2.2.4.2.2.20.19 | ProactiveCachingBinding | 190 |
| 2.2.4.2.2.20.20 | ProactiveCachingObjectNotificationBinding | 190 |
| 2.2.4.2.2.20.21 | ProactiveCachingInheritedBinding | 190 |
| 2.2.4.2.2.20.22 | ProactiveCachingTablesBinding | 191 |
| 2.2.4.2.2.20.22.1 | TableNotification | 191 |
| 2.2.4.2.2.20.23 | ProactiveCachingQueryBinding | 192 |
| 2.2.4.2.2.20.23.1 | QueryNotification | 192 |
| 2.2.4.2.2.20.24 | ProactiveCachingIncrementalProcessingBinding | 192 |
| 2.2.4.2.2.20.24.1 | IncrementalProcessingNotification | 193 |
| 2.2.4.2.2.20.25 | eng200_200:RowNumberBinding | 193 |
| 2.2.4.2.2.20.26 | CalculatedMeasureBinding | 194 |
| 2.2.4.2.2.20.27 | eng200_200:ExpressionBinding | 194 |
| 2.2.4.2.2.21 | Permission | 194 |
| 2.2.4.2.2.21.1 | CubeDimensionPermission | 196 |
| 2.2.4.2.2.21.2 | AttributePermission | 197 |
| 2.2.4.2.2.21.3 | CellPermission | 198 |
| 2.2.4.2.2.22 | DatabasePermission | 198 |
| 2.2.4.2.2.23 | DataSourcePermission | 199 |
| 2.2.4.2.2.24 | DimensionPermission | 199 |
| 2.2.4.2.2.25 | MiningStructurePermission | 201 |
| 2.2.4.2.2.26 | MiningModelPermission | 201 |
| 2.2.4.2.2.27 | CubePermission | 202 |
| 2.2.4.2.2.28 | Role | 203 |
| 2.2.4.2.2.28.1 | Member | 204 |
| 2.2.4.2.2.29 | ProactiveCaching | 204 |
| 2.2.4.2.2.30 | (Updated Section) ErrorConfiguration | 205 |
| 2.2.4.2.2.31 | ImpersonationInfo | 207 |
| 2.2.4.3 | TraceDefinition Complex Types | 208 |
| 2.2.4.3.1 | Trace_Definition_ProviderInfo | 208 |
| 2.2.4.3.2 | Trace_Event_Categories | 209 |
| 2.2.4.3.2.1 | TraceEvent | 210 |
| 2.2.4.3.2.1.1 | EventColumn | 210 |
| 2.2.4.3.3 | Trace_Columns | 211 |
| 2.2.5 | Simple Types | 212 |
| 2.2.6 | Attributes | 212 |
| 2.2.7 | Groups | 212 |
| 2.2.8 | Attribute Groups | 212 |

3 Protocol Details 213

| | | |
|--------------------|--|-----|
| 3.1 | Server Details..... | 213 |
| 3.1.1 | Abstract Data Model..... | 213 |
| 3.1.2 | Timers | 213 |
| 3.1.3 | Initialization..... | 213 |
| 3.1.3.1 | Initialization for Non-HTTP Transport..... | 214 |
| 3.1.3.2 | Initialization for HTTP Transport..... | 215 |
| 3.1.4 | Message Processing Events and Sequencing Rules | 217 |
| 3.1.4.1 | Authenticate..... | 217 |
| 3.1.4.1.1 | Messages | 217 |
| 3.1.4.1.1.1 | AuthenticateSoapIn..... | 217 |
| 3.1.4.1.1.2 | AuthenticateSoapOut..... | 218 |
| 3.1.4.1.2 | Elements..... | 218 |
| 3.1.4.1.2.1 | Authenticate..... | 218 |
| 3.1.4.1.2.2 | AuthenticateResponse | 219 |
| 3.1.4.2 | Discover | 219 |
| 3.1.4.2.1 | Messages | 219 |
| 3.1.4.2.1.1 | DiscoverSoapIn | 220 |
| 3.1.4.2.1.2 | DiscoverSoapOut | 220 |
| 3.1.4.2.2 | Elements..... | 220 |
| 3.1.4.2.2.1 | Discover | 220 |
| 3.1.4.2.2.1.1 | Restrictions and RestrictionList..... | 222 |
| 3.1.4.2.2.1.2 | Properties Type..... | 222 |
| 3.1.4.2.2.1.2.1 | PropertyList | 223 |
| 3.1.4.2.2.1.3 | Discover Request Types | 260 |
| 3.1.4.2.2.1.3.1 | DBSCHEMA_CATALOGS | 260 |
| 3.1.4.2.2.1.3.1.1 | Columns | 261 |
| 3.1.4.2.2.1.3.2 | DBSCHEMA_TABLES..... | 262 |
| 3.1.4.2.2.1.3.2.1 | Columns | 262 |
| 3.1.4.2.2.1.3.3 | DBSCHEMA_COLUMNS | 263 |
| 3.1.4.2.2.1.3.3.1 | Columns | 264 |
| 3.1.4.2.2.1.3.4 | DBSCHEMA_PROVIDER_TYPES | 268 |
| 3.1.4.2.2.1.3.4.1 | Columns | 268 |
| 3.1.4.2.2.1.3.5 | MDSHEMA_CUBES | 272 |
| 3.1.4.2.2.1.3.5.1 | Columns | 272 |
| 3.1.4.2.2.1.3.6 | MDSHEMA_DIMENSIONS | 274 |
| 3.1.4.2.2.1.3.6.1 | Columns | 274 |
| 3.1.4.2.2.1.3.6.2 | Additional Restrictions | 277 |
| 3.1.4.2.2.1.3.7 | MDSHEMA_HIERARCHIES | 277 |
| 3.1.4.2.2.1.3.7.1 | Columns | 277 |
| 3.1.4.2.2.1.3.7.2 | Additional Restrictions | 281 |
| 3.1.4.2.2.1.3.8 | MDSHEMA_LEVELS | 282 |
| 3.1.4.2.2.1.3.8.1 | Columns | 282 |
| 3.1.4.2.2.1.3.8.2 | Additional Restrictions | 289 |
| 3.1.4.2.2.1.3.9 | MDSHEMA_MEASURES | 289 |
| 3.1.4.2.2.1.3.9.1 | Columns | 289 |
| 3.1.4.2.2.1.3.9.2 | Additional Restrictions | 292 |
| 3.1.4.2.2.1.3.10 | MDSHEMA_PROPERTIES | 293 |
| 3.1.4.2.2.1.3.10.1 | Columns | 293 |
| 3.1.4.2.2.1.3.10.2 | Additional Restrictions | 298 |
| 3.1.4.2.2.1.3.11 | MDSHEMA_MEMBERS | 299 |
| 3.1.4.2.2.1.3.11.1 | Columns | 299 |
| 3.1.4.2.2.1.3.11.2 | Additional Restrictions | 301 |
| 3.1.4.2.2.1.3.12 | MDSHEMA_ACTIONS | 302 |
| 3.1.4.2.2.1.3.12.1 | Columns | 302 |
| 3.1.4.2.2.1.3.12.2 | Additional Restrictions | 304 |
| 3.1.4.2.2.1.3.12.3 | Remarks | 304 |
| 3.1.4.2.2.1.3.13 | MDSHEMA_SETS..... | 304 |
| 3.1.4.2.2.1.3.13.1 | Columns | 305 |

| | | |
|--------------------|--|-----|
| 3.1.4.2.2.1.3.13.2 | Additional Restrictions | 306 |
| 3.1.4.2.2.1.3.14 | DISCOVER_INSTANCES | 306 |
| 3.1.4.2.2.1.3.14.1 | Columns | 306 |
| 3.1.4.2.2.1.3.15 | MDSHEMA_KPIS | 307 |
| 3.1.4.2.2.1.3.15.1 | Columns | 307 |
| 3.1.4.2.2.1.3.15.2 | Additional Restrictions | 309 |
| 3.1.4.2.2.1.3.16 | MDSHEMA_MEASUREGROUPS | 309 |
| 3.1.4.2.2.1.3.16.1 | Columns | 309 |
| 3.1.4.2.2.1.3.17 | MDSHEMA_MEASUREGROUP_DIMENSIONS | 310 |
| 3.1.4.2.2.1.3.17.1 | Columns | 310 |
| 3.1.4.2.2.1.3.17.2 | Additional Restrictions | 312 |
| 3.1.4.2.2.1.3.18 | MDSHEMA_INPUT_DATASOURCES | 312 |
| 3.1.4.2.2.1.3.18.1 | Columns | 312 |
| 3.1.4.2.2.1.3.19 | DMSHEMA_MINING_SERVICES | 313 |
| 3.1.4.2.2.1.3.19.1 | Columns | 313 |
| 3.1.4.2.2.1.3.20 | DMSHEMA_MINING_SERVICE_PARAMETERS | 319 |
| 3.1.4.2.2.1.3.20.1 | Columns | 319 |
| 3.1.4.2.2.1.3.21 | DMSHEMA_MINING_FUNCTIONS | 321 |
| 3.1.4.2.2.1.3.21.1 | Columns | 321 |
| 3.1.4.2.2.1.3.22 | DMSHEMA_MINING_MODEL_CONTENT | 321 |
| 3.1.4.2.2.1.3.22.1 | Columns | 321 |
| 3.1.4.2.2.1.3.22.2 | Additional Restrictions | 326 |
| 3.1.4.2.2.1.3.23 | DMSHEMA_MINING_MODEL_XML | 327 |
| 3.1.4.2.2.1.3.23.1 | (Updated Section) Columns | 327 |
| 3.1.4.2.2.1.3.24 | DMSHEMA_MINING_MODEL_CONTENT_PMML | 328 |
| 3.1.4.2.2.1.3.24.1 | (Updated Section) Columns | 328 |
| 3.1.4.2.2.1.3.25 | DMSHEMA_MINING_MODELS | 329 |
| 3.1.4.2.2.1.3.25.1 | Columns | 329 |
| 3.1.4.2.2.1.3.26 | DMSHEMA_MINING_COLUMNS | 332 |
| 3.1.4.2.2.1.3.26.1 | Columns | 332 |
| 3.1.4.2.2.1.3.27 | DMSHEMA_MINING_STRUCTURES | 337 |
| 3.1.4.2.2.1.3.27.1 | Columns | 337 |
| 3.1.4.2.2.1.3.28 | DMSHEMA_MINING_STRUCTURE_COLUMNS | 339 |
| 3.1.4.2.2.1.3.28.1 | Columns | 339 |
| 3.1.4.2.2.1.3.29 | DISCOVER_PROPERTIES | 344 |
| 3.1.4.2.2.1.3.29.1 | Columns | 344 |
| 3.1.4.2.2.1.3.30 | DISCOVER_LITERAL | 345 |
| 3.1.4.2.2.1.3.30.1 | Columns | 345 |
| 3.1.4.2.2.1.3.31 | DISCOVER_SCHEMA_ROWSETS | 347 |
| 3.1.4.2.2.1.3.31.1 | Columns | 347 |
| 3.1.4.2.2.1.3.32 | DISCOVER_KEYWORDS | 348 |
| 3.1.4.2.2.1.3.32.1 | Columns | 348 |
| 3.1.4.2.2.1.3.33 | DISCOVER_DATASOURCES | 348 |
| 3.1.4.2.2.1.3.33.1 | Columns | 349 |
| 3.1.4.2.2.1.3.34 | DISCOVER_ENUMERATORS | 350 |
| 3.1.4.2.2.1.3.34.1 | Columns | 350 |
| 3.1.4.2.2.1.3.35 | DISCOVER_XML_METADATA | 350 |
| 3.1.4.2.2.1.3.35.1 | Columns | 351 |
| 3.1.4.2.2.1.3.35.2 | Additional Restrictions | 351 |
| 3.1.4.2.2.1.3.36 | DISCOVER_TRACES | 352 |
| 3.1.4.2.2.1.3.36.1 | Columns | 352 |
| 3.1.4.2.2.1.3.37 | DISCOVER_TRACE_DEFINITION_PROVIDERINFO | 353 |
| 3.1.4.2.2.1.3.37.1 | Columns | 353 |
| 3.1.4.2.2.1.3.38 | DISCOVER_TRACE_COLUMNS | 354 |
| 3.1.4.2.2.1.3.38.1 | Columns | 354 |
| 3.1.4.2.2.1.3.39 | DISCOVER_TRACE_EVENT_CATEGORIES | 354 |
| 3.1.4.2.2.1.3.39.1 | Columns | 354 |
| 3.1.4.2.2.1.3.40 | DISCOVER_MEMORYUSAGE | 355 |

| | | |
|--------------------|---|-----|
| 3.1.4.2.2.1.3.40.1 | Columns | 355 |
| 3.1.4.2.2.1.3.41 | DISCOVER_MEMORYGRANT | 356 |
| 3.1.4.2.2.1.3.41.1 | Columns | 357 |
| 3.1.4.2.2.1.3.42 | DISCOVER_LOCKS | 357 |
| 3.1.4.2.2.1.3.42.1 | (Updated Section) Columns | 357 |
| 3.1.4.2.2.1.3.42.2 | Additional Restrictions | 359 |
| 3.1.4.2.2.1.3.43 | DISCOVER_CONNECTIONS | 359 |
| 3.1.4.2.2.1.3.43.1 | Columns | 359 |
| 3.1.4.2.2.1.3.44 | DISCOVER_SESSIONS | 361 |
| 3.1.4.2.2.1.3.44.1 | (Updated Section) Columns | 361 |
| 3.1.4.2.2.1.3.45 | DISCOVER_JOBS | 364 |
| 3.1.4.2.2.1.3.45.1 | Columns | 365 |
| 3.1.4.2.2.1.3.45.2 | Additional Restrictions | 365 |
| 3.1.4.2.2.1.3.46 | DISCOVER_TRANSACTIONS | 366 |
| 3.1.4.2.2.1.3.46.1 | Columns | 366 |
| 3.1.4.2.2.1.3.47 | DISCOVER_DB_CONNECTIONS | 366 |
| 3.1.4.2.2.1.3.47.1 | Columns | 367 |
| 3.1.4.2.2.1.3.48 | DISCOVER_MASTER_KEY | 368 |
| 3.1.4.2.2.1.3.48.1 | Columns | 368 |
| 3.1.4.2.2.1.3.49 | DISCOVER_PERFORMANCE_COUNTERS | 368 |
| 3.1.4.2.2.1.3.49.1 | (Updated Section) Columns | 368 |
| 3.1.4.2.2.1.3.50 | DISCOVER_LOCATIONS | 369 |
| 3.1.4.2.2.1.3.50.1 | Columns | 369 |
| 3.1.4.2.2.1.3.50.2 | Additional Restrictions | 370 |
| 3.1.4.2.2.1.3.51 | DISCOVER_PARTITION_DIMENSION_STAT | 370 |
| 3.1.4.2.2.1.3.51.1 | Columns | 370 |
| 3.1.4.2.2.1.3.52 | DISCOVER_PARTITION_STAT | 371 |
| 3.1.4.2.2.1.3.52.1 | Columns | 371 |
| 3.1.4.2.2.1.3.53 | DISCOVER_DIMENSION_STAT | 372 |
| 3.1.4.2.2.1.3.53.1 | Columns | 372 |
| 3.1.4.2.2.1.3.54 | DISCOVER_COMMANDS | 373 |
| 3.1.4.2.2.1.3.54.1 | Columns | 373 |
| 3.1.4.2.2.1.3.55 | DISCOVER_COMMAND_OBJECTS | 374 |
| 3.1.4.2.2.1.3.55.1 | Columns | 374 |
| 3.1.4.2.2.1.3.56 | DISCOVER_OBJECT_ACTIVITY | 375 |
| 3.1.4.2.2.1.3.56.1 | Columns | 376 |
| 3.1.4.2.2.1.3.57 | DISCOVER_OBJECT_MEMORY_USAGE | 377 |
| 3.1.4.2.2.1.3.57.1 | Columns | 377 |
| 3.1.4.2.2.1.3.58 | DISCOVER_STORAGE_TABLES | 379 |
| 3.1.4.2.2.1.3.58.1 | (Updated Section) Columns | 379 |
| 3.1.4.2.2.1.3.59 | DISCOVER_STORAGE_TABLE_COLUMNS | 380 |
| 3.1.4.2.2.1.3.59.1 | Columns | 380 |
| 3.1.4.2.2.1.3.60 | DISCOVER_STORAGE_TABLE_COLUMN_SEGMENTS | 383 |
| 3.1.4.2.2.1.3.60.1 | Columns | 383 |
| 3.1.4.2.2.1.3.61 | DISCOVER_CSDL_METADATA | 385 |
| 3.1.4.2.2.1.3.61.1 | (Updated Section) Columns | 385 |
| 3.1.4.2.2.1.3.61.2 | Additional Restrictions | 385 |
| 3.1.4.2.2.1.3.62 | DISCOVER_CALC_DEPENDENCY | 385 |
| 3.1.4.2.2.1.3.62.1 | Columns | 386 |
| 3.1.4.2.2.1.3.62.2 | (Updated Section) Additional Restrictions | 388 |
| 3.1.4.2.2.1.3.63 | MDSHEMA_FUNCTIONS | 389 |
| 3.1.4.2.2.1.3.63.1 | (Updated Section) Columns | 389 |
| 3.1.4.2.2.1.3.64 | DISCOVER_RING_BUFFERS | 392 |
| 3.1.4.2.2.1.3.64.1 | Columns | 392 |
| 3.1.4.2.2.1.3.64.2 | Additional Restrictions | 392 |
| 3.1.4.2.2.1.3.65 | DISCOVER_XEVENT_TRACE_DEFINITION | 393 |
| 3.1.4.2.2.1.3.65.1 | Columns | 393 |
| 3.1.4.2.2.1.3.66 | DISCOVER_XEVENT_PACKAGES | 393 |

| | | |
|--------------------|---------------------------------|-----|
| 3.1.4.2.2.1.3.66.1 | Columns | 393 |
| 3.1.4.2.2.1.3.67 | DISCOVER_XEVENT_OBJECTS | 394 |
| 3.1.4.2.2.1.3.67.1 | Columns | 394 |
| 3.1.4.2.2.1.3.68 | DISCOVER_XEVENT_OBJECT_COLUMNS | 395 |
| 3.1.4.2.2.1.3.68.1 | Columns | 395 |
| 3.1.4.2.2.1.3.69 | DISCOVER_XEVENT_SESSIONS | 397 |
| 3.1.4.2.2.1.3.69.1 | Columns | 397 |
| 3.1.4.2.2.1.3.69.2 | Additional Restrictions | 399 |
| 3.1.4.2.2.1.3.70 | DISCOVER_XEVENT_SESSION_TARGETS | 399 |
| 3.1.4.2.2.1.3.70.1 | Columns | 399 |
| 3.1.4.2.2.1.3.70.2 | Additional Restrictions | 400 |
| 3.1.4.2.2.1.3.71 | DISCOVER_MEM_STATS | 400 |
| 3.1.4.2.2.1.3.71.1 | Columns | 400 |
| 3.1.4.2.2.1.3.72 | DISCOVER_DB_MEM_STATS | 401 |
| 3.1.4.2.2.1.3.72.1 | Columns | 402 |
| 3.1.4.2.2.1.3.73 | DISCOVER_OBJECT_COUNTERS | 404 |
| 3.1.4.2.2.1.3.73.1 | Columns | 404 |
| 3.1.4.2.2.2 | DiscoverResponse | 404 |
| 3.1.4.2.2.2.1 | return Element | 405 |
| 3.1.4.3 | Execute | 405 |
| 3.1.4.3.1 | Messages | 405 |
| 3.1.4.3.1.1 | ExecuteSoapIn | 405 |
| 3.1.4.3.1.2 | ExecuteSoapOut | 405 |
| 3.1.4.3.2 | Elements | 406 |
| 3.1.4.3.2.1 | Execute | 406 |
| 3.1.4.3.2.1.1 | Command Element | 406 |
| 3.1.4.3.2.1.1.1 | ObjectReference Type | 407 |
| 3.1.4.3.2.1.1.2 | Statement | 409 |
| 3.1.4.3.2.1.1.3 | Create | 409 |
| 3.1.4.3.2.1.1.4 | Alter | 410 |
| 3.1.4.3.2.1.1.5 | Delete | 411 |
| 3.1.4.3.2.1.1.6 | Process | 411 |
| 3.1.4.3.2.1.1.6.1 | OutOfLineBinding | 413 |
| 3.1.4.3.2.1.1.7 | MergePartitions | 415 |
| 3.1.4.3.2.1.1.8 | DesignAggregations | 416 |
| 3.1.4.3.2.1.1.9 | ClearCache | 416 |
| 3.1.4.3.2.1.1.10 | Subscribe | 417 |
| 3.1.4.3.2.1.1.11 | Unsubscribe | 417 |
| 3.1.4.3.2.1.1.12 | Cancel | 418 |
| 3.1.4.3.2.1.1.13 | BeginTransaction | 418 |
| 3.1.4.3.2.1.1.14 | CommitTransaction | 418 |
| 3.1.4.3.2.1.1.15 | RollbackTransaction | 419 |
| 3.1.4.3.2.1.1.16 | Lock | 419 |
| 3.1.4.3.2.1.1.17 | Unlock | 420 |
| 3.1.4.3.2.1.1.18 | Backup | 420 |
| 3.1.4.3.2.1.1.18.1 | Location_Backup | 421 |
| 3.1.4.3.2.1.1.19 | Restore | 421 |
| 3.1.4.3.2.1.1.19.1 | Location | 423 |
| 3.1.4.3.2.1.1.19.2 | Folder | 423 |
| 3.1.4.3.2.1.1.20 | Synchronize | 424 |
| 3.1.4.3.2.1.1.20.1 | Source | 425 |
| 3.1.4.3.2.1.1.21 | Attach | 425 |
| 3.1.4.3.2.1.1.22 | Detach | 426 |
| 3.1.4.3.2.1.1.23 | Insert | 426 |
| 3.1.4.3.2.1.1.23.1 | Object | 427 |
| 3.1.4.3.2.1.1.23.2 | Attribute_InsertUpdate | 427 |
| 3.1.4.3.2.1.1.23.3 | Translation_InsertUpdate | 428 |
| 3.1.4.3.2.1.1.24 | Update | 428 |

| | | |
|--------------------|--|------------|
| 3.1.4.3.2.1.1.24.1 | Where..... | 429 |
| 3.1.4.3.2.1.1.24.2 | Where_Attribute | 429 |
| 3.1.4.3.2.1.1.25 | Drop | 430 |
| 3.1.4.3.2.1.1.26 | UpdateCells..... | 430 |
| 3.1.4.3.2.1.1.26.1 | Cell | 431 |
| 3.1.4.3.2.1.1.27 | NotifyTableChange..... | 432 |
| 3.1.4.3.2.1.1.28 | (Updated Section) Batch..... | 432 |
| 3.1.4.3.2.1.1.29 | (Updated Section) ImageLoad | 434 |
| 3.1.4.3.2.1.1.30 | ImageSave | 435 |
| 3.1.4.3.2.1.1.31 | CloneDatabase | 436 |
| 3.1.4.3.2.1.1.32 | SetAuthContext | 437 |
| 3.1.4.3.2.1.1.33 | DBCC | 437 |
| 3.1.4.3.2.1.2 | Properties Element | 437 |
| 3.1.4.3.2.1.3 | Parameters..... | 438 |
| 3.1.4.3.2.1.3.1 | ExecuteParameter..... | 438 |
| 3.1.4.3.2.2 | ExecuteResponse | 438 |
| 3.1.4.3.2.2.1 | return Element..... | 438 |
| 3.1.5 | Timer Events..... | 439 |
| 3.1.6 | Other Local Events..... | 440 |
| 3.2 | Transport-Specific Protocol Details | 440 |
| 3.2.1 | Connection | 440 |
| 3.2.2 | Authentication and Encryption | 440 |
| 3.2.3 | Content Type Negotiation | 440 |
| 3.2.4 | Generating and Parsing Messages..... | 441 |
| 3.2.5 | Compression..... | 442 |
| 4 | Protocol Examples..... | 443 |
| 4.1 | Client Obtains a List of Databases from the Server over TCP..... | 443 |
| 4.1.1 | Connection | 443 |
| 4.1.2 | Authentication..... | 443 |
| 4.1.3 | New Session Request | 447 |
| 4.1.4 | Request for List of Catalogs | 449 |
| 4.1.5 | End of Session | 452 |
| 4.2 | Client Obtains a List of Cubes from the Server over HTTP..... | 454 |
| 4.2.1 | Connection | 454 |
| 4.2.2 | New Session Request | 454 |
| 4.2.3 | Request for List of Cubes..... | 455 |
| 4.2.4 | End of Session | 456 |
| 4.3 | Client Obtains a List of Measures from the Server | 457 |
| 4.3.1 | Client Sends Request | 457 |
| 4.3.2 | Server Response | 458 |
| 4.4 | Client Obtains a List of Properties from the Server | 459 |
| 4.4.1 | Client Sends Request | 459 |
| 4.4.2 | Server Response | 460 |
| 4.5 | Client Obtains a List of Mining Models from the Server..... | 473 |
| 4.5.1 | Client Sends Request | 473 |
| 4.5.2 | Server Response | 474 |
| 4.6 | Client Obtains a List of Traces from the Server | 474 |
| 4.6.1 | Client Sends Request | 474 |
| 4.6.2 | Server Response | 475 |
| 4.7 | Client Obtains a List of Connections from the Server..... | 475 |
| 4.7.1 | Client Sends Request | 475 |
| 4.7.2 | Server Response | 476 |
| 4.8 | Client Obtains a List of Locks from the Server..... | 478 |
| 4.8.1 | Client Sends Request | 478 |
| 4.8.2 | Server Response | 478 |
| 4.9 | Client Obtains a List of Commands from the Server..... | 482 |
| 4.9.1 | Client Sends Request | 482 |

| | | |
|----------|---|------------|
| 4.9.2 | Server Response | 483 |
| 4.10 | Client Obtains Trace Provider Information | 484 |
| 4.10.1 | Client Sends Request | 484 |
| 4.10.2 | Server Response | 484 |
| 4.11 | Client Obtains List of Trace Column Definitions | 485 |
| 4.11.1 | Client Sends Request | 485 |
| 4.11.2 | Server Response | 486 |
| 4.12 | Client Obtains List of Trace Event Categories | 493 |
| 4.12.1 | Client Sends Request | 493 |
| 4.12.2 | Server Response | 493 |
| 4.13 | Client Sends MDX Query and Receives mddataset Result | 553 |
| 4.13.1 | Client Sends Request | 553 |
| 4.13.2 | Server Response | 553 |
| 4.14 | Create | 609 |
| 4.14.1 | Client Sends Request | 609 |
| 4.14.2 | Server Response | 663 |
| 4.15 | Alter | 663 |
| 4.15.1 | Client Sends Request | 663 |
| 4.15.2 | Server Response | 664 |
| 4.16 | Delete | 664 |
| 4.16.1 | Client Sends Request | 665 |
| 4.16.2 | Server Response | 665 |
| 4.17 | Process | 665 |
| 4.17.1 | Client Sends Request | 665 |
| 4.17.2 | Server Response | 665 |
| 4.18 | Backup | 665 |
| 4.18.1 | Client Sends Request | 665 |
| 4.18.2 | Server Response | 666 |
| 4.19 | Restore | 666 |
| 4.19.1 | Client Sends Request | 666 |
| 4.19.2 | Server Response | 666 |
| 4.20 | Begin Transaction | 666 |
| 4.20.1 | Client Sends Request | 666 |
| 4.20.2 | Server Response | 667 |
| 4.21 | Commit Transaction | 667 |
| 4.21.1 | Client Sends Request | 667 |
| 4.21.2 | Server Response | 668 |
| 4.22 | Rollback Transaction | 668 |
| 4.22.1 | Client Sends Request | 668 |
| 4.22.2 | Server Response | 668 |
| 5 | Security | 669 |
| 5.1 | Security Considerations for Implementers | 669 |
| 5.2 | Index of Security Parameters | 669 |
| 6 | (Updated Section) Appendix A: Product Behavior | 670 |
| 7 | Change Tracking | 705 |
| 8 | Index | 706 |

1 Introduction

The SQL Server Analysis Services protocol provides the methods for a client to communicate with and perform operations on an analysis server.

Sections 1.5, 1.8, 1.9, 2, and 3 of this specification are normative. All other sections and examples in this specification are informative.

1.1 (Updated Section) Glossary

This document uses the following terms:

action: An OLAP object, such as a cube, dimension, and cell, that has an action associated with it, so that a user can perform that action when browsing OLAP data. For example, a user can jump to a URL, execute a command, or drill through to data.

analysis server: A server that supports high performance and complex analytics for business intelligence applications.

assembly: A managed application module that contains class metadata and managed code as an object in Microsoft SQL Server, against which common language runtime (CLR) functions, stored procedures, triggers, user-defined aggregates, and user-defined types can be created in SQL Server.

attribute hierarchy: An implied single-level hierarchy, based on a single attribute, that consists of all the members of the attribute. An all-level member can optionally be enabled for an attribute hierarchy.

balanced hierarchy: A dimension hierarchy in which all leaf nodes are the same distance from the root node.

complex type: An element that can contain other elements or attributes and appears as <complexType> in an XML document. See also simple type.

Component Object Model (COM): An object-oriented programming model that defines how objects interact within a single process or between processes. In COM, clients have access to an object through interfaces implemented on the object. For more information, see [MS-DCOM].

conceptual schema definition language (CSDL): A language that is based on XML and that can be used to define conceptual models that are based on the Entity Data Model (EDM).

cube: A set of data that is organized and summarized into a multidimensional structure that is defined by a set of dimensions and measures.

Data Analysis Expressions (DAX): A library of functions and operators that can be combined to build formulas and expressions in a data model.

data block: A unit of data that is transferred at one time between an application and an instance of Microsoft SQL Server Analysis Services. The term is also applied to the units of storage for these data types.

data definition language (DDL): A subset of SQL or XMLE statements that defines all the attributes and properties of a database and its objects. DDL statements typically begin with CREATE, ALTER, or DROP.

data manipulation language (DML): The subset of SQL statements that is used to retrieve and manipulate data.

data mining dimension: A dimension that is specified when the MiningModel ID element for a dimension is non-empty. Certain other restrictions apply to the dimension's definition beyond what can be expressed in XSD.

Data Mining Extensions (DMX): A syntax that is used to create data mining model objects and to query and manipulate data mining data.

dimension: A structural attribute of a cube, which is an organized hierarchy of categories (levels) that describe data in the fact table.

hierarchy: A logical tree structure that organizes the members of a dimension such that each member has one parent member and zero or more child members.

in-memory: A memory model in which multidimensional aggregates are precomputed and stored but not written out on disk. Instead, they are stored in computer memory.

key attribute: The attribute of a dimension that links the non-key attributes in the dimension to related measures.

K-Means algorithm: An algorithm that places each value in the cluster with the nearest mean, and in which clusters are formed by minimizing the within-cluster deviation from the mean.

language code identifier (LCID): A 32-bit number that identifies the user interface human language dialect or variation that is supported by an application or a client computer.

lazy aggregation: An aggregation that is rebuilt by the server in the background after the processing step has been completed, instead of during the processing step. This is the process that underlies expressions, such as partitions that are "lazily processed," and aggregations and indexes that are "built lazily."

level: The name of a set of members in a dimension hierarchy, such that all members of the set are at the same distance from the root of the hierarchy.

locale ID: See language code identifier (LCID).

measure: In a cube, a set of values that are typically numeric and are based on a column in the fact table of the cube. Measures are the central values that are aggregated and analyzed.

measure group: A collection of related measures in a cube that derive from a single fact table, typically in a data source view.

MIME type: A method that is used by protocol clients to associate files of a certain type with applications that can open or access files of that type.

mining model: An object that contains the definition of a data mining process and the results of the training activity.

mining structure: A data mining object that defines the data domain from which the mining models are built.

MOLAP: A memory model in which multidimensional data aggregates are stored on disk (Multidimensional OLAP).

Multidimensional Expressions (MDX): A syntax that is used for defining multidimensional objects, and for querying and manipulating multidimensional data.

Multipurpose Internet Mail Extensions (MIME): A set of extensions that redefines and expands support for various types of content in email messages, as described in [RFC2045], [RFC2046], and [RFC2047].

Online Analytical Processing (OLAP): A technology that uses multidimensional structures to provide access to data for analysis. The source data for OLAP is stored in data warehouses in a relational database. See also cube.

partition: One of the storage containers for data and aggregations of a cube. Every cube contains one or more partitions. For a cube with multiple partitions, each partition can be stored separately in a different physical location. Each partition can be based on a different data source. Partitions are not visible to users; the cube appears to be a single object.

permission: A rule that is associated with an object and that regulates which users can gain access to the object and in what manner. See also rights.

proactive caching: A system that manages data obsolescence in a cube by which objects in MOLAP storage are automatically updated and processed in the cache, while queries are redirected to ROLAP storage.

remote partition: A partition whose data is stored on a server that is running an instance of Analysis Services other than the one used to store the metadata of the partition.

repeated base: A base column where the trace provider can reference previous data and therefore omit resending a column to SQL Server Profiler. The client tool keeps track of all repeatable columns for each new repeated-base column value.

ROLAP: A memory model in which no multidimensional aggregates are stored, and in which the server must make a relational query to obtain an aggregate upon the request of an individual query (Relational OLAP).

role-playing dimension: A single database dimension joined to the fact table on a different foreign key to produce multiple cube dimensions.

security token: An opaque data packet that is provided to an authorized user of computer services to facilitate authentication.

simple type: An element that can contain only text and appears as <simpleType> in an XML document or any attribute of an element. Attributes are considered simple types because they contain only text. See also complex type.

slicer axis: A filter for the data that is returned by a multidimensional expression (MDX) SELECT statement. The slicer axis restricts the returned data so that only data that intersects with specified members is returned. It can be thought of as an invisible extra axis in a query. The slicer axis is defined in the WHERE clause of the SELECT statement.

SOAP action: The HTTP request header field used to indicate the intent of the SOAP request, using a URI value. See [SOAP1.1] section 6.1.1 for more information.

SOAP body: A container for the payload data being delivered by a SOAP message to its recipient. See [SOAP1.2-1/2007] section 5.3 for more information.

SOAP fault: A container for error and status information within a SOAP message. See [SOAP1.2-1/2007] section 5.4 for more information.

SOAP header: A mechanism for implementing extensions to a SOAP message in a decentralized manner without prior agreement between the communicating parties. See [SOAP1.2-1/2007] section 5.2 for more information.

SOAP message: An XML document consisting of a mandatory SOAP envelope, an optional SOAP header, and a mandatory SOAP body. See [SOAP1.2-1/2007] section 5 for more information.

tuple: An ordered grouping of members from different dimensions or hierarchies. A single member is a special case of a tuple and can be used as an expression. Every hierarchy does not have to be represented in a tuple.

unbalanced hierarchy: A hierarchy in which one or more levels do not contain members in one or more branches of the hierarchy. This is also known as a ragged hierarchy.

Uniform Resource Identifier (URI): A string that identifies a resource. The URI is an addressing mechanism defined in Internet Engineering Task Force (IETF) Uniform Resource Identifier (URI): Generic Syntax [RFC3986].

WSDL message: An abstract, typed definition of the data that is communicated during a WSDL operation [WSDL]. Also, an element that describes the data being exchanged between web service providers and clients.

XML namespace: A collection of names that is used to identify elements, types, and attributes in XML documents identified in a URI reference [RFC3986]. A combination of XML namespace and local name allows XML documents to use elements, types, and attributes that have the same names but come from different sources. For more information, see [XMLNS-2ED].

XML schema: A description of a type of XML document that is typically expressed in terms of constraints on the structure and content of documents of that type, in addition to the basic syntax constraints that are imposed by XML itself. An XML schema provides a view of a document type at a relatively high level of abstraction.

XML schema definition (XSD): The World Wide Web Consortium (W3C) standard language that is used in defining XML schemas. Schemas are useful for enforcing structure and constraining the types of data that can be used validly within other XML documents. XML schema definition refers to the fully specified and currently recommended standard for use in authoring XML schemas.

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as defined in [RFC2119]. All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the Errata.

1.2.1 Normative References

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1.3 Overview

Analysis Services provides methods for a client to communicate with, and perform operations on, an analysis server. This protocol is based on SOAP and XML for Analysis (XMLA) [XMLA]. This protocol supports TCP/IP as an underlying transport mechanism in addition to HTTP/HTTPS.

Analysis Services defines the following operations: **Authenticate**, **Discover**, and **Execute**.

Authenticate is used by the client and server to exchange UTF-8 ([RFC2279]) encoded security token data blocks as part of the authentication process. For more information about authentication, see section 3.1.4.1.

Discover is used to obtain information from an analysis server, such as a list of catalogs on a server. Properties are used to control what data is obtained. This generic interface and the use of properties allow extensibility without rewriting existing functions. For more information, see section 3.1.4.2.

Execute is used to execute commands against a particular analysis server and optionally get back a result set either in a tabular or multidimensional form. For more information, see section 3.1.4.3.

By using the **Authenticate**, **Discover**, and **Execute** operations, the transfer of data between a client and an analysis server can be achieved.

The following diagram illustrates this concept:

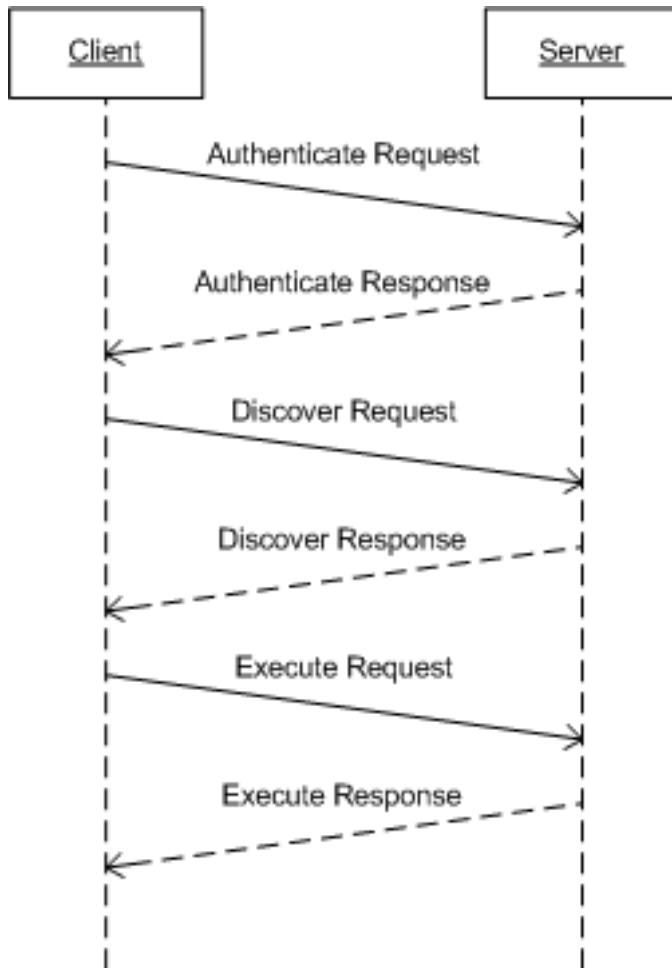


Figure 1: Data transfer between a client and an analysis server via the Authenticate, Discover, and Execute operations

1.4 Relationship to Other Protocols

Analysis Services uses the SOAP messaging protocol for formatting requests and responses as specified either in [SOAP1.1] or in [SOAP1.2-1/2007] and [SOAP1.2-2/2007]. It transmits these messages using HTTP [RFC7230], HTTPS [RFC2818], or TCP [RFC793].

This protocol uses SOAP over HTTP or HTTPS, as shown in the following layering diagram:

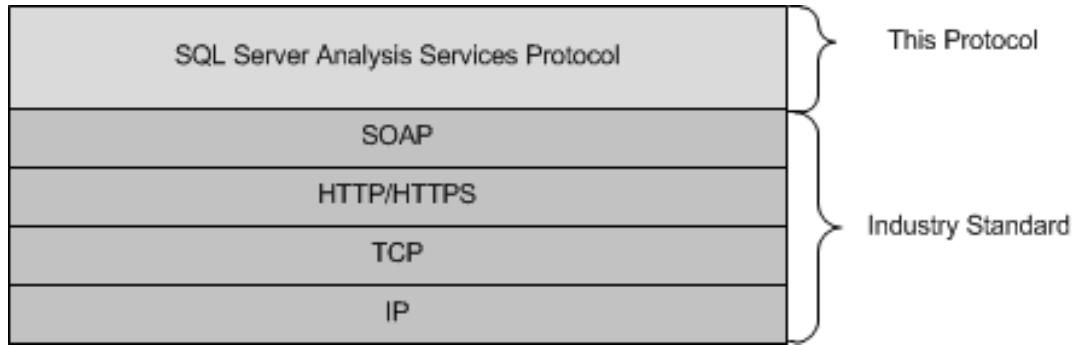


Figure 2: SOAP over HTTP or HTTPS

Analysis Services uses SOAP over Direct Internet Message Encapsulation [DIME] and TCP/IP, as shown in the following layering diagram:

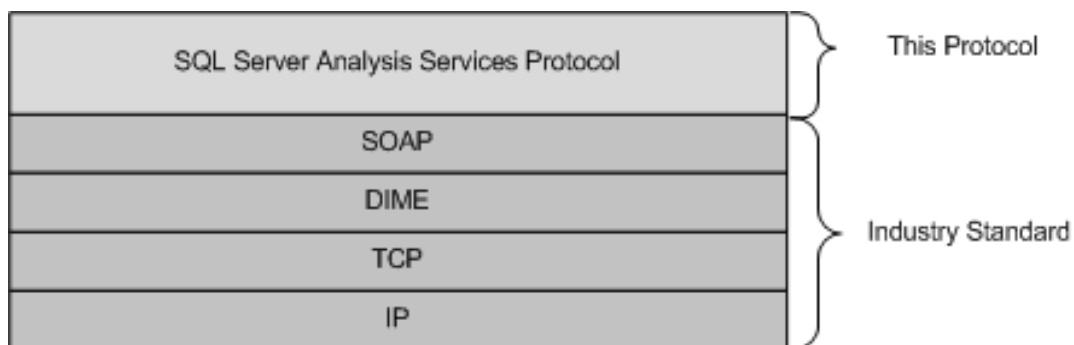


Figure 3: SOAP over DIME and TCP/IP

1.5 Prerequisites/Preconditions

None.

1.6 Applicability Statement

This protocol supports the exchange of messages between a client and an analysis server.

1.7 Versioning and Capability Negotiation

1.7.1 Versioning

This protocol includes capabilities for a client and a server to exchange versioning information by indicating whether XML elements that are sent or received need to be understood, or, if not understood, can be ignored. This is specified in section 2.2.4.2.1.3.

1.7.2 Capability Negotiation

This protocol does explicit negotiation between the client and the server for use of binary XML and compression, as specified in section 2.1.1.

1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

None.

2 Messages

2.1 Transport

The communication between a client and a server MUST be performed either over TCP or HTTP/HTTPS. The message format is a clear text XML [XML10/5] or binary XML [MS-BINXML] that can be compressed. It is recommended that the message also be encrypted by using GSS-API [RFC4178] over TCP or SSL over HTTPS.

In addition, DIME [DIME] is used for messages transmitted using TCP, and all data transferred between client and server is encoded by using UTF-8 [RFC2279]. Section 2.2 specifies the SOAP message syntax, regardless of the underlying transport.

Unless otherwise specified, this protocol uses network byte order (big-endian) for all data.

2.1.1 TCP

When using TCP as the transport, the client and server MUST compose messages by using Direct Internet Message Encapsulation [DIME]. A DIME message consists of one or more DIME records. Each DIME message can be broken into smaller records.<1>

The following table describes the layout of a DIME record.

| Field | Description |
|-----------------------------|---|
| VERSION (5 bits) | Specifies the version of the DIME message. |
| MB (1 bit) | Specifies that this record is the first record of the message. |
| ME (1 bit) | Specifies that this record is the last record of the message. |
| CF (1 bit) | Specifies that the contents of the message have been broken into smaller records. |
| TYPE_T (4 bits) | Specifies whether the DIME record is the first record of a DIME message. |
| RESERVED (4 bits) | The behavior of this field is undefined and MUST be set to 0.<2> |
| OPTIONS_LENGTH (16 bits) | Specifies the length (in bytes) of the OPTIONS field, excluding any necessary padding (up to 3 bytes). Padding consists of bytes that are inserted in a data stream to maintain alignment of the protocol requests on natural boundaries. |
| ID_LENGTH (16 bits) | Specifies the length (in bytes) of the ID field, excluding any necessary padding (up to 3 bytes). |
| TYPE_LENGTH (16 bits) | Specifies the length (in bytes) of the TYPE field, excluding any necessary padding (up to 3 bytes). |
| DATA_LENGTH (32 bits) | Specifies the length (in bytes) of the DATA field, excluding any necessary padding (up to 3 bytes). |
| OPTIONS | Contains any optional information used by a DIME parser. |
| ID | Contains a Uniform Resource Identifier (URI) for uniquely identifying a DIME payload with any additional padding. The length of this field is specified by ID_LENGTH. For more information, see [RFC2396]. |
| TYPE | Specifies the encoding for the record based on a type reference URI or a MIME media-type. The reference type is specified by TYPE, and the length of this field is specified by |

| Field | Description |
|-------|---|
| | TYPE_LENGTH. For more information, see [RFC2396]. |
| DATA | Contains the actual data payload for the record. The format of the data depends on the TYPE specified for the record. The length of this field is specified by DATA_LENGTH. |

The VERSION field (5 bits) is used to identify the internal version of DIME parser that is used by both parties. This value MUST be set to 1.

The MB field (1 bit) MUST be set to 1 for every DIME record that is beginning a new DIME message and MUST be set to 0 for all consecutive DIME records.

The ME field (1 bit) MUST be set to 1 for every DIME record that is a last record of every DIME message and MUST be set to 0 for all other DIME records.

The CF field (1 bit) MUST be set to 1 for every chunked DIME record except for the last record. Every chunked sequence is required to be encapsulated entirely within one DIME message and cannot span across multiple DIME messages. Therefore, a first or a middle record MUST NOT have the ME field value set to 1.

The TYPE_T field (4 bits) MUST be set to 1 for every DIME record that is beginning a new DIME message and MUST be set to 0 for all consecutive DIME records.

This protocol allows the optional use of binary XML [MS-BINXML] and compression that the client or server SHOULD apply on the SOAP request or response to reduce network latency. The content types that are supported are described in the following table.

| TYPE_LENGTH | TYPE | Description |
|-------------|------------------------|--|
| 8 | text/xml | Data content is clear text XML. |
| 14 | application/sx | Data content is binary XML. |
| 22 | application/xml+xpress | Data content is compressed XML. |
| 21 | application/sx+xpress | Data content is compressed binary XML. |

Because the support for binary XML and compression is optional, the client and server MUST negotiate the content type of the messages for the duration of the connection. This is done using flags in the OPTIONS field. The OPTIONS field consists of 4 bytes of which only the first byte is used. The last three bytes are reserved and MUST be set to zero. The following table describes the bits in the first byte in order from the least significant bit to the most significant bit.

| Bit | Description |
|-------------|---|
| NEGO | Specifies whether message content type negotiation is complete. |
| REQ_SX | Specifies whether request from the client is to be binary XML. |
| REQ_XPRESS | Specifies whether request from the client is to be compressed. |
| RESP_SX | Specifies whether response from the server is to be binary XML. |
| RESP_XPRESS | Specifies whether response from the server is to be compressed. |
| RESERVED | Behavior is undefined. This field MUST be set to 0. |
| RESERVED | Behavior is undefined. This field MUST be set to 0. |
| RESERVED | Behavior is undefined. This field MUST be set to 0. |

2.1.2 HTTP/HTTPS

When HTTP/HTTPS is used as the transport, the client and server MUST set the HTTP headers that are described in the following table.<4>

| Field | Description |
|------------------------------------|--|
| SOAPAction | Specifies SOAP action type "urn:schemas-microsoft-com:xml-analysis:Discover" for Discover requests or "urn:schemas-microsoft-com:xml-analysis:Execute" for Execute requests. |
| X-Transport-Caps-Negotiation-Flags | Used for content type negotiation. The value is a comma-separated list of five values that correspond to NEGO, REQ_SX, REQ_XPRESS, RESP_SX, and RESP_XPRESS. |
| Content-Type | Specifies the content type of the payload. The value is one of the following: "text/xml" "application/sx" "application/xml+xpress" "application/sx+xpress" |

When HTTP/HTTPS is used as the transport, the client and server can also set the following HTTP headers.

| Field | Description |
|-------------------------|--|
| SspropInitAppName | Represents the name of the client application. |
| X-AS-ActivityID<5> | Specifies a unique identifier that is represented as a GUID and is either passed by an external application via Thread Local Storage or auto-generated. |
| X-AS-GetSessionToken<6> | Specifies a session token. To request the session token, this field MUST be set to "true". |
| X-AS-RequestID<7> | Specifies a unique identifier that is represented as a GUID and can be set by a client to track individual commands for a given request. |
| X-AS-SessionID<8> | Specifies a unique identifier that is retrieved from the response to the BeginSession request and MUST be set in this field. For the initial interaction, this flag is optional. |
| Content-Encoding<9> | Indicates to the server whether the stream is compressed. When the stream is compressed, the value MUST be set to "deflate". |
| Authorization<10> | Indicates to the front-end server that the request states the type of authentication and the corresponding token. |

2.1.3 Encryption

When using TCP as the transport, the client and server SHOULD choose to encrypt or hash messages using [RFC2743]. This is negotiated at the time of authentication after which the client and server can use GSS-API to determine whether encryption or hashing is enabled for the connection.

If encryption or hashing is being used, the message can be composed of one or more encryption data blocks. Each encryption data block has a layout as described in the following table.

| Field | Description |
|----------------------|---|
| DATA_SIZE (16 bits) | Specifies the size of the encrypted data. This field uses little-endian byte order. |
| TOKEN_SIZE (16 bits) | Specifies the size of the encryption token. This field uses little-endian byte order. |
| DATA | Encrypted data. |
| TOKEN | Encryption token. |

Note that an encryption data block can span multiple DIME records.

2.1.4 Compression

When using TCP or HTTP/HTTPS as the transport, the client and server SHOULD choose to compress messages. This is first negotiated when the connection is established.

If compression is being used, the message can be composed of one or more compression data blocks. Each compression data block has a layout as described in the following table.

| Field | Description |
|---------------------------|---|
| ORIGINAL_SIZE (32 bits) | Specifies the original size of the data. This field uses little-endian byte order. |
| COMPRESSED_SIZE (32 bits) | Specifies the size of the data after compression. This field uses little-endian byte order. |
| DATA | Compressed data. |

Note that a compression data block can span multiple DIME records or encryption data blocks.

2.1.5 (Updated Section) Binary XML

When using TCP or HTTP/HTTPS as the transport, the client and server SHOULD choose to encode messages in binary XML [MS-BINXML]. This is first negotiated when the connection is established.

The following table lists the binary XML data types that are supported in this protocol. The client and server MUST NOT use data types outside this list.

| XSD Type | Binary XML Type |
|-------------------|-----------------------------------|
| xsd:boolean | XSD-BOOLEAN |
| xsd:byte | SQL-TINYINT |
| xsd:short | SQL-SMALLINT |
| xsd:int | SQL-INT |
| xsd:long | SQL-BIGINT |
| xsd:unsignedByte | XSD- UNSIGNEDBYTE BYTE |
| xsd:unsignedShort | XSD-UNSIGNEDSHORT |
| xsd:unsignedInt | XSD-UNSIGNEDINT |
| xsd:unsignedLong | XSD-UNSIGNEDLONG |

| XSD Type | Binary XML Type |
|------------------|--|
| xsd:double | SQL-REAL |
| xsd:float | SQL-FLOAT |
| xsd:decimal | SQL-MONEY |
| xsd:dateTime | SQL-DATETIME |
| uuid | SQL-UUID |
| xsd:string | SQL-NTEXT SQL-NCHAR SQL-NVARCHAR |
| xsd:base64Binary | SQL-BINARY |

2.2 Common Message Syntax

This section contains common definitions used by this protocol. The syntax of the definitions uses XML schema as defined in [XMLSCHEMA1/2] and [XMLSCHEMA2/2] and Web Services Description Language (WSDL) as defined in [WSDL].

2.2.1 Namespaces

This specification defines and references various XML namespaces using the mechanisms that are specified in [XMLNS]. Although this specification associates a specific XML namespace prefix for each XML namespace that is used, the choice of any particular XML namespace prefix is implementation-specific and not significant for interoperability.

This section contains common definitions used by this protocol. The syntax of the definitions uses XML schema as defined in [XMLSCHEMA1/2] and [XMLSCHEMA2/2], and Web Services Description Language as defined in [WSDL].

| Prefix | Namespace URI | Reference |
|---------------|---|----------------------------------|
| xsd | http://www.w3.org/2001/XMLSchema | [XMLSCHEMA1/2] [XMLSCHEMA2/2] |
| xsi | http://www.w3.org/2001/XMLSchema-instance | [XMLSCHEMA1/2] [XMLSCHEMA2/2] |
| sql | urn:schemas-microsoft-com:xml-sql | [MSDN-SQLXML- pg19087] |
| xmla | urn:schemas-microsoft-com:xml-analysis | [XMLA] |
| xmla-ds | urn:schemas-microsoft-com:xml-analysis:mddataset | [XMLA] |
| xmla-rs | urn:schemas-microsoft-com:xml-analysis:rowset | [XMLA] |
| xmla-e | urn:schemas-microsoft-com:xml-analysis:empty | [XMLA] |
| xmla-x | urn:schemas-microsoft-com:xml-analysis:exception | [XMLA] |
| xmla-m | http://schemas.microsoft.com/analysisservices/2003/xmla-multipleresults | |

| Prefix | Namespace URI | Reference |
|------------|---|-----------|
| msxmla | http://schemas.microsoft.com/analysisservices/2003/xmla | |
| eng | http://schemas.microsoft.com/analysisservices/2003/engine | |
| eng2 | http://schemas.microsoft.com/analysisservices/2003/engine/2 | |
| eng2_2 | http://schemas.microsoft.com/analysisservices/2003/engine/2/2 | |
| eng100 | http://schemas.microsoft.com/analysisservices/2008/engine/100<11> | |
| eng100_100 | http://schemas.microsoft.com/analysisservices/2008/engine/100/100<12> | |
| eng200 | http://schemas.microsoft.com/analysisservices/2010/engine/200<13> | |
| eng200_200 | http://schemas.microsoft.com/analysisservices/2010/engine/200/200<14> | |
| eng300 | http://schemas.microsoft.com/analysisservices/2011/engine/300<15> | |
| eng300_300 | http://schemas.microsoft.com/analysisservices/2011/engine/300/300<16> | |
| eng400 | http://schemas.microsoft.com/analysisservices/2012/engine/400<17> | |
| eng400_400 | http://schemas.microsoft.com/analysisservices/2012/engine/400/400<18> | |
| eng500 | http://schemas.microsoft.com/analysisservices/2013/engine/500<19> | |
| eng500_500 | http://schemas.microsoft.com/analysisservices/2013/engine/500/500<20> | |
| eng600 | http://schemas.microsoft.com/analysisservices/2013/engine/600<21> | |
| eng600_600 | http://schemas.microsoft.com/analysisservices/2013/engine/600/600<22> | |
| eng800 | http://schemas.microsoft.com/analysisservices/2013/engine/800<23> | |
| eng800_800 | http://schemas.microsoft.com/analysisservices/2013/engine/800/800<24> | |

2.2.2 Messages

This specification does not define any common XML schema message definitions.

2.2.3 Elements

This specification does not define any common XML schema element definitions.

2.2.4 Complex Types

The following table summarizes the set of common XML schema definitions (XSDs) for the complex types that are defined by this specification. Complex type XSDs that are specific to a particular operation are described with the operation.

| Complex type | Description |
|------------------|---|
| xmla-mddataset | Describes data from a cube in a representation consisting of information about the origin of the data, the axes of the cube and the data cells. |
| xmla-emptyresult | Describes a response to an exception that has occurred at the server during the process of the client request and no further data is available to the client. |

| Complex type | Description |
|-----------------|---|
| xmla-rowset | Describes data from a cube in a tabular representation. |
| xmla-x:messages | Describes the structure of error and warning messages sent by the server to the client. |

2.2.4.1 Return Value Complex Types

2.2.4.1.1 xmla-ds:mddataset Complex Type

An **xmla-ds:mddataset** type is the type that is returned by commands that return an **mddataset** as the return result.

The XML schema definition (XSD) for the **xmla-ds:mddataset** complex type is as follows.

```
<xsd:complexType name="mddataset" >
  <xsd:sequence>
    <xsd:element ref="xs:Schema" />
    <xsd:element name="OlapInfo" minOccurs="0" type="OlapInfo" />
    <xsd:element name="Axes" minOccurs="0" type="Axes" />
    <xsd:element name="CellData" minOccurs="0" type="CellData" />
    <xsd:element name="Exception" minOccurs="0" type="Exception" />
    <xsd:element name="Messages" minOccurs="0" type="Messages" />
  </xsd:sequence>
</xsd:complexType>
```

| Element | Description |
|-----------|---|
| Schema | An XSD schema that describes the rest of the result. |
| OlapInfo | Describes the structure of the Online Analytical Processing (OLAP) elements of this result. |
| Axes | Contains the axes of the result. |
| CellData | Contains the cell data of the result. |
| Exception | This optional element is returned if there are exceptions that accompany the result. See section 2.2.4.1.4. |
| Messages | This optional element is returned if there are messages that accompany the result. See section 2.2.4.1.4. |

An example of the **mddataset** return type is shown in section 4.13.

2.2.4.1.1.1 xmla-ds:OlapInfo Complex Type

The **OlapInfo** type contains information describing the multidimensional data that is sent in a specific response. It **MUST** contain information about the cube or cubes from which these results were extracted, information about all axes involved, and data for the cells returned.

The **xmla-ds:OlapInfo** complex type describes the current schema definition for the result set requested by the client. The **OlapInfo** complex type contains the description of the specific structure of the data that is returned. The result set is described in three major sections:

- **CubeInfo**: Describes the source of the result set.
- **AxesInfo**: Describes the data structure of all axes in the result set, including the slicer axis.

- **CellInfo**: Describes the data structure for the cells.

The XML schema definition (XSD) for the **OlapInfo** complex type is as follows. The **OlapInfo** element and all its contained elements are in the namespace **xmla-ds**.

```
<xsd:complexType name="OlapInfo">
  <xsd:sequence>
    <xsd:element name="CubeInfo" type="CubeInfo" />
    <xsd:element name="AxesInfo" type="AxesInfo" />
    <xsd:element name="CellInfo" type="CellInfo" />
  </xsd:sequence>
</xsd:complexType>
```

| Element | Description |
|----------|---|
| CubeInfo | Contains information about the cubes for this result. |
| AxesInfo | Describes the axes that will be in the Axes element of this response. |
| CellInfo | Describes the cells that will be in the CellData element of this response. |

2.2.4.1.1.1.1 xmla-ds:CubeInfo

The **CubeInfo** complex type describes all the sources that are involved in providing the current result set.

```
<xsd:complexType name="CubeInfo">
  <xsd:sequence>
    <xsd:element name="Cube" maxOccurs="unbounded" type="OlapInfoCube" />
  </xsd:sequence>
</xsd:complexType>
```

| Element | Description |
|---------|--|
| Cube | A collection of elements of type OlapInfoCube , which contains information about the cubes for this result. |

2.2.4.1.1.1.1.1 OlapInfoCube

This complex type contains information about the cubes that are returned in an **mddataset** result.

```
<xsd:complexType name="OlapInfoCube" >
  <xsd:sequence>
    <xsd:element name="CubeName" type="xsd:string" />
    <xsd:element ref="eng:LastDataUpdate" minOccurs="0" />
    <xsd:element ref="eng:LastSchemaUpdate" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

The **OlapInfoCube** XSD depends upon element definitions in namespaces other than the default namespace. The following elements are defined in the namespace **eng**.

```
<xsd:element name="LastSchemaUpdate" type="xsd:dateTime" />
```

```
<xsd:element name="LastDataUpdate" type="xsd:dateTime" />
```

| Element | Description |
|------------------|--|
| CubeName | The name of the cube. |
| LastDataUpdate | Last date and time that the cube data was updated. |
| LastSchemaupdate | Last date and time that the cube schema was updated. |

2.2.4.1.1.1.2 xmla-ds:AxesInfo

The **AxesInfo** complex type describes the axes that will be contained in the **Axes** element of the **mddataset** result.

```
<xsd:complexType name="AxesInfo">
  <xsd:sequence>
    <xsd:element name="AxisInfo" maxOccurs="unbounded" type="AxisInfo">
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```

| Element | Description |
|----------|---|
| AxisInfo | Contains the description of the axes that will appear in the Axes element of this mddataset . |

2.2.4.1.1.1.2.1 xmla-ds:AxisInfo Complex Type

The **AxisInfo** complex type describes a single axis that will appear in the **Axes** section of a particular **mddataset** return result.

```
<xsd:complexType name="AxisInfo">
  <xsd:sequence>
    <xsd:element name="HierarchyInfo" type="HierarchyInfo"
      minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
  <xsd:attribute name="name" type="xsd:string" />
</xsd:complexType>
```

| Element | Description |
|---------------|--|
| HierarchyInfo | A collection of HierarchyInfo elements is returned. |

| Attribute | Description |
|-----------|--|
| Name | The Name of the axis that is being described. |

2.2.4.1.1.1.2.1.1 xmla-ds:HierarchyInfo Complex Type

The **HierarchyInfo** complex type contains information about the hierarchies that appear on an axis of an **mddataset** return result.

```
<xsd:complexType name="HierarchyInfo">
  <xsd:sequence>
    <xsd:any namespace="##targetNamespace" minOccurs="0"
      maxOccurs="unbounded" processContents="skip" />
  </xsd:sequence>
  <xsd:attribute name="name" type="xsd:string" use="required" />
</xsd:complexType>
```

| Element | Description |
|---------|--|
| xsd:any | The contents of the HierarchyInfo element vary according to the contents of the axis that is being described. There is one child element within HierarchyInfo for each property that is returned on the axis being described. The number of properties returned is variable and depends on the query that has been executed. |

| Attribute | Description |
|-----------|---|
| Name | The Name of the hierarchy that is being described. |

2.2.4.1.1.1.3 xmla-ds:CellInfo Complex Type

The **CellInfo** complex type describes the properties of a data cell that will appear in the **CellData** section of a specific **mddataset** return result.

```
<xsd:complexType name="CellInfo">
  <xsd:sequence>
    <xsd:any namespace="##targetNamespace" minOccurs="0"
      maxOccurs="unbounded" processContents="skip" />
  </xsd:sequence>
</xsd:complexType>
```

| Element | Description |
|---------|---|
| xsd:any | This complex type is a variable number of elements of type xsd:any . There will be one element for each property that is returned in the CellData section of this mddataset result. The number of elements present depends upon the number of properties that were requested in the query that was executed. |

The elements returned also have the following XML attributes, with the following interpretations.

| Attribute | Description |
|-----------|--|
| Name | The Name of the property on the server. This name cannot be the same as the element name. |
| Type | The type that the element in the CellData section of the mddataset result will have. |

2.2.4.1.1.2 xmla-ds:Axes Complex Type

The **xmlla-ds:Axes** complex type contains the values and properties of each member in the hierarchy of an axis in the **mddataset** result.

```
<xsd:complexType name="Axes">
  <xsd:sequence>
    <xsd:element name="Axis" type="Axis" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

| Element | Description |
|---------|--|
| Axis | An Axis element contains the values for one axis of an mddataset result. |

2.2.4.1.1.2.1 (Updated Section) Axis

An **Axis** element contains the values for one axis of an **mddataset** result. The result can be either a **SetType** or a **NormType** model group. **NormType** is returned only when the client sets the **OptimizeResponseDbpropMsmddOptimizeResponse** flag to "7". This format is used when the **DbpropMsmddOptimizeResponse** property is appropriately set (see section 3.1.4.2.2.1.2.1).

```
<xs:complexType name="Axis">
  <xs:group ref="SetType" minOccurs="0" maxOccurs="unbounded" />
  <xs:group ref="NormType" minOccurs="0" maxOccurs="unbounded" />
  <xs:attribute name="name" type="xs:string" />
</xs:complexType>
```

The **SetType** model group is described in section 2.2.4.1.1.2.1.1. The **NormType** model group is described in section 2.2.4.1.1.2.1.2.

| Attribute | Description |
|-----------|-----------------------|
| Name | The name of the axis. |

2.2.4.1.1.2.1.1 SetType Model Group

The **SetType** model group describes the possible types of sets that belong to the group. For more information about model groups, see [XMLSCHEMA1/2].

```
<xsd:group name="SetType">
  <xsd:choice>
    <xsd:element name="Members" type="MembersType" />
    <xsd:element name="Tuples" type="TuplesType" />
    <xsd:element name="CrossProduct" type="SetListType" />
    <xsd:element ref="msxmlla:NormTupleSet" />
    <xsd:element name="Union">
      <xsd:complexType>
        <xsd:group ref="SetType" minOccurs="0" maxOccurs="unbounded" />
      </xsd:complexType>
    </xsd:element>
  </xsd:choice>
</xsd:group>
```

Each set type in the group is described independently in its own section:

- MembersType complex type
- TuplesType complex type
- SetListType complex Type
- msxmla:NormTupleSet complex Type

The **Union** subelement is an invocation of the **SetType** model group.<25>

2.2.4.1.1.2.1.1.1 MembersType Complex Type

The **MembersType** complex type is a collection of **MemberType** elements. For more information, see section 2.2.4.1.1.2.1.1.2.

```
<xsd:complexType name="MembersType">
  <xsd:sequence>
    <xsd:element name="Member" type="MemberType" minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
  <xsd:attribute name="Hierarchy" type="xsd:string" use="required" />
</xsd:complexType>
```

| Attribute | Description |
|-----------|-------------------------------------|
| Hierarchy | The Hierarchy of the member. |

2.2.4.1.1.2.1.1.2 MemberType Complex Type

The **MemberType** type describes the properties of a simple element in the axis hierarchy. For example, in the Year:Quarter:Month:MonthDay axis dimension, the member type describes the **Year**, the **Quarter**, the **Month**, or the **MonthDay** member of the hierarchy.

The schema definition of the **MemberType** type is defined in the **AxisInfo** specification of this message.

```
<xsd:complexType name="MemberType">
  <xsd:sequence>
    <xsd:any namespace="##targetNamespace" minOccurs="0" maxOccurs="unbounded"
processContents="skip" />
  </xsd:sequence>
  <xsd:attribute name="Hierarchy" type="xsd:string" />
</xsd:complexType>
```

| Element | Description |
|---------|--|
| xsd:any | The MemberType will contain one element for each property of the member that was requested in the query. Therefore, both the content and the count of elements in the MemberType are variable. |

| Attribute | Description |
|-----------|-------------------------------------|
| Hierarchy | The Hierarchy of the member. |

2.2.4.1.1.2.1.1.3 TupleType Complex Type

The **TuplesType** complex type is a collection of **TupleType** elements. For more information, see section 2.2.4.1.1.2.1.1.4.

```
<xsd:complexType name="TuplesType">
  <xsd:sequence>
    <xsd:element name="Tuple" type="TupleType" minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

2.2.4.1.1.2.1.1.4 TupleType Complex Type

The **TupleType** type describes the set of members that identifies a point in the axis hierarchy. A **TupleType** type is a collection of **MemberType** objects.

```
<xsd:complexType name="TupleType">
  <xsd:sequence>
    <xsd:element name="Member" type="MemberType" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

| Element | Description |
|---------|---|
| Member | A collection of MemberType elements that form the tuples along this axis of the mddataset result. |

2.2.4.1.1.2.1.1.5 SetListType Complex Type

A **SetListType** type describes a complex type that is composed of elements that belong to the **SetType** group.

```
<xsd:complexType name="SetListType">
  <xsd:group ref="SetType" minOccurs="0" maxOccurs="unbounded" />
  <xsd:attribute name="Size" type="xsd:unsignedInt" />
</xsd:complexType>
```

2.2.4.1.1.2.1.1.6 (Updated Section) msxmla:NormTupleSet Complex Type

The **msxmla:NormTupleSet** type provides an optimized format for a **TupleSet**. This format is used when the **DbpropMsmdOptimizeResponse** property is appropriately set (see section 3.1.4.2.2.1.2.1).

```
<xsd:element name="NormTupleSet">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="NormTuples" type="msxmla:NormTuplesType"
        minOccurs="1" maxOccurs="1"/>
      <xsd:element name="MembersLookup" minOccurs="1" maxOccurs="1">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Members" type="xmla-ds:TupleType"
              minOccurs="1" maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

```

    </xsd:complexType>
  </xsd:element>

  <xsd:complexType name="NormTuplesType">
    <xsd:sequence>
      <xsd:element name="NormTuple" minOccurs="0" maxOccurs="unbounded">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="MemberRef" minOccurs="0" maxOccurs="unbounded">
              <xsd:complexType>
                <xsd:sequence>
                  <xsd:element name="MemberOrdinal" type="xsd:int"
                    minOccurs="1" maxOccurs="1" />
                  <xsd:element name="MemberDispInfo" type="xsd:int"
                    minOccurs="0" maxOccurs="1" />
                </xsd:sequence>
              </xsd:complexType>
            </xsd:element>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
</xsd:sequence>
</xsd:complexType>
</xsd:sequence>
</xsd:complexType>

```

| Element | Description |
|----------------|--|
| MemberOrdinal | An integer value that specifies the ordinal number of the member in the tuple set. |
| MemberDispInfo | An integer value that represents the display information of the member in the tuple. |

2.2.4.1.1.2.1.2 NormType Model Group

The **NormType** model group<26> describes the possible types of sets that belong to the group. For more information about model groups, see [XMLSCHEMA1/2].

```

<xsd:group name="NormType">
  <xsd:sequence>
    <xsd:element name="MetadataSet" type="MetadatasType" minOccurs="1" />
    <xsd:element name="TupleSet" type="TuplesNormType" minOccurs="1" />
    <xsd:element name="KeySet" type="KeysNormType" minOccurs="1" />
    <xsd:element name="MeasureFormatStringSet" type="MeasureFormatStringsNormType"
      minOccurs="0" />
  </xsd:sequence>
</xsd:group>

```

Each set type in the group is described independently in its own section:

- MetadatasType Complex Type
- TuplesNormType Complex Type
- KeysNormType Complex Type
- MeasureFormatStringsNormType Complex Type (optional)

2.2.4.1.1.2.1.2.1 MetadatasType Complex Type

The **MetadatasType** type<27> is a collection of **MetadataType** elements. For more information, see section 2.2.4.1.1.2.1.2.2. Each hierarchy that is included on an axis contains one metadata complex type object.

```

<xsd:complexType name="MetadatasType">
  <xsd:sequence>
    <xsd:element name="Metadata" type="MetadataType" minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>

```

2.2.4.1.1.2.1.2.2 (Updated Section) MetadataType Complex Type

The **MetadataType** type<28> describes the properties of a simple element in the axis hierarchy. For example, in the Year:Quarter:Month:MonthDay axis dimension, the member type describes the **Year**, the **Quarter**, the **Month**, or the **MonthDay** member of the hierarchy.

```

<xsd:complexType name="MetadataType">
  <xsd:sequence>
    <xsd:element name="HierUName" type="xsd:string" minOccurs="1" maxOccurs="1" />
    <xsd:element name="HierFlags" type="xsd:int" minOccurs="1" maxOccurs="1" />
    <xsd:element name="AllMemberName" type="xsd:string" minOccurs="1" maxOccurs="1" />
    <xsd:element name="L#UName" type="xsd:string" minOccurs="1" maxOccurs="2" />
    <xsd:element name="MemberFormatString" type="xsd:string" minOccurs="0" maxOccurs="1" />
    <xsd:element name="DLValType" type="xsd:int" minOccurs="1" maxOccurs="1" />
  </xsd:sequence>
</xsd:complexType>

```

| Attribute/Element | Description |
|--------------------|---|
| HierUName | The name of the hierarchy that uniquely identifies the hierarchy. |
| HierFlags | 0 – Indicates that the hierarchy is from one of the dimensions. 1 – Indicates that the hierarchy is from the Measures dimension. |
| AllMemberName | The name that uniquely identifies the All member. |
| L#UName | The UniqueName (a name that uniquely identifies the level) generated by the server for each level, where # is an integer that indicates the level number. The only valid integers are 0 and 1, as in L0UName and L1UName . |
| MemberFormatString | The MemberFormatString provides the format string of the members of the hierarchy.<29> |
| DLValType | This value indicates the data type of the result: <ul style="list-style-type: none"> ▪ VT_NULL= 1 indicates a null value. ▪ VT_I2= 2 indicates a 2-byte integer. ▪ VT_I4= 3 indicates a 4-byte integer. ▪ T_R4= 4 indicates a 4-byte real. ▪ VT_R8= 5 indicates an 8-byte real. ▪ VT_CY= 6 indicates a currency. ▪ VT_DATE= 7 indicates a date. ▪ VT_BSTR= 8 indicates a binary string. ▪ VT_BOOL= 11 indicates a Boolean. |

2.2.4.1.1.2.1.2.3 (Updated Section) TuplesNormType Complex Type

The **TuplesNormType** type<30> is a collection of simple elements.

```
<xsd:complexType name="TuplesNormType">
  <xsd:sequence>
    <xsd:element name="TupleCount" type="xsd:integer" minOccurs="1" maxOccurs="1" />
    <xsd:element name="Data" type="xsd:base64Binary" minOccurs="1" maxOccurs="1" />
  </xsd:sequence>
</xsd:complexType>
```

| AttributeElement | Description |
|------------------|--|
| TupleCount | Indicates the count of tuples in the result. |
| Data | The tuples of the result set that are represented in a condensed binary format. Each tuple is represented by an offset of 4 bytes and by DisplayInfo of 4 bytes. The total size of the content within the Data element is equal to 8 bytes (4 bytes offset plus 4 bytes DisplayInfo) multiplied by the number of hierarchies that form the tuple (as identified in the metadata set) multiplied by the tuple count. The offset indicates the position. Once the client is able to form the UniqueName for each hierarchy member, the offset helps to identify the correct member in the hierarchy that forms the tuple. |

2.2.4.1.1.2.1.2.4 KeysNormType Complex Type

The **KeysNormType** type<31> is a collection of **KeyNormType** elements. For more information, see section 2.2.4.1.1.2.1.2.5. Each hierarchy that is included on an axis contains one **KeyNormType** complex type object.

```
<xsd:complexType name="KeysNormType">
  <xsd:sequence>
    <xsd:element name="KeySet" type="KeyNormType" minOccurs="1" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

2.2.4.1.1.2.1.2.5 (Updated Section) KeyNormType Complex Type

The **KeyNormType** type<32> is a collection of two simple elements that represents the keys of all the distinct members in a hierarchy.

```
<xsd:complexType name="KeyNormType">
  <xsd:sequence>
    <xsd:element name="DistinctCountMember" type="xsd:string" minOccurs="1" maxOccurs="1" />
    <xsd:element name="Data" type="xsd:base64Binary" minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

| AttributeElement | Description |
|---------------------|--|
| DistinctCountMember | Indicates the distinct count of keys in the hierarchy. |
| Data | Keys of the distinct members of the hierarchy are represented in an optimized format. Please see the format details that follow about how the keys are stored. |

The following format details specify how the tuples are optimized within the **Data** element:

- The **Data** element contains the keys for each level of the hierarchy. If the key is of type **String**, the key has a variable length. For keys that are not strings, the size can be estimated by multiplying the number of distinct members by the value 9 (1 byte for data type, 4 bytes for offset, and 4 bytes for **DisplayInfo**).
- If the data type is not a string, the next 8 bytes are used to represent the data, irrespective of the data type.
- If the data type is a string, the length of the string is indicated by 4 bytes followed by the string.
- If the string is an empty string, it is represented by the value -1.
- Clients are expected to use the **KeySet** information to form the **UniqueName** of the member by using the **HierarchyUniqueName** **HierUName** information in the metadata and appending that result by using an opening square bracket ([), a **KeyValue** from the **KeySet**, and a closing square bracket (]). For example, if the **UniqueName** of a hierarchy is specified as [Customer].[CustomerID], the **UniqueName** for "Customer ID = 1" can be formed as [Customer].[CustomerID].[1]. Clients can use the value that is specified in **MemberFormatString** to format the members in the hierarchy.
- If there is a null string, the key is expected to be specified as an empty set of square brackets ([]).
- Once the **UniqueName** for each member in a hierarchy is formed, the tuple can be constructed by combining the unique names of each member and the offset that is specified in the **TupleSet**.

For example, if an axis contains two hierarchies as follows:

- Month hierarchy with **HierarchyUniqueName** [Calendar].[Month] with distinct members **Null**, **Jan**, **Feb**, and **Mar**.
- Year hierarchy with **HierarchyUniqueName** [Date].[Year] with values {Null, Jan, Feb, Mar} and {2010, 2011, 2012}.

Then, a tuple such as ([Calendar.Month].[Jan], [Date].[Year].[2011]) can be formed by using the value in **KeySet** and the offset value in the **Data** element of **TupleSet**.

2.2.4.1.1.2.1.2.6 MeasureFormatStringsNormType Complex Type

The **MeasureFormatStringsNormType** type<33> is a collection of **MeasureFormatStringNormType** elements. For more information, see section 2.2.4.1.1.2.1.2.7.

```
<xsd:complexType name="MeasureFormatStringsNormType">
  <xsd:sequence>
    <xsd:element name="MeasureFormatStringSet" type="MeasureFormatStringNormType"
      minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

2.2.4.1.1.2.1.2.7 MeasureFormatStringNormType Complex Type

The **MeasureFormatStringNormType**<34> type is a collection of simple elements.

```
<xsd:complexType name="MeasureFormatStringNormType">
  <xsd:sequence>
    <xsd:element name="DistinctMemberCount" type="xsd:integer" minOccurs="1" maxOccurs="1" />
    <xsd:element name="Data" type="xsd:base64Binary" minOccurs="1" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

| Attribute | Description |
|---------------------|---|
| DistinctMemberCount | Indicates the distinct count of measure members from the measures hierarchy. |
| Data | Contains the format string for each measure member from the measures hierarchy. The format string is usually of type base64Binary . However, if the format string is an empty string, it is represented by the value -1. |

2.2.4.1.1.3 (Updated Section) xmla-ds:CellData Complex Type

The **CellData** complex type contains either a collection of **Cell** elements or a **CellSet** element. The server typically returns a response that contains a collection of **Cell** elements. However, when the **OptimizeResponseDbpropMsmdOptimizeResponse** flag is set to "7", the server returns **CellData** with an embedded **CellSet**.

The XML schema definition (XSD) for the **CellData** complex type is defined in the **CellInfo** element specification of the current instance of this message.

```
<xsd:complexType name="CellData">
  <xsd:sequence>
    <xsd:element name="Cell" type="CellType" minOccurs="0" maxOccurs="unbounded" />
    <xsd:element name="CellSet" type="CellSetType" minOccurs="0" maxOccurs="1" />
  </xsd:sequence>
</xsd:complexType>
```

| Element | Description |
|---------|--|
| Cell | Contains the output value for an individual cell in the result set, based on the axes that are used in the query. Each cell is uniquely identified by a CellOrdinal . |
| CellSet | Contains a binary optimized result for the query. |

2.2.4.1.1.3.1 xmla-ds:CellType ComplexType

The **CellType** complex type contains the result returned by the server for an individual cell. A returned individual cell typically contains a value and can return additional cell properties, such as format and so on. However, the cell can contain an error if the server encountered a runtime error while computing the results for that cell.

```
<xsd:complexType name="CellType">
  <xsd:sequence>
    <xsd:element name="Value" minOccurs="0" maxOccurs="1">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Error" minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="ErrorCode" minOccurs="0" maxOccurs="1" />
            <xsd:element name="Description" minOccurs="0" maxOccurs="1" />
            <xsd:any namespace="##targetNamespace" minOccurs="0" maxOccurs="unbounded" />
          </xsd:element>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:any namespace="##targetNamespace" minOccurs="0"
      maxOccurs="unbounded" processContents="skip" />
  </xsd:sequence>
  <xsd:attribute name="CellOrdinal" type="xsd:unsignedInt" use="required" />
</xsd:complexType>
```


</xsd:complexType>

| Element | Description |
|-------------|---|
| Value | Contains the contents of the Error element. |
| Error | Indicates that an error has occurred. |
| ErrorCode | Provides the ordinal number that is the code for the error. |
| Description | Describes the type of error that occurred. |
| xsd:any | CellType contains one element for each property of the cell that was requested in the query. Therefore, both the content and the number of elements in the CellType are variable. |

The following are the XML attributes for elements that are returned.

| Attribute | Description |
|-------------|--|
| CellOrdinal | Indicates the ordinal of the cell in which the error occurred. |

2.2.4.1.1.3.1.1 Cell Value Errors

When a run-time error occurs while computing the query result for a cell, the server returns an **Error** element inside the **Value** element of the cell. For more information about the corresponding grammar, see `xmla-ds:CellType ComplexType` (section 2.2.4.1.1.3.1).

The following sample shows an error that can occur when a user requests results for a cell to which the user's access is restricted by the administrator.

```
<CellData>
...
  <Cell CellOrdinal="10">
    <Value>
      <Error>
        <ErrorCode>2148497527</ErrorCode>
        <Description>Security Error.</Description>
      </Error>
    </Value>
  </Cell>
...
</CellData>
```

2.2.4.1.1.3.1.2 CellOrdinal Attribute

The **CellOrdinal** attribute MUST be specified and indicates the ordinal of the cell. **CellOrdinal** is numbered 0 to n-1, for n cells.

The axis reference for a cell can be calculated based on **CellOrdinal**. Conceptually, cells are numbered in a dataset as if the dataset were a p-dimensional array, where p is the number of axes. Cells are addressed in row-major order. The following illustration shows the formula for calculating the ordinal number of a cell.

If axis k has U_k members, the ordinal number of a cell whose tuple ordinals are $(S_0, S_1, S_2, \dots, S_{p-1})$ is

$$\sum_{i=0}^{p-1} S_i \times E_i \text{ where } E_0 = 1 \text{ and } E_i = \prod_{k=0}^{i-1} U_k$$

Σ represents the sum of the terms in the series and Π the product.

Figure 4: Calculating ordinal number of a cell

The preceding formula will be applied to the result set shown in the following table. The query asked for four measures on columns and a crossjoin of two states with four quarters on rows. In the following dataset result, the **CellOrdinal** property for the part of the dataset result shown in the box is the set {9, 10, 11, 13, 14, 15, 17, 18, 19}. This is because the cells are numbered in row-major order, starting with a **CellOrdinal** of zero for the upper left cell.

Next, the preceding formula is applied to the cell that is {CA, Q3, Store Cost}. Axis $k=0$ has $U_k=4$ members and axis $k=1$ has $U_k=8$ tuples. P is the total number of axes in the query, here equal to 2. So, the initial summation is $i=0$ to 1. For $i=0$, the tuple ordinal on axis 0 of {Store Cost} is 1. For $i = 1$, the tuple ordinal of {CA, Q3} is 2.

For $i=0$, $E_i = 1$, so for $i = 0$ the sum is $1 * 1 = 1$ and for $i=1$, the sum is 2 (tuple ordinal) * 4 (the value of E_i , computed as $1 * 4$), or 8, and so the sum is equal to $1 + 8 = 9$, the cell ordinal for that cell.

| Location | Quarter | Unit Sales | Store Cost | Store Sales | Sales Count |
|----------|---------|------------|------------|-------------|-------------|
| CA | Q1 | 16,890.00 | 14,431.09 | \$36,175.20 | 5498 |
| | Q2 | 18,052.00 | 15,332.02 | \$38,396.75 | 5915 |
| | Q3 | 18,370.00 | 15,672.83 | \$39,394.05 | 6014 |
| | Q4 | 21,436.00 | 18,094.50 | \$45,201.84 | 7015 |
| OR | Q1 | 19,287.00 | 16,081.07 | \$40,170.29 | 6184 |
| | Q2 | 15,079.00 | 12,678.96 | \$31,772.88 | 4799 |
| | Q3 | 16,940.00 | 14,273.78 | \$35,880.46 | 5432 |
| | Q4 | 16,353.00 | 13,738.68 | \$34,453.44 | 5196 |

2.2.4.1.1.3.2 (Updated Section) CellSetType ComplexType

The **CellSetType** complex type contains the data for the **CellSet** element in the response. The server typically returns the results in the **CellType** format. However, when the **OptimizeResponseDbpropMsmdOptimizeResponse** flag is set to "7" in the query request, the server returns a **CellSetType** with embedded binary data.

```
<xsd:complexType name="CellSetType">
  <xsd:sequence>
    <xsd:element name="Data" type="xsd:base64Binary" minOccurs="1" maxOccurs="unbounded"/>
  </xsd:sequence>
```

</xsd:complexType>

| Element | Description |
|---------|---|
| Data | CellSet data in compressed binary format. That is, the server returns the actual compressed store data in a paged fashion. |

2.2.4.1.2 xmla-e:emptyresult Complex Type

The **xmla-e:emptyresult** complex type is returned if the return result is empty.

The XSD for the **xmla-e:emptyresult** complex type is as follows.

```
<xsd:complexType name="emptyresult" >
  <xsd:sequence>
    <xsd:element name="Exception" minOccurs="0" type="Exception" />
    <xsd:element name="Messages" minOccurs="0" type="Messages" />
  </xsd:sequence>
</xsd:complexType>
```

| Element | Description |
|-----------|---|
| Exception | This optional element is returned if there are exceptions that accompany the empty result. See section 2.2.4.1.5.1. |
| Messages | This optional element is returned if there are messages that accompany the empty result. See section 2.2.4.1.5.2. |

2.2.4.1.3 xmla-rs:rowset Complex Type

The **xmla-rs:rowset** complex type is returned by commands whose return result is a rowset. The XSD for the **xmla-rs:rowset** complex type is as follows.

```
<xsd:complexType name="rowset" >
  <xsd:sequence>
    <xsd:element ref="xs:Schema" minOccurs="0" />
    <xsd:element name="row" minOccurs="0" maxOccurs="unbounded" type="row" />
    <xsd:element name="Exception" minOccurs="0" type="Exception" />
    <xsd:element name="Messages" minOccurs="0" type="Messages" />
  </xsd:sequence>
</xsd:complexType>
```

| Element | Description |
|-----------|--|
| Schema | An optional XSD schema that describes the format of the row. Whether it is returned depends on the value of the Content server property. See section 4.4.2. |
| row | Contains the rows with the results. |
| Exception | This optional element is returned if there are exceptions that accompany the empty result. See section 2.2.4.1.5.1. |
| Messages | This optional element is returned if there are messages that accompany the empty result. See |

| Element | Description |
|---------|----------------------|
| | section 2.2.4.1.5.2. |

2.2.4.1.3.1 xmla-rs:row Complex Type

Each row element represents a row of tabular data.

```
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:any namespace="##any" minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

| Element | Description |
|---------|--|
| xsd:any | The content of each row is variable. Each element within each row can be thought of as a column in a tabular return result. There will be one element in each row to represent one column in a tabular presentation. The Schema element within the rs:root element can be used to obtain a dictionary of elements that will appear within each row, and the types of the elements. Additional rows can be nested within a row result, to a single level. See section 2.2.4.1.3.1.1 for information on nested rows. |

2.2.4.1.3.1.1 Nested Rowsets

A special case of the row element is where it is part of a nested rowset, and therefore contains the contents of an additional row. This can be thought of as "a row within a row." However, the nested row does not contain a new Row element. The limit of nesting is to one level. That is, nested rows cannot contain additional nested rows.

The nested rowset does not have a specific XSD. That is because the XSD definition for the **xmla-rs:row** element is **xsd:any**, and therefore, the concept of nested rows is included within the XSD definition of **xmla-rs:row**. However, the restriction is imposed that nesting is limited to one level.

This concept is best illustrated by a fragment of an example. The following code shows the return result of one row from the DISCOVER_SCHEMA_ROWSETS **Discover**.

```
<row>
  <SchemaName>DBSCHEMA_CATALOGS</SchemaName>
  <SchemaGuid>C8B52211-5CF3-11CE-ADE5-00AA0044773D</SchemaGuid>
  <Restrictions>
    <Name>CATALOG_NAME</Name>
    <Type>xsd:string</Type>
  </Restrictions>
  <RestrictionsMask>1</RestrictionsMask>
</row>
```

Note that the **Restrictions** column of the above row contains a nested row within it. The nested row itself contains two elements, **Name** and **Type**. If a return result of **xmla-rs:root** contains a rowset with nested rows, this is reflected in the **Schema** element of the particular **xmla-rs:rowset** return result.

2.2.4.1.4 xmla-m:results Complex Type

The **xmla-m:results** complex type is returned only as a response to a **Batch** command. The **results** element contains one or more **root** elements, one that corresponds to each command that was executed within the **Batch** command. See section 3.1.4.3.2.2.1 for a description of the **root** element and of the different types for the **root** element.

```
<xsd:complexType name="results" >
  <xsd:sequence>
    <xsd:element ref="xmla-e:root" minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

| Element | Description |
|---------|---|
| Root | One or more xmla-e:root elements are contained by the results element. One xmla-e:root element is returned for each command result in the Batch command stream. |

2.2.4.1.5 Error and Warning Complex Types

2.2.4.1.5.1 xmla-x:Exception

The **xmla-x:Exception** complex type is used when the server encounters an error during execution. This element **MUST** be empty.

An **Exception** element of type **xmla-x:Exception** can be returned at any point within a response if the server encounters an exception. When an exception is encountered, the server also attempts to close all open XML tags so that the response is well-formed XML.

If partial recovery from an exception is possible, the server can continue to append additional response text after closing one or more of the open XML tags. In this way, a response might contain more than one **xmla-x:Exception** element.

The XSD for the **xmla-x:Exception** type is as follows.

```
<xsd:complexType name="Exception">
  <xsd:sequence>
  </xsd:sequence>
</xsd:complexType>
```

2.2.4.1.5.2 xmla-x:Messages

Any of the **root** elements can contain a **messages** element.

```
<xsd:complexType name="Messages">
  <xsd:choice minOccurs="1" maxOccurs="unbounded">
    <xsd:element name="Warning" type="WarningType" />
    <xsd:element name="Error" type="ErrorType" />
  </xsd:choice>
</xsd:complexType>
```

| Element | Description |
|---------|--|
| Warning | Information about the Warning . |

| Element | Description |
|---------|--------------------------------------|
| Error | Information about the Error . |

2.2.4.1.5.2.1 WarningType

The XSD for the **WarningType** complex type is as follows.

```
<xsd:complexType name="WarningType">
  <xsd:all>
    <xsd:element name="Location" type="MessageLocation" minOccurs="0" />
  </xsd:all>
  <xsd:attribute name="WarningCode" type="xsd:int" />
  <xsd:attribute name="Description" type="xsd:string" />
  <xsd:attribute name="Source" type="xsd:string" />
  <xsd:attribute name="HelpFile" type="xsd:string" />
</xsd:complexType>
```

| Element | Description |
|----------|---|
| Location | The location information for the Warning . |

| Attribute | Description |
|-------------|--|
| WarningCode | The warning code for the Warning . |
| Description | A description of the Warning . |
| Source | The source of the Warning , such as a product name. |
| HelpFile | A help file that contains information about the Warning . |

2.2.4.1.5.2.2 ErrorType

The XSD for the **ErrorType** complex type is as follows.

```
<xsd:complexType name="ErrorType">
  <xsd:all>
    <xsd:element name="Location" type="MessageLocation" minOccurs="0" />
    <xsd:element name="Callstack" type="xsd:string" minOccurs="0" />
  </xsd:all>
  <xsd:attribute name="ErrorCode" type="xsd:long" />
  <xsd:attribute name="Description" type="xsd:string" />
  <xsd:attribute name="Source" type="xsd:string" />
  <xsd:attribute name="HelpFile" type="xsd:string" />
</xsd:complexType>
```

| Element | Description |
|-----------|---|
| Location | The location information for the Error . |
| Callstack | The callstack at which the Error occurred. |

| Attribute | Description |
|-------------|--|
| ErrorCode | The error code for the Error . |
| Description | A description of the Error . |
| Source | The source of the Error , such as a product name. |
| HelpFile | A help file that contains information about the Error . |

2.2.4.1.5.2.3 MessageLocation

The **MessageLocation** type is used to identify the line and column location of a warning or an error within a **Statement** element.

The XSD for the **MessageLocation** complex type is as follows.

```
<xsd:complexType name="MessageLocation">
  <xsd:all>
    <xsd:element name="Start" >
      <xsd:complexType>
        <xsd:all>
          <xsd:element name="Line" type="xsd:int" />
          <xsd:element name="Column" type="xsd:int" />
        </xsd:all>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="End" >
      <xsd:complexType>
        <xsd:all>
          <xsd:element name="Line" type="xsd:int" />
          <xsd:element name="Column" type="xsd:int" />
        </xsd:all>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="LineOffset" type="xsd:int" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="TextLength" type="xsd:int" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="SourceObject" type="eng200:WarningLocationObject" minOccurs="0"
maxOccurs="1"/>
    <xsd:element name="DependsOnObject" type="eng200:WarningLocationObject" minOccurs="0"
maxOccurs="1"/>
    <xsd:element name="RowNumber" type="xsd:int" minOccurs="0" maxOccurs="1"/>
  </xsd:all>
</xsd:complexType>
```

The **MessageLocation** XSD depends on the following definitions in a namespace other than the default namespace.

The following elements are defined in the **eng200** namespace.

```
<xsd:element name="WarningColumn">
  <xsd:complexType>
    <xsd:all>
      <xsd:element name="Dimension" type="xsd:string"/>
      <xsd:element name="Attribute" type="xsd:string"/>
    </xsd:all>
  </xsd:complexType>
</xsd:element>
```

```

<xsd:element name="WarningMeasure">
  <xsd:complexType>
    <xsd:all>
      <xsd:element name="Cube" type="xsd:string"/>
      <xsd:element name="MeasureGroup" type="xsd:string"/>
      <xsd:element name="MeasureName" type="xsd:string"/>
    </xsd:all>
  </xsd:complexType>
</xsd:element>

<xsd:complexType name="WarningLocationObject">
  <xsd:choice>
    <xsd:element ref="eng200:WarningColumn"/>
    <xsd:element ref="eng200:WarningMeasure"/>
  </xsd:choice>
</xsd:complexType>

```

| Element | Description |
|-----------------|---|
| Start | The Start element contains a Line element (integer) and a Column element (integer) that indicates the starting point of the Warning or Error . |
| End | The End element contains a Line element (integer) and a Column element (integer) that indicates the ending point of the Warning or Error . |
| LineOffset | The number of characters from the beginning of the stream to the beginning of the Start line. |
| TextLength | Number of characters in the message location, between Start and End . |
| SourceObject | The SourceObject is the object that has the error. The WarningLocation object represents either a column or a measure. |
| DependsOnObject | The DependsOnObject is the object on which the SourceObject depends in the case of a dependency error. The WarningLocation object represents either a column or a measure. |
| Dimension | Identifies the Dimension of the SourceObject or DependsOnObject . |
| Attribute | Identifies the Attribute of the SourceObject or DependsOnObject . |
| Cube | Identifies the Cube of the SourceObject or DependsOnObject . |
| MeasureGroup | Identifies the MeasureGroup of the SourceObject or DependsOnObject . |
| MeasureName | Identifies the MeasureName of the SourceObject or DependsOnObject . |
| RowNumber | For calculation errors, the RowNumber in which the error occurred is provided. |

2.2.4.2 Object Definition Complex Types

An XML payload is sent to the server within the **Create** command (see section 3.1.4.3.2.1.1.3) or the **Alter** command (see section 3.1.4.3.2.1.1.4) to describe the objects on a server to be created or altered. Each server object is represented by a complex type in the commands that are sent to the server. The entire hierarchy of the complex types that comprise the available hierarchy of objects is described in this section.

All types defined in this section are in the namespace **eng**: unless otherwise specified.

2.2.4.2.1 Rules that Apply to All Complex Types

There are some rules that apply to all of the complex types enumerated in this section. This subsection enumerates rules that apply across all of the complex types.

2.2.4.2.1.1 Name, ID, and Description

Every structural object contains the following properties, as described in the subsequent sections under each complex type description.<35><36>

- A name. Names of sibling objects MUST be unique, within some scope. The scope is generally within the parent collection. Any exceptions to this are stated in the following, under the description for the complex type. Name is what is exposed to client programmers in the schema rowsets.
- An ID. The same restrictions on uniqueness apply to IDs. In addition, they are not changeable. They are assigned upon creation, either by the user/tool, or automatically by the engine (if not specified) to the initial name of the object. ID is considered a management property. ID is not exposed in the schema rowset for client programming.
- A description.

2.2.4.2.1.2 String Elements

In addition to restrictions on **Name** and **ID** string elements, this protocol imposes restrictions on the handling of all string elements.<37>

2.2.4.2.1.3 Versioning

The protocol defined in this specification uses the <http://schemas.microsoft.com/analysiservices/2003/engine> XML namespace. Forward/backward compatibility is an important issue with the protocol that is described in this document because new elements can be added in any release. When new elements are added in a release, with regard to all previously released releases, the new element can be considered as one of the following:

- Ignorable
- Not ignorable

Ignorable elements are those that can be safely ignored by any release for which the element is deemed to be harmless if it is ignored. That release will have been released before the element in question existed. Therefore, that element will be an unexpected element to the component that receives a command that contains that element. However, the receiving component can safely ignore the presence of this unknown element and can process the rest of the elements as if the unknown element were not present if the new element is not breaking.

If an element is deemed to be not ignorable to the release, that release MUST NOT successfully process a command that contains the unknown element. The release MUST issue an error message because it has encountered an unknown XML element that it cannot process and that it cannot safely ignore.

This protocol does not include a mechanism to negotiate element version compatibility between a client and a server. The only mechanism that is supplied transmits information that indicates when elements can be ignored and when elements cannot be ignored.

Information about whether an element is ignorable is obtained by using the namespace. The target namespace for this protocol consists of the following format:

[http://schemas.microsoft.com/analysiservices/YYYY/engine\[/M\[/N\]\]](http://schemas.microsoft.com/analysiservices/YYYY/engine[/M[/N]])

The versioning that is described in this section refers only to this namespace and its derivatives. Other namespaces that are referenced in this protocol definition are not versioned in the way that is described in this section.

The <http://schemas.microsoft.com/analysisservices> namespace is referred to as "root". The following rules apply to this root namespace:

- "YYYY" is the year of a major protocol release. For example, this protocol was initially released in 2003. Therefore, in this example, YYYY equals "2003". Subsequent protocol releases will have future YYYY tagging. The YYYY element of the namespace MUST NOT be changed in minor releases, such as service packs and hotfixes. However, this component is not critical to compatibility issues, and other users of this protocol can use any desired designation for YYYY.
- "M" is the sequence number of the XML element. For every protocol release that introduces new XML elements or new enumeration values for existing elements, a new sequence number for M MUST be used. M MUST always be incremented; that is, every new M needs to be greater than any previously used M. The very first version of this protocol did not use any value for M, and therefore it is treated as if it were 0.
- "N" is the smallest and earliest protocol version number, so that a client or a server that was originally released with this sequence number or higher can safely ignore this XML element. If N is unspecified, it is assumed to be 0. This means that the XML element is nonbreaking to the initial protocol release and to all subsequent protocol releases. If N is specified, a component MUST compare N to M for its own release. If N is greater than M for its own release, this element MUST NOT be ignored, and an error MUST be issued.

The namespace for an element is specified by using the "xmlns" attribute within the instance XML.

For enumeration values, an XML **valuens** attribute is used when a new value is added to an existing enumeration type. If the instance uses the new enumeration value, the **valuens** attribute MUST be included for that element in the instance.

Clients and servers MUST look for the element namespace or the **valuens** attribute in order to evaluate whether an element can be ignored.

For example, if a particular component that used this protocol were released and built to protocol version 2, the namespace that it would recognize would be root/2003/engine/2. Therefore, for itself, M = 2. If it receives an XML element with an **xmlns** attribute or a **valuens** attribute that has an N component, and if that N component is greater than 2, then this component issues an error. If it receives an XML element with an N component that is less than or equal to 2, or if the N component is absent (which means implicitly that N=0), then it can safely process the request.

This protocol also uses elements that do not have the following namespace base format:

[http://schemas.microsoft.com/analysisservices/YYYY/engine\[/M\[/N\]\]](http://schemas.microsoft.com/analysisservices/YYYY/engine[/M[/N]])

For these elements, this protocol does not provide any versioning capability and does not provide a mechanism for determining whether an element is ignorable.

2.2.4.2.1.4 Optional Element Usage

The <xsd:sequence> usage expressed in the XSD is optional. Throughout this protocol definition, if the <xsd:sequence> construct is used, it is not intended to be enforced by the protocol requirements. Elements MAY appear in any order within the <xsd:sequence> tags.

2.2.4.2.2 Complex Type Definitions for Server Object Hierarchy

Each type described in this section has an XSD fragment that describes the required XML syntax for the type and a table of additional information about the elements that comprise the type. In addition

to a brief description of each element of each type, the table has columns for "Read-Only" and "Default."

If a property is marked "Read-Only", the property is returned by the server in DISCOVER_XML_METADATA. However, a value for the property cannot be set by the contents of a Create or Alter command executed on the server.

The Default column indicates what value the server instantiates for the object if a **Create** or **Alter** command omits that particular element from the definition that is being sent to the server. If the value in the Default column is "Required", there is no default value, and the command that is sent to the server **MUST** set a value for that property. If the command does not contain a value for the property, the command results in an error.

Unless noted otherwise, all types that are described in this section are in the <http://schemas.microsoft.com/analysiservices/2003/engine> namespace.

2.2.4.2.2.1 (Updated Section) MajorObject

The **MajorObject** complex type represents a choice between the objects that can be created or altered directly with a Create command or an Alter command. Any of the elements that are available within the **xsd:choice** element for **MajorObject** are referred to as "major objects" throughout this document.

```
<xsd:complexType name="MajorObject">
  <xsd:choice>
    <xsd:element name="AggregationDesign" type="AggregationDesign"/>
    <xsd:element name="Assembly" type="Assembly"/>
    <xsd:element name="Cube" type="Cube"/>
    <xsd:element name="Database" type="Database"/>
    <xsd:element name="DataSource" type="DataSource"/>
    <xsd:element name="DataSourceView" type="DataSourceView"/>
    <xsd:element name="Dimension" type="Dimension"/>
    <xsd:element name="MdxScript" type="MdxScript"/>
    <xsd:element name="MeasureGroup" type="MeasureGroup"/>
    <xsd:element name="MiningModel" type="MiningModel"/>
    <xsd:element name="MiningStructure" type="MiningStructure"/>
    <xsd:element name="Partition" type="Partition"/>
    <xsd:element name="Permission" type="Permission"/>
    <xsd:element name="Perspective" type="Perspective"/>
    <xsd:element name="Role" type="Role"/>
    <xsd:element name="Server" type="Server"/>
    <xsd:element name="Trace" type="Trace"/>
  </xsd:choice>
</xsd:complexType>
```

The following table specifies the elements that are included within the **xsd:choice** XSD schema element for **MajorObject**.

| Element | Section | Description |
|-------------------|------------------------------|---|
| AggregationDesign | 2.2.4.2.2.12 | A complex type that specifies a group of aggregations for a measure group. |
| Assembly | 2.2.4.2.2.3 | A complex type that specifies a function library containing functions that are accessible by queries and scripts. |
| Cube | 2.2.4.2.2.9 | A complex type that specifies a cube. |
| Database | 2.2.4.2.2.5 | A complex type that specifies a database object. |
| DataSource | 2.2.4.2.2.6 | A complex type that represents a source of data that is available to a database. |

| Element | Section | Description |
|-----------------|------------------------------|---|
| DataSourceView | 2.2.4.2.2.7 | A complex type that specifies a view over the schema of a data source. |
| Dimension | 2.2.4.2.2.8 | A complex type that specifies a dimensions object. |
| MdxScript | 2.2.4.2.2.10 | A complex type that specifies a script defined in the Multidimensional Expressions (MDX) language that contains calculation definition. |
| MeasureGroup | 2.2.4.2.2.11 | A complex type that specifies a MeasureGroup object for a cube. |
| MiningModel | 2.2.4.2.2.16 | A complex type that specifies a mining model. |
| MiningStructure | 2.2.4.2.2.15 | A complex type that specifies a mining structure. |
| Partition | 2.2.4.2.2.13 | A complex type that specifies a partition of a measure group. |
| Permission | 2.2.4.2.2.21 | A complex type that specifies a set of permissions assigned to a role. |
| Perspective | 2.2.4.2.2.14 | A complex type that specifies a Perspective object for a cube. |
| Role | 2.2.4.2.2.28 | A complex type that specifies a role to which permissions can be assigned. |
| Server | 2.2.4.2.2.2 | A complex type that specifies a server instance. |
| Trace | 2.2.4.2.2.4 | A complex type that represents a trace object. A trace is a set of server events that can be subscribed to by a client. |

The following elements are common to all elements that are within the **xsd:choice** element for **MajorObject**. To avoid repetition, this table is not repeated for each element within **xsd:choice**.

| Element | Read-Only | Default value | Description |
|------------------|-----------|-------------------|--|
| Name | | [Required] | The object name. |
| ID | | Defaults to Name. | The object ID string. |
| CreatedTimestamp | Yes | | A timestamp for the time that the object was created. |
| LastSchemaUpdate | Yes | | A timestamp for the time that the schema was last updated. |
| Description | | Empty | The object description. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.2 Server

This complex type represents a **Server** instance.

This protocol does not allow for the creation or deletion of the **Server** object.

```
<xsd:complexType name="Server">
  <xsd:all>
    <!--These elements are common to each MajorObject-->
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="ID" type="xsd:string" minOccurs="0" />
    <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="Description" type="xsd:string" minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

```

<xsd:element name="Annotations" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Annotation" type="Annotation" minOccurs="0"
        maxOccurs="unbounded" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<!--Extended elements for Server object-->
<xsd:element name="ProductName" type="xsd:string" minOccurs="0" />
<xsd:element name="Edition" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="Standard"/>
      <xsd:enumeration value="Standard64"/>
      <xsd:enumeration value="Enterprise"/>
      <xsd:enumeration value="Enterprise64"/>
      <xsd:enumeration value="Developer"/>
      <xsd:enumeration value="Developer64"/>
      <xsd:enumeration value="Evaluation"/>
      <xsd:enumeration value="Evaluation64"/>
      <xsd:enumeration value="Local"/>
      <xsd:enumeration value="Local64"/>
      <xsd:enumeration value="BusinessIntelligence"/>
      <xsd:enumeration value="BusinessIntelligence64"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="EditionID" type="xsd:long" minOccurs="0" />
<xsd:element name="Version" type="xsd:string" minOccurs="0" />
  <xsd:element ref="eng300:ServerMode" minOccurs="0" />
<xsd:element name="ProductLevel" type="xsd:string" minOccurs="0" />
<xsd:element ref="eng400:DefaultCompatibilityLevel" minOccurs="0" />
<xsd:element ref="eng600:SupportedCompatibilityLevels" minOccurs="0" />
<xsd:element name="Databases " minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Database" type="Database" minOccurs="0"
        maxOccurs="unbounded" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Assemblies" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Assembly" type="Assembly" minOccurs="0"
        maxOccurs="unbounded" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Traces" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Trace" type="Trace" minOccurs="0"
        maxOccurs="unbounded" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Roles" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Role" type="Role" minOccurs="0"
        maxOccurs="unbounded" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="ServerProperties" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="ServerProperty" type="ServerProperty"

```

```

minOccurs="0" maxOccurs="unbounded" />
</xsd:sequence>
</xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

In the namespace **eng300**:

```

<xsd:element name="ServerMode">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Multidimensional" />
      <xsd:enumeration value="Tabular" />
      <xsd:enumeration value="SharePoint" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>

```

In the namespace **eng400**:

```

<xsd:element name="DefaultCompatibilityLevel" type="xsd:long" minOccurs="0" />

```

In the namespace **eng600**:

```

<xsd:element name="SupportedCompatibilityLevels" type="xsd:string" minOccurs="0" />

```

The following table describes the elements that are included in the XSD schema for the **Server** object. Those elements common to all major objects are described in section 2.2.4.2.2.1.

| Element | Read-Only | Default value | Description |
|---------------------------|-----------|---------------|---|
| ProductName | Yes | | The product name. |
| Edition | Yes | | The product edition. The text values of the enumeration describe the edition to which each enumeration value sets this element, respectively. |
| EditionID | Yes | | The ID for the edition.<39> |
| Version | Yes | | The product version.<40> |
| ServerMode | Yes | | Specifies the mode the server is operating in. Values include: <ul style="list-style-type: none"> ▪ Multidimensional - Multidimensional and Data Mining Mode. ▪ Tabular - Tabular mode. ▪ SharePoint - Server is operating as a SharePoint shared service. |
| ProductLevel | Yes | | The product level. |
| DefaultCompatibilityLevel | Yes | | The default compatibility level for databases that are created without explicitly specifying a level. |

| Element | Read-Only | Default value | Description |
|------------------------------|-----------|---------------|---|
| SupportedCompatibilityLevels | Yes | | The set of compatibility levels that are supported by the server. This set is provided as a list of comma separated values. |
| Databases | | Empty | A collection of Database objects. |
| Assemblies | | Empty | A collection of Assembly objects. |
| Traces | | Empty | A collection of Trace objects. |
| Roles | | Empty | A collection of Role objects. |
| ServerProperties | | Empty | A collection of ServerProperty objects. |

2.2.4.2.2.1 ServerProperty

A **ServerProperty** is a name-value pair that contains values for setting server properties. <41>

```
<xsd:complexType name="ServerProperty" >
  <xsd:all>
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="Value" type="xsd:string" />
    <xsd:element name="RequiresRestart" type="xsd:boolean" minOccurs="0" />
    <xsd:element name="PendingValue" type="xsd:anySimpleType" minOccurs="0" />
    <xsd:element name="DefaultValue" type="xsd:anySimpleType" minOccurs="0" />
    <xsd:element name="DisplayFlag" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="Type" minOccurs="0" type="xsd:string" />
  </xsd:all>
</xsd:complexType>
```

The following table describes the elements that are included in the XSD schema for the **ServerProperty** object.

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---------------|--|
| Name | | [Required] | The name of the property. |
| Value | | [Required] | The value of the property. |
| RequiresRestart | Yes | | When true, the server MUST be restarted before the new value takes effect; otherwise, false. |
| PendingValue | Yes | | A value that will be instantiated at next server restart. |
| DefaultValue | Yes | | The default value when the server is installed. |
| DisplayFlag | Yes | | When true, this is a hint provided by the server to the client that indicates that it is recommended to display this property in the user interface; otherwise, false. |
| Type | Yes | | The type of the server property. This is expressed as an XSD type. |

2.2.4.2.2.3 Assembly

The **Assembly** complex type represents a function library that can be invoked from within a Multidimensional Expressions (MDX), Data Mining Extensions (DMX), or SQL query.

Assembly is an abstract type and requires an instance to identify the type of **Assembly** being sent-- ComAssembly or ClrAssembly.

```
<xsd:complexType name="Assembly" abstract="true" >
  <xsd:sequence>
    <!--These elements are common to each MajorObject-->
    <xsd:element name="ID" type="xsd:string" minOccurs="0" />
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="Description" type="xsd:string" minOccurs="0" />
    <xsd:element name="Annotations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <!--Extended elements for Assembly object-->
    <xsd:element name="ImpersonationInfo" type="ImpersonationInfo"
      minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

The following table describes the elements that are included in the XSD schema for **Assembly**. Those elements common to all major objects are described in section 2.2.4.2.2.1.

| Element | Read-Only | Default value | Description |
|-------------------|-----------|---------------|--|
| ImpersonationInfo | | Empty | User credentials under which to invoke the assembly. |

2.2.4.2.2.3.1 ComAssembly

The **ComAssembly** complex type represents a Component Object Model (COM) library.

ComAssembly is derived from **Assembly**.

COM assemblies treat ImpersonationMode=Default as ImpersonateCurrentUser. COM assemblies do not support impersonation modes other than ImpersonateCurrentUser.

```
<xsd:complexType name="ComAssembly">
  <xsd:complexContent>
    <xsd:extension base="Assembly">
      <xsd:sequence>
        <xsd:element name="Source" type="xsd:string" minOccurs="0"/>
      </xsd:sequence>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

The following table describes the elements that are included in the XSD schema for **ComAssembly**. Those elements common to all major objects are described in section 2.2.4.2.2.1. Also included in **ComAssembly** are all the elements from **Assembly** as described in section 2.2.4.2.2.3.

| Element | Read-only | Default value | Description |
|---------|-----------|---------------|---|
| Source | | Empty | This element MUST contain either a file name or a PROG ID (program ID). |

2.2.4.2.2.3.2 ClrAssembly

The **ClrAssembly** complex type represents a common language runtime (CLR) assembly. CLR assemblies treat ImpersonationMode=Default as ImpersonateServiceAccount for the Safe permission set and ImpersonateCurrentUser for the ExternalAccess and Unrestricted permission sets. CLR assemblies support all impersonation modes.

ClrAssembly is derived from Assembly.

```
<xsd:complexType name="ClrAssembly">
  <xsd:complexContent>
    <xsd:extension base="Assembly" >
      <xsd:sequence>
        <xsd:element name="Files" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="File" type="ClrAssemblyFile"
                maxOccurs="unbounded" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="PermissionSet" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value="Safe"/>
              <xsd:enumeration value="ExternalAccess"/>
              <xsd:enumeration value="Unrestricted"/>
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

The following table describes the elements that are included in the XSD schema for **ClrAssembly**. Also included in **ClrAssembly** are all the elements from **Assembly**, as described in section 2.2.4.2.2.3.

| Element | Read-Only | Default value | Description |
|---------------|-----------|---------------|--|
| Files | | [Required] | A collection of file elements, each of which includes the contents of an Assembly file. At least one file in the collection of files MUST have a Type element that has a value of "Main". |
| PermissionSet | | "Safe" | The access permission level that the server will apply to this Assembly object. The enumeration values are as follows: <ul style="list-style-type: none"> Safe - Only internal computation and local data access is allowed. Safe is the most restrictive permission set. Code executed by an assembly with Safe permissions cannot access external system resources, such as files, network, environment variables, or the |

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|---|
| | | | registry. <ul style="list-style-type: none"> ExternalAccess - Safe, with the additional ability to access external system resources, such as files, networks, environmental variables, and the registry. Unrestricted – Allows assemblies unrestricted access to resources, both inside and outside the server. Code that executes from within an unrestricted assembly can call unmanaged code. |

2.2.4.2.2.3.2.1 CclrAssemblyFile

CclrAssemblyFile specifies the actual contents of a CLR assembly file.

```
<xsd:complexType name="CclrAssemblyFile">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Type" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Main" />
          <xsd:enumeration value="Dependent" />
          <xsd:enumeration value="Debug" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Data" type="DataBlock" />
  </xsd:all>
</xsd:complexType>
```

The following table describes the elements that are included in the XSD schema for **CclrAssemblyFile**.

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|--|
| Name | | [Required] | The name of the file. |
| Type | | [Required] | The type of the file. The enumeration types are as follows: <ul style="list-style-type: none"> Main – This is the main assembly file. Dependent – This is a dependent assembly file. Debug – This is a debug assembly file version. |
| Data | | [Required] | A collection of DataBlock elements that constitute the file contents. |

2.2.4.2.2.3.2.2 DataBlock

DataBlock specifies the binary contents of each block of Assembly code.

```
<xsd:complexType name="DataBlock">
  <xsd:sequence>
```

```

    <xsd:element name="Block" type="xsd:base64Binary"
                minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

```

The following table describes the elements that are included in the XSD schema for **DataBlock**.

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|--|
| Block | | Empty | A block of data representing a portion of the file contents. |

2.2.4.2.2.4 Trace

The **Trace** complex type represents a trace object. A trace consists of a set of server events that a client can subscribe to by using the Subscribe command.

```

<xsd:complexType name="Trace">
  <xsd:all>
    <!--These elements are common to each MajorObject-->
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="ID" type="xsd:string" minOccurs="0" />
    <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="Description" type="xsd:string" minOccurs="0" />
    <xsd:element name="Annotations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                      maxOccurs="unbounded" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <!--Extended elements for Trace object-->
    <xsd:element name="LogFileName" type="xsd:string" minOccurs="0"/>
    <xsd:element name="LogFileAppend" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="LogFileSize" type="xsd:long" minOccurs="0" />
    <xsd:element name="Audit" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="LogFileRollover" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="AutoRestart" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="StopTime" type="xsd:dateTime" minOccurs="0"/>
    <xsd:element name="Filter" type="TraceFilter" minOccurs="0" />
    <xsd:choice maxOccurs="1" minOccurs="1">
      <xsd:element name="Events" >
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="Event" type="Event" minOccurs="0"
                        maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element ref="eng300_300:XEvent" minOccurs="0" />
    </xsd:choice>
  </xsd:all>
</xsd:complexType>

```

The **Trace** XSD depends upon the following definition in namespaces other than the default namespace.

In the namespace **eng300_300**:

```

<xsd:element name="XEvent">

```

```

<xsd:complexType>
  <xsd:element name="event_session"/>
</xsd:complexType>
</xsd:element>

```

The following table describes the elements that are included in the XSD schema for **Trace**.

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---------------|---|
| LogFileName | | Empty | The file name for the log file. LogFileName MUST contain the .trc file name extension. |
| LogFileAppend | | False | When true, indicates to append to the existing log file; otherwise, false. |
| LogFileSize | | 0 | An integer that sets maximum file size in MB. If zero or negative, it means no maximum size.<42> |
| Audit | | False | When true, indicates that a Trace element is not allowed to drop events, even if this results in degraded performance on the server; otherwise, false. |
| LogFileRollover | | False | A Boolean that indicates what to do if LogFileSize is exceeded. If true, a new file is started; if false, logging stops. |
| AutoRestart | | False | When true, performs a Trace auto restart with service stop/start; otherwise, false. |
| StopTime | | No stop time | The time that the server will stop logging to the Trace log file. |
| Filter | | Empty | A complex XML type that specifies a logical condition that will determine whether the event is included in Trace output.<43> |
| Events | | | A collection of Event objects. This element is required if XEvent is not specified. |
| XEvent | | | An optional element that can be specified if the client code wants to subscribe to get information in XEvent format. |

2.2.4.2.2.4.1 Event

The **Event** complex type represents an event that is traced.

```

<xsd:complexType name="Event">
  <xsd:all>
    <xsd:element name="EventID" type="xsd:string"/>
    <xsd:element name="Columns" type="EventColumnID"/>
  </xsd:all>
</xsd:complexType>

```

The following table describes the elements that are included in the XSD schema for **Event**.

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|--|
| EventID | | [Required] | The ID string for the Event . |
| Columns | | [Required] | A collection of objects of type EventColumnID. |

2.2.4.2.2.4.1.1 EventColumnID

The **EventColumnID** complex type describes the columns for this Event.

```
<xsd:complexType name="EventColumnID">
  <xsd:sequence>
    <xsd:element name="ColumnID" type="xsd:string" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

The following table describes the elements that are included in the XSD schema for **EventColumnID**.

| Element | Read-Only | Default value | Description |
|----------|-----------|---------------|---|
| ColumnID | | [Required] | The ID of the column used for this event. |

2.2.4.2.2.4.2 TraceFilter

The **Filter** for a trace is expressed as an XML structure. This structure amounts to a logical expression.

```
<xsd:complexType name="TraceFilter" >
  <xsd:choice minOccurs="1" maxOccurs="1">
    <xsd:element name="Not" type="not_type" minOccurs="0" />
    <xsd:element name="Or" type="and_or_type" minOccurs="0" />
    <xsd:element name="And" type="and_or_type" minOccurs="0" />
    <xsd:element name="Equal" type="bool_binop" minOccurs="0" />
    <xsd:element name="NotEqual" type="bool_binop" minOccurs="0" />
    <xsd:element name="Less" type="bool_binop" minOccurs="0" />
    <xsd:element name="LessOrEqual" type="bool_binop" minOccurs="0" />
    <xsd:element name="Greater" type="bool_binop" minOccurs="0" />
    <xsd:element name="GreaterOrEqual" type="bool_binop" minOccurs="0" />
    <xsd:element name="Like" type="bool_binop" minOccurs="0" />
    <xsd:element name="NotLike" type="bool_binop" minOccurs="0" />
  </xsd:choice>
</xsd:complexType>
<xsd:complexType name="not_type" >
  <xsd:choice maxOccurs="1" minOccurs="1">
    <xsd:element name="Not" type="not_type" minOccurs="0" />
    <xsd:element name="Or" type="and_or_type" minOccurs="0" />
    <xsd:element name="And" type="and_or_type" minOccurs="0" />
    <xsd:element name="Equal" type="bool_binop" minOccurs="0" />
    <xsd:element name="NotEqual" type="bool_binop" minOccurs="0" />
    <xsd:element name="Less" type="bool_binop" minOccurs="0" />
    <xsd:element name="LessOrEqual" type="bool_binop" minOccurs="0" />
    <xsd:element name="Greater" type="bool_binop" minOccurs="0" />
    <xsd:element name="GreaterOrEqual" type="bool_binop" minOccurs="0" />
    <xsd:element name="Like" type="bool_binop" minOccurs="0" />
    <xsd:element name="NotLike" type="bool_binop" minOccurs="0" />
  </xsd:choice>
</xsd:complexType>
<xsd:complexType name="and_or_type" >
  <xsd:choice maxOccurs="2" minOccurs="2">
    <xsd:element name="Not" type="not_type" minOccurs="0"/>
    <xsd:element name="Or" type="and_or_type" minOccurs="0" />
    <xsd:element name="And" type="and_or_type" minOccurs="0" />
    <xsd:element name="Equal" type="bool_binop" minOccurs="0" />
    <xsd:element name="NotEqual" type="bool_binop" minOccurs="0" />
    <xsd:element name="Less" type="bool_binop" minOccurs="0" />
```

```

<xsd:element name="LessOrEqual" type="bool_binop" minOccurs="0" />
<xsd:element name="Greater" type="bool_binop" minOccurs="0" />
<xsd:element name="GreaterOrEqual" type="bool_binop" minOccurs="0" />
<xsd:element name="Like" type="bool_binop" minOccurs="0" />
<xsd:element name="NotLike" type="bool_binop" minOccurs="0" />
</xsd:choice>
</xsd:complexType>
<xsd:complexType name="bool_binop" >
  <xsd:all>
    <xsd:element name="ColumnID" type="xsd:string"/>
    <xsd:element name="Value" type="xsd:string" />
  </xsd:all>
</xsd:complexType>

```

2.2.4.2.4.3 (Updated Section) event_session

The **event_session** complex type<44> represents a configuration of an XEvent session. This element is not used with **Event** or **TraceFilter** elements. The **event_session** element is defined in the following schema.

```

<xs:element name="event_session" maxOccurs="unbounded" minOccurs="1">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="templateCategory" minOccurs="0" maxOccurs="1" type="xs:string"/>
      <xs:element name="templateName" minOccurs="0" maxOccurs="1" type="xs:string" />
      <xs:element name="templateDescription" minOccurs="0"
        maxOccurs="1" type="xs:string" />
      <xs:element name="event" minOccurs="0" maxOccurs="unbounded" />
      <xs:element name="target" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="name" type="xs:string" use="required"/>
    <xs:attribute name="maxMemory" type="xs:unsignedLong" use="optional" default="4" />
    <xs:attribute name="eventRetentionMode" type="retentionModes"
      use="optional" default="allowSingleEventLoss" />
    <xs:attribute name="dispatchLatency" type="xs:unsignedInt"
      use="optional" default="30"/>
    <xs:attribute name="maxEventSize" type="xs:unsignedInt" use="optional" default="0"/>
    <xs:attribute name="memoryPartitionMode" type="partitionModes"
      use="optional" default="none"/>
    <xs:attribute name="trackCausality" type="xs:boolean"
      use="optional" default="false"/>
  </xs:complexType>
</xs:element>

```

The following tables describe the elements and attributes of the **event_session** complex type.

| Element | Read-Only | Default value | Description |
|---------------------|-----------|---------------|--|
| templateCategory | | | Category of a predefined XEvent session template. |
| templateName | | | Name of a predefined XEvent session template. |
| templateDescription | | | Description of a predefined XEvent session template. |
| event | | | List of XEvents to be activated within the session. |
| target | | | List of XEvent targets for the session. |

| Attribute | Read-Only | Default value | Description |
|---------------------|-----------|----------------------|--|
| name | | [Required] | Name of the XEvent session. |
| maxMemory | | 4 | Specifies the maximum amount of memory in MB to allocate to the session for event buffering. |
| eventRetentionMode | | allowSingleEventLoss | Specifies the event retention mode to use for handling event loss. |
| dispatchLatency | | 30 | Specifies the amount of time in seconds that events will be buffered in memory before being dispatched to event session targets. |
| maxEventSize | | 0 | Specifies the maximum allowable size for events in MB. The maxEventSize attribute SHOULD only be set to allow single events larger than maxMemory ; setting it to less than maxMemory will cause the value to be ignored. When maxEventSize is set, two buffers of size are created in addition to maxMemory . This means that the total memory used for event buffering is maxMemory plus double the maxEventSize . |
| memoryPartitionMode | | None | Specifies the location where event buffers are created. |
| trackCausality | | False | Specifies whether causality is tracked. If enabled, causality allows related events on different threads to be correlated together. |

The **retentionModes** simple type is defined as:

```
<xs:simpleType name="retentionModes">
  <xs:restriction base="xs:string">
    <xs:enumeration value="allowSingleEventLoss"/>
    <xs:enumeration value="allowMultipleEventLoss"/>
    <xs:enumeration value="noEventLoss"/>
  </xs:restriction>
</xs:simpleType>
```

The following table describes the supported retention modes.

| Mode | Description |
|------------------------|--|
| allowSingleEventLoss | An event can be lost from the session. A single event is dropped only when all the event buffers are full. Losing a single event when event buffers are full allows for acceptable SQL Server performance characteristics, while minimizing the loss of data in the processed event stream. |
| allowMultipleEventLoss | Full event buffers that contain multiple events can be lost from the session. The number of events lost is dependent upon the memory size allocated to the session, the partitioning of the memory, and the size of the events in the buffer. This option minimizes performance impact on the server when event buffers are quickly filled, but large numbers of events can be lost from the session. |
| noEventLoss | No event loss is allowed. This option ensures that all events raised will be retained. |

| Mode | Description |
|------|--|
| | Using this option forces all tasks that fire events to wait until space is available in an event buffer. This causes detectable performance issues while the event session is active. |

The **partitionModes** simple type is defined as:

```
<xs:simpleType name="partitionModes">
  <xs:restriction base="xs:string">
    <xs:enumeration value="none"/>
    <xs:enumeration value="perNode"/>
    <xs:enumeration value="perCpu"/>
  </xs:restriction>
</xs:simpleType>
```

The following table describes the supported memory partitioning modes.

| Mode | Description |
|---------|---|
| none | A single set of buffers is created within the process |
| perNode | A set of buffers is created for each non-uniform memory access (NUMA) node. For more information about NUMA nodes, see [MSDN-NUMA]. |
| perCpu | A set of buffers is created for each CPU. |

2.2.4.2.2.4.3.1 (Updated Section) event

The **event** complex type represents a configuration of an XEvent to be traced.

```
<xs:element name="event" minOccurs="0" maxOccurs="unbounded">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="action" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element ref="parameter" maxOccurs="unbounded" minOccurs="0" />
      <xs:element name="predicate" minOccurs="0" maxOccurs="1" type="unary_expr"/>
    </xs:sequence>
    <xs:attributeGroup ref="objectNames"/>
  </xs:complexType>
</xs:element>
```

The **objectNames** attribute group is described in section 2.2.4.2.2.4.3.4.

| Element | Read-Only | Default value | Description |
|--------------------|-----------|---------------|---|
| action | | | List of actions to be triggered upon the event. |
| parameter | | | List of the event parameters. |
| predicate | | | Boolean predicate for event filtering. |
| objectNames | | | Fully-qualified name of the event. |

2.2.4.2.2.4.3.2 (Updated Section) action

The **action** complex type<46> represents a predefined XEvent action to be triggered after the XEvent occurs. Actions are used to collect additional information, such as a call stack.

```
<xs:element name="action" minOccurs="0" maxOccurs="unbounded">
  <xs:complexType>
    <xs:attributeGroup ref="objectNames"/>
  </xs:complexType>
</xs:element>
```

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|-------------------------------------|
| objectNames | | | Fully qualified name of the action. |

The **objectNames** attribute group is described in section 2.2.4.2.2.4.3.4.

2.2.4.2.2.4.3.3 (Updated Section) target

The **target** complex type<47> represents a configuration of a target destination for sending XEvents.

```
<xs:element name="target" minOccurs="0" maxOccurs="unbounded">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="parameter" maxOccurs="unbounded" minOccurs="0" />
    </xs:sequence>
    <xs:attributeGroup ref="objectNames"></xs:attributeGroup>
  </xs:complexType>
</xs:element>
```

The **objectNames** attribute group is described in section 2.2.4.2.2.4.3.4.

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|---|
| parameter | | | Configuration parameter for the target. |
| objectNames | | | Fully qualified name of the target. |

2.2.4.2.2.4.3.4 (Updated Section) objectNames

The **objectNames** attribute group<48> represents the fully qualified name of the XEvent object.

```
<xs:attributeGroup name="objectNames">
  <xs:attribute name="module" type="xs:string" use="optional">
</xs:attribute>
  <xs:attribute name="package" type="xs:string" use="required">
</xs:attribute>
  <xs:attribute name="name" type="xs:string" use="required">
</xs:attribute>
</xs:attributeGroup>
```

| ElementAttribute | Read-Only | Default value | Description |
|------------------|-----------|---------------|--|
| module | | | Dynamic-link library (DLL) where the XEvent object is defined. |
| package | | [Required] | XEvent package where the object is defined. |
| name | | [Required] | The object name. |

2.2.4.2.2.4.3.5 (Updated Section) parameter

The **parameter** complex type<49> represents an input parameter for an XEvent object.

```
<xs:element name="parameter">
  <xs:complexType>
    <xs:attribute name="name" type="xs:string" use="required" />
    <xs:attribute name="value" use="required" />
  </xs:complexType>
</xs:element>
```

| ElementAttribute | Read-Only | Default value | Description |
|------------------|-----------|---------------|-------------------------|
| name | | [Required] | Name of the parameter. |
| value | | [Required] | Value of the parameter. |

2.2.4.2.2.4.3.6 unary_expr

The **unary_expr** complex type<50> represents a condition to be evaluated upon firing an XEvent. The condition is a composite Boolean expression over fields of the XEvent or global XEvent object. The Boolean expression can contain **not**, **and**, and **or** operators. The leaf predicate of Boolean expressions is composed of:

- A comparator. A list of supported comparators along with descriptions can be retrieved by using the DISCOVER_XEVENT_OBJECTS<51> command.
- A reference to the event field or global state.
- The value to which the event field is to be compared.

```
<xs:complexType name="pred_leaf">
  <xs:sequence>
    <xs:element name="comparator">
      <xs:complexType>
        <xs:attributeGroup ref="objectNames"/>
      </xs:complexType>
    </xs:element>
    <xs:choice>
      <xs:element name="event">
        <xs:complexType>
          <xs:attributeGroup ref="objectNames"/>
          <xs:attribute name="field" type="xs:string"/>
        </xs:complexType>
      </xs:element>
      <xs:element name="global">
```

```

        <xs:complexType>
            <xs:attributeGroup ref="objectNames"/>
        </xs:complexType>
    </xs:element>
</xs:choice>
<xs:element name="value"></xs:element>
</xs:sequence>
</xs:complexType>
<xs:complexType name="unary_expr">
    <xs:choice>
        <xs:element name="not" type="unary_expr"></xs:element>
        <xs:element name="and" type="boolean_expr"></xs:element>
        <xs:element name="or" type="boolean_expr"></xs:element>
        <xs:element name="leaf" type="pred_leaf"></xs:element>
    </xs:choice>
</xs:complexType>
<xs:complexType name="boolean_expr">
    <xs:sequence>
        <xs:choice>
            <xs:element name="and" type="boolean_expr"></xs:element>
            <xs:element name="or" type="boolean_expr"></xs:element>
            <xs:element name="not" type="unary_expr"></xs:element>
            <xs:element name="leaf" type="pred_leaf"></xs:element>
        </xs:choice>
        <xs:choice maxOccurs="1" minOccurs="1">
            <xs:element name="and" type="boolean_expr"></xs:element>
            <xs:element name="or" type="boolean_expr"></xs:element>
            <xs:element name="not" type="unary_expr"></xs:element>
            <xs:element name="leaf" type="pred_leaf"></xs:element>
        </xs:choice>
    </xs:sequence>
</xs:complexType>

```

The following are examples of Boolean expressions:

```

<predicate>
  <and>
    <leaf>
      <comparator name="equal_uint64" package="package0" />
      <event name="Event4" package="TESTPKG" field="m1" />
      <value>1</value>
    </leaf>
    <leaf>
      <comparator name="equal_uint64" package="package0" />
      <event name="Event4" package="TESTPKG" field="m1" />
      <value>2</value>
    </leaf>
  </and>
</predicate>

<predicate>
  <leaf>
    <comparator name="greater_than_equal_int64" package="package0"></comparator>
    <event name="Event0" field="I16"/>
    <value>20</value>
  </leaf>
</predicate>

```

2.2.4.2.2.5 Database

The **Database** complex type represents a database.

```

<xsd:complexType name="Database">
  <xsd:all>
    <!--These elements are common to each MajorObject-->

```

```

<xsd:element name="Name" type="xsd:string" />
<xsd:element name="ID" type="xsd:string" minOccurs="0" />
<xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
<xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
<xsd:element name="Description" type="xsd:string" minOccurs="0" />
<xsd:element name="Annotations" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Annotation" type="Annotation" minOccurs="0"
        maxOccurs="unbounded" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<!--Extended elements for Database object-->
<xsd:element name="LastUpdate" type="xsd:dateTime" minOccurs="0" />
<xsd:element name="State" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Processed" />
      <xsd:enumeration value="PartiallyProcessed" />
      <xsd:enumeration value="Unprocessed" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element ref="eng100:ReadWriteMode" minOccurs="0" />
<xsd:element ref="eng100_100:DbStorageLocation" minOccurs="0"/>
<xsd:element name="AggregationPrefix" type="xsd:string" minOccurs="0"/>
<xsd:element name="ProcessingPriority" type="xsd:integer" minOccurs="0"/>
<xsd:element name="EstimatedSize" type="xsd:long" minOccurs="0"/>
<xsd:element name="LastProcessed" type="xsd:dateTime" minOccurs="0"/>
<xsd:element name="Language" type="xsd:integer" minOccurs="0"/>
<xsd:element name="Collation" type="xsd:string" minOccurs="0"/>
<xsd:element name="Visible" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="MasterDataSourceID" type="xsd:string" minOccurs="0"/>
<xsd:element name="DataSourceImpersonationInfo" type="ImpersonationInfo"
  minOccurs="0" />
<xsd:element name="Accounts" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Account" type="Account" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="DataSources" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="DataSource" type="DataSource" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="DataSourceViews" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="DataSourceView" type="DataSourceView"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Dimensions" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Dimension" type="Dimension"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Cubes" minOccurs="0">
  <xsd:complexType>

```

```

    <xsd:sequence>
      <xsd:element name="Cube" type="Cube" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="MiningStructures" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="MiningStructure" type="MiningStructure"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Roles" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Role" type="Role" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Assemblies" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Assembly" type="Assembly" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="DatabasePermissions" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="DatabasePermission" type="DatabasePermission"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Translations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Translation" type="Translation" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element ref="eng200_200:StorageEngineUsed" minOccurs="0" />
<xsd:element ref="eng200_200:ImagePath" minOccurs="0" />
<xsd:element ref="eng200_200:ImageUrl" minOccurs="0" />
<xsd:element ref="eng200_200:ImageUniqueID" minOccurs="0" />
<xsd:element ref="eng200_200:ImageVersion" minOccurs="0" />
<xsd:element ref="eng200_200:Token" minOccurs="0" />
<xsd:element ref="eng200:CompatibilityLevel" minOccurs="0" />
  <xsd:element ref="eng300_300:DirectQueryMode" minOccurs="0" />
</xsd:all>
</xsd:complexType>

```

The **Database** XSD depends upon the following definitions in namespaces other than the default namespace.

In the namespace **eng100**:

```

<xsd:element name="ReadWriteMode" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="ReadWrite" />
      <xsd:enumeration value="ReadOnly" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>

```

```

        <xsd:enumeration value="ReadOnlyExclusive" />
    </xsd:restriction>
</xsd:simpleType>
</xsd:element>

```

In the namespace **eng100_100**:

```

<xsd:element name="DbStorageLocation" type="xsd:string" />

```

In the namespace **eng200**:

```

<xsd:element name="CompatibilityLevel" type="xsd:integer" />

```

In the namespace **eng200_200**:

```

<xsd:element name="StorageEngineUsed" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Traditional" />
      <xsd:enumeration value="InMemory" />
      <xsd:enumeration value="Mixed" />
      <xsd:enumeration value="TabularMetadata" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ImagePath" type="xsd:string" />
<xsd:element name="ImageUrl" type="xsd:string" />
<xsd:element name="ImageUniqueID" type="xsd:string" />
<xsd:element name="ImageVersion" type="xsd:string" />
<xsd:element name="Token" type="xsd:string" />

```

In the namespace **eng300_300**:

```

<xsd:element name="DirectQueryMode">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="InMemory" />
      <xsd:enumeration value="DirectQueryWithInMemory" />
      <xsd:enumeration value="InMemoryWithDirectQuery" />
      <xsd:enumeration value="DirectQuery" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>

```

The following table describes the elements that are included in the XSD schema for **Database**.

| Element | Read-Only | Default value | Description |
|------------------|-----------|----------------------------------|--|
| Name | | [Required] | The object name. |
| ID | | MAY<52> default to Name . | The object ID string. |
| CreatedTimestamp | Yes | | A timestamp that indicates the time that object was created. |
| LastSchemaUpdate | Yes | | A timestamp that indicates the time that the schema was last |

| Element | Read-Only | Default value | Description |
|-----------------------------|-----------|---------------|--|
| | | | updated. |
| LastUpdate | Yes | | A timestamp that indicates the last time the database or any of its contained major objects was altered. |
| Description | | Empty | The object description. |
| State | Yes | | The current state of processing within the Database objects. The enumeration values are as follows: <ul style="list-style-type: none"> ▪ Processed – The object has been processed. ▪ PartiallyProcessed – The object has been partially processed. ▪ Unprocessed – The object has not been processed. |
| ReadWriteMode | Yes | "ReadWrite" | An enumeration value that indicates the access modes allowed to the database. The enumeration values are as follows: <ul style="list-style-type: none"> ▪ ReadWrite – Read-write access is allowed. ▪ ReadOnly – Read-only access is allowed. ▪ ReadOnlyExclusive – Read-only exclusive access is allowed. |
| DbStorageLocation | | Empty | A valid UNC path for where the server will store the data for this database. |
| AggregationPrefix | | Empty | The common prefix that can be used for aggregation names for all the partitions in a database. |
| ProcessingPriority | | 0 | An integer that indicates the priority for processing, when lazy processing is used. Higher integer values will be processed before lower integer values. |
| EstimatedSize | Yes | | The estimated size of the database in bytes. |
| LastProcessed | Yes | | A timestamp that indicates the date and time when the object was last processed. This element is updated only if the process command processes the whole database as one; processing all objects in the database individually does not result in an update. |
| Language | | Empty | The language code identifier (LCID)<53> of the language to use by default. <54> |
| Collation | | Empty | The collation sequence. |
| Visible | | True | When true, indicates that the database is visible to clients; otherwise, false. |
| MasterDataSourceID | | Empty | A string that specifies the MasterDataSourceID of the OLAP data source that points to the master server for remote partitions. |
| DataSourceImpersonationInfo | | Empty | The default user credentials to connect to data source. |
| Accounts | | Empty | A collection of objects of type Account. |
| DataSources | | Empty | A collection of objects of type DataSource. |

| Element | Read-Only | Default value | Description |
|---------------------|-----------|---------------|--|
| DataSourceViews | | Empty | A collection of objects of type DataSourceView. |
| Dimensions | | Empty | A collection of objects of Dimension objects. |
| Cubes | | Empty | A collection of Cube objects. |
| MiningStructures | | Empty | A collection of MiningStructure objects. |
| Roles | | Empty | A collection of Role objects. |
| Assemblies | | Empty | A collection of Assembly objects. |
| DatabasePermissions | | Empty | A collection of DatabasePermission objects. |
| Translations | | Empty | A collection of Translation objects. |
| Annotations | | Empty | A collection of Annotation objects. |
| StorageEngineUsed | | "Traditional" | An enumeration value that indicates which of the types of available storage engines to use. The enumeration values are as follows: <ul style="list-style-type: none"> Traditional – MOLAP storage is used. InMemory – In memory storage is used. Mixed – A mixture of MOLAP and In memory storage is used. TabularMetadata – Tabular Metadata is used with InMemory storage. This mode is available only for Tabular databases that have the compatibility level set to 1200 or greater. For more details about compatibility level, see the CompatibilityLevel element that is described in this table and in [MS-SSAS-T]. |
| ImagePath | Yes | | The UNC path of the file from which this database was loaded. The database MUST be loaded or created by using the ImageLoad (section 3.1.4.3.2.1.1.29) command; otherwise the element will be empty. |
| ImageUrl | Yes | | The URL of the file from which this database was loaded. This element will be empty if the database is not loaded from a URL. |
| ImageUniqueID | Yes | | The Unique ID assigned to this database, if it was loaded from a URL location. This element will be empty if the database is not loaded from a URL location. |
| ImageVersion | | Empty | A string that represents a timestamp containing the last time that the file that contains the database was updated. The string format is MM/dd/yyyy HH:mm:ss [AM/PM]. This element will be empty if the database is not loaded from a file. |
| CompatibilityLevel | | | Specifies the compatibility level of the database. <55> |
| DirectQueryMode | | | DirectQueryMode , in conjunction with the Direct Query connection string property, determines which mode is to be used for a query. DirectQueryMode has the following values: |

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|---|
| | | | <ul style="list-style-type: none"> ▪ InMemory - default property ▪ DirectQueryWithInMemory ▪ InMemoryWithDirectQuery ▪ DirectQuery <p>DirectQueryMode connection string property values are:</p> <ul style="list-style-type: none"> ▪ Default ▪ DirectQuery ▪ InMemory ▪ InMemoryWithDirectQuery <p>User connecting with DirectQueryMode connection string property set to InMemory or Default will be querying database in cached mode.</p> <p>User connecting with DirectQueryMode connection string property set to DirectQuery will be querying database in DirectQuery mode.</p> <p>Note If database is using features that are incompatible with the supported set of features in DirectQuery mode, run-time error will be generated.</p> <p>DirectQueryWithInMemory</p> <p>User connecting with DirectQueryMode connection string property set to DirectQuery or Default will be querying database in DirectQuery mode.</p> <p>User connecting with DirectQueryMode connection string property set to InMemory will be querying database in Cached mode.</p> <p>InMemory\DirectQuery</p> <p>User connecting with DirectQueryMode property other than Default or DirectQuery\InMemory (respectively) will be given an error indicating the particular situation.</p> |
| Token | | | Specifies the token of a user whose database access needs to be restricted to a single database. |

2.2.4.2.2.5.1 Account

Dimensions that are of the type **Accounts** might have an attribute marked as providing the **Account Type** (such as Income, Expense, and Balance). Measures can then have an aggregate function of **ByAccount**. The set of account types defined for a database map the valid account types to the aggregate functions that apply for measures marked with **ByAccount**.

```

<xsd:complexType name="Account">
  <xsd:all>
    <xsd:element name="AccountType" type="xsd:string" />
    <xsd:element name="AggregationFunction" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >

```

```

    <xsd:enumeration value="Sum" />
    <xsd:enumeration value="Count" />
    <xsd:enumeration value="Min" />
    <xsd:enumeration value="Max" />
    <xsd:enumeration value="DistinctCount" />
    <xsd:enumeration value="None" />
    <xsd:enumeration value="AverageOfChildren" />
    <xsd:enumeration value="FirstChild" />
    <xsd:enumeration value="LastChild" />
    <xsd:enumeration value="FirstNonEmpty" />
    <xsd:enumeration value="LastNonEmpty" />
  </xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="Aliases" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Alias" type="xsd:string" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Annotations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Annotation" type="Annotation" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

The following table describes the elements that are included in the XSD schema for **Account**.

| Element | Read-Only | Default value | Description |
|---------------------|-----------|---------------|--|
| AccountType | | [Required] | A string value that represents the name of the account type. The following list of known string values can be extended: "Income" - Represents an Income account type. "Expense" - Represents an Expense account type. "Flow" - Represents a Flow account type. "Balance" - Represents a Balance account type. "Asset" - Represents an Asset account type. "Liability" - Represents a Liability account type. "Statistical" - Represents a Statistical account type. |
| AggregationFunction | | "Sum" | The aggregation function to use for the Account Type . Each enumeration value is the name of the aggregation function that would be set by choosing that value. The possible values for the enumeration are as follows: Sum - Calculates the sum of values for all child members. Count - Retrieves the count of all child members. Min - Retrieves the lowest value for all child members. Max - Retrieves the highest value for all child members. DistinctCount - Retrieves the count of all unique child members. None - No aggregation is performed. All values for leaf and nonleaf members in a dimension are supplied directly from the fact table for the measure group that contains the measure. If no value can be read from the fact table for a member, the value for |

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|--|
| | | | that member is set to null. AverageOfChildren - Calculates the average of values for all nonempty child members. FirstChild - Retrieves the value of the first child member. LastChild - Retrieves the value of the last child member. FirstNonEmpty - Retrieves the value of the first nonempty child member. LastNonEmpty - Retrieves the value of the last nonempty child member. |
| Aliases | | Empty | A collection of strings, each of which will be treated as an alias for the given Account Type . |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.6 DataSource

The **DataSource** complex type represents a source of data for cubes, dimensions, and mining structures. The following complex types extend this type:

- RelationalDataSource
- OlapDataSource

```
<xsd:complexType name="DataSource" abstract="true" >
  <xsd:all>
    <!--These elements are common to each MajorObject-->
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="ID" type="xsd:string" minOccurs="0" />
    <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="Description" type="xsd:string" minOccurs="0" />
    <xsd:element name="Annotations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <!--Extended elements for DataSource object-->
    <xsd:element name="ManagedProvider" type="xsd:string" minOccurs="0"/>
    <xsd:element name="ConnectionString" type="xsd:string"/>
    <xsd:element name="ConnectionStringSecurity" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="PasswordRemoved" />
          <xsd:enumeration value="Unchanged" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="ImpersonationInfo" type="ImpersonationInfo"
      minOccurs="0" />
    <xsd:element name="Isolation" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="ReadCommitted" />
          <xsd:enumeration value="Snapshot" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

```

    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="MaxActiveConnections" type="xsd:integer"
    minOccurs="0"/>
  <xsd:element name="Timeout" type="xsd:duration" minOccurs="0" />
  <xsd:element name="DataSourcePermissions" minOccurs="0">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="DataSourcePermission" type="DataSourcePermission"
          minOccurs="0" maxOccurs="unbounded"/>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>
  <xsd:element ref="eng300:QueryImpersonationInfo" minOccurs="0" />
  <xsd:element ref="eng300:QueryHints" minOccurs="0" />
</xsd:all>
</xsd:complexType>

```

The following elements are defined in the namespace **eng300**:

```

<xsd:element name="QueryImpersonationInfo" type="eng:ImpersonationInfo" />
<xsd:element name="QueryHints" type="xsd:string" />

```

The following table describes the elements that are included in the XSD schema for **DataSource**. Those elements common to all major objects are described in section 2.2.4.2.2.1.

| Element | Read-Only | Default value | Description |
|--------------------------|-----------|-----------------|--|
| ManagedProvider | | Empty | The managed provider name. |
| ConnectionString | | [Required] | The connection string. The password can be stripped out, depending upon the setting of the ConnectionStringSecurity element. |
| ConnectionStringSecurity | Yes | "Unchanged" | An enumeration value that specifies whether the user's password is stripped from the data source connection string for security purposes. The enumeration values are as follows: <ul style="list-style-type: none"> PasswordRemoved – The user's password is stripped from the connection string. Unchanged - The connection string text is unchanged. |
| ImpersonationInfo | | Empty | The user credentials that are used to connect to a data source. |
| Isolation | | "ReadCommitted" | An enumeration value that specifies the isolation level for reading data that was modified but not committed by another simultaneous transaction. The enumeration values are as follows: <ul style="list-style-type: none"> ReadCommitted – ReadCommitted isolation is used. Snapshot – Snapshot isolation is used. |
| MaxActiveConnections | | 10 | The maximum number of concurrent connections to the data source. A negative number means that there is no limit. A |

| Element | Read-Only | Default value | Description |
|------------------------|-----------|-----------------|--|
| | | | value of zero means the default limit. |
| Timeout | | Server default. | An integer that specifies the time, in seconds, after which an attempt to retrieve data reports a timeout. |
| DataSourcePermissions | | Empty | A collection of objects of type DataSourcePermission. |
| QueryImpersonationInfo | | Empty | The user credentials that are used to connect to a data source in DirectQuery mode. If not in DirectQuery mode, the value is ignored. If not provided, the credentials are obtained from the ImpersonationInfo element, also in this table. |
| QueryHints | | Empty | If provided, the query hint is appended to any query before the query is invoked in DirectQuery mode. |

2.2.4.2.2.6.1 RelationalDataSource

The **RelationalDataSource** complex type represents a relational data source.

```
<xsd:complexType name="RelationalDataSource" >
  <xsd:complexContent>
    <xsd:extension base="DataSource" />
  </xsd:complexContent>
</xsd:complexType>
```

2.2.4.2.2.6.2 OlapDataSource

The **OlapDataSource** complex type represents an OLAP data source.

```
<xsd:complexType name="OlapDataSource" >
  <xsd:complexContent>
    <xsd:extension base="DataSource" />
  </xsd:complexContent>
</xsd:complexType>
```

2.2.4.2.2.6.3 PushedDataSource

The **PushedDataSource** complex type represents a chunk of tabular data being pushed into the server. This is in contrast to RelationalDataSource and OlapDataSource, where the server pulls the data by sending queries to the data source.

PushedDataSource cannot be specified in a Create or Alter command. It can be used only within a Process command. For more information, see section 3.1.4.3.2.1.1.6.

```
<xsd:complexType name="PushedDataSource" >
  <xsd:all>
    <xsd:element name="root">
      <xsd:complexType>
        <xsd:attribute name="Parameter">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value="InputRowset" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:attribute>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

```

        </xsd:simpleType>
    </xsd:attribute>
</xsd:complexType>
</xsd:element>
<xsd:element name="EndOfData" >
    <xsd:complexType>
        <xsd:attribute name="Parameter" >
            <xsd:simpleType>
                <xsd:restriction base="xsd:string" >
                    <xsd:enumeration value="EndOfInputRowset" />
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:attribute>
    </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-----------|-----------|---------------|---|
| root | | [Required] | The XML attribute "Parameter" MUST be present, and it MUST be set to the value "InputRowset". When using a PushedDataSource , the actual data will be contained in a "Parameter" that is used on the Execute method with name "InputRowset". For a description of how to use an Execute parameter, see section 3.1.4.3.2.1.3.1. |
| EndOfData | | [Required] | The XML attribute "Parameter" MUST be present with this element, and its value MUST be set to "EndOfInputRowset". When using a PushedDataSource , the command MUST contain a parameter named "EndOfInputRowset", and its value MUST be set to true in order to signal an end of input data. |

2.2.4.2.2.7 DataSourceView

The **DataSourceView** complex type represents a view over the schema of a data source.

```

<xsd:complexType name="DataSourceView">
    <xsd:complexContent>
        <xsd:extension base="MajorObject">
            <xsd:all>
                <!--These elements are common to each MajorObject-->
                <xsd:element name="Name" type="xsd:string" />
                <xsd:element name="ID" type="xsd:string" minOccurs="0" />
                <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
                <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
                <xsd:element name="Description" type="xsd:string" minOccurs="0" />
                <xsd:element name="Annotations" minOccurs="0" >
                    <xsd:complexType>
                        <xsd:sequence>
                            <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                                maxOccurs="unbounded" />
                        </xsd:sequence>
                    </xsd:complexType>
                </xsd:element>
                <!--Extended elements for DataSourceView object-->
                <xsd:element name="DataSourceID" type="xsd:string"/>
                <xsd:element name="Schema">
                    <xsd:complexType>
                        <xsd:sequence>
                            <xsd:element ref="xsd:schema" />
                        </xsd:sequence>
                    </xsd:complexType>
                </xsd:element>
            </xsd:all>
        </xsd:extension>
    </xsd:complexContent>
</xsd:complexType>

```

```

    </xsd:element>
  </xsd:all>
</xsd:extension>
</xsd:complexContent>
</xsd:complexType>

```

The following table describes the elements that are included in the XSD schema for **DataSourceView**. Those elements common to all major objects are described in section 2.2.4.2.2.1.

| Element | Read-Only | Default value | Description |
|--------------|-----------|---------------|---|
| DataSourceID | | [Required] | The ID of the DataSource for which this is a DataSourceView . |
| Schema | | [Required] | The schema of the DataSource , for example, the contents of the DataSource view. This is defined using the "Schema" element from XMLSchema (XSD), as used in the persistence format of DataSets . For more information, see [MSDN-DDRXSD]. |

2.2.4.2.2.8 (Updated Section) Dimension

The **Dimension** complex type represents a dimension object.

```

<xsd:complexType name="Dimension">
  <xsd:all>
    <!--These elements are common to each MajorObject-->
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="ID" type="xsd:string" minOccurs="0" />
    <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="Description" type="xsd:string" minOccurs="0" />
    <xsd:element name="Annotations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <!--Extended elements for Dimension object-->
    <xsd:element name="Source" minOccurs="0" type="Binding" />
    <xsd:element name="MiningModelID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Type" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Regular"/>
          <xsd:enumeration value="Time"/>
          <xsd:enumeration value="Geography"/>
          <xsd:enumeration value="Organization"/>
          <xsd:enumeration value="BillOfMaterials"/>
          <xsd:enumeration value="Accounts"/>
          <xsd:enumeration value="Customers"/>
          <xsd:enumeration value="Products"/>
          <xsd:enumeration value="Scenario"/>
          <xsd:enumeration value="Quantitative"/>
          <xsd:enumeration value="Utility"/>
          <xsd:enumeration value="Currency"/>
          <xsd:enumeration value="Rates"/>
          <xsd:enumeration value="Channel"/>
          <xsd:enumeration value="Promotion"/>
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
  </xsd:all>

```

```

<xsd:element name="UnknownMember" minOccurs="0">
  <xsd:complexType>
    <xsd:simpleContent>
      <xsd:extension base="UnknownMemberEnumType">
        <xsd:attribute name="valuens" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration
                value=
                "http://schemas.microsoft.com/analysisservices/2010/engine/200/200" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:attribute>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
</xsd:element>
<xsd:element name="MdxMissingMemberMode" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Default"/>
      <xsd:enumeration value="Ignore"/>
      <xsd:enumeration value="Error"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ErrorConfiguration" type="ErrorConfiguration"
  minOccurs="0" />
<xsd:element name="StorageMode" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="Molap"/>
      <xsd:enumeration value="Rolap"/>
      <xsd:enumeration value="InMemory"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="WriteEnabled" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="ProcessingPriority" type="xsd:integer" minOccurs="0"/>
<xsd:element name="LastProcessed" type="xsd:dateTime" minOccurs="0"/>
<xsd:element name="DimensionPermissions" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="DimensionPermission" type="DimensionPermission"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="DependsOnDimensionID" type="xsd:string" minOccurs="0"/>
<xsd:element name="Language" type="xsd:integer" minOccurs="0"/>
<xsd:element name="Collation" type="xsd:string" minOccurs="0"/>
<xsd:element name="UnknownMemberName" type="xsd:string" minOccurs="0"/>
<xsd:element name="UnknownMemberTranslations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="UnknownMemberTranslation" type="Translation"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="State" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="Processed"/>
      <xsd:enumeration value="Unprocessed"/>
      <xsd:enumeration value="PartiallyProcessed"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ProactiveCaching" type="ProactiveCaching"

```



```

        minOccurs="0" />
<xsd:element name="ProcessingMode" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="Regular"/>
      <xsd:enumeration value="LazyAggregations"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ProcessingGroup" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="ByAttribute"/>
      <xsd:enumeration value="ByTable"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="CurrentStorageMode" minOccurs="0">
  <xsd:complexType>
    <xsd:simpleContent>
      <xsd:extension base="DimensionCurrentStorageModeEnumType">
        <xsd:attribute name="valuens" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration
                value=
                "http://schemas.microsoft.com/analysisservices/2010/engine/200/200" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:attribute>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Translations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Translation" type="Translation"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Attributes" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Attribute" type="DimensionAttribute" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="AttributeAllMemberName" type="xsd:string" minOccurs="0"/>
<xsd:element name="AttributeAllMemberTranslations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="MemberAllMemberTranslation" type="Translation"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Hierarchies" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Hierarchy" type="Hierarchy" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element ref="eng200_200:ProcessingRecommendation" minOccurs="0" />
<xsd:element name="Relationships" type="eng300_300:Relationships"
  minOccurs="0" maxOccurs="1"/>

```

```

    <xsd:element ref="eng300:StringStoresCompatibilityLevel" minOccurs="0"/>
    <xsd:element ref="eng300:CurrentStringStoresCompatibilityLevel"
        minOccurs="0"/>
</xsd:all>
</xsd:complexType>

<xsd:simpleType name="DimensionCurrentStorageModeEnumType" >
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Molap"/>
    <xsd:enumeration value="InMemory"/>
    <xsd:enumeration value="Rolap"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="UnknownMemberEnumType" >
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Visible"/>
    <xsd:enumeration value="Hidden"/>
    <xsd:enumeration value="None"/>
    <xsd:enumeration value="AutomaticNull"/>
  </xsd:restriction>
</xsd:simpleType>

```

The **Dimension** XSD depends upon element definitions in namespaces other than the default namespace.

The following elements are defined in the namespace **eng200_200**:

```

<xsd:element name="ProcessingRecommendation" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="None"/>
      <xsd:enumeration value="Stale"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>

```

The following elements are defined in the namespace **eng300**:

```

<xsd:element name="StringStoresCompatibilityLevel">
  <xsd:simpleType>
    <xsd:restriction base="xsd:int">
      <xsd:enumeration value="1050"/>
      <xsd:enumeration value="1100"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="CurrentStringStoresCompatibilityLevel">
  <xsd:simpleType>
    <xsd:restriction base="xsd:int">
      <xsd:enumeration value="1050"/>
      <xsd:enumeration value="1100"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>

```

The following elements are defined in the namespace **eng300_300**:

```

<xsd:complexType name="Relationships">
  <xsd:sequence>
    <xsd:element name="Relationship" type="eng300_300:Relationship"
        minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>

```

</xsd:complexType>

The following table describes the elements that are included in the XSD schema for **Dimension**. Those elements common to all major objects are described in section 2.2.4.2.2.1.

| Element | Read-Only | Default value | Description |
|---------------|-----------|---------------|--|
| Source | | Empty | <p>The source is of type Binding. However, one of the following derived types MUST be used:</p> <ul style="list-style-type: none"> ▪ DataSourceViewBinding ▪ DimensionBinding ▪ CubeDimensionBinding ▪ TimeBinding |
| MiningModelID | | Empty | <p>The ID of a MiningModel. Used by data mining dimensions.</p> <p>For data mining dimensions, the Source element of the dimension MUST be of type DataSourceView binding, and the DataSourceViewID property of the DataSourceViewBinding MUST be set to the value ".".</p> |
| Type | | "Regular" | <p>An enumeration value that provides both the server and client applications with information about the contents of the dimension.</p> <p>Enumeration values can be informative only; however, a server MAY<56> implement behavior for specific enumeration values. The enumeration values are as follows:</p> <ul style="list-style-type: none"> ▪ Regular – The dimension is a regular dimension. ▪ Time – The dimension is a time dimension. ▪ Geography – The dimension contains geographical information. ▪ Organization – The dimension contains organizational information. ▪ BillOfMaterials – The dimension contains bill of materials information. ▪ Accounts – The dimension contains account-related information. ▪ Customers – The dimension contains customer-related information. ▪ Products – The dimension contains product-related information. ▪ Scenario – The dimension contains scenario-related information. ▪ Quantitative – The dimension contains |

| Element | Read-Only | Default value | Description |
|----------------------|-----------|---------------|--|
| | | | <p>quantitative information.</p> <ul style="list-style-type: none"> ▪ Utility – The dimension contains utility information. ▪ Currency – The dimension contains currency information. ▪ Rates – The dimension contains exchange rate information. ▪ Channel – The dimension contains channel information. ▪ Promotion – The dimension contains promotion-related information. |
| UnknownMember | | "None" | <p>When referential integrity (RI) violations or null foreign keys are encountered, the server MAY impute an "unknown member". This enumeration defines whether and how the UnknownMember is exposed.</p> <ul style="list-style-type: none"> ▪ Visible – The unknown member exists and is displayed. Its value is "Unknown Member". ▪ AutomaticNull - If the dimension is a reference dimension and the relationship has an RI violation, the unknown member is visible and is displayed. Otherwise, the unknown member does not exist. Its value is null. The UnknownMemberName property is ignored. <p>If the AutomaticNull value is used in an instance document, the valuens attribute MUST be used.</p> <ul style="list-style-type: none"> ▪ Hidden – The unknown member exists but is not displayed. ▪ None – The unknown member does not exist for the dimension. |
| MdxMissingMemberMode | | "Default" | Determines how missing members are handled for MDX statements. For more information, see [MSDN-MDXR]. |
| ErrorConfiguration | | Empty | Allows configuration of processing errors. |
| StorageMode | | "Molap" | Determines the storage mode for the dimension. Applies to all attributes of the dimension. |
| WriteEnabled | | False | <p>When true, indicates that dimension writebacks are available (subject to security permissions); otherwise, false.</p> <p>For more information about dimension writebacks, see [MSFT-WBDIM].</p> |

| Element | Read-Only | Default value | Description |
|--------------------------------|-----------|---------------|---|
| ProcessingPriority | | Zero | An integer that determines the priority for processing. |
| LastProcessed | Yes | | The date and time when the dimension was last processed. |
| DimensionPermissions | | Empty | A collection of objects of type DimensionPermission. |
| DependsOnDimensionID | | Empty | Provides the ID of any other dimension that this dimension is dependent upon. |
| Language | | Empty | The LCID of the language to use by default. See [MS-LCID] for information about LCIDs. If empty, the server will determine the language to use.<57> |
| Collation | | Empty | The collation sequence. |
| UnknownMemberName | | "Unknown" | The caption for UnknownMember in DefaultLanguage the default language. |
| UnknownMemberTranslation | | Empty | A collection of objects of type Translation that represents the translation for the UnknownMember in different languages. |
| State | Yes | | Contains the current processing state of the dimension. |
| ProactiveCaching | | Empty | Defines proactive caching parameters. |
| ProcessingMode | | "Regular" | Indicates whether the instance indexes and aggregates during or after processing. The enumeration values are as follows: <ul style="list-style-type: none"> Regular - The instance indexes and performs aggregations during processing. LazyAggregations - The instance indexes and performs aggregations after processing. |
| ProcessingGroup | | "ByAttribute" | Indicates how the dimension is grouped during processing. Controls what kind of SQL queries are sent to the source data repository. |
| CurrentStorageMode | Yes | | The actual current storage mode for dimension. When the enumeration value is "InMemory", the valuens attribute MUST be included. |
| Translations | | Empty | A collection of Translation objects. |
| Attributes | | Empty | A collection of Attribute objects. |
| AttributeAllMemberName | | Empty | Contains the caption in the default language for the All member of a Hierarchy element. |
| AttributeAllMemberTranslations | | Empty | A collection of Translation objects for the AttributeAllMemberName . |
| Hierarchies | | Empty | A collection of Hierarchy objects. |

| Element | Read-Only | Default value | Description |
|---------------------------------------|-----------|---------------|---|
| ProcessingRecommendation | Yes | | An enumeration value that the system uses to indicate whether the Dimension is stale and needs to be processed. |
| StringStoresCompatibilityLevel | | 1050 | An enumeration value that specifies the string store compatibility level that is instituted the next time the object is processed. The valid values are the following: <ul style="list-style-type: none"> 1050 – Standard string handling. 1100 – Enhanced string handling.<58> |
| CurrentStringStoresCompatibilityLevel | Yes | 1050 | An enumeration value that specifies the string store compatibility level that is currently in effect. The interpretation of the values is the same as for StringStoresCompatibilityLevel . |

2.2.4.2.2.8.1 (Updated Section) DimensionAttribute

The **DimensionAttribute** complex type represents an attribute of a dimension.

```

<xsd:complexType name="DimensionAttribute">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Type" minOccurs="0">
      <xsd:complexType>
        <xsd:simpleContent>
          <xsd:extension base="DimensionAttributeTypeEnumType">
            <xsd:attribute name="valuens" >
              <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                  <xsd:enumeration value="http://schemas.microsoft.com/analysisservices/2010/engine/200/200" />
                </xsd:restriction>
              </xsd:simpleType>
            </xsd:attribute>
          </xsd:extension>
        </xsd:simpleContent>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Usage" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Regular" />
          <xsd:enumeration value="Key" />
          <xsd:enumeration value="Parent" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Source" type="Binding" minOccurs="0" />
    <xsd:element name="EstimatedCount" type="xsd:long" minOccurs="0"/>
    <xsd:element name="KeyColumns" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="KeyColumn" type="DataItem" minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</complexType>

```

```

    </xsd:complexType>
  </xsd:element>
  <xsd:element name="NameColumn" type="DataItem" minOccurs="0" />
  <xsd:element name="ValueColumn" type="DataItem" minOccurs="0" />
  <xsd:element name="Translations" minOccurs="0">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="Translation" type="AttributeTranslation" minOccurs="0"
          maxOccurs="unbounded"/>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>
  <xsd:element name="AttributeRelationships" minOccurs="0">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="AttributeRelationship" type="AttributeRelationship"
          minOccurs="0" maxOccurs="unbounded"/>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>
  <xsd:element name="DiscretizationMethod" minOccurs="0">
    <xsd:simpleType>
      <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="None" />
        <xsd:enumeration value="Automatic" />
        <xsd:enumeration value="EqualAreas" />
        <xsd:enumeration value="Clusters" />
        <xsd:enumeration value="Thresholds" />
        <xsd:enumeration value="UserDefined" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="DiscretizationBucketCount" type="xsd:integer" minOccurs="0"/>
  <xsd:element name="RootMemberIf" minOccurs="0">
    <xsd:simpleType>
      <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="ParentIsBlankSelfOrMissing" />
        <xsd:enumeration value="ParentIsBlank" />
        <xsd:enumeration value="ParentIsSelf" />
        <xsd:enumeration value="ParentIsMissing" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="OrderBy" minOccurs="0">
    <xsd:simpleType>
      <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="Key" />
        <xsd:enumeration value="Name" />
        <xsd:enumeration value="AttributeKey" />
        <xsd:enumeration value="AttributeName" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="DefaultMember" type="xsd:string" minOccurs="0"/>
  <xsd:element name="OrderByAttributeID" type="xsd:string" minOccurs="0"/>
  <xsd:element name="SkippedLevelsColumn" type="DataItem" minOccurs="0" />
  <xsd:element name="NamingTemplate" type="xsd:string" minOccurs="0"/>
  <xsd:element name="MembersWithData" minOccurs="0">
    <xsd:simpleType>
      <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="NonLeafDataHidden" />
        <xsd:enumeration value="NonLeafDataVisible" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="MembersWithDataCaption" type="xsd:string" minOccurs="0"/>
  <xsd:element name="NamingTemplateTranslations" minOccurs="0">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="NamingTemplateTranslation" type="Translation"

```

```

        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:element name="CustomRollupColumn" type="DataItem" minOccurs="0" />
<xsd:element name="CustomRollupPropertiesColumn" type="DataItem"
    minOccurs="0" />
<xsd:element name="UnaryOperatorColumn" type="DataItem" minOccurs="0" />
<xsd:element name="AttributeHierarchyOrdered" type="xsd:boolean"
    minOccurs="0"/>
<xsd:element name="MemberNamesUnique" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="IsAggregatable" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="AttributeHierarchyEnabled" type="xsd:boolean"
    minOccurs="0"/>
<xsd:element name="AttributeHierarchyOptimizedState" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="FullyOptimized" />
            <xsd:enumeration value="NotOptimized" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="AttributeHierarchyVisible" type="xsd:boolean"
    minOccurs="0"/>
<xsd:element name="AttributeHierarchyDisplayFolder" type="xsd:string"
    minOccurs="0"/>
<xsd:element name="KeyUniquenessGuarantee" type="xsd:boolean"
    minOccurs="0"/>
<xsd:element name="GroupingBehavior" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="EncourageGrouping" />
            <xsd:enumeration value="DiscourageGrouping" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="InstanceSelection" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="None" />
            <xsd:enumeration value="DropDown" />
            <xsd:enumeration value="List" />
            <xsd:enumeration value="FilteredList" />
            <xsd:enumeration value="MandatoryFilter" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="Annotations" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<xsd:element name="ProcessingState" minOccurs="0" >
    <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="Processed" />
            <xsd:enumeration value="Unprocessed" />
            <xsd:enumeration value="InvalidExpression" />
            <xsd:enumeration value="CalculationError" />
            <xsd:enumeration value="DependencyError" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="AttributeHierarchyProcessingState"
    type="eng300:AttributeHierarchyProcessingState"
    minOccurs="0" >
    <xsd:simpleType>

```



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        <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="Processed" />
            <xsd:enumeration value="Unprocessed" />
            <xsd:enumeration value="DependencyError" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="VisualizationProperties"
    type="eng300:DimensionAttributeVisualizationProperties"
    minOccurs="0" maxOccurs="1"/>
    <xsd:element name="ExtendedType" type="xsd:string" minOccurs="0" maxOccurs="1"/>
</xsd:all>
</xsd:complexType>

<xsd:simpleType name="DimensionAttributeTypeEnum">
    <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="Account" />
        <xsd:enumeration value="AccountName" />
        <xsd:enumeration value="AccountNumber" />
        <xsd:enumeration value="AccountType" />
        <xsd:enumeration value="Address" />
        <xsd:enumeration value="AddressBuilding" />
        <xsd:enumeration value="AddressCity" />
        <xsd:enumeration value="AddressCountry" />
        <xsd:enumeration value="AddressFax" />
        <xsd:enumeration value="AddressFloor" />
        <xsd:enumeration value="AddressHouse" />
        <xsd:enumeration value="AddressPhone" />
        <xsd:enumeration value="AddressQuarter" />
        <xsd:enumeration value="AddressRoom" />
        <xsd:enumeration value="AddressStateOrProvince" />
        <xsd:enumeration value="AddressStreet" />
        <xsd:enumeration value="AddressZip" />
        <xsd:enumeration value="BomResource" />
        <xsd:enumeration value="Caption" />
        <xsd:enumeration value="CaptionAbbreviation" />
        <xsd:enumeration value="CaptionDescription" />
        <xsd:enumeration value="Channel" />
        <xsd:enumeration value="City" />
        <xsd:enumeration value="Company" />
        <xsd:enumeration value="Continent" />
        <xsd:enumeration value="Country" />
        <xsd:enumeration value="County" />
        <xsd:enumeration value="CurrencyDestination" />
        <xsd:enumeration value="CurrencyIsoCode" />
        <xsd:enumeration value="CurrencyName" />
        <xsd:enumeration value="CurrencySource" />
        <xsd:enumeration value="CustomerGroup" />
        <xsd:enumeration value="CustomerHousehold" />
        <xsd:enumeration value="Customers" />
        <xsd:enumeration value="Date" />
        <xsd:enumeration value="DateCanceled" />
        <xsd:enumeration value="DateDuration" />
        <xsd:enumeration value="DateEnded" />
        <xsd:enumeration value="DateModified" />
        <xsd:enumeration value="DateStart" />
        <xsd:enumeration value="DayOfHalfYear" />
        <xsd:enumeration value="DayOfMonth" />
        <xsd:enumeration value="DayOfQuarter" />
        <xsd:enumeration value="DayOfTenDays" />
        <xsd:enumeration value="DayOfTrimester" />
        <xsd:enumeration value="DayOfWeek" />
        <xsd:enumeration value="DayOfYear" />
        <xsd:enumeration value="Days" />
        <xsd:enumeration value="DeletedFlag" />
        <xsd:enumeration value="ExtendedType" />
        <xsd:enumeration value="FiscalDate" />
        <xsd:enumeration value="FiscalDayOfHalfYear" />
        <xsd:enumeration value="FiscalDayOfMonth" />
        <xsd:enumeration value="FiscalDayOfQuarter" />
    </xsd:restriction>
</xsd:simpleType>

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```
<xsd:enumeration value="FiscalDayOfTrimester" />
<xsd:enumeration value="FiscalDayOfWeek" />
<xsd:enumeration value="FiscalDayOfYear" />
<xsd:enumeration value="FiscalHalfYears" />
<xsd:enumeration value="FiscalHalfYearOfYear" />
<xsd:enumeration value="FiscalMonths" />
<xsd:enumeration value="FiscalMonthOfHalfYear" />
<xsd:enumeration value="FiscalMonthOfQuarter" />
<xsd:enumeration value="FiscalMonthOfTrimester" />
<xsd:enumeration value="FiscalMonthOfYear" />
<xsd:enumeration value="FiscalQuarters" />
<xsd:enumeration value="FiscalQuarterOfHalfYear" />
<xsd:enumeration value="FiscalQuarterOfYear" />
<xsd:enumeration value="FiscalTrimesters" />
<xsd:enumeration value="FiscalTrimesterOfYear" />
<xsd:enumeration value="FiscalWeeks" />
<xsd:enumeration value="FiscalWeekOfHalfYear" />
<xsd:enumeration value="FiscalWeekOfMonth" />
<xsd:enumeration value="FiscalWeekOfQuarter" />
<xsd:enumeration value="FiscalWeekOfTrimester" />
<xsd:enumeration value="FiscalWeekOfYear" />
<xsd:enumeration value="FiscalYears" />
<xsd:enumeration value="FormattingColor" />
<xsd:enumeration value="FormattingFont" />
<xsd:enumeration value="FormattingFontEffects" />
<xsd:enumeration value="FormattingFontSize" />
<xsd:enumeration value="FormattingOrder" />
<xsd:enumeration value="FormattingSubtotal" />
<xsd:enumeration value="GeoBoundaryBottom" />
<xsd:enumeration value="GeoBoundaryFront" />
<xsd:enumeration value="GeoBoundaryLeft" />
<xsd:enumeration value="GeoBoundaryPolygon" />
<xsd:enumeration value="GeoBoundaryRear" />
<xsd:enumeration value="GeoBoundaryRight" />
<xsd:enumeration value="GeoBoundaryTop" />
<xsd:enumeration value="GeoCentroidX" />
<xsd:enumeration value="GeoCentroidY" />
<xsd:enumeration value="GeoCentroidZ" />
<xsd:enumeration value="HalfYears" />
<xsd:enumeration value="HalfYearOfYear" />
<xsd:enumeration value="Hours" />
<xsd:enumeration value="ID" />
<xsd:enumeration value="Image" />
<xsd:enumeration value="ImageBmp" />
<xsd:enumeration value="ImageGif" />
<xsd:enumeration value="ImageJpg" />
<xsd:enumeration value="ImagePng" />
<xsd:enumeration value="ImageTiff" />
<xsd:enumeration value="ImageUrl" />
<xsd:enumeration value="IsHoliday" />
<xsd:enumeration value="Iso8601Date" />
<xsd:enumeration value="Iso8601DayOfWeek" />
<xsd:enumeration value="Iso8601DayOfYear" />
<xsd:enumeration value="Iso8601Weeks" />
<xsd:enumeration value="Iso8601WeekOfYear" />
<xsd:enumeration value="Iso8601Years" />
<xsd:enumeration value="IsPeakDay" />
<xsd:enumeration value="IsWeekDay" />
<xsd:enumeration value="IsWorkingDay" />
<xsd:enumeration value="ManufacturingDate" />
<xsd:enumeration value="ManufacturingDayOfHalfYear" />
<xsd:enumeration value="ManufacturingDayOfMonth" />
<xsd:enumeration value="ManufacturingDayOfQuarter" />
<xsd:enumeration value="ManufacturingDayOfWeek" />
<xsd:enumeration value="ManufacturingDayOfYear" />
<xsd:enumeration value="ManufacturingHalfYears" />
<xsd:enumeration value="ManufacturingHalfYearOfYear" />
<xsd:enumeration value="ManufacturingMonths" />
<xsd:enumeration value="ManufacturingMonthOfHalfYear" />
<xsd:enumeration value="ManufacturingMonthOfQuarter" />
```

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<xsd:enumeration value="ManufacturingMonthOfYear" />
<xsd:enumeration value="ManufacturingQuarters" />
<xsd:enumeration value="ManufacturingQuarterOfHalfYear" />
<xsd:enumeration value="ManufacturingQuarterOfYear" />
<xsd:enumeration value="ManufacturingWeeks" />
<xsd:enumeration value="ManufacturingWeekOfHalfYear" />
<xsd:enumeration value="ManufacturingWeekOfMonth" />
<xsd:enumeration value="ManufacturingWeekOfQuarter" />
<xsd:enumeration value="ManufacturingWeekOfYear" />
<xsd:enumeration value="ManufacturingYears" />
<xsd:enumeration value="Minutes" />
<xsd:enumeration value="Months" />
<xsd:enumeration value="MonthOfHalfYear" />
<xsd:enumeration value="MonthOfQuarter" />
<xsd:enumeration value="MonthOfTrimester" />
<xsd:enumeration value="MonthOfYear" />
<xsd:enumeration value="OrganizationalUnit" />
<xsd:enumeration value="OrgTitle" />
<xsd:enumeration value="PercentOwnership" />
<xsd:enumeration value="PercentVoteRight" />
<xsd:enumeration value="Person" />
<xsd:enumeration value="PersonContact" />
<xsd:enumeration value="PersonDemographic" />
<xsd:enumeration value="PersonFirstName" />
<xsd:enumeration value="PersonFullName" />
<xsd:enumeration value="PersonLastName" />
<xsd:enumeration value="PersonMiddleName" />
<xsd:enumeration value="PhysicalColor" />
<xsd:enumeration value="PhysicalDensity" />
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<xsd:enumeration value="PhysicalHeight" />
<xsd:enumeration value="PhysicalSize" />
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<xsd:enumeration value="PhysicalWeight" />
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<xsd:enumeration value="ProductBrand" />
<xsd:enumeration value="ProductCategory" />
<xsd:enumeration value="ProductGroup" />
<xsd:enumeration value="ProductSKU" />
<xsd:enumeration value="Project" />
<xsd:enumeration value="ProjectCode" />
<xsd:enumeration value="ProjectCompletion" />
<xsd:enumeration value="ProjectEndDate" />
<xsd:enumeration value="ProjectName" />
<xsd:enumeration value="ProjectStartDate" />
<xsd:enumeration value="Promotion" />
<xsd:enumeration value="QtyRangeHigh" />
<xsd:enumeration value="QtyRangeLow" />
<xsd:enumeration value="Quantitative" />
<xsd:enumeration value="Quarters" />
<xsd:enumeration value="QuarterOfHalfYear" />
<xsd:enumeration value="QuarterOfYear" />
<xsd:enumeration value="Rate" />
<xsd:enumeration value="RateType" />
<xsd:enumeration value="Region" />
<xsd:enumeration value="Regular" />
<xsd:enumeration value="RelationToParent" />
<xsd:enumeration value="ReportingDate" />
<xsd:enumeration value="ReportingDayOfHalfYear" />
<xsd:enumeration value="ReportingDayOfMonth" />
<xsd:enumeration value="ReportingDayOfQuarter" />
<xsd:enumeration value="ReportingDayOfTrimester" />
<xsd:enumeration value="ReportingDayOfWeek" />
<xsd:enumeration value="ReportingDayOfYear" />
<xsd:enumeration value="ReportingHalfYears" />
<xsd:enumeration value="ReportingHalfYearOfYear" />
<xsd:enumeration value="ReportingMonths" />

```

```

<xsd:enumeration value="ReportingMonthOfHalfYear" />
<xsd:enumeration value="ReportingMonthOfQuarter" />
<xsd:enumeration value="ReportingMonthOfTrimester" />
<xsd:enumeration value="ReportingMonthOfYear" />
<xsd:enumeration value="ReportingQuarters" />
<xsd:enumeration value="ReportingQuarterOfHalfYear" />
<xsd:enumeration value="ReportingQuarterOfYear" />
<xsd:enumeration value="ReportingTrimesters" />
<xsd:enumeration value="ReportingTrimesterOfYear" />
<xsd:enumeration value="ReportingWeeks" />
<xsd:enumeration value="ReportingWeekOfHalfYear" />
<xsd:enumeration value="ReportingWeekOfMonth" />
<xsd:enumeration value="ReportingWeekOfQuarter" />
<xsd:enumeration value="ReportingWeekOfTrimester" />
<xsd:enumeration value="ReportingWeekOfYear" />
<xsd:enumeration value="ReportingYears" />
<xsd:enumeration value="Representative" />
<xsd:enumeration value="RowNumber" />
<xsd:enumeration value="ScdEndDate" />
<xsd:enumeration value="ScdOriginalID" />
<xsd:enumeration value="ScdStartDate" />
<xsd:enumeration value="ScdStatus" />
<xsd:enumeration value="Scenario" />
<xsd:enumeration value="Seconds" />
<xsd:enumeration value="Sequence" />
<xsd:enumeration value="ShortCaption" />
<xsd:enumeration value="StateOrProvince" />
<xsd:enumeration value="TenDay" />
<xsd:enumeration value="TenDayOfHalfYear" />
<xsd:enumeration value="TenDayOfMonth" />
<xsd:enumeration value="TenDayOfQuarter" />
<xsd:enumeration value="TenDayOfTrimester" />
<xsd:enumeration value="TenDayOfYear" />
<xsd:enumeration value="Trimesters" />
<xsd:enumeration value="TrimesterOfYear" />
<xsd:enumeration value="UndefinedTime" />
<xsd:enumeration value="Utility" />
<xsd:enumeration value="Version" />
<xsd:enumeration value="WebHtml" />
<xsd:enumeration value="WebMailAlias" />
<xsd:enumeration value="WebUrl" />
<xsd:enumeration value="WebXmlOrXsl" />
<xsd:enumeration value="WeekOfYear" />
<xsd:enumeration value="Weeks" />
<xsd:enumeration value="WinterSummerSeason" />
<xsd:enumeration value="Years" />
</xsd:restriction>
</xsd:simpleType>

```

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------------------|---|
| Name | | [Required] | The object name. |
| ID | | Defaults to Name . | The object ID string. |
| Description | | Empty | The object description. |
| Type | | "Regular" | The type of the Attribute . The values that are specified in the enumeration allow the tagging of a DimensionAttribute with a standard code. However, the codes do not carry a specific definition and can be used |

| Element | Read-Only | Default value | Description |
|----------------|-----------|---|--|
| | | | within organizations for any purpose. These codes do not change processing by the server. If the value "RowNumber" is used for the Type element, the valuens attribute MUST be present. |
| Usage | | "Regular" | An enumeration value that indicates whether the Attribute is a key, parent, or regular. If the usage of the attribute is as a key, the Usage element MUST be specified as "Key". Otherwise, the Usage element is optional and has a default value of "Regular". |
| Source | | Empty | Source is of type Binding . However, one of the following types MUST be used: AttributeBinding UserDefinedGroupBinding MeasureBinding CalculatedMeasureBinding CubeAttributeBinding TimeAttributeBinding |
| EstimatedCount | | Empty | The estimated number of distinct values of the attribute. |
| KeyColumns | | [Required] | A collection of objects of type DataItem . Every attribute needs to have at least one KeyColumn collection that defines the KeyColumn(s) for this Attribute's data. The Source element within the DataItem MUST be one of the following types: AttributeBinding MeasureBinding CalculatedMeasureBinding CubeAttributeBinding TimeAttributeBinding RowNumberBinding CubeDimensionBinding ColumnBinding RowBinding InheritedBinding ExpressionBinding |
| NameColumn | | Defaults to KeyColumn (if non-composite) with String data type. | A collection of objects of type DataItem . Defines column(s) that will be used for the Names of Attribute members. The Source element within the DataItem MUST be one of the following types: AttributeBinding MeasureBinding |

| Element | Read-Only | Default value | Description |
|---------------------------|-----------|---|---|
| | | | <p>CalculatedMeasureBinding</p> <p>CubeAttributeBinding</p> <p>TimeAttributeBinding</p> <p>RowNumberBinding</p> <p>CubeDimensionBinding</p> <p>ColumnBinding</p> <p>RowBinding</p> <p>InheritedBinding</p> |
| ValueColumn | | Defaults to NameColumn (if specified), or else KeyColumn (if non-composite) | <p>A collection of objects of type DataItem. Defines column(s) that will be used for the Names of Attribute members. The Source element within the DataItem MUST be one of the following types:</p> <p>AttributeBinding</p> <p>MeasureBinding</p> <p>CalculatedMeasureBinding</p> <p>CubeAttributeBinding</p> <p>TimeAttributeBinding</p> <p>RowNumberBinding</p> <p>CubeDimensionBinding</p> <p>ColumnBinding</p> <p>RowBinding</p> <p>InheritedBinding</p> |
| Translations | | Empty | A collection of Translation objects. |
| AttributeRelationships | | Empty | A collection of AttributeRelationship objects. |
| DiscretizationMethod | | "None" | The discretization method that will be applied to the attribute. |
| DiscretizationBucketCount | | Empty | The number of buckets in which to discretize. |
| RootMemberIf | | "ParentIsBlankSelfOrMissing" | <p>Defines the means of indicating the topmost members of a parent-child hierarchy. Applicable only if Usage = Parent. The enumeration values are as follows:</p> <p>ParentIsBlankSelfOrMissing - Only members that meet one or more of the conditions described for ParentIsBlank, ParentIsSelf, or ParentIsMissing are treated as root members.</p> <p>ParentIsBlank - Only members with a null, a zero, or an empty string in the key columns represented by the KeyColumns collection of DimensionAttribute are treated as root members.</p> <p>ParentIsSelf - Only members with themselves as parents are treated as</p> |

| Element | Read-Only | Default value | Description |
|------------------------------|-----------|----------------------|---|
| | | | root members. ParentIsMissing - Only members with parents that cannot be found are treated as root members. |
| OrderBy | | "Name" | The column by which the attribute will be ordered. |
| DefaultMember | | Empty | An MDX expression describing the Default Member . |
| OrderByAttributeID | | Empty | The ID of another attribute by which to order this attribute (only allowed if OrderBy = AttributeKey or AttributeName). |
| SkippedLevelsColumn | | Empty | A collection of objects of type DataItem that provides the details of column(s) that stores the number of skipped (empty) levels between each member and its parent. The Source element within the DataItem MUST be one of the following types: ColumnBinding AttributeBinding |
| NamingTemplate | | Empty | A string that defines a template for how levels in a parent-child hierarchy are named. Applicable only if Usage = Parent . |
| MembersWithData | | "NonLeafDataVisible" | Used only by parent attributes to determine whether to display data members for nonleaf members in the parent attribute. Applicable only if Usage = Parent . |
| MembersWithDataCaption | | Empty | Provides a template string that is used to create captions for system-generated data members. Applicable only if Usage = Parent . |
| NamingTemplateTranslations | | Empty | Provides a template for naming levels of a parent-child hierarchy. Applicable only if Usage = Parent . |
| CustomRollupColumn | | Empty | An object of type DataItem that defines the details of a column that provides a custom rollup formula. The Source element within the DataItem MUST be one of the following types: ColumnBinding AttributeBinding |
| CustomRollupPropertiesColumn | | Empty | A collection of objects of type DataItem . Collection that defines the details of column(s) providing properties of the custom rollup. The Source element within the DataItem MUST be one of the following types: |

| Element | Read-Only | Default value | Description |
|-----------------------------------|-----------|------------------|---|
| | | | ColumnBinding AttributeBinding |
| UnaryOperatorColumn | | Empty | An object of type DataItem that defines the details of a column that provides a unary operator. Applicable only if Usage = Parent . The Source element within the DataItem MUST be one of the following types: ColumnBinding AttributeBinding |
| AttributeHierarchyOrdered | | True | When true, indicates that AttributeHierarchiesattribute hierarchies are ordered; otherwise, false. |
| MemberNamesUnique | | False | When true, indicates that Member names are unique; otherwise, false. |
| IsAggregatable | | True | When true, indicates that this Attribute is aggregatable; otherwise, false. |
| AttributeHierarchyEnabled | | True | When true, indicates that an AttributeHierarchyattribute hierarchy is enabled for this attribute; otherwise, false. If the DimensionAttribute is used as a MeasureGroupAttribute with Type=Granularity , the AttributeHierarchyEnabled element MUST be set to True. |
| AttributeHierarchyOptimized State | | "FullyOptimized" | Indicates the type of optimization for this AttributeHierarchyattribute hierarchy . The following values are allowed: <ul style="list-style-type: none"> "FullyOptimized" - Indexes are built for the AttributeHierarchyattribute hierarchy. "NotOptimized" - Indexes are not built for the AttributeHierarchyattribute hierarchy. |
| AttributeHierarchyVisible | | True | When true, indicates that an AttributeHierarchyattribute hierarchy is visible; otherwise, false. |
| AttributeHierarchyDisplayFolder | | Empty | Indicates the name of the AttributeHierarchyattribute hierarchy display folder. |
| KeyUniquenessGuarantee | | False | When true, indicates that the relationship between the attribute key and its name, and the relationship to related attributes, is guaranteed to be |

| Element | Read-Only | Default value | Description |
|------------------------------------|-----------|---------------------|--|
| | | | valid; otherwise, false. |
| GroupingBehavior | | "EncourageGrouping" | Indicates which type of GroupingBehavior will be applied to this Attribute . |
| InstanceSelection | | "None" | Provides a hint to client applications to suggest how a list of items is to be displayed, based on the expected number of items in the list. |
| Annotations | | Empty | Collection A collection of Annotation objects. |
| ProcessingState | Yes | | Represents the processing state of the attribute. For calculated columns, any of the five available enumeration values can appear. Attributes that are not calculated columns can have only the values Processed or Unprocessed .<59> |
| AttributeHierarchyProcessing State | Yes | | Represents the processing state of the attribute.<60> |
| VisualizationProperties | | | A complex type that specifies a set of properties for visualization of the DimensionAttribute . |
| ExtendedType | | "None" | When a client needs to set the Type property of the DimensionAttribute to a value other than one of the enum values (for example, <i>ABC</i>) that is provided by DimensionAttributeTypeEnumType , <61> the client MUST first set the Type property of the DimensionAttribute to ExtendedType and then assign the value (<i>ABC</i>) to the ExtendedType property.<62> |

2.2.4.2.2.8.1.1 AttributeRelationship

This complex type represents a relationship between two attributes in a dimension.

```
<xsd:complexType name="AttributeRelationship">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string" />
    <xsd:element name="RelationshipType" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Rigid" />
          <xsd:enumeration value="Flexible" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Cardinality" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
```

```

        <xsd:enumeration value="Many" />
        <xsd:enumeration value="One" />
    </xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="Optionality" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="Mandatory" />
            <xsd:enumeration value="Optional" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="OverrideBehavior" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="None" />
            <xsd:enumeration value="Strong" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="Annotations" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<xsd:element name="Name" type="xsd:string" minOccurs="0" />
<xsd:element name="Visible" type="xsd:boolean" minOccurs="0" />
<xsd:element name="Translations" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Translation" type="Translation" minOccurs="0"
                maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|------------------|-----------|-----------------------------------|--|
| AttributeID | | [Required] | The ID for the object. |
| RelationshipType | | "Flexible" | Indicates whether the attribute relationship is Flexible or Rigid. Flexible and rigid relationships are enforced. Flexible relationships can change over time. Rigid relationships cannot. |
| Cardinality | | "Many" | Indicates if the related attribute has a many-to-one or one-to-one relationship with this attribute. |
| Optionality | | "Mandatory" | Indicates if each member in a related attribute is associated with at least one member in this attribute. |
| OverrideBehavior | | "Strong" | Indicates the override behavior of the relationship described by an AttributeRelationship element. Dictates how positioning on one attribute affects the position of the other. |
| Annotation | | Empty | A collection of Annotation objects. |
| Name | | Default is to use Attribute name. | The name of the AttributeRelationship . |

| Element | Read-Only | Default value | Description |
|--------------|-----------|---------------|---|
| Visible | | True | When true, indicates that the relationship is visible to clients; otherwise, false. |
| Translations | | Empty | A collection of Translation objects. |

2.2.4.2.2.8.1.2 DimensionAttributeVisualizationProperties

The **DimensionAttributeVisualizationProperties** complex type specifies visualization properties for a calculated result. This type is defined in the **eng300** namespace.

The following is the XSD for the **DimensionAttributeVisualizationProperties** complex type.

```
<xsd:complexType name="DimensionAttributeVisualizationProperties">
  <xsd:sequence>
    <xsd:element name="FolderPosition" type="xsd:integer"
      minOccurs="0" maxOccurs="1" default="-1"/>
    <xsd:element name="ContextualNameRule" minOccurs="0" maxOccurs="1" default="None">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Context" />
          <xsd:enumeration value="Merge" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Alignment" minOccurs="0" maxOccurs="1" default="Default">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Default" />
          <xsd:enumeration value="Left" />
          <xsd:enumeration value="Right" />
          <xsd:enumeration value="Center" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="IsFolderDefault" type="xsd:boolean"
      minOccurs="0" maxOccurs="1" default="false"/>
    <xsd:element name="IsRightToLeft" type="xsd:boolean"
      minOccurs="0" maxOccurs="1" default="false"/>
    <xsd:element name="SortDirection" minOccurs="0" maxOccurs="1" default="Default">
      <xsd:simpleType >
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Default" />
          <xsd:enumeration value="Ascending" />
          <xsd:enumeration value="Descending" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Units" type="xsd:string" minOccurs="0" maxOccurs="1" default=""/>
    <xsd:element name="Width" type="xsd:integer" minOccurs="0" maxOccurs="1" default="-1"/>
    <xsd:element name="DefaultDetailsPosition" type="xsd:integer"
      minOccurs="0" maxOccurs="1" default="-1"/>
    <xsd:element name="CommonIdentifierPosition" type="xsd:integer"
      minOccurs="0" maxOccurs="1" default="-1"/>
    <xsd:element name="SortPropertiesPosition" type="xsd:integer"
      minOccurs="0" maxOccurs="1" default="-1"/>
    <xsd:element name="DisplayKeyPosition" type="xsd:integer"
      minOccurs="0" maxOccurs="1" default="-1"/>
    <xsd:element name="IsDefaultImage" type="xsd:boolean"
      minOccurs="0" maxOccurs="1" default="false"/>
    <xsd:element name="DefaultAggregateFunction">

```

```

        minOccurs="0" maxOccurs="1" default="Default">
<xsd:simpleType>
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Default" />
    <xsd:enumeration value="None" />
    <xsd:enumeration value="Sum" />
    <xsd:enumeration value="Min" />
    <xsd:enumeration value="Max" />
    <xsd:enumeration value="Count" />
    <xsd:enumeration value="Average" />
  </xsd:restriction>
</xsd:simpleType>
</xsd:element>
</xsd:sequence>
</xsd:complexType>

```

| Element | Read-only | Default value | Description |
|--------------------|-----------|---------------|---|
| FolderPosition | | -1 | Provides a hint to client applications to suggest the position this attribute might hold among the other elements that share the same display folder (AttributeTranslation). |
| ContextualNameRule | | "None" | Provides a hint to client applications to suggest how to create unambiguous names for this attribute. The following values are allowed: <ul style="list-style-type: none"> "None" – Use the attribute name "Context" – Use the incoming relationship name. "Merge" – Attending to language grammar, concatenate the incoming relationship name and the attribute name. |
| Alignment | | "Default" | Provides a hint to client applications to suggest how to justify this attribute when displayed. The following values are allowed: <ul style="list-style-type: none"> "Default" – Use the alignment that is appropriate for the attribute's data type. "Left" – Align left. "Right" – Align right. "Center" – Center. |
| IsFolderDefault | | False | Provides a hint to client applications that this attribute is representative of its display folder. |
| IsRightToLeft | | False | Provides a hint to client applications that this attribute is to be displayed right-to-left. |
| SortDirection | | "Default" | Provides a hint to client applications to suggest how to sort instances of this attribute. The following values are allowed: <ul style="list-style-type: none"> "Default" – Use the sort direction that is appropriate for the attribute's data type. "Ascending" – Sort in ascending order. "Descending" – Sort in descending order. |

| Element | Read-only | Default value | Description |
|--------------------------|-----------|---------------|--|
| Units | | Empty | Provides a hint to client applications that specifies a string to be associated with the values of this attribute. |
| Width | | -1 | Provides a hint to client applications that suggests the length (in characters) to reserve to display this attribute. |
| DefaultDetailsPosition | | -1 | Provides the ability to place this attribute in the Default Details collection of the Dimension. This collection is an ordered set of DimensionAttribute types, CalculationProperty types, and Relationship Ends. A positive value indicates participation in the collection. The collection is sorted in ascending order of this element. |
| CommonIdentifierPosition | | -1 | Provides the ability to place this attribute in the Common Identifier collection of the Dimension . This collection is an ordered set of DimensionAttribute types and Relationship Ends . Client applications can interpret this collection as a suggestion to use such items to perform a multi-column sort on this Dimension . A positive value indicates participation in the collection. The collection is sorted in ascending order of this element. |
| SortPropertiesPosition | | | Provides the ability to place this attribute in the Sort Properties collection of the Dimension . This collection is an ordered set of DimensionAttribute types, CalculationProperty types, and Relationship Ends . Client applications can interpret this collection as a suggestion as to how to perform a multi-column sort on this Dimension . A positive value specifies participation in the collection. The collection is sorted in ascending order of this element. |
| DisplayKeyPosition | | -1 | Provides the ability to place this attribute in the Display Key collection of the Dimension. This collection is an ordered set of DimensionAttribute types and Relationship Ends . Client applications can interpret this collection as a suggestion as to how to perform a multi-column sort on this Dimension . A positive value indicates participation in the collection. The collection is sorted in ascending order of this element. |
| IsDefaultImage | | False | Provides a hint to client applications that this attribute contains an image that is representative of its Dimension instance. |
| DefaultAggregateFunction | | "Default" | Provides a hint to client applications to suggest how to aggregate instances of this attribute. The following values are allowed: <ul style="list-style-type: none"> ▪ "Default" – Use the function that is appropriate for the attribute’s data type. ▪ "None" – Data in this property is not suited for aggregation. ▪ "Sum" – Aggregate this dimension with Sum. ▪ "Min" – Aggregate this dimension with Min. ▪ "Max" – Aggregate this dimension with Max. ▪ "Count" – Aggregate this dimension with Count. |

| Element | Read-only | Default value | Description |
|---------|-----------|---------------|--|
| | | | <ul style="list-style-type: none"> "Average" – Aggregate this dimension with Average. |

2.2.4.2.2.8.2 (Updated Section) Hierarchy

The **Hierarchy** complex type represents a hierarchy in a dimension.

```

<xsd:complexType name="Hierarchy">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element ref="eng300:ProcessingState" minOccurs="0" />
    <xsd:element ref="eng300:StructureType" minOccurs="0" />
    <xsd:element name="DisplayFolder" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Translations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation" type="Translation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="AllMemberName" type="xsd:string" minOccurs="0"/>
    <xsd:element name="AllMemberTranslations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="AllMemberTranslation" type="Translation"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="MemberNamesUnique" type="xsd:boolean" minOccurs="0" />
    <xsd:element ref="eng2:MemberKeysUnique" minOccurs="0" />
    <xsd:element name="AllowDuplicateNames" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="Levels" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Level" type="Level"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="VisualizationProperties"
      type="eng300:HierarchyVisualizationProperties"
      minOccurs="0" maxOccurs="1" />
  </xsd:all>
</xsd:complexType>

```

The **Hierarchy** XSD depends upon element definitions in namespaces other than the default namespace. The following elements are defined in the namespace **eng2**:

```

<xsd:element name="MemberKeysUnique" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="NotUnique" />
      <xsd:enumeration value="Unique" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>

```

The following elements are defined in the namespace **eng300**:

```

<xsd:complexType name="HierarchyVisualizationProperties">
  <xsd:sequence>
    <xsd:element name="ContextualNameRule" minOccurs="0" maxOccurs="1" default="None">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Context" />
          <xsd:enumeration value="Merge" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="FolderPosition" type="xsd:integer"
      minOccurs="0" maxOccurs="1" default="-1"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:element name="ProcessingState" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Processed" />
      <xsd:enumeration value="Unprocessed" />
      <xsd:enumeration value="InvalidExpression" />
      <xsd:enumeration value="DependencyError" />
      <xsd:enumeration value="CalculationError" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>

<xsd:element name="StructureType">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Natural" />
      <xsd:enumeration value="Unnatural" />
      <xsd:enumeration value="Unknown" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>

```

| Element | Read-Only | Default value | Description |
|---------------|-----------|---------------------------|---|
| Name | | [Required] | The object name. |
| ID | | Defaults to Name . | The object ID string. |
| Description | | Empty | The object description. |
| DisplayFolder | | Empty | Defines the display folder for the hierarchy, for use by clients. |
| Translations | | Empty | A collection of Translation objects. |

| Element | Read-Only | Default value | Description |
|---------------------------|------------|---------------|---|
| AllMemberName | | Empty | The caption for AllMember the All member in DefaultLanguage the default language. |
| AllMemberTranslations | | Empty | A collection of Translation objects for the All Member member. |
| MemberNamesUnique | | False | When true, indicates that MemberNames are required to be unique; otherwise, false. |
| MemberKeysUnique | | "NotUnique" | Specifies whether member keys are required to be unique.<63> |
| AllowDuplicateNames | | True | When true, determines that duplicate names are allowed in a Hierarchy element; otherwise, false. |
| Levels | | [Required] | A collection of Level objects. |
| Annotations | | Empty | A collection of Annotation objects. |
| VisualizationProperties | | | A collection of properties that can be used by tools to specify the visualization and enhanced formatting information of the Hierarchy .A collection of HierarchyVisualizationProperties objects. |
| FolderPosition | | -1 | Provides a hint to client applications to suggest the position that this attribute might hold among the other elements that share the same DisplayFolder . |
| ContextualNameRule | | "None" | Provides a hint to client applications to suggest how to create unambiguous names for this attribute. The following values are allowed: <ul style="list-style-type: none"> *—"None"—Use the hierarchy name. *—"Context"—Use the incoming relationship name. *—"Merge"—Attending to language grammar, concatenate the incoming relationship name and the attribute name. |
| ProcessingState | Yes | | Represents the processing state of the hierarchy. Values include: <ul style="list-style-type: none"> *—Processed *—Unprocessed *—InvalidExpression (hence, unprocessed) *—DependencyError (hence, unprocessed) *—CalculationError (hence, unprocessed) |
| StructureType | Yes | | Describes the current hierarchy structure. Values are: <ul style="list-style-type: none"> *—Natural *—Unnatural *—Unknown |

2.2.4.2.2.8.2.1 Level

The **Level** complex type defines a level in a hierarchy.

```
<xsd:complexType name="Level">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="SourceAttributeID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="HideMemberIf" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Never" />
          <xsd:enumeration value="OnlyChildWithNoName" />
          <xsd:enumeration value="OnlyChildWithParentName" />
          <xsd:enumeration value="NoName" />
          <xsd:enumeration value="ParentName" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Translations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation" type="Translation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|-------------------|-----------|--|--|
| Name | | [Required] | The object name. |
| ID | | Defaults to Name . | The object ID string. |
| Description | | Empty | The object description. |
| SourceAttributeID | | Default is for Level to be based on the containing attribute. | The ID of the source attribute on which the level is based. This can be an attribute from a referenced dimension. |
| HideMemberIf | | "Never" | Indicates whether and when a level member is hidden from client applications. The enumeration values are: <ul style="list-style-type: none"> ▪ Never - Members are never hidden. ▪ OnlyChildWithNoName - A member is hidden when it is the only child of its parent and its name is empty. ▪ OnlyChildWithParentName - A member is hidden when it is the only child of its parent and its name is identical |

| Element | Read-Only | Default value | Description |
|--------------|-----------|---------------|--|
| | | | <p>to that of its parent.</p> <ul style="list-style-type: none"> NoName - A member is hidden when its name is empty. ParentName - A member is hidden when its name is identical to that of its parent. |
| Translations | | Empty | A collection of Translation objects. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.8.2.2 (Added Section) **HierarchyVisualizationProperties**

The **HierarchyVisualizationProperties** complex type defines the properties that can be used by tools to specify the visualization and enhanced formatting information of the **Hierarchy**. This type is defined in the **eng300** namespace.

The following is the XSD for the **HierarchyVisualizationProperties** complex type.

```

<xsd:complexType name="HierarchyVisualizationProperties">
  <xsd:sequence>
    <xsd:element name="ContextualNameRule" minOccurs="0" maxOccurs="1" default="None">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Context" />
          <xsd:enumeration value="Merge" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="FolderPosition" type="xsd:integer"
      minOccurs="0" maxOccurs="1" default="-1"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:element name="ProcessingState" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Processed" />
      <xsd:enumeration value="Unprocessed" />
      <xsd:enumeration value="InvalidExpression" />
      <xsd:enumeration value="DependencyError" />
      <xsd:enumeration value="CalculationError" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>

<xsd:element name="StructureType">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Natural" />
      <xsd:enumeration value="Unnatural" />
      <xsd:enumeration value="Unknown" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>

```

| Element | Read-Only | Default value | Description |
|--------------------|-----------|---------------|--|
| FolderPosition | | -1 | Provides a hint to client applications to suggest the position that this attribute might hold among the other elements that share the same DisplayFolder. |
| ContextualNameRule | | "None" | Provides a hint to client applications to suggest how to create unambiguous names for this attribute. The following values are allowed: <ul style="list-style-type: none"> None – Use the hierarchy name. Context – Use the incoming relationship name. Merge – Attending to language grammar, concatenate the incoming relationship name and the attribute name. |
| ProcessingState | Yes | | Represents the processing state of the hierarchy. Values include the following: <ul style="list-style-type: none"> Processed Unprocessed InvalidExpression (hence, unprocessed) DependencyError (hence, unprocessed) CalculationError (hence, unprocessed) |
| StructureType | Yes | | Describes the current hierarchy structure. Values are the following: <ul style="list-style-type: none"> Natural Unnatural Unknown |

2.2.4.2.2.8.3 Relationship

The **Relationship** complex type specifies a relationship between in-memory **Dimensions**.<64>

The following elements are defined in the **eng300_300** namespace.

```

<xsd:complexType name="Relationship">
  <xsd:sequence>
    <xsd:element name="ID" type="xsd:string" />
    <xsd:element name="Visible" type="xsd:boolean" />
    <xsd:element name="FromRelationshipEnd" type="eng300_300:RelationshipEnd" />
    <xsd:element name="ToRelationshipEnd" type="eng300_300:RelationshipEnd" />
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="RelationshipEnd">
  <xsd:sequence>
    <xsd:element name="Role" type="xsd:string"/>
    <xsd:element name="Multiplicity" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">

```

```

        <xsd:enumeration value="One" />
        <xsd:enumeration value="Many" />
    </xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="DimensionID" type="xsd:string"/>
<xsd:element name="Attributes" minOccurs="0" >
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Attribute" minOccurs="0" maxOccurs="unbounded">
                <xsd:complexType>
                    <xsd:sequence>
                        <xsd:element name="AttributeID" type="xsd:string"/>
                    </xsd:sequence>
                </xsd:complexType>
            </xsd:element>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<xsd:element name="Translations" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Translation" type="eng300_300:RelationshipEndTranslation"
                minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<xsd:element name="VisualizationProperties"
    type="eng300:RelationshipEndVisualizationProperties"
    minOccurs="0" maxOccurs="1" />
</xsd:sequence>
</xsd:complexType>

<xsd:complexType name="RelationshipEndTranslation">
    <xsd:all>
        <xsd:element name="Language" type="xsd:unsignedInt"/>
        <xsd:element name="Caption" type="xsd:string" minOccurs="0"/>
        <xsd:element name="CollectionCaption" type="xsd:string"/>
        <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
        <xsd:element name="DisplayFolder" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Annotations" minOccurs="0">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="Annotation" type="eng300_300:Annotation"
                        minOccurs="0" maxOccurs="unbounded"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
    </xsd:all>
</xsd:complexType>

<xsd:complexType name="Annotation">
    <xsd:all>
        <xsd:element name="Name" type="xsd:string"/>
        <xsd:element name="Visibility" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string" >
                    <xsd:enumeration value="SchemaRowset" />
                    <xsd:enumeration value="None" />
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Value" type="xsd:anyType" />
    </xsd:all>
</xsd:complexType>

```

The following elements are defined in the namespace **eng300**:

```

<xsd:complexType name="RelationshipEndVisualizationProperties">
  <xsd:sequence>
    <!-- we do not put displayfolder in visualization properties because
         it already is in plain udm on other objects -->
    <!--<xsd:element name="DisplayFolder" type="xsd:boolean"
         minOccurs="0" maxOccurs="1"/>-->
    <xsd:element name="FolderPosition" type="xsd:integer"
         minOccurs="0" maxOccurs="1" default="-1"/>
    <xsd:element name="ContextualNameRule" minOccurs="0" maxOccurs="1" default="None">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Context" />
          <xsd:enumeration value="Merge" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="DefaultDetailsPosition" type="xsd:integer"
         minOccurs="0" maxOccurs="1" default="-1"/>
    <xsd:element name="DisplayKeyPosition" type="xsd:integer"
         minOccurs="0" maxOccurs="1" default="-1"/>
    <xsd:element name="CommonIdentifierPosition" type="xsd:integer"
         minOccurs="0" maxOccurs="1" default="-1"/>
    <xsd:element name="IsDefaultMeasure" type="xsd:boolean"
         minOccurs="0" maxOccurs="1" default="false"/>
    <xsd:element name="IsDefaultImage" type="xsd:boolean"
         minOccurs="0" maxOccurs="1" default="false"/>
    <xsd:element name="SortPropertiesPosition" type="xsd:integer"
         minOccurs="0" maxOccurs="1" default="-1"/>
  </xsd:sequence>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-------------------------|-----------|---------------|---|
| ID | | [Required] | The object ID string. |
| Visible | | | Provides a hint to client applications that this Relationship is not to be exposed. |
| FromRelationshipEnd | | | A collection of properties that defines the characteristics of the Relationship-End. |
| ToRelationshipEnd | | | A collection of properties that defines the characteristics of the Relationship-End. |
| Role | | | Identifies one end of a one-to-many relationship |
| Multiplicity | | | Indicates whether the RelationshipEnd is at the "one" side or the "many" side of a relationship. The enumeration values are: <ul style="list-style-type: none"> ▪ One – This is the primary key end. ▪ Many – This is the foreign key end. |
| DimensionID | | | The Dimension associated with this end of the relationship. |
| Attributes | | | A collection of DimensionAttribute complex types that denote the columns that are participating in this key. |
| Translations | | Empty | A collection of Translation objects. |
| VisualizationProperties | | | A collection of properties that can be used by tools to specify the set of visualization and enhanced formatting |

| Element | Read-Only | Default value | Description |
|--------------------------|-----------|---------------|--|
| | | | information of the Relationship. |
| Language | | [Required] | The locale ID of the language. For more details on locale identifiers, see [MS-LCID]. |
| Caption | | Empty | The caption of the object in the language represented by the Language element. |
| CollectionCaption | | Empty | The caption of a collection of objects. |
| Description | | Empty | The object description. |
| DisplayFolder | | Empty | The folder in which the object is displayed. |
| Annotations | | Empty | A collection of Annotation objects. |
| FolderPosition | | -1 | Provides a hint to client applications to suggest the position that this relationship might hold among the other elements that share the same display folder. |
| ContextualNameRule | | "None" | Provides a hint to client applications to suggest how to create unambiguous names for this attribute. The following values are allowed: <ul style="list-style-type: none"> "None" – Use the attribute name. "Context" – Use the incoming relationship name. "Merge" – Attending to language grammar, concatenate the incoming relationship name and the attribute name. |
| DefaultDetailsPosition | | -1 | Provides a hint to client applications to suggest the position that this relationship might hold among the other elements that can be used to summarize a record. |
| DisplayKeyPosition | | -1 | Provides a hint to client applications to suggest the position that this relationship might hold among the other user-readable elements that uniquely identify the record. |
| CommonIdentifierPosition | | -1 | Provides a hint to client applications to suggest the position that this relationship might hold among the other common elements that can be used to identify the record. |
| IsDefaultMeasure | | False | An indication if this measure is automatically used to summarize the dimension. |
| IsDefaultImage | | False | An indication if this image is used to represent a record. |
| SortPropertiesPosition | | -1 | Provides the ability to place this relationship in the Sort Properties collection of the Dimension . |

2.2.4.2.2.9 (Updated Section) Cube

The **Cube** complex type represents a cube.

```
<xsd:complexType name="Cube">
  <xsd:all>
    <!--These elements are common to each MajorObject-->
    <xsd:element name="Name" type="xsd:string" />
  </xsd:all>
</xsd:complexType>
```

```

<xsd:element name="ID" type="xsd:string" minOccurs="0" />
<xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
<xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
<xsd:element name="Description" type="xsd:string" minOccurs="0" />
<xsd:element name="Annotations" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Annotation" type="Annotation" minOccurs="0"
        maxOccurs="unbounded" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<!--Extended elements for Cube object-->
<xsd:element name="Language" type="xsd:integer" minOccurs="0"/>
<xsd:element name="Collation" type="xsd:string" minOccurs="0"/>
<xsd:element name="Translations" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Translation" type="Translation" minOccurs="0"
        maxOccurs="unbounded" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Dimensions" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Dimension" type="CubeDimension"
        maxOccurs="unbounded" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="CubePermissions" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="CubePermission" minOccurs="0"
        type="CubePermission" maxOccurs="unbounded" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="MdxScripts" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="MdxScript" type="MdxScript" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Perspectives" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Perspective" type="Perspective" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="State" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="Processed" />
      <xsd:enumeration value="PartiallyProcessed" />
      <xsd:enumeration value="Unprocessed" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DefaultMeasure" type="xsd:string" minOccurs="0"/>
<xsd:element name="Visible" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="MeasureGroups">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="MeasureGroup" type="MeasureGroup" minOccurs="0"

```

```

        maxOccurs="unbounded"/>
    </xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:element name="Source" type="DataSourceViewBinding" minOccurs="0"/>
<xsd:element name="AggregationPrefix" type="xsd:string" minOccurs="0"/>
<xsd:element name="ProcessingPriority" type="xsd:integer" minOccurs="0"/>
<xsd:element name="StorageMode" minOccurs="0">
    <xsd:complexType>
        <xsd:simpleContent>
            <xsd:extension base="CubeStorageModeEnumType">
                <xsd:attribute name="valuens" />
                <xsd:simpleType>
                    <xsd:restriction base="xsd:string">
                        <xsd:enumeration value="http://schemas.microsoft.com/analysisservices/2010/engine/200/200" />
                    </xsd:restriction>
                </xsd:simpleType>
            </xsd:attribute>
        </xsd:extension>
    </xsd:simpleContent>
</xsd:complexType>
</xsd:element>
<xsd:element name="ProcessingMode" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Regular" />
            <xsd:enumeration value="LazyAggregations" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="ScriptCacheProcessingMode" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Regular" />
            <xsd:enumeration value="Lazy" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="ScriptErrorHandlingMode" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:string">
            <xsd:enumeration value="IgnoreNone" />
            <xsd:enumeration value="IgnoreAll" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="eng800:DaxOptimizationMode" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:string">
            <xsd:enumeration value="1" />
            <xsd:enumeration value="0" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="ProactiveCaching" type="ProactiveCaching" minOccurs="0" />
<xsd:element name="Kpis" minOccurs="0" >
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Kpi" type="Kpi" minOccurs="0" maxOccurs="unbounded" />
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<xsd:element name="ErrorConfiguration" type="ErrorConfiguration" minOccurs="0"/>
<xsd:element name="Actions" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>

```



```

        <xsd:element name="Action" minOccurs="0"
            type="Action" maxOccurs="unbounded"/>
    </xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:element name="StorageLocation" type="xsd:string" minOccurs="0"/>
<xsd:element name="EstimatedRows" type="xsd:long" minOccurs="0"/>
<xsd:element name="LastProcessed" type="xsd:dateTime" minOccurs="0"/>
</xsd:all>
</xsd:complexType>

<xsd:simpleType name="CubeStorageModeEnumType">
    <xsd:restriction base="xsd:string">
        <xsd:enumeration value="Molap" />
        <xsd:enumeration value="Rolap" />
        <xsd:enumeration value="Holap" />
        <xsd:enumeration value="InMemory" />
    </xsd:restriction>
</xsd:simpleType>

```

The **Cube** XSD depends upon element definitions in a namespace other than the default namespace.

The following elements are defined in the namespace **eng800**:

```

<xsd:element name="DaxOptimizationMode" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:string">
            <xsd:enumeration value="1" />
            <xsd:enumeration value="0" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>

```

The following table describes the elements that are included in the XSD schema for **Cube**. Those elements common to all major objects are described in section 2.2.4.2.2.1.

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---------------|---|
| Language | | Empty | The LCID of the language to use by default. See [MS-LCID] for information about LCIDs. If empty, the server will determine the language to use.<65> |
| Collation | | Empty | The collation to use by default.<66> |
| Translations | | Empty | A collection of Translation objects. |
| Dimensions | | Empty | A collection of CubeDimension objects. A Dimension MUST NOT have same name as a MeasureGroup. |
| CubePermissions | | Empty | A collection of CubePermission objects. |
| MdxScripts | | Empty | A collection of MdxScript objects. |
| Perspectives | | Empty | A collection of Perspective objects. A perspective is a subset of the features of a cube. A perspective contains subsets of objects from a cube. |
| State | Yes | | Represents the Cube state on the server. |
| DefaultMeasure | | Empty | The MDX expression that defines the default measure. |
| Visible | | True | When true, indicates that the cube is visible to a client; |

| Element | Read-Only | Default value | Description |
|---------------------------|-----------|---------------|--|
| | | | otherwise, false. |
| MeasureGroups | | [Required] | A collection of MeasureGroup objects. |
| Source | | Empty | A reference to the source data for the cube. Only for a cube with a relational data source. For a cube with an OLAP data source, this element MUST be empty. |
| AggregationPrefix | | Empty | A text prefix used on tables used for aggregation. |
| ProcessingPriority | | Zero | The priority for processing. |
| StorageMode | | "Molap" | Determines the default storage mode for the cube. MAY be overridden per measure group and partition. When the value of StorageMode is "InMemory", the valuens attribute MUST be used. |
| ProcessingMode | | "Regular" | Indicates whether the server indexes and aggregates during processing or afterward. Provides the default for the cube, and can be overridden per partition. |
| ScriptCacheProcessingMode | | "Regular" | Indicates whether the server is to build the script cache during processing or afterwards. |
| ScriptErrorHandlingMode | | "IgnoreNone" | Indicates how MDX script errors are handled by the server. |
| DaxOptimizationMode | | Empty | Indicates whether Data Analysis Expressions (DAX) optimizations are enabled or disabled on the cube.<67> The possible values are as follows: <ul style="list-style-type: none"> ▪ 1 – DAX optimizations are enabled. ▪ 0 – DAX optimizations are disabled. |
| ProactiveCaching | | Empty | This object sets parameters to control proactive caching. |
| Kpis | | Empty | A collection of key performance indicator (KPI) objects. A KPI is a quantifiable measurement for gauging business success. |
| ErrorConfiguration | | Empty | This object sets parameters to control error handling. |
| Actions | | Empty | A collection of Action objects. |
| StorageLocation | | Empty | The file system storage location for the cube. Provides the default for the cube. The default MAY be overridden for each partition. |
| EstimatedRows | | | Contains the estimated number of rows. |
| LastProcessed | Yes | | A timestamp indicating the date and time when the object was last processed. |

2.2.4.2.2.9.1 CubeDimension

The **CubeDimension** complex type defines the dimensions that are part of a cube.

```

<xsd:complexType name="CubeDimension">
  <xsd:all>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Name" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Translations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation" type="Translation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="DimensionID" type="xsd:string"/>
    <xsd:element name="Visible" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="AllMemberAggregationUsage" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Full" />
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Unrestricted" />
          <xsd:enumeration value="Default" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="HierarchyUniqueNameStyle" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="IncludeDimensionName" />
          <xsd:enumeration value="ExcludeDimensionName" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="MemberUniqueNameStyle" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Native" />
          <xsd:enumeration value="NamePath" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Attributes" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Attribute" type="CubeAttribute" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Hierarchies" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Hierarchy" type="CubeHierarchy" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|---------------------------|-----------|---|---|
| ID | | Defaults to the Dimension ID of the Dimension that is pointed to by the DimensionID element. | The object ID. |
| Name | | Defaults to Dimension Name pointed to by DimensionID . | The object name. |
| Description | | Empty | The object description. |
| Translations | | Empty | A collection of Translation objects. |
| DimensionID | | [Required] | The ID of the dimension to which this CubeDimension points. |
| Visible | | True | When true, specifies that this object is visible; otherwise, false. |
| AllMemberAggregationUsage | | "Default" | Specifies how aggregations are to be designed for the All member. The enumeration values are as follows: <ul style="list-style-type: none"> ▪ Full - Every aggregation for the cube is to include the All member. ▪ None - No aggregation for the cube is to include the All member. ▪ Unrestricted - No restrictions are placed on the Aggregation Designer. ▪ Default - Same as Unrestricted. |
| HierarchyUniqueNameStyle | | "IncludeDimensionName" | Determines how the system will generate unique names for dimensions. |
| MemberUniqueNameStyle | | "Native" | Determines how the system will generate unique names for members. Enumeration values are as follows: <ul style="list-style-type: none"> ▪ Native – The instance automatically determines the unique names of members. ▪ NamePath - The instance generates a compound name consisting of each level and the caption of the member. |
| Attributes | | Empty | A collection of CubeAttribute objects. The server SHOULD<68> implicitly include any attributes not specified in the collection with their default values. |
| Hierarchies | | Empty | A collection of CubeHierarchy |

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|---|
| | | | objects. The server SHOULD<69> implicitly include any hierarchies not specified in the collection with their default values. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.9.2 (Updated Section) CubeAttribute

The **CubeAttribute** complex type defines details for an attribute on a cube.

```

<xsd:complexType name="CubeAttribute">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string"/>
    <xsd:element name="AggregationUsage" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Full" />
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Unrestricted" />
          <xsd:enumeration value="Default" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="AttributeHierarchyOptimizedState" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="FullyOptimized" />
          <xsd:enumeration value="NotOptimized" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="AttributeHierarchyEnabled" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="AttributeHierarchyVisible" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|------------------|-----------|---------------|---|
| AttributeID | | [Required] | The ID of the attribute that is pointed to by this object. |
| AggregationUsage | | "Default" | A string that specifies how aggregations are to be designed for this attribute. Enumeration values are the same as for AllMemberAggregationUsage . |

| Element | Read-Only | Default value | Description |
|----------------------------------|-----------|------------------|---|
| AttributeHierarchyOptimizedState | | "FullyOptimized" | Specifies the optimization for AttributeHierarchy the attribute hierarchy. |
| AttributeHierarchyEnabled | | True | When true, this Boolean determines that an AttributeHierarchy attribute hierarchy is enabled for this attribute. This value is ignored if AttributeHierarchyEnabled=False on the DimensionAttribute. |
| AttributeHierarchyVisible | | True | When true, this Boolean controls the visibility of this CubeAttribute . This value is ignored if the AttributeHierarchyVisible=False on the DimensionAttribute that is pointed to by AttributeID . |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.9.3 CubeHierarchy

The **CubeHierarchy** complex type defines details for a hierarchy on a cube.

```

<xsd:complexType name="CubeHierarchy">
  <xsd:all>
    <xsd:element name="HierarchyID" type="xsd:string"/>
    <xsd:element name="OptimizedState" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="FullyOptimized" />
          <xsd:enumeration value="NotOptimized" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Visible" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="Enabled" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|----------------|-----------|------------------|--|
| HierarchyID | | [Required] | The ID of the hierarchy that this hierarchy points to. |
| OptimizedState | | "FullyOptimized" | Specifies the degree of optimization for this object. |
| Visible | | True | When true, determines that this CubeHierarchy is visible; otherwise, false. |
| Enabled | | True | When true, determines that this CubeHierarchy is enabled; otherwise, false. |

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|-------------------------------------|
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.9.4 Kpi

The **Kpi** complex type represents a KPI.

```

<xsd:complexType name="Kpi">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Translations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation" type="Translation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="DisplayFolder" type="xsd:string" minOccurs="0"/>
    <xsd:element name="AssociatedMeasureGroupID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Value" type="xsd:string"/>
    <xsd:element name="Goal" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Status" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Trend" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Weight" type="xsd:string" minOccurs="0"/>
    <xsd:element name="TrendGraphic" type="xsd:string" minOccurs="0"/>
    <xsd:element name="StatusGraphic" type="xsd:string" minOccurs="0"/>
    <xsd:element name="CurrentTimeMember" type="xsd:string" minOccurs="0"/>
    <xsd:element name="ParentKpiID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|--------------------------|-----------|-------------------|---|
| Name | | [Required] | The object name. |
| ID | | Defaults to Name. | The ID string for the object. |
| Description | | Empty | The object description. |
| Translations | | Empty | A collection of Translation objects. |
| DisplayFolder | | Empty | The folder in which to display the object. |
| AssociatedMeasureGroupID | | Empty | The MeasureGroup that the object refers to. |

| Element | Read-Only | Default value | Description |
|-------------------|-----------|---------------|---|
| Value | | [Required] | The value for this KPI. An MDX expression that evaluates to a number. |
| Goal | | Empty | The goal for this KPI. An MDX expression that evaluates to a number. |
| Status | | Empty | The status for this KPI. An MDX expression that evaluates to a number. |
| Trend | | Empty | The trend for this KPI. An MDX expression that evaluates to a number. |
| Weight | | Empty | The weight for this KPI. An MDX numeric expression that assigns a relative importance to a KPI. |
| TrendGraphic | | Empty | The recommended graphic to represent the trend of this KPI.<70> |
| StatusGraphic | | Empty | The recommended graphic to represent the status of this KPI.<71> |
| CurrentTimeMember | | Empty | The CurrentTimeMember that applies to this KPI. An MDX expression that returns the member that identifies the temporal context of the KPI. |
| ParentKpiID | | Empty | The ID for a parent KPI (if any) for this KPI. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.9.5 Action

This complex type represents an action.

Action is an abstract type, and types for derived **Action** types are derived from it. Therefore, the XSD for action does not show the elements; instead they are shown within the XSD of each of the derived types. However, all the elements in the base type are explained in the table in this section.

```
<xsd:complexType name="Action" abstract="true" />
```

| Element | Read-Only | Default value | Description |
|--------------|-----------|------------------|--|
| Name | | [Required] | The object name. |
| ID | | Defaults to Name | The object ID string. |
| Caption | | Empty | The caption displayed for the action. Can be an MDX expression. |
| CaptionIsMdx | | False | When true, specifies that the caption is an MDX expression; otherwise, false. |
| Translations | | Empty | A collection of Translation objects. |
| TargetType | | [Required] | The type of object to which this Action applies. Such objects are limited to those in the enumeration that is specified in the XSD. The following |

| Element | Read-Only | Default value | Description |
|------------|-----------|---------------|---|
| | | | <p>objects are allowed:</p> <ul style="list-style-type: none"> ▪ "Cube": A Cube object. ▪ "Cells": A subcube. Subcubes are created by using MDX [MSDN-CREATESUBCUBE]. ▪ "Set": A set. Sets are created by using MDX [MSDN-CREATESET]. ▪ "Hierarchy": A Hierarchy object. ▪ "Level": A Level object. ▪ "DimensionMembers": The members of a Dimension. ▪ "HierarchyMembers": The members of a Hierarchy. ▪ "LevelMembers": The members of a Level. ▪ "AttributeMembers": The members of a DimensionAttribute. |
| Target | | Empty | Identifies the target for this Action . The specified Target MUST be an object of type TargetType . |
| Condition | | Empty | An MDX expression that determines if the action applies. If false, the action does not apply. |
| Type | | [Required] | <p>The type of action. The following values are allowed:</p> <ul style="list-style-type: none"> ▪ "Url" – Opens a URL string in an Internet browser. ▪ "Html" – Renders an HTML script in an Internet browser. ▪ "Statement" – Executes a statement that is understood by the client application. ▪ "DrillThrough" - See DrillThroughAction. ▪ "Dataset" – Executes an MDX statement whose results are returned as a dataset. ▪ "Rowset" – Executes an MDX statement whose results are returned as a rowset. ▪ "CommandLine" – Executes a command. ▪ "Proprietary" – Executes an action whose structure is understood by a particular proprietary client application. ▪ "Report" – See ReportAction. <p>The DrillThrough type can be defined only with actions where the target type is Cells. The DrillThrough type is referenced in the MDSHEMA_ACTIONS schema rowset, Action_Type column, as a Rowset action (0x010). The report action is exposed in the MDSHEMA_ACTIONS schema rowset, Action_Type column, as a URL action(0x01). Note that for the derived types ReportAction and DrillThroughAction, this value MUST be set to "Report" and "DrillThrough", respectively.</p> |
| Invocation | | Empty | An enumeration value that determines how the action is invoked. |

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|--|
| Application | | Empty | Identifies the application associated with an Action element. |
| Description | | Empty | The object description. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.9.5.1 StandardAction

This complex type represents a standard action.

The **StandardAction** type extends the Action type and includes all elements of **Action**. The XSD includes all the elements from the base class and the additional elements in the derived class.

```

<xsd:complexType name="StandardAction">
  <xsd:complexContent>
    <xsd:extension base="Action">
      <xsd:all>
        <!--These elements are inherited from Action-->
        <xsd:element name="Name" type="xsd:string"/>
        <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Caption" type="xsd:string" minOccurs="0"/>
        <xsd:element name="CaptionIsMdx" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="Translations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Translation" type="Translation" minOccurs="0"
                maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="TargetType" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Cube" />
              <xsd:enumeration value="Cells" />
              <xsd:enumeration value="Set" />
              <xsd:enumeration value="Hierarchy" />
              <xsd:enumeration value="Level" />
              <xsd:enumeration value="DimensionMembers" />
              <xsd:enumeration value="HierarchyMembers" />
              <xsd:enumeration value="LevelMembers" />
              <xsd:enumeration value="AttributeMembers" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Target" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Condition" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Type" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Url" />
              <xsd:enumeration value="Html" />
              <xsd:enumeration value="Statement" />
              <xsd:enumeration value="DrillThrough" />
              <xsd:enumeration value="Dataset" />
              <xsd:enumeration value="Rowset" />
              <xsd:enumeration value="CommandLine" />
              <xsd:enumeration value="Proprietary" />
              <xsd:enumeration value="Report" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

```

```

</xsd:element>
<xsd:element name="Invocation" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Interactive" />
      <xsd:enumeration value="OnOpen" />
      <xsd:enumeration value="Batch" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="Application" type="xsd:string" minOccurs="0"/>
<xsd:element name="Description" type="xsd:string" minOccurs="0"/>
<xsd:element name="Annotations" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Annotation" type="Annotation" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<!--Extended elements for StandardAction object-->
<xsd:element name="Expression" type="xsd:string"/>
</xsd:all>
</xsd:extension >
</xsd:complexContent>
</xsd:complexType>

```

The following table only includes the elements in **StandardAction** that are in addition to those in the base **Action** class.

| Element | Read-Only | Default value | Description |
|------------|-----------|---------------|--|
| Expression | | [Required] | An MDX expression that determines the content of the action. If the expression is blank, there is no action on the target. |

2.2.4.2.2.9.5.2 ReportAction

This complex type represents an action that invokes a report.

ReportAction extends **Action**, and includes all the elements in **Action**. The XSD includes all the elements from the base class and the additional elements in the derived class.

```

<xsd:complexType name="ReportAction">
  <xsd:complexContent>
    <xsd:extension base="Action">
      <xsd:all>
        <!--These elements are inherited from Action-->
        <xsd:element name="Name" type="xsd:string"/>
        <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Caption" type="xsd:string" minOccurs="0"/>
        <xsd:element name="CaptionIsMdx" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="Translations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Translation" type="Translation" minOccurs="0"
                maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="TargetType" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >

```

```

        <xsd:enumeration value="Cube" />
        <xsd:enumeration value="Cells" />
        <xsd:enumeration value="Set" />
        <xsd:enumeration value="Hierarchy" />
        <xsd:enumeration value="Level" />
        <xsd:enumeration value="DimensionMembers" />
        <xsd:enumeration value="HierarchyMembers" />
        <xsd:enumeration value="LevelMembers" />
        <xsd:enumeration value="AttributeMembers" />
    </xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="Target" type="xsd:string" minOccurs="0"/>
<xsd:element name="Condition" type="xsd:string" minOccurs="0"/>
<xsd:element name="Type" >
    <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="Url" />
            <xsd:enumeration value="Html" />
            <xsd:enumeration value="Statement" />
            <xsd:enumeration value="Drillthrough" />
            <xsd:enumeration value="Dataset" />
            <xsd:enumeration value="Rowset" />
            <xsd:enumeration value="CommandLine" />
            <xsd:enumeration value="Proprietary" />
            <xsd:enumeration value="Report" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="Invocation" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="Interactive" />
            <xsd:enumeration value="OnOpen" />
            <xsd:enumeration value="Batch" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="Application" type="xsd:string" minOccurs="0"/>
<xsd:element name="Description" type="xsd:string" minOccurs="0"/>
<xsd:element name="Annotations" minOccurs="0" >
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<!--Extended elements for ReportAction object-->
<xsd:element name="ReportServer" type="xsd:string"/>
<xsd:element name="Path" type="xsd:string" minOccurs="0"/>
<xsd:element name="ReportParameters" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="ReportParameter" type="ReportParameter"
                minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<xsd:element name="ReportFormatParameters" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="ReportFormatParameter"
                type="ReportFormatParameter"
                minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:extension >

```

```
</xsd:complexContent>
</xsd:complexType>
```

ReportAction inherits all elements from **Action**. The following table shows only the elements that are in addition to those contained in the **Action** base class.

| Element | Read-Only | Default value | Description |
|------------------------|-----------|---------------|---|
| ReportServer | | [Required] | The name of the computer on which the report server is running. |
| Path | | | The path pointing to the report in the report server. |
| ReportParameters | | | A collection of type ReportParameter, which is passed to a specific report and handled according to the specification in that report for that parameter. |
| ReportFormatParameters | | | A collection of type ReportFormatParameter, which is passed to a specific report to affect the formatting of the report. The parameter is handled according to the specification in that report for that parameter. |

2.2.4.2.2.9.5.2.1 ReportParameter

Each **ReportParameter** is a name-value pair. As a collection, it is the parameters needed for a report.

```
<xsd:complexType name="ReportParameter">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Value" type="xsd:string"/>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|--|
| Name | | | The name of the report parameter. |
| Value | | | An MDX expression that represents the parameter value. |

2.2.4.2.2.9.5.2.2 ReportFormatParameter

The **ReportFormatParameter** complex type specifies a parameter for formatting a report.

```
<xsd:complexType name="ReportFormatParameter">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Value" type="xsd:string"/>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|--|
| Name | | | The name of the report format parameter. |
| Value | | | The parameter value. (This is not an MDX expression as it is in the ReportParameter object.) |

2.2.4.2.2.9.5.3 DrillThroughAction

This complex type represents an action that returns the underlying detail data associated with a cell.

DrillThroughAction inherits all elements from Action.

```

<xsd:complexType name="DrillThroughAction">
  <xsd:complexContent>
    <xsd:extension base="Action">
      <xsd:all>
        <!--These elements are inherited from Action-->
        <xsd:element name="Name" type="xsd:string"/>
        <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Caption" type="xsd:string" minOccurs="0"/>
        <xsd:element name="CaptionIsMdx" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="Translations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Translation" type="Translation"
                minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="TargetType" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Cube" />
              <xsd:enumeration value="Cells" />
              <xsd:enumeration value="Set" />
              <xsd:enumeration value="Hierarchy" />
              <xsd:enumeration value="Level" />
              <xsd:enumeration value="DimensionMembers" />
              <xsd:enumeration value="HierarchyMembers" />
              <xsd:enumeration value="LevelMembers" />
              <xsd:enumeration value="AttributeMembers" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Target" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Condition" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Type" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Url" />
              <xsd:enumeration value="Html" />
              <xsd:enumeration value="Statement" />
              <xsd:enumeration value="DrillThrough" />
              <xsd:enumeration value="Dataset" />
              <xsd:enumeration value="Rowset" />
              <xsd:enumeration value="CommandLine" />
              <xsd:enumeration value="Proprietary" />
              <xsd:enumeration value="Report" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Invocation" minOccurs="0">

```

```

<xsd:simpleType>
  <xsd:restriction base="xsd:string" >
    <xsd:enumeration value="Interactive" />
    <xsd:enumeration value="OnOpen" />
    <xsd:enumeration value="Batch" />
  </xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="Application" type="xsd:string" minOccurs="0"/>
<xsd:element name="Description" type="xsd:string" minOccurs="0"/>
<xsd:element name="Annotations" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Annotation" type="Annotation" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<!--Extended elements for DrillThroughAction object-->
<xsd:element name="Default" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="Columns" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Column" type="Binding" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="MaximumRows" type="xsd:integer" minOccurs="0"/>
</xsd:all>
</xsd:extension >
</xsd:complexContent>
</xsd:complexType>

```

DrillThroughAction inherits all elements from **Action**. The elements shown in this table are in addition to those contained in the **Action** base class.

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|---|
| Default | | False | A Boolean, which, when set to true, sets this DrillThroughAction as the default DrillThroughAction ; otherwise, false. |
| Columns | | | A collection of Column objects that define the results to be returned in the drillthrough. Each column object is of type Binding . However, one of the following derived classes MUST be used: <ul style="list-style-type: none"> ▪ MeasureBinding ▪ CubeAttributeBinding If no columns are defined, all are returned. |
| MaximumRows | | | The maximum number of rows that are to be returned in the resulting rowset. |

2.2.4.2.2.10 MdxScript

This complex type represents a script containing MDX calculations.

```

<xsd:complexType name="MdxScript">
  <xsd:all>

```

```

<!--These elements are common to each MajorObject-->
<xsd:element name="Name" type="xsd:string" />
<xsd:element name="ID" type="xsd:string" minOccurs="0" />
<xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
<xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
<xsd:element name="Description" type="xsd:string" minOccurs="0" />
<xsd:element name="Annotations" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Annotation" type="Annotation" minOccurs="0"
        maxOccurs="unbounded" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<!--Extended elements for MdxScript object-->
<xsd:element name="Commands" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Command" type="Command" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="DefaultScript" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="CalculationProperties" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="CalculationProperty" type="CalculationProperty"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

The following table describes the elements that are included in the XSD schema for **MdxScript**. Those elements common to all major objects are described in section 2.2.4.2.2.1.

| Element | Read-Only | Default value | Description |
|-----------------------|-----------|---------------|--|
| Commands | | Empty | A collection of command objects. |
| DefaultScript | | True | When true, indicates that this script is the default script; otherwise, false. |
| CalculationProperties | | Empty | A collection of CalculationProperty objects. |

2.2.4.2.2.10.1 CalculationProperty

This complex type represents properties associated with a calculation in the MDX script.

```

<xsd:complexType name="CalculationProperty">
  <xsd:all>
    <xsd:element name="CalculationReference" type="xsd:string"/>
    <xsd:element name="CalculationType">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Member" />
          <xsd:enumeration value="Set" />
          <xsd:enumeration value="Cells" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>

```



```

</xsd:element>
<xsd:element name="Translations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Translation" type="Translation" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Description" type="xsd:string" minOccurs="0"/>
<xsd:element name="Visible" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="SolveOrder" type="xsd:integer" minOccurs="0"/>
<xsd:element name="FormatString" type="xsd:string" minOccurs="0"/>
<xsd:element name="ForeColor" type="xsd:string" minOccurs="0"/>
<xsd:element name="BackColor" type="xsd:string" minOccurs="0"/>
<xsd:element name="FontName" type="xsd:string" minOccurs="0"/>
<xsd:element name="FontSize" type="xsd:string" minOccurs="0"/>
<xsd:element name="FontFlags" type="xsd:string" minOccurs="0"/>
<xsd:element name="NonEmptyBehavior" type="xsd:string" minOccurs="0"/>
<xsd:element name="AssociatedMeasureGroupID" type="xsd:string" minOccurs="0"/>
<xsd:element name="DisplayFolder" type="xsd:string" minOccurs="0"/>
<xsd:element name="Language" type="xsd:integer" minOccurs="0"/>
<xsd:element name="VisualizationProperties"
  type="eng300:CalculationPropertiesVisualizationProperties"
  minOccurs="0" maxOccurs="1"/>
</xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|----------------------|-----------|---------------|---|
| CalculationReference | | [Required] | The name of the object to which the CalculationProperty applies. |
| CalculationType | | [Required] | Specifies the type of calculation to which the CalculationProperty applies. |
| Translations | | Empty | A collection of objects of type Translation. |
| Description | | Empty | The object description. |
| Visible | | True | When true, indicates that this object is visible to the user; otherwise, false. Applies to Set and Member . |
| SolveOrder | | Empty | Indicates the solve order in which the CalculationProperty element is applied to a calculated member or calculated cell definition. Applies to Member and Cell CalculationType . |
| FormatString | | Empty | An MDX expression that defines the FormatString to be used in the display. Applies to Member and Cell CalculationType . |
| ForeColor | | Empty | An MDX expression that defines the ForeColor to be used in the display. Applies to Member and Cell CalculationType . |
| BackColor | | Empty | An MDX expression that defines the BackColor to be used in the display. Applies to Member and Cell CalculationType . |
| FontName | | Empty | An MDX expression that defines the FontName to be used in the display. Applies to Member and Cell CalculationType . |

| Element | Read-Only | Default value | Description |
|--------------------------|-----------|---------------|--|
| FontSize | | Empty | An MDX expression that defines the FontSize to be used in the display. Applies to Member and Cell CalculationType . |
| FontFlags | | Empty | An MDX expression that defines the FontFlags to be used in the display. Applies to Member and Cell CalculationType . |
| NonEmptyBehavior | | Empty | A valid MDX Set expression that only applies when CalculationType is set to "Member". |
| AssociatedMeasureGroupID | | Empty | The ID of the measure group with which this calculation is associated. |
| DisplayFolder | | Empty | The folder in which to list the parent CalculationProperty object. Applies to Member and Set CalculationType . |
| Language | | Empty | The LCID of the language to use by default. See [MS-LCID] for information about LCIDs. If empty, the server will determine the language to use. <72> |
| VisualizationProperties | | | A complex type that specifies a set of properties for visualization of the DimensionAttribute. |

2.2.4.2.2.10.2 CalculationPropertiesVisualizationProperties

The **CalculationPropertiesVisualizationProperties** complex type specifies visualization properties for a calculated result. This type is defined in the **eng300** namespace.

The following is the XSD for the **CalculationPropertiesVisualizationProperties** complex type.

```
<xsd:complexType name="CalculationPropertiesVisualizationProperties">
  <xsd:sequence>
    <xsd:element name="FolderPosition" type="xsd:integer"
      minOccurs="0" maxOccurs="1" default="-1"/>
    <xsd:element name="ContextualNameRule" minOccurs="0" maxOccurs="1" default="None">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Context" />
          <xsd:enumeration value="Merge" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Alignment" minOccurs="0" maxOccurs="1" default="Default">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Default" />
          <xsd:enumeration value="Left" />
          <xsd:enumeration value="Right" />
          <xsd:enumeration value="Center" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="IsFolderDefault" type="xsd:boolean"
      minOccurs="0" maxOccurs="1" default="false"/>
    <xsd:element name="IsRightToLeft" type="xsd:boolean"
      minOccurs="0" maxOccurs="1" default="false"/>
    <xsd:element name="SortDirection" minOccurs="0" maxOccurs="1" default="Default">
      <xsd:simpleType >
```

```

    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="Default" />
      <xsd:enumeration value="Ascending" />
      <xsd:enumeration value="Descending" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="Units" type="xsd:string" minOccurs="0" maxOccurs="1" default=""/>
<xsd:element name="Width" type="xsd:integer" minOccurs="0" maxOccurs="1" default="-1"/>
<xsd:element name="IsDefaultMeasure" type="xsd:boolean" minOccurs="0"
  maxOccurs="1" default="false"/>
<xsd:element name="DefaultDetailsPosition" type="xsd:integer"
  minOccurs="0" maxOccurs="1" default="-1"/>
<xsd:element name="SortPropertiesPosition" type="xsd:integer"
  minOccurs="0" maxOccurs="1" default="-1"/>
<xsd:element name="IsSimpleMeasure" type="xsd:boolean"
  minOccurs="0" maxOccurs="1" default="false" />
</xsd:sequence>
</xsd:complexType>

```

| Element | Read-only | Default value | Description |
|--------------------|-----------|---------------|---|
| FolderPosition | | -1 | Provides a hint to client applications to suggest the position that this attribute might hold among the other elements that share the same display folder (AttributeTranslation). |
| ContextualNameRule | | "None" | Provides a hint to client applications to suggest how to create unambiguous names for this attribute. The following values are allowed: <ul style="list-style-type: none"> "None" – Use the attribute name "Context" – Use the incoming relationship name. "Merge" – Attending to language grammar, concatenate the incoming relationship name and the attribute name. |
| Alignment | | "Default" | Provides a hint to client applications to suggest how to justify this attribute when displayed. The following values are allowed: <ul style="list-style-type: none"> "Default" – Use the alignment appropriate for the attribute's data type. "Left" – Align left. "Right" – Align right. "Center" – Center. |
| IsFolderDefault | | "false" | Provides a hint to client applications that this attribute is representative of its display folder. |
| IsRightToLeft | | "false" | Provides a hint to client applications that this attribute is to be displayed right-to-left. |
| SortDirection | | "Default" | Provides a hint to client applications to suggest how to sort instances of this attribute. The following values are allowed: <ul style="list-style-type: none"> "Default" – Use the sort direction appropriate for the attribute's data type. "Ascending" – Sort in ascending order. |

| Element | Read-only | Default value | Description |
|------------------------|-----------|---------------|---|
| | | | <ul style="list-style-type: none"> "Descending" – Sort in descending order. |
| Units | | Empty | Provides a hint to client applications to suggest a string to be associated with values of this attribute |
| Width | | -1 | Provides a hint to client applications to suggest the length (in characters) to reserve to display this attribute. |
| IsDefaultMeasure | | "false" | Provides a hint to client applications that this CalculationProperty contains a result that is uniquely representative of a Dimension instance that the CalculationProperty is associated with. |
| DefaultDetailsPosition | | -1 | Provides the ability to place this attribute in the Default Details collection of the Dimension. This collection is an ordered set of DimensionAttribute types, CalculationProperty types, and RelationshipEnd elements. A positive value specifies participation in the collection. The collection is sorted in ascending order of this element. |
| SortPropertiesPosition | | -1 | Provides the ability to place this attribute in the Sort Properties collection of the Dimension . This collection is an ordered set of DimensionAttribute types, CalculationProperty types, and RelationshipEnd elements. Client applications can interpret this collection as a suggestion for how to perform a multi-column sort on this Dimension . A positive value specifies participation in the collection. The collection is sorted in ascending order of this element. |
| IsSimpleMeasure | | "false" | Provides a hint to client applications that this CalculationProperty need not be displayed in clients. For example, a client might mark an automatically generated calculation as IsSimple so that it remains visible to the client, but is filtered out of any user views. |

2.2.4.2.2.10.3 Command

The **Command** complex type represents a command in the MDX script.

```

<xsd:complexType name="Command">
  <xsd:all>
    <xsd:element name="Text" type="xsd:string"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|-----------------------|
| Text | | [Required] | The MDX command text. |

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---------------|--|
| Annotations<73> | | Empty | A collection of Annotation objects. |

2.2.4.2.2.11 MeasureGroup

This complex type represents a measure group in the cube.

```

<xsd:complexType name="MeasureGroup">
  <xsd:all>
    <!--These elements are common to each MajorObject-->
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="ID" type="xsd:string" minOccurs="0" />
    <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="Description" type="xsd:string" minOccurs="0" />
    <xsd:element name="Annotations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <!--Extended elements for MeasureGroup object-->
    <xsd:element name="LastProcessed" type="xsd:dateTime" minOccurs="0"/>
    <xsd:element name="Translations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation" type="Translation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Type" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Regular" />
          <xsd:enumeration value="ExchangeRate" />
          <xsd:enumeration value="Sales" />
          <xsd:enumeration value="Budget" />
          <xsd:enumeration value="FinancialReporting" />
          <xsd:enumeration value="Marketing" />
          <xsd:enumeration value="Inventory" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="State" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Processed" />
          <xsd:enumeration value="PartiallyProcessed" />
          <xsd:enumeration value="Unprocessed" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Measures" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Measure" type="Measure"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="DataAggregation" minOccurs="0">

```

```

<xsd:simpleType>
  <xsd:restriction base="xsd:string" >
    <xsd:enumeration value="None" />
    <xsd:enumeration value="DataAggregatable" />
    <xsd:enumeration value="CacheAggregatable" />
    <xsd:enumeration value="DataAndCacheAggregatable" />
  </xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="Source" type="MeasureGroupBinding" minOccurs="0" />
<xsd:element name="StorageMode" minOccurs="0">
  <xsd:complexType>
    <xsd:simpleContent>
      <xsd:extension base="MeasureGroupStorageModeEnumType">
        <xsd:attribute name="valuens" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value="http://schemas.microsoft.com/analysisisservices/2010/engine/200/200" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:attribute>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
</xsd:element>
<xsd:element name="StorageLocation" type="xsd:string" minOccurs="0" />
<xsd:element name="IgnoreUnrelatedDimensions" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="ProactiveCaching" type="ProactiveCaching" minOccurs="0" />
<xsd:element name="EstimatedRows" type="xsd:long" minOccurs="0"/>
<xsd:element name="ErrorConfiguration" type="ErrorConfiguration" minOccurs="0" />
<xsd:element name="EstimatedSize" type="xsd:long" minOccurs="0"/>
<xsd:element name="ProcessingMode" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Regular"/>
      <xsd:enumeration value="LazyAggregations"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="Dimensions" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Dimension" type="MeasureGroupDimension" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Partitions" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Partition" type="Partition" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="AggregationPrefix" type="xsd:string" minOccurs="0"/>
<xsd:element name="ProcessingPriority" type="xsd:integer" minOccurs="0"/>
<xsd:element name="AggregationDesigns" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="AggregationDesign" type="AggregationDesign" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
</xsd:all>

```

```

</xsd:complexType>

<xsd:simpleType name="MeasureGroupStorageModeEnumType">
  <xsd:restriction base="xsd:string" >
    <xsd:enumeration value="Molap" />
    <xsd:enumeration value="Rolap" />
    <xsd:enumeration value="Holap" />
    <xsd:enumeration value="InMemory" />
  </xsd:restriction>
</xsd:simpleType>

```

The following table describes the elements that are included in the XSD schema for **MeasureGroup**. Those elements common to all major objects are described in section 2.2.4.2.2.1.

| Element | Read-Only | Default value | Description |
|---------------------------|-----------|------------------------------------|--|
| LastProcessed | Yes | | A timestamp indicating the date and time when the MeasureGroup was last processed. |
| Translations | | Empty | A collection of Translation objects. |
| Type | | "Regular" | Provides both the server and client applications with information about the contents of the MeasureGroup . |
| State | Yes | | The state of processing of the object. |
| Measures | | Empty | A collection of Measure objects. |
| DataAggregation | | "DataAndCacheAggregatable" | Indicates whether the server can aggregate data (persisted on disk or cached in memory). |
| Source | | Empty | The source of data for MeasureGroup . MUST NOT be used if DataSourceID for cube is not OLAP sourced DataSourceView. If present, MUST be of type MeasureGroupBinding. |
| StorageMode | | Default is the value from the Cube | The storage mode for this object. When the value of StorageMode is "InMemory", the valuens attribute MUST be used. |
| StorageLocation | | Default is the value from the Cube | The file system storage location. |
| IgnoreUnrelatedDimensions | | True | When true, specifies to ignore dimensions unrelated to this MeasureGroup in an MDX query or expression; otherwise, false. |
| ProactiveCaching | | Empty | Proactive caching settings for the MeasureGroup . |
| EstimatedRows | | Empty | The estimated number of rows in the MeasureGroup . |
| ErrorConfiguration | | Empty | Error configuration settings for this MeasureGroup . |
| EstimatedSize | Yes | | The estimated size of the |

| Element | Read-Only | Default value | Description |
|--------------------|-----------|---------------|---|
| | | | MeasureGroup in bytes. |
| ProcessingMode | | "Regular" | The processing mode for the object. |
| Dimensions | | Empty | A collection of type MeasureGroupDimension . None are allowed if there is a MeasureGroupBinding at time of creation. When returned by DISCOVER_XML_METADATA , at least one Dimension is always returned. |
| Partitions | | Empty | A collection of Partition objects. |
| AggregationPrefix | | Empty | A prefix used on tables that are used for aggregation. This serves as default for partitions in this MeasureGroup . |
| ProcessingPriority | | Zero | An integer that determines the priority for processing. |
| AggregationDesigns | | Empty | A collection of objects of type AggregationDesign . |

2.2.4.2.2.11.1 MeasureGroupDimension

This complex type represents the relationship between a **CubeDimension** and a **MeasureGroup**. **MeasureGroupDimension** is an abstract class and has derived types for different **MeasureGroupDimension** types. An XML instance always has one of the derived types.

This section does not include the common elements in the XSD; those elements are included within the XSDs for the derived types. However, the table in this section includes the common elements, and those common elements are not included in the tables for the derived types.

```
<xsd:complexType name="MeasureGroupDimension" abstract="true" />
```

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---------------|--|
| CubeDimensionID | | [Required] | The ID of the cube dimension for this MeasureGroupDimension . |
| Annotations | | Empty | A collection of Annotation objects. |
| Source | | Empty | The source of data for this MeasureGroupDimension . |

2.2.4.2.2.11.1.1 ManyToManyMeasureGroupDimension

This complex type represents a many-to-many relationship between a **CubeDimension** and a **MeasureGroup** via an intermediate **MeasureGroup**. The XSD is complete for this class and includes all elements from the base type and the extended type. The table includes only additional elements in the extended type.


```

<xsd:complexType name="ManyToManyMeasureGroupDimension">
  <xsd:complexContent>
    <xsd:extension base="MeasureGroupDimension">
      <xsd:all>
        <!--These elements are inherited from MeasureGroupDimension-->
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="Annotations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Source" type="MeasureGroupDimensionBinding"
          minOccurs="0" />
        <!--Extended elements for ManyToManyMeasureGroupDimension object-->
        <xsd:element name="MeasureGroupID" type="xsd:string" minOccurs="0"/>
        <xsd:element name="DirectSlice" type="xsd:string" minOccurs="0"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>

```

The following table includes only those elements in this class that are in addition to those in the base MeasureGroupDimension class.

| Element | Read-Only | Default value | Description |
|----------------|-----------|---------------|--|
| MeasureGroupID | | [Required] | The ID of the intermediate MeasureGroup for the many-to-many relationship. |
| DirectSlice | | Empty | An MDX expression that returns a dimension member that is associated with every fact record. |

2.2.4.2.2.11.1.2 RegularMeasureGroupDimension

This complex type represents a direct many-to-one or one-to-one relationship between a CubeDimension and a MeasureGroup. The XSD is complete for this class and includes all elements from the base class and the derived class. The table includes only additional elements in the derived class.

```

<xsd:complexType name="RegularMeasureGroupDimension">
  <xsd:complexContent>
    <xsd:extension base="MeasureGroupDimension">
      <xsd:all>
        <!--These elements are inherited from MeasureGroupDimension-->
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="Annotations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Source" type="MeasureGroupDimensionBinding" minOccurs="0" />
        <!--Extended elements for RegularMeasureGroupDimension object-->
        <xsd:element name="Cardinality" minOccurs="0">

```

```

    <xsd:simpleType>
      <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="Many" />
        <xsd:enumeration value="One" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="Attributes" >
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="Attribute" type="MeasureGroupAttribute"
          maxOccurs="unbounded"/>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>
</xsd:all>
</xsd:extension >
</xsd:complexContent>
</xsd:complexType>

```

The following table has only those elements that are in addition to those in the MeasureGroupDimension abstract base class.

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|---|
| Cardinality | | "One"<74> | Indicates the cardinality of the relationship (many-to-one or one-to-one). |
| Attributes | | [Required] | A collection of MeasureGroupAttribute objects. Exactly one granularity attribute MUST be defined for a Regular Measure Group. Additional attributes can be included in the collection if they are not granularity attributes. The server SHOULD<75> implicitly add any attribute that is not specified in the collection with the default element values. |

2.2.4.2.2.11.1.3 ReferenceMeasureGroupDimension

This complex type represents an indirect many-to-one relationship between a CubeDimension and a MeasureGroup via an intermediate **CubeDimension**. The XSD is complete for this class and includes all elements from the base class and the derived class. The table includes only additional elements in the derived class.

```

<xsd:complexType name="ReferenceMeasureGroupDimension">
  <xsd:complexContent>
    <xsd:extension base="MeasureGroupDimension">
      <xsd:all>
        <!--These elements are inherited from MeasureGroupDimension-->
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="Annotations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Source" type="MeasureGroupDimensionBinding"
          minOccurs="0" />
        <!--Extended elements for ReferenceMeasureGroupDimension object-->
        <xsd:element name="IntermediateCubeDimensionID" type="xsd:string"
          minOccurs="1"/>
        <xsd:element name="IntermediateGranularityAttributeID" type="xsd:string"
          minOccurs="1"/>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

```

```

<xsd:element name="Materialization" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Regular" />
      <xsd:enumeration value="Indirect" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element ref="eng200_200:ProcessingState" minOccurs="0" />
</xsd:all>
</xsd:extension >
</xsd:complexContent>
</xsd:complexType>

```

The **ReferenceMeasureGroup** XSD depends on the following definitions in a namespace other than the default namespace.

The following element is defined in the **eng200_200** namespace.

```

<xsd:element name="ProcessingState" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Processed" />
      <xsd:enumeration value="Unprocessed" />
      <xsd:enumeration value="InvalidExpression" />
      <xsd:enumeration value="CalculationError" />
      <xsd:enumeration value="DependencyError" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>

```

The following table includes only the elements that are in addition to those contained in the MeasureGroupDimension base class.

| Element | Read-Only | Default value | Description |
|------------------------------------|-----------|---------------|---|
| IntermediateCubeDimensionID | | Empty | The ID of the intermediate CubeDimension . |
| IntermediateGranularityAttributeID | | Empty | The ID of the attribute in the intermediate CubeDimension that relates to this CubeDimension . |
| Materialization | | "Indirect" | Specifies how the reference dimension relationship is materialized. |
| ProcessingState | Yes | | Represents the processing state of the attribute. For calculated columns, any of the five available enumeration values can appear. Attributes that are not calculated columns can have only the "Processed" or "Unprocessed" values. The usages of the enumeration values are as follows: <ul style="list-style-type: none"> ▪ "Processed": The column has been processed and contains data. ▪ "Unprocessed": The column contains all NULL values and requires processing. ▪ "InvalidExpression": A calculated column |

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|--|
| | | | <p>contains an invalid expression.</p> <ul style="list-style-type: none"> "CalculationError": A calculation error occurred during an attempt to process the column. "DependencyError": A column that this column depends on contains an error. |

2.2.4.2.2.11.1.4 DegenerateMeasureGroupDimension

This complex type represents a degenerate relationship between a CubeDimension and a MeasureGroup in which both are sourced from the same table. The XSD is complete for this class and includes all elements from the base class and the derived class. The table includes only additional elements in the derived class.

```

<xsd:complexType name="DegenerateMeasureGroupDimension">
  <xsd:complexContent>
    <xsd:extension base="MeasureGroupDimension">
      <xsd:all>
        <!--These elements are inherited from MeasureGroupDimension-->
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="Annotations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Source" type="MeasureGroupDimensionBinding"
          minOccurs="0" />
        <!--Extended elements for DegenerateMeasureGroupDimension object-->
        <xsd:element ref="eng200_200:ShareDimensionStorage" minOccurs="0" />
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>

```

The **DegenerateMeasureGroupDimension** XSD depends on element definitions in namespaces other than the default namespace.

The following elements are defined in the **eng200_200** namespace.

```

<xsd:element name="ShareDimensionStorage" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Distinct" />
      <xsd:enumeration value="Shared" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>

```

The following table shows only the additional elements in **DegenerateMeasureGroupDimension** that are beyond those in MeasureGroupDimension, from which it is derived.

| Element | Read-Only | Default value | Description |
|-----------------------|-----------|---------------|---|
| ShareDimensionStorage | | "Distinct" | Specifies whether MeasureGroup and Dimension share storage or use distinct storage. |

2.2.4.2.2.11.1.5 DataMiningMeasureGroupDimension

This complex type represents a relationship between a CubeDimension and a MeasureGroup via a MiningModel. The **CubeDimension** is built from the content that is learned by training the **MiningModel** on another **CubeDimension**.

The XSD is complete for this class and includes all elements from the base class and the derived class. The table includes only additional elements in the derived class.

```
<xsd:complexType name="DataMiningMeasureGroupDimension">
  <xsd:complexContent>
    <xsd:extension base="MeasureGroupDimension">
      <xsd:all>
        <!--These elements are inherited from MeasureGroupDimension-->
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="Annotations" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Source" type="MeasureGroupDimensionBinding"
          minOccurs="0" />
        <!--Extended elements for DataMiningMeasureGroupDimension object-->
        <xsd:element name="CaseCubeDimensionID" type="xsd:string" />
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

The following table includes only those elements that are in addition to those in the MeasureGroupDimension base abstract class.

| Element | Read-Only | Default value | Description |
|---------------------|-----------|---------------|---|
| CaseCubeDimensionID | | [Required] | The ID of the CubeDimension from which the MiningModel was trained. |

2.2.4.2.2.11.2 MeasureGroupAttribute

This complex type represents an attribute in a MeasureGroupDimension.

```
<xsd:complexType name="MeasureGroupAttribute">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string"/>
    <xsd:element name="KeyColumns" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
```

```

        <xsd:element name="KeyColumn" type="DataItem" minOccurs="0"
            maxOccurs="unbounded"/>
    </xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:element name="Type" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="Regular" />
            <xsd:enumeration value="Granularity" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="Annotations" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-------------|-----------|--|---|
| AttributeID | | [Required] | The ID of the attribute. |
| KeyColumns | | KeyColumns from the corresponding DimensionAttribute | A collection of KeyColumn elements that have type DataItem. The Source element within the DataItem MUST be one of the following types: ColumnBinding, AttributeBinding, or InheritedBinding. |
| Type | | Regular | Specifies the type of the MeasureGroupAttribute . It indicates whether the MeasureGroupAttribute is a granularity attribute or a regular attribute. There MUST be exactly one granularity attribute in a MeasureGroupDimension . Therefore, within the collection of Attribute elements, the Type element MUST be present for at least one item in the collection. |
| Annotations | | | A collection of Annotation objects. |

2.2.4.2.2.11.3 Measure

This complex type represents a measure.

```

<xsd:complexType name="Measure">
    <xsd:all>
        <xsd:element name="Name" type="xsd:string"/>
        <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
        <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
        <xsd:element name="AggregateFunction" minOccurs="0">
            <xsd:simpleType>
                <xsd:restriction base="xsd:string" >
                    <xsd:enumeration value="Sum" />
                    <xsd:enumeration value="Count" />
                    <xsd:enumeration value="Min" />
                    <xsd:enumeration value="Max" />
                    <xsd:enumeration value="DistinctCount" />
                    <xsd:enumeration value="None" />
                    <xsd:enumeration value="ByAccount" />
                    <xsd:enumeration value="AverageOfChildren" />
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:element>
    </xsd:all>
</xsd:complexType>

```

```

        <xsd:enumeration value="FirstChild" />
        <xsd:enumeration value="LastChild" />
        <xsd:enumeration value="FirstNonEmpty" />
        <xsd:enumeration value="LastNonEmpty" />
    </xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="DataType" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="WChar" />
            <xsd:enumeration value="Integer" />
            <xsd:enumeration value="BigInt" />
            <xsd:enumeration value="Single" />
            <xsd:enumeration value="Double" />
            <xsd:enumeration value="Date" />
            <xsd:enumeration value="Currency" />
            <xsd:enumeration value="UnsignedTinyInt" />
            <xsd:enumeration value="UnsignedSmallInt" />
            <xsd:enumeration value="UnsignedInt" />
            <xsd:enumeration value="UnsignedBigInt" />
            <xsd:enumeration value="Bool" />
            <xsd:enumeration value="Smallint" />
            <xsd:enumeration value="Tinyint" />
            <xsd:enumeration value="Variant" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="Source" type="DataItem" />
<xsd:element name="Visible" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="MeasureExpression" type="xsd:string" minOccurs="0"/>
<xsd:element name="DisplayFolder" type="xsd:string" minOccurs="0"/>
<xsd:element name="FormatString" type="xsd:string" minOccurs="0"/>
<xsd:element name="BackColor" type="xsd:string" minOccurs="0"/>
<xsd:element name="ForeColor" type="xsd:string" minOccurs="0"/>
<xsd:element name="FontName" type="xsd:string" minOccurs="0"/>
<xsd:element name="FontSize" type="xsd:string" minOccurs="0"/>
<xsd:element name="FontFlags" type="xsd:string" minOccurs="0"/>
<xsd:element name="Translations" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Translation" type="Translation" minOccurs="0"
                maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<xsd:element name="Annotations" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-------------|-----------|------------------|--|
| Name | | [Required] | The object name. The name of the measure MUST be unique within the Cube, not only within the MeasureGroup. |
| ID | | Defaults to Name | The object ID string. |
| Description | | Empty | The object description. |

| Element | Read-Only | Default value | Description |
|-------------------|-----------|---------------|--|
| AggregateFunction | | "Sum" | A string that specifies the type of aggregate function used by the measure. |
| DataType | | Empty | The data type. |
| Source | | [Required] | The source of the measure data. Type is DataItem. The Source element within the DataItem MUST be one of the following types: RowBinding, ColumnBinding, MeasureBinding, or CubeDimensionBinding. |
| Visible | | True | When true, indicates to the client that the Measure is to be visible; otherwise, false. |
| MeasureExpression | | Empty | Contains an MDX expression that specifies how the measure value is computed. |
| DisplayFolder | | Empty | Defines the display folder for the measure. |
| FormatString | | Empty | A string that specifies how to format measure values to produce a formatted value. For a description of the content of the string, see [MSDN-FSCMDX]. |
| BackColor | | Empty | Specifies the background color of a cell in the red-green-blue (RGB) format.<76> The valid range for an ordinary RGB color is from zero (&H00000000) to 16,777,215 (&H00FFFFFF). The high byte of a number in this range always equals zero. The lower 3 bytes, from least to most significant byte, determine the amount of red, green, and blue, respectively. The red, green, and blue components are each represented by a number between 0 and 255 (&HFF). |
| ForeColor | | Empty | Specifies the foreground color of a cell in the RGB format.<77> The valid range for an ordinary RGB color is from zero (&H00000000) to 16,777,215 (&H00FFFFFF). The high byte of a number in this range always equals zero. The lower 3 bytes, from least to most significant byte, determine the amount of red, green, and blue, respectively. The red, green, and blue components are each represented by a number between 0 and 255 (&HFF). |
| FontName | | Empty | The font to be used to display the value or formatted value of this measure. |
| FontSize | | Empty | The font size to be used to display the value of formatted value of this measure. |
| FontFlags | | Empty | A bitmask that details effects on the font. The value is the result of a bitwise OR operation of one or more of the following constants: BOLD = 1 ITALIC = 2 UNDERLINE = 4 STRIKEOUT = 8 |
| Translations | | Empty | A collection of Translation objects. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.12 AggregationDesign

This complex type represents a group of aggregations for the MeasureGroup.

```
<xsd:complexType name="AggregationDesign">
  <xsd:all>
    <!--These elements are common to each MajorObject-->
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="ID" type="xsd:string" minOccurs="0" />
    <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="Description" type="xsd:string" minOccurs="0" />
    <xsd:element name="Annotations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <!--Extended elements for AggregationDesign object-->
    <xsd:element name="EstimatedRows" type="xsd:long" minOccurs="0"/>
    <xsd:element name="Dimensions" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Dimension" type="AggregationDesignDimension"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Aggregations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Aggregation" type="Aggregation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="EstimatedPerformanceGain" type="xsd:integer"
      minOccurs="0"/>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|--------------------------|-----------|---------------|---|
| EstimatedRows | | Empty | The estimated average number of rows in the partition for the partitions that share this design. If this value is not set in the Create command, the system will compute a value. |
| Dimensions | | Empty | A collection of Dimension objects. |
| Aggregations | | Empty | A collection of Aggregation objects. |
| EstimatedPerformanceGain | | | The estimated performance gain of the partition, expressed as a percentage. |

2.2.4.2.2.12.1 AggregationDesignDimension

This complex type represents a CubeDimension within an AggregationDesign.

```
<xsd:complexType name="AggregationDesignDimension">
  <xsd:all>
```

```

<xsd:element name="CubeDimensionID" type="xsd:string"/>
<xsd:element name="Attributes" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Attribute" type="AggregationDesignAttribute"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Annotations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Annotation" type="Annotation" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---------------|---|
| CubeDimensionID | | [Required] | The ID of the CubeDimension . |
| Attributes | | Empty | A collection of AggregationDesignAttribute objects. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.12.1.1 AggregationDesignAttribute

This complex type represents an attribute in the AggregationDesignDimension.

```

<xsd:complexType name="AggregationDesignAttribute">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string"/>
    <xsd:element name="EstimatedCount" type="xsd:long" minOccurs="0"/>
  </xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|----------------|-----------|---------------|--|
| AttributeID | | [Required] | The ID of the attribute. |
| EstimatedCount | | Empty | The estimated number of members for the attribute. |

2.2.4.2.2.12.2 Aggregation

This complex type represents an aggregation in the AggregationDesign.

```

<xsd:complexType name="Aggregation">
  <xsd:all>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Dimensions" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Dimension" type="AggregationDimension"

```

```

        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:element name="Annotations" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<xsd:element name="Description" type="xsd:string" minOccurs="0"/>
</xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-------------|-----------|------------------|---|
| ID | | Defaults to Name | The object ID string. |
| Name | | [Required] | The object name. |
| Dimensions | | Empty | A collection of objects of type AggregationDimension. |
| Annotations | | Empty | A collection of Annotation objects. |
| Description | | Empty | The object description. |

2.2.4.2.2.12.2.1 AggregationDimension

This complex type represents a dimension in the aggregation.

```

<xsd:complexType name="AggregationDimension">
    <xsd:all>
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="Attributes" minOccurs="0">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="Attribute" type="AggregationAttribute"
                        minOccurs="0" maxOccurs="unbounded"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="Annotations" minOccurs="0">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                        maxOccurs="unbounded"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
    </xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---------------|---|
| CubeDimensionID | | [Required] | The ID of the cube dimension. For example, a reference to a specific dimension on the owning measure group. |

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|---|
| Attributes | | Empty | A collection of objects of type AggregationAttribute. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.12.2.1.1 AggregationAttribute

This complex type represents the attribute in the AggregationDimension for which the fact data is aggregated.

```
<xsd:complexType name="AggregationAttribute">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|-------------------------------------|
| AttributeID | | [Required] | The ID of the attribute. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.13 Partition

The **Partition** complex type represents a partition of a measure group.

```
<xsd:complexType name="Partition">
  <xsd:all>
    <!--These elements are common to each MajorObject-->
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="ID" type="xsd:string" minOccurs="0" />
    <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="Description" type="xsd:string" minOccurs="0" />
    <xsd:element name="Annotations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <!--Extended elements for Partition object-->
    <xsd:element name="Source" type="TabularBinding" minOccurs="0" />
    <xsd:element name="ProcessingPriority" type="xsd:integer" minOccurs="0"/>
    <xsd:element name="AggregationPrefix" type="xsd:string" minOccurs="0"/>
    <xsd:element name="StorageMode" minOccurs="0">
      <xsd:complexType>
```

```

    <xsd:simpleContent>
      <xsd:extension base="PartitionStorageModeEnumType">
        <xsd:attribute name="valuens" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value=
                "http://schemas.microsoft.com/analysisservices/2010/engine/200/200" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:attribute>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
</xsd:element>
<xsd:element name="ProcessingMode" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="Regular"/>
      <xsd:enumeration value="LazyAggregations"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ErrorConfiguration" type="ErrorConfiguration"
  minOccurs="0" />
<xsd:element name="StorageLocation" type="xsd:string" minOccurs="0"/>
<xsd:element name="RemoteDataSourceID" type="xsd:string" minOccurs="0"/>
<xsd:element name="Slice" type="xsd:string" minOccurs="0"/>
<xsd:element name="ProactiveCaching" type="ProactiveCaching"
  minOccurs="0" />
<xsd:element name="Type" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Data" />
      <xsd:enumeration value="Writeback" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="EstimatedSize" type="xsd:long" minOccurs="0"/>
<xsd:element name="EstimatedRows" type="xsd:long" minOccurs="0"/>
<xsd:element name="CurrentStorageMode" minOccurs="0">
  <xsd:complexType>
    <xsd:simpleContent>
      <xsd:extension base="PartitionCurrentStorageModeEnumType">
        <xsd:attribute name="valuens" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value=
                "http://schemas.microsoft.com/analysisservices/2010/engine/200/200" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:attribute>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
</xsd:element>
<xsd:element name="AggregationDesignID" type="xsd:string" minOccurs="0"/>
<xsd:element name="AggregationInstances" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="AggregationInstance" type="AggregationInstance"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="AggregationInstanceSource" type="DataSourceViewBinding"
  minOccurs="0" />
<xsd:element name="LastProcessed" type="xsd:dateTime" minOccurs="0"/>
<xsd:element name="State" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >

```

```

        <xsd:enumeration value="Processed" />
        <xsd:enumeration value="Unprocessed" />
    </xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element ref="eng300:StringStoresCompatibilityLevel" minOccurs="0"/>
<xsd:element ref="eng300:CurrentStringStoresCompatibilityLevel"
    minOccurs="0"/>
    <xsd:element ref="eng300_300:DirectQueryUsage" minOccurs="0"/>
</xsd:all>
</xsd:complexType>

<xsd:simpleType name="PartitionStorageModeEnumType">
    <xsd:restriction base="xsd:string">
        <xsd:enumeration value="Molap"/>
        <xsd:enumeration value="Rolap"/>
        <xsd:enumeration value="Holap"/>
        <xsd:enumeration value="InMemory"/>
    </xsd:restriction>
</xsd:simpleType>
<xsd:simpleType name="PartitionCurrentStorageModeEnumType">
    <xsd:restriction base="xsd:string">
        <xsd:enumeration value="Molap"/>
        <xsd:enumeration value="Rolap"/>
        <xsd:enumeration value="Holap"/>
        <xsd:enumeration value="InMemory"/>
    </xsd:restriction>
</xsd:simpleType>

```

In the namespace **eng300_300**:

```

<xsd:element name="DirectQueryUsage" >
    <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="InMemoryWithDirectQuery" />
            <xsd:enumeration value="DirectQueryOnly" />
            <xsd:enumeration value="InMemoryOnly" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>

```

The following table describes the elements that are included in the XSD schema for **Partition**. Those elements common to all major objects are described in section 2.2.4.2.2.1.

| Element | Read-Only | Default value | Description |
|--------------------|-----------|--|---|
| Source | | Empty | Specifies the source of the partition data. |
| ProcessingPriority | | Zero | Integer that determines the priority for processing. |
| AggregationPrefix | | Empty | A prefix that is pre-pended to the names of aggregation tables/views. |
| StorageMode | | StorageMode of the parent MeasureGroup | Determines the storage mode for the partition. When the value of StorageMode is "InMemory", the valuens attribute MUST be used. |

| Element | Read-Only | Default value | Description |
|---------------------------|-----------|--|---|
| ProcessingMode | | ProcessingMode of the parent Cube | A string that specifies whether aggregations and indexes are to be built lazily. For more information about lazy aggregations, see section 1.1. |
| ErrorConfiguration | | Empty | Error configuration settings to handle issues in the source data. |
| StorageLocation | | StorageLocation of the parent MeasureGroup | The file system storage location for the partition. |
| RemoteDatasourceID | | Empty | Specifies the ID of the OLAP data source that points to the remote server where this partition is stored. |
| Slice | | Empty | An MDX expression that defines the slice that is contained in the partition. |
| ProactiveCaching | | Empty | Proactive caching settings for this partition. |
| Type | | "Data" | Indicates partition type as either Data or Writeback . If Type is set to "Writeback", the Source element MUST NOT be empty, and all Measure objects for the cube MUST use "Sum" as the value of the AggregateFunction element. |
| EstimatedSize | Yes | | The estimated size of the partition in bytes. |
| EstimatedRows | | 0 | Estimated number of rows. |
| CurrentStorageMode | Yes | | The current storage mode of the partition. Used for proactive caching when StorageMode might transiently change. When the value of StorageMode is "InMemory", the valuens attribute MUST be used. |
| AggregationDesignID | | Empty | The ID of the AggregationDesign for the partition. |
| AggregationInstances | | Empty | A collection of AggregationInstance objects. |
| AggregationInstanceSource | | Defaults to Source element of the cube. | The source of the aggregation instance data. |
| LastProcessed | Yes | | The date and time when the partition was last processed. |
| State | Yes | | Represents the processing state of the partition. Values include: |

| Element | Read-Only | Default value | Description |
|---------------------------------------|-----------|-------------------------|---|
| | | | <ul style="list-style-type: none"> Processed Unprocessed |
| StringStoresCompatibilityLevel | | 1050 | <p>An enumeration value that specifies the string store compatibility level that will be instituted the next time the object is processed. The valid values are the following:</p> <ul style="list-style-type: none"> 1050 – Standard string handling. 1100 – Enhanced string handling.<78> |
| CurrentStringStoresCompatibilityLevel | Yes | 1050 | <p>An enumeration value that specifies the string store compatibility level that is currently in effect. The interpretation of the values is the same as for StringStoresCompatibilityLevel.</p> |
| DirectQueryUsage | | InMemoryWithDirectQuery | <p>DirectQueryUsage specifies how a partition is to be queried. Values are:</p> <ul style="list-style-type: none"> InMemoryWithDirectQuery DirectQueryOnly InMemoryOnly |

2.2.4.2.2.13.1 AggregationInstance

This complex type represents an aggregation instance in a partition.

```

<xsd:complexType name="AggregationInstance">
  <xsd:all>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="AggregationType" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="IndexedView" />
          <xsd:enumeration value="Table" />
          <xsd:enumeration value="UserDefined" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Source" type="TabularBinding" minOccurs="0" />
    <xsd:element name="Dimensions" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Dimension" type="AggregationInstanceDimension"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</complexType>

```



```

    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Measures" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Measure" type="AggregationInstanceMeasure"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Annotations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Annotation" type="Annotation" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Description" type="xsd:string" minOccurs="0"/>
</xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-----------------|-----------|------------------|---|
| ID | | Defaults to Name | The object ID string. |
| Name | | [Required] | The object name. |
| AggregationType | | [Required] | The type of aggregation stored in the partition. The enumeration values are the following: IndexedView : The aggregation is stored in an indexed view. Table : The aggregation is stored in a table. UserDefined : The aggregation is user-defined. |
| Source | | Empty | The table name that is used if it is different than the name that is associated with column binding. This permits a single aggregation table to be defined in the DataSourceView for multiple partitions instead of one per partition. |
| Dimensions | | Empty | A collection of objects of type AggregationInstanceDimension. |
| Measures | | Empty | A collection of objects of type AggregationInstanceMeasure. |
| Annotations | | Empty | A collection of Annotation objects. |
| Description | | Empty | The object description. |

2.2.4.2.2.13.1.1 AggregationInstanceDimension

This complex type represents a CubeDimension in an AggregationInstance.

```

<xsd:complexType name="AggregationInstanceDimension">
  <xsd:all>
    <xsd:element name="CubeDimensionID" type="xsd:string"/>
    <xsd:element name="Attributes" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Attribute" type="AggregationInstanceAttribute"

```

```

minOccurs="0" maxOccurs="unbounded"/>
</xsd:sequence>
</xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---------------|---|
| CubeDimensionID | | [Required] | The ID of the CubeDimension . |
| Attributes | | Empty | A collection of objects of type AggregationInstanceAttribute. |

2.2.4.2.2.13.1.2 AggregationInstanceAttribute

This complex type represents the attribute in the AggregationInstanceDimension for which the fact data is aggregated.

```

<xsd:complexType name="AggregationInstanceAttribute">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string"/>
    <xsd:element name="KeyColumns" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="KeyColumn" type="DataItem" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-------------|-----------|--|--|
| AttributeID | | [Required] | The ID of the attribute. |
| KeyColumns | | Required. However, if this element is specified as empty, the default is the binding that is specified on the attribute that is pointed to by AttributeID . | A collection of KeyColumn elements of type DataItem . This can be used to override the binding that is specified on the attribute. The Source element within the DataItem MUST be of type ColumnBinding. |

2.2.4.2.2.13.1.3 AggregationInstanceMeasure

This complex type represents a Measure in an AggregationInstance.

```

<xsd:complexType name="AggregationInstanceMeasure">
  <xsd:all>
    <xsd:element name="MeasureID" type="xsd:string"/>
    <xsd:element name="Source" type="ColumnBinding" />
  </xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-----------|-----------|---------------|---------------------------------|
| MeasureID | | [Required] | The ID of the Measure . |
| Source | | [Required] | The source of the measure data. |

2.2.4.2.2.14 Perspective

This complex type represents a perspective of a cube.

```

<xsd:complexType name="Perspective">
  <xsd:all>
    <!--These elements are common to each MajorObject-->
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="ID" type="xsd:string" minOccurs="0" />
    <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="Description" type="xsd:string" minOccurs="0" />
    <xsd:element name="Annotations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <!--Extended elements for Perspective object-->
    <xsd:element name="Translations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation" type="Translation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="DefaultMeasure" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Dimensions" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Dimension" type="PerspectiveDimension"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="MeasureGroups" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="MeasureGroup" type="PerspectiveMeasureGroup"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Calculations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Calculation" type="PerspectiveCalculation"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Kpis" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Kpi" type="PerspectiveKpi" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>

```

```

        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<xsd:element name="Actions" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Action" type="PerspectiveAction"
                minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

The following table describes the elements that are included in the XSD schema for **Perspective**. Those elements common to all major objects are described in section 2.2.4.2.2.1.

| Element | Read-Only | Default value | Description |
|----------------|-----------|---------------|--|
| Translations | | Empty | A collection of Translation objects. |
| DefaultMeasure | | Empty | The default measure for the perspective. |
| Dimensions | | Empty | A collection of PerspectiveDimension objects. |
| MeasureGroups | | Empty | A collection of PerspectiveMeasureGroup objects. |
| Calculations | | Empty | A collection of PerspectiveCalculation objects. |
| Kpis | | Empty | A collection of PerspectiveKpi objects. |
| Actions | | Empty | A collection of PerspectiveAction objects. |

2.2.4.2.2.14.1 PerspectiveDimension

This complex type represents a CubeDimension in a Perspective.

```

<xsd:complexType name="PerspectiveDimension">
    <xsd:all>
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="Attributes" minOccurs="0">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="Attribute" type="PerspectiveAttribute"
                        minOccurs="0" maxOccurs="unbounded"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="Hierarchies" minOccurs="0">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="Hierarchy" type="PerspectiveHierarchy"
                        minOccurs="0" maxOccurs="unbounded"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="Annotations" minOccurs="0">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                        maxOccurs="unbounded"/>
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
    </xsd:all>
</xsd:complexType>

```

```

    </xsd:complexType>
  </xsd:element>
</xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---|---|
| CubeDimensionID | | [Required] | The ID of a CubeDimension . |
| Attributes | | If no hierarchies are included, the perspective contains all the attributes from the dimension. | A collection of objects of type PerspectiveAttribute that is included in this PerspectiveDimension. |
| Hierarchies | | If no hierarchies are included, the perspective contains all of the hierarchies from the dimension. | A collection of objects of type PerspectiveHierarchy that is included in this PerspectiveDimension . |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.14.1.1 (Updated Section) PerspectiveAttribute

This complex type represents an attribute in a PerspectiveDimension.

```

<xsd:complexType name="PerspectiveAttribute">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string"/>
    <xsd:element name="AttributeHierarchyVisible" type="xsd:boolean"
      minOccurs="0"/>
    <xsd:element name="DefaultMember" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|---------------------------|-----------|---------------|--|
| AttributeID | | [Required] | The ID of the attribute. |
| AttributeHierarchyVisible | | True | When true, specifies whether the AttributeHierarchy attribute hierarchy is visible; otherwise, false. |
| DefaultMember | | Empty | An MDX expression specifying the default member for this attribute. <79> |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.14.1.2 PerspectiveHierarchy

This complex type represents a hierarchy in a PerspectiveDimension.

```
<xsd:complexType name="PerspectiveHierarchy">
  <xsd:all>
    <xsd:element name="HierarchyID" type="xsd:string"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|-------------------------------------|
| HierarchyID | | [Required] | The ID of the hierarchy. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.14.2 PerspectiveMeasureGroup

This complex type represents a measure group in a Perspective.

```
<xsd:complexType name="PerspectiveMeasureGroup">
  <xsd:all>
    <xsd:element name="MeasureGroupID" type="xsd:string"/>
    <xsd:element name="Measures" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Measure" type="PerspectiveMeasure" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|----------------|-----------|---------------|---|
| MeasureGroupID | | [Required] | The ID of the measure group. |
| Measures | | Empty | A collection of objects of type PerspectiveMeasure. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.14.2.1 PerspectiveMeasure

This complex type represents a measure in a PerspectiveMeasureGroup.

```
<xsd:complexType name="PerspectiveMeasure">
  <xsd:all>
    <xsd:element name="MeasureID" type="xsd:string"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|-------------------------------------|
| MeasureID | | [Required] | The ID of the Measure. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.14.3 PerspectiveCalculation

This complex type represents a calculation in a Perspective.

```
<xsd:complexType name="PerspectiveCalculation">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Type" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Member" />
          <xsd:enumeration value="Set" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|---|
| Name | | [Required] | Indicates the name of the calculation. This is the UniqueName of the calculated member or set. |
| Type | | [Required] | Indicates the type of the calculation. The enumeration values are the following: Member : Calculated member Set : Named set |

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|-------------------------------------|
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.14.4 PerspectiveKpi

This complex type represents a KPI in a Perspective.

```
<xsd:complexType name="PerspectiveKpi">
  <xsd:all>
    <xsd:element name="KpiID" type="xsd:string"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|-------------------------------------|
| KpiID | | [Required] | The ID of the KPI. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.14.5 PerspectiveAction

This complex type represents an Action in a Perspective.

```
<xsd:complexType name="PerspectiveAction">
  <xsd:all>
    <xsd:element name="ActionID" type="xsd:string"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|-------------------------------------|
| ActionID | | [Required] | The ID of the Action . |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.15 MiningStructure

This complex type represents a mining structure.

```
<xsd:complexType name="MiningStructure">
  <xsd:all>
    <!--These elements are common to each MajorObject-->
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="ID" type="xsd:string" minOccurs="0" />
    <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="Description" type="xsd:string" minOccurs="0" />
    <xsd:element name="Annotations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <!--Extended elements for MiningStructure object-->
    <xsd:element name="Source" type="Binding" minOccurs="0" />
    <xsd:element name="LastProcessed" type="xsd:dateTime" minOccurs="0"/>
    <xsd:element name="Translations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation" type="Translation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Language" type="xsd:integer" minOccurs="0"/>
    <xsd:element name="Collation" type="xsd:string" minOccurs="0"/>
    <xsd:element name="ErrorConfiguration" type="ErrorConfiguration"
      minOccurs="0" />
    <xsd:element name="CacheMode" minOccurs="0" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="KeepTrainingCases" />
          <xsd:enumeration value="ClearAfterProcessing" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element ref="eng100_100:HoldoutMaxPercent" minOccurs="0" />
    <xsd:element ref="eng100_100:HoldoutMaxCases" minOccurs="0" />
    <xsd:element ref="eng100_100:HoldoutSeed" minOccurs="0" />
    <xsd:element ref="eng100_100:HoldoutActualSize" minOccurs="0" />
    <xsd:element name="Columns" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Column" type="MiningStructureColumn"
            minOccurs="1" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="State" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Processed" />
          <xsd:enumeration value="Unprocessed" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="MiningStructurePermissions" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="MiningStructurePermission"
            type="MiningStructurePermission" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

```

    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="MiningModels" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="MiningModel" type="MiningModel"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

The **MiningStructure** XSD depends upon element definitions in namespaces other than the default namespace. The following elements are defined in the namespace **eng100_100**:

```

<xsd:element name="HoldoutMaxPercent" type="xsd:int" />
<xsd:element name="HoldoutMaxCases" type="xsd:int" />
<xsd:element name="HoldoutSeed" type="xsd:int" />
<xsd:element name="HoldoutActualSize" type="xsd:int" />

```

The following table describes the elements that are included in the XSD schema for **MiningStructure**. Those elements common to all major objects are described in section 2.2.4.2.2.1.

| Element | Read-Only | Default value | Description |
|--------------------|-----------|---------------------|---|
| Source | | Empty | The source for the MiningStructure data. Source is of type "Binding". One of the following derived classes MUST be used: DataSourceViewBinding, DimensionBinding, or CubeDimensionBinding. If DimensionBinding or CubeDimensionBinding is used, then the DataSourceID for DimensionBinding and CubeDimensionBinding MUST indicate an OLAP source. |
| LastProcessed | Yes | | The date and time when the mining structure was last processed. |
| Translations | | Empty | A collection of Translation objects. |
| Language | | Empty | The LCID of the language to use by default. See [MS-LCID] for information about LCIDs. If empty, the server will determine the language to use.<80> |
| Collation | | Empty | The collation of this MiningStructure . |
| ErrorConfiguration | | Empty | Error configuration settings to deal with issues in the source data. |
| CacheMode | | "KeepTrainingCases" | Determines caching mechanism for training data retrieved during mining structure processing. |
| HoldoutMaxPercent | | Zero | An integer value between 0 and 99 that specifies the maximum percentage of the cases that are to be held out as the test set. The remaining cases become the training data set. Zero indicates no limit. |

| Element | Read-Only | Default value | Description |
|----------------------------|-----------|---------------|---|
| HoldoutMaxCases | | Zero | An integer value equal to or greater than zero that specifies the maximum number of cases that are to be held out as the test set. The remaining cases become the training data set. Zero indicates no limit. If not zero, then the lowest of (HoldoutMaxCases , HoldoutMaxPercent) is used. |
| HoldoutSeed | | Zero | Used as the seed for repeatable partitioning. If unspecified or set to zero, a hash of the mining structure name is used as the seed. |
| HoldoutActualSize | Yes | | If the mining structure is processed, this indicates the actual size of the test data set, expressed in number of cases. Zero indicates either no test partition or that the structure is not processed. |
| Columns | | [Required] | A collection of Column objects for MiningStructure . |
| State | Yes | | The state of processing of the object. |
| MiningStructurePermissions | | Empty | A collection of MiningStructurePermission objects. Each MiningStructurePermission defines the permissions a role has on this MiningStructure . |
| MiningModels | | Empty | A collection of MiningModel objects. |

2.2.4.2.2.15.1 MiningStructureColumn

This complex type represents a column in a MiningStructure. This is an abstract type for the ScalarMiningStructureColumn and TableMiningStructureColumn derived types. The XSD in this section has no elements because the derived classes contain the XSD for the elements. However, the common elements to all derived classes are documented in the following table.

```
<xsd:complexType name="MiningStructureColumn" abstract="true" />
```

| Element | Read-Only | Default value | Description |
|-------------|-----------|------------------|--|
| Name | | [Required] | The object name. |
| ID | | Defaults to Name | The object ID string. |
| Description | | Empty | The object description. |
| Type | | [Required] | Contains the data type of the element. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.15.1.1 ScalarMiningStructureColumn

This complex type represents a scalar column in the MiningStructure.
ScalarMiningStructureColumn extends the base class MiningStructureColumn.

```

<xsd:complexType name="ScalarMiningStructureColumn">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Type" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Long" />
          <xsd:enumeration value="Boolean" />
          <xsd:enumeration value="Text" />
          <xsd:enumeration value="Double" />
          <xsd:enumeration value="Date" />
          <xsd:enumeration value="Table" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="IsKey" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="Source" type="Binding" minOccurs="0" />
    <xsd:element name="Distribution" type="xsd:string" minOccurs="0"/>
    <xsd:element name="ModelingFlags" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="ModelingFlag" type="MiningModelingFlag"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Content" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <!-- This list is user-extensible -->
          <xsd:enumeration value="Discrete" />
          <xsd:enumeration value="Continuous" />
          <xsd:enumeration value="Discretized" />
          <xsd:enumeration value="Ordered" />
          <xsd:enumeration value="Cyclical" />
          <xsd:enumeration value="Probability" />
          <xsd:enumeration value="Variance" />
          <xsd:enumeration value="StdDev" />
          <xsd:enumeration value="ProbabilityVariance" />
          <xsd:enumeration value="ProbabilityStdDev" />
          <xsd:enumeration value="Support" />
          <xsd:enumeration value="Key" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="ClassifiedColumns" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="ClassifiedColumnID" type="xsd:string"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="DiscretizationMethod" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DiscretizationBucketCount" type="xsd:integer" minOccurs="0"/>
    <xsd:element name="KeyColumns" minOccurs="0">

```

```

<xsd:complexType>
  <xsd:sequence>
    <xsd:element name="KeyColumn" type="DataItem" minOccurs="0"
      maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:element name="NameColumn" type="DataItem" minOccurs="0" />
<xsd:element name="Translations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Translation" type="Translation" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|----------------------|-----------|---|---|
| IsKey | | False | When true, indicates that the column provides the key of the case; otherwise, false. One or more columns MAY be designated as the key. At least one column MUST be designated as the key. |
| Source | | Empty | The data source for this column, if the mining structure is bound to OLAP objects. Source is of type "Binding". This element MAY be empty for mining structures based on relational data, but for OLAP-based mining structures, one of the following derived classes MUST be used: AttributeBinding, CubeAttributeBinding, or MeasureBinding. |
| Distribution | | Empty | An extensible enumeration, such as Normal , Uniform , and LogNormal . |
| ModelingFlags | | Empty | A collection of MiningModelingFlag objects. If non-empty, the only supported string value is "NotNull". |
| Content | | [Required] | An enumeration that describes the type of content represented by a mining structure column. All values might not necessarily be supported by all algorithms. |
| ClassifiedColumns | | Empty | A string collection of the ID for any columns classified by this column. |
| DiscretizationMethod | | Empty (Mapped to Automatic for columns where content is discretized) | Defines the method to be used for discretization. Current values supported for this string element are as follows: <ul style="list-style-type: none"> "Automatic" - The algorithm chooses the best technique among EqualAreas, Thresholds, and Clusters. "EqualAreas" - For continuous values, specifies that the area that represents the distribution of each bucket is equal. "Thresholds" - For continuous variables, specifies that bucket thresholds are based on inflection points of the distribution curve. |

| Element | Read-Only | Default value | Description |
|---------------------------|-----------|---------------|---|
| | | | <ul style="list-style-type: none"> "Clusters" - Finds buckets by single dimension clustering by using the K-Means algorithm. |
| DiscretizationBucketCount | | 0 | The number of buckets in which to discretize. |
| KeyColumns | | Empty | The data source for this column, for mining structures bound to relational data (or unbound). Collection of objects of type DataItem to bind to values of this column. The Source element within the DataItem MUST be of type ColumnBinding. |
| NameColumn | | Empty | An optional column binding containing the name of the key values (in the KeyColumns element). NameColumn is of type DataItem . The Source element within the DataItem MUST be of type ColumnBinding . |
| Translations | | Empty | A collection of Translation objects. |

2.2.4.2.2.15.1.2 (Updated Section) TableMiningStructureColumn

This complex type represents a nested table column in the MiningStructure. **TableMiningStructureColumn** extends MiningStructureColumn.

```

<xsd:complexType name="TableMiningStructureColumn">
  <xsd:all>
    <xsd:element name="ForeignKeyColumns" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="ForeignKeyColumn" type="DataItem"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="SourceMeasureGroup" type="MeasureGroupBinding"
      minOccurs="0" />
    <xsd:element name="Columns" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Column" type="MiningStructureColumn"
            minOccurs="1" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Translations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation" type="Translation"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|--------------------|-----------|---------------|---|
| ForeignKeyColumns | | Empty | A collection of DataItem objects that binds to foreign keys for this column. The Source element within the DataItem MUST be of type ColumnBinding. |
| SourceMeasureGroup | | Empty | An optional binding to a MeasureGroup if DataSourceID for MiningModelStructure MiningStructure is OLAP. |
| Columns | | Empty | A collection of bindings to MiningStructureColumns . MiningStructureColumns can be nested within each other, but it is only recursive to one level. That is, a set of scalar columns can be specified here, but included columns cannot have included columns nested within them. |
| Translations | | Empty | A collection of Translation objects. |

2.2.4.2.2.16 MiningModel

This complex type represents a mining model.

```

<xsd:complexType name="MiningModel">
  <xsd:all>
    <!--These elements are common to each MajorObject-->
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="ID" type="xsd:string" minOccurs="0" />
    <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="Description" type="xsd:string" minOccurs="0" />
    <xsd:element name="Annotations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <!--Extended elements for MiningModel object-->
    <xsd:element name="Algorithm" minOccurs="1">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Microsoft_Naive_Bayes" />
          <xsd:enumeration value="Microsoft_Decision_Trees" />
          <xsd:enumeration value="Microsoft_Clustering" />
          <xsd:enumeration value="Microsoft_Neural_Network" />
          <xsd:enumeration value="Microsoft_Logistic_Regression" />
          <xsd:enumeration value="Microsoft_Linear_Regression" />
          <xsd:enumeration value="Microsoft_Association_Rules" />
          <xsd:enumeration value="Microsoft_Time_Series" />
          <xsd:enumeration value="Microsoft_Sequence_Clustering" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="LastProcessed" type="xsd:dateTime" minOccurs="0"/>
    <xsd:element name="AlgorithmParameters" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="AlgorithmParameter" type="AlgorithmParameter"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="AllowDrillThrough" type="xsd:boolean" minOccurs="0"/>
  </xsd:all>
</xsd:complexType>

```

```

<xsd:element name="Translations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Translation" type="AttributeTranslation"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Columns" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Column" type="MiningModelColumn" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="State" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Processed" />
      <xsd:enumeration value="Unprocessed" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="FoldingParameters" type="FoldingParameters"
  minOccurs="0" />
<xsd:element name="Filter" type="xsd:string" minOccurs="0" />
<xsd:element name="MiningModelPermissions" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="MiningModelPermission" type="MiningModelPermission"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Language" type="xsd:string" minOccurs="0"/>
<xsd:element name="Collation" type="xsd:string" minOccurs="0"/>
</xsd:all>
</xsd:complexType>

```

The following table describes the elements that are included in the XSD schema for **MiningModel**. Those elements common to all major objects are described in section 2.2.4.2.2.1.

| Element | Read-Only | Default value | Description |
|---------------------|-----------|---------------|--|
| Algorithm | | [Required] | The protocol does not require any particular algorithms to be supported, and each server developer can support whichever algorithms he or she chooses to support. <81> |
| LastProcessed | Yes | | The date and time when the mining model was last processed. |
| AlgorithmParameters | | Empty | A collection of objects of type AlgorithmParameter. The allowed parameters are different depending on the algorithm. |
| AllowDrillThrough | | False | When true, indicates that drillthrough is allowed; otherwise, false. |
| Translations | | Empty | A collection of Translation objects. |
| Columns | | Empty | A collection of objects of type MiningModelColumn. |
| State | Yes | | Represents the processing state of the partition. Values include: |

| Element | Read-Only | Default value | Description |
|------------------------|-----------|---------------|--|
| | | | <ul style="list-style-type: none"> Processed Unprocessed |
| FoldingParameters | | Empty | An object of type FoldingParameters. Describes a fold (a partition of the training data) to be used for training this mining model. Used only as part of the multifold cross-validation procedure.<82> |
| Filter | | Empty | The DMX filter statement to be applied to training data for models that are trained only on a part of a structure's data. An empty string or missing element implies no filter.<83> |
| MiningModelPermissions | | Empty | A collection of MiningModelPermission objects. |
| Language | | Empty | The language to use by default. |
| Collation | | Empty | The collation sequence to use. |

2.2.4.2.2.16.1 MiningModelingFlag

This complex type represents a flag for a MiningModel algorithm. The flags that can be accepted depend upon the algorithm used in the **MiningModel**.

```
<xsd:complexType name="MiningModelingFlag">
  <xsd:all>
    <xsd:element name="ModelingFlag" type="xsd:string" />
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|--------------|-----------|---------------|---|
| ModelingFlag | | Empty | A flag that is passed to a mining model algorithm. The form and content of flags is specific to each algorithm. Each ModelingFlag needs to be valid for the algorithm chosen.<84> Server vendors can define flags that support their algorithms. |

2.2.4.2.2.16.2 MiningModelColumn

This complex type represents a column in a MiningModel.

```
<xsd:complexType name="MiningModelColumn">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="ID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="SourceColumnID" type="xsd:string"/>
    <xsd:element name="Usage" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Key" />
          <xsd:enumeration value="Input" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

```

        <xsd:enumeration value="Predict" />
        <xsd:enumeration value="PredictOnly" />
    </xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="Filter" type="xsd:string" minOccurs="0"/>
<xsd:element name="Translations" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Translation" type="Translation" minOccurs="0"
                maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<xsd:element name="Columns" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Column" type="MiningModelColumn" minOccurs="0"
                maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<xsd:element name="ModelingFlags" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="ModelingFlag" type="MiningModelingFlag" minOccurs="0"
                maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<xsd:element name="Annotations" minOccurs="0">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Annotation" type="Annotation" minOccurs="0"
                maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|----------------|-----------|------------------|---|
| Name | | [Required] | The object name. |
| ID | | Defaults to Name | The object ID string. |
| Description | | Empty | The object description. |
| SourceColumnID | | Empty | The ID of the source column in the parent structure. |
| Usage | | "None"<85> | Specifies the usage for this column within the MiningModel . If the column that is referenced by the SourceColumnID value is a key column, the Usage element MUST be set to "Key". |
| Filter | | Empty | A string that contains a valid DMX filter to be applied to nested table columns. An empty string or missing element implies no filter. This element is empty for non-table columns.<86> |
| Translations | | Empty | A collection of Translation objects. |
| Columns | | Empty | A set of Column objects. This is a nesting of this same type. It is used only for nested tables. |

| Element | Read-Only | Default value | Description |
|---------------|-----------|---------------|--|
| ModelingFlags | | Empty | A collection of ModelingFlag objects. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.16.3 AlgorithmParameter

This complex type represents an algorithm parameter for a MiningModel. The parameters that are allowed vary by which algorithm is chosen.

```
<xsd:complexType name="AlgorithmParameter">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Value" type="xsd:anySimpleType" />
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|--|
| Name | | [Required] | The parameter name. Algorithm-specific. |
| Value | | [Required] | The parameter value. Algorithm-specific. |

2.2.4.2.2.16.4 FoldingParameters

This complex type represents the folding parameters for a MiningModel.<87>

```
<xsd:complexType name="FoldingParameters">
  <xsd:all>
    <xsd:element name="FoldIndex" type="xsd:integer" />
    <xsd:element name="FoldCount" type="xsd:integer" />
    <xsd:element name="FoldMaxCases" type="xsd:long" minOccurs="0"/>
    <xsd:element name="FoldTargetAttribute" type="xsd:string" minOccurs="0"/>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|---------------------|-----------|---------------|---|
| FoldIndex | | [Required] | An integer that indicates the index of the partition to be used for validating this mining model in a multifold cross-validation procedure.<88> |
| FoldCount | | [Required] | An integer that indicates the number of partitions in the multifold cross-validation procedure.<89> |
| FoldMaxCases | | 0 | An integer value that indicates the maximum number of training cases to be used for cross-validation in this model. This value MUST be a positive integer. A value of 0 indicates that all cases are used.<90> |
| FoldTargetAttribute | | Empty | A string that indicates the ID of the model column that contains |

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|--------------------------------|
| | | | the predictable attribute.<91> |

2.2.4.2.2.17 Annotation

This complex type represents an **Annotation**.

```
<xsd:complexType name="Annotation">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Visibility" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="SchemaRowset" />
          <xsd:enumeration value="None" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Value" type="xsd:anyType" minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|----------------|-----------|---------------|---|
| Name | | [Required] | This element SHOULD<92> be in a style that references the vendor's XML namespace, to prevent collisions in sharing of information contained in other Annotation objects. The Name element MUST be unique within the collection of Annotations that is contained within an individual object. |
| Visibility<93> | | "None" | This element determines the way in which Annotation objects are exposed. By default, Annotation objects are exposed only in DISCOVER_XML_METADATA , and are not visible to client software. If Visibility is set to SchemaRowset , then Annotation object information is exposed as a column by schema rowset requests. |
| Value | | Empty | The content of the Annotation . |

2.2.4.2.2.17.1 LinguisticSchemas Annotation

The **LinguisticSchemas** annotation<94> is a predefined **Annotation** that is available on the **Database** object with Name = LinguisticSchemas.

The value of this annotation is the element **LinguisticSchemas** with the following complex type.

```
<xsd:complexType name="LinguisticSchemas">
  <xsd:sequence>
    <xsd:element name="LinguisticSchema" type="LinguisticSchema" minOccurs="1" />
  </xsd:sequence>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|-------------------|-----------|---------------|---|
| LinguisticSchemas | | Empty | A collection of LinguisticSchema objects. |

The following is an example of a **LinguisticSchemas** annotation.

```

<Annotation>
  <Name>LinguisticSchemas</Name>
  <Value>
    <LinguisticSchemas xmlns="">
      <LinguisticSchema Language="en-US" xmlns="http://schemas.microsoft.com
/sqlserver/2014/01/linguisticschema">
        <Entities>
          <Entity Name="my_table" EdmEntitySet="Sandbox.Table1">
            <Words>
              <Word>my table</Word>
            </Words>
          </Entity>
          <Entity Name="my_table.A" EdmEntitySet="Sandbox.Table1" EdmProperty="A">
            <Words>
              <Word>A</Word>
              <Word>my table a</Word>
            </Words>
          </Entity>
          <Entity Name="my_table.B" EdmEntitySet="Sandbox.Table1" EdmProperty="B">
            <Words>
              <Word>B</Word>
            </Words>
          </Entity>
          <Entity Name="my_table.XL_row_number" EdmEntitySet="Sandbox.Table1"
EdmProperty="v_XL_RowNumber">
            <Words>
              <Word>XL row number</Word>
            </Words>
          </Entity>
        </Entities>
      </LinguisticSchema>
    </LinguisticSchemas>
  </Value>
</Annotation>

```

2.2.4.2.2.17.1.1 LinguisticSchema

This complex type represents a **LinguisticSchema**.<95>

```

<xsd:complexType name="LinguisticSchema">
  <xsd:sequence>
    <xsd:element name="Entities" type="EntitiesType" minOccurs="0" maxOccurs="1" />
  </xsd:sequence>
  <xsd:attribute name="Language" type="xsd:language" use="required" />
</xsd:complexType>

<xsd:complexType name="EntitiesType">
  <xsd:sequence>
    <xsd:element name="Entity" type="EntityType" minOccurs="1" />
  </xsd:sequence>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|----------|-----------|---------------|---------------------------------|
| Entities | | Empty | A collection of Entity objects. |

| Attribute | Description |
|-----------|--|
| Language | Language code for the language of the linguistic schema. The language MUST comply with [HTML] section 8.1.1. |

2.2.4.2.2.17.1.1.1 Entity

This complex type represents an **Entity**.<96>

```
<xsd:complexType name="EntityType">
  <xsd:sequence>
    <xsd:element name="Words" type="WordsType" minOccurs="0" maxOccurs="1" />
  </xsd:sequence>
  <xsd:attribute name="Name" type="Name" use="required" />
  <xsd:attribute name="EdmEntitySet" type="EdmQualifiedName" use="required" />
  <xsd:attribute name="EdmProperty" type="EdmSimpleName" use="optional" />
</xsd:complexType>

<xsd:complexType name="WordsType">
  <xsd:sequence>
    <xsd:element name="Word" type="xsd:token" minOccurs="1" />
  </xsd:sequence>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|---|
| Words | | Empty | A collection of string objects. Each Word represents a term that can be used to refer to the Entity . |

| Attribute | Description |
|--------------|---|
| Name | Name of the entity. |
| EdmEntitySet | Name of the EdmEntitySet that represents the entity or contains the EdmProperty that represents the entity. |
| EdmProperty | Name of the EdmProperty that represents the entity. |

2.2.4.2.2.18 Translation

This complex type represents a translation of an object in a specific language.

```
<xsd:complexType name="Translation">
  <xsd:all>
    <xsd:element name="Language" type="xsd:unsignedInt"/>
    <xsd:element name="Caption" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DisplayFolder" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

```

        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|---------------|-----------|---------------|---|
| Language | | [Required] | The locale ID of the language. For more details on locale identifiers, see [MS-LCID]. |
| Caption | | Empty | The caption of the object in the language represented by the Language element. |
| Description | | Empty | The description for the object. |
| DisplayFolder | | Empty | The folder in which the object is displayed. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.18.1 AttributeTranslation

This complex type represents a translation of a DimensionAttribute in a specific language. The **AttributeTranslation** type is an extension of the Translation type, and includes all its elements.

```

<xsd:complexType name="AttributeTranslation">
  <xsd:all>
    <xsd:element name="Language" type="xsd:unsignedInt"/>
    <xsd:element name="Caption" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DisplayFolder" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="CaptionColumn" type="DataItem" minOccurs="0" />
    <xsd:element name="MembersWithDataCaption" type="xsd:string" minOccurs="0" />
  </xsd:all>
</xsd:complexType>

```

The following table includes only the elements that are in addition to the **AttributeTranslation** type. All elements from the **Translation** type are also included.

| Element | Read-Only | Default value | Description |
|------------------------|-----------|---------------|---|
| CaptionColumn | | None | The source column for the attribute member captions. |
| MembersWithDataCaption | | None | The caption template for data members. This applies only if Usage is set to Parent in the DimensionAttribute . |

2.2.4.2.2.19 DataItem

This complex type represents a scalar data item associated with an object, such as DimensionAttribute and Measure.

The **Source** element of the **DataItem** is of type Binding. However, in a specific instance of the **DataItem**, there are often additional constraints as to what type of **Binding** will be permitted, depending upon the parent of the **DataItem**. Within the tables throughout this document, it is noted exactly which derived types of **Binding** are permitted in each context and **MUST** be used for that particular context.

```
<xsd:complexType name="DataItem">
  <xsd:all>
    <xsd:element name="DataType">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="WChar" />
          <xsd:enumeration value="Integer" />
          <xsd:enumeration value="BigInt" />
          <xsd:enumeration value="Single" />
          <xsd:enumeration value="Double" />
          <xsd:enumeration value="Date" />
          <xsd:enumeration value="Currency" />
          <xsd:enumeration value="UnsignedTinyInt" />
          <xsd:enumeration value="UnsignedSmallInt" />
          <xsd:enumeration value="UnsignedInt" />
          <xsd:enumeration value="UnsignedBigInt" />
          <xsd:enumeration value="Bool" />
          <xsd:enumeration value="Smallint" />
          <xsd:enumeration value="Tinyint" />
          <xsd:enumeration value="Binary" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="DataSize" type="xsd:integer" minOccurs="0"/>
    <xsd:element name="MimeType" type="xsd:string" minOccurs="0"/>
    <xsd:element name="NullProcessing" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Preserve" />
          <xsd:enumeration value="Error" />
          <xsd:enumeration value="UnknownMember" />
          <xsd:enumeration value="ZeroOrBlank" />
          <xsd:enumeration value="Automatic" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Trimming" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Left" />
          <xsd:enumeration value="Right" />
          <xsd:enumeration value="LeftRight" />
          <xsd:enumeration value="None" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="InvalidXmlCharacters" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Preserve" />
          <xsd:enumeration value="Remove" />
          <xsd:enumeration value="Replace" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Collation" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Format" minOccurs="0">
      <xsd:simpleType>
```



```

    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="TrimRight" />
      <xsd:enumeration value="TrimLeft" />
      <xsd:enumeration value="TrimAll" />
      <xsd:enumeration value="TrimNone" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="Source" type="Binding" minOccurs="0"/>
<xsd:element name="Annotations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Annotation" type="Annotation"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|----------------------|-----------|---------------|--|
| DataType | | [Required] | The data type of the column. |
| DataSize | | 0 | The data size in bytes. Zero means that the server will determine the DataSize . |
| MimeType | | Empty | The MIME type. Applicable only if the DataType is Binary . |
| NullProcessing | | "Automatic" | Sets the processing of NULL values: <ul style="list-style-type: none"> "Automatic" – The server determines how null processing is handled.<97> "Automatic" uses the default processing that is appropriate for the element: "UnknownMember" – Generates an unknown member. This value MUST NOT be used if the column is associated with a measure. "ZeroOrBlank" – Converts the null value to zero (for numeric data items) or a blank string (for string data items). "Preserve" – Preserves the null value. "Error" – Raises an error. Value "Error" is not supported for measures. This value MUST NOT be used if the column is associated with a measure. |
| Trimming | | "Right" | Specifies how data from the data source is trimmed. Applicable only to string data items. |
| InvalidXmlCharacters | | "Preserve" | Specifies handling for invalid XML characters. The valid values are the following: <ul style="list-style-type: none"> "Preserve" - Specifies that invalid XML characters are preserved in the character stream. "Remove" – Specifies that invalid XML characters are removed. "Replace" – Specifies that invalid XML characters are replaced with a question mark (?) character. |

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|--|
| Collation | | Empty | The collation of the data item. Applicable only to string data items. |
| Format | | Empty | The format of the data item. The valid values are the following: <ul style="list-style-type: none"> "TrimRight": The value is trimmed on the right. "TrimLeft": The value is trimmed on the left. "TrimAll": The value is trimmed on the left and the right. "TrimNone": The value is not trimmed. |
| Source | | Empty | The source of the data item. Which derived type of Binding is permitted is dependent upon the enclosing object, and is explained in the table for each enclosing object. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.20 Binding

This complex type represents a binding of an object to a source of data. It is an abstract type that is extended by many binding types.

```
<xsd:complexType name="Binding" abstract="true" />
```

2.2.4.2.2.20.1 ColumnBinding

This complex type represents a binding to a column of a table.

```
<xsd:complexType name="ColumnBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="TableID" type="xsd:string"/>
        <xsd:element name="ColumnID" type="xsd:string"/>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|----------|-----------|---------------|---|
| TableID | | [Required] | The ID of the table in the DataSourceView. |
| ColumnID | | [Required] | The ID of the column in the DataSourceView . |

2.2.4.2.2.20.2 RowBinding

This complex type represents a binding to the rows of a table.

```

<xsd:complexType name="RowBinding">
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="TableID" type="xsd:string"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|--|
| TableID | | [Required] | The ID of the table in the DataSourceView. |

2.2.4.2.2.20.3 DataSourceViewBinding

This complex type represents a binding to a DataSourceView.

```

<xsd:complexType name="DataSourceViewBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="DataSourceViewID" type="xsd:string" />
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|------------------|-----------|---------------|---------------------------------------|
| DataSourceViewID | | [Required] | The ID of the DataSourceView . |

2.2.4.2.2.20.4 MeasureBinding

This complex type represents a binding to a Measure.

```

<xsd:complexType name="MeasureBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="MeasureID" type="xsd:string"/>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-----------|-----------|---------------|--------------------------------|
| MeasureID | | [Required] | The ID of the Measure . |

2.2.4.2.2.20.5 AttributeBinding

This complex type represents a binding to a DimensionAttribute.

```
<xsd:complexType name="AttributeBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="AttributeID" type="xsd:string"/>
        <xsd:element name="Type" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="All" />
              <xsd:enumeration value="Key" />
              <xsd:enumeration value="Name" />
              <xsd:enumeration value="Value" />
              <xsd:enumeration value="Translation" />
              <xsd:enumeration value="UnaryOperator" />
              <xsd:enumeration value="SkippedLevels" />
              <xsd:enumeration value="CustomRollup" />
              <xsd:enumeration value="CustomRollupProperties" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="Ordinal" type="xsd:integer" minOccurs="0"/>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|--|
| AttributeID | | [Required] | The ID of the Attribute . |
| Type | | [Required] | Indicates the part of the Attribute to bind to. Enumeration values are as follows: All: All Level Key: Member keys Name: Member name Value: Member value Translation: Member translations UnaryOperator: Unary operators SkippedLevels: Skipped levels CustomRollup: Custom rollup formulas CustomRollupProperties: Custom rollup properties |
| Ordinal | | Zero | When the binding is to a collection of objects, the ordinal indicates the ordinal number within that collection to bind to. (Applies to KeyColumns and Translation objects). |

2.2.4.2.2.20.6 UserDefinedGroupBinding

This complex type represents a binding to a grouping of members from another DimensionAttribute.

```
<xsd:complexType name="UserDefinedGroupBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="AttributeID" type="xsd:string"/>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

```

<xsd:element name="Groups" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Group" type="Group" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:extension>
</xsd:complexContent>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|---|
| AttributeID | | [Required] | The ID of the Attribute that is being grouped. |
| Groups | | | A collection of objects of type Group. |

2.2.4.2.2.20.6.1 Group

This complex type represents a single group within a UserDefinedGroupBinding.

```

<xsd:complexType name="Group">
  <xsd:all>
    <xsd:element name="Name" type="xsd:string"/>
    <xsd:element name="Members" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Member" type="xsd:string" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|--|
| Name | | [Required] | Name of the grouping member. |
| Members | | | A collection of strings that contain MDX expressions that identify the set of members to be grouped. |

2.2.4.2.2.20.7 CubeAttributeBinding

This complex type represents a binding to a CubeAttribute.

```

<xsd:complexType name="CubeAttributeBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding" >
      <xsd:all>
        <xsd:element name="CubeID" type="xsd:string"/>
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="AttributeID" type="xsd:string"/>
        <xsd:element name="Type" >

```

```

<xsd:simpleType>
  <xsd:restriction base="xsd:string" >
    <xsd:enumeration value="All" />
    <xsd:enumeration value="Key" />
    <xsd:enumeration value="Name" />
    <xsd:enumeration value="Value" />
    <xsd:enumeration value="Translation" />
    <xsd:enumeration value="UnaryOperator" />
    <xsd:enumeration value="SkippedLevels" />
    <xsd:enumeration value="CustomRollup" />
    <xsd:enumeration value="CustomRollupProperties" />
  </xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="Ordinal" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Ordinal" type="xsd:integer"
        minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:extension>
</xsd:complexContent>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---------------|--|
| CubeID | | [Required] | The ID of the Cube. |
| CubeDimensionID | | [Required] | The ID of the CubeDimension. |
| AttributeID | | [Required] | The ID of the CubeAttribute . |
| Type | | [Required] | Indicates the part of the Attribute to bind to. For more information about the enumeration values, see section 2.2.4.2.2.20.5. |
| Ordinal | | Zero | When the binding is to a collection of objects, the ordinal indicates the ordinal number within that collection to bind to. (Applies to KeyColumns and Translations .) |

2.2.4.2.2.20.8 DimensionBinding

The **DimensionBinding** complex type represents a binding to a dimension.

```

<xsd:complexType name="DimensionBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="DataSourceID" type="xsd:string"/>
        <xsd:element name="DimensionID" type="xsd:string"/>
        <xsd:element name="Persistence" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="NotPersisted" />
              <xsd:enumeration value="Metadata" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="RefreshPolicy" minOccurs="0">

```

```

    <xsd:simpleType>
      <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="ByQuery" />
        <xsd:enumeration value="ByInterval" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="RefreshInterval" type="xsd:duration" minOccurs="0" />
</xsd:all>
</xsd:extension>
</xsd:complexContent>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-----------------|-----------|----------------|---|
| DataSourceID | | [Required] | The ID of the DataSource. |
| DimensionID | | [Required] | The ID of the Dimension. |
| Persistence | | "NotPersisted" | Determines which parts of the bound source data are dynamic and are checked for updates by using the frequency that is specified by the RefreshPolicy element. Enumeration values are as follows: <ul style="list-style-type: none"> NotPersisted - Source metadata, members, and data are all dynamic. Metadata - Source metadata is static, but members and data are dynamic. |
| RefreshPolicy | | "ByQuery" | Determines how often the dynamic part of the dimension or measure group (as specified by the Persistence element) is checked for changes. Enumeration values are as follows: <ul style="list-style-type: none"> ByQuery - Every query checks to see whether the source data has changed. ByInterval - Source data is checked for changes only at the interval that is specified by the RefreshInterval element. |
| RefreshInterval | | | Specifies the interval at which the dynamic part of the dimension or measure group is refreshed. The value -10000000 is interpreted to mean infinite. |

2.2.4.2.2.20.9 CubeDimensionBinding

The **CubeDimensionBinding** complex type represents a binding to a CubeDimension.

```

<xsd:complexType name="CubeDimensionBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="DataSourceID" type="xsd:string"/>
        <xsd:element name="CubeID" type="xsd:string"/>
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
        <xsd:element name="Filter" type="xsd:string" minOccurs="0"/>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---------------|---|
| DataSourceID | | [Required] | The ID of the DataSource. |
| CubeID | | [Required] | The ID of the Cube. |
| CubeDimensionID | | [Required] | The ID of the CubeDimension . |
| Filter | | Empty | An MDX expression that specifies how to filter the source data. |

2.2.4.2.2.20.10 MeasureGroupBinding

The **MeasureGroupBinding** complex type represents a binding to a MeasureGroup.

```

<xsd:complexType name="MeasureGroupBinding">
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="DataSourceID" type="xsd:string"/>
        <xsd:element name="CubeID" type="xsd:string"/>
        <xsd:element name="MeasureGroupID" type="xsd:string"/>
        <xsd:element name="Persistence" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="NotPersisted" />
              <xsd:enumeration value="Metadata" />
              <xsd:enumeration value="All" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="RefreshPolicy" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="ByQuery" />
              <xsd:enumeration value="ByInterval" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="RefreshInterval" type="xsd:duration" minOccurs="0" />
        <xsd:element name="Filter" type="xsd:string" minOccurs="0"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|----------------|-----------|----------------|---|
| DataSourceID | | [Required] | The ID of the DataSource. |
| CubeID | | [Required] | The ID of the Cube. |
| MeasureGroupID | | [Required] | The ID of the MeasureGroup . |
| Persistence | | "NotPersisted" | Determines which parts of the bound source data are dynamic and are checked for updates using the frequency that is specified by the RefreshPolicy element. Enumeration values are as follows: <ul style="list-style-type: none"> NotPersisted - Source metadata, members, and data are all |

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---------------|--|
| | | | <p>dynamic.</p> <ul style="list-style-type: none"> Metadata - Source metadata is static, but members and data are dynamic. All - Source metadata, members, and data are all static. |
| RefreshPolicy | | Empty | <p>Determines how often the dynamic part of the dimension or measure group (as specified by the Persistence element) is checked for changes. Enumeration values are as follows:</p> <ul style="list-style-type: none"> ByQuery - Every query checks to determine whether the source data has changed. ByInterval - Source data is checked for changes only at the interval that is specified by the RefreshInterval element. |
| RefreshInterval | | -1 second | A duration that specifies the interval at which the dynamic part of the dimension or measure group is refreshed. The value -1 second is interpreted to mean infinite. |
| Filter | | Empty | An MDX expression that specifies how to filter the source data. |

2.2.4.2.2.20.11 MeasureGroupDimensionBinding

The **MeasureGroupDimensionBinding** complex type represents a binding to a MeasureGroupDimension.

```
<xsd:complexType name="MeasureGroupDimensionBinding">
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="CubeDimensionID" type="xsd:string"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---------------|------------------------------|
| CubeDimensionID | | [Required] | The ID of the CubeDimension. |

2.2.4.2.2.20.12 TimeBinding

The **TimeBinding** complex type represents a binding to a time calendar.

```
<xsd:complexType name="TimeBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="CalendarStartDate" type="xsd:dateTime"/>
        <xsd:element name="CalendarEndDate" type="xsd:dateTime"/>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

```

<xsd:element name="FirstDayOfWeek " minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:minInclusive value="1" />
      <xsd:maxInclusive value="7" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="CalendarLanguage" type="xsd:integer" minOccurs="0"/>
<xsd:element name="FiscalFirstMonth" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:minInclusive value="1" />
      <xsd:maxInclusive value="12" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="FiscalFirstDayOfMonth" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:minInclusive value="1" />
      <xsd:maxInclusive value="31" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="FiscalYearName" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="CalendarYearName" />
      <xsd:enumeration value="NextCalendarYearName" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ReportingFirstMonth" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:minInclusive value="1" />
      <xsd:maxInclusive value="12" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ReportingFirstWeekOfMonth" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
      <xsd:enumeration value="3" />
      <xsd:enumeration value="4" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ReportingWeekToMonthPattern" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Weeks445" />
      <xsd:enumeration value="Weeks454" />
      <xsd:enumeration value="Weeks544" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ManufacturingFirstMonth" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:minInclusive value="1" />
      <xsd:maxInclusive value="12" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name=" ManufacturingFirstWeekOfMonth" minOccurs="0">
  <xsd:simpleType>

```

```

        <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="1" />
            <xsd:maxInclusive value="4" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="ManufacturingExtraMonthQuarter" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:integer">
            <xsd:minInclusive value="1" />
            <xsd:maxInclusive value="4" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
</xsd:all>
</xsd:extension>
</xsd:complexContent>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-----------------------------|-----------|------------------------|--|
| CalendarStartDate | | [Required] | The start date of the calendar. |
| CalendarEndDate | | [Required] | The end date of the calendar. The end date needs to be on or after the start date. |
| FirstDayOfWeek | | 1 | The first day of the week. 1=Sunday 7=Saturday |
| CalendarLanguage | | 1033 (English-US) | The language in which the dimension member names will be created. This MUST be a language code identifier (LCID) code. |
| FiscalFirstMonth | | 1 | The first month of the fiscal calendar. 1=January 12=December |
| FiscalFirstDayOfMonth | | 1 | The first day of the fiscal calendar. |
| FiscalYearName | | "NextCalendarYearName" | This enumeration value specifies how the name of the fiscal year is generated. |
| ReportingFirstMonth | | 1 | The first month of the reporting calendar. 1=January 12=December |
| ReportingFirstWeekOfMonth | | 1 | The first week of the reporting calendar. |
| ReportingWeekToMonthPattern | | "Weeks445" | The pattern by which to match weeks to months. |
| ManufacturingFirstMonth | | 1 | The first month of the manufacturing calendar. 1=January 12=December |

| Element | Read-Only | Default value | Description |
|--------------------------------|-----------|---------------|--|
| ManufacturingFirstWeekOfMonth | | 1 | The first week of the manufacturing calendar. |
| ManufacturingExtraMonthQuarter | | 4 | The quarter of a year that contains the extra month. |

2.2.4.2.2.20.13 TimeAttributeBinding

The **TimeAttributeBinding** complex type represents a binding of a DimensionAttribute to a time calendar. It has no additional elements. It is used for the **KeyColumns** of attributes in dimensions that have a Source property with type TimeBinding.

```
<xsd:complexType name="TimeAttributeBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding" />
  </xsd:complexContent>
</xsd:complexType>
```

2.2.4.2.2.20.14 InheritedBinding

The **InheritedBinding** complex type represents a binding that is inherited from another object. **InheritedBinding** has no elements. It is used to indicate that a MeasureGroupAttribute inherits its bindings from the corresponding DimensionAttribute.

```
<xsd:complexType name="InheritedBinding">
  <xsd:complexContent>
    <xsd:extension base="Binding" />
  </xsd:complexContent>
</xsd:complexType>
```

2.2.4.2.2.20.15 TabularBinding

The **TabularBinding** abstract complex type represents a binding to a tabular source of data.

```
<xsd:complexType name="TabularBinding" abstract="true" />
```

2.2.4.2.2.20.16 TableBinding

The **TableBinding** complex type represents a binding to a table.

```
<xsd:complexType name="TableBinding" >
  <xsd:complexContent>
    <xsd:extension base="TabularBinding">
      <xsd:all>
        <xsd:element name="DataSourceID" type="xsd:string" minOccurs="0"/>
        <xsd:element name="DbTableName" type="xsd:string"/>
        <xsd:element name="DbSchemaName" type="xsd:string" minOccurs="0"/>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
```

```
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|--------------|-----------|---------------|---------------------------|
| DataSourceID | | Empty | The ID of the DataSource. |
| DbTableName | | [Required] | The name of the table. |
| DbSchemaName | | Empty | The name of the schema. |

2.2.4.2.2.20.17 QueryBinding

The **QueryBinding** complex type represents a binding to a query.

```
<xsd:complexType name="QueryBinding" >  
  <xsd:complexContent>  
    <xsd:extension base="TabularBinding">  
      <xsd:all>  
        <xsd:element name="DataSourceID" type="xsd:string" minOccurs="0"/>  
        <xsd:element name="QueryDefinition" type="xsd:string"/>  
      </xsd:all>  
    </xsd:extension>  
  </xsd:complexContent>  
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---------------|---------------------------|
| DataSourceID | | Empty | The ID of the DataSource. |
| QueryDefinition | | [Required] | The text of the query. |

2.2.4.2.2.20.18 DSVTableBinding

The **DSVTableBinding** complex type represents a binding to a table within a DataSourceView.

```
<xsd:complexType name="DSVTableBinding" >  
  <xsd:complexContent>  
    <xsd:extension base="TabularBinding">  
      <xsd:all>  
        <xsd:element name="DataSourceViewID" type="xsd:string" minOccurs="0"/>  
        <xsd:element name="TableID" type="xsd:string"/>  
        <xsd:element ref="eng300:DataEmbeddingStyle" minOccurs="0"/>  
      </xsd:all>  
    </xsd:extension>  
  </xsd:complexContent>  
</xsd:complexType>
```

In the namespace **eng300**:

```
<xsd:element name="DataEmbeddingStyle">  
  <xsd:simpleType>  
    <xsd:restriction base="xsd:string" >
```

```

    <xsd:enumeration value="Embedded" />
    <xsd:enumeration value="NotEmbedded" />
  </xsd:restriction>
</xsd:simpleType>
</xsd:element>

```

| Element | Read-Only | Default value | Description |
|--------------------|-----------|---------------|---|
| DataSourceViewID | | Empty | The ID of the DataSourceView . |
| TableID | | [Required] | The ID of the table. |
| DataEmbeddingStyle | Yes | NotEmbedded | Specifies whether the table contents are embedded within the DSV, or whether the DSV refers to their actual location. |

2.2.4.2.2.20.19 ProactiveCachingBinding

The **ProactiveCachingBinding** abstract complex type represents a binding for proactive caching.

```
<xsd:complexType name="ProactiveCachingBinding" abstract="true" />
```

2.2.4.2.2.20.20 ProactiveCachingObjectNotificationBinding

The **ProactiveCachingObjectNotificationBinding** abstract complex type represents an object notification binding for proactive caching.

The XSD does not show the elements for this class; instead the XSD of each derived class shows the elements. However, the elements that are common to all derived classes are shown in the table.

```
<xsd:complexType name="ProactiveCachingObjectNotificationBinding" abstract="true" />
```

| Element | Read-Only | Default value | Description |
|-----------------------|-----------|---------------|--|
| NotificationTechnique | | "Client" | Specifies the notification technique to be used. Client - The client sends notifications by using the NotifyTableChange command. Server - The server listens for notifications from the data source. |

2.2.4.2.2.20.21 ProactiveCachingInheritedBinding

The **ProactiveCachingInheritedBinding** complex type represents an object notification binding for proactive caching. The following XSD includes all elements in the base class and the derived class.

```

<xsd:complexType name="ProactiveCachingInheritedBinding" >
  <xsd:complexContent>
    <xsd:extension base="ProactiveCachingObjectNotificationBinding">
      <xsd:all>
        <xsd:element name="NotificationTechnique" minOccurs="0">
          <xsd:simpleType>

```

```

        <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="Client" />
            <xsd:enumeration value="Server" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
</xsd:all>
</xsd:extension>
</xsd:complexContent>
</xsd:complexType>

```

2.2.4.2.2.20.22 ProactiveCachingTablesBinding

The **ProactiveCachingTablesBinding** complex type represents a binding to a collection of table notifications for proactive caching. The XSD includes the entire class, including elements common with the base class. The table includes only elements in this subclass that are in addition to elements in the base class.

```

<xsd:complexType name="ProactiveCachingTablesBinding" >
  <xsd:complexContent>
    <xsd:extension base="ProactiveCachingObjectNotificationBinding">
      <xsd:all>
        <xsd:element name="NotificationTechnique" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Client" />
              <xsd:enumeration value="Server" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="TableNotifications" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="TableNotification" type="TableNotification"
                minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

```

This table includes only elements that are in addition to elements in the base class.

| Element | Read-Only | Default value | Description |
|--------------------|-----------|---------------|--|
| TableNotifications | | [Required] | Collection of objects of type TableNotification. |

2.2.4.2.2.20.22.1 TableNotification

The **TableNotification** complex type represents a table notification for proactive caching.

```

<xsd:complexType name="TableNotification">
  <xsd:all>
    <xsd:element name="DbTableName" type="xsd:string"/>
    <xsd:element name="DbSchemaName" type="xsd:string" minOccurs="0"/>
  </xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|--------------|-----------|---------------|-------------------------|
| DbTableName | | [Required] | The name of the table. |
| DbSchemaName | | Empty | The name of the schema. |

2.2.4.2.2.20.23 ProactiveCachingQueryBinding

The **ProactiveCachingQueryBinding** complex type represents a binding to a collection of query notifications for proactive caching. The base type has no elements. Therefore, all elements are defined in the following XSD and table.

```
<xsd:complexType name="ProactiveCachingQueryBinding" >
  <xsd:complexContent>
    <xsd:extension base="ProactiveCachingBinding">
      <xsd:all>
        <xsd:element name="RefreshInterval" type="xsd:duration" />
        <xsd:element name="QueryNotifications" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="QueryNotification" type="QueryNotification"
                minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|--------------------|-----------|---------------|--|
| RefreshInterval | | 1 second | The interval for running the queries. |
| QueryNotifications | | [Required] | A collection of objects of type QueryNotification. |

2.2.4.2.2.20.23.1 QueryNotification

The **QueryNotification** complex type represents a query notification for proactive caching.

```
<xsd:complexType name="QueryNotification">
  <xsd:all>
    <xsd:element name="Query" type="xsd:string"/>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|-----------------|
| Query | | Empty | The query text. |

2.2.4.2.2.20.24 ProactiveCachingIncrementalProcessingBinding

This complex type represents a binding to a collection of incremental processing notifications for proactive caching.

```
<xsd:complexType name="ProactiveCachingIncrementalProcessingBinding" >
  <xsd:complexContent>
    <xsd:extension base="ProactiveCachingBinding">
      <xsd:all>
        <xsd:element name="RefreshInterval" type="xsd:duration" minOccurs="0" />
        <xsd:element name="IncrementalProcessingNotifications" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="IncrementalProcessingNotification"
                type="IncrementalProcessingNotification"
                minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|------------------------------------|-----------|---------------|--|
| RefreshInterval | | 1 second | The interval for running the queries. |
| IncrementalProcessingNotifications | | [Required] | A collection of objects of type IncrementalProcessingNotification. |

2.2.4.2.2.20.24.1 IncrementalProcessingNotification

This complex type represents an incremental processing notification for proactive caching.

```
<xsd:complexType name="IncrementalProcessingNotification">
  <xsd:all>
    <xsd:element name="TableID" type="xsd:string"/>
    <xsd:element name="ProcessingQuery" type="xsd:string"/>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---------------|--|
| TableID | | [Required] | The ID of the table in the DataSourceView. |
| ProcessingQuery | | [Required] | The processing query text. |

2.2.4.2.2.20.25 eng200_200:RowNumberBinding

This complex type represents a binding to the row number of the source table.<98>

The **RowNumberBinding** complex type is not defined in the default namespace. It is defined in the **eng200_200**: namespace.

```
<xsd:complexType name="RowNumberBinding" >
```

```

<xsd:complexContent>
  <xsd:extension base="Binding" />
</xsd:complexContent>
</xsd:complexType>

```

2.2.4.2.2.20.26 CalculatedMeasureBinding

This complex type represents a binding to a calculated measure.

```

<xsd:complexType name="CalculatedMeasureBinding" >
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="MeasureName" type="xsd:string" />
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|-------------------------------------|
| MeasureName | | [Required] | The name of the calculated measure. |

2.2.4.2.2.20.27 eng200_200:ExpressionBinding

This complex type represents a binding to a calculation expression.

```

<xsd:complexType name="ExpressionBinding">
  <xsd:complexContent>
    <xsd:extension base="Binding">
      <xsd:all>
        <xsd:element name="Expression" type="xsd:string" />
      </xsd:all>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|------------|-----------|---------------|----------------------|
| Expression | | [Required] | The expression text. |

2.2.4.2.2.21 Permission

The **Permission** complex type represents a set of permissions assigned to a Role.

```

<xsd:complexType name="Permission">
  <xsd:sequence>
    <!--These elements are common to each MajorObject-->
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="ID" type="xsd:string" minOccurs="0" />
    <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="Description" type="xsd:string" minOccurs="0" />
    <xsd:element name="Annotations" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

```

<xsd:complexType>
  <xsd:sequence>
    <xsd:element name="Annotation" type="Annotation"
      minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
</xsd:element>
<!--Extended elements for Permission object-->
<xsd:element name="RoleID" type="xsd:string"/>
<xsd:element name="Process" type="xsd:boolean" minOccurs="0"/>
<xsd:element name="ReadDefinition" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="None" />
      <xsd:enumeration value="Basic" />
      <xsd:enumeration value="Allowed" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="Read" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="None" />
      <xsd:enumeration value="Allowed" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="Write" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="None" />
      <xsd:enumeration value="Allowed" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
</xsd:sequence>
</xsd:complexType>

```

The following table describes the elements that are included in the XSD schema for **Permission**. Those elements common to all major objects are described in section 2.2.4.2.2.1.

| Element | Read-Only | Default value | Description |
|----------------|-----------|---|--|
| RoleID | | [Required] | The ID of the Role for which permissions are being defined. |
| Process | | False | When true, specifies that the role has permission to process the object; otherwise, false. |
| ReadDefinition | | "None" for all objects (except Dimension where default is value of Read property) | A string that specifies whether the role has permission to read the XML definition of the object or any of its contained objects using DISCOVER_XML_METADATA. "None" implies no access to object definition. "Basic" implies limited access to object definition. "Allowed" implies full access to object definition. |
| Read | | "None" | A string that specifies whether the role has permission to read metadata or data from the object or any of its contained objects. "None" implies no read access to object metadata or data.<99> "Allowed" implies full read access to object metadata or data. |
| Write | | "None" | A string that specifies whether the role has permission to write |

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|---|
| | | | to the object or any of its contained objects. DatabasePermission, DataSourcePermission, and MiningStructurePermission cannot have Write="Allowed". Write cannot be set to "Allowed" unless Read is also set to "Allowed". "None" implies no write access to object metadata or data. "Allowed" implies full write access to object metadata or data. |

2.2.4.2.2.1 CubeDimensionPermission

The **CubeDimensionPermission** complex type represents permissions for a CubeDimension.

```
<xsd:complexType name="CubeDimensionPermission">
  <xsd:all>
    <xsd:element name="CubeDimensionID" type="xsd:string"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Read" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Allowed" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Write" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Allowed" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="AttributePermissions" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="AttributePermission" type="AttributePermission"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|-----------------|-----------|---------------|--|
| CubeDimensionID | | [Required] | The ID of the CubeDimension . For the Measures dimension, this string MUST be set to "Measures". |
| Description | | Empty | The object description. |

| Element | Read-Only | Default value | Description |
|----------------------|-----------|---------------|--|
| Read | | "Allowed" | Specifies whether the role has permission to read metadata or data from the CubeDimension . |
| Write | | "None" | Specifies whether the role has permission to write to the CubeDimension . |
| AttributePermissions | | Empty | A collection of AttributePermission objects. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.21.2 AttributePermission

The **AttributePermission** complex type represents permissions for a DimensionAttribute.

```
<xsd:complexType name="AttributePermission">
  <xsd:all>
    <xsd:element name="AttributeID" type="xsd:string"/>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DefaultMember" type="xsd:string" minOccurs="0"/>
    <xsd:element name="VisualTotals" type="xsd:string" minOccurs="0"/>
    <xsd:element name="AllowedSet" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DeniedSet" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|---------------|-----------|---------------|--|
| AttributeID | | [Required] | The ID of the attribute. The "Measures" string MUST be used to indicate the Measures dimension. |
| Description | | Empty | The object description. |
| DefaultMember | | Empty | An MDX expression that returns the default member for the attribute. |
| VisualTotals | | Empty | An MDX expression that if true, specifies whether MDX queries are to return visual totals for the attribute; otherwise, false. |
| AllowedSet | | Empty | An MDX set expression that specifies the set of allowed members for the attribute. |
| DeniedSet | | Empty | An MDX set expression that defines the set of denied members for the attribute. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.21.3 CellPermission

The **CellPermission** complex type represents permissions for the cells in a Cube.

A maximum of three **CellPermission** objects can exist within a **CellPermissions** collection, one each for the Read, ReadContingent, and ReadWrite values of the **Access** element.

```
<xsd:complexType name="CellPermission">
  <xsd:all>
    <xsd:element name="Access" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Read" />
          <xsd:enumeration value="ReadContingent" />
          <xsd:enumeration value="ReadWrite" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Expression" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Annotations" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|-------------|-----------|---------------|---|
| Access | | "Read" | An enumeration value that indicates the type of access being granted. The enumeration values are as follows: <ul style="list-style-type: none"> ▪ Read – Read access to the cell is permitted. ▪ ReadContingent – ReadContingent access to the cell is permitted. ▪ ReadWrite – ReadWrite access to the cell is permitted. |
| Description | | Empty | The object description. |
| Expression | | Empty | An MDX expression that returns a Boolean. |
| Annotations | | Empty | A collection of Annotation objects. |

2.2.4.2.2.22 DatabasePermission

The **DatabasePermission** complex type represents permissions for a Database.

```
<xsd:complexType name="DatabasePermission">
  <xsd:complexContent>
    <xsd:extension base="Permission">
      <xsd:sequence>
        <xsd:element name="Administer" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="Write" minOccurs="0">
          <xsd:simpleType>
```

```

        <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="None" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
</xsd:sequence>
</xsd:extension >
</xsd:complexContent>
</xsd:complexType>

```

The following table shows only the additional elements that are not contained in the Permission object.

| Element | Read-Only | Default value | Description |
|------------|-----------|---------------|---|
| Administer | | False | When true, specifies that the Role has permission to administer the Database ; otherwise, false. |
| Write | | "None" | A string that specifies whether the role has permission to write to the object or any of its contained objects. "None" specifies no write access to object metadata or data. |

2.2.4.2.2.23 DataSourcePermission

The **DataSourcePermission** complex type represents permissions for a DataSource.

```

<xsd:complexType name="DataSourcePermission">
    <xsd:complexContent>
        <xsd:extension base="Permission">
            <xsd:sequence>
                <!--Extended elements for DataSourcePermission object-->
                <xsd:element name="Write" minOccurs="0">
                    <xsd:simpleType>
                        <xsd:restriction base="xsd:string" >
                            <xsd:enumeration value="None" />
                        </xsd:restriction>
                    </xsd:simpleType>
                </xsd:element>
            </xsd:sequence>
        </xsd:extension >
    </xsd:complexContent>
</xsd:complexType>

```

DataSourcePermission has no elements that are additional to those that are contained in the Permission object.

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|---|
| Write | | "None" | A string that specifies whether the role has permission to write to the object or any of its contained objects. "None" specifies no write access to object metadata or data. |

2.2.4.2.2.24 DimensionPermission

The **DimensionPermission** complex type represents permissions for a Dimension.

```
<xsd:complexType name="DimensionPermission">
  <xsd:complexContent>
    <xsd:extension base="Permission">
      <xsd:sequence>
        <!--Extended elements for DimensionPermission object-->
        <xsd:element name="AttributePermissions" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="AttributePermission" type="AttributePermission"
                minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Write" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element ref="eng300_300:AllowedRowsExpression" minOccurs="0" />
      </xsd:sequence>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

In the namespace **eng300_300**:

```
<xsd:element name="AllowedRowsExpression" type="xsd:string" />
```

The following table shows only the additional elements in **DimensionPermission** that are not contained in **Permission**.

| Element | Read-Only | Default value | Description |
|-----------------------|-----------|---------------|--|
| AttributePermissions | | Empty | A collection of AttributePermission objects. |
| AllowedRowsExpression | | Empty | This string is to contain a DAX Boolean expression that evaluates to TRUE for the rows in the table that are allowed. This is equivalent to saying that the table expression that returns the allowed rows is FILTER (ALL (Table), AllowedRowsExpression).<100> If the DAX Boolean expression is empty, it is treated as TRUE. If the DAX Boolean expression evaluates to an error, it is treated as FALSE for those rows and permission is not allowed. |
| Write | | "None" | A string that specifies whether the role has permission to write to the object or any of its contained objects. Write cannot be set to "Allowed" unless Read is also set to "Allowed". "None" specifies no write access to object metadata or data. "Allowed" specifies full write access to object metadata or data. |

In **DimensionPermission**, the default for the **Read** element differs from the default for the **Read** element in the base **Permission** class. In **DimensionPermission**, the default for the **Read** element is "Allowed".

2.2.4.2.2.25 MiningStructurePermission

The **MiningStructurePermission** complex type represents permissions for a MiningStructure.

```
<xsd:complexType name="MiningStructurePermission">
  <xsd:complexContent>
    <xsd:extension base="Permission">
      <xsd:sequence>
        <!--Extended elements for MiningStructurePermission object-->
        <xsd:element name="AllowDrillThrough" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="Write" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
      </xsd:sequence>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

The following table shows only the additional elements that are not contained in Permission.

| Element | Read-Only | Default value | Description |
|-------------------|-----------|---------------|---|
| AllowDrillThrough | | False | A Boolean that indicates whether drillthrough is allowed on the MiningModel . |
| Write | | "None" | A string that specifies whether the role has permission to write to the object or any of its contained objects. "None" specifies no write access to object metadata or data. |

2.2.4.2.2.26 MiningModelPermission

The **MiningModelPermission** complex type represents permissions for a MiningModel.

```
<xsd:complexType name="MiningModelPermission">
  <xsd:complexContent>
    <xsd:extension base="Permission">
      <xsd:sequence>
        <!--Extended elements for MiningModelPermission object-->
        <xsd:element name="AllowDrillThrough" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="AllowBrowsing" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="Write" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
      </xsd:sequence>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>
```

The following table shows only the additional elements that are not contained in Permission.

| Element | Read-Only | Default value | Description |
|-------------------|-----------|---------------|---|
| AllowDrillThrough | | False | When true, indicates that drillthrough is allowed on the MiningModel ; otherwise, false. |
| AllowBrowsing | | True | When true, indicates that browsing is allowed on the object; otherwise, false. |
| Write | | "None" | A string that specifies whether the role has permission to write to the object or any of its contained objects. Write cannot be set to "Allowed" unless Read is also set to "Allowed". "None" specifies no write access to object metadata or data. "Allowed" specifies full write access to object metadata or data. |

2.2.4.2.2.27 CubePermission

The **CubePermission** complex type represents permissions for a Cube.

```

<xsd:complexType name="CubePermission">
  <xsd:complexContent>
    <xsd:extension base="Permission">
      <xsd:sequence>
        <!--Extended elements for CubePermission object-->
        <xsd:element name="ReadSourceData" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="DimensionPermissions" minOccurs="0">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="DimensionPermission"
                type="CubeDimensionPermission"
                minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="CellPermissions" minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="CellPermission" type="CellPermission"
                minOccurs="0" maxOccurs="3"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
        <xsd:element name="Write" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="None" />
              <xsd:enumeration value="Allowed" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
      </xsd:sequence>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>

```

CubePermission inherits from **Permission**. The following table shows only the elements that are in addition to those contained in **Permission**.

| Element | Read-Only | Default value | Description |
|----------------------|-----------|--|---|
| ReadSourceData | | "None" | Specifies whether the role has permission to read the underlying source data in the Cube . |
| DimensionPermissions | | Inherited from DimensionPermissions on Dimension. | A collection of CubeDimensionPermission objects. |
| CellPermissions | | | A collection of CellPermission objects. |
| Write | | "None" | A string that specifies whether the role has permission to write to the object or any of its contained objects. Write cannot be set to "Allowed" unless Read is also set to "Allowed". "None" specifies no write access to object metadata or data. "Allowed" specifies full write access to object metadata or data. |

2.2.4.2.2.28 Role

The **Role** complex type represents a role for which permissions can be assigned.

```
<xsd:complexType name="Role">
  <xsd:all>
    <!--These elements are common to each MajorObject-->
    <xsd:element name="Name" type="xsd:string" />
    <xsd:element name="ID" type="xsd:string" minOccurs="0" />
    <xsd:element name="CreatedTimestamp" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="LastSchemaUpdate" type="xsd:dateTime" minOccurs="0" />
    <xsd:element name="Description" type="xsd:string" minOccurs="0" />
    <xsd:element name="Annotations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Annotation" type="Annotation"
            minOccurs="0" maxOccurs="unbounded" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <!--Extended elements for Role object-->
    <xsd:element name="Members" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Member" type="Member" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

The following table describes the elements that are included in the XSD schema for **Role**. Those elements common to all major objects are described in section 2.2.4.2.2.1.

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|---------------------------------|
| Members | | Empty | A collection of Member objects. |

2.2.4.2.2.28.1 Member

The **Member** complex type represents a member in a role.

```
<xsd:complexType name="Member">
  <xsd:all>
    <xsd:element name="Name" minOccurs="0" type="xsd:string"/>
    <xsd:element name="Sid" minOccurs="0" type="xsd:string"/>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|---------|-----------|---------------|-----------------------|
| Name | | Empty | The name of the user. |
| Sid | | Empty | The SID of the user. |

2.2.4.2.2.29 ProactiveCaching

The **ProactiveCaching** complex type represents proactive caching settings for an object.

```
<xsd:complexType name="ProactiveCaching">
  <xsd:all>
    <xsd:element name="OnlineMode" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Immediate" />
          <xsd:enumeration value="OnCacheComplete" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="AggregationStorage" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="Regular" />
          <xsd:enumeration value="MolapOnly" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Source" type="ProactiveCachingBinding" minOccurs="0" />
    <xsd:element name="SilenceInterval" type="xsd:duration" minOccurs="0" />
    <xsd:element name="Latency" type="xsd:duration" minOccurs="0" />
    <xsd:element name="SilenceOverrideInterval" type="xsd:duration"
      minOccurs="0" />
    <xsd:element name="ForceRebuildInterval" type="xsd:duration" minOccurs="0" />
    <xsd:element name="Enabled" type="xsd:boolean" minOccurs="0"/>
  </xsd:all>
</xsd:complexType>
```

| Element | Read-Only | Default value | Description |
|-------------------------|-----------|------------------------------------|--|
| OnlineMode | | "Immediate" | A string that specifies whether the dimension/partition is brought back online immediately when the rebuilding of the cache is initiated or only when the rebuilding of the cache is complete. |
| AggregationStorage | | "Regular" | A string that specifies the storage method for aggregations. Applies only to partitions. On a dimension, it MUST be "Regular". |
| Source | | "ProactiveCachingInheritedBinding" | The binding of the proactive caching. This regulates the notification mechanisms as well as the processing options. |
| SilenceInterval | | -1 second | The minimum amount of quiet time (in milliseconds) that occurs before the cache rebuild starts. The default value, -1 second, is used to specify an infinite interval. |
| Latency | | -1 second | The grace period between the earliest notification and the moment when the current cache is dropped. The default value, -1 second, is used to specify an infinite interval. |
| SilenceOverrideInterval | | -1 second | The amount of time that elapses after an initial notification after which the cache rebuild begins unconditionally. The default value, -1 second, is used to specify an infinite interval. |
| ForceRebuildInterval | | -1 second | The amount of time that elapses after a cache becomes available after which the cache rebuild begins unconditionally. The default value, -1 second, is used to specify an infinite interval. |
| Enabled | | False | When true, specifies that proactive caching is enabled; otherwise, false. |

2.2.4.2.2.30 (Updated Section) ErrorConfiguration

The **ErrorConfiguration** complex type represents error configuration settings to deal with issues in the source data.

```

<xsd:complexType name="ErrorConfiguration">
  <xsd:all>
    <xsd:element name="KeyErrorLimit" type="xsd:long" minOccurs="0"/>
    <xsd:element name="KeyErrorLogFile" type="xsd:string" minOccurs="0"/>
    <xsd:element name="KeyErrorAction" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="ConvertToUnknown" />
          <xsd:enumeration value="DiscardRecord" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
  </xsd:all>
</complexType>

```

```

    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="KeyErrorLimitAction" minOccurs="0">
    <xsd:simpleType>
      <xsd:restriction base="xsd:string">
        <xsd:enumeration value="StopProcessing" />
        <xsd:enumeration value="StopLogging" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="KeyNotFound" minOccurs="0">
    <xsd:simpleType>
      <xsd:restriction base="xsd:string">
        <xsd:enumeration value="IgnoreError" />
        <xsd:enumeration value="ReportAndContinue" />
        <xsd:enumeration value="ReportAndStop" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="KeyDuplicate" minOccurs="0">
    <xsd:simpleType>
      <xsd:restriction base="xsd:string">
        <xsd:enumeration value="IgnoreError" />
        <xsd:enumeration value="ReportAndContinue" />
        <xsd:enumeration value="ReportAndStop" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="NullKeyConvertedToUnknown" minOccurs="0">
    <xsd:simpleType>
      <xsd:restriction base="xsd:string">
        <xsd:enumeration value="IgnoreError" />
        <xsd:enumeration value="ReportAndContinue" />
        <xsd:enumeration value="ReportAndStop" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element name="NullKeyNotAllowed" minOccurs="0">
    <xsd:simpleType>
      <xsd:restriction base="xsd:string">
        <xsd:enumeration value="IgnoreError" />
        <xsd:enumeration value="ReportAndContinue" />
        <xsd:enumeration value="ReportAndStop" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:element>
  <xsd:element ref="eng200:CalculationError" minOccurs="0" />
</xsd:all>
</xsd:complexType>

```

The **ErrorConfiguration** XSD depends upon the following definitions in namespaces other than the default namespace.

In the namespace **eng200**:

```

<xsd:element name="CalculationError">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="IgnoreError" />
      <xsd:enumeration value="ReportAndStop" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>

```

| Element | Read-Only | Default value | Description |
|---------------------------|-----------|---------------------|--|
| KeyErrorLimit | | Zero | The number of key errors after which processing will fail. |
| KeyErrorLogFile | | Empty | The file path for logging key errors. |
| KeyErrorAction | | "ConvertToUnknown" | The action to take upon encountering a key error. |
| KeyErrorLimitAction | | "StopProcessing" | The action to take upon encountering a key error limit. |
| KeyNotFound | | "ReportAndContinue" | The action to take upon encountering a "Key not found" error. |
| KeyDuplicate | | "IgnoreError" | The action to take upon encountering a key duplicate error. |
| NullKeyConvertedToUnknown | | "IgnoreError" | The action to take if a null key is converted to Unknown. |
| NullKeyNotAllowed | | "ReportAndContinue" | The action to take if a null key is encountered and not allowed. |
| CalculationError | | "IgnoreError" | The action to take upon encountering a calculation error. |

2.2.4.2.2.31 ImpersonationInfo

The **ImpersonationInfo** complex type represents impersonation settings for an object or operation.

```

<xsd:complexType name="ImpersonationInfo">
  <xsd:all>
    <xsd:element name="ImpersonationMode" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Default" />
          <xsd:enumeration value="ImpersonateServiceAccount" />
          <xsd:enumeration value="ImpersonateAnonymous" />
          <xsd:enumeration value="ImpersonateCurrentUser" />
          <xsd:enumeration value="ImpersonateAccount" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Account" type="xsd:string" minOccurs="0"/>
    <xsd:element name="Password" type="xsd:string" minOccurs="0"/>
    <xsd:element name="ImpersonationInfoSecurity" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="PasswordRemoved" />
          <xsd:enumeration value="Unchanged" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>

```

| Element | Read-Only | Default value | Description |
|---------------------------|-----------|---------------|---|
| ImpersonationMode | | [Required] | <p>A string that specifies the credentials to use for impersonation. The enumeration values are as follows:</p> <ul style="list-style-type: none"> Default - The server uses the impersonation method that it deems to be appropriate for the context in which impersonation is used. ImpersonateServiceAccount - Use the user account that the server is running as. ImpersonateAnonymous - Use the anonymous user account. ImpersonateCurrentUser - Use the user account that the client is connecting as. ImpersonateAccount - Use the specified user account.<101> |
| Account | | Empty | The user account to impersonate when ImpersonationMode=ImpersonateAccount. |
| Password | | Empty | The password of the user account when ImpersonationMode=ImpersonateAccount. |
| ImpersonationInfoSecurity | Read-only | | Specifies whether the password was removed. |

2.2.4.3 TraceDefinition Complex Types

The specific trace events and columns that are supported by this protocol are described in sections 4.10, 4.11, and 4.12.

2.2.4.3.1 Trace_Definition_ProviderInfo

This complex type contains basic information about the server/trace provider.

```

<xsd:complexType name="Trace_Definition_ProviderInfo" >
  <xsd:sequence>
    <xsd:element name="Data" >
      <xsd:complexType>
        <xsd:all>
          <xsd:element name="Name" type="xsd:string" />
          <xsd:element name="Version" >
            <xsd:complexType>
              <xsd:all>
                <xsd:element name="Major" type="xsd:string" minOccurs="0" />
                <xsd:element name="Minor" type="xsd:string" minOccurs="0" />
                <xsd:element name="BuildNumber" type="xsd:string" minOccurs="0" />
              </xsd:all>
            </xsd:complexType>
          </xsd:element>
          <xsd:element name="Type" type="xsd:string" minOccurs="0" />
          <xsd:element name="Description" type="xsd:string" minOccurs="0" />
        </xsd:all>
      </xsd:complexType>
    </xsd:element>
  </xsd:sequence>

```



```
</xsd:complexType>
```

| Element | Default value | Description |
|-------------|---------------|--|
| Data | [Required] | This serves as the root element for the XML that it encloses. |
| Name | [Required] | The name of the server. |
| Version | Empty | A complex type consisting of three separate elements to identify a major version, a minor version, and a build number. |
| Type | Empty | The type of the server. |
| Description | Empty | The description of the server. |

2.2.4.3.2 Trace_Event_Categories

This complex type contains information about the trace events that are available from the server.

```
<xsd:complexType name="Trace_Event_Categories" >
  <xsd:sequence>
    <xsd:element name="Data" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="EventCategory" >
            <xsd:complexType>
              <xsd:all>
                <xsd:element name="Name" type="xsd:string" />
                <xsd:element name="Type" type="xsd:string" minOccurs="0" />
                <xsd:element name="Description" type="xsd:string" minOccurs="0" />
                <xsd:element name="EventList" >
                  <xsd:complexType>
                    <xsd:sequence>
                      <xsd:element name="Event" type="TraceEvent" minOccurs="0"
                        maxOccurs="unbounded" />
                    </xsd:sequence>
                  </xsd:complexType>
                </xsd:element>
              </xsd:all>
            </xsd:complexType>
          </xsd:element>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```

| Element | Default value | Description |
|---------------|---------------|--|
| Data | [Required] | This serves as the root element for the XML that it encloses. |
| EventCategory | [Required] | This element encloses the information about each event category. |
| Name | [Required] | The name of the event category. |
| Type | Empty | A string indicating the type of event category. The enumeration values are as follows: 0=Normal |

| Element | Default value | Description |
|-------------|---------------|--|
| | | 1=Significant 2=Error |
| Description | Empty | The description of the event category. |
| EventList | [Required] | A collection of elements of type TraceEvent for each event that belongs to this EventCategory . |

2.2.4.3.2.1 TraceEvent

This complex type represents a single trace event.

```
<xsd:complexType name="TraceEvent" >
  <xsd:all>
    <xsd:element name="ID" type="xsd:integer" />
    <xsd:element name="Name" type="xsd:string" minOccurs="0" />
    <xsd:element name="Description" type="xsd:string" minOccurs="0" />
    <xsd:element name="EventColumnList" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="EventColumn" type="EventColumn" minOccurs="0"
            maxOccurs="unbounded" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|-----------------|---------------|---|
| ID | [Required] | The ID of the event. |
| Name | Empty | The name of the event. |
| Description | Empty | A string containing the event description. |
| EventColumnList | [Required] | A collection of elements of type EventColumn for each column in this event. |

2.2.4.3.2.1.1 EventColumn

This complex type represents a single trace event column.

```
<xsd:complexType name="EventColumn" >
  <xsd:all>
    <xsd:element name="ID" type="xsd:integer" />
    <xsd:element name="EventColumnSubclassList" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="EventColumnSubclass" minOccurs="0"
            maxOccurs="unbounded" >
            <xsd:complexType>
              <xsd:all>
                <xsd:element name="ID" type="xsd:integer" />
                <xsd:element name="name" type="xsd:string" />
              </xsd:all>
            </xsd:complexType>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:all>
  </xsd:all>
```

```

        </xsd:complexType>
    </xsd:element>
</xsd:sequence>
</xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

| Element | Default value | Description |
|-------------------------|---------------|---|
| ID | [Required] | The ID of the event column. |
| EventColumnSubclassList | Empty | A collection of EventColumnSubclass elements for each subclass that this event column has. |

2.2.4.3.3 Trace_Columns

This complex type contains information about the trace columns that are available from the server. Every TraceEvent can use one or more of these columns.

```

<xsd:complexType name="Trace_Columns" >
  <xsd:sequence>
    <xsd:element name="Data">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Column" >
            <xsd:complexType>
              <xsd:all>
                <xsd:element name="ID" type="xsd:integer" />
                <xsd:element name="Type" type="xsd:integer" />
                <xsd:element name="Name" type="xsd:string" />
                <xsd:element name="Description" type="xsd:string" minOccurs="0"/>
                <xsd:element name="Filterable" type="xsd:boolean" />
                <xsd:element name="Repeatable" type="xsd:boolean" />
                <xsd:element name="RepeatedBase" type="xsd:boolean" />
              </xsd:all>
            </xsd:complexType>
          </xsd:element>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>

```

| Element | Default value | Description |
|---------|---------------|--|
| Data | [Required] | This serves as the root element for the XML that it encloses. |
| Column | [Required] | This element encloses the information about each trace column. |
| ID | [Required] | The ID of the column. |
| Type | [Required] | The type of the column. The definitions for the integers are not constant and change depending upon the ID of the column. By referring to examples in sections 4.10, 4.11, and 4.12, it can be seen what integers are valid for which particular column IDs. |
| Name | | The name of the column. |

| Element | Default value | Description |
|----------------|----------------------|--|
| Description | | The description of the column. |
| Filterable | | When true, indicates that the column can be used in a filtering operation; otherwise, false. |
| Repeatable | | When true, indicates that the server omits the value in this column if it is repeated from the value above it; otherwise, false. |
| RepeatedBase | | When true, indicates that this column is a repeated base for another column; otherwise, false. |

2.2.5 Simple Types

This specification does not define any common XML schema simple type definitions.

2.2.6 Attributes

This specification does not define any common XML schema attribute definitions.

2.2.7 Groups

This specification does not define any common XML schema group definitions.

2.2.8 Attribute Groups

This specification does not define any common XML schema attribute group definitions.

3 Protocol Details

The client side of this protocol is simply a pass-through. That is, no additional timers or other state is required on the client side of this protocol. Calls made by the higher-layer protocol or application are passed directly to the transport, and the results that are returned by the transport are passed directly back to the higher-layer protocol or application.

3.1 Server Details

3.1.1 Abstract Data Model

This section describes a conceptual model of possible data organization that an implementation maintains to participate in this protocol. The described organization is provided to facilitate the explanation of how the protocol behaves. This document does not mandate that implementations adhere to this model as long as their external behavior is consistent with that described in this document.

It is recommended that the server organize its data as per the OLAP data model and the DM model.

The OLAP model's high-level features are as follows:

- The server contains a collection of databases.
- Each database contains a collection of cubes.
- Each cube contains a collection of dimensions, measure groups, measures, sets, key performance indicators (KPIs), and actions.
- Each dimension contains a collection of hierarchies.
- Each hierarchy contains a collection of levels.
- Each level contains a collection of members.
- Each member contains a collection of properties.
- Each measure group contains a collection of measure group dimensions and measures.

The DM model's high-level features are as follows:

- A collection of MiningStructure complex types is located in the collection of databases on the server.
- Each **MiningStructure** contains a collection of mining structure columns and a collection of mining models.
- Each mining model contains a collection of mining model columns.

For more information about the OLAP data model, see [MSDN-SSAS].

3.1.2 Timers

None. All protocol requests are initiated by the client.

3.1.3 Initialization

The server **MUST** start and begin listening for requests.

For stateless connections, no further initialization is required. For stateful connections, the following example shows how sessions are supported.

3.1.3.1 Initialization for Non-HTTP Transport

To begin the session, the client adds a **BeginSession** SOAP header to the request.

```
<?xml version="1.0" encoding="utf-8"?>
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <BeginSession xmlns="urn:schemas-microsoft-com:xml-analysis" mustUnderstand="1"/>
  </Header>
  <Body>
    ...<!-- Discover or Execute element goes here.-->
  </Body>
</Envelope>
```

The SOAP response message from the server includes the session ID in the SOAP header.

```
<Header>
  <Session
    xmlns="urn:schemas-microsoft-com:xml-analysis"
    SessionId="537C61C6-827C-4305-83A6-C8CE4A91001B"/>
</Header>
```

For each subsequent request, the client **MUST** include the session ID that is provided by the server.

```
<Header>
  <Session
    xmlns="urn:schemas-microsoft-com:xml-analysis"
    mustUnderstand="1"
    SessionId="537C61C6-827C-4305-83A6-C8CE4A91001B"/>
</Header>
```

To end the session, the client **MUST** send the **EndSession** header that contains the related session ID value to the server.

```
<Header>
  <EndSession
    xmlns="urn:schemas-microsoft-com:xml-analysis"
    mustUnderstand="1"
    SessionId="537C61C6-827C-4305-83A6-C8CE4A91001B"/>
</Header>
```

Sessions **MUST** be supported on the server.<102>

Multiple commands can be executed in the context of a single session. The server **MAY**<103> choose to time out an active session after a period of inactivity.

The following tables list the SOAP header elements and attributes that this protocol defines for initiating, maintaining, and closing a session.

| SOAP Header | Description |
|--------------|--|
| BeginSession | This header requests that the server create a session. The server is to respond by constructing a new session and returning the session ID in the Session header in the SOAP response. |

| SOAP Header | Description |
|-------------|---|
| Session | This header is required for every method call that is to occur in the session. The session ID MUST be included in the header. |
| EndSession | This header is used to end the session. The session ID MUST be included in the header. |

| SOAP Header | Attribute | Description |
|-------------|-----------|--|
| Session | SessionID | The token that was received from the server in response to the BeginSession request. |
| EndSession | SessionID | The token that was received from the server in response to the BeginSession request. |

If the session ID that is specified in the **Session** or **EndSession** SOAP header is not valid or has timed out, then the server MUST return a SOAP fault.

3.1.3.2 Initialization for HTTP Transport

The client sends the following command to retrieve the session token from the server that has X-AS-GetSessionToken that contains the value "true" in the HTTP header.

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <BeginGetSessionToken soap:mustUnderstand="1"
      xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns="urn:schemas-microsoft-com:xml-
      analysis" />
    <Version Sequence="400"
      xmlns="http://schemas.microsoft.com/analysisservices/2003/engine/2" />
  </Header>
  <Body>
    <Execute xmlns="urn:schemas-microsoft-com:xml-analysis">
      <Command>
        <Statement />
      </Command>
    </Execute>
  </Body>
</Envelope>
```

The following is included in the SOAP response message from the server.

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Header>
    <SessionToken>
      <!--if the SOAP response body receives the session token, the-->
      <!--BeginSession header embeds the session token in the-->
      <!--body of the message here.-->
    </SessionToken>
  </soap:Header>
  <soap:Body>
    <ExecuteResponse xmlns="urn:schemas-microsoft-com:xml-analysis">
      <return />
    </ExecuteResponse>
  </soap:Body>
</soap:Envelope>
```

If SessionToken is received in the SOAP response message, the **BeginSession** SOAP header embeds SessionToken in the body of the message as shown in the following example.

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <BeginSession soap:mustUnderstand="1"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns="urn:schemas-microsoft-com:xml-
analysis" />
    <Version Sequence="400"
xmlns="http://schemas.microsoft.com/analysisservices/2003/engine/2" />
  </Header>
  <Body>
    <Execute xmlns="urn:schemas-microsoft-com:xml-analysis">
      <Command>
        <ExtAuth>
          <AuthenticationScheme>DelegateToken</AuthenticationScheme>
          <ExtAuthInfo>
            <!--if the SOAP response body receives the session token,-->
            <!--the BeginSession header embeds the session token-->
            <!--in the body of the message here.-->
          </ExtAuthInfo>
        </ExtAuth>
      </Command>
      <Properties>
        <PropertyList>
          <LocaleIdentifier>1033</LocaleIdentifier>
        </PropertyList>
      </Properties>
    </Execute>
  </Body>
</Envelope>
```

If the SessionToken is not received in the SOAP response message or if there is an error in the response, the **BeginSession** SOAP header is as shown in the following example.

```
<?xml version="1.0" encoding="utf-8"?>
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <BeginSession xmlns="urn:schemas-microsoft-com:xml-analysis" mustUnderstand="1"/>
  </Header>
  <Body>
    ...<!-- Discover or Execute element goes here.-->
  </Body>
</Envelope>
```

The SOAP response message from the server includes the session ID in the SOAP header.

```
<Header>
  <Session
xmlns="urn:schemas-microsoft-com:xml-analysis"
  SessionId="537C61C6-827C-4305-83A6-C8CE4A91001B"/>
</Header>
```

For each subsequent request, the client MUST include the session ID that is provided by the server.

```
<Header>
  <Session
xmlns="urn:schemas-microsoft-com:xml-analysis"
  mustUnderstand="1"
  SessionId="537C61C6-827C-4305-83A6-C8CE4A91001B"/>
</Header>
```


To end the session, the client MUST send the **EndSession** header that contains the related session ID value to the server.

```
<Header>
  <EndSession
    xmlns="urn:schemas-microsoft-com:xml-analysis"
    mustUnderstand="1"
    SessionId="537C61C6-827C-4305-83A6-C8CE4A91001B"/>
</Header>
```

Sessions MUST be supported on the server.<104>

Multiple commands can be executed in the context of a single session. The server MAY<105> choose to time out an active session after a period of inactivity.

The SOAP header elements and attributes for initiating, maintaining, and closing a session for HTTP transport are the same as the SOAP header elements and attributes that this protocol defines for non-HTTP transport (section 3.1.3.1).

If the session ID that is specified in the **Session** or **EndSession** SOAP header is not valid or has timed out, the server MUST return a SOAP fault.

3.1.4 Message Processing Events and Sequencing Rules

| Operation | Description |
|--------------|---|
| Authenticate | Used by the client and server to exchange security token data blocks as a part of the authentication process. |
| Discover | Used to find information about the server. |
| Execute | Used to send commands to the server. |

3.1.4.1 Authenticate

This operation SHOULD be used by the client and server to exchange security token data blocks as a part of the authentication process. The client MUST send an **Authenticate** request message and the server MUST respond with an **AuthenticateResponse** message.

The following WSDL describes the **Authenticate** operation.

```
<wsdl:operation name="Authenticate">
  <wsdl:input message="AuthenticateSoapIn" />
  <wsdl:output message="AuthenticateSoapOut" />
</wsdl:operation>
```

3.1.4.1.1 Messages

The following WSDL message definitions are specific to this operation.

3.1.4.1.1.1 AuthenticateSoapIn

This message is the request message for the **Authenticate** operation.

The SOAP action value of the message is defined as follows.

"http://schemas.microsoft.com/analysisisservices/2003/ext"

The SOAP body MUST contain an **Authenticate** element.

```
<message name="AuthenticateSoapIn">  
  <part name="parameters" element="xmla:Authenticate" />  
</message>
```

3.1.4.1.1.2 AuthenticateSoapOut

This message is the response message for the Authenticate operation.

The SOAP action value of the message is defined as follows.

"http://schemas.microsoft.com/analysisisservices/2003/ext"

The SOAP body MUST contain an AuthenticateResponse element.

```
<message name="AuthenticateSoapOut">  
  <part name="parameters" element="xmla:AuthenticateResponse" />  
</message>
```

3.1.4.1.2 Elements

The following XML schema element definitions are specific to this operation.

Some attributes in the following XML element definitions have a default value. If the attribute is not specified in an instance within a command, the attribute has the value given. If an attribute MUST be specified, it is described as having [Required] as the default value.

Some elements in the following XML element definitions have a default value. If the element is not specified in an instance within a command, the default value of the element is used. If an element MUST be specified, it is described as having [Required] as the default value.

3.1.4.1.2.1 Authenticate

The **Authenticate** element has the following definition.

```
<xsd:element name="Authenticate">  
  <xsd:complexType>  
    <xsd:sequence>  
      <xsd:element name="SspiHandshake" minOccurs="1" maxOccurs="1"  
        nillable="false" type="xsd:base64Binary" />  
    </xsd:sequence>  
  </xsd:complexType>  
</xsd:element>
```

| Element | Default value | Description |
|---------------|---------------|---|
| SspiHandshake | [Required] | This is a base64-encoded security token data block that contains authentication information for a user. |

The following is an example of an **Authenticate** request.

```

<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <Authenticate xmlns="http://schemas.microsoft.com/analysisisservices/2003/ext">
      <SspiHandshake>[Base64 encoded security token data block here]</SspiHandshake>
    </Authenticate>
  </soap:Body>
</soap:Envelope>

```

3.1.4.1.2.2 AuthenticateResponse

The **AuthenticateResponse** element has the following definition.

```

<xsd:element name="AuthenticateResponse">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="return" minOccurs="1" maxOccurs="1">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="SspiHandshake" minOccurs="1" maxOccurs="1"
              nillable="false" type="xsd:base64Binary" />
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>

```

The following is an example of the **AuthenticateResponse** response.

```

<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <AuthenticateResponse xmlns="http://schemas.microsoft.com/analysisisservices/2003/ext">
      <return>
        <SspiHandshake>[Base64 encoded security token data block here]</SspiHandshake>
      </return>
    </AuthenticateResponse>
  </soap:Body>
</soap:Envelope>

```

3.1.4.2 Discover

This operation is used to find information about the server.

The following WSDL describes the **Discover** operation.

```

<wsdl:operation name="Discover">
  <wsdl:input message="DiscoverSoapIn" />
  <wsdl:output message="DiscoverSoapOut" />
</wsdl:operation>

```

The protocol client MUST send a DiscoverSoapIn request message, and the protocol server MUST respond with a DiscoverSoapOut response message.

3.1.4.2.1 Messages

The following XML schema message definitions are specific to this operation.

3.1.4.2.1.1 DiscoverSoapIn

This message is the request message for the Discover operation.

The SOAP action value in the HTTP header of the message SHOULD<106> be the following.

```
"urn:schemas-microsoft-com:xml-analysis:Discover"
```

The SOAP body MUST contain a schema rowset.

```
<message name="DiscoverSoapIn">
  <part name="parameters" element="xmla:Discover" />
</message>
```

3.1.4.2.1.2 DiscoverSoapOut

This message is the response message for the Discover operation.

The SOAP body MUST contain a DiscoverResponse element.

```
<message name="DiscoverSoapOut">
  <part name="parameters" element="xmla:DiscoverResponse" />
</message>
```

3.1.4.2.2 Elements

The following XML schema element definitions are specific to this operation.

Some attributes in the following XML element definitions have a default value. If the attribute is not specified in an instance within a command, the attribute has the value given. If an attribute MUST be specified, it is described as having [Required] as the default value.

Some elements in the following XML element definitions have a default value. If the element is not specified in an instance within a command, the default value of the element is used. If an element MUST be specified, it is described as having [Required] as the default value.

3.1.4.2.2.1 Discover

The **Discover** message is used to request information from the server.

The server MUST support each of the enumerated **RequestTypes**.

The schema rowset has the following definition.

```
<xsd:element name="Discover">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="RequestType" minOccurs="1" maxOccurs="1" >
        <xsd:simpleType>
          <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="DBSCHEMA_CATALOGS" />
            <xsd:enumeration value="MDSHEMA_CUBES" />
            <xsd:enumeration value="MDSHEMA_DIMENSIONS" />
            <xsd:enumeration value="MDSHEMA_HIERARCHIES" />
            <xsd:enumeration value="MDSHEMA_LEVELS" />
            <xsd:enumeration value="MDSHEMA_MEASURES" />
            <xsd:enumeration value="MDSHEMA_PROPERTIES" />
            <xsd:enumeration value="MDSHEMA_MEMBERS" />
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

```

<xsd:enumeration value="MDSHEMA_ACTIONS" />
<xsd:enumeration value="MDSHEMA_SETS" />
<xsd:enumeration value="DISCOVER_INSTANCES" />
<xsd:enumeration value="MDSHEMA_KPIS" />
<xsd:enumeration value="MDSHEMA_MEASUREGROUPS" />
<xsd:enumeration value="MDSHEMA_MEASUREGROUP_DIMENSIONS" />
<xsd:enumeration value="DISCOVER_PROPERTIES" />
<xsd:enumeration value="DISCOVER_LITERALs" />
<xsd:enumeration value="DISCOVER_SCHEMA_ROWSETS" />
<xsd:enumeration value="DISCOVER_KEYWORDS" />
<xsd:enumeration value="DBSCHEMA_TABLES" />
<xsd:enumeration value="DBSCHEMA_COLUMNS" />
<xsd:enumeration value="DBSCHEMA_PROVIDER_TYPES" />
<xsd:enumeration value="MDSHEMA_INPUT_DATASOURCES" />
<xsd:enumeration value="DMSHEMA_MINING_SERVICES" />
<xsd:enumeration value="DMSHEMA_MINING_SERVICE_PARAMETERS" />
<xsd:enumeration value="DMSHEMA_MINING_FUNCTIONS" />
<xsd:enumeration value="DMSHEMA_MINING_MODEL_CONTENT" />
<xsd:enumeration value="DMSHEMA_MINING_MODEL_XML" />
<xsd:enumeration value="DMSHEMA_MINING_MODEL_CONTENT_PMML" />
<xsd:enumeration value="DMSHEMA_MINING_MODELS" />
<xsd:enumeration value="DMSHEMA_MINING_COLUMNS" />
<xsd:enumeration value="DMSHEMA_MINING_STRUCTURES" />
<xsd:enumeration value="DMSHEMA_MINING_STRUCTURE_COLUMNS" />
<xsd:enumeration value="DISCOVER_DATASOURCES" />
<xsd:enumeration value="DISCOVER_ENUMERATORS" />
<xsd:enumeration value="DISCOVER_XML_METADATA" />
<xsd:enumeration value="DISCOVER_TRACES" />
<xsd:enumeration value="DISCOVER_TRACE_DEFINITION_PROVIDERINFO" />
<xsd:enumeration value="DISCOVER_TRACE_COLUMNS" />
<xsd:enumeration value="DISCOVER_TRACE_EVENT_CATEGORIES" />
<xsd:enumeration value="DISCOVER_MEMORYUSAGE" />
<xsd:enumeration value="DISCOVER_MEMORYGRANT" />
<xsd:enumeration value="DISCOVER_LOCKS" />
<xsd:enumeration value="DISCOVER_CONNECTIONS" />
<xsd:enumeration value="DISCOVER_SESSIONS" />
<xsd:enumeration value="DISCOVER_JOBS" />
<xsd:enumeration value="DISCOVER_TRANSACTIONS" />
<xsd:enumeration value="DISCOVER_DB_CONNECTIONS" />
<xsd:enumeration value="DISCOVER_MASTER_KEY" />
<xsd:enumeration value="DISCOVER_PERFORMANCE_COUNTERS" />
<xsd:enumeration value="DISCOVER_LOCATIONS" />
<xsd:enumeration value="DISCOVER_PARTITION_DIMENSION_STAT" />
<xsd:enumeration value="DISCOVER_PARTITION_STAT" />
<xsd:enumeration value="DISCOVER_DIMENSION_STAT" />
<xsd:enumeration value="DISCOVER_COMMANDS" />
<xsd:enumeration value="DISCOVER_COMMAND_OBJECTS" />
<xsd:enumeration value="DISCOVER_OBJECT_ACTIVITY" />
<xsd:enumeration value="DISCOVER_OBJECT_MEMORY_USAGE" />
<xsd:enumeration value="DISCOVER_STORAGE_TABLES" />
<xsd:enumeration value="DISCOVER_STORAGE_TABLE_COLUMNS" />
<xsd:enumeration value="DISCOVER_STORAGE_TABLE_COLUMN_SEGMENTS" />
<xsd:enumeration value="DISCOVER_CSDL_METADATA" />
<xsd:enumeration value="DISCOVER_CALC_DEPENDENCY" />
<xsd:enumeration value="MDSHEMA_FUNCTIONS" />
<xsd:enumeration value="DISCOVER_RING_BUFFERS" />
<xsd:enumeration value="DISCOVER_XEVENT_TRACE_DEFINITION" />
<xsd:enumeration value="DISCOVER_XEVENT_PACKAGES" />
<xsd:enumeration value="DISCOVER_XEVENT_OBJECTS" />
<xsd:enumeration value="DISCOVER_XEVENT_OBJECT_COLUMNS" />
<xsd:enumeration value="DISCOVER_XEVENT_SESSIONS" />
<xsd:enumeration value="DISCOVER_XEVENT_SESSION_TARGETS" />
<xsd:enumeration value="DISCOVER_MEM_STATS" />
<xsd:enumeration value="DISCOVER_DB_MEM_STATS" />
<xsd:enumeration value="DISCOVER_OBJECT_COUNTERS" />
</xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="Restrictions" minOccurs="1" maxOccurs="1">
<xsd:complexType>

```

```

        <xsd:sequence>
          <xsd:element name="RestrictionList" minOccurs="0" maxOccurs="1"
nillable="true" >
            <xsd:complexType>
              <xsd:sequence>
                <xsd:any minOccurs="0" maxOccurs="unbounded" />
              </xsd:sequence>
            </xsd:complexType>
          </xsd:element>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Properties" type="Properties" />
  </xsd:sequence>
</xsd:complexType>
</xsd:element>

```

In addition to the **RequestTypes** defined in the enumeration above, the [MS-SSAS-T] specification extends the set of **RequestTypes** to support **Discover** operations on databases in Tabular mode that have a compatibility level greater than or equal to 1200.

| Element | Read-Only | Default value | Description |
|--------------|-----------|---------------|---|
| RequestType | | [Required] | This enumeration value specifies which of the schema rowsets is being requested. |
| Restrictions | | Empty | This element contains a single RestrictionList element, in which the restrictions on the number of rows to be returned are specified. |
| Properties | | Empty | The Properties type is common to the Discover and Execute methods. It is described in section 3.1.4.2.2.1.2. |

3.1.4.2.2.1.1 Restrictions and RestrictionList

The **Restrictions** element contains a single **RestrictionList** element. The **RestrictionList** element is of type **xsd:anyType**. This is because the restrictions that are available are variable depending upon the value of the **RequestType** specification.

Each individual **RequestType** is described in section 3.1.4.2.2.1.3, and for each **RequestType**, the available restrictions are specified. The specified restrictions will restrict the number of rows that are returned by the Discover request. If a restriction is marked "Required", a restriction on that column MUST be sent with the request to the server. If a required restriction is omitted from the request, the request fails.

If a restriction on the same column is included multiple times for one request, the last specified instance of the restriction is applied.

3.1.4.2.2.1.2 Properties Type

The **Properties** type consists of a PropertyList element, which itself consists of a collection of **Request** properties. Each property allows the user to control the aspect of a Discover or Execute method that is documented in the Description column of the table in section 3.1.4.2.2.1.2.1, such as defining the information required for the connection, specifying the return format of the result set, or specifying the locale in which the data is to be formatted.

The available properties and their values can be obtained by using the DISCOVER_PROPERTIES request type with the **Discover** method. There is no required order for the properties that are listed in the **Properties** element. This element MUST be included, but it can be empty.

The **Properties** element MUST contain one and only one **PropertyList** element, of type **PropertyList**. The **PropertyList** type is defined in section 3.1.4.2.2.1.2.1.

3.1.4.2.2.1.2.1 PropertyList

The **PropertyList** type contains the properties that are associated with a Discover or Execute request. Only writeable properties can be sent to the server in a request. Attempts to send properties that are not writeable or that are reserved for future use will result in a fault.

```
<xsd:complexType name="PropertyList" >
  <xsd:all>
    <xsd:element name="DataSourceInfo" type="xsd:string" minOccurs="0" />
    <xsd:element name="Timeout" type="xsd:integer" minOccurs="0" />
    <xsd:element name="UserName" type="xsd:string" minOccurs="0" />
    <xsd:element name="Password" type="xsd:string" minOccurs="0" />
    <xsd:element name="LocaleIdentifier" type="xsd:integer"
      minOccurs="0" />
    <xsd:element name="Catalog" type="xsd:string" minOccurs="0" />
    <xsd:element name="StateSupport" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Sessions" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Content" minOccurs="0" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="None" />
          <xsd:enumeration value="Schema" />
          <xsd:enumeration value="Data" />
          <xsd:enumeration value="SchemaData" />
          <xsd:enumeration value="Metadata" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Format" minOccurs="0" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Tabular" />
          <xsd:enumeration value="Multidimensional" />
          <xsd:enumeration value="Native" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="AxisFormat" minOccurs="0" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="ClusterFormat" />
          <xsd:enumeration value="CustomFormat" />
          <xsd:enumeration value="TupleFormat" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="BeginRange" type="xsd:integer" minOccurs="0" />
    <xsd:element name="EndRange" type="xsd:integer" minOccurs="0" />
    <xsd:element name="MDXSupport" minOccurs="0" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="Core" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="ProviderName" type="xsd:string" minOccurs="0" />
    <xsd:element name="ProviderVersion" type="xsd:string" minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

```

<xsd:element name="DBMSVersion" type="xsd:string" minOccurs="0" />
<xsd:element name="ProviderType" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
      <xsd:enumeration value="3" />
      <xsd:enumeration value="4" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ShowHiddenCubes" type="xsd:boolean" minOccurs="0" />
<xsd:element name="SQLSupport" type="xsd:integer" minOccurs="0" />
<xsd:element name="TransactionDDL" type="xsd:integer" minOccurs="0" />
<xsd:element name="MaximumRows" type="xsd:integer" minOccurs="0" />
<xsd:element name="Roles" type="xsd:string" minOccurs="0" />
<xsd:element name="VisualMode" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="0" />
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="EffectiveRoles" type="xsd:string" minOccurs="0" />
<xsd:element name="EffectiveUserName" type="xsd:string" minOccurs="0" />
<xsd:element name="ServerName" type="xsd:string" minOccurs="0" />
<xsd:element name="CatalogLocation" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropCatalogTerm" type="xsd:string" minOccurs="0" />
<xsd:element name="DbpropCatalogUsage" type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropColumnDefinition" type="xsd:integer"
  minOccurs="0" />
<xsd:element name="DbpropConcatNullBehavior" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropDataSourceReadOnly" type="xsd:boolean"
  minOccurs="0" />
<xsd:element name="DbpropGroupBy" minOccurs="0" type="xsd:integer" />
<xsd:element name="DbpropHeterogeneousTables" type="xsd:integer"
  minOccurs="0" />
<xsd:element name="DbpropIdentifierCase" type="xsd:integer"
  minOccurs="0" />
<xsd:element name="DbpropMaxIndexSize" type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropMaxOpenChapters" type="xsd:integer"
  minOccurs="0" />
<xsd:element name="DbpropMaxRowSize" type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropMaxRowSizeIncludeBlob" type="xsd:boolean"
  minOccurs="0" />
<xsd:element name="DbpropMaxTablesInSelect" type="xsd:integer"
  minOccurs="0" />
<xsd:element name="DbpropMultiTableUpdate" type="xsd:boolean"
  minOccurs="0" />
<xsd:element name="DbpropNullCollation" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
  </xsd:simpleType>

```



```

        <xsd:enumeration value="4" />
        <xsd:enumeration value="8" />
    </xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropOrderByColumnsInSelect" type="xsd:boolean"
    minOccurs="0" />
<xsd:element name="DbpropOutputParameterAvailable" minOccurs="0" >
    <xsd:simpleType>
        <xsd:restriction base="xsd:integer">
            <xsd:enumeration value="1" />
            <xsd:enumeration value="2" />
            <xsd:enumeration value="4" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropPersistentIdType" minOccurs="0" >
    <xsd:simpleType>
        <xsd:restriction base="xsd:integer">
            <xsd:enumeration value="1" />
            <xsd:enumeration value="2" />
            <xsd:enumeration value="4" />
            <xsd:enumeration value="8" />
            <xsd:enumeration value="16" />
            <xsd:enumeration value="32" />
            <xsd:enumeration value="64" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropPrepareAbortBehavior" minOccurs="0" >
    <xsd:simpleType>
        <xsd:restriction base="xsd:integer">
            <xsd:enumeration value="1" />
            <xsd:enumeration value="2" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropPrepareCommitBehavior" minOccurs="0" >
    <xsd:simpleType>
        <xsd:restriction base="xsd:integer">
            <xsd:enumeration value="1" />
            <xsd:enumeration value="2" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropProcedureTerm" type="xsd:string" minOccurs="0" />
<xsd:element name="DbpropQuotedIdentifierCase" minOccurs="0" >
    <xsd:simpleType>
        <xsd:restriction base="xsd:integer">
            <xsd:enumeration value="1" />
            <xsd:enumeration value="2" />
            <xsd:enumeration value="4" />
            <xsd:enumeration value="8" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropSchemaUsage" type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropSqlSupport" type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropSubqueries" type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropSupportedTxnDdl" type="xsd:integer"
    minOccurs="0" />
<xsd:element name="MdpropMdxSubqueries" type="xsd:integer"
    minOccurs="0" />
<xsd:element name="DbpropSupportedTxnIsoLevels" type="xsd:integer"
    minOccurs="0" />
<xsd:element name="DbpropSupportedTxnIsoRetain" type="xsd:integer"
    minOccurs="0" />
<xsd:element name="DbpropTableTerm" type="xsd:string" minOccurs="0" />
<xsd:element name="MdpropAggregateCellUpdate" minOccurs="0" >
    <xsd:simpleType>

```

```

    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="0" />
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="MdpropAxes" type="xsd:integer" minOccurs="0" />
<xsd:element name="MdpropFlatteningSupport" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
      <xsd:enumeration value="3" />
      <xsd:enumeration value="4" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="MdpropMdxCaseSupport" type="xsd:integer"
  minOccurs="0" />
<xsd:element name="MdpropMdxDescFlags" type="xsd:integer" minOccurs="0" />
<xsd:element name="MdpropMdxDrillFunctions" type="xsd:integer"
  minOccurs="0" />
<xsd:element name="MdpropMdxFormulas" type="xsd:integer" minOccurs="0" />
<xsd:element name="MdpropMdxJoinCubes" type="xsd:integer"
  minOccurs="0" />
<xsd:element name="MdpropMdxMemberFunctions" type="xsd:integer"
  minOccurs="0" />
<xsd:element name="MdpropMdxNonMeasureExpressions" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer">
      <xsd:enumeration value="0" />
      <xsd:enumeration value="1" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="MdpropMdxNumericFunctions" type="xsd:integer"
  minOccurs="0" />
<xsd:element name="MdpropMdxObjQualification" type="xsd:integer"
  minOccurs="0" />
<xsd:element name="MdpropMdxOuterReference" type="xsd:integer"
  minOccurs="0" />
<xsd:element name="MdpropMdxQueryByProperty" type="xsd:boolean"
  minOccurs="0" />
<xsd:element name="MdpropMdxRangeRowset" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
      <xsd:enumeration value="4" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="MdpropMdxSetFunctions" type="xsd:integer"
  minOccurs="0" />
<xsd:element name="MdpropMdxSlicer" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="MdpropMdxStringCompop" type="xsd:integer"
  minOccurs="0"/>
<xsd:element name="MdpropNamedLevels" type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropMsmdMDXCompatibility" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="0" />
    </xsd:restriction>
  </xsd:simpleType>

```

```

        <xsd:enumeration value="1" />
        <xsd:enumeration value="2" />
        <xsd:enumeration value="3" />
    </xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropMsmdSQLCompatibility" type="xsd:integer"
    minOccurs="0" />
<xsd:element name="DbpropMsmdMDXUniqueNameStyle" type="xsd:integer"
    minOccurs="0"/>
<xsd:element name="DbpropMsmdCachePolicy" type="xsd:integer"
    minOccurs="0"/>
<xsd:element name="DbpropMsmdCacheRatio" type="xsd:integer"
    minOccurs="0"/>
<xsd:element name="DbpropMsmdCacheMode" type="xsd:integer" minOccurs="0"/>
<xsd:element name="DbpropMsmdCompareCaseSensitiveStringFlags"
    minOccurs="0" >
    <xsd:simpleType>
        <xsd:restriction base="xsd:integer" >
            <xsd:enumeration value="1" />
            <xsd:enumeration value="2" />
            <xsd:enumeration value="16" />
            <xsd:enumeration value="256" />
            <xsd:enumeration value="4096" />
            <xsd:enumeration value="65536" />
            <xsd:enumeration value="1048576" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropMsmdCompareCaseNotSensitiveStringFlags"
    Type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropMsmdFlattened2" type="xsd:boolean"
    minOccurs="0" />
<xsd:element name="DbpropInitMode" type="xsd:integer" minOccurs="0"/>
<xsd:element name="SspropInitAppName" type="xsd:string" minOccurs="0"/>
<xsd:element name="SspropInitWsid" type="xsd:string" minOccurs="0" />
<xsd:element name="SspropInitPacketSize" type="xsd:integer"
    minOccurs="0"/>
<xsd:element name="ReadOnlySession" type="xsd:integer" minOccurs="0" />
<xsd:element name="SecuredCellValue" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:integer" >
            <xsd:enumeration value="0" />
            <xsd:enumeration value="1" />
            <xsd:enumeration value="2" />
            <xsd:enumeration value="3" />
            <xsd:enumeration value="4" />
            <xsd:enumeration value="5" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="NonEmptyThreshold" type="xsd:integer" minOccurs="0"/>
<xsd:element name="SafetyOptions" minOccurs="0">
    <xsd:simpleType>
        <xsd:restriction base="xsd:integer" >
            <xsd:enumeration value="0" />
            <xsd:enumeration value="1" />
            <xsd:enumeration value="2" />
            <xsd:enumeration value="3" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropMsmdCacheRatio2" type="xsd:double"
    minOccurs="0"/>
<xsd:element name="DbpropMsmdUseFormulaCache" type="xsd:string"
    minOccurs="0"/>
<xsd:element name="DbpropMsmdDynamicDebugLimit" type="xsd:integer"
    minOccurs="0"/>
<xsd:element name="DbpropMsmdDebugMode" type="xsd:string" minOccurs="0"/>
<xsd:element name="Dialect" minOccurs="0">

```

```

<xsd:simpleType>
  <xsd:restriction base="xsd:string" >
    <xsd:enumeration value="MDX" />
    <xsd:enumeration value="DMX" />
    <xsd:enumeration value="SQL" />
  </xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="ImpactAnalysis" type="xsd:boolean" minOccurs="0" />
<xsd:element name="SQLQueryMode" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Data" />
      <xsd:enumeration value="Calculated" />
      <xsd:enumeration value="IncludeEmpty" />
      <xsd:enumeration value="DataKeys" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="ClientProcessID" type="xsd:integer" minOccurs="0"/>
<xsd:element name="Cube" type="xsd:string" minOccurs="0" />
<xsd:element name="ReturnCellProperties" type="xsd:boolean" minOccurs="0" />
<xsd:element name="CommitTimeout" type="xsd:integer" minOccurs="0"/>
<xsd:element name="ForceCommitTimeout" type="xsd:integer"
  minOccurs="0"/>
<xsd:element name="ExecutionMode" type="xsd:string" minOccurs="0"/>
<xsd:element name="RealTimeOlap" type="xsd:boolean" minOccurs="0" />
<xsd:element name="MdxMissingMemberMode" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="Default" />
      <xsd:enumeration value="Ignore" />
      <xsd:enumeration value="Error" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="MdpropMdxNamedSets" type="xsd:integer"
  minOccurs="0" />
<xsd:element name="DbpropMsmdSubqueries" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="0" />
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
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  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
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      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
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    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="CustomData" type="xsd:string" minOccurs="0"/>
<xsd:element name="DisablePrefetchFacts" type="xsd:boolean"
  minOccurs="0" />
<xsd:element name="UpdateIsolationLevel" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="1" />
      <xsd:enumeration value="2" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropMsmdErrorMessageMode" type="xsd:integer"
  minOccurs="0"/>

```

```

<xsd:element name="MdpropMdxDdlExtensions" type="xsd:integer"
    minOccurs="0" />
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  <xsd:simpleType>
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      <xsd:enumeration value="UTF-8" />
      <xsd:enumeration value="UTF-16" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="MemoryLockingMode" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:integer" >
      <xsd:enumeration value="0" />
      <xsd:enumeration value="1" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="DbpropMsmdOptimizeResponse" type="xsd:integer" minOccurs="0"/>
<xsd:element name="DbpropMsmdActivityID" type="xsd:string" minOccurs="0"/>
<xsd:element name="DbpropMsmdRequestID" type="xsd:string" minOccurs="0"/>
<xsd:element name="ReturnAffectedObjects" type="xsd:integer" minOccurs="0" />
<xsd:element name="DbpropMsmdRequestMemoryLimit" type="xsd:integer" minOccurs="0" />
<xsd:element name="ApplicationContext" type="xsd:string" minOccurs="0" />
</xsd:all>
</xsd:complexType>

```

| Name | Usage | Default value | Description |
|------------------|------------|---------------|---|
| DataSourceInfo | Read/Write | Empty | Contains the information, such as the instance name, that is required to connect to the data source. |
| LocaleIdentifier | Read/Write | | An integer that represents an LCID. This property represents the LCID that is currently in effect. |
| Timeout | Read/Write | 0 | An integer value that specifies, in seconds, the maximum time that the server is to wait for a request to be successful before returning an error. |
| UserName | Read | | The user name. |
| Catalog | Read/Write | | The current database for the session. |
| Password | Write | | The password for the session. |
| StateSupport | Read | "Sessions" | Reserved for future use. |
| Content | Write | "SchemaData" | <p>An enumeration value that determines the type of data that is returned from the Discover and Execute methods. This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ None - Allows the structure of the command to be verified but not run. ▪ Schema - Returns the XML schema that relates to the requested command. The XML schema indicates columns and other information. |

| Name | Usage | Default value | Description |
|------------|-------|---------------|--|
| | | | <ul style="list-style-type: none"> ▪ Data - Returns only the data that was requested. ▪ SchemaData - Returns the schema information and the data. ▪ Metadata - Includes the schema plus the OlapInfo result section for results that use the MDDataset return type. See section 2.2.4.1.1.1 for the definition of the OlapInfo type and section 2.2.4.1.1 for the definition of the MDDataset type. |
| Format | Write | "Native" | <p>An enumeration value that determines the type of result set that is returned from the Execute method. This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ Tabular - Returns a result set using the Rowset data type. See section 2.2.4.1.3 for the definition of the Rowset type. ▪ Multidimensional - Returns a rowset using the MDDataset data type. See section 2.2.4.1.1 for the definition of the MDDataset type. ▪ Native - No format is explicitly specified. |
| AxisFormat | Write | "TupleFormat" | <p>An enumeration value that determines the format used within an MDDataset result set to describe the axes of the multidimensional dataset. This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ ClusterFormat - The MDDataset axis is made up of one or more CrossProduct elements. ▪ CustomFormat - A vendor can use this value to indicate a vendor-specific format. ▪ TupleFormat - The MDDataset axis contains one or more Tuple elements.<107> |
| BeginRange | Write | -1 | <p>Contains a zero-based integer value corresponding to a CellOrdinal attribute value, which indicates the beginning of the range of cells to include in the result. The CellOrdinal attribute is part of the Cell element in the CellData section of MDDataset.</p> |
| EndRange | Write | -1 | <p>Specifies a zero-based integer value corresponding to a CellOrdinal attribute value, indicating the end of the range of cells to include in the result. The CellOrdinal attribute is part of the Cell element in the CellData section of MDDataset.</p> |

| Name | Usage | Default value | Description |
|-----------------|------------|--|---|
| ProviderName | Read | | This property is equivalent to the DBPROP_PROVIDERFRIENDLYNAME OLE DB property. Indicates the name of the provider. |
| ProviderVersion | Read | | This property is equivalent to the DBPROP_PROVIDERVER OLE DB property. Indicates the version of the provider. |
| DBMSVersion | Read | | This property is equivalent to the DBPROP_DBMSVER OLE DB property. Indicates the server version number. |
| ProviderType | Read | 6 | This property is equivalent to the DBPROP_DATASOURCE_TYPE OLE DB property. This property can have one of the following values or a combination of the following values: <ul style="list-style-type: none"> ▪ DBPROPVAL_DST_TDP(0x00000001L) - The provider is a tabular data provider (TDP). ▪ DBPROPVAL_DST_MDP(0x00000002L) - The provider is a multidimensional provider (MDP). ▪ DBPROPVAL_DST_TDPANDMDP(0x00000003L) - The provider is both a TDP and an MDP. ▪ DBPROPVAL_DST_DOCSOURCE(0x00000004L) - The provider supports direct URL binding and is a document source provider.<108> |
| ShowHiddenCubes | Read/Write | | This property is reserved for future use. |
| SQLSupport | Read | 512 (DBPROPVAL_SQL_SUBMINIMUM) | This property is equivalent to the DBPROP_SQLSUPPORT OLE DB property which is a bitmask displaying the level of support for the SQL language. This property can have a combination of zero or more of the following values: <ul style="list-style-type: none"> ▪ (0x00000000L)DBPROPVAL_SQL_NONE - SQL is not supported. ▪ (0x00000001L)DBPROPVAL_SQL_ODBC_MINIMUM. ▪ (0x00000002L)DBPROPVAL_SQL_ODBC_CORE. ▪ (0x00000004L)DBPROPVAL_SQL_ODBC_EXTENDED - These levels correspond to the levels of SQL conformance defined in ODBC version 2.5. These levels are cumulative. That is, if the provider supports one level, |

| Name | Usage | Default value | Description |
|----------------|------------|---------------|--|
| | | | <p>it also sets the bits for all lower levels.</p> <ul style="list-style-type: none"> ▪ (0x00000100L)DBPROPVAL_SQL_ESCAPECLAUSES - The provider supports the ODBC escape clause syntax. ▪ (0x00000010L)DBPROPVAL_SQL_ANSI92_ENTRY. ▪ (0x00000020L)DBPROPVAL_SQL_FIPS_TRANSITIONAL. ▪ (0x00000040L)DBPROPVAL_SQL_ANSI92_INTERMEDIATE. ▪ (0x00000080L)DBPROPVAL_SQL_ANSI92_FULL - These levels correspond to the levels in ANSI SQL-92. These levels are cumulative. That is, if the provider supports one level, it also sets the bits for all lower levels. ▪ (0x00000008L)DBPROPVAL_SQL_ANSI89_IEF - The provider supports the ANSI89 Integrity Enhancement Facility. ▪ (0x00000200L)DBPROPVAL_SQL_SUBMINIMUM - The provider supports the DBGUID_SQL dialect and parses the command text according to SQL rules but does not support either the minimum ODBC level or the ANSI SQL-92 Entry level. This level is not cumulative; providers that support at least the minimal ODBC Level or ANSI SQL-92 Entry Level do not set this bit.<109> |
| TransactionDDL | Read | | Reserved for future use. |
| MaximumRows | Write | | Reserved for future use. |
| Roles | Read/Write | | Specifies a comma-delimited string of the role names for this request. |
| VisualMode | Write | 0 | <p>This property is equivalent to the MDPROP_VISUALMODE OLE DB property. Indicates whether the provider is to calculate visual totals, which dynamically totals child members of parent members specified in a set. This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_VISUAL_MODE_DEFAULT (0) - Default mode for a server; each server can define this for their server. ▪ MDPROPVAL_VISUAL_MODE_VISUAL (1) - Visual totals on. |

| Name | Usage | Default value | Description |
|--------------------|-------|---------------|---|
| | | | <ul style="list-style-type: none"> ▪ MDPROPVAL_VISUAL_MODE_VISUALOFF (2) - Visual totals off. |
| EffectiveRoles | Write | | Reserved for future use. |
| EffectiveUserName | Write | | Specifies the name of an account to use to override the user name when connecting to the server. |
| ServerName | Read | | Indicates the name of the server. |
| CatalogLocation | Read | | <p>An integer enumeration value that is equivalent to the DBPROP_CATALOGLOCATION OLE DB property and which identifies where the catalog name appears within a text string that represents a fully qualified name. This property can be one of the following values:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_CL_START (0x00000001L) - The catalog name is at the start of the fully qualified name. ▪ DBPROPVAL_CL_END (0x00000002L) - The catalog name is at the end of the fully qualified name.<110> |
| DbpropCatalogTerm | Read | | This string property is equivalent to the DBPROP_CATALOGTERM OLE DB property which lists the term that the server uses to describe a catalog.<111> |
| DbpropCatalogUsage | Read | | <p>This property is equivalent to the DBPROP_CATALOGUSAGE OLE DB property.</p> <p>A bitmask that specifies how catalog names can be used in text commands. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_CU_DML_STATEMENTS(0x00000001L) - Catalog names are supported in all data manipulation language (DML) statements. ▪ DBPROPVAL_CU_TABLE_DEFINITION(0x00000002L) - Catalog names are supported in all table definition statements. ▪ DBPROPVAL_CU_INDEX_DEFINITION(0x00000004L) - Catalog names are supported in all index definition statements and can apply only to the table name, not the index name, depending on the SQL implementation. ▪ DBPROPVAL_CU_PRIVILEGE_DEFINITION(0x00000008L) - Catalog names are supported in all privilege definition statements.<112> |

| Name | Usage | Default value | Description |
|--------------------------|-------|---------------|---|
| DbpropColumnDefinition | Read | | <p>This property is equivalent to the DBPROP_COLUMNDEFINITION OLE DB property. A bitmask defining the valid clauses for the definition of a column. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_CD_NOTNULL (0x00000001L) Columns can be created non-nullable.<113> |
| DbpropConcatNullBehavior | Read | | <p>This property is equivalent to the DBPROP_CONCATNULLBEHAVIOR OLE DB property. An enumeration value that indicates how the data source object handles the concatenation of NULL-valued character data type columns with non-NULL-valued character data type columns. This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_CB_NULL (1) - The result is NULL-valued. ▪ DBPROPVAL_CB_NON_NULL (2) - The result is the concatenation of the non-NULL-valued column or columns.<114> |
| DbpropDataSourceReadOnly | Read | | <p>A Boolean that is equivalent to the DBPROP_DATASOURCEREADONLY OLE DB property. When true, indicates that the data store is read-only; otherwise, false.<115></p> |
| DbpropGroupBy | Read | | <p>This property is equivalent to the OLE DB property DBPROP_GROUPBY. A partial bitmask that indicates the relationship between the columns in a GROUP BY clause and the non-aggregated columns in the select list.</p> <p>The first value in the following list can be used in an OR operation with any of the other values in the list:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_GB_COLLATE(0x00000010L) - A COLLATE clause can be specified at the end of each grouping column. ▪ DBPROPVAL_GB_EQUALS_SELECT(0x00000002L) - The GROUP BY clause MUST contain all nonaggregated columns in the select list. It cannot contain any other columns. ▪ DBPROPVAL_GB_CONTAINS_SELECT(0x00000004L) - The GROUP BY clause MUST contain all nonaggregated columns in the select list. It can contain columns that are not in the select list. ▪ DBPROPVAL_GB_NO_RELATION(0x00000008L) - The columns in the GROUP BY clause and the select list are not |

| Name | Usage | Default value | Description |
|---------------------------|-------|---------------|---|
| | | | related.<116> |
| DbpropHeterogeneousTables | Read | | This property is equivalent to the OLE DB property DBPROP_HETEROGENEOUSTABLES . A bitmask that specifies whether the provider can join tables from different catalogs or providers. This property can be a combination of zero or more of the following values: <ul style="list-style-type: none"> ▪ DBPROPVAL_HT_DIFFERENT_CATALOGS(0x00000001L) ▪ DBPROPVAL_HT_DIFFERENT_PROVIDERS(0x00000002L)<117> |
| DbpropIdentifierCase | Read | 8 | This property is equivalent to the OLE DB property DBPROP_IDENTIFIER_CASE . A bitmask that indicates how identifiers treat case in data definition commands or interfaces. This property can have one of the following values: <ul style="list-style-type: none"> ▪ DBPROPVAL_IC_UPPER(0x00000001L) - Identifiers in SQL are case-sensitive and are stored in uppercase. ▪ DBPROPVAL_IC_LOWER(0x00000002L) - Identifiers in SQL are case-insensitive and are stored in lowercase. ▪ DBPROPVAL_IC_SENSITIVE(0x00000004L) - Identifiers in SQL are case-sensitive and are stored in mixed case. ▪ DBPROPVAL_IC_MIXED(0x00000008L) - Identifiers in SQL are case-insensitive and are stored in mixed case.<118> |
| DbpropMaxIndexSize | Read | | This property is equivalent to the OLE DB property DBPROP_MAXINDEXSIZE . Indicates the maximum number of bytes allowed in the combined columns of an index. If there is no specified limit or the limit is unknown, this value is set to zero.<119> |
| DbpropMaxOpenChapters | Read | | This integer property is equivalent to the OLE DB property DBPROP_MAXOPENCHAPTERS . If a chapter is released before a new chapter can be opened, this value is "1"; if the provider has no limit on the number of open chapters or does not support chapters, this value is "0".<120> |
| DbpropMaxRowSize | Read | | This integer property is equivalent to the OLE DB property DBPROP_MAXROWSIZE . Indicates the maximum length of a single row in a table. If there is no specified limit or the limit is unknown, this value is set to zero.<121> |

| Name | Usage | Default value | Description |
|--------------------------------|-------|---------------|---|
| DbpropMaxRowSizeIncludeBlob | Read | | This property is equivalent to the OLE DB property DBPROP_MAXROWSIZEINCLUDESBLOB . A Boolean that, when true, indicates that the maximum row size includes any blob present in the row; otherwise, false.<122> |
| DbpropMaxTablesInSelect | Read | | This integer property is equivalent to the OLE DB property DBPROP_MAXTABLESINSELECT . Indicates the maximum number of tables allowed in the FROM clause of a SELECT statement. If there is no specified limit or the limit is unknown, this value is set to zero.<123> |
| DbpropMultiTableUpdate | Read | | This Boolean property is equivalent to the OLE DB property DBPROP_MULTITABLEUPDATE . When true, indicates that the provider can do a multitable update; otherwise, false.<124> |
| DbpropNullCollation | Read | | This enumeration value is equivalent to the OLE DB property DBPROP_NULLCOLLATION . Indicates where NULLs are sorted in a list. This property can have one of the following values: <ul style="list-style-type: none"> ▪ DBPROPVAL_NC_END(0x00000001L) - NULLs are sorted at the end of the list, regardless of the sort order. ▪ DBPROPVAL_NC_HIGH(0x00000002L) - NULLs are sorted at the high end of the list. ▪ DBPROPVAL_NC_LOW(0x00000004L) - NULLs are sorted at the low end of the list. ▪ DBPROPVAL_NC_START(0x00000008L) - NULLs are sorted at the start of the list, regardless of the sort order.<125> |
| DbpropOrderByColumnsInSelect | Read | | This Boolean property is equivalent to the OLE DB property DBPROP_ORDERBYCOLUMNSINSELECT . When true, orders by columns in the select list; otherwise, false.<126> |
| DbpropOutputParameterAvailable | Read | | This property is equivalent to the OLE DB property DBPROP_OUTPUTPARAMETERAVAILABILITY . It is an integer enumeration that indicates the time at which output parameter values become available. This property can have one of the following values: <ul style="list-style-type: none"> ▪ DBPROPVAL_OA_NOTSUPPORTED(0x00000001L) - Output parameters are not supported. ▪ DBPROPVAL_OA_ATEXECUTE(0x00000000) |

| Name | Usage | Default value | Description |
|----------------------------|-------|---------------|--|
| | | | <p>2L) - Output parameter data is available immediately after a command is executed.</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_OA_ATROWRELEASE(0x00000004L) - If a command returns a single result that is a rowset, output parameter data is available at the time the rowset is completely released. If a command returns multiple results, output parameter data is available when a multiple results object is completely released, whichever occurs first.<127> |
| DbpropPersistentIdType | Read | | <p>This property is equivalent to the OLE DB property DBPROP_PERSISTENTIDTYPE. An integer specifying the type of DBID that the provider uses when persisting DBIDs that name entities in the data store, such as tables, indexes, columns, commands, or constraints. This is generally the type of DBID that the provider considers the most permanent under schema changes and physical data reorganizations. This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_PT_NAME(0x0000004L) ▪ DBPROPVAL_PT_PROPID(0x0000010L) ▪ DBPROPVAL_PT_GUID(0x0000008L) ▪ DBPROPVAL_PT_GUID_NAME(0x0000001L) ▪ DBPROPVAL_PT_GUID_PROPID(0x0000002L) ▪ DBPROPVAL_PT_PGUID_NAME(0x0000000L) ▪ DBPROPVAL_PT_PGUID_PROPID(0x0000004L)<128> |
| DbpropPrepareAbortBehavior | Read | | <p>This enumeration value is equivalent to the OLE DB property DBPROP_PREPAREABORTBEHAVIOR. It indicates how aborting a transaction affects prepared commands. This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_CB_DELETE(0x00000002L) - Aborting a transaction deletes prepared commands. The application MUST re-prepare commands before executing them. ▪ DBPROPVAL_CB_PRESERVE(0x00000001L) - Aborting a transaction preserves prepared commands. The application can re-execute commands without re- |

| Name | Usage | Default value | Description |
|-----------------------------|-------|---------------|--|
| | | | preparing them.<129> |
| DbpropPrepareCommitBehavior | Read | | <p>This integer enumeration value is equivalent to the OLE DB property DBPROP_PREPARECOMMITBEHAVIOR. It indicates how committing a transaction affects prepared commands. This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_CB_DELETE(0x00000002L) - Aborting a transaction deletes prepared commands. The application MUST re-prepare commands before executing them. ▪ DBPROPVAL_CB_PRESERVE(0x00000001L) - Aborting a transaction preserves prepared commands. The application can re-execute commands without re-preparing them.<130> |
| DbpropProcedureTerm | Read | | <p>This property is equivalent to the OLE DB property DBPROP_PROCEDURETERM. A character string with the data store vendor's name for a procedure - for example, "database procedure", "stored procedure", or "procedure". This is used for building user interfaces.<131></p> |
| DbpropQuotedIdentifierCase | Read | | <p>This enumeration value is equivalent to the OLE DB property DBPROP_QUOTEDIDENTIFIERCASE. It indicates how quoted identifiers treat case. This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_IC_UPPER(0x00000001L) - Quoted identifiers in SQL are case-insensitive and are stored in uppercase in the system catalog. ▪ DBPROPVAL_IC_LOWER(0x00000002L) - Quoted identifiers in SQL are case-insensitive and are stored in lowercase in the system catalog. ▪ DBPROPVAL_IC_SENSITIVE(0x00000004L) - Quoted identifiers in SQL are case-sensitive and are stored in mixed case in the system catalog. ▪ DBPROPVAL_IC_MIXED(0x00000008L) - Quoted identifiers in SQL are case-insensitive and are stored in mixed case in the system catalog.<132> |
| DbpropSchemaUsage | Read | | <p>This property is equivalent to the OLE DB property DBPROP_SCHEMAUSAGE. A bitmask specifying how schema names can be used in text commands. This property can have a combination of zero or more of the</p> |

| Name | Usage | Default value | Description |
|------------------|-------|---------------|---|
| | | | <p>following values:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_SU_DML_STATEMENTS(0x0000001L) - Schema names are supported in all DML statements. ▪ DBPROPVAL_SU_TABLE_DEFINITION(0x0000002L) - Schema names are supported in all table definition statements. ▪ DBPROPVAL_SU_INDEX_DEFINITION(0x0000004L) - Schema names are supported in all index definition statements and can apply only to the table name, not the index name, depending on the SQL implementation. ▪ DBPROPVAL_SU_PRIVILEGE_DEFINITION(0x0000008L) - Schema names are supported in all privilege definition statements.<133> |
| DbpropSqlSupport | Read | 512 | <p>This property is equivalent to the OLE DB property DBPROP_SQLSUPPORT. A bitmask specifying the level of support for SQL. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_SQL_NONE(0x0000000L) - SQL is not supported. ▪ DBPROPVAL_SQL_ODBC_MINIMUM(0x0000001L) ▪ DBPROPVAL_SQL_ODBC_CORE(0x0000002L) ▪ DBPROPVAL_SQL_ODBC_EXTENDED(0x0000004L) - These levels correspond to the levels of SQL conformance defined in ODBC version 2.5. These levels are cumulative. That is, if the provider supports one level, it also sets the bits for all lower levels. For example, if the provider sets the DBPROPVAL_SQL_ODBC_CORE bit, it also sets the DBPROPVAL_SQL_ODBC_MINIMUM bit. ▪ DBPROPVAL_SQL_ESCAPECLAUSES(0x0000100L) - The provider supports the ODBC escape clause syntax. ▪ DBPROPVAL_SQL_ANSI92_ENTRY(0x0000010L) ▪ DBPROPVAL_SQL_FIPS_TRANSITIONAL(0x0000020L) ▪ DBPROPVAL_SQL_ANSI92_INTERMEDIATE(0x0000040L) |

| Name | Usage | Default value | Description |
|-----------------------|-------|---------------|---|
| | | | <ul style="list-style-type: none"> ▪ DBPROPVAL_SQL_ANSI92_FULL(0x00000080L) - These levels correspond to the levels in ANSI SQL-92. These levels are cumulative. That is, if the provider supports one level, it also sets the bits for all lower levels. ▪ DBPROPVAL_SQL_ANSI89_IEF(0x00000008L) - The provider supports the ANSI89 Integrity Enhancement Facility. ▪ DBPROPVAL_SQL_SUBMINIMUM(0x000000200L)- The provider supports the DBGUID_SQL dialect and parses the command text according to SQL rules but does not support either the minimum ODBC level or the ANSI SQL-92 entry level. This level is not cumulative; providers that support at least the minimal ODBC Level or ANSI SQL-92 entry level do not set this bit. OLE DB consumers can determine whether the provider supports the DBGUID_SQL dialect by verifying that the DBPROPVAL_SQL_NONE bit is not set.<134> |
| DbpropSubqueries | Read | 0 | <p>This property is equivalent to the OLE DB property DBPROP_SUBQUERIES. A bitmask specifying the predicates in text commands that support subqueries. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_SQ_CORRELATEDSUBQUERIES(0x00000001L) ▪ DBPROPVAL_SQ_COMPARISON(0x00000002L) ▪ DBPROPVAL_SQ_EXISTS(0x00000004L) ▪ DBPROPVAL_SQ_IN(0x00000008L) ▪ DBPROPVAL_SQ_QUANTIFIED(0x00000010L) ▪ DBPROPVAL_SQ_TABLE(0x00000020L)<135> |
| DbpropSupportedTxnDdl | Read | | <p>This property is equivalent to the OLE DB property DBPROP_SUPPORTEDTXNDDL. An integer that indicates the relationship of transactions to table and index modification data definition language (DDL) statements. This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_TC_NONE(0x00000000L) - Transactions are not supported. ▪ DBPROPVAL_TC_DML(0x00000001L) - |

| Name | Usage | Default value | Description |
|-----------------------------|-------|---------------|--|
| | | | <p>Transactions can contain only DML statements. Attempting to modify tables or indexes within a transaction causes an error.</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_TC_DDL_COMMIT(0x00000002L) - Transactions can contain only DML statements. Modifying tables or indexes within a transaction causes the transaction to be committed. The provider's commit mode remains unchanged in accordance with the value of DBPROP_COMMITPRESERVE. If the provider was in auto-commit mode, it remains in auto-commit mode. The same is true for manual-commit mode. ▪ DBPROPVAL_TC_DDL_IGNORE(0x00000004L) - Transactions can contain only DML statements. Attempts to modify tables or indexes within a transaction are ignored.<136> |
| DbpropSupportedTxnIsoLevels | Read | | <p>This property is equivalent to the OLE DB property DBPROP_SUPPORTEDTXNISOLEVELS. A bitmask specifying the supported transaction isolation levels. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_TI_CHAOS(0x00000010L) ▪ DBPROPVAL_TI_READUNCOMMITTED or DBPROPVAL_TI_BROWSE(0x00000100L) ▪ DBPROPVAL_TI_CURSORSTABILITY or DBPROPVAL_TI_READCOMMITTED(0x00001000L) ▪ DBPROPVAL_TI_REPEATABLEREAD(0x00010000L) ▪ DBPROPVAL_TI_SERIALIZABLE or DBPROPVAL_TI_ISOLATED(0x00100000L)<137> |
| DbpropSupportedTxnIsoRetain | Read | 292 | <p>This property is equivalent to the OLE DB property DBPROP_SUPPORTEDTXNISORETAIN. A bitmask specifying the supported transaction isolation retention levels. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_TR_COMMIT_DC(0x00000001L) - The transaction can either preserve or dispose of isolation context across a retaining commit. ▪ DBPROPVAL_TR_COMMIT(0x00000002L) - The transaction preserves its isolation |

| Name | Usage | Default value | Description |
|--------------------------------|-------|---------------|---|
| | | | <p>context (that is, it preserves its locks, if that is how isolation is implemented) across a retaining commit.</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_TR_COMMIT_NO(0x00000004L) - The transaction is explicitly not to preserve isolation across a retaining commit. ▪ DBPROPVAL_TR_ABORT_DC(0x00000008L) - The transaction can either preserve or dispose of isolation context across a retaining abort. ▪ DBPROPVAL_TR_ABORT(0x00000010L) - The transaction preserves its isolation context across a retaining abort. ▪ DBPROPVAL_TR_ABORT_NO(0x00000020L) - The transaction is explicitly not to preserve isolation across a retaining abort. ▪ DBPROPVAL_TR_DONTCARE(0x00000040L) - The transaction can preserve or dispose of isolation context across a retaining commit or abort. ▪ DBPROPVAL_TR_BOTH(0x00000080L) - Isolation is preserved across both a retaining commit and a retaining abort. ▪ DBPROPVAL_TR_NONE(0x00000100L) - Isolation is explicitly not to be retained across either a retaining commit or a retaining abort. ▪ DBPROPVAL_TR_OPTIMISTIC(0x00000200L) - Optimistic concurrency control is used. When this value is specified, and then whatever isolation technology is in place (such as locking), it MUST be the case that other transactions' ability to make changes to the data and resources manipulated by this transaction is not in any way affected by the data read or updated by this transaction. That is, optimistic control is used for all data in the transaction.<138> |
| DbpropTableTerm | Read | | <p>This property is equivalent to the OLE DB property DBPROP_TABLETERM. A string value that indicates the name the data source object uses for a table - for example, "table" or "file". This property is used for building user interfaces.<139></p> |
| MdpropAggregateCellUpdate<140> | Read | | <p>This property is equivalent to the OLE DB property MDPROP_AGGREGATECELL_UPDATE. An integer enumeration value that indicates support for updating aggregated cells. This property can have one of the following</p> |

| Name | Usage | Default value | Description |
|-------------------------|-------|---------------|--|
| | | | values: <ul style="list-style-type: none"> ▪ MDPROPVAL_AU_UNSUPPORTED(0x00000000L) - The provider does not support updating nonatomic cells. ▪ MDPROPVAL_AU_UNCHANGED(0x00000001L) - The provider supports updating of aggregated cells, but the value of cells beneath an aggregated cell remains unchanged. ▪ MDPROPVAL_AU_UNKNOWN(0x00000002L) - The provider supports updating of aggregated cells, and the value of cells beneath an aggregated cell remains undefined. |
| MdpropAxes | Read | | This property is equivalent to the OLE DB property MDPROP_AXES . This is an OLE DB for OLAP property. The value of this property is the maximum number of axes that the provider supports in the dataset. To be compliant with OLE DB for OLAP, this value MUST be at least 3.<141> |
| MdpropFlatteningSupport | Read | | This property is equivalent to the OLE DB property MDPROP_FLATTENING_SUPPORT . An integer that indicates if a provider supports flattening, and if so, of what type. This property can have one of the following values: <ul style="list-style-type: none"> ▪ MDPROPVAL_FS_FULL_SUPPORT(0x00000001L) - The provider supports flattening as described in [MSDN-FDPR]. ▪ MDPROPVAL_FS_GENERATED_COLUMN(0x00000002L) - The provider supports flattening by using dummy names, as described in [MSDN-SLNL]. ▪ MDPROPVAL_FS_GENERATED_DIMENSION(0x00000003L) - The provider supports flattening by generating one column per dimension, as described in [MSDN-SLNL]. ▪ MDPROPVAL_FS_NO_SUPPORT(0x00000004L) - The provider does not support flattening.<142> |
| MdpropMdxCaseSupport | Read | | This property is equivalent to the OLE DB property MDPROP_MDX_CASESUPPORT . A bitmask that represents the type of CASE statement in MDX that the provider supports. This property can have one of the following values: <ul style="list-style-type: none"> ▪ MDPROPVAL_MC_SINGLECASE(0x00000001L) - The provider supports a simple |

| Name | Usage | Default value | Description |
|-------------------------|-------|---------------|---|
| | | | <p>case expression.</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MC_SEARCHEDCASE(0x00000002L) - The provider supports a searched case expression.<143> |
| MdpropMdxDescFlags | Read | | <p>This property is equivalent to the OLE DB property MDPROP_MDX_DESCFLAGS. It is a bitmask that indicates which desc flag values in the DESCENDANTS MDX function are supported by the provider. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MD_BEFORE (0x00000002L) - The provider supports the flag BEFORE. ▪ MDPROPVAL_MD_AFTER(0x00000004L) - The provider supports the flag AFTER. ▪ MDPROPVAL_MD_SELF(0x00000001L) - The provider supports the flag SELF. This bit MUST be set by all providers because support for SELF is mandatory.<144> |
| MdpropMdxDrillFunctions | Read | | <p>A bitmask indicating support for drilldown and drillup groups of functions. These functions indicate provider support for drilldown and drillup on tuples as well as members. This property is a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MDF_BASIC(0x01) - The support operation for the drilldown and drillup groups of functions on members. ▪ MDPROPVAL_MDF_ASYMMETRIC(0x02) - The support operation for the drilldown and drillup groups of functions on tuples as well as members.<145> ▪ MDPROPVAL_MDF_CALC_MEMBERS(0x04) - The support operation for the drilldown and drillup groups of functions returning child calculated members.<146><147> |
| MdpropMdxFormulas | Read | 63 | <p>This property is equivalent to the OLE DB property MDPROP_MDX_FORMULAS. A bitmask that indicates what support the provider has for the creation of named sets and calculated members. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MF_WITH_CALC_MEMBERS(0x00000001L) - The provider supports the creation of calculated members by using the WITH clause before a SELECT. ▪ MDPROPVAL_MF_WITH_NAMEDSETS(0x0 |

| Name | Usage | Default value | Description |
|--------------------------|-------|---------------|--|
| | | | <p>0000002L) - The provider supports the creation of named sets by using the WITH clause before a SELECT.</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MF_CREATE_CALCMEMBERS (0x00000004L) - The provider supports the creation of named calculated members by using the CREATE clause. ▪ MDPROPVAL_MF_CREATE_NAMEDSETS(0x00000008L) - The provider supports the creation of named sets by using the CREATE clause. ▪ MDPROPVAL_MF_SCOPE_SESSION(0x00000010L) - The provider supports the scope value of SESSION during the creation of named sets and calculated members. ▪ MDPROPVAL_MF_SCOPE_GLOBAL(0x00000020L) - The provider supports the scope value of GLOBAL during the creation of named sets and calculated members.<148> |
| MdpropMdxJoinCubes | Read | 1 | <p>This property is equivalent to the OLE DB property MDPROP_MDX_JOINCUBES. A bitmask that indicates what support the provider has for queries joining multiple cubes.</p> <p>This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MJC_IMPLICITCUBE(0x00000004L) - The provider supports an empty FROM clause. The cube is implicitly resolved by the axis and slicer dimensions. ▪ MDPROPVAL_MJC_SINGLECUBE(0x00000001) - The provider supports only one cube in the FROM clause of the MDX statement. ▪ MDPROPVAL_MJC_MULTICUBES(0x00000002L) - The provider supports more than one cube in the FROM clause of the MDX statement.<149> |
| MdpropMdxMemberFunctions | Read | 15 | <p>This property is equivalent to the OLE DB property MDPROP_MDX_MEMBER_FUNCTIONS. A bitmask indicating support for various MDX member functions. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MMF_COUSIN(0x00000001L) - The provider supports the function COUSIN. |

| Name | Usage | Default value | Description |
|--------------------------------|-------|---------------|---|
| | | | <ul style="list-style-type: none"> ▪ MDPROPVAL_MMF_PARALLELPERIOD(0x0000002L) - The provider supports the function PARALLELPERIOD. ▪ MDPROPVAL_MMF_OPENINGPERIOD(0x0000004L) - The provider supports the function OPENINGPERIOD. ▪ MDPROPVAL_MMF_CLOSINGPERIOD(0x0000008L) - The provider supports the function CLOSINGPERIOD.<150> |
| MdpropMdxNonMeasureExpressions | Read | | <p>This property is equivalent to the OLE DB property MDPROP_MDX_NONMEASURE_EXPRESSIONS. An enumeration value that indicates the capabilities in the numeric_value_expression argument of MDX set functions. This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_NME_MEASURESONLY(0x0000001L) - The provider supports only expressions involving Measures dimension members. ▪ MDPROPVAL_NME_ALLDIMENSIONS(0x0000000L) - The provider supports expressions involving members from any dimension.<151> |
| MdpropMdxNumericFunctions | Read | | <p>This property is equivalent to the OLE DB property MDPROP_MDX_NUMERIC_FUNCTIONS. A bitmask that indicates support for various numeric functions. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MNF_MEDIAN(0x00000001L) - The provider supports the function MEDIAN. ▪ MDPROPVAL_MNF_VAR(0x00000002L) - The provider supports the function VAR. ▪ MDPROPVAL_MNF_STDDEV(0x00000004L) - The provider supports the function STDDEV. ▪ MDPROPVAL_MNF_RANK(0x00000008L) - The provider supports the function RANK. ▪ MDPROPVAL_MNF_AGGREGATE(0x00000010L) - The provider supports the function AGGREGATE. ▪ MDPROPVAL_MNF_COVARIANCE(0x00000020L) - The provider supports the function COVARIANCE. ▪ MDPROPVAL_MNF_CORRELATION(0x0000 |

| Name | Usage | Default value | Description |
|---------------------------|-------|---------------|--|
| | | | <p>0040L) - The provider supports the function CORRELATION.</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MNF_LINREGSLOPE(0x00000080L) - The provider supports the function LINREGSLOPE. ▪ MDPROPVAL_MNF_LINREGVARIANCE(0x0000100L) - The provider supports the function LINREGVARIANCE. ▪ MDPROPVAL_MNF_LINREGR2(0x00000200L) - The provider supports the function LINREGR2. ▪ MDPROPVAL_MNF_LINREGPOINT(0x00000400L) - The provider supports the function LINREGPOINT.<152> |
| MdpropMdxObjQualification | Read | | <p>This property is equivalent to the OLE DB property MDPROP_MDX_OBJQUALIFICATION. This property is a bitmask specifying how multidimensional schema object names can be qualified in an MDX statement. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MOQ_DATASOURCE_CUBE(0x00000001L) - Cubes can be qualified by the data source name. ▪ MDPROPVAL_MOQ_CATALOG_CUBE(0x00000002L) - Cubes can be qualified by the catalog name. ▪ MDPROPVAL_MOQ_SCHEMA_CUBE(0x00000004L) - Cubes can be qualified by the schema name. ▪ MDPROPVAL_MOQ_CUBE_DIM(0x00000008L) - Dimensions can be qualified by cube name. ▪ MDPROPVAL_MOQ_DIM_HIER(0x00000010L) - Hierarchies can be qualified by dimension names. ▪ MDPROPVAL_MOQ_DIMHIER_LEVEL(0x00000020L) - Levels can be qualified by the dimension name and/or hierarchy name. This property applies only if named levels are supported, which can be checked by the property. ▪ MDPROP_NAMED_LEVELS(0x000000ffL) - If named levels are not supported, this bit MUST be set. ▪ MDPROPVAL_MOQ_DIMHIER_MEMBER(0x00000100L) -Members can be qualified by a dimension name and/or a hierarchy |

| Name | Usage | Default value | Description |
|--------------------------|-------|---------------|--|
| | | | <p>name.</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MOQ_LEVEL_MEMBER(0x000040L) - Members can be qualified by a level name. ▪ MDPROPVAL_MOQ_MEMBER_MEMBER(0x0000080L) - Members can be qualified by their ancestor names.<153> |
| MdpropMdxOuterReference | Read | | <p>This property is equivalent to the OLE DB property MDPROP_MDX_OUTERREFERENCE. This integer indicates whether <tuple>[.VALUE] can be qualified by <cube_name> in an MDX value expression. 0 means true and 1 means false.<154></p> |
| MdpropMdxQueryByProperty | Read | True | <p>This property is equivalent to the OLE DB property MDPROP_MDX_QUERYBYPROPERTY. A Boolean that, when true, indicates that the provider supports for querying by property values in an MDX statement; otherwise, false.<155></p> |
| MdpropMdxRangeRowset | Read | | <p>This property is equivalent to the OLE DB property MDPROP_MDX_RANGEROWSET. An enumeration value that defines the type of support for cell updates provided by the provider. This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_RR_NORANGEROWSET(0x0000001L) - The provider does not support a range rowset. ▪ MDPROPVAL_RR_READONLY(0x00000002L) - The provider supports a read-only range rowset. ▪ MDPROPVAL_RR_UPDATE(0x00000004L) - The provider supports an updatable range rowset.<156> |
| MdpropMdxSetFunctions | Read | | <p>This property is equivalent to the OLE DB property MDPROP_MDX_SET_FUNCTIONS. A bitmask that indicates support for various set functions. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MSF_TOPPERCENT(0x00000001L) - The provider supports the function TOPPERCENT. ▪ MDPROPVAL_MSF_BOTTOMPERCENT(0x00000002L) - The provider supports the function BOTTOMPERCENT. ▪ MDPROPVAL_MSF_TOPSUM(0x00000004L) - The provider supports the function |

| Name | Usage | Default value | Description |
|------|-------|---------------|--|
| | | | <p>TOPSUM.</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MSF_BOTTOMSUM(0x00000008L) - The provider supports the function BOTTOMSUM. ▪ MDPROPVAL_MSF_DRILLDOWNLEVEL(0x00000800L) - The provider supports the function DRILLDOWNLEVEL. ▪ MDPROPVAL_MSF_DRILLDOWNMEMBER(0x00000400L) - The provider supports the function DRILLDOWNMEMBER. ▪ MDPROPVAL_MSF_DRILLDOWNMEMBERTOP(0x00001000L) - The provider supports the function DRILLDOWNMEMBERTOP. ▪ MDPROPVAL_MSF_DRILLDOWNMEMBERBOTTOM(0x00002000L) - The provider supports the function DRILLDOWNMEMBERBOTTOM. ▪ MDPROPVAL_MSF_DRILLDOWNLEVELTOP(0x00004000L) - The provider supports the function DRILLDOWNLEVELTOP. ▪ MDPROPVAL_MSF_DRILLDOWNLEVELBOTTOM(0x00008000L) - The provider supports the function DRILLDOWNLEVELBOTTOM. ▪ MDPROPVAL_MSF_DRILLUPMEMBER(0x00010000L) - The provider supports the function DRILLUPMEMBER. ▪ MDPROPVAL_MSF_DRILLUPLEVEL(0x00020000L) - The provider supports the function DRILLUPLEVEL. ▪ MDPROPVAL_MSF_PERIODSTODATE(0x0000010L) - The provider supports the function PERIODSTODATE. ▪ MDPROPVAL_MSF_LASTPERIODS(0x0000020L) - The provider supports the function LASTPERIODS. ▪ MDPROPVAL_MSF_YTD(0x00000040L) - The provider supports the function YTD. ▪ MDPROPVAL_MSF_QTD(0x00000080L) - The provider supports the function QTD. ▪ MDPROPVAL_MSF_MTD(0x00000100L) - The provider supports the function MTD. ▪ MDPROPVAL_MSF_WTD(0x00000200L) - The provider supports the function WTD. ▪ MDPROPVAL_MSF_TOGGLEDRIILLSTATE(0x00040000) - The provider supports |

| Name | Usage | Default value | Description |
|-----------------------|-------|---------------|---|
| | | | the TOGGLEDRILLSTATE function.<157> |
| MdpropMdxSlicer | Read | | <p>This property is equivalent to the OLE DB property MDPROP_MDX_SLICER. An enumeration value that indicates the capabilities available in the WHERE clause of an MDX statement. This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MS_SINGLETUPLE(0x0000002L) - The provider supports only one tuple in the WHERE clause. ▪ MDPROPVAL_MS_MULTIPLETUPLES(0x0000001L) - The provider supports more than one tuple in the WHERE clause.<158> |
| MdpropMdxStringCompop | Read | | <p>This property is equivalent to the OLE DB property MDPROP_MDX_STRING_COMPOP. A bitmask that indicates support for string comparison operators other than equals and not-equals operators. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MSC_LESSTHAN(0x00000001L) - The provider supports the less-than operator. ▪ MDPROPVAL_MSC_GREATERTHAN(0x00000002L) - The provider supports the greater-than operator. ▪ MDPROPVAL_MSC_LESSTHANEQUAL(0x00000004L) - The provider supports the less-than-or-equal-to operator. ▪ MDPROPVAL_MSC_GREATERTHANEQUAL(0x00000008L) - The provider supports the greater-than-or-equal-to operator.<159> |
| MdpropNamedLevels | Read | | <p>This property is equivalent to the OLE DB property MDPROP_NAMED_LEVELS. A bitmask that indicates support for named levels. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_NL_NAMEDLEVELST(0x00000001L) - The provider supports named levels. ▪ MDPROPVAL_NL_NUMBEREDLEVELS(0x00000002L) - The provider supports numbered levels using the LEVELS(n) function. ▪ MDPROPVAL_NL_SCHEMAONLY(0x00000004L) - The provider supports "dummy" named levels. These level names are for |

| Name | Usage | Default value | Description |
|-------------------------------|------------|---------------|--|
| | | | display only and are frequently just provider-generated names for a given level number. These names cannot be used in an MDX statement (such as in <level_name>.MEMBERS). These names appear in the LEVEL_NAME and LEVEL_UNIQUE_NAME columns of the schema rowset; providers can choose to have the same name in both the columns, or they can generate LEVEL_UNIQUE_NAME by appropriately qualifying the LEVEL_NAME. It is provider-specific whether these dummy names also appear in the LEVEL_UNIQUE_NAME column of the MEMBERS and PROPERTIES rowsets.<160> |
| MDXSupport | Read | Core | An enumeration value that specifies the degree of MDX support. This enumeration has only one value, "Core".<161> |
| DbpropMsmdMDXCompatibility | Read/Write | 0 | An enumeration value that determines how placeholder members in a ragged or unbalanced hierarchy are treated. This property can have one of the following values: <ul style="list-style-type: none"> ▪ 0 - This value is equivalent to 1. ▪ 1 - Hierarchies in role-playing dimensions receive a caption that includes the dimension name and the hierarchy name. The caption has the following format: [Dimension].[Hierarchy] ▪ Placeholder members are exposed. ▪ 2 - Hierarchies in role-playing dimensions receive a caption that includes the dimension name and the hierarchy name. The caption has the following format: [Dimension].[Hierarchy] ▪ Placeholder members are not exposed. ▪ 3 - Placeholder members are not exposed. |
| DbpropMsmdSQLCompatibility | Read/Write | 0 | Reserved for future use. |
| DbpropMsmdMDXUniqueName Style | Read/Write | 0 | A bitmask that determines the algorithm for generating the unique names of members in a dimension. This property can have a combination of zero or more of the following values: <ul style="list-style-type: none"> ▪ 0 - For compatibility with earlier versions of Analysis Services, this value is |

| Name | Usage | Default value | Description |
|---|------------|---------------|---|
| | | | <p>equivalent to 3.</p> <ul style="list-style-type: none"> ▪ 1 - Uses a key path algorithm that has the following format: [dim].&[key1].&[key2] Note In this algorithm, <i>dim</i> is the name of the dimension, and <i>key1</i> and <i>key2</i> are the attribute keys. ▪ 2 - Uses a name path algorithm that has the following format: [dim].[name1].&[name2] Note In this algorithm, <i>dim</i> is the name of the dimension, and <i>name1</i> and <i>name2</i> are the attribute names. ▪ 3 - Uses guaranteed unique names that are stable over time. |
| DbpropMsmdCachePolicy | Read/Write | | Reserved for future use. |
| DbpropMsmdCacheRatio | Read/Write | | Reserved for future use. |
| DbpropMsmdCacheMode | Read/Write | | Reserved for future use. |
| DbpropMsmdCompareCaseSensitiveStringFlags | Read/Write | 1 | <p>A bitmask that determines case-sensitive string comparison and sort order functionality. This property controls how comparisons are made in character sets that do not support uppercase and lowercase characters, such as Hindi and Japanese katakana. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ NORM_IGNORECASE(0x00000001) - Case is ignored. ▪ NORM_BINARY(0x00000002) - Binary comparison. Characters are compared based on their underlying value in the character set, not on their order in their particular alphabet. ▪ NORM_IGNORENONSPACE(0x00000010) - Nonspacing characters are ignored. ▪ NORM_IGNORESYMBOLS(0x00000100) - Symbols are ignored. ▪ NORM_IGNOREKANATYPE(0x00001000) - No differentiation is made between hiragana and katakana characters. When compared, corresponding hiragana and katakana characters are considered to be equal. |

| Name | Usage | Default value | Description |
|---|------------|---------------|---|
| | | | <ul style="list-style-type: none"> ▪ NORM_IGNOREWIDTH(0x00010000) - No differentiation is made between single-byte and double-byte versions of the same character. ▪ SORT_STRINGSORT(0x00100000) - Punctuation is treated the same as symbols. |
| DbpropMsmdCompareCaseNot SensitiveStringFlags | Read/Write | 69633 | <p>A bitmask that determines case-insensitive string comparison and sort order functionality. This property controls how comparisons are made in character sets that do not support uppercase and lowercase characters, such as Hindi and Japanese katakana. This property can have a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ NORM_IGNORECASE(0x00000001) - Case is ignored. ▪ NORM_BINARY(0x00000002) - Binary comparison. Characters are compared based on their underlying value in the character set, not on their order in their particular alphabet. ▪ NORM_IGNORENONSPACE(0x00000010) - Nonspacing characters are ignored. ▪ NORM_IGNORESYMBOLS(0x00000100) - Symbols are ignored. ▪ NORM_IGNOREKANATYPE(0x00001000) - No differentiation is made between hiragana and katakana characters. When compared, corresponding hiragana and katakana characters are considered to be equal. ▪ NORM_IGNOREWIDTH(0x00010000) - No differentiation is made between single-byte and double-byte versions of the same character. ▪ SORT_STRINGSORT(0x00100000) - Punctuation is treated the same as symbols. |
| DbpropMsmdFlattened2 | Read/Write | False | <p>A Boolean property that, when true, outputs all members of a parent-child hierarchy in a single table column in the flattened result, unless the parent-child hierarchy is requested on Axis 0; otherwise, false. The Level template for output columns is not used.</p> |
| DbpropInitMode | Read/Write | | <p>This property is a bitmask specifying access permissions, and is equivalent to the OLE DB property DBPROP_INIT_MODE.</p> <p>The only supported values for this property are DB_MODE_READWRITE (0x03) and DB_MODE_READ (0x01).<162></p> |

| Name | Usage | Default value | Description |
|----------------------|------------|---------------|--|
| SspropInitAppName | Read/Write | | The name of the client application. |
| SspropInitWsid | Read/Write | | The ID of the client workstation. |
| SspropInitPacketsize | Read/Write | | The ID of the client application. |
| ReadOnlySession | Read/Write | | Reserved for future use. |
| SecuredCellValue | Read/Write | 0 | <p>An integer enumeration that specifies the error code and the values for the Value and Formatted Value cell properties to be returned when a query tries to access a secured cell.</p> <p>This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ 0 - this value is the same as 1. ▪ 1 - The return Value property of the cell contains the result as a variant data type. The string "#N/A" is returned in the Formatted Value property. ▪ 2 - Returns an error in the Cell element for this cell, of the mddataset that is returned. ▪ 3 - Returns NULL in both the Value and Formatted Value properties. ▪ 4 - Returns a numeric zero (0) in the Value property and returns a formatted zero in the Formatted Value property. For example, 0.00 is returned in the Formatted Value property for a cell whose Format property is "#.##". ▪ 5 - Returns the string "#SEC" in both the Value and Formatted Value properties. |
| NonEmptyThreshold | Read/Write | | Reserved for future use. |
| SafetyOptions | Read/Write | 0 | <p>An enumeration value that determines whether unsafe libraries can be registered and loaded by client applications. This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_MSMD_SAFETY_OPTIONS_DEFAULT(0)- This value is treated as DBPROPVAL_MSMD_SAFETY_OPTIONS_ALLOW_SAFE. ▪ DBPROPVAL_MSMD_SAFETY_OPTIONS_ALLOW_ALL(1) -This value enables all user-defined function libraries without verifying that they are safe for |

| Name | Usage | Default value | Description |
|-----------------------------|------------|---------------|--|
| | | | <p>initialization and scripting.</p> <ul style="list-style-type: none"> ▪ DBPROPVAL_MSMD_SAFETY_OPTIONS_ALLOW_SAFE(2) -This value makes sure that all classes for a particular user-defined function library are checked to make sure that they are safe for initialization and scripting. ▪ DBPROPVAL_MSMD_SAFETY_OPTIONS_ALLOW_NONE(3) - This value prevents user-defined functions from being used during the session. |
| DbpropMsmdCacheRatio2 | Read/Write | | Reserved for future use. |
| DbpropMsmdUseFormulaCache | Read/Write | | Reserved for future use. |
| DbpropMsmdDynamicDebugLimit | Read/Write | | Reserved for future use. |
| DbpropMsmdDebugMode | Read/Write | | Reserved for future use. |
| Dialect | Read/Write | | <p>A server SHOULD attempt to deduce the command dialect from the content of the statement element. The dialect property establishes the dialect used in the following situations:</p> <ul style="list-style-type: none"> ▪ The dialect that the provider will use the first time that the provider tries to run a query. ▪ The dialect used to return execution errors as the result of query failures. ▪ The dialect that is used when it is ambiguous as to what dialect was used in the query. ▪ If the Dialect property is not set, query execution returns errors in the dialect last used. <p>The value of the Dialect property identifies the language used for expressing the statement. The value can be one of the following:</p> <ul style="list-style-type: none"> ▪ MDX ▪ DMX ▪ SQL |
| ImpactAnalysis | Write | False | When this Boolean is set to true, commands CREATE, ALTER, DELETE, and PROCESS will return a rowset that lists the objects that would be impacted if the command were |

| Name | Usage | Default value | Description |
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| | | | executed; otherwise, false. |
| SQLQueryMode | Read/Write | "Calculated" | An enumeration value that modifies the behavior of calculations which are included in SQL queries. This property can have one of the following values: <ul style="list-style-type: none"> Data - No calculations are included. Calculated - Calculations are returned. IncludeEmpty - Calculations and empty rows are returned. DataKeys - No calculations are included, and keys associated with columns instead of the key captions for the columns are returned. |
| ClientProcessID | Read/Write | 0 | The ID of the client process. |
| Cube | Write | Empty | The name of the cube that sets the context for the command. If the command itself contains a cube name, such as within the FROM clause of an MDX SELECT statement, the setting of this property is ignored. |
| ReturnCellProperties | Read/Write | False | A Boolean that, when true, indicates that cell properties are to be returned in query results; otherwise, false. |
| CommitTimeout | Write | 0 | An integer that determines how long, in seconds, the commit phase of a command waits for locks before rolling back. A value of zero (0) indicates that the instance waits indefinitely. |
| ForceCommitTimeout | Write | 0 | An integer that determines for how long, in seconds, the commit phase of a command waits before forcing previously issued commands to roll back. A value of zero (0) indicates that the instance waits indefinitely. |
| ExecutionMode | Write | "Execute" | Reserved for future use. |
| RealTimeOlap | Read/Write | False | A Boolean that, when set to true, indicates that all of the partitions that are listening for table notifications are queried in real time, bypassing caching; otherwise, false. |
| MdxMissingMemberMode | Write | "Default" | Indicates how missing members are handled in MDX statements. This property can have one of the following values: <ul style="list-style-type: none"> Default -Default behavior of the server. Error - Generate an error. Ignore - Always ignore missing members. |
| CustomData | Write | Empty | A string value that defines a value that will be |

| Name | Usage | Default value | Description |
|-----------------------------|------------|---------------|--|
| | | | returned by the customdata() MDX function. |
| MdpropMdxSubqueries | Read | | <p>A bitmask that indicates the level of support for subqueries in MDX. This property can have a combination of zero or more of the following values: <164></p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MSQ_BASIC (0x01) - Supports subselects without arbitrary shapes. ▪ MDPROPVAL_MSQ_ARBITRARYSHAPE (0x02) - Supports subselects with arbitrary shapes. ▪ MDPROPVAL_MSQ_NONVISUAL (0x04) - Supports subselects with NON VISUAL keyword. ▪ MDPROPVAL_MSQ_CALCMEMBERS (0x08) - Supports calc members in subselects. This option does not allow use of arbitrary shapes in a subselect. <165> ▪ MDPROPVAL_MSQ_CALCMEMBERS2 (0x10) - Supports calc members in subselects. This option includes support for arbitrary shapes in a subselect. <166> ▪ MDPROPVAL_MSQ_DRILLTHROUGH (0x20) - Supports drillthrough, which provides additional details regarding a calculation. <167> |
| DbpropMsmdeErrorMessageMode | Write | 2 | <p>If a cell security MDX expression does not return true or false, but in fact itself returns an error, the integer this property is set to controls what happens.</p> <p>If set to "2", the result returns the error message associated with the error that the evaluation of the cell security expression returns.</p> <p>If this property is set to any other value, the result is treated the same as if the cell security expression evaluated to false, and access to the cell data is denied.</p> <p>This property will be recognized only for administrator connections.</p> |
| DisablePrefetchFacts | Read/Write | False | <p>A Boolean that, when true, indicates to the server that it is to disable the prefetching of fact data when executing MDX queries; otherwise, false. By default, the server does prefetch fact data, so the default value for this property, false, leaves the server default in effect.</p> |
| UpdateIsolationLevel | Read/Write | 2 | <p>An enumeration value that specifies whether the cells in a single UPDATE CUBE are isolated from each other. When the property is set to isolated, the server evaluates each cell update without any consideration for the others,</p> |

| Name | Usage | Default value | Description |
|----------------------|------------|---------------|--|
| | | | <p>resulting in better performance.</p> <p>This property is a performance hint and is to be used with care. Specifying the property as isolated when the cells actually overlap can produce incorrect results.</p> <p>This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ 1 – Isolated ▪ 2 – Not isolated |
| MdpropMdxNamedSets | Read | 15 | <p>A bitmask that indicates the type of support for named sets. This property can be a combination of zero or more of the following values:</p> <ul style="list-style-type: none"> ▪ MDPROPVAL_MNS_BASIC (0x01) – Supports static named sets. ▪ MDPROPVAL_MNS_DYNAMIC (0x02) – Supports dynamic named sets. ▪ MDPROPVAL_MNS_DISPLAYFOLDER (0x04) – Supports specifying a display folder in a named set. ▪ MDPROPVAL_MNS_CAPTION (0x08) – Supports specifying a caption in a named set. |
| DbpropMsmdSubqueries | Read/Write | 0 | <p>An enumeration value that determines the behavior of subqueries. This property can have one of the following values:<168></p> <ul style="list-style-type: none"> ▪ 0 – Calculated members are not restricted by subselects. ▪ 1 – Calculated members are restricted by subselects. This value does not support arbitrary-shaped subselects. ▪ 2 – Calculated members are restricted by subselects. This value supports arbitrary-shaped subselects. |
| DbpropMsmdAutoExists | Read/Write | 0 | <p>Determines the behavior of autoexists. This property can have one of the following values:</p> <ul style="list-style-type: none"> ▪ 0 – Default value. ▪ 1 – Apply deep autoexists for query axes and named sets. Includes WHERE clauses and subselects. ▪ 2 – Apply deep autoexists for query axes and exclude named sets from autoexists. Includes WHERE clauses and subselects. ▪ 3 – Apply no autoexists for named sets |

| Name | Usage | Default value | Description |
|---------------------------------|------------|---------------|--|
| | | | with WHERE clause. Apply shallow autoexists for query axes with WHERE clause. Apply deep autoexists for query axes with subselects and named sets with subselects. |
| MdpropMdxDdlExtensions<169> | Read | | A bitmask that indicates one or more of the following:<170> <ul style="list-style-type: none"> ▪ DBPROPVAL_MDX_DDL_CREATECUBE (0x1). Create Cube is supported. ▪ DBPROPVAL_MDX_DDL_INSERTINTO (0x2). InsertInto is supported. ▪ DBPROPVAL_MDX_DDL_REFRESHCUBE (0x4). Refresh Cube is supported. ▪ DBPROPVAL_MDX_DLL_CREATESESSION CUBE (0x8). Create Session is supported. ▪ DBPROPVAL_MDX_DLL_CREATEGLOBALCUBE (0x10). Create Global Cube is supported. |
| ResponseEncoding<171> | Read/Write | "Default" | Specifies the character encoding to use for the server response to a client request. |
| MemoryLockingMode<172> | Read | | The server is able to achieve higher performance if it locks memory. However, users might not have permissions to lock memory. In this case, the server executes in a lower-performance, non-locking, mode. This integer indicates which mode is active: <ul style="list-style-type: none"> ▪ 0 – Low performance (non-locking) ▪ 1 – High performance (locking) |
| DbpropMsmdOptimizeResponse<173> | Read/Write | 0 | A bitmask that indicates which of the following query response optimizations are enabled. <ul style="list-style-type: none"> ▪ (0x01) – AXIS_NORMALIZATION – Use the msxmla:NormTupleSet complex type specified in section 2.2.4.1.1.2.1.1.6. ▪ (0x02) – EMPTYSLICERAXIS – The slicer axis in query responses does not contain information. ▪ (0x04) – BINARY_DATASET – Use the msxmla:NormAxis or the xmlds:CellSet complex type when applicable for query responses. |
| DbpropMsmdActivityID | Read/Write | | A string value that can be set by a client on a session to trace multiple query requests to the server.<174> |

| Name | Usage | Default value | Description |
|------------------------------|------------|---------------|--|
| DbpropMsmdRequestID | Read/Write | | A string value that can be set by a client on a session to correlate traces from multiple components.<175> |
| ReturnAffectedObjects | Read/Write | | <p>This property controls the result of the commands documented in [MS-SSAS-T]. This property is an integer that can be set to cause the current command to return the affected objects.<176></p> <p>The possible values are as follows.</p> <ul style="list-style-type: none"> ▪ -1 – This value can be set only when a transaction is active on the current session. The result of the command will contain all the objects that are affected by the command. ▪ >= 0 – This value represents the Base Version of the Tabular Metadata. The result will contain all the metadata objects that have been updated or deleted since the transactional state represented by that Version number. |
| DbpropMsmdRequestMemoryLimit | Read/Write | | This property is used to further constrain the memory allowed to be used for a request by the Memory\QueryMemoryLimit server property value (see section 2.2.4.2.2.2.1). The unit of measure is in kilobytes.<177> |
| ApplicationContext | Read/Write | | This property is provided by external applications and is used for end-to-end correlation of user activities.<178> |

3.1.4.2.2.1.3 Discover Request Types

One section follows for each of the enumerated request types. The title of each section is the name of the request type. Each section describes the request, specifies the restrictions, and specifies the columns in the rowset that is returned by the server.

Restrictions allow clients to filter **Discover** responses to only those that match the restriction. The client is responsible for ensuring restrictions are valid. For the columns that can be restricted on, only a single restriction is supported.

Restrictions might apply unless specifically stated otherwise in the description for a specific **Discover** request type. If any restrictions have default values, they will be explained for the specific **Discover** request type.

A **Discover** response can also contain an exception within the response if the server encounters an exception condition. For more information about the types that are allowed, see section 2.2.4.1.5.

For many schema rowsets, the result is sorted. When the indication is that the result is sorted by a particular column, the sort is by ascending order.

3.1.4.2.2.1.3.1 DBSCHEMA_CATALOGS

This schema rowset describes the catalogs that are accessible on the server.

3.1.4.2.2.1.3.1.1 Columns

The **DBSCHEMA_CATALOGS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------------------|-----------------|-------------|---|
| CATALOG_NAME | xsd:string | Yes | The catalog name. |
| DESCRIPTION | xsd:string | | The catalog description. |
| ROLES | xsd:string | | A comma-delimited list of roles to which the current user belongs.<179> |
| DATE_MODIFIED | xsd:dateTime | | The date that the catalog was last modified. |
| COMPATIBILITY_LEVEL | xsd:integer | | The compatibility level of the database. |
| TYPE | xsd:integer | | A mask with the following flags: <ul style="list-style-type: none"> (0x0) Multidimensional. If the other bits are not set, the database is a Multidimensional database. (0x1) TabularMetadata. The Tabular model is built by using Tabular metadata. (0x2) TabularModel. This is a Tabular model, including those built using Tabular or Multidimensional metadata. |
| VERSION | xsd:integer | | A database that uses Tabular Metadata will return the current version of the database. For more details, see [MS-SSAS-T]. Otherwise, the value will be 0. |
| DATABASE_ID | xsd:string | | The ID of the database object. |
| DATE_QUERIED | xsd:dateTime | | Unused. |
| CURRENTLY_USED | xsd:boolean | | Unused. |
| POPULARITY | xsd:float | | A measure of how frequently the database is used. The value is empty for the system tracker. |
| WEIGHTEDPOPULARITY | xsd:double | | A measure of how frequently the database is used, expressed as a fraction with respect to the other databases. The value is empty for the system tracker. |
| CLIENTCACHEREFRESHPOLICY | xsd:unsignedInt | | A hint to the client applications about when their data caches, if any, SHOULD<180> be refreshed after a Refresh command changes the data on the server. The possible values are as follows: <ul style="list-style-type: none"> 0 – Client applications are notified to refresh their caches only if a user query/interaction needs newer data. -1 (default) – Client applications are notified to allow all background cache refreshes. |

The rowset is sorted on CATALOG_NAME.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="ROLES" name="ROLES" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DATE_MODIFIED" name="DATE_MODIFIED" type="xsd:dateTime"
      minOccurs="0" />
    <xsd:element sql:field="COMPATIBILITY_LEVEL" name="COMPATIBILITY_LEVEL"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="TYPE" name="TYPE" type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="VERSION" name="VERSION" type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="DATABASE_ID" name="DATABASE_ID" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="DATE_QUERIED" name="DATE_QUERIED" type="xsd:dateTime"
      minOccurs="0" />
    <xsd:element sql:field="CURRENTLY_USED" name="CURRENTLY_USED" type="xsd:boolean"
      minOccurs="0" />
    <xsd:element sql:field="POPULARITY" name="POPULARITY" type="xsd:float"
      minOccurs="0" />
    <xsd:element sql:field="WEIGHTEDPOPULARITY" name="WEIGHTEDPOPULARITY"
      type="xsd:double" minOccurs="0" />
    <xsd:element sql:field="CLIENTCACHEREFRESHPOLICY" name="CLIENTCACHEREFRESHPOLICY"
      type="xsd:unsignedInt" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.2 DBSCHEMA_TABLES

This schema rowset returns dimensions, measure groups, or schema rowsets exposed as tables.

3.1.4.2.2.1.3.2.1 Columns

The **DBSCHEMA_TABLES** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------|------------|-------------|---|
| TABLE_CATALOG | xsd:string | Yes | The name of the database. |
| TABLE_SCHEMA | xsd:string | Yes | The name of the schema. |
| TABLE_NAME | xsd:string | Yes | The name of the table. |
| TABLE_TYPE<181> | xsd:string | Yes | The type of table: <ul style="list-style-type: none"> ▪ TABLE for measure group. ▪ SYSTEM TABLE for dimension. ▪ SCHEMA for schema rowset table. |

| Name | Type | Restriction | Description |
|----------------------|-----------------|-------------|---|
| TABLE_GUID | uuid | | The GUID of the table. |
| DESCRIPTION | xsd:string | | A description of the object. |
| TABLE_PROPID | xsd:unsignedInt | | The ID of the table. |
| DATE_CREATED | xsd:dateTime | | The date the table was created. |
| DATE_MODIFIED | xsd:dateTime | | The date the table was last modified. |
| TABLE_OLAP_TYPE<182> | xsd:string | Yes | The OLAP type of the object: <ul style="list-style-type: none"> CUBE_DIMENSION indicates that the object is a cube dimension. MEASURE_GROUP indicates that the object is a measure group. SCHEMA indicates that the object is a schema rowset table. |

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="TABLE_CATALOG" name="TABLE_CATALOG" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="TABLE_SCHEMA" name="TABLE_SCHEMA" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="TABLE_NAME" name="TABLE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="TABLE_TYPE" name="TABLE_TYPE" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="TABLE_GUID" name="TABLE_GUID" type="uuid" minOccurs="0" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="TABLE_PROPID" name="TABLE_PROPID" type="xsd:unsignedInt"
      minOccurs="0" />
    <xsd:element sql:field="DATE_CREATED" name="DATE_CREATED" type="xsd:dateTime"
      minOccurs="0" />
    <xsd:element sql:field="DATE_MODIFIED" name="DATE_MODIFIED" type="xsd:dateTime"
      minOccurs="0" />
    <xsd:element sql:field="TABLE_OLAP_TYPE" name="TABLE_OLAP_TYPE" type="xsd:string"
      minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.3 DBSCHEMA_COLUMNS

This schema rowset returns a row for each measure, each cube dimension attribute, and each schema rowset column, exposed as a column.

3.1.4.2.2.1.3.3.1 Columns

The **DBSCHEMA_COLUMNS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------------|-----------------|-------------|--|
| TABLE_CATALOG | xsd:string | Yes | The name of the database. |
| TABLE_SCHEMA | xsd:string | Yes | The name of the table schema. |
| TABLE_NAME | xsd:string | Yes | The name of the table. |
| COLUMN_NAME | xsd:string | Yes | The name of the attribute hierarchy or measure. |
| COLUMN_GUID | uuid | | The GUID of the column. |
| COLUMN_PROPID | xsd:unsignedInt | | The property ID of the column. |
| ORDINAL_POSITION | xsd:unsignedInt | | The column order for each constraint. |
| COLUMN_HAS_DEFAULT | xsd:boolean | | Indicates whether the column has a default. If true, the column has a default. If false, the column does not have a default.<183> |
| COLUMN_DEFAULT | xsd:string | | The default value of the column.<184> |
| COLUMN_FLAGS | xsd:unsignedInt | | <p>A bitmask that indicates column properties.</p> <ul style="list-style-type: none"> ▪ 0x1 - DBCOLUMNFLAGS_ISBOOKMARK – Set if the column is a bookmark. ▪ 0x2 - DBCOLUMNFLAGS_MAYDEFER – Set if the column is deferred. ▪ 0x4 - DBCOLUMNFLAGS_WRITE – Set if the OLEDB interface IRowsetChange:SetData can be called. ▪ 0x8 - DBCOLUMNFLAGS_WRITEUNKNOWN – Set if the column can be updated through some means, but the means is unknown. ▪ 0x10 - DBCOLUMNFLAGS_ISFIXEDLENGTH – Set if all data in the column has the same length. ▪ 0x20 - DBCOLUMNFLAGS_ISNULLABLE – Set if consumer can set the column to NULL or if the provider cannot determine if the column can be set to NULL. |

| Name | Type | Restriction | Description |
|--------------------------|-------------------|-------------|---|
| | | | <ul style="list-style-type: none"> ▪ 0x40 - DBCOLUMNFLAGS_MAYBENULL – Set if the column can contain NULL values, or if the provider cannot guarantee that the column cannot contain NULL values. ▪ 0x80 - DBCOLUMNFLAGS_ISLONG – Set if the column contains a BLOB that contains very long data. ▪ 0x100 - DBCOLUMNFLAGS_ISROWID – Set if the column contains a persistent row identifier that cannot be written to and has no meaningful value except to identify the row. ▪ 0x200 - DBCOLUMNFLAGS_ISROWVER – Set if the column contains a timestamp or other versioning mechanism that cannot be written to directly and that is automatically updated to a new increasing value when the row is updated or committed. ▪ 0x1000 - DBCOLUMNFLAGS_CACHEDDEFERRED – Set if when a deferred column is first read its value the column is cached by the provider. |
| IS_NULLABLE | xsd:boolean | | Indicates whether the column is nullable.<185> If true, indicates that the column is nullable. Otherwise, false. |
| DATA_TYPE | xsd:unsignedShort | | The data type of the column. Returns a string for dimension columns and a variant for measures. |
| TYPE_GUID | uuid | | The GUID of the column's data type. |
| CHARACTER_MAXIMUM_LENGTH | xsd:unsignedInt | | The maximum possible length of a value in the column, expressed as the number of wide characters. |
| CHARACTER_OCTET_LENGTH | xsd:unsignedInt | | The maximum length in octets (bytes) of the column, if the type of the column is character or binary. A value of zero means that the column has no maximum length. NULL for all other types of columns. |
| NUMERIC_PRECISION | xsd:unsignedShort | | The maximum precision of the column if the column's data type is of a numeric data type other than DBTYPE_VARNUMERIC. |
| NUMERIC_SCALE | xsd:short | | The number of digits to the right of the decimal point if the column's type indicator is DBTYPE_DECIMAL, DBTYPE_NUMERIC, or DBTYPE_VARNUMERIC. Otherwise, this is |

| Name | Type | Restriction | Description |
|-----------------------|-----------------|-------------|--|
| | | | NULL.<186> |
| DATETIME_PRECISION | xsd:unsignedInt | | The date/time precision (number of digits in the fractional seconds portion) of the column if the column is a DateTime or Interval type. |
| CHARACTER_SET_CATALOG | xsd:string | | The catalog name. NULL if the provider does not support catalogs. |
| CHARACTER_SET_SCHEMA | xsd:string | | The unqualified schema name. NULL if the provider does not support schemas.<187> |
| CHARACTER_SET_NAME | xsd:string | | The character set name. |
| COLLATION_CATALOG | xsd:string | | The catalog name in which the collation is defined. NULL if the provider does not support catalogs or different collations. |
| COLLATION_SCHEMA | xsd:string | | The unqualified schema name in which the collation is defined. NULL if the provider does not support schemas or different collations. |
| COLLATION_NAME | xsd:string | | The collation name. NULL if the server does not support different collations. |
| DOMAIN_CATALOG | xsd:string | | The catalog name in which the domain is defined. NULL if the server does not support catalogs or domains. |
| DOMAIN_SCHEMA | xsd:string | | The unqualified schema name in which the domain is defined. NULL if the server does not support schemas or domains. |
| DOMAIN_NAME | xsd:string | | The domain name. NULL if the server does not support domains. |
| DESCRIPTION | xsd:string | | The human-readable description of the column. For example, the description for a column that is named Name in the Employee table might be "Employee name." NULL if this column is not supported by the server, or if there is no description associated with the column. |
| COLUMN_OLAP_TYPE | xsd:string | Yes | The OLAP type of the object: MEASURE indicates that the object is a measure. ATTRIBUTE indicates that the object is a dimension attribute. SCHEMA indicates that the object is a column in a schema rowset table. |

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

```

    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="TABLE_CATALOG" name="TABLE_CATALOG" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="TABLE_SCHEMA" name="TABLE_SCHEMA" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="TABLE_NAME" name="TABLE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="COLUMN_NAME" name="COLUMN_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="COLUMN_GUID" name="COLUMN_GUID" type="uuid"
      minOccurs="0" />
    <xsd:element sql:field="COLUMN_PROPID" name="COLUMN_PROPID" type="xsd:unsignedInt"
      minOccurs="0" />
    <xsd:element sql:field="ORDINAL_POSITION" name="ORDINAL_POSITION"
      type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="COLUMN_HAS_DEFAULT" name="COLUMN_HAS_DEFAULT"
      type="xsd:boolean" minOccurs="0" />
    <xsd:element sql:field="COLUMN_DEFAULT" name="COLUMN_DEFAULT" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="COLUMN_FLAGS" name="COLUMN_FLAGS" type="xsd:unsignedInt"
      minOccurs="0" />
    <xsd:element sql:field="IS_NULLABLE" name="IS_NULLABLE" type="xsd:boolean"
      minOccurs="0" />
    <xsd:element sql:field="DATA_TYPE" name="DATA_TYPE" type="xsd:unsignedShort"
      minOccurs="0" />
    <xsd:element sql:field="TYPE_GUID" name="TYPE_GUID" type="uuid" minOccurs="0" />
    <xsd:element sql:field="CHARACTER_MAXIMUM_LENGTH" name="CHARACTER_MAXIMUM_LENGTH"
      type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="CHARACTER_OCTET_LENGTH" name="CHARACTER_OCTET_LENGTH"
      type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="NUMERIC_PRECISION" name="NUMERIC_PRECISION"
      type="xsd:unsignedShort" minOccurs="0" />
    <xsd:element sql:field="NUMERIC_SCALE" name="NUMERIC_SCALE" type="xsd:short"
      minOccurs="0" />
    <xsd:element sql:field="DATETIME_PRECISION" name="DATETIME_PRECISION"
      type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="CHARACTER_SET_CATALOG" name="CHARACTER_SET_CATALOG"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CHARACTER_SET_SCHEMA" name="CHARACTER_SET_SCHEMA"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CHARACTER_SET_NAME" name="CHARACTER_SET_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="COLLATION_CATALOG" name="COLLATION_CATALOG"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="COLLATION_SCHEMA" name="COLLATION_SCHEMA" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="COLLATION_NAME" name="COLLATION_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="DOMAIN_CATALOG" name="DOMAIN_CATALOG" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="DOMAIN_SCHEMA" name="DOMAIN_SCHEMA" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="DOMAIN_NAME" name="DOMAIN_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="COLUMN_OLAP_TYPE" name="COLUMN_OLAP_TYPE" type="xsd:string"
      minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

</xsd:complexType>

3.1.4.2.2.1.3.4 DBSCHEMA_PROVIDER_TYPES

This schema rowset identifies the (base) data types supported by the server.

3.1.4.2.2.1.3.4.1 Columns

The **DBSCHEMA_PROVIDER_TYPES** rowset contains the following columns.

| Name | Type | Restriction | Description |
|----------------|-------------------|-------------|---|
| TYPE_NAME | xsd:string | | The server-specific data type name.<188> |
| DATA_TYPE | xsd:unsignedShort | Yes | This enumeration is the same as LEVEL_DBTYPE for MDSHEMA_LEVELS . (See section 3.1.4.2.2.1.3.8) |
| COLUMN_SIZE | xsd:unsignedInt | | The length of a non-numeric column or parameter that refers to either the maximum or the length defined for this type by the server. For character data, this is the maximum or defined length in characters. For DateTime data types, this is the length of the string representation (assuming the maximum allowed precision of the fractional second component). If the data type is numeric, this is the upper bound on the maximum precision of the data type. |
| LITERAL_PREFIX | xsd:string | | The character or characters used to prefix a literal of this type in a text command. |
| LITERAL_SUFFIX | xsd:string | | The character or characters used to suffix a literal of this type in a text command. |
| CREATE_PARAMS | xsd:string | | The creation parameters specified by the consumer when creating a column of this data type. For example, the SQL DECIMAL data type needs a precision and a scale. In this case, the creation parameters might be the string "precision,scale". In a text command to create a DECIMAL column with a precision of 10 and a scale of 2, the value of the TYPE_NAME column might be DECIMAL(), and the complete type specification would be DECIMAL(10,2). The creation parameters appear as a comma-separated list of values, in the order they are to be supplied and with no surrounding parentheses. If a creation parameter is length, maximum length, precision, scale, seed, or increment, use "length", "max length", "precision", "scale", "seed", and "increment", respectively. If the creation parameter is some other value, the server determines what text is to be used to describe the creation parameter. If the data type requires creation parameters, "(" usually appears in the type name. This indicates the position at which to insert the creation parameters. If the type name does not include "()", the creation parameters are enclosed in parentheses and appended to the data type name. |

| Name | Type | Restriction | Description |
|--------------------|-----------------|-------------|---|
| IS_NULLABLE | xsd:boolean | | <p>A Boolean that indicates whether the data type is nullable.</p> <ul style="list-style-type: none"> True indicates that the data type is nullable. False indicates that the data type is not nullable. NULL indicates that it is not known whether the data type is nullable.<189> |
| CASE_SENSITIVE | xsd:boolean | | <p>A Boolean that indicates whether the data type is a character type and case-sensitive.</p> <ul style="list-style-type: none"> True indicates that the data type is a character type and is case-sensitive. False indicates that the data type is not case-sensitive. NULL indicates that the data type is not a character type. |
| SEARCHABLE | xsd:unsignedInt | | <p>An integer indicating how the data type can be used in searches if the server supports ICommandText; otherwise, NULL.</p> <p>If the server supports ICommandText, then this column can have the following values:</p> <ul style="list-style-type: none"> DB_UNSEARCHABLE (0x01) - indicates that the data type cannot be used in a WHERE clause. DB_LIKE_ONLY (0x02) - indicates that the data type can be used in a WHERE clause only with the LIKE predicate. DB_ALL_EXCEPT_LIKE (0x03) - indicates that the data type can be used in a WHERE clause with all comparison operators except LIKE. DB_SEARCHABLE (0x04) - indicates that the data type can be used in a WHERE clause with any comparison operator.<190> |
| UNSIGNED_ATTRIBUTE | xsd:boolean | | <p>A Boolean that indicates whether the data type is unsigned.</p> <ul style="list-style-type: none"> True indicates that the data type is unsigned. False indicates that the data type is signed. NULL indicates that this is not applicable to the data type. |
| FIXED_PREC_SCALE | xsd:boolean | | <p>A Boolean that indicates whether the data type has a fixed precision and scale.</p> <ul style="list-style-type: none"> True indicates that the data type has a fixed precision and scale. |

| Name | Type | Restriction | Description |
|-------------------|-------------|-------------|--|
| | | | <ul style="list-style-type: none"> False indicates that the data type does not have a fixed precision and scale.<191> |
| AUTO_UNIQUE_VALUE | xsd:boolean | | <p>A Boolean that indicates whether the data type can be autoincrementing.</p> <ul style="list-style-type: none"> True indicates that values of this type can be autoincrementing. False indicates that values of this type cannot be autoincrementing. If this value is true, the server's DBPROP_COL_AUTOINCREMENT column property determines whether a column of this type is always autoincrementing. If the DBPROP_COL_AUTOINCREMENT property is read/write, the setting of the DBPROP_COL_AUTOINCREMENT property determines whether a column of this type is autoincrementing. If DBPROP_COL_AUTOINCREMENT is a read-only property, either all or none of the columns of this type are autoincrementing.<192> |
| LOCAL_TYPE_NAME | xsd:string | | The localized version of TYPE_NAME. NULL is returned if a localized name is not supported by the server. |
| MINIMUM_SCALE | xsd:short | | If the type indicator is DBTYPE_VARNUMERIC, DBTYPE_DECIMAL, or DBTYPE_NUMERIC, this column specifies the minimum number of digits allowed to the right of the decimal point. Otherwise, it is NULL. |
| MAXIMUM_SCALE | xsd:short | | If the type indicator is DBTYPE_VARNUMERIC, DBTYPE_DECIMAL, or DBTYPE_NUMERIC, this column specifies the maximum number of digits allowed to the right of the decimal point. Otherwise, it is NULL. |
| GUID | uuid | | (Reserved for future use.) The GUID of the type, if the type is described in a type library. Otherwise, it is NULL. |
| TYPELIB | xsd:string | | The type library that contains the description of the type, if the type is described in a type library. Otherwise, it is NULL. |
| VERSION | xsd:string | | The version of the type definition. Servers might request to create different versions of type definitions. Different servers might use different versioning schemes, such as a timestamp or a number (Integer or Float). NULL if not supported. |
| IS_LONG | xsd:boolean | | <p>A Boolean that indicates whether the data type is a binary large object (BLOB) and has very long data.</p> <ul style="list-style-type: none"> True indicates that the data type is a BLOB that contains very long data; the definition of very long data is server-specific.<193> |

| Name | Type | Restriction | Description |
|----------------|-------------|-------------|---|
| | | | <ul style="list-style-type: none"> False indicates that the data type is a BLOB that does not contain very long data or that is not a BLOB. <p>This column value determines the setting of the DBCOLUMNFLAGS_ISLONG flag that is returned by GetColumnInfo in IColumnsInfo and the setting of the DBCOLUMNFLAGS_ISLONG flag that is returned by GetParameterInfo in ICommandWithParameters.</p> |
| BEST_MATCH | xsd:boolean | Yes<194> | <p>A Boolean that indicates whether the data type is the best match.</p> <p>A value of true indicates that the data type is the best match between all data types in the data store and the OLE DB data type that is indicated by the value in the DATA_TYPE column. For more information, see [MSDN-OLEDB].</p> <p>A value of false indicates that the data type is not the best match.</p> <p>For each set of rows in which the value of the DATA_TYPE column is the same, the BEST_MATCH column is set to true in only one row.<195></p> |
| IS_FIXEDLENGTH | xsd:boolean | | <p>A Boolean that indicates whether the column is fixed in length.</p> <p>A value of true indicates that columns of this type that are created by the DDL will be of fixed length.</p> <p>A value of false indicates that columns of this type that are created by the DDL will be of variable length.</p> <p>If the field is NULL, it is not known whether the server will map this field with a fixed-length or variable-length column.</p> |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="TYPE_NAME" name="TYPE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="DATA_TYPE" name="DATA_TYPE" type="xsd:unsignedShort"
      minOccurs="0" />
    <xsd:element sql:field="COLUMN_SIZE" name="COLUMN_SIZE" type="xsd:unsignedInt"
      minOccurs="0" />
    <xsd:element sql:field="LITERAL_PREFIX" name="LITERAL_PREFIX" type="xsd:string"
  
```

```

        minOccurs="0" />
<xsd:element sql:field="LITERAL_SUFFIX" name="LITERAL_SUFFIX" type="xsd:string"
minOccurs="0" />
<xsd:element sql:field="CREATE_PARAMS" name="CREATE_PARAMS" type="xsd:string"
minOccurs="0" />
<xsd:element sql:field="IS_NULLABLE" name="IS_NULLABLE" type="xsd:boolean"
minOccurs="0" />
<xsd:element sql:field="CASE_SENSITIVE" name="CASE_SENSITIVE" type="xsd:boolean"
minOccurs="0" />
<xsd:element sql:field="SEARCHABLE" name="SEARCHABLE" type="xsd:unsignedInt"
minOccurs="0" />
<xsd:element sql:field="UNSIGNED_ATTRIBUTE" name="UNSIGNED_ATTRIBUTE"
type="xsd:boolean" minOccurs="0" />
<xsd:element sql:field="FIXED_PREC_SCALE" name="FIXED_PREC_SCALE"
type="xsd:boolean" minOccurs="0" />
<xsd:element sql:field="AUTO_UNIQUE_VALUE" name="AUTO_UNIQUE_VALUE"
type="xsd:boolean" minOccurs="0" />
<xsd:element sql:field="LOCAL_TYPE_NAME" name="LOCAL_TYPE_NAME" type="xsd:string"
minOccurs="0" />
<xsd:element sql:field="MINIMUM_SCALE" name="MINIMUM_SCALE" type="xsd:short"
minOccurs="0" />
<xsd:element sql:field="MAXIMUM_SCALE" name="MAXIMUM_SCALE" type="xsd:short"
minOccurs="0" />
<xsd:element sql:field="GUID" name="GUID" type="uuid" minOccurs="0" />
<xsd:element sql:field="TYPELIB" name="TYPELIB" type="xsd:string" minOccurs="0" />
<xsd:element sql:field="VERSION" name="VERSION" type="xsd:string" minOccurs="0" />
<xsd:element sql:field="IS_LONG" name="IS_LONG" type="xsd:boolean" minOccurs="0" />
<xsd:element sql:field="BEST_MATCH" name="BEST_MATCH" type="xsd:boolean"
minOccurs="0" />
<xsd:element sql:field="IS_FIXEDLENGTH" name="IS_FIXEDLENGTH" type="xsd:boolean"
minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.5 MDSHEMA_CUBES

This schema rowset describes the structure of cubes within a database. Perspectives are also returned in this schema.

3.1.4.2.2.1.3.5.1 Columns

The **MDSHEMA_CUBES** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------------|--------------|-------------|--|
| CATALOG_NAME | xsd:string | Yes | The catalog name. |
| SCHEMA_NAME | xsd:string | Yes | The name of the schema.<196> |
| CUBE_NAME | xsd:string | Yes | The name of the cube. |
| CUBE_TYPE | xsd:string | | The type of the cube. Valid values are: <ul style="list-style-type: none"> ▪ CUBE ▪ DIMENSION |
| CUBE_GUID | uuid | | The GUID of the cube. |
| CREATED_ON | xsd:dateTime | | The date and time the cube was created.<197> |
| LAST_SCHEMA_UPDATE | xsd:dateTime | | The date and time that the cube schema |

| Name | Type | Restriction | Description |
|--------------------------|-------------------|-------------|---|
| | | | was last updated. |
| SCHEMA_UPDATED_BY | xsd:string | | The name of the user who last updated the cube's schema.<198> |
| LAST_DATA_UPDATE | xsd:dateTime | | The date and time that the cube was last processed. |
| DATA_UPDATED_BY | xsd:string | | The name of the user who last updated the data of the cube.<199> |
| DESCRIPTION | xsd:string | | A description of the cube. |
| IS_DRILLTHROUGH_ENABLED | xsd:boolean | | When true, indicates that the cube has drillthrough enabled; otherwise, false.<200> |
| IS_LINKABLE | xsd:boolean | | When true, indicates that the cube can be used in a linked cube; otherwise false. |
| IS_WRITE_ENABLED | xsd:boolean | | When true, indicates that the cube is write-enabled; otherwise false. |
| IS_SQL_ENABLED | xsd:boolean | | When true, indicates that SQL can be used on the cube; otherwise false. |
| CUBE_CAPTION | xsd:string | | The caption of the cube. |
| BASE_CUBE_NAME | xsd:string | Yes | The name of the source cube if this cube is a perspective cube. |
| CUBE_SOURCE | xsd:unsignedShort | Yes | A bitmask with one of these valid values: <ul style="list-style-type: none"> 0x01-Cube 0x02-Dimension<201> |
| PREFERRED_QUERY_PATTERNS | xsd:unsignedShort | No | A bitmask<202> that describes query pattern client applications can utilize for higher performance. Valid values are: <ul style="list-style-type: none"> 0x00 – Use CrossJoin function to create symmetric sets on an axis. This is the default value for the 0th bit when Analysis Services is running in Traditional mode. 0x01 – Use DrillDownMember to create a more restrictive, asymmetric axis. This is the default value for the 0th bit when a server that is running Analysis Services is running in VertiPaq mode. |

The rowset is sorted on CATALOG_NAME, SCHEMA_NAME, and CUBE_NAME.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
```

```

        <xsd:element name="row" type="row" />
    </xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
    <xsd:restriction base="xsd:string">
        <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-
            [0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
    </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
    <xsd:sequence>
        <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string" />
        <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string"
            minOccurs="0" />
        <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string"
            minOccurs="0" />
        <xsd:element sql:field="CUBE_TYPE" name="CUBE_TYPE" type="xsd:string"
            minOccurs="0" />
        <xsd:element sql:field="CUBE_GUID" name="CUBE_GUID" type="uuid" minOccurs="0" />
        <xsd:element sql:field="CREATED_ON" name="CREATED_ON" type="xsd:dateTime"
            minOccurs="0" />
        <xsd:element sql:field="LAST_SCHEMA_UPDATE" name="LAST_SCHEMA_UPDATE"
            type="xsd:dateTime" minOccurs="0" />
        <xsd:element sql:field="SCHEMA_UPDATED_BY" name="SCHEMA_UPDATED_BY"
            type="xsd:string" minOccurs="0" />
        <xsd:element sql:field="LAST_DATA_UPDATE" name="LAST_DATA_UPDATE"
            type="xsd:dateTime" minOccurs="0" />
        <xsd:element sql:field="DATA_UPDATED_BY" name="DATA_UPDATED_BY"
            type="xsd:string" minOccurs="0" />
        <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
            minOccurs="0" />
        <xsd:element sql:field="IS_DRILLTHROUGH_ENABLED" name="IS_DRILLTHROUGH_ENABLED"
            type="xsd:boolean" minOccurs="0" />
        <xsd:element sql:field="IS_LINKABLE" name="IS_LINKABLE" type="xsd:boolean"
            minOccurs="0" />
        <xsd:element sql:field="IS_WRITE_ENABLED" name="IS_WRITE_ENABLED"
            type="xsd:boolean" minOccurs="0" />
        <xsd:element sql:field="IS_SQL_ENABLED" name="IS_SQL_ENABLED" type="xsd:boolean"
            minOccurs="0" />
        <xsd:element sql:field="CUBE_CAPTION" name="CUBE_CAPTION" type="xsd:string"
            minOccurs="0" />
        <xsd:element sql:field="BASE_CUBE_NAME" name="BASE_CUBE_NAME" type="xsd:string"
            minOccurs="0" />
        <xsd:element sql:field="CUBE_SOURCE" name="CUBE_SOURCE" type="xsd:unsignedShort"
            minOccurs="0" />
        <xsd:element sql:field="PREFERRED_QUERY_PATTERNS"
            name="PREFERRED_QUERY_PATTERNS"
            type="xsd:unsignedShort" minOccurs="0" />
    </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.6 MDSHEMA_DIMENSIONS

This schema rowset describes the dimensions within a database.

3.1.4.2.2.1.3.6.1 Columns

The **MDSHEMA_DIMENSIONS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------|------------|-------------|------------------------------|
| CATALOG_NAME | xsd:string | Yes | The name of the database. |
| SCHEMA_NAME | xsd:string | Yes | The name of the schema.<203> |

| Name | Type | Restriction | Description |
|---------------------------|-----------------|-------------|--|
| CUBE_NAME | xsd:string | Yes | The name of the cube. |
| DIMENSION_NAME | xsd:string | Yes | The name of the dimension. |
| DIMENSION_UNIQUE_NAME | xsd:string | Yes | The unique name of the dimension. |
| DIMENSION_GUID | uuid | | The GUID of the dimension. |
| DIMENSION_CAPTION | xsd:string | | The caption of the dimension. |
| DIMENSION_ORDINAL | xsd:unsignedInt | | The position of the dimension within the cube. |
| DIMENSION_TYPE | xsd:short | | The type of the dimension. Valid values are: <ul style="list-style-type: none"> ▪ 0 - UNKNOWN ▪ 1 - TIME ▪ 2 - MEASURE ▪ 3 - OTHER ▪ 5 - QUANTITATIVE ▪ 6- ACCOUNTS ▪ 7 - CUSTOMERS ▪ 8- PRODUCTS ▪ 9 - SCENARIO ▪ 10- UTILITY ▪ 11 - CURRENCY ▪ 12 - RATES ▪ 13 - CHANNEL ▪ 14 - PROMOTION ▪ 15 - ORGANIZATION ▪ 16 - BILL OF MATERIALS ▪ 17 - GEOGRAPHY |
| DIMENSION_CARDINALITY | xsd:unsignedInt | | The number of members in the key attribute. |
| DEFAULT_HIERARCHY | xsd:string | | The default hierarchy of the dimension. |
| DESCRIPTION | xsd:string | | A description of the dimension. |
| IS_VIRTUAL | xsd:boolean | | When true, indicates that the dimension is virtual; otherwise false.<204> |
| IS_READWRITE | xsd:boolean | | When true, indicates that the dimension is write-enabled; otherwise false. |
| DIMENSION_UNIQUE_SETTINGS | xsd:int | | A bitmask that specifies which columns |

| Name | Type | Restriction | Description |
|-----------------------|-------------|-------------|--|
| | | | contain unique values: <ul style="list-style-type: none"> 0x00000001 - Member key columns establish uniqueness. 0x00000002 - Member name columns establish uniqueness. |
| DIMENSION_MASTER_NAME | xsd:string | | The name of the master dimension. |
| DIMENSION_IS_VISIBLE | xsd:boolean | | When true, indicates that the dimension is visible in a client application; otherwise false. |

The rowset is sorted on CATALOG_NAME, CUBE_NAME, and DIMENSION_NAME.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_NAME" name="DIMENSION_NAME" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_UNIQUE_NAME" name="DIMENSION_UNIQUE_NAME" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_GUID" name="DIMENSION_GUID" type="uuid" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_CAPTION" name="DIMENSION_CAPTION" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_ORDINAL" name="DIMENSION_ORDINAL" type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_TYPE" name="DIMENSION_TYPE" type="xsd:short" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_CARDINALITY" name="DIMENSION_CARDINALITY" type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="DEFAULT_HIERARCHY" name="DEFAULT_HIERARCHY" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="IS_VIRTUAL" name="IS_VIRTUAL" type="xsd:boolean" minOccurs="0" />
    <xsd:element sql:field="IS_READWRITE" name="IS_READWRITE" type="xsd:boolean" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_UNIQUE_SETTINGS" name="DIMENSION_UNIQUE_SETTINGS" type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_MASTER_NAME" name="DIMENSION_MASTER_NAME"

```

```

        type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_IS_VISIBLE" name="DIMENSION_IS_VISIBLE"
        type="xsd:boolean" minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.6.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|----------------------|-------------------|---|
| CUBE_SOURCE | xsd:unsignedShort | A bitmask with one of these valid values: <ul style="list-style-type: none"> 0x01 - Cube 0x02 - Dimension<205> The default restriction is a value of 1. |
| DIMENSION_VISIBILITY | xsd:unsignedShort | A bitmask with one of these valid values: <ul style="list-style-type: none"> 0x01 - Visible 0x02 - Not Visible The default restriction is a value of 1. |

3.1.4.2.2.1.3.7 MDSHEMA_HIERARCHIES

This schema rowset describes each hierarchy within a particular dimension.

3.1.4.2.2.1.3.7.1 Columns

The **MDSHEMA_HIERARCHIES** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------------|------------|-------------|--|
| CATALOG_NAME | xsd:string | Yes | The name of the database. |
| SCHEMA_NAME | xsd:string | Yes | The name of the schema.<206> |
| CUBE_NAME | xsd:string | Yes | The name of the cube. |
| DIMENSION_UNIQUE_NAME | xsd:string | Yes | The unique name of the dimension.<207> |
| HIERARCHY_NAME | xsd:string | Yes | The name of the hierarchy. This column MAY<208> be blank if there is only a single hierarchy in the dimension. |
| HIERARCHY_UNIQUE_NAME | xsd:string | Yes | The unique name of the hierarchy. |
| HIERARCHY_GUID | uuid | | The GUID of the hierarchy. |
| HIERARCHY_CAPTION | xsd:string | | The caption of the hierarchy. |
| DIMENSION_TYPE | xsd:short | | The type of the dimension. |

| Name | Type | Restriction | Description |
|-----------------------|-----------------|-------------|--|
| | | | <ul style="list-style-type: none"> ▪ 0 - UNKNOWN ▪ 1 - TIME ▪ 2 - MEASURE ▪ 3 - OTHER ▪ 5 - QUANTITATIVE ▪ 6 - ACCOUNTS ▪ 7 - CUSTOMERS ▪ 8 - PRODUCTS ▪ 9 - SCENARIO ▪ 10 - UTILITY ▪ 11 - CURRENCY ▪ 12 - RATES ▪ 13 - CHANNEL ▪ 14 - PROMOTION ▪ 15 - ORGANIZATION ▪ 16 - BILL_OF_MATERIALS ▪ 17 - GEOGRAPHY |
| HIERARCHY_CARDINALITY | xsd:unsignedInt | | The number of members in the hierarchy. |
| DEFAULT_MEMBER | xsd:string | | The default member for this hierarchy. |
| ALL_MEMBER | xsd:string | | The member name at the highest level of the hierarchy. |
| DESCRIPTION | xsd:string | | A description of the hierarchy. |
| STRUCTURE | xsd:short | | <p>The structure of the hierarchy. Valid values are defined in the following table.</p> <ul style="list-style-type: none"> ▪ 0 - Hierarchy is a fully balanced structure. ▪ 1 - Hierarchy is a ragged balanced structure. ▪ 2 - Hierarchy is an unbalanced structure. ▪ 3 - Hierarchy is a network structure. <p>For more information, see the definitions for balanced hierarchy</p> |

| Name | Type | Restriction | Description |
|------------------------------|-------------------|-------------|--|
| | | | and unbalanced hierarchy in section 1.1. |
| IS_VIRTUAL | xsd:boolean | | When true, indicates that the hierarchy is a virtual hierarchy; otherwise false.<209> |
| IS_READWRITE | xsd:boolean | | When true, indicates that write back to the hierarchy is enabled; otherwise false. |
| DIMENSION_UNIQUE_SETTINGS | xsd:int | | A list of values that specifies which columns contain unique values:<210> <ul style="list-style-type: none"> ▪ 0x00000001 - Member key columns establish uniqueness. ▪ 0x00000002 - Member name columns establish uniqueness. |
| DIMENSION_MASTER_UNIQUE_NAME | xsd:string | | The unique name of the master dimension.<211> |
| DIMENSION_IS_VISIBLE | xsd:boolean | | When true, indicates that the dimension is visible; otherwise false.<212> |
| HIERARCHY_ORDINAL | xsd:unsignedInt | | The ordinal number of the hierarchy across all hierarchies of the dimension. |
| DIMENSION_IS_SHARED | xsd:boolean | | When true, indicates that the dimension is shared; otherwise false.<213> |
| HIERARCHY_IS_VISIBLE | xsd:boolean | | When true, indicates that the hierarchy is visible; otherwise false. |
| HIERARCHY_ORIGIN | xsd:unsignedShort | Yes | A bitmask that determines the source of the hierarchy. <ul style="list-style-type: none"> ▪ 0x0001 - Identifies user-defined hierarchies. ▪ 0x0002 - Identifies attribute hierarchies. ▪ 0x0004 - Identifies key attribute hierarchies. ▪ 0x0008 - Identifies attributes with no attribute hierarchies. ▪ 0x0003 - The default restriction value. |
| HIERARCHY_DISPLAY_FOLDER | xsd:string | | Display folder for the hierarchy. |
| INSTANCE_SELECTION | xsd:unsignedShort | | A list of values that provides a hint to the client application about how to display the hierarchy values. Valid |

| Name | Type | Restriction | Description |
|-------------------|-------------------|-------------|--|
| | | | <p>values include the following:</p> <ul style="list-style-type: none"> ▪ 0 - NONE (No hint is suggested.) ▪ 1 - DROPDOWN type of display is suggested. ▪ 2 - LIST type of display is suggested. ▪ 3 - FILTERED LIST type of display is suggested. ▪ 4 - MANDATORY FILTER type of display is suggested |
| GROUPING_BEHAVIOR | xsd:unsignedShort | | <p>Recommends to client applications how to build queries within the hierarchy. Valid values include the following:</p> <ul style="list-style-type: none"> ▪ 1 - Client applications are encouraged to group by each member of the hierarchy. ▪ 2 - Client applications are discouraged from grouping by each member of the hierarchy. |
| STRUCTURE_TYPE | xsd:string | | <p>Indicates the type of hierarchy. Valid values include the following:</p> <ul style="list-style-type: none"> ▪ Natural ▪ Unnatural ▪ Unknown |

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME"
      type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```



```

<xsd:element sql:field="DIMENSION_UNIQUE_NAME" name="DIMENSION_UNIQUE_NAME"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="HIERARCHY_NAME" name="HIERARCHY_NAME"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="HIERARCHY_UNIQUE_NAME" name="HIERARCHY_UNIQUE_NAME"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="HIERARCHY_GUID" name="HIERARCHY_GUID"
  type="uuid" minOccurs="0" />
<xsd:element sql:field="HIERARCHY_CAPTION" name="HIERARCHY_CAPTION"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DIMENSION_TYPE" name="DIMENSION_TYPE"
  type="xsd:short" minOccurs="0" />
<xsd:element sql:field="HIERARCHY_CARDINALITY" name="HIERARCHY_CARDINALITY"
  type="xsd:unsignedInt" minOccurs="0" />
<xsd:element sql:field="DEFAULT_MEMBER" name="DEFAULT_MEMBER"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="ALL_MEMBER" name="ALL_MEMBER"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DESCRIPTION" name="DESCRIPTION"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="STRUCTURE" name="STRUCTURE"
  type="xsd:short" minOccurs="0" />
<xsd:element sql:field="IS_VIRTUAL" name="IS_VIRTUAL"
  type="xsd:boolean" minOccurs="0" />
<xsd:element sql:field="IS_READWRITE" name="IS_READWRITE"
  type="xsd:boolean" minOccurs="0" />
<xsd:element sql:field="DIMENSION_UNIQUE_SETTINGS" name="DIMENSION_UNIQUE_SETTINGS"
  type="xsd:int" minOccurs="0" />
<xsd:element sql:field="DIMENSION_MASTER_UNIQUE_NAME"
  name="DIMENSION_MASTER_UNIQUE_NAME"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DIMENSION_IS_VISIBLE" name="DIMENSION_IS_VISIBLE"
  type="xsd:boolean" minOccurs="0" />
<xsd:element sql:field="HIERARCHY_ORDINAL" name="HIERARCHY_ORDINAL"
  type="xsd:unsignedInt" minOccurs="0" />
<xsd:element sql:field="DIMENSION_IS_SHARED" name="DIMENSION_IS_SHARED"
  type="xsd:boolean" minOccurs="0" />
<xsd:element sql:field="HIERARCHY_IS_VISIBLE" name="HIERARCHY_IS_VISIBLE"
  type="xsd:boolean" minOccurs="0" />
<xsd:element sql:field="HIERARCHY_ORIGIN" name="HIERARCHY_ORIGIN"
  type="xsd:unsignedShort" minOccurs="0" />
<xsd:element sql:field="HIERARCHY_DISPLAY_FOLDER" name="HIERARCHY_DISPLAY_FOLDER"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="INSTANCE_SELECTION" name="INSTANCE_SELECTION"
  type="xsd:unsignedShort" minOccurs="0" />
<xsd:element sql:field="GROUPING_BEHAVIOR" name="GROUPING_BEHAVIOR"
  type="xsd:unsignedShort" minOccurs="0" />
<xsd:element sql:field="STRUCTURE_TYPE" name="STRUCTURE_TYPE"
  type="xsd:string" minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.7.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|-------------|-------------------|---|
| CUBE_SOURCE | xsd:unsignedShort | A bitmask with one of these valid values: <ul style="list-style-type: none"> ▪ 0x01 - Cube ▪ 0x02 - Dimension<214> The default restriction is a value of 1. |

| Name | Type | Description |
|----------------------|-------------------|---|
| HIERARCHY_VISIBILITY | xsd:unsignedShort | <p>A bitmask with one of these valid values:</p> <ul style="list-style-type: none"> ▪ 0x01 - Visible ▪ 0x02 - Not Visible <p>The default restriction is a value of 1.</p> |

3.1.4.2.2.1.3.8 MDSHEMA_LEVELS

This schema rowset describes each level within a particular hierarchy.

3.1.4.2.2.1.3.8.1 Columns

The **MDSHEMA_LEVELS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------------|-----------------|-------------|--|
| CATALOG_NAME | xsd:string | Yes | The name of the database. |
| SCHEMA_NAME | xsd:string | Yes | The name of the schema.<215> |
| CUBE_NAME | xsd:string | Yes | The name of the cube. |
| DIMENSION_UNIQUE_NAME | xsd:string | Yes | The unique name of the dimension.<216> |
| HIERARCHY_UNIQUE_NAME | xsd:string | Yes | The unique name of the hierarchy. |
| LEVEL_NAME | xsd:string | Yes | The name of the level. |
| LEVEL_UNIQUE_NAME | xsd:string | Yes | The unique name of the level. |
| LEVEL_GUID | uuid | | The GUID of the level. |
| LEVEL_CAPTION | xsd:string | | The caption of the hierarchy.<217> |
| LEVEL_NUMBER | xsd:unsignedInt | | The level number in the hierarchy. Top level is zero (0). |
| LEVEL_CARDINALITY | xsd:unsignedInt | | The number of members in the level. |
| LEVEL_TYPE | xsd:int | | <p>The type of the level from a list of possible values.</p> <ul style="list-style-type: none"> ▪ Account 0x1014 ▪ All 0x0001 ▪ Bill of Material Resource 0x1012 ▪ Calculated 0x0002 |

| Name | Type | Restriction | Description |
|------|------|-------------|--|
| | | | <ul style="list-style-type: none"> ▪ Channel 0x1061 ▪ Company 0x1042 ▪ Currency Destination 0x1052 ▪ Currency Source 0x1051 ▪ Customer 0x1021 ▪ Customer Group 0x1022 ▪ Customer Household 0x1023 ▪ Geography City 0x2006 ▪ Geography Continent 0x2001 ▪ Geography country 0x2003 ▪ Geography County 0x2005 ▪ Geography Point 0x2008 ▪ Postal Code 0x2007 ▪ Geography Region 0x2002 ▪ Geography StateOrProvince 0x2004 ▪ Organization Unit 0x1011 ▪ Person 0x1041 ▪ Product 0x1031 ▪ Product Group 0x1032 ▪ Promotion 0x1071 ▪ Quantitative 0x1013 ▪ Regular 0x0000 ▪ Representative 0x1062 ▪ Reserved1 0x0008 ▪ Scenario 0x1015 ▪ Time 0x0004 ▪ Time Days 0x0204 ▪ Time Half Years 0x0024 ▪ Time Quarters 0x0044 |

| Name | Type | Restriction | Description |
|-------------------------|-------------|-------------|---|
| | | | <ul style="list-style-type: none"> ▪ Time Seconds 0x0804 ▪ Time Undefined 0x1004 ▪ Time Weeks 0x0104 ▪ Time Years 0x0014 ▪ Utility 0x1016 |
| DESCRIPTION | xsd:string | | A description of the level. |
| CUSTOM_ROLLUP_SETTINGS | xsd:int | | <p>A bitmask that specifies the custom rollup options:</p> <ul style="list-style-type: none"> ▪ 0x01 - Indicates that a custom rollup expression exists for this level. ▪ 0x02 - Indicates that members of this level have custom rollup expressions. ▪ 0x04 - Indicates that there is a skipped level associated with members of this level. ▪ 0x08 - Indicates that members of this level have custom member properties. ▪ 0x10 - Indicates that members on this level have unary operators. |
| LEVEL_UNIQUE_SETTINGS | xsd:int | | <p>A bitmask that specifies which columns contain unique values, if the level only has members with unique names or keys:</p> <ul style="list-style-type: none"> ▪ 0x00000001 - Member key columns establish uniqueness. ▪ 0x00000002 - Member name columns establish uniqueness. |
| LEVEL_IS_VISIBLE | xsd:boolean | | When true, indicates that the level is visible; otherwise false. |
| LEVEL_ORDERING_PROPERTY | xsd:string | | The name of the attribute on which the level is sorted. |
| LEVEL_DBTYPE | xsd:int | | The type of the member key column that is used for the level attribute. It MUST be |

| Name | Type | Restriction | Description |
|------|------|-------------|---|
| | | | <p>null if concatenated keys are used as the member key column.</p> <p>Type values are described in the following list:</p> <ul style="list-style-type: none"> ▪ 0 – (DBTYPE_EMPTY) Indicates that no value was specified. ▪ 2 – (DBTYPE_I2) Indicates a two-byte signed integer. ▪ 3 – (DBTYPE_I4) Indicates a four-byte signed integer. ▪ 4 – (DBTYPE_R4) Indicates a single-precision floating-point value. ▪ 5 – (DBTYPE_R8) Indicates a double-precision floating-point value. ▪ 6 – (DBTYPE_CY) Indicates a currency value. Currency is a fixed-point number with four digits to the right of the decimal point and is stored in an eight-byte signed integer scaled by 10,000. ▪ 7 – (DBTYPE_DATE) Indicates a date value. Date values are stored as Double, the whole part of which is the number of days since December 30, 1899, and the fractional part of which is the fraction of a day. ▪ 8 – (DBTYPE_BSTR) A pointer to a BSTR, which is a null-terminated character string in which the string length is stored with the string. ▪ 9 – (DBTYPE_IDISPATCH) Indicates a pointer to an IDispatch interface on an OLE object. ▪ 10 – (DBTYPE_ERROR) Indicates a 32-bit error |

| Name | Type | Restriction | Description |
|------|------|-------------|--|
| | | | <p>code.</p> <ul style="list-style-type: none"> <li data-bbox="1101 247 1435 323">▪ 11 – (DBTYPE_BOOL) Indicates a Boolean value. <li data-bbox="1101 348 1435 424">▪ 12 – (DBTYPE_VARIANT) Indicates an Automation variant. <li data-bbox="1101 449 1435 579">▪ 13 – (DBTYPE_IUNKNOWN) Indicates a pointer to an IUnknown interface on an OLE object. <li data-bbox="1101 604 1435 756">▪ 14 – (DBTYPE_DECIMAL) Indicates an exact numeric value with a fixed precision and scale. The scale is between 0 and 28. <li data-bbox="1101 781 1435 856">▪ 16 – (DBTYPE_I1) Indicates a one-byte signed integer. <li data-bbox="1101 882 1435 957">▪ 17 – (DBTYPE_UI1) Indicates a one-byte unsigned integer. <li data-bbox="1101 982 1435 1058">▪ 18 – (DBTYPE_UI2) Indicates a two-byte unsigned integer. <li data-bbox="1101 1083 1435 1159">▪ 19 – (DBTYPE_UI4) Indicates a four-byte unsigned integer. <li data-bbox="1101 1184 1435 1260">▪ 20 – (DBTYPE_I8) Indicates an eight-byte signed integer. <li data-bbox="1101 1285 1435 1360">▪ 21 – (DBTYPE_UI8) Indicates an eight-byte unsigned integer. <li data-bbox="1101 1386 1435 1436">▪ 72 – (DBTYPE_GUID) Indicates a GUID. <li data-bbox="1101 1461 1435 1512">▪ 128 – (DBTYPE_BYTES) Indicates a binary value. <li data-bbox="1101 1537 1435 1587">▪ 129 – (DBTYPE_STR) Indicates a string value. <li data-bbox="1101 1612 1435 1713">▪ 130 – (DBTYPE_WSTR) Indicates a null-terminated Unicode character string. <li data-bbox="1101 1738 1435 1814">▪ 131 – (DBTYPE_NUMERIC) Indicates an exact |

| Name | Type | Restriction | Description |
|-----------------------------------|-------------------|-------------|---|
| | | | <p>numeric value with a fixed precision and scale. The scale is between 0 and 38.</p> <ul style="list-style-type: none"> ▪ 132 – (DBTYPE_UDT) Indicates a user-defined variable. ▪ 133 – (DBTYPE_DBDATE) Indicates a date value (yyyymmdd). ▪ 134 – (DBTYPE_DBTIME) Indicates a time value (hhmmss). ▪ 135 – (DBTYPE_DBTIMESTAMP) Indicates a date-time stamp (yyyymmddhhmmss plus a fraction in billionths). ▪ 136 – (DBTYPE_HCHAPTER) Indicates a four-byte chapter value used to identify rows in a child rowset. |
| LEVEL_MASTER_UNIQUE_NAME | xsd:string | | The unique name of the master level. |
| LEVEL_NAME_SQL_COLUMN_NAME | xsd:string | | The SQL column name for the level name. |
| LEVEL_KEY_SQL_COLUMN_NAME | xsd:string | | The SQL column name for the level key. |
| LEVEL_UNIQUE_NAME_SQL_COLUMN_NAME | xsd:string | | The SQL column name for the level unique name. |
| LEVEL_ATTRIBUTE_HIERARCHY_NAME | xsd:string | | The name of the attribute hierarchy that provides the source of the level. |
| LEVEL_KEY_CARDINALITY | xsd:unsignedShort | | The number of columns in the level key. |
| LEVEL_ORIGIN | xsd:unsignedShort | Yes | <p>A bitmask that defines how the level was sourced:</p> <ul style="list-style-type: none"> ▪ 0x0001 - Identifies levels in a user defined hierarchy. ▪ 0x0002 - Identifies levels in an attribute hierarchy. ▪ 0x0004 - Identifies levels in a key attribute |

| Name | Type | Restriction | Description |
|------|------|-------------|---|
| | | | <p>hierarchy.</p> <ul style="list-style-type: none"> 0x0008 - Identifies levels in attribute hierarchies that are not enabled. |

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_UNIQUE_NAME" name="DIMENSION_UNIQUE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="HIERARCHY_UNIQUE_NAME" name="HIERARCHY_UNIQUE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LEVEL_NAME" name="LEVEL_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LEVEL_UNIQUE_NAME" name="LEVEL_UNIQUE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LEVEL_GUID" name="LEVEL_GUID"
      type="uuid" minOccurs="0" />
    <xsd:element sql:field="LEVEL_CAPTION" name="LEVEL_CAPTION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LEVEL_NUMBER" name="LEVEL_NUMBER"
      type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="LEVEL_CARDINALITY" name="LEVEL_CARDINALITY"
      type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="LEVEL_TYPE" name="LEVEL_TYPE"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CUSTOM_ROLLUP_SETTINGS" name="CUSTOM_ROLLUP_SETTINGS"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="LEVEL_UNIQUE_SETTINGS" name="LEVEL_UNIQUE_SETTINGS"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="LEVEL_IS_VISIBLE" name="LEVEL_IS_VISIBLE"
      type="xsd:boolean" minOccurs="0" />
    <xsd:element sql:field="LEVEL_ORDERING_PROPERTY" name="LEVEL_ORDERING_PROPERTY"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LEVEL_DBTYPE" name="LEVEL_DBTYPE"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="LEVEL_MASTER_UNIQUE_NAME" name="LEVEL_MASTER_UNIQUE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LEVEL_NAME_SQL_COLUMN_NAME"
      name="LEVEL_NAME_SQL_COLUMN_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LEVEL_KEY_SQL_COLUMN_NAME"

```



```

        name="LEVEL_KEY_SQL_COLUMN_NAME"
        type="xsd:string" minOccurs="0" />
<xsd:element sql:field="LEVEL_UNIQUE_NAME_SQL_COLUMN_NAME"
        name="LEVEL_UNIQUE_NAME_SQL_COLUMN_NAME"
        type="xsd:string" minOccurs="0" />
<xsd:element sql:field="LEVEL_ATTRIBUTE_HIERARCHY_NAME"
        name="LEVEL_ATTRIBUTE_HIERARCHY_NAME"
        type="xsd:string" minOccurs="0" />
<xsd:element sql:field="LEVEL_KEY_CARDINALITY" name="LEVEL_KEY_CARDINALITY"
        type="xsd:unsignedShort" minOccurs="0" />
<xsd:element sql:field="LEVEL_ORIGIN" name="LEVEL_ORIGIN"
        type="xsd:unsignedShort" minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.8.2 Additional Restrictions

In addition to the column restrictions that are indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|------------------|-------------------|---|
| CUBE_SOURCE | xsd:unsignedShort | A bitmask with one of these valid values: <ul style="list-style-type: none"> ▪ 0x01 - Cube ▪ 0x02 - Dimension<218> The default restriction is a value of 1. |
| LEVEL_VISIBILITY | xsd:unsignedShort | A bitmask with one of these valid values: <ul style="list-style-type: none"> ▪ 0x01 - Visible ▪ 0x02 - Not Visible The default restriction is a value of 1. |

3.1.4.2.2.1.3.9 MDSHEMA_MEASURES

This schema rowset describes each measure.

3.1.4.2.2.1.3.9.1 Columns

The **MDSHEMA_MEASURES** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------|------------|-------------|--|
| CATALOG_NAME | xsd:string | Yes | The name of the catalog to which this measure belongs. |
| SCHEMA_NAME | xsd:string | Yes | The name of the schema to which this measure belongs.<219> |
| CUBE_NAME | xsd:string | Yes | The name of the cube to which this measure belongs. |
| MEASURE_NAME | xsd:string | Yes | The name of the measure. |

| Name | Type | Restriction | Description |
|---------------------|------------|-------------|---|
| MEASURE_UNIQUE_NAME | xsd:string | Yes | The unique name of the measure. |
| MEASURE_CAPTION | xsd:string | | A caption associated with the measure. |
| MEASURE_GUID | uuid | | The GUID of the measure. |
| MEASURE_AGGREGATOR | xsd:int | | <p>An enumeration that identifies how a measure was derived. This enumeration can be one of the following values:</p> <ul style="list-style-type: none"> ▪ 1 - (MDMEASURE_AGGR_SUM) MEASURE aggregates from SUM. ▪ 2 - (MDMEASURE_AGGR_COUNT) MEASURE aggregates from COUNT. ▪ 3 - (MDMEASURE_AGGR_MIN) MEASURE aggregates from MIN. ▪ 4 - (MDMEASURE_AGGR_MAX) MEASURE aggregates from MAX. ▪ 5 - (MDMEASURE_AGGR_AVG) MEASURE aggregates from AVG. ▪ 6 - (MDMEASURE_AGGR_VAR) MEASURE aggregates from VAR. ▪ 7 - (MDMEASURE_AGGR_STD) Identifies that the measure aggregates from STDEV. ▪ 8 - (MDMEASURE_AGGR_DST) Distinct Count: The aggregation is a count of unique members. ▪ 9 - (MDMEASURE_AGGR_NONE) None: No aggregation is applied. ▪ 10 - (MDMEASURE_AGGR_AVGCHILDREN) Average of Children: The aggregation of a member is the average of its children. ▪ 11 - (MDMEASURE_AGGR_FIRSTCHILD) First Child: The member value is evaluated as the value of its first child along the time dimension. ▪ 12 - (MDMEASURE_AGGR_LASTCHILD) Last Child: The member value is evaluated as the value of its last child along the time dimension. ▪ 13 - (MDMEASURE_AGGR_FIRSTNONEMPTY) First Non-Empty: The member value is evaluated as the value of its first child along the time dimension that contains data. ▪ 14 - (MDMEASURE_AGGR_LASTNONEMPTY) Last Non-Empty: The member value is evaluated as the value of its last child along the time dimension that contains |

| Name | Type | Restriction | Description |
|------------------------------|-------------------|-------------|--|
| | | | <p>data.</p> <ul style="list-style-type: none"> 15 - (MDMEASURE_AGGR_BYACCOUNT) ByAccount: The system uses the semiadditive behavior specified for the account type. 127 - (MDMEASURE_AGGR_CALCULATED) Identifies that the measure was derived from a formula that was not any of the single functions listed in any of the preceding single functions. 0 - (MDMEASURE_AGGR_UNKNOWN) Identifies that the measure was derived from an unknown aggregation function or formula. |
| DATA_TYPE | xsd:unsignedShort | | This enumeration is the same as LEVEL_DBTYPE for MDSHEMA_LEVELS. (See section 3.1.4.2.2.1.3.8.) |
| NUMERIC_PRECISION | xsd:unsignedShort | | The maximum precision of the measure if the measure object's data type is Numeric, Decimal, or DateTime. NULL for all other property types. |
| NUMERIC_SCALE | xsd:short | | The number of digits to the right of the decimal point if the measure object's type indicator is Numeric, Decimal or DateTime. Otherwise, this value is NULL.<220> |
| MEASURE_UNITS | xsd:string | | The units for the measure. |
| DESCRIPTION | xsd:string | | A description of the measure. |
| EXPRESSION | xsd:string | | An expression for the member. |
| MEASURE_IS_VISIBLE | xsd:boolean | | When true, indicates that the measure is visible. Always returns a value of true. If the measure is not visible, it will not be included in the schema rowset. |
| LEVELS_LIST | xsd:string | | Not currently in use. |
| MEASURE_NAME_SQL_COLUMN_NAME | xsd:string | | The name of the column in the SQL query that corresponds to the measure's name. |
| MEASURE_UNQUALIFIED_CAPTION | xsd:string | | The caption of the measure, not qualified with the measure group caption. |
| MEASUREGROUP_NAME | xsd:string | Yes | The name of the measure group to which the measure belongs. |
| MEASURE_DISPLAY_FOLDER | xsd:string | | The display folder of the measure.<221> |
| DEFAULT_FORMAT_STRING | xsd:string | | The default format string for the measure. |

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
```

```

    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-
      [0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MEASURE_NAME" name="MEASURE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MEASURE_UNIQUE_NAME" name="MEASURE_UNIQUE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MEASURE_CAPTION" name="MEASURE_CAPTION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MEASURE_GUID" name="MEASURE_GUID"
      type="uuid" minOccurs="0" />
    <xsd:element sql:field="MEASURE_AGGREGATOR" name="MEASURE_AGGREGATOR"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="DATA_TYPE" name="DATA_TYPE"
      type="xsd:unsignedShort" minOccurs="0" />
    <xsd:element sql:field="NUMERIC_PRECISION" name="NUMERIC_PRECISION"
      type="xsd:unsignedShort" minOccurs="0" />
    <xsd:element sql:field="NUMERIC_SCALE" name="NUMERIC_SCALE"
      type="xsd:short" minOccurs="0" />
    <xsd:element sql:field="MEASURE_UNITS" name="MEASURE_UNITS"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="EXPRESSION" name="EXPRESSION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MEASURE_IS_VISIBLE" name="MEASURE_IS_VISIBLE"
      type="xsd:boolean" minOccurs="0" />
    <xsd:element sql:field="LEVELS_LIST" name="LEVELS LIST"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MEASURE_NAME_SQL_COLUMN_NAME"
      name="MEASURE_NAME_SQL_COLUMN_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MEASURE_UNQUALIFIED_CAPTION"
      name="MEASURE_UNQUALIFIED_CAPTION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MEASUREGROUP_NAME" name="MEASUREGROUP_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MEASURE_DISPLAY_FOLDER" name="MEASURE_DISPLAY_FOLDER"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DEFAULT_FORMAT_STRING" name="DEFAULT_FORMAT_STRING"
      type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.9.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|--------------------|-------------------|---|
| CUBE_SOURCE | xsd:unsignedShort | A bitmask with one of these valid values: <ul style="list-style-type: none"> 0x01 - Cube 0x02 - Dimension<222> The default restriction is a value of 1. |
| MEASURE_VISIBILITY | xsd:unsignedShort | A bitmask with one of these valid values: <ul style="list-style-type: none"> 0x01 - Visible 0x02 - Not Visible The default restriction is a value of 1. |

3.1.4.2.2.1.3.10 MDSHEMA_PROPERTIES

This schema rowset describes the properties of members and cell properties.

3.1.4.2.2.1.3.10.1 Columns

The **MDSHEMA_PROPERTIES** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------------|------------|-------------|---|
| CATALOG_NAME | xsd:string | Yes | The name of the database. |
| SCHEMA_NAME | xsd:string | Yes | The name of the schema.<223> |
| CUBE_NAME | xsd:string | Yes | The name of the cube. |
| DIMENSION_UNIQUE_NAME | xsd:string | Yes | The unique name of the dimension. |
| HIERARCHY_UNIQUE_NAME | xsd:string | Yes | The unique name of the hierarchy. |
| LEVEL_UNIQUE_NAME | xsd:string | Yes | The unique name of the level to which the property belongs. |
| MEMBER_UNIQUE_NAME | xsd:string | Yes | The unique name of the member to which the property belongs. |
| PROPERTY_TYPE | xsd:short | Yes | A bitmask that specifies the type of the property, as follows: <ul style="list-style-type: none"> 1 - Identifies a property of a member. 2 - Identifies a property of a cell. 4 - Identifies an internal property. |

| Name | Type | Restriction | Description |
|--------------------------|-------------------|-------------|--|
| | | | <ul style="list-style-type: none"> 8 - Identifies a property which contains a binary large object (BLOB). |
| PROPERTY_NAME | xsd:string | Yes | The name of the property. |
| PROPERTY_CAPTION | xsd:string | | A label or caption associated with the property.<224> |
| DATA_TYPE | xsd:unsignedShort | | This enumeration is the same as LEVEL_DBTYPE for MDSHEMA_LEVELS. (See 3.1.4.2.2.1.3.8) |
| CHARACTER_MAXIMUM_LENGTH | xsd:unsignedInt | | The maximum possible length of the property, if it is a Character or Binary type. Zero indicates there is no defined maximum length. Returns NULL for all other data types. |
| CHARACTER_OCTET_LENGTH | xsd:unsignedInt | | The maximum possible length (in bytes) of the property, if it is a Character or Binary type. Zero indicates there is no defined maximum length. Returns NULL for all other data types. |
| NUMERIC_PRECISION | xsd:unsignedShort | | The maximum precision of the property if the measure object's data type is Numeric , Decimal or DateTime . NULL for all other property types. |
| NUMERIC_SCALE | xsd:short | | The number of digits to the right of the decimal point if the measure object's type indicator is Numeric , Decimal or DateTime . Otherwise, this value is NULL.<225> |
| DESCRIPTION | xsd:string | | A description of the property. |
| PROPERTY_CONTENT_TYPE | xsd:short | | <p>The content type of the property.</p> <p>Built-in values are values listed as follows. This enumeration is extensible and additional values can be added by users.</p> <ul style="list-style-type: none"> 0x00 - Regular 0x01 - Id 0x02 - Relation to parent |

| Name | Type | Restriction | Description |
|------|------|-------------|---|
| | | | <ul style="list-style-type: none"> ▪ 0x03 - Rollup operator ▪ 0x11 - Organization title ▪ 0x21 - Caption ▪ 0x22 - Caption short ▪ 0x23 - Caption description ▪ 0x24 - Caption abbreviation ▪ 0x31 - Web URL ▪ 0x32 - Web HTML ▪ 0x33 - Web XML or XSL ▪ 0x34 - Web mail alias ▪ 0x41 - Address ▪ 0x42 - Address street ▪ 0x43 - Address house ▪ 0x44 - Address city ▪ 0x45 - Address state or province ▪ 0x46 - Address zip ▪ 0x47 - Address quarter ▪ 0x48 - Address country ▪ 0x49 - Address building ▪ 0x4A - Address room ▪ 0x4B - Address floor ▪ 0x4C - Address fax ▪ 0x4D - Address phone ▪ 0x61 - Geography centroid x ▪ 0x62 - Geography centroid y ▪ 0x63 - Geography centroid z ▪ 0x64 - Geography boundary top ▪ 0x65 - Geography boundary left ▪ 0x66 - Geography |

| Name | Type | Restriction | Description |
|------|------|-------------|---|
| | | | boundary bottom <ul style="list-style-type: none"> ▪ 0x67 - Geography boundary right ▪ 0x68 - Geography boundary front ▪ 0x69 - Geography boundary rear ▪ 0x6A - Geography boundary polygon ▪ 0x71 - Physical size ▪ 0x72 - Physical color ▪ 0x73 - Physical weight ▪ 0x74 - Physical height ▪ 0x75 - Physical width ▪ 0x76 - Physical depth ▪ 0x77 - Physical volume ▪ 0x78 - Physical density ▪ 0x82 - Person full name ▪ 0x83 - Person first name ▪ 0x84 - Person last name ▪ 0x85 - Person middle name ▪ 0x86 - Person demographic ▪ 0x87 - Person contact ▪ 0x91 - Quantity range low ▪ 0x92 - Quantity range high ▪ 0xA1 - Formatting color ▪ 0xA2 - Formatting order ▪ 0xA3 - Formatting font ▪ 0xA4 - Formatting font effects ▪ 0xA5 - Formatting font size ▪ 0xA6 - Formatting sub total ▪ 0xB1 - Date ▪ 0xB2 - Date start |

| Name | Type | Restriction | Description |
|-----------------------------------|-------------------|-------------|--|
| | | | <ul style="list-style-type: none"> ▪ 0xB3 - Date ended ▪ 0xB4 - Date canceled ▪ 0xB5 - Date modified ▪ 0xB6 - Date duration ▪ 0xC1 - Version |
| SQL_COLUMN_NAME | xsd:string | | The column name of the property used in SQL queries. |
| LANGUAGE | xsd:unsignedShort | | The language expressed as an LCID. Valid only for property translations. |
| PROPERTY_ORIGIN | xsd:unsignedShort | Yes | <p>A bitmask that specifies the type of hierarchy to which the property applies, as follows:</p> <ul style="list-style-type: none"> ▪ 1 - Indicates the property is on a user defined hierarchy. ▪ 2 - Indicates the property is on an attribute hierarchy. ▪ 4 - Indicates the property is on a key attribute hierarchy. ▪ 8 - Indicates the property is on an attribute hierarchy that is not enabled. |
| PROPERTY_ATTRIBUTE_HIERARCHY_NAME | xsd:string | | The name of the attribute hierarchy that is sourcing this property. |
| PROPERTY_CARDINALITY | xsd:string | | <p>The cardinality of the property. Possible values include the following strings:</p> <ul style="list-style-type: none"> ▪ "ONE" ▪ "MANY" |
| MIME_TYPE | xsd:string | | The MIME type (if this property is of type Binary). |
| PROPERTY_IS_VISIBLE | xsd:boolean | | When true, indicates that the property is visible; otherwise false. |

This schema rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
```

```

<xsd:complexType>
  <xsd:sequence minOccurs="0" maxOccurs="unbounded">
    <xsd:element name="row" type="row" />
  </xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_UNIQUE_NAME" name="DIMENSION_UNIQUE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="HIERARCHY_UNIQUE_NAME" name="HIERARCHY_UNIQUE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LEVEL_UNIQUE_NAME" name="LEVEL_UNIQUE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MEMBER_UNIQUE_NAME" name="MEMBER_UNIQUE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="PROPERTY_TYPE" name="PROPERTY_TYPE"
      type="xsd:short" minOccurs="0" />
    <xsd:element sql:field="PROPERTY_NAME" name="PROPERTY_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="PROPERTY_CAPTION" name="PROPERTY_CAPTION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DATA_TYPE" name="DATA_TYPE"
      type="xsd:unsignedShort" minOccurs="0" />
    <xsd:element sql:field="CHARACTER_MAXIMUM_LENGTH" name="CHARACTER_MAXIMUM_LENGTH"
      type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="CHARACTER_OCTET_LENGTH" name="CHARACTER_OCTET_LENGTH"
      type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="NUMERIC_PRECISION" name="NUMERIC_PRECISION"
      type="xsd:unsignedShort" minOccurs="0" />
    <xsd:element sql:field="NUMERIC_SCALE" name="NUMERIC_SCALE"
      type="xsd:short" minOccurs="0" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="PROPERTY_CONTENT_TYPE" name="PROPERTY_CONTENT_TYPE"
      type="xsd:short" minOccurs="0" />
    <xsd:element sql:field="SQL_COLUMN_NAME" name="SQL_COLUMN_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LANGUAGE" name="LANGUAGE"
      type="xsd:unsignedShort" minOccurs="0" />
    <xsd:element sql:field="PROPERTY_ORIGIN" name="PROPERTY_ORIGIN"
      type="xsd:unsignedShort" minOccurs="0" />
    <xsd:element sql:field="PROPERTY_ATTRIBUTE_HIERARCHY_NAME"
      name="PROPERTY_ATTRIBUTE_HIERARCHY_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="PROPERTY_CARDINALITY" name="PROPERTY_CARDINALITY"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MIME_TYPE" name="MIME_TYPE"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="PROPERTY_IS_VISIBLE" name="PROPERTY_IS_VISIBLE"
      type="xsd:boolean" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.10.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|---------------------|-------------------|---|
| CUBE_SOURCE | xsd:unsignedShort | A bitmask with one of these valid values: <ul style="list-style-type: none"> 0x01 - Cube 0x02 - Dimension<226> The default restriction is a value of 1. |
| PROPERTY_VISIBILITY | xsd:unsignedShort | A bitmask with one of these valid values: <ul style="list-style-type: none"> 0x01 - Visible 0x02 - Not Visible The default restriction is a value of 1. |

3.1.4.2.2.1.3.11 MDSHEMA_MEMBERS

This schema rowset describes the members within a database.

3.1.4.2.2.1.3.11.1 Columns

The **MDSHEMA_MEMBERS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------------|-----------------|-------------|--|
| CATALOG_NAME | xsd:string | Yes | The name of the database. |
| SCHEMA_NAME | xsd:string | Yes | The name of the schema. <227> |
| CUBE_NAME | xsd:string | Yes | The name of the cube. |
| DIMENSION_UNIQUE_NAME | xsd:string | Yes | The unique name of the dimension. |
| HIERARCHY_UNIQUE_NAME | xsd:string | Yes | The unique name of the hierarchy. |
| LEVEL_UNIQUE_NAME | xsd:string | Yes | The unique name of the level. |
| LEVEL_NUMBER | xsd:unsignedInt | Yes | The distance of the member from the root of the hierarchy. The root level is zero (0). |
| MEMBER_ORDINAL | xsd:unsignedInt | | The ordinal of the member in its level. |
| MEMBER_NAME | xsd:string | Yes | The name of the member. |
| MEMBER_UNIQUE_NAME | xsd:string | Yes | The unique name of the member. |
| MEMBER_TYPE | xsd:int | Yes | The type of the member. <228> <ul style="list-style-type: none"> 1 - Is a regular member. 2 - Is the All member. 3 - Is a measure. 4 - Is a formula. 0 - Is of unknown type. |

| Name | Type | Restriction | Description |
|----------------------|-----------------|-------------|--|
| MEMBER_GUID | uuid | | The GUID of the member. |
| MEMBER_CAPTION | xsd:string | Yes | The caption of the member. |
| CHILDREN_CARDINALITY | xsd:unsignedInt | | The number of children that the member has. This can be an estimate. |
| PARENT_LEVEL | xsd:unsignedInt | | The distance of the member's parent from the root level of the hierarchy. The root level is zero (0). |
| PARENT_UNIQUE_NAME | xsd:string | | The unique name of the member's parent. NULL is returned for any members at the root level. |
| PARENT_COUNT | xsd:unsignedInt | | The number of parents that this member has. |
| DESCRIPTION | xsd:string | | The description of the member. |
| EXPRESSION | xsd:string | | The expression for calculations, if the member is of type 4 (Formula). |
| MEMBER_KEY | xsd:string | | The value of the member's key column. Returns NULL if the member has a composite key. |
| IS_PLACEHOLDERMEMBER | xsd:boolean | | When true, indicates that a member is a placeholder member for an empty position in a dimension hierarchy; otherwise false. It is valid only if the MDX Compatibility property has been set to 1. |
| IS_DATAMEMBER | xsd:boolean | | When true, indicates that the member is a data member; otherwise false. |
| SCOPE | xsd:int | | The scope of the member. The member can be a session-calculated member or a global-calculated member. The column returns NULL for non-calculated members. This column can have one of the following values: <ul style="list-style-type: none"> ▪ 1 - Global ▪ 2 - Session |

Additional columns can be returned in this schema rowset for custom member properties.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">

```

```

<xsd:sequence>
  <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME"
    type="xsd:string" minOccurs="0" />
  <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME"
    type="xsd:string" minOccurs="0" />
  <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME"
    type="xsd:string" minOccurs="0" />
  <xsd:element sql:field="DIMENSION_UNIQUE_NAME" name="DIMENSION_UNIQUE_NAME"
    type="xsd:string" minOccurs="0" />
  <xsd:element sql:field="HIERARCHY_UNIQUE_NAME" name="HIERARCHY_UNIQUE_NAME"
    type="xsd:string" minOccurs="0" />
  <xsd:element sql:field="LEVEL_UNIQUE_NAME" name="LEVEL_UNIQUE_NAME"
    type="xsd:string" minOccurs="0" />
  <xsd:element sql:field="LEVEL_NUMBER" name="LEVEL_NUMBER"
    type="xsd:unsignedInt" minOccurs="0" />
  <xsd:element sql:field="MEMBER_ORDINAL" name="MEMBER_ORDINAL"
    type="xsd:unsignedInt" minOccurs="0" />
  <xsd:element sql:field="MEMBER_NAME" name="MEMBER_NAME"
    type="xsd:string" minOccurs="0" />
  <xsd:element sql:field="MEMBER_UNIQUE_NAME" name="MEMBER_UNIQUE_NAME"
    type="xsd:string" minOccurs="0" />
  <xsd:element sql:field="MEMBER_TYPE" name="MEMBER_TYPE"
    type="xsd:int" minOccurs="0" />
  <xsd:element sql:field="MEMBER_GUID" name="MEMBER_GUID"
    type="uuid" minOccurs="0" />
  <xsd:element sql:field="MEMBER_CAPTION" name="MEMBER_CAPTION"
    type="xsd:string" minOccurs="0" />
  <xsd:element sql:field="CHILDREN_CARDINALITY" name="CHILDREN_CARDINALITY"
    type="xsd:unsignedInt" minOccurs="0" />
  <xsd:element sql:field="PARENT_LEVEL" name="PARENT_LEVEL"
    type="xsd:unsignedInt" minOccurs="0" />
  <xsd:element sql:field="PARENT_UNIQUE_NAME" name="PARENT_UNIQUE_NAME"
    type="xsd:string" minOccurs="0" />
  <xsd:element sql:field="PARENT_COUNT" name="PARENT_COUNT"
    type="xsd:unsignedInt" minOccurs="0" />
  <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION"
    type="xsd:string" minOccurs="0" />
  <xsd:element sql:field="EXPRESSION" name="EXPRESSION"
    type="xsd:string" minOccurs="0" />
  <xsd:element sql:field="MEMBER_KEY" name="MEMBER_KEY"
    type="xsd:string" minOccurs="0" />
  <xsd:element sql:field="IS_PLACEHOLDERMEMBER" name="IS_PLACEHOLDERMEMBER"
    type="xsd:boolean" minOccurs="0" />
  <xsd:element sql:field="IS_DATAMEMBER" name="IS_DATAMEMBER"
    type="xsd:boolean" minOccurs="0" />
  <xsd:element sql:field="SCOPE" name="SCOPE" type="xsd:int" minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.11.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|-------------|-------------------|---|
| CUBE_SOURCE | xsd:unsignedShort | A bitmask with one of the following valid values: <ul style="list-style-type: none"> 0x01 - Cube 0x02 - Dimension<229> The default restriction is a value of 1. |
| TREE_OP | xsd:int | Applies only to a single member: |

| Name | Type | Description |
|------|------|--|
| | | <ul style="list-style-type: none"> ▪ 0x20 - Returns all of the ancestors. ▪ 0x01 - Returns only the immediate children. ▪ 0x02 - Returns members on the same level. ▪ 0x04 - Returns only the immediate parent. ▪ 0x08 - Returns only itself. ▪ 0x10 - Returns all of the descendants. |

3.1.4.2.2.1.3.12 MDSHEMA_ACTIONS

This schema rowset describes the actions that can be available to the client application.

3.1.4.2.2.1.3.12.1 Columns

The **MDSHEMA_ACTIONS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------|------------|-------------|--|
| CATALOG_NAME | xsd:string | Yes | The name of the database. |
| SCHEMA_NAME | xsd:string | Yes | The name of the schema.<230> |
| CUBE_NAME | xsd:string | [Required] | The name of the cube. |
| ACTION_NAME | xsd:string | Yes | The name of this action. |
| ACTION_TYPE | xsd:int | Yes | <p>A bitmask that is used to specify the action type.</p> <ul style="list-style-type: none"> ▪ 0x01 - Action type is URL. ▪ 0x02 - Action type is HTML. ▪ 0x04 - Action type is Statement. ▪ 0x08 - Action type is Dataset. ▪ 0x10 - Action type is Rowset. ▪ 0x20 - Action type is Commandline. ▪ 0x40 - Action type is Proprietary. ▪ 0x80 - Action type is Report. ▪ 0x100 - Action type is DrillThrough. <p>If the action is PROPRIETARY (0x40), then a value MUST be provided in the APPLICATION column.</p> |
| COORDINATE | xsd:string | [Required] | An MDX expression that specifies an object or a coordinate in the multidimensional space in which the action is performed. The COORDINATE MUST resolve to the object specified in COORDINATE_TYPE. |

| Name | Type | Restriction | Description |
|-----------------|------------|-------------|---|
| COORDINATE_TYPE | xsd:int | [Required] | An enumeration that specifies how the COORDINATE restriction column is interpreted. The possible values are as follows: <ul style="list-style-type: none"> 1 - Action coordinate refers to the cube. 2 - Action coordinate refers to a dimension. 3 - Action coordinate refers to a level. 4 - Action coordinate refers to a member. 5 - Action coordinate refers to a set. 6 - Action coordinate refers to a cell. |
| ACTION_CAPTION | xsd:string | | The caption for the action. The action name is used if no caption was specified and no translations were specified when the action was created or altered. |
| DESCRIPTION | xsd:string | | A description of the action. |
| CONTENT | xsd:string | | The expression or content of the action that is to be run. |
| APPLICATION | xsd:string | | The name of the application that is to be used to run the action. |
| INVOCATION | xsd:int | Yes | Information about how to invoke the action: <ul style="list-style-type: none"> 1 - Indicates a regular action used during normal operations. This is the default value for this column. 2 - Indicates that the action is performed when the cube is first opened. 4 - Indicates that the action is performed as part of a batch operation. |

The rowset is sorted on CATALOG_NAME, CUBE_NAME, ACTION_NAME.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="ACTION_NAME" name="ACTION_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="ACTION_TYPE" name="ACTION_TYPE"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="COORDINATE" name="COORDINATE"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="COORDINATE_TYPE" name="COORDINATE_TYPE"

```

```

        type="xsd:int" minOccurs="0" />
<xsd:element sql:field="ACTION_CAPTION" name="ACTION_CAPTION"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DESCRIPTION" name="DESCRIPTION"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="CONTENT" name="CONTENT"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="APPLICATION" name="APPLICATION"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="INVOCATION" name="INVOCATION"
    type="xsd:int" minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.12.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|-------------|-------------------|---|
| CUBE_SOURCE | xsd:unsignedShort | A bitmask with one of these valid values: <ul style="list-style-type: none"> ▪ 0x01 - Cube ▪ 0x02 - Dimension<231> The default restriction is a value of 1. |

3.1.4.2.2.1.3.12.3 Remarks

The following table lists the valid COORDINATE and COORDINATE_TYPE combinations.

| COORDINATE object type | COORDINATE_TYPE |
|------------------------|---|
| Cube | MDACTION_COORDINATE_CUBE (1) |
| Dimension | MDACTION_COORDINATE_DIMENSION (2) MDACTION_COORDINATE_LEVEL (3) MDACTION_COORDINATE_MEMBER (4) MDACTION_COORDINATE_SET (5) MDACTION_COORDINATE_CELL (6) |
| Hierarchy | MDACTION_COORDINATE_DIMENSION (2) |
| Level | MDACTION_COORDINATE_LEVEL (3) |
| Member | MDACTION_COORDINATE_MEMBER (4) |
| Set | MDACTION_COORDINATE_SET (5) |
| Cell | MDACTION_COORDINATE_CELL (6) |

3.1.4.2.2.1.3.13 MDSHEMA_SETS

This **Discover** element describes any sets that are currently defined in a database, including session-scoped sets.

3.1.4.2.2.1.3.13.1 Columns

The **MDSHEMA_SETS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|------------------------|------------|-------------|---|
| CATALOG_NAME | xsd:string | Yes | The name of the database. |
| SCHEMA_NAME | xsd:string | Yes | The name of the schema.<232> |
| CUBE_NAME | xsd:string | Yes | The name of the cube. |
| SET_NAME | xsd:string | Yes | The name of the set, as specified in the CREATE SET statement. |
| SCOPE | xsd:int | Yes | The scope of the set. The set can be a session-defined set or a global-defined set. This column can have one of the following values: <ul style="list-style-type: none">1 - Global2 - Session |
| DESCRIPTION | xsd:string | | A description of the set. |
| EXPRESSION | xsd:string | | The expression for the set. |
| DIMENSIONS | xsd:string | | A comma-delimited list of hierarchies included in the set. |
| SET_CAPTION | xsd:string | | A caption associated with the set. |
| SET_DISPLAY_FOLDER | xsd:string | | The display folder. |
| SET_EVALUATION_CONTEXT | xsd:int | | The context for the set. The set can be static or dynamic. This column can have one of the following values: <ul style="list-style-type: none">1 - STATIC2 - DYNAMIC |

The rowset is sorted on CATALOG_NAME and CUBE_NAME.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="SET_NAME" name="SET_NAME"
      type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
</xsd:element>
```

```

<xsd:element sql:field="SCOPE" name="SCOPE" type="xsd:int" minOccurs="0" />
<xsd:element sql:field="DESCRIPTION" name="DESCRIPTION"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="EXPRESSION" name="EXPRESSION"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DIMENSIONS" name="DIMENSIONS"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="SET_CAPTION" name="SET_CAPTION"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="SET_DISPLAY_FOLDER" name="SET_DISPLAY_FOLDER"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="SET_EVALUATION_CONTEXT" name="SET_EVALUATION_CONTEXT"
  type="xsd:int" minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.13.2 Additional Restrictions

In addition to the column restrictions that are indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|-----------------------|-------------------|---|
| CUBE_SOURCE | xsd:unsignedShort | A bitmask with one of the following valid values: <ul style="list-style-type: none"> ▪ 0x01 - Cube ▪ 0x02 - Dimension<233> The default restriction is a value of 1. |
| HIERARCHY_UNIQUE_NAME | xsd:string | The unique name of the hierarchy that contains the set. |

3.1.4.2.2.1.3.14 DISCOVER_INSTANCES

This schema rowset describes the instances on the server.

3.1.4.2.2.1.3.14.1 Columns

The **DISCOVER_INSTANCES** rowset contains the following columns.

| Name | Type | Restriction | Description |
|----------------------|------------|-------------|--|
| INSTANCE_NAME | xsd:string | Yes | The name of the instance. |
| INSTANCE_PORT_NUMBER | xsd:int | | The port number the instance listens on. |
| INSTANCE_STATE | xsd:int | | The state of the server instance. This column can have one of the following values: <ul style="list-style-type: none"> ▪ Running (0x00000004) ▪ Stopped (0x00000001) ▪ Start Pending (0x00000002) ▪ Stop Pending (0x00000003) ▪ Paused (0x00000007) |

| Name | Type | Restriction | Description |
|------|------|-------------|---|
| | | | <ul style="list-style-type: none"> ▪ Pause Pending (0x00000006) ▪ Continue Pending (0x00000005) |

This schema rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="INSTANCE_NAME" name="INSTANCE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="INSTANCE_PORT_NUMBER" name="INSTANCE_PORT_NUMBER"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="INSTANCE_STATE" name="INSTANCE_STATE"
      type="xsd:int" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.15 MDSHEMA_KPIS

This schema rowset describes the KPIs within a database.

3.1.4.2.2.1.3.15.1 Columns

The **MDSHEMA_KPIS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------------|------------|-------------|--|
| CATALOG_NAME | xsd:string | Yes | The name of the database. |
| SCHEMA_NAME | xsd:string | Yes | The name of the schema.<234> |
| CUBE_NAME | xsd:string | Yes | The parent cube for the KPI. |
| MEASUREGROUP_NAME | xsd:string | | The associated measure group for the KPI. |
| KPI_NAME | xsd:string | Yes | The name of the KPI. |
| KPI_CAPTION | xsd:string | | A label or caption associated with the KPI. |
| KPI_DESCRIPTION | xsd:string | | A description of the KPI. |
| KPI_DISPLAY_FOLDER | xsd:string | | The display folder. |
| KPI_VALUE | xsd:string | | The unique name of the member in the measures dimension for the KPI value. |
| KPI_GOAL | xsd:string | | The unique name of the member in the measures dimension for the KPI goal. |
| KPI_STATUS | xsd:string | | The unique name of the member in the measures |

| Name | Type | Restriction | Description |
|-------------------------|------------|-------------|---|
| | | | dimension for the KPI status. |
| KPI_TREND | xsd:string | | The unique name of the member in the measures dimension for the KPI trend. |
| KPI_STATUS_GRAPHIC | xsd:string | | The default graphical representation of the KPI status. |
| KPI_TREND_GRAPHIC | xsd:string | | The default graphical representation of the KPI trend. |
| KPI_WEIGHT | xsd:string | | The unique name of the member in the measures dimension for the KPI weight. |
| KPI_CURRENT_TIME_MEMBER | xsd:string | | The unique name of the member in the time dimension that defines the temporal context of the KPI. |
| KPI_PARENT_KPI_NAME | xsd:string | | The name of the parent KPI. |
| ANNOTATIONS | xsd:string | | The annotations on the KPI. |
| SCOPE | xsd:int | | The scope of the KPI. The KPI can be a session KPI or global KPI. This column can have one of the following values: <ul style="list-style-type: none"> ▪ MDKPI_SCOPE_GLOBAL(1) – Global KPI ▪ MDKPI_SCOPE_SESSION(2) – Session based KPI |

This schema rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MEASUREGROUP_NAME" name="MEASUREGROUP_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="KPI_NAME" name="KPI_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="KPI_CAPTION" name="KPI_CAPTION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="KPI_DESCRIPTION" name="KPI_DESCRIPTION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="KPI_DISPLAY_FOLDER" name="KPI_DISPLAY_FOLDER"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="KPI_VALUE" name="KPI_VALUE"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="KPI_GOAL" name="KPI_GOAL"
      type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

```

<xsd:element sql:field="KPI_STATUS" name="KPI_STATUS"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="KPI_TREND" name="KPI_TREND"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="KPI_STATUS_GRAPHIC" name="KPI_STATUS_GRAPHIC"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="KPI_TREND_GRAPHIC" name="KPI_TREND_GRAPHIC"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="KPI_WEIGHT" name="KPI_WEIGHT"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="KPI_CURRENT_TIME_MEMBER" name="KPI_CURRENT_TIME_MEMBER"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="KPI_PARENT_KPI_NAME" name="KPI_PARENT_KPI_NAME"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="ANNOTATIONS" name="ANNOTATIONS"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="SCOPE" name="SCOPE" type="xsd:int" minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.15.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|-------------|-------------------|---|
| CUBE_SOURCE | xsd:unsignedShort | A bitmask with one of these valid values: <ul style="list-style-type: none"> ▪ 0x01 - Cube ▪ 0x02 - Dimension<235> The default restriction is a value of 1. |

3.1.4.2.2.1.3.16 MDSHEMA_MEASUREGROUPS

This schema rowset describes the measure groups within a database.

3.1.4.2.2.1.3.16.1 Columns

The **MDSHEMA_MEASUREGROUPS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-------------------|-------------|-------------|--|
| CATALOG_NAME | xsd:string | Yes | The name of the catalog. |
| SCHEMA_NAME | xsd:string | Yes | The name of the schema.<236> |
| CUBE_NAME | xsd:string | Yes | The name of the cube. |
| MEASUREGROUP_NAME | xsd:string | Yes | The name of the measure group. |
| DESCRIPTION | xsd:string | | A description of the member. |
| IS_WRITE_ENABLED | xsd:boolean | | When true, indicates that the measure group is write-enabled; otherwise false. Returns a value of true if the measure group is write-enabled. |

| Name | Type | Restriction | Description |
|----------------------|------------|-------------|------------------------------------|
| MEASUREGROUP_CAPTION | xsd:string | | The caption for the measure group. |

This schema rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MEASUREGROUP_NAME" name="MEASUREGROUP_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="IS_WRITE_ENABLED" name="IS_WRITE_ENABLED"
      type="xsd:boolean" minOccurs="0" />
    <xsd:element sql:field="MEASUREGROUP_CAPTION" name="MEASUREGROUP_CAPTION"
      type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.17 MDSHEMA_MEASUREGROUP_DIMENSIONS

This schema rowset enumerates the dimensions of measure groups.

3.1.4.2.2.1.3.17.1 Columns

The **MDSHEMA_MEASUREGROUP_DIMENSIONS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------------------|------------|-------------|--|
| CATALOG_NAME | xsd:string | Yes | The name of the catalog. |
| SCHEMA_NAME | xsd:string | Yes | The name of the schema.<237> |
| CUBE_NAME | xsd:string | Yes | The name of the cube. |
| MEASUREGROUP_NAME | xsd:string | Yes | The name of the measure group. |
| MEASUREGROUP_CARDINALITY | xsd:string | | The number of instances a measure in the measure group can have for a single dimension member. Possible values include: <ul style="list-style-type: none"> ▪ ONE ▪ MANY |

| Name | Type | Restriction | Description |
|-----------------------------|---------------|-------------|---|
| DIMENSION_UNIQUE_NAME | xsd:string | Yes | The unique name for the dimension. |
| DIMENSION_CARDINALITY | xsd:string | | The number of instances a dimension member can have for a single instance of a measure group measure. Possible values include: <ul style="list-style-type: none"> ▪ ONE ▪ MANY |
| DIMENSION_IS_VISIBLE | xsd:boolean | | When true, indicates that hierarchies in the dimension are visible; otherwise false. |
| DIMENSION_IS_FACT_DIMENSION | xsd:boolean | | When true, indicates that the dimension is a fact dimension; otherwise false. |
| DIMENSION_PATH | nested rowset | | A list of dimensions for the reference dimension. The column name of the nested row is "MeasureGroupDimension". For information on nested rowsets, see section 2.2.4.1.3.1.1. |
| DIMENSION_GRANULARITY | xsd:string | | The unique name of the attribute hierarchy that represents the granularity of the dimension. |

The rowset supports sorting on CATALOG_NAME, CUBE_NAME, MEASUREGROUP_NAME, and DIMENSION_UNIQUE_NAME.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MEASUREGROUP_NAME" name="MEASUREGROUP_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MEASUREGROUP_CARDINALITY" name="MEASUREGROUP_CARDINALITY"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_UNIQUE_NAME" name="DIMENSION_UNIQUE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_CARDINALITY" name="DIMENSION_CARDINALITY"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_IS_VISIBLE" name="DIMENSION_IS_VISIBLE"
      type="xsd:boolean" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_IS_FACT_DIMENSION"
      name="DIMENSION_IS_FACT_DIMENSION"
      type="xsd:boolean" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_PATH" name="DIMENSION_PATH"
      minOccurs="0" maxOccurs="unbounded">
      <xsd:complexType>

```

```

    <xsd:sequence>
      <xsd:element sql:field="MeasureGroupDimension" name="MeasureGroupDimension"
        type="xsd:string" minOccurs="0" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element sql:field="DIMENSION_GRANULARITY" name="DIMENSION_GRANULARITY"
  type="xsd:string" minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.17.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|----------------------|-------------------|---|
| DIMENSION_VISIBILITY | xsd:unsignedShort | A bitmask with one of these valid values: <ul style="list-style-type: none"> ▪ 0x01 - Visible ▪ 0x02 - Not Visible The default restriction is a value of 1. |

3.1.4.2.2.1.3.18 MDSHEMA_INPUT_DATASOURCES

This schema rowset request describes the data source objects defined within the database.

3.1.4.2.2.1.3.18.1 Columns

The **MDSHEMA_INPUT_DATASOURCES** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------------|-----------------|-------------|---|
| CATALOG_NAME | xsd:string | Yes | The name of the catalog. |
| SCHEMA_NAME | xsd:string | Yes | The name of the schema. <238> |
| DATASOURCE_NAME | xsd:string | Yes | The name of the data source object. |
| DATASOURCE_TYPE | xsd:string | Yes | The type of the data source. Valid values include the following: <ul style="list-style-type: none"> ▪ Relational ▪ Olap |
| CREATED_ON | xsd:dateTime | | The date that the data source was created. |
| LAST_SCHEMA_UPDATE | xsd:dateTime | | The date and time that the data source was last modified. |
| DESCRIPTION | xsd:string | | The description of the action. |
| TIMEOUT | xsd:unsignedInt | | The timeout of the data source in seconds. |

| Name | Type | Restriction | Description |
|--------------|------------|-------------|-----------------------------------|
| DBMS_NAME | xsd:string | | The external data source name. |
| DBMS_VERSION | xsd:string | | The external data source version. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="SCHEMA_NAME" name="SCHEMA_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="DATASOURCE_NAME" name="DATASOURCE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="DATASOURCE_TYPE" name="DATASOURCE_TYPE" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="CREATED_ON" name="CREATED_ON" type="xsd:dateTime"
      minOccurs="0" />
    <xsd:element sql:field="LAST_SCHEMA_UPDATE" name="LAST_SCHEMA_UPDATE"
      type="xsd:dateTime" minOccurs="0" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="TIMEOUT" name="TIMEOUT" type="xsd:unsignedInt"
      minOccurs="0" />
    <xsd:element sql:field="DBMS_NAME" name="DBMS_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="DBMS_VERSION" name="DBMS_VERSION" type="xsd:string"
      minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.19 DMSHEMA_MINING_SERVICES

This schema rowset provides information about each data mining algorithm that the server supports.

3.1.4.2.2.1.3.19.1 Columns

The **DMSHEMA_MINING_SERVICES** rowset contains the following columns.

| Name | Type | Restriction | Description |
|----------------------|------------------|-------------|--|
| SERVICE_NAME | xsd:string | Yes | The name of the algorithm. |
| SERVICE_TYPE_ID | xsd:unsigned Int | Yes | This column contains a binary value that describes the mining service. <239> |
| SERVICE_DISPLAY_NAME | xsd:string | | A localizable display name for the algorithm. |
| SERVICE_GUID | uuid | | The GUID for the algorithm. |

| Name | Type | Restriction | Description |
|-------------------------------|------------------|-------------|--|
| DESCRIPTION | xsd:string | | A human-readable description of the algorithm. |
| PREDICTION_LIMIT | xsd:unsigned Int | | The maximum number of predictions the model and algorithm can provide. |
| SUPPORTED_DISTRIBUTION_FLAGS | xsd:string | | <p>A comma-delimited list of flags that describe the statistical distributions supported by the algorithm. This column contains one or more of the following values:<240></p> <ul style="list-style-type: none"> ▪ NORMAL ▪ LOG NORMAL ▪ UNIFORM |
| SUPPORTED_INPUT_CONTENT_TYPES | xsd:string | | <p>A comma-delimited list of flags that describe the input content types that are supported by the algorithm. This column contains one or more of the following values:<241></p> <ul style="list-style-type: none"> ▪ KEY – Uniquely identifies a case in a mining model. ▪ DISCRETE – Specifies discrete values. ▪ CONTINUOUS – Specifies continuous values. ▪ DISCRETIZED – Specifies discretized values. ▪ ORDERED – Not supported. ▪ KEY SEQUENCE - Uniquely identifies a step in a sequence of events that constitute the current case. ▪ CYCLICAL – Not supported. ▪ PROBABILITY – Not supported. ▪ VARIANCE – Not supported. ▪ STDEV – Not supported. ▪ SUPPORT – Not supported. ▪ PROBABILITY VARIANCE – Not supported. ▪ PROBABILITY STDEV – Not supported. ▪ KEY TIME – Represents a time slice in time series data. |

| Name | Type | Restriction | Description |
|------------------------------------|------------|-------------|--|
| SUPPORTED_PREDICTION_CONTENT_TYPES | xsd:string | | <p>A comma-delimited list of flags that describe the prediction content types that are supported by the algorithm. This column contains one or more of the following values: <242></p> <ul style="list-style-type: none"> ▪ KEY – Uniquely identifies a case in a mining model. ▪ DISCRETE – Specifies discrete values. ▪ CONTINUOUS – Specifies continuous values. ▪ DISCRETIZED – Specifies discretized values. ▪ ORDERED – Not supported. ▪ KEY SEQUENCE - Uniquely identifies a step in a sequence of events that constitute the current case. ▪ CYCLICAL – Not supported. ▪ PROBABILITY – Not supported. ▪ VARIANCE – Not supported. ▪ STDEV – Not supported. ▪ SUPPORT – Not supported. ▪ PROBABILITY VARIANCE – Not supported. ▪ PROBABILITY STDEV – Not supported. ▪ KEY TIME - Represents a time slice in time series data. |
| SUPPORTED_MODELING_FLAGS | xsd:string | | <p>A comma-delimited list of the modeling flags that are supported by the algorithm. Currently defined flags will include one or more of the following values:</p> <ul style="list-style-type: none"> ▪ MODEL_EXISTENCE_ONLY - Model the column as a binary ("value exists for this column", "value does not exist for this column"). ▪ REGRESSOR - Mark the column for inclusion as an explicit term in the regression equation for output attributes in the model. ▪ NOT NULL – The column does not |

| Name | Type | Restriction | Description |
|------------------------|------------|-------------|---|
| | | | <p>contain null values.</p> <p>Server-specific flags can also appear in this column.</p> |
| SUPPORTED_SOURCE_QUERY | xsd:string | | Reserved for future use. |
| TRAINING_COMPLEXITY | xsd:int | | <p>The length of time that training is expected to take is as follows:</p> <ul style="list-style-type: none"> ▪ 0 - DM_TRAINING_COMPLEXITY_LOW indicates that the running time is relatively short, and that it is proportional to input. ▪ 1 - DM_TRAINING_COMPLEXITY_MEDIUM indicates that the running time might be long, but that it is generally proportional to input. ▪ 2 - DM_TRAINING_COMPLEXITY_HIGH indicates that the running time is long and that it might grow exponentially in relationship to the number of training cases. |
| PREDICTION_COMPLEXITY | xsd:int | | <p>The length of time that prediction is expected to take is as follows:</p> <ul style="list-style-type: none"> ▪ 0 - DM_PREDICTION_COMPLEXITY_LOW indicates that the running time is relatively short, and that it is proportional to input. ▪ 1 - DM_PREDICTION_COMPLEXITY_MEDIUM indicates that the running time might be long, but that it is generally proportional to input. ▪ 2 - DM_PREDICTION_COMPLEXITY_HIGH indicates that the running time is long and that it might grow exponentially in relationship to the number of training cases. |
| EXPECTED_QUALITY | xsd:int | | <p>The expected quality of the model produced with this algorithm is as follows:</p> <ul style="list-style-type: none"> ▪ 0 - DM_EXPECTED_QUALITY_LOW indicates that the average accuracy of models produced by this algorithm is low. ▪ 1 - |

| Name | Type | Restriction | Description |
|---------------------------|-------------|-------------|---|
| | | | <p>DM_EXPECTED_QUALITY_MEDIUM indicates that the average accuracy of models produced by this algorithm is medium.</p> <ul style="list-style-type: none"> ▪ 2 - DM_EXPECTED_QUALITY_HIGH indicates that the average accuracy of models produced by this algorithm is high. |
| SCALING | xsd:int | | <p>The scalability of the algorithm is as follows:</p> <ul style="list-style-type: none"> ▪ 0 - DM_SCALING_LOW indicates that the algorithm scales to small data sets. ▪ 1 - DM_SCALING_MEDIUM indicates that the algorithm scales to large data sets. ▪ 2 - DM_SCALING_HIGH indicates that the algorithm scales to very large data sets. |
| ALLOW_INCREMENTAL_INSERT | xsd:boolean | | <p>When true, indicates that the algorithm supports incremental training, that is, updating the discovered patterns based on new factual data, rather than fully rediscovering the patterns; otherwise false.</p> |
| ALLOW_PMML_INITIALIZATION | xsd:boolean | | <p>When true, indicates that mining models can be created based on a Predictive Model Markup Language (PMML) 2.1 string; otherwise false. When true, the mining algorithm supports initialization from PMML 2.1 content.</p> |
| CONTROL | xsd:int | | <p>The support given by the service if training is interrupted is as follows:</p> <ul style="list-style-type: none"> ▪ DM_CONTROL_NONE (0) indicates that the algorithm cannot be canceled after it starts to train the model. ▪ DM_CONTROL_CANCEL (1) indicates that the algorithm can be canceled after it starts to train the model, but that it MUST be restarted to resume training. ▪ DM_CONTROL_SUSPENDRESUME (2) indicates that the algorithm can be canceled and resumed at any time, but that results are not available until training is complete. ▪ DM_CONTROL_SUSPENDWITHRES |

| Name | Type | Restriction | Description |
|--|-------------|-------------|--|
| | | | ULT (3) indicates that the algorithm can be canceled and resumed at any time, and that any incremental results can be obtained. |
| ALLOW_DUPLICATE_KEY | xsd:boolean | | When true, indicates that cases are allowed to contain duplicate keys; otherwise false. |
| VIEWER_TYPE | xsd:string | | The recommended viewer for this model. |
| HELP_FILE | xsd:string | | The name of the file that contains the documentation for this service. The HELP_FILE column is optional. |
| HELP_CONTEXT | xsd:int | | The Help context ID for this service. The HELP_CONTEXT column is optional. |
| MSOLAP_SUPPORTS_ANALYSIS_SERVICE_S_DDL | xsd:string | | The version of DDL supported. The string "zero" indicates no DDL support. |
| MSOLAP_SUPPORTS_OLAP_MINING_MODELS | xsd:boolean | | When true, indicates that OLAP mining models can be created and MSOLAP_SUPPORTS_ANALYSIS_SERVICES_DDL MUST be non-zero; otherwise false. |
| MSOLAP_SUPPORTS_DATA_MINING_DIMENSIONS | xsd:boolean | | When true, indicates that data mining dimensions can be created; otherwise false. |
| MSOLAP_SUPPORTS_DRILLTHROUGH | xsd:boolean | | When true, indicates that the service supports drillthrough capabilities; otherwise false. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="SERVICE_NAME" name="SERVICE_NAME" type="xsd:string" />
    <xsd:element sql:field="SERVICE_TYPE_ID" name="SERVICE_TYPE_ID" type="xsd:unsignedInt" />
    <xsd:element sql:field="SERVICE_DISPLAY_NAME" name="SERVICE_DISPLAY_NAME" type="xsd:string" />
    <xsd:element sql:field="SERVICE_GUID" name="SERVICE_GUID" />
  </xsd:sequence>
</xsd:complexType>

```

```

        type="uuid" minOccurs="0" />
<xsd:element sql:field="DESCRIPTION" name="DESCRIPTION"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="PREDICTION_LIMIT" name="PREDICTION_LIMIT"
    type="xsd:unsignedInt" />
<xsd:element sql:field="SUPPORTED_DISTRIBUTION_FLAGS"
    name="SUPPORTED_DISTRIBUTION_FLAGS"
    type="xsd:string" />
<xsd:element sql:field="SUPPORTED_INPUT_CONTENT_TYPES"
    name="SUPPORTED_INPUT_CONTENT_TYPES"
    type="xsd:string" />
<xsd:element sql:field="SUPPORTED_PREDICTION_CONTENT_TYPES"
    name="SUPPORTED_PREDICTION_CONTENT_TYPES"
    type="xsd:string" />
<xsd:element sql:field="SUPPORTED_MODELING_FLAGS" name="SUPPORTED_MODELING_FLAGS"
    type="xsd:string" />
<xsd:element sql:field="SUPPORTED_SOURCE_QUERY" name="SUPPORTED_SOURCE_QUERY"
    type="xsd:string" />
<xsd:element sql:field="TRAINING_COMPLEXITY" name="TRAINING_COMPLEXITY"
    type="xsd:int" />
<xsd:element sql:field="PREDICTION_COMPLEXITY" name="PREDICTION_COMPLEXITY"
    type="xsd:int" />
<xsd:element sql:field="EXPECTED_QUALITY" name="EXPECTED_QUALITY"
    type="xsd:int" />
<xsd:element sql:field="SCALING" name="SCALING" type="xsd:int" />
<xsd:element sql:field="ALLOW_INCREMENTAL_INSERT" name="ALLOW_INCREMENTAL_INSERT"
    type="xsd:boolean" />
<xsd:element sql:field="ALLOW_PMML_INITIALIZATION" name="ALLOW_PMML_INITIALIZATION"
    type="xsd:boolean" />
<xsd:element sql:field="CONTROL" name="CONTROL" type="xsd:int" />
<xsd:element sql:field="ALLOW_DUPLICATE_KEY" name="ALLOW_DUPLICATE_KEY"
    type="xsd:boolean" />
<xsd:element sql:field="VIEWER_TYPE" name="VIEWER_TYPE"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="HELP_FILE" name="HELP_FILE"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="HELP_CONTEXT" name="HELP_CONTEXT"
    type="xsd:int" minOccurs="0" />
<xsd:element sql:field="MSOLAP_SUPPORTS_ANALYSIS_SERVICES_DDL"
    name="MSOLAP_SUPPORTS_ANALYSIS_SERVICES_DDL"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="MSOLAP_SUPPORTS_OLAP_MINING_MODELS"
    name="MSOLAP_SUPPORTS_OLAP_MINING_MODELS"
    type="xsd:boolean" minOccurs="0" />
<xsd:element sql:field="MSOLAP_SUPPORTS_DATA_MINING_DIMENSIONS"
    name="MSOLAP_SUPPORTS_DATA_MINING_DIMENSIONS"
    type="xsd:boolean" minOccurs="0" />
<xsd:element sql:field="MSOLAP_SUPPORTS_DRILLTHROUGH"
    name="MSOLAP_SUPPORTS_DRILLTHROUGH"
    type="xsd:boolean" minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.20 DMSHEMA_MINING_SERVICE_PARAMETERS

This schema rowset provides a list of parameters that can be used to configure the behavior of each data mining algorithm that is installed on the server.

3.1.4.2.2.1.3.20.1 Columns

The **DMSHEMA_MINING_SERVICE_PARAMETERS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------|------------|-------------|----------------------------|
| SERVICE_NAME | xsd:string | Yes | The name of the algorithm. |

| Name | Type | Restriction | Description |
|-------------------|-----------------|-------------|--|
| PARAMETER_NAME | xsd:string | Yes | The name of the parameter. |
| PARAMETER_TYPE | xsd:string | | The type of the parameter. |
| IS_REQUIRED | xsd:boolean | | Returns true if the parameter is required; otherwise, false. |
| PARAMETER_FLAGS | xsd:unsignedInt | | A bitmask that describes the characteristics of the parameter: <ul style="list-style-type: none"> DM_PARAMETER_TRAINING (0x00000001) - Indicates that the parameter is used for training. DM_PARAMETER_PREDICTION (0x00000002) - Indicates that the parameter is used for prediction. DM_PARAMETER_CONTENT (0x00000003) - Indicates that the parameter is used for content restriction. |
| DESCRIPTION | xsd:string | | A human-readable description of the parameter. |
| DEFAULT_VALUE | xsd:string | | The default value of the parameter. Returns NULL if the default value is not a simple data type. |
| VALUE_ENUMERATION | xsd:string | | An enumerator of possible values for the parameter. |
| HELP_FILE | xsd:string | | The name of the file that contains documentation for this parameter. |
| HELP_CONTEXT | xsd:int | | The help context ID for this function. |

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="SERVICE_NAME" name="SERVICE_NAME" type="xsd:string" />
    <xsd:element sql:field="PARAMETER_NAME" name="PARAMETER_NAME" type="xsd:string" />
    <xsd:element sql:field="PARAMETER_TYPE" name="PARAMETER_TYPE" type="xsd:string" />
    <xsd:element sql:field="IS_REQUIRED" name="IS_REQUIRED" type="xsd:boolean" />
    <xsd:element sql:field="PARAMETER_FLAGS" name="PARAMETER_FLAGS"
      type="xsd:unsignedInt" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DEFAULT_VALUE" name="DEFAULT_VALUE"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="VALUE_ENUMERATION" name="VALUE_ENUMERATION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="HELP_FILE" name="HELP_FILE"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="HELP_CONTEXT" name="HELP_CONTEXT"
      type="xsd:int" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```


3.1.4.2.2.1.3.21 DMSHEMA_MINING_FUNCTIONS

This schema rowset describes the data mining functions that are supported by the data mining algorithms that are available on a server that is running Analysis Services. <243>

3.1.4.2.2.1.3.21.1 Columns

The **DMSHEMA_MINING_FUNCTIONS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------------|-------------|-------------|--|
| SERVICE_NAME | xsd:string | Yes | The name of the algorithm. |
| FUNCTION_NAME | xsd:string | Yes | The name of the function. |
| FUNCTION_SIGNATURE | xsd:string | | The signature of the function. |
| RETURNS_TABLE | xsd:boolean | | When true, indicates that the function returns a table (such as a histogram table). When false, indicates that the function returns scalar content (such as the length of the character argument). |
| DESCRIPTION | xsd:string | | A human-readable description of the function. |
| HELP_FILE | xsd:string | | The name of the file that contains this function's documentation. |
| HELP_CONTEXT | xsd:int | | The help context ID for this function. |

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="SERVICE_NAME" name="SERVICE_NAME" type="xsd:string" />
    <xsd:element sql:field="FUNCTION_NAME" name="FUNCTION_NAME" type="xsd:string" />
    <xsd:element sql:field="FUNCTION_SIGNATURE" name="FUNCTION_SIGNATURE"
      type="xsd:string" />
    <xsd:element sql:field="RETURNS_TABLE" name="RETURNS_TABLE" type="xsd:boolean" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string" />
    <xsd:element sql:field="HELP_FILE" name="HELP_FILE"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="HELP_CONTEXT" name="HELP_CONTEXT"
      type="xsd:int" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.22 DMSHEMA_MINING_MODEL_CONTENT

This schema rowset enables the client application to browse the content of a trained data mining model.

3.1.4.2.2.1.3.22.1 Columns

The **DMSHEMA_MINING_MODEL_CONTENT** rowset contains the following columns.

| Name | Type | Restriction | Description |
|------------------|------------|-------------|---|
| MODEL_CATALOG | xsd:string | Yes | The catalog name. |
| MODEL_SCHEMA | xsd:string | Yes | The unqualified schema name.<244> |
| MODEL_NAME | xsd:string | Yes | The name of the model with which the content described by this row is associated. |
| ATTRIBUTE_NAME | xsd:string | Yes | The name of the attribute that corresponds to this node. |
| NODE_NAME | xsd:string | Yes | The name of the node. This column contains the same value as NODE_UNIQUE_NAME. |
| NODE_UNIQUE_NAME | xsd:string | Yes | The unique name of the node. |
| NODE_TYPE | xsd:int | Yes | <p>The type of the node. Will generate one of the following values (third-party data mining algorithms can extend this list):</p> <ul style="list-style-type: none"> ▪ DM_NODE_TYPE_MODEL (1) – The root node of a decision tree model. ▪ DM_NODE_TYPE_CLASSIFICATION_TREE_ROOT (2) - The node corresponds to the root of the tree for an output attribute in a classification model. ▪ DM_NODE_TYPE_TREE_INTERIOR (3) - The node corresponds to an interior node (non-leaf/non-root) in the tree for an output attribute in a classification/regression model (including Decision Trees and Time Series models). ▪ DM_NODE_TYPE_TREE_DISTRIBUTION (4) - The node corresponds to a leaf node in the tree for an output attribute in a classification model that includes the distribution of the output attribute at that branch of the tree. ▪ DM_NODE_TYPE_CLUSTER (5) - The node corresponds to a cluster discovered by a clustering model. ▪ DM_NODE_TYPE_UNKNOWN (6) – Not supported. ▪ DM_NODE_TYPE_ITEMSET (7) – The node represents a frequent itemset in an association rules model. ▪ DM_NODE_TYPE_ASSOCIATION_RULE (8) – The node represents a rule discovered by an association rules model. ▪ DM_NODE_TYPE_NB_PREDICTABLE_ATTRIBUTE (9) – The node represents an output attribute in a Naive Bayes model. ▪ DM_NODE_TYPE_NB_INPUT_ATTRIBUTE (10) – The node represents an input attribute in a |

| Name | Type | Restriction | Description |
|------|------|-------------|---|
| | | | <p>Naïve Bayes model.</p> <ul style="list-style-type: none"> ▪ DM_NODE_TYPE_NB_INPUT_ATTRIBUTE_STATE (11) – The node represents a specific state of an input attribute in a Naïve Bayes model. ▪ DM_NODE_TYPE_SEQUENCE (13) – The node represents a sequence in a Sequence Clustering model. ▪ DM_NODE_TYPE_TRANSITION (14) – The node represents a state transition in a Sequence Clustering model. ▪ DM_NODE_TYPE_TIME_SERIES (15) – The node represents the summary for a time series model. ▪ DM_NODE_TYPE_TS_TREE (16) – The node represents the root of the regression tree for a Time Series model. ▪ DM_NODE_TYPE_NN_SUBNETWORK (17) – The node represents Neural network, subnetwork. ▪ DM_NODE_TYPE_NN_INPUT_LAYER (18) – The node represents Neural network, input layer (parent of input nodes). ▪ DM_NODE_TYPE_NN_HIDDEN_LAYER (19) – The node represents Neural network, hidden layer (parent of hidden nodes). ▪ DM_NODE_TYPE_NN_OUTPUT_LAYER (20) – The node represents Neural network, output layer (parent of output nodes). ▪ DM_NODE_TYPE_NN_INPUT_NODE (21) – The node represents Neural network, input node. ▪ DM_NODE_TYPE_NN_HIDDEN_NODE (22) – The node represents Neural network, hidden node. ▪ DM_NODE_TYPE_NN_OUTPUT_NODE (23) – The node represents Neural network, output node. ▪ DM_NODE_TYPE_NN_MARGINAL_STAT_NODE (24) – The node represents Neural network, marginal stat node. ▪ DM_NODE_TYPE_REGRESSION_TREE_ROOT (25) – The node corresponds to the root of the tree for a continuous output attribute in a Decision Tree (regression tree) model. ▪ DM_NODE_TYPE_NB_MARGINAL_STAT_NODE (26) – The node represents Neural network, marginal stat node. ▪ DM_NODE_TYPE_ARIMA_ROOT (27) – The |

| Name | Type | Restriction | Description |
|----------------------|-----------------|-------------|--|
| | | | <p>root node of an Autoregressive Integrated Moving Average (ARIMA) model.<245></p> <ul style="list-style-type: none"> ▪ DM_NODE_TYPE_ARIMA_PERIODICSTRUCTURE (28) – A single ARIMA periodic structure node.<246> ▪ DM_NODE_TYPE_ARIMA_AUTOREGRESSIVE (29) – An autoregressive node of an ARIMA model.<247> ▪ DM_NODE_TYPE_ARIMA_MOVINGAVERAGE (30) – A moving average node of an ARIMA model.<248> |
| NODE_GUID | uuid | Yes | The node GUID.<249> |
| NODE_CAPTION | xsd:string | Yes | A label or a caption associated with the node. This property is primarily for display purposes. |
| CHILDREN_CARDINALITY | xsd:unsignedInt | | An estimate of the number of children that the node has. |
| PARENT_UNIQUE_NAME | xsd:string | | The unique name of the node's parent. NULL is returned for any nodes at the root level. |
| NODE_DESCRIPTION | xsd:string | | The human-readable description of the node. |
| NODE_RULE | xsd:string | | An XML description of the rule that is embedded in the node. |
| MARGINAL_RULE | xsd:string | | An XML description of the rule that is moving to the node from the parent node. |
| NODE_PROBABILITY | xsd:double | | The probability associated with this node. |
| MARGINAL_PROBABILITY | xsd:double | | The probability of reaching the node from the parent node. |
| NODE_DISTRIBUTION | nested rowset | | A table that contains the probability histogram of the node. |
| ATTRIBUTE_NAME | xsd:string | | The name part of key-value pair. |
| ATTRIBUTE_VALUE | xsd:anyType | | The value part of key-value pair. |
| SUPPORT | xsd:double | | The count of the cases that have this attribute-value pair, or that contain this itemset or rule. |
| PROBABILITY | xsd:double | | Indicates the probability for this specific node within the entire model. |
| VARIANCE | xsd:double | | Indicates the variance of the values within the node. By definition, variance is always zero for discrete values. If the model supports continuous values, variance is computed as σ (sigma), using the denominator n , representing the number of cases in the node. |
| VALUETYPE | xsd:int | | Indicates the data type of the value or an attribute, and the usage of the value. Certain |

| Name | Type | Restriction | Description |
|---------------------------|------------|-------------|---|
| | | | value types apply only to certain model types: <ul style="list-style-type: none"> ▪ 0 - Auto Detect ▪ 1 - Missing ▪ 2 - Existing ▪ 3 - Continuous ▪ 4 - Discrete ▪ 5 - Discretized ▪ 6 - Boolean ▪ 7 - Coefficient ▪ 8 - Score gain ▪ 9 - Statistics ▪ 10 - Node unique name ▪ 11 - Intercept ▪ 12 - Periodicity ▪ 13 - Autoregressive order ▪ 14 - Moving average order ▪ 15 - Difference order ▪ 16 - Other ▪ -1 - Prerendered string |
| NODE_SUPPORT | xsd:double | | The number of cases that support this node. |
| MSOLAP_MODEL_COLUMN | xsd:string | | The name of the column from the model definition to which this node pertains. |
| MSOLAP_NODE_SCORE | xsd:double | | The score that was computed for this node. |
| MSOLAP_NODE_SHORT_CAPTION | xsd:string | | A short caption for the node that can be used for display purposes to improve readability. |

The rowset is sorted on MODEL_CATALOG and MODEL_SCHEMA.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-

```

```

                                [0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
</xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="MODEL_CATALOG" name="MODEL_CATALOG" type="xsd:string" />
    <xsd:element sql:field="MODEL_SCHEMA" name="MODEL_SCHEMA"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MODEL_NAME" name="MODEL_NAME" type="xsd:string" />
    <xsd:element sql:field="ATTRIBUTE_NAME" name="ATTRIBUTE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="NODE_NAME" name="NODE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="NODE_UNIQUE_NAME" name="NODE_UNIQUE_NAME"
      type="xsd:string" />
    <xsd:element sql:field="NODE_TYPE" name="NODE_TYPE" type="xsd:int" />
    <xsd:element sql:field="NODE_GUID" name="NODE_GUID" type="uuid" minOccurs="0" />
    <xsd:element sql:field="NODE_CAPTION" name="NODE_CAPTION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CHILDREN_CARDINALITY" name="CHILDREN_CARDINALITY"
      type="xsd:unsignedInt" />
    <xsd:element sql:field="PARENT_UNIQUE_NAME" name="PARENT_UNIQUE_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="NODE_DESCRIPTION" name="NODE_DESCRIPTION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="NODE_RULE" name="NODE_RULE"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MARGINAL_RULE" name="MARGINAL_RULE"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="NODE_PROBABILITY" name="NODE_PROBABILITY"
      type="xsd:double" minOccurs="0" />
    <xsd:element sql:field="MARGINAL_PROBABILITY" name="MARGINAL_PROBABILITY"
      type="xsd:double" minOccurs="0" />
    <xsd:element sql:field="NODE_DISTRIBUTION" name="NODE_DISTRIBUTION"
      minOccurs="0" maxOccurs="unbounded">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element sql:field="ATTRIBUTE_NAME" name="ATTRIBUTE_NAME"
            type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="ATTRIBUTE_VALUE" name="ATTRIBUTE_VALUE"
            minOccurs="0" />
          <xsd:element sql:field="SUPPORT" name="SUPPORT"
            type="xsd:double" minOccurs="0" />
          <xsd:element sql:field="PROBABILITY" name="PROBABILITY"
            type="xsd:double" minOccurs="0" />
          <xsd:element sql:field="VARIANCE" name="VARIANCE"
            type="xsd:double" minOccurs="0" />
          <xsd:element sql:field="VALUETYPE" name="VALUETYPE"
            type="xsd:int" minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element sql:field="NODE_SUPPORT" name="NODE_SUPPORT"
      type="xsd:double" minOccurs="0" />
    <xsd:element sql:field="MSOLAP_MODEL_COLUMN" name="MSOLAP_MODEL_COLUMN"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MSOLAP_NODE_SCORE" name="MSOLAP_NODE_SCORE"
      type="xsd:double" minOccurs="0" />
    <xsd:element sql:field="MSOLAP_NODE_SHORT_CAPTION" name="MSOLAP_NODE_SHORT_CAPTION"
      type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.22.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|----------------|-----------------|--|
| TREE_OPERATION | xsd:unsignedInt | <p>The TREE_OPERATION restriction does not apply to any particular column of the DMSHEMA_MINING_MODEL_CONTENT rowset; rather, it specifies a tree operator. To use this restriction, the consumer MUST specify a NODE_UNIQUE_NAME restriction and a MODEL_NAME restriction, and then the consumer can specify the desired tree operator (ANCESTORS, CHILDREN, SIBLINGS, PARENT, DESCENDANTS, SELF) to obtain the requested set of members. The SELF operator includes the row for the node itself in the list of returned rows.</p> <p>The following list describes the constants that make up the bitmask definition for the TREE_OPERATION restriction. They can be combined by using the logical OR operator.</p> <ul style="list-style-type: none"> ▪ DMTREEOP_ANCESTORS = 0x00000020 ▪ DMTREEOP_CHILDREN = 0x00000001 ▪ DMTREEOP_SIBLINGS = 0x00000002 ▪ DMTREEOP_PARENT = 0x00000004 ▪ DMTREEOP_SELF = 0x00000008 ▪ DMTREEOP_DESCENDANTS = 0x00000010 |

3.1.4.2.2.1.3.23 DMSHEMA_MINING_MODEL_XML

The DMSHEMA_MINING_MODEL_XML schema rowset returns the XML structure of the mining model. The format of the XML string follows the PMML 2.1 standard. <250>

3.1.4.2.2.1.3.23.1 (Updated Section) Columns

The **DMSHEMA_MINING_MODEL_XML** rowset contains the following columns.

| Name | Type | Restriction | Description |
|---------------|------------------------|-------------|--|
| MODEL_CATALOG | xsd:string | Yes | The catalog name. |
| MODEL_SCHEMA | xsd:string | Yes | The unqualified schema name. <251> |
| MODEL_NAME | xsd:string | Yes | The model name. |
| MODEL_TYPE | xsd:string | Yes <252> | The model type. |
| MODEL_GUID | uuid | | The GUID that identifies the model. |
| MODEL_PMML | xsd:string xmlDocument | | An XML representation of the model's content in PMML format. |
| SIZE | xsd:unsignedInt | | The number of bytes in the XML string. |
| LOCATION | xsd:string | | The location of the XML file. It is NULL if a physical file is not used for storage. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="xmlDocument">
  <xsd:sequence>
    <xsd:any />
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="MODEL_CATALOG" name="MODEL_CATALOG"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MODEL_SCHEMA" name="MODEL_SCHEMA"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MODEL_NAME" name="MODEL_NAME" type="xsd:string" />
    <xsd:element sql:field="MODEL_TYPE" name="MODEL_TYPE"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MODEL_GUID" name="MODEL_GUID"
      type="uuid" minOccurs="0" />
    <xsd:element sql:field="MODEL_PMML" name="MODEL_PMML"
      type="xmlDocument" minOccurs="0" />
    <xsd:element sql:field="SIZE" name="SIZE" type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="LOCATION" name="LOCATION"
      type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.24 DMSHEMA_MINING_MODEL_CONTENT_PMML

This schema rowset returns the XML structure of the mining model. The format of the XML string follows the PMML 2.1 standard.<253>

3.1.4.2.2.1.3.24.1 (Updated Section) Columns

The **DMSHEMA_MINING_MODEL_CONTENT_PMML** rowset contains the following columns.

| Name | Type | Restriction | Description |
|---------------|-----------------------------------|-------------|---|
| MODEL_CATALOG | xsd:string | Yes | The catalog name that is populated with the name of the database of which the model is a member. |
| MODEL_SCHEMA | xsd:string | Yes | The unqualified schema name.<254> |
| MODEL_NAME | xsd:string | Yes | The model name. This column cannot contain NULL. |
| MODEL_TYPE | xsd:string | Yes<255> | The model type. It is a server-specific string. It can be NULL. |
| MODEL_GUID | uuid | | The GUID that identifies the model. Servers that do not use GUIDs to identify tables return NULL. |
| MODEL_PMML | xsd:string xmlDocument | | An XML representation of the model's content in PMML format. |

| Name | Type | Restriction | Description |
|----------|-----------------|-------------|---|
| SIZE | xsd:unsignedInt | | The number of bytes in the XML string. |
| LOCATION | xsd:string | | The location of the XML file. It is NULL if no location is available. |

This rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="xmlDocument">
  <xsd:sequence>
    <xsd:any />
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="MODEL_CATALOG" name="MODEL_CATALOG"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MODEL_SCHEMA" name="MODEL_SCHEMA"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MODEL_NAME" name="MODEL_NAME" type="xsd:string" />
    <xsd:element sql:field="MODEL_TYPE" name="MODEL_TYPE"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MODEL_GUID" name="MODEL_GUID" type="uuid" minOccurs="0" />
    <xsd:element sql:field="MODEL_PMML" name="MODEL_PMML"
      type="xmlDocument" minOccurs="0" />
    <xsd:element sql:field="SIZE" name="SIZE" type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="LOCATION" name="LOCATION"
      type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.25 DMSHEMA_MINING_MODELS

This schema rowset enumerates the data mining models that are deployed on the server.

3.1.4.2.2.1.3.25.1 Columns

The **DMSHEMA_MINING_MODELS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|---------------|------------|-------------|-----------------------------------|
| MODEL_CATALOG | xsd:string | Yes | The catalog name. |
| MODEL_SCHEMA | xsd:string | Yes | The unqualified schema name.<256> |

| Name | Type | Restriction | Description |
|--------------------|-----------------|-------------|---|
| MODEL_NAME | xsd:string | Yes | The mining model name. |
| MODEL_TYPE | xsd:string | Yes | The model type.<257> |
| MODEL_GUID | uuid | | The GUID of the model. |
| DESCRIPTION | xsd:string | | The human-readable description of the model. |
| MODEL_PROPID | xsd:unsignedInt | | The property ID of the model. |
| DATE_CREATED | xsd:dateTime | | The date on which the model was created. |
| DATE_MODIFIED | xsd:dateTime | | The date on which the model definition was last modified. |
| SERVICE_TYPE_ID | xsd:unsignedInt | Yes | An enumeration that identifies the type of data mining algorithm that is used by the model. This type can be one of the following values: <ul style="list-style-type: none"> ▪ DM_SERVICETYPE_CLASSIFICATION (0x1) ▪ DM_SERVICETYPE_CLUSTERING (0x2) ▪ DM_SERVICETYPE_ASSOCIATION (0x4) ▪ DM_SERVICETYPE_DENSITY_ESTIMATE (0x8) ▪ DM_SERVICETYPE_SEQUENCE (0x10) |
| SERVICE_NAME | xsd:string | Yes | The server-specific name for the data mining algorithm that is used by the model. |
| CREATION_STATEMENT | xsd:string | | The statement that was used to create the mining model. |
| PREDICTION_ENTITY | xsd:string | | A comma-delimited list that indicates which mining columns can be predicted. |
| IS_POPULATED | xsd:boolean | | Indicates whether the model is populated. The value is true if the model is populated; otherwise, false. |
| MINING_PARAMETERS | xsd:string | | A comma-delimited list of the parameters that were used when the model was created. |
| MINING_STRUCTURE | xsd:string | Yes | The ID of the mining structure on which the model is based. |
| LAST_PROCESSED | xsd:dateTime | | The date when the model was last |

| Name | Type | Restriction | Description |
|--------------------------------|------------------|-------------|--|
| | | | processed. |
| MSOLAP_IS_DRILLTHROUGH_ENABLED | xsd:boolean | | When true, indicates that the model supports drillthrough; otherwise false. |
| FILTER | xsd:string | | The filter expression that is associated with the mining model. NULL or empty string indicates that no filter is applied. |
| TRAINING_SET_SIZE | xsd:unsignedLong | | The number of cases that are contained in the mining model training set after the structure has been processed and any filters have been applied to the model. |

First, the rowset is sorted by mining structure name, which is not a column in the rowset. Then, the rowset is sorted on MODEL_CATALOG, MODEL_SCHEMA, and MODEL_NAME.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="MODEL_CATALOG" name="MODEL_CATALOG" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MODEL_SCHEMA" name="MODEL_SCHEMA" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MODEL_NAME" name="MODEL_NAME" type="xsd:string" />
    <xsd:element sql:field="MODEL_TYPE" name="MODEL_TYPE" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MODEL_GUID" name="MODEL_GUID" type="uuid" minOccurs="0" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MODEL_PROPID" name="MODEL_PROPID" type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="DATE_CREATED" name="DATE_CREATED" type="xsd:dateTime" minOccurs="0" />
    <xsd:element sql:field="DATE_MODIFIED" name="DATE_MODIFIED" type="xsd:dateTime" minOccurs="0" />
    <xsd:element sql:field="SERVICE_TYPE_ID" name="SERVICE_TYPE_ID" type="xsd:unsignedInt" />
    <xsd:element sql:field="SERVICE_NAME" name="SERVICE_NAME" type="xsd:string" />
    <xsd:element sql:field="CREATION_STATEMENT" name="CREATION_STATEMENT" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="PREDICTION_ENTITY" name="PREDICTION_ENTITY" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="IS_POPULATED" name="IS_POPULATED" type="xsd:boolean" />
    <xsd:element sql:field="MINING_PARAMETERS" name="MINING_PARAMETERS" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MINING_STRUCTURE" name="MINING_STRUCTURE" />
  </xsd:sequence>
</xsd:complexType>

```

```

        type="xsd:string" minOccurs="0" />
<xsd:element sql:field="LAST_PROCESSED" name="LAST_PROCESSED"
    type="xsd:dateTime" minOccurs="0" />
<xsd:element sql:field="MSOLAP_IS_DRILLTHROUGH_ENABLED"
    name="MSOLAP_IS_DRILLTHROUGH_ENABLED"
    type="xsd:boolean" />
<xsd:element sql:field="FILTER" name="FILTER" type="xsd:string" minOccurs="0" />
<xsd:element sql:field="TRAINING_SET_SIZE" name="TRAINING_SET_SIZE"
    type="xsd:unsignedLong" minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.26 DMSHEMA_MINING_COLUMNS

This schema rowset describes the individual columns of all defined data mining models that are deployed on the server.

3.1.4.2.2.1.3.26.1 Columns

The **DMSHEMA_MINING_COLUMNS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------------|-------------------|-------------|---|
| MODEL_CATALOG | xsd:string | Yes | The catalog name. |
| MODEL_SCHEMA | xsd:string | Yes | The unqualified schema name.<258> |
| MODEL_NAME | xsd:string | Yes | The mining model name. |
| COLUMN_NAME | xsd:string | Yes | The name of the column. |
| COLUMN_GUID | uuid | | The column GUID. |
| COLUMN_PROPID | xsd:unsignedInt | | The column property ID. |
| ORDINAL_POSITION | xsd:unsignedInt | | The ordinal position of the column. Columns are numbered starting from 1. This column contains NULL if there is no stable ordinal value for the column. |
| COLUMN_HAS_DEFAULT | xsd:boolean | | A Boolean that indicates whether the column has a default value. True if the column has a default value; otherwise false. |
| COLUMN_DEFAULT | xsd:string | | The default value of the column. If the default value is the NULL value, COLUMN_HAS_DEFAULT contains TRUE and COLUMN_DEFAULT contains NULL. |
| COLUMN_FLAGS | xsd:unsignedInt | | A bitmask that describes characteristics of the column. The bitmask is the same as is described for the COLUMN_FLAGS column in section 3.1.4.2.2.1.3.3. This column is never empty. |
| IS_NULLABLE | xsd:boolean | | A Boolean that indicates whether the column is nullable. False if the column is known not to be nullable; otherwise, true. |
| DATA_TYPE | xsd:unsignedShort | | This enumeration is the same as LEVEL_DBTYPE for |

| Name | Type | Restriction | Description |
|--------------------------|-------------------|-------------|--|
| | | | MDSHEMA_LEVELS. (See 3.1.4.2.2.1.3.8) |
| TYPE_GUID | uuid | | The GUID of the column's data type. |
| CHARACTER_MAXIMUM_LENGTH | xsd:unsignedInt | | <p>The maximum possible length of a value in the column. For character, binary, or bit columns, this is one of the following:</p> <ul style="list-style-type: none"> ▪ The maximum length of the column in characters, bytes, or bits, respective to the column type, if a length is defined. For example, a CHAR(5) column in an SQL table has a maximum length of 5. ▪ The maximum length of the data type in characters, bytes, or bits, respective to the column type, if the column does not have a defined length. ▪ Zero (0) if neither the column nor the data type has a defined maximum length. ▪ NULL for all other types of columns. |
| CHARACTER_OCTET_LENGTH | xsd:unsignedInt | | The maximum length in octets (bytes) of the column, if the type of the column is Character or Binary . A value of zero (0) means the column has no maximum length. This column contains NULL for all other types of columns. |
| NUMERIC_PRECISION | xsd:unsignedShort | | <p>The maximum precision of the column if the column's data type is of a numeric data type other than DBTYPE_VARNUMERIC.</p> <p>NULL if the column's data type is not numeric or is DBTYPE_VARNUMERIC.</p> <p>The precision of columns with a data type of DBTYPE_DECIMAL or DBTYPE_NUMERIC depends on the column definition.</p> |
| NUMERIC_SCALE | xsd:short | | The number of digits to the right of the decimal point if the column's type indicator is DBTYPE_DECIMAL, DBTYPE_NUMERIC, or DBTYPE_VARNUMERIC. Otherwise, this column contains NULL.<259> |
| DATETIME_PRECISION | xsd:unsignedInt | | The date/time precision (number of digits in the fractional seconds portion) of the column if the column data type is a DateTime or Interval type; otherwise, NULL. |
| CHARACTER_SET_CATALOG | xsd:string | | The catalog name in which the |

| Name | Type | Restriction | Description |
|----------------------|------------|-------------|--|
| | | | character set is defined.<260> |
| CHARACTER_SET_SCHEMA | xsd:string | | An unqualified schema name in which the character set is defined.<261> |
| CHARACTER_SET_NAME | xsd:string | | The character set name. |
| COLLATION_CATALOG | xsd:string | | The catalog name in which the collation is defined.<262> |
| COLLATION_SCHEMA | xsd:string | | An unqualified schema name in which the collation is defined.<263> |
| COLLATION_NAME | xsd:string | | The collation name.<264> |
| DOMAIN_CATALOG | xsd:string | | The catalog name in which the domain is defined.<265> |
| DOMAIN_SCHEMA | xsd:string | | The unqualified schema name in which the domain is defined.<266> |
| DOMAIN_NAME | xsd:string | | The domain name.<267> |
| DESCRIPTION | xsd:string | | The human-readable description of the column.<268> |
| DISTRIBUTION_FLAG | xsd:string | | A description of the statistical distribution of the column. This column contains one of the following: <ul style="list-style-type: none"> ▪ NORMAL ▪ LOG_NORMAL ▪ UNIFORM |
| CONTENT_TYPE | xsd:string | | A description of the content of the column. This column contains one of the following: <ul style="list-style-type: none"> ▪ KEY ▪ DISCRETE ▪ CONTINUOUS ▪ DISCRETIZED(arguments) ▪ ORDERED ▪ KEY TIME ▪ CYCLICAL ▪ PROBABILITY ▪ VARIANCE ▪ STDEV ▪ SUPPORT ▪ PROBABILITY_VARIANCE |

| Name | Type | Restriction | Description |
|-----------------------------|-------------|-------------|---|
| | | | <ul style="list-style-type: none"> ▪ PROBABILITY_STDEV ▪ KEY SEQUENCE |
| MODELING_FLAG | xsd:string | | <p>A comma-delimited list of flags. The defined flags are as follows: MODEL_EXISTENCE_ONLY REGRESSOR</p> <p>Algorithm-specific modeling flags can also be contained in this column.</p> |
| IS_RELATED_TO_KEY | xsd:boolean | | <p>A Boolean that indicates whether the column is related to the key.</p> <p>True if this column is related to the key. If the key is a single column, the RELATED_ATTRIBUTE field can optionally contain its column name; otherwise false.</p> |
| RELATED_ATTRIBUTE | xsd:string | | <p>The name of the target column to which the current column either relates or is a special property.</p> |
| IS_INPUT | xsd:boolean | | <p>A Boolean that indicates whether the column is an input column.</p> <p>True if this is an input column; otherwise false.</p> |
| IS_PREDICTABLE | xsd:boolean | | <p>A Boolean that indicates whether the column is predictable.</p> <p>True if the column is predictable; otherwise false.</p> |
| CONTAINING_COLUMN | xsd:string | | <p>The name of the TABLE column that contains this column. This column contains NULL if the column is not contained in another column.</p> |
| PREDICTION_SCALAR_FUNCTIONS | xsd:string | | <p>A comma-delimited list of scalar functions that can be performed on the column.</p> |
| PREDICTION_TABLE_FUNCTIONS | xsd:string | | <p>A comma-delimited list of functions that can be applied to the column. The functions are to return a table. The list has the following format: <function name>(<column1> [, <column2>], ...)</p> <p>The format allows the client application to determine the signature (list of parameters) for the respective function.</p> |
| IS_POPULATED | xsd:boolean | | <p>A Boolean that indicates whether the column has been trained with a set of possible values.</p> <p>True if the column has been trained with a set of possible values. False if the column is not populated.</p> |

| Name | Type | Restriction | Description |
|------------------|------------|-------------|---|
| PREDICTION_SCORE | xsd:double | | The score of the model on predicting the column. Score is used to measure the accuracy of a model. |
| SOURCE_COLUMN | xsd:string | | The name of the source mining structure column for the current mining column. |
| FILTER | xsd:string | | The filter that was used in definition of the nested table. If the column is a scalar column, the value is always expected to be NULL or an empty string. If the column is a nested table, NULL or an empty string indicates that no filter is applied to the nested table. |

First, the rowset is sorted by mining structure name, which is not a column in the rowset. Then, the rowset is sorted on MODEL_CATALOG, MODEL_SCHEMA, MODEL_NAME, and COLUMN_NAME.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="MODEL_CATALOG" name="MODEL_CATALOG"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MODEL_SCHEMA" name="MODEL_SCHEMA"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="MODEL_NAME" name="MODEL_NAME"
      type="xsd:string" />
    <xsd:element sql:field="COLUMN_NAME" name="COLUMN_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="COLUMN_GUID" name="COLUMN_GUID"
      type="uuid" minOccurs="0" />
    <xsd:element sql:field="COLUMN_PROPID" name="COLUMN_PROPID"
      type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="ORDINAL_POSITION" name="ORDINAL_POSITION"
      type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="COLUMN_HAS_DEFAULT" name="COLUMN_HAS_DEFAULT"
      type="xsd:boolean" />
    <xsd:element sql:field="COLUMN_DEFAULT" name="COLUMN_DEFAULT"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="COLUMN_FLAGS" name="COLUMN_FLAGS" type="xsd:unsignedInt" />
    <xsd:element sql:field="IS_NULLABLE" name="IS_NULLABLE" type="xsd:boolean" />
    <xsd:element sql:field="DATA_TYPE" name="DATA_TYPE" type="xsd:unsignedShort" />
    <xsd:element sql:field="TYPE_GUID" name="TYPE_GUID" type="uuid" minOccurs="0" />
    <xsd:element sql:field="CHARACTER_MAXIMUM_LENGTH" name="CHARACTER_MAXIMUM_LENGTH"
      type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="CHARACTER_OCTET_LENGTH" name="CHARACTER_OCTET_LENGTH"
      type="xsd:unsignedInt" minOccurs="0" />
```



```

<xsd:element sql:field="NUMERIC_PRECISION" name="NUMERIC_PRECISION"
  type="xsd:unsignedShort" minOccurs="0" />
<xsd:element sql:field="NUMERIC_SCALE" name="NUMERIC_SCALE"
  type="xsd:short" minOccurs="0" />
<xsd:element sql:field="DATETIME_PRECISION" name="DATETIME_PRECISION"
  type="xsd:unsignedInt" minOccurs="0" />
<xsd:element sql:field="CHARACTER_SET_CATALOG" name="CHARACTER_SET_CATALOG"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="CHARACTER_SET_SCHEMA" name="CHARACTER_SET_SCHEMA"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="CHARACTER_SET_NAME" name="CHARACTER_SET_NAME"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="COLLATION_CATALOG" name="COLLATION_CATALOG"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="COLLATION_SCHEMA" name="COLLATION_SCHEMA"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="COLLATION_NAME" name="COLLATION_NAME"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DOMAIN_CATALOG" name="DOMAIN_CATALOG"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DOMAIN_SCHEMA" name="DOMAIN_SCHEMA"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DOMAIN_NAME" name="DOMAIN_NAME"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DESCRIPTION" name="DESCRIPTION"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DISTRIBUTION_FLAG" name="DISTRIBUTION_FLAG"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="CONTENT_TYPE" name="CONTENT_TYPE"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="MODELING_FLAG" name="MODELING_FLAG"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="IS_RELATED_TO_KEY" name="IS_RELATED_TO_KEY"
  type="xsd:boolean" />
<xsd:element sql:field="RELATED_ATTRIBUTE" name="RELATED_ATTRIBUTE"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="IS_INPUT" name="IS_INPUT" type="xsd:boolean" />
<xsd:element sql:field="IS_PREDICTABLE" name="IS_PREDICTABLE" type="xsd:boolean" />
<xsd:element sql:field="CONTAINING_COLUMN" name="CONTAINING_COLUMN"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="PREDICTION_SCALAR_FUNCTIONS"
  name="PREDICTION_SCALAR_FUNCTIONS"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="PREDICTION_TABLE_FUNCTIONS"
  name="PREDICTION_TABLE_FUNCTIONS"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="IS_POPULATED" name="IS_POPULATED" type="xsd:boolean" />
<xsd:element sql:field="PREDICTION_SCORE" name="PREDICTION_SCORE"
  type="xsd:double" minOccurs="0" />
<xsd:element sql:field="SOURCE_COLUMN" name="SOURCE_COLUMN"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="FILTER" name="FILTER" type="xsd:string" minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.27 DMSHEMA_MINING_STRUCTURES

This schema rowset enumerates information about the mining structures in the current catalog.

3.1.4.2.2.1.3.27.1 Columns

The **DMSHEMA_MINING_STRUCTURES** rowset contains the following columns.

| Name | Type | Restriction | Description |
|---------------------|------------------|-------------|---|
| STRUCTURE_CATALOG | xsd:string | Yes | The catalog name. |
| STRUCTURE_SCHEMA | xsd:string | Yes | The unqualified schema name.<269> |
| STRUCTURE_NAME | xsd:string | Yes | The structure name. |
| STRUCTURE_GUID | uuid | | A GUID that uniquely identifies the structure. |
| DESCRIPTION | xsd:string | | The human-readable description of the structure. |
| STRUCTURE_PROPID | xsd:unsignedInt | | The property ID of the structure. NULL if not supported by the server. |
| DATE_CREATED | xsd:dateTime | | The date when the structure was created. NULL if not available from the server. |
| DATE_MODIFIED | xsd:dateTime | | The date when the structure was last modified. NULL if not available from the server. |
| CREATION_STATEMENT | xsd:string | | This column is optional. The statement that was used to create the original data mining model. |
| IS_POPULATED | xsd:boolean | | A Boolean that indicates whether the structure is populated. True if the structure is populated; false otherwise. |
| LAST_PROCESSED | xsd:dateTime | | The date when the structure was last processed. NULL if not available from the server. |
| HOLDOUT_MAXPERCENT | xsd:unsignedByte | | A user-specified value that indicates the maximum percentage of the input cases that are held out as the test set. Zero or NULL indicates no limit. |
| HOLDOUT_MAXCASES | xsd:unsignedLong | | A user-specified value that indicates the maximum number of the input cases that are held out as the test set. Zero or NULL indicates no limit. |
| HOLDOUT_SEED | xsd:unsignedLong | | A user-specified value that is used as the seed for repeatable partitioning. Zero indicates that a hash of the mining structure ID is used as the seed. |
| HOLDOUT_ACTUAL_SIZE | xsd:unsignedLong | | If the mining structure is processed, this column indicates the actual size of the test data set, expressed in number of cases. NULL indicates that the mining structure is not processed. |

The rowset is sorted on STRUCTURE_CATALOG, STRUCTURE_SCHEMA, and STRUCTURE_NAME.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

```

</xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-
      [0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="STRUCTURE_CATALOG" name="STRUCTURE_CATALOG"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="STRUCTURE_SCHEMA" name="STRUCTURE_SCHEMA"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="STRUCTURE_NAME" name="STRUCTURE_NAME" type="xsd:string" />
    <xsd:element sql:field="STRUCTURE_GUID" name="STRUCTURE_GUID"
      type="uuid" minOccurs="0" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="STRUCTURE_PROPID" name="STRUCTURE_PROPID"
      type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="DATE_CREATED" name="DATE_CREATED"
      type="xsd:dateTime" minOccurs="0" />
    <xsd:element sql:field="DATE_MODIFIED" name="DATE_MODIFIED"
      type="xsd:dateTime" minOccurs="0" />
    <xsd:element sql:field="CREATION_STATEMENT" name="CREATION_STATEMENT"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="IS_POPULATED" name="IS_POPULATED" type="xsd:boolean" />
    <xsd:element sql:field="LAST_PROCESSED" name="LAST_PROCESSED"
      type="xsd:dateTime" minOccurs="0" />
    <xsd:element sql:field="HOLDOUT_MAXPERCENT" name="HOLDOUT_MAXPERCENT"
      type="xsd:unsignedByte" minOccurs="0" />
    <xsd:element sql:field="HOLDOUT_MAXCASES" name="HOLDOUT_MAXCASES"
      type="xsd:unsignedLong" minOccurs="0" />
    <xsd:element sql:field="HOLDOUT_SEED" name="HOLDOUT_SEED"
      type="xsd:unsignedLong" minOccurs="0" />
    <xsd:element sql:field="HOLDOUT_ACTUAL_SIZE" name="HOLDOUT_ACTUAL_SIZE"
      type="xsd:unsignedLong" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.28 DMSHEMA_MINING_STRUCTURE_COLUMNS

This schema rowset describes the individual columns of all mining structures that are deployed on the server.

3.1.4.2.2.1.3.28.1 Columns

The **DMSHEMA_MINING_STRUCTURE_COLUMNS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-------------------|------------|-------------|--|
| STRUCTURE_CATALOG | xsd:string | Yes | The catalog name. |
| STRUCTURE_SCHEMA | xsd:string | Yes | The unqualified schema name.<270> |
| STRUCTURE_NAME | xsd:string | Yes | The structure name. This column cannot contain a NULL. |
| COLUMN_NAME | xsd:string | Yes | The name of the column. Uniqueness is guaranteed only among columns that share the same pattern. For example, two nested columns can have the same name if they belong to two different nested |

| Name | Type | Restriction | Description |
|-------------------|-------------------|-------------|---|
| | | | tables inside the same structure. |
| COLUMN_GUID | uuid | | The column GUID. |
| COLUMN_PROPID | xsd:unsignedInt | | The column property ID. |
| ORDINAL_POSITION | xsd:unsignedInt | | The ordinal of the column. Columns are numbered starting from 1. NULL if there is no stable ordinal value for the column. |
| COLUMN_HASDEFAULT | xsd:boolean | | A Boolean that indicates whether this column has a default value. True if the column has a default value. False if the column does not have a default value or if it is unknown whether the column has a default value.<271> |
| COLUMN_DEFAULT | xsd:string | | The default value of the column.<272> |
| COLUMN_FLAGS | xsd:unsignedInt | | A bitmask that describes column characteristics. The DBCOLUMNFLAGS enumerated type specifies the bits in the bitmask. This column cannot contain a NULL value. Valid values include the following: 0x10 - DBCOLUMNFLAGS_ISFIXEDLENGTH - Set if all data in the column has the same length. 0x20 - DBCOLUMNFLAGS_ISNULLABLE - Set if consumer can set the column to NULL or if the provider cannot determine if the column can be set to NULL. 0x40 - DBCOLUMNFLAGS_MAYBENULL - Set if the column can contain NULL values, or if the provider cannot guarantee that the column cannot contain NULL values. 0x80 - DBCOLUMNFLAGS_ISLONG - Set if the column contains a BLOB that contains very long data. |
| IS_NULLABLE | xsd:boolean | | A Boolean that indicates whether this column has a default value. True if the column can contain NULL; otherwise, false. |
| DATA_TYPE | xsd:unsignedShort | | The indicator of the column's data type. <ul style="list-style-type: none"> ▪ "TABLE" = DBTYPE_HCHAPTER (16) ▪ "TEXT" = DBTYPE_WSTR (130) ▪ "LONG" = DBTYPE_I8 (20) ▪ "DOUBLE" = DBTYPE_R8 (5) ▪ "DATE" = DBTYPE_DATE (7) |
| TYPE_GUID | uuid | | The GUID of the column's data type. Servers that do not use GUIDs to identify |

| Name | Type | Restriction | Description |
|--------------------------|-------------------|-------------|---|
| | | | data types are to return NULL in this column. |
| CHARACTER_MAXIMUM_LENGTH | xsd:unsignedInt | | <p>The maximum possible length of a value in the column. For character, binary, or bit columns, this is one of the following:</p> <p>The maximum length of the column in characters, bytes, or bits, respectively, if the length is defined. For example, a CHAR(5) column in an SQL table has a maximum length of 5.</p> <p>The maximum length of the data type in characters, bytes, or bits, respectively, if the column does not have a defined length.</p> <p>Zero (0) if neither the column nor the data type has a defined maximum length.</p> <p>NULL for all other types of columns.</p> |
| CHARACTER_OCTET_LENGTH | xsd:unsignedInt | | The maximum length in octets (bytes) of the column, if the type of the column is character or binary. A value of zero (0) means the column has no maximum length. NULL for all other types of columns. |
| NUMERIC_PRECISION | xsd:unsignedShort | | <p>The maximum precision of the column if the column's data type is of a numeric data type other than DBTYPE_VARNUMERIC; NULL if the column's data type is not numeric or is DBTYPE_VARNUMERIC.</p> <p>The precision of columns with a data type of DBTYPE_DECIMAL or DBTYPE_NUMERIC depends on the definition of the column.</p> |
| NUMERIC_SCALE | xsd:short | | The number of digits to the right of the decimal point if the column's type indicator is DBTYPE_DECIMAL, DBTYPE_NUMERIC, or DBTYPE_VARNUMERIC. Otherwise, this is NULL.<273> |
| DATETIME_PRECISION | xsd:unsignedInt | | The date/time precision (the number of digits in the fractional seconds portion) of the column if the column is a DateTime or Interval type. If the column's data type is not DateTime, this is NULL. |
| CHARACTER_SET_CATALOG | xsd:string | | The catalog name in which the character set is defined. NULL if the server does not support catalogs or different character sets. |
| CHARACTER_SET_SCHEMA | xsd:string | | The unqualified schema name in which the character set is defined.<274> |
| CHARACTER_SET_NAME | xsd:string | | The character set name. NULL if the server does not support different character sets. |

| Name | Type | Restriction | Description |
|-------------------|------------|-------------|---|
| COLLATION_CATALOG | xsd:string | | The catalog name in which the collation is defined. NULL if the server does not support catalogs or different collations. |
| COLLATION_SCHEMA | xsd:string | | The unqualified schema name in which the collation is defined. NULL if the server does not support schemas or different collations. |
| COLLATION_NAME | xsd:string | | The collation name. NULL if the server does not support different collations. |
| DOMAIN_CATALOG | xsd:string | | The catalog name in which the domain is defined. NULL if the server does not support catalogs or domains. |
| DOMAIN_SCHEMA | xsd:string | | The unqualified schema name in which the domain is defined. NULL if the server does not support schemas or domains. |
| DOMAIN_NAME | xsd:string | | The domain name. NULL if the server does not support domains. |
| DESCRIPTION | xsd:string | | The human-readable description of the column. NULL if no description is associated with the column. |
| DISTRIBUTION_FLAG | xsd:string | | The distribution of the mining structure column. This value can be empty or be one of the following: <ul style="list-style-type: none"> ▪ NORMAL ▪ LOG_NORMAL ▪ UNIFORM |
| CONTENT_TYPE | xsd:string | | The content type of the mining structure column. This value is one of the following: <ul style="list-style-type: none"> ▪ KEY ▪ DISCRETE ▪ CONTINUOUS ▪ DISCRETIZED(arguments) ▪ ORDERED ▪ SEQUENCE_TIME ▪ CYCLICAL ▪ PROBABILITY ▪ VARIANCE ▪ STDEV ▪ SUPPORT |

| Name | Type | Restriction | Description |
|-------------------|-------------|-------------|---|
| | | | <ul style="list-style-type: none"> PROBABILITY_VARIANCE PROBABILITY_STDEV |
| MODELING_FLAG | xsd:string | | A comma-delimited list of modeling flags. The only supported MODELING_FLAG column for a mining structure column is "NOT NULL". |
| IS_RELATED_TO_KEY | xsd:boolean | | A Boolean that indicates whether this column is related to the key. True if this column is related to the key; otherwise false. If the key is a single column, the RELATED_ATTRIBUTE field optionally can contain its column name. |
| RELATED_ATTRIBUTE | xsd:string | | The name of the target column that the current column relates to or is a special property of. |
| CONTAINING_COLUMN | xsd:string | | The name of the TABLE column containing this column. NULL if no table contains the column. |
| IS_POPULATED | xsd:boolean | | A Boolean that indicates whether this column has learned a set of possible values. True if the column has learned a set of possible values; otherwise false. |

The rowset is sorted on STRUCTURE_CATALOG, STRUCTURE_SCHEMA, STRUCTURE_NAME, and COLUMN_NAME.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="STRUCTURE_CATALOG" name="STRUCTURE_CATALOG" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="STRUCTURE_SCHEMA" name="STRUCTURE_SCHEMA" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="STRUCTURE_NAME" name="STRUCTURE_NAME" type="xsd:string" />
    <xsd:element sql:field="COLUMN_NAME" name="COLUMN_NAME" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="COLUMN_GUID" name="COLUMN_GUID" type="uuid" minOccurs="0" />
    <xsd:element sql:field="COLUMN_PROPID" name="COLUMN_PROPID" type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="ORDINAL_POSITION" name="ORDINAL_POSITION" />
  </xsd:sequence>
</xsd:complexType>

```

```

        type="xsd:unsignedInt" minOccurs="0" />
<xsd:element sql:field="COLUMN_HASDEFAULT" name="COLUMN_HASDEFAULT"
    type="xsd:boolean" />
<xsd:element sql:field="COLUMN_DEFAULT" name="COLUMN_DEFAULT"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="COLUMN_FLAGS" name="COLUMN_FLAGS" type="xsd:unsignedInt" />
<xsd:element sql:field="IS_NULLABLE" name="IS_NULLABLE" type="xsd:boolean" />
<xsd:element sql:field="DATA_TYPE" name="DATA_TYPE" type="xsd:unsignedShort" />
<xsd:element sql:field="TYPE_GUID" name="TYPE_GUID" type="uuid" minOccurs="0" />
<xsd:element sql:field="CHARACTER_MAXIMUM_LENGTH" name="CHARACTER_MAXIMUM_LENGTH"
    type="xsd:unsignedInt" minOccurs="0" />
<xsd:element sql:field="CHARACTER_OCTET_LENGTH" name="CHARACTER_OCTET_LENGTH"
    type="xsd:unsignedInt" minOccurs="0" />
<xsd:element sql:field="NUMERIC_PRECISION" name="NUMERIC_PRECISION"
    type="xsd:unsignedShort" minOccurs="0" />
<xsd:element sql:field="NUMERIC_SCALE" name="NUMERIC_SCALE"
    type="xsd:short" minOccurs="0" />
<xsd:element sql:field="DATETIME_PRECISION" name="DATETIME_PRECISION"
    type="xsd:unsignedInt" minOccurs="0" />
<xsd:element sql:field="CHARACTER_SET_CATALOG" name="CHARACTER_SET_CATALOG"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="CHARACTER_SET_SCHEMA" name="CHARACTER_SET_SCHEMA"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="CHARACTER_SET_NAME" name="CHARACTER_SET_NAME"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="COLLATION_CATALOG" name="COLLATION_CATALOG"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="COLLATION_SCHEMA" name="COLLATION_SCHEMA"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="COLLATION_NAME" name="COLLATION_NAME"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DOMAIN_CATALOG" name="DOMAIN_CATALOG"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DOMAIN_SCHEMA" name="DOMAIN_SCHEMA"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DOMAIN_NAME" name="DOMAIN_NAME"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DESCRIPTION" name="DESCRIPTION"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DISTRIBUTION_FLAG" name="DISTRIBUTION_FLAG"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="CONTENT_TYPE" name="CONTENT_TYPE"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="MODELING_FLAG" name="MODELING_FLAG"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="IS_RELATED_TO_KEY" name="IS_RELATED_TO_KEY"
    type="xsd:boolean" />
<xsd:element sql:field="RELATED_ATTRIBUTE" name="RELATED_ATTRIBUTE"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="CONTAINING_COLUMN" name="CONTAINING_COLUMN"
    type="xsd:string" minOccurs="0" />
<xsd:element sql:field="IS_POPULATED" name="IS_POPULATED" type="xsd:boolean" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.29 DISCOVER_PROPERTIES

This schema rowset returns a list of information and values about the properties that are supported by the server for the specified data source.

3.1.4.2.2.1.3.29.1 Columns

The **DISCOVER_PROPERTIES** rowset contains the following columns.

| Name | Type | Restriction | Description |
|---------------------|-------------|-------------|--|
| PropertyName | xsd:string | Yes | The name of the property. |
| PropertyDescription | xsd:string | | A description of the property. |
| PropertyType | xsd:string | | The XSD data type of the property. |
| PropertyAccessType | xsd:string | | The access for the property. The value can be Read, Write, or ReadWrite. |
| IsRequired | xsd:boolean | | When true, indicates that a property is required; otherwise false. |
| Value | xsd:string | | The current value of the property. |

This schema rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="PropertyName" name="PropertyName" type="xsd:string" />
    <xsd:element sql:field="PropertyDescription" name="PropertyDescription"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="PropertyType" name="PropertyType" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="PropertyAccessType" name="PropertyAccessType"
      type="xsd:string" />
    <xsd:element sql:field="IsRequired" name="IsRequired" type="xsd:boolean"
      minOccurs="0" />
    <xsd:element sql:field="Value" name="Value" type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.30 DISCOVER_LITERALS

This schema rowset returns information about literals supported by the server.

3.1.4.2.2.1.3.30.1 Columns

The **DISCOVER_LITERALS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------------------|------------|-------------|--|
| LiteralName | xsd:string | Yes | The name of the literal. |
| LiteralValue | xsd:string | | The literal value. |
| LiteralInvalidChars | xsd:string | | The characters that are not valid in the literal. |
| LiteralInvalidStartingChars | xsd:string | | The characters that are not valid as the first character of the literal. |
| LiteralMaxLength | xsd:int | | The maximum number of characters in the literal. If there is no maximum or the maximum is unknown, the |

| Name | Type | Restriction | Description |
|----------------------|---------|-------------|---|
| | | | value is -1. |
| LiteralNameEnumValue | xsd:int | | <p>The value is one of the following:</p> <ul style="list-style-type: none"> ▪ DBLITERAL_INVALID = 0 ▪ DBLITERAL_BINARY_LITERAL = 1 ▪ DBLITERAL_CATALOG_NAME = 2 ▪ DBLITERAL_CATALOG_SEPARATOR = 3 ▪ DBLITERAL_CHAR_LITERAL = 4 ▪ DBLITERAL_COLUMN_ALIAS = 5 ▪ DBLITERAL_COLUMN_NAME = 6 ▪ DBLITERAL_CORRELATION_NAME = 7 ▪ DBLITERAL_CURSOR_NAME = 8 ▪ DBLITERAL_ESCAPE_PERCENT = 9 ▪ DBLITERAL_ESCAPE_UNDERSCORE = 10 ▪ DBLITERAL_INDEX_NAME = 11 ▪ DBLITERAL_LIKE_PERCENT = 12 ▪ DBLITERAL_LIKE_UNDERSCORE = 13 ▪ DBLITERAL_PROCEDURE_NAME = 14 ▪ DBLITERAL_QUOTE_PREFIX = 15 ▪ DBLITERAL_SCHEMA_NAME = 16 ▪ DBLITERAL_TABLE_NAME = 17 ▪ DBLITERAL_TEXT_COMMAND = 18 ▪ DBLITERAL_USER_NAME = 19 ▪ DBLITERAL_VIEW_NAME = 20 ▪ DBLITERAL_CUBE_NAME = 21 ▪ DBLITERAL_DIMENSION_NAME = 22 ▪ DBLITERAL_HIERARCHY_NAME = 23 ▪ DBLITERAL_LEVEL_NAME = 24 ▪ DBLITERAL_MEMBER_NAME = 25 ▪ DBLITERAL_PROPERTY_NAME = 26 ▪ DBLITERAL_SCHEMA_SEPARATOR = 27 ▪ DBLITERAL_QUOTE_SUFFIX = 28 ▪ DBLITERAL_ESCAPE_PERCENT_SUFFIX = 29 |

| Name | Type | Restriction | Description |
|------|------|-------------|---|
| | | | <ul style="list-style-type: none"> DBLITERAL_ESCAPE_UNDERSCORE_SUFFIX = 30 |

This schema rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="LiteralName" name="LiteralName" type="xsd:string" />
    <xsd:element sql:field="LiteralValue" name="LiteralValue" type="xsd:string" />
    <xsd:element sql:field="LiteralInvalidChars" name="LiteralInvalidChars"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LiteralInvalidStartingChars"
      name="LiteralInvalidStartingChars"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LiteralMaxLength" name="LiteralMaxLength" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="LiteralNameEnumValue" name="LiteralNameEnumValue"
      type="xsd:int" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.31 DISCOVER_SCHEMA_ROWSETS

This schema rowset returns the names, restrictions, description, and other information for all **Discover** requests.

3.1.4.2.2.1.3.31.1 Columns

The **DISCOVER_SCHEMA_ROWSETS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|------------------|------------------|-------------|--|
| SchemaName | xsd:string | Yes | The name of the Discover request. |
| SchemaGuid | uuid | | The GUID of the Discover request. |
| Restrictions | nested rowset | | The restrictions supported by the Discover request. |
| Description | xsd:string | | The description of the Discover request. |
| RestrictionsMask | xsd:unsignedLong | | The lowest N bits set to 1, where N is the number of restrictions. |

This schema rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>

```

```

        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
    <xsd:restriction base="xsd:string">
        <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
    </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
    <xsd:sequence>
        <xsd:element sql:field="SchemaName" name="SchemaName" type="xsd:string" />
        <xsd:element sql:field="SchemaGuid" name="SchemaGuid" type="uuid" minOccurs="0" />
        <xsd:element sql:field="Restrictions" name="Restrictions" minOccurs="0"
            maxOccurs="unbounded">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element sql:field="Name" name="Name" type="xsd:string" minOccurs="0" />
                    <xsd:element sql:field="Type" name="Type" type="xsd:string" minOccurs="0" />
                </xsd:sequence>
            </xsd:complexType>
        </xsd:element>
        <xsd:element sql:field="Description" name="Description" type="xsd:string"
            minOccurs="0" />
        <xsd:element sql:field="RestrictionsMask" name="RestrictionsMask"
            type="xsd:unsignedLong" minOccurs="0" />
    </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.32 DISCOVER_KEYWORDS

This schema rowset returns information about keywords that are reserved by the XMLA server.

If you call the **Discover** method with the **DISCOVER_KEYWORDS** enumeration value in the **RequestType** element, the **Discover** method returns the **DISCOVER_KEYWORDS** rowset.

3.1.4.2.2.1.3.32.1 Columns

The **DISCOVER_KEYWORDS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|---------|------------|-------------|---------------------|
| Keyword | xsd:string | Yes | The keyword string. |

This schema rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
    <xsd:complexType>
        <xsd:sequence minOccurs="0" maxOccurs="unbounded">
            <xsd:element name="row" type="row" />
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
    <xsd:sequence>
        <xsd:element sql:field="Keyword" name="Keyword" type="xsd:string" />
    </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.33 DISCOVER_DATASOURCES

This schema rowset returns a list of the data sources that are available on the server.

3.1.4.2.2.1.3.33.1 Columns

The **DISCOVER_DATASOURCES** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------------|------------|-------------|--|
| DataSourceName | xsd:string | Yes | The name of the data source. |
| DataSourceDescription | xsd:string | | The description of the data source. |
| URL | xsd:string | Yes | The unique path of the data source. |
| DataSourceInfo | xsd:string | | A string that contains any additional information required to connect to the data source. |
| ProviderName | xsd:string | Yes | The name of the provider for the data source. |
| ProviderType | xsd:string | Yes | This array specifies the types of data supported by the server. It can include one or more of the following types: <ul style="list-style-type: none"> MDP: multidimensional data provider. TDP: tabular data provider. DMP: data mining provider (implements the OLE for DB for Data Mining specification).<275> |
| AuthenticationMode | xsd:string | Yes | A string that specifies what type of security mode the data source uses. Values can be one of the following: <ul style="list-style-type: none"> Unauthenticated: No user ID or password has to be sent. Authenticated: User ID and password MUST be included in the information required to connect to the data source. Integrated: The data source uses the underlying security to determine authorization.<276> |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="DataSourceName" name="DataSourceName" type="xsd:string" />
    <xsd:element sql:field="DataSourceDescription" name="DataSourceDescription"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="URL" name="URL" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DataSourceInfo" name="DataSourceInfo" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="ProviderName" name="ProviderName" type="xsd:string" />
    <xsd:element sql:field="ProviderType" name="ProviderType" type="xsd:string" />
  </xsd:sequence>
</xsd:complexType>
</xsd:schema>
```

```

        minOccurs="0" maxOccurs="unbounded" />
    <xsd:element sql:field="AuthenticationMode" name="AuthenticationMode"
        type="xsd:string" minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.34 DISCOVER_ENUMERATORS

This schema rowset returns a list of names, data types, and enumeration values of enumerators supported by the XMLA Provider for a specific data source.

3.1.4.2.2.1.3.34.1 Columns

The **DISCOVER_ENUMERATORS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------------|------------|-------------|--|
| EnumName | xsd:string | Yes | The name of the enumerator that contains a set of values. |
| EnumDescription | xsd:string | | A localizable description of the enumerator. |
| EnumType | xsd:string | | The data type of the enumeration values. |
| ElementName | xsd:string | | The name of one of the value elements in the enumerator set. Example: TDP |
| ElementDescription | xsd:string | | This column is optional. A localizable description of the element. |
| ElementValue | xsd:string | | The value of the element. This is always a string representing a number, and it never has a leading 0. Example: 1 |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="EnumName" name="EnumName" type="xsd:string" />
    <xsd:element sql:field="EnumDescription" name="EnumDescription" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="EnumType" name="EnumType" type="xsd:string" />
    <xsd:element sql:field="ElementName" name="ElementName" type="xsd:string" />
    <xsd:element sql:field="ElementDescription" name="ElementDescription"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="ElementValue" name="ElementValue" type="xsd:string"
      minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.35 DISCOVER_XML_METADATA

This schema rowset returns a rowset with one row and one column. The single cell in the rowset contains an XML document that contains the requested XML metadata.

3.1.4.2.2.1.3.35.1 Columns

The **DISCOVER_XML_METADATA** rowset contains the following columns.

| Name | Type | Restriction | Description |
|----------|-------------|-------------|---|
| METADATA | xmlDocument | | An XML document that describes the object requested by the restriction. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="xmlDocument">
  <xsd:sequence>
    <xs:any processContents="skip"/>
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="METADATA" name="METADATA" type="xmlDocument" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.35.2 Additional Restrictions

In addition to the column restrictions that are indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|-------------------------|------------|---------------------------------|
| DatabaseID | xsd:string | The database ID. |
| DimensionID | xsd:string | The dimension ID. |
| CubeID | xsd:string | The cube ID. |
| MeasureGroupID | xsd:string | The measure group ID. |
| PartitionID | xsd:string | The partition ID. |
| PerspectiveID | xsd:string | The perspective ID. |
| DimensionPermissionID | xsd:string | The dimension permission ID. |
| RoleID | xsd:string | The role ID. |
| DatabasePermissionID | xsd:string | The database permission ID. |
| MiningModelID | xsd:string | The mining model ID. |
| MiningModelPermissionID | xsd:string | The mining model permission ID. |

| Name | Type | Description |
|-----------------------------|------------|---|
| DataSourceID | xsd:string | The data source ID. |
| MiningStructureID | xsd:string | The mining structure ID. |
| AggregationDesignID | xsd:string | The aggregation design ID. |
| TraceID | xsd:string | The trace ID. |
| MiningStructurePermissionID | xsd:string | The mining structure permission ID. |
| CubePermissionID | xsd:string | The cube permission ID. |
| AssemblyID | xsd:string | The assembly ID. |
| MdxScriptID | xsd:string | The MDX script ID. |
| DataSourceViewID | xsd:string | The data source view ID. |
| DataSourcePermissionID | xsd:string | The data source permission ID. |
| ObjectExpansion | xsd:string | <p>The degree of expansion that is wanted in the return result. The available values are:</p> <ul style="list-style-type: none"> ▪ ReferenceOnly - Returns only the name/ID/timestamp/state requested for the requested objects and all descendant major objects recursively. ▪ ObjectProperties - Expands the requested object with no references to contained objects (includes expanded minor contained objects). ▪ ExpandObject - Same as <i>ObjectProperties</i>, but also returns the name, ID, and timestamp for contained major objects. ▪ ExpandFull - Fully expands the requested object recursively to the bottom of every contained object. |

3.1.4.2.2.1.3.36 DISCOVER_TRACES

This schema rowset contains the **DISCOVER_TRACES** schema rowset.

3.1.4.2.2.1.3.36.1 Columns

The **DISCOVER_TRACES** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------|-------------|-------------|---|
| TraceID | xsd:string | Yes | The trace ID. |
| TraceName | xsd:string | | The trace name. |
| LogFileName | xsd:string | | The trace log file name. |
| LogFileSize | xsd:long | | The trace log file size. |
| LogFileRollover | xsd:boolean | | When true, indicates that the log file is to be rolled over; otherwise false. |

| Name | Type | Restriction | Description |
|--------------|--------------|-------------|---|
| AutoRestart | xsd:boolean | | When true, indicates that the auto restart option is enabled; otherwise, false. |
| CreationTime | xsd:dateTime | | The date and time that the trace was created. |
| Type | xsd:string | | The type of the trace: <ul style="list-style-type: none"> Trace indicates a profiler trace. XEvent indicates an XEvent trace. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="TraceID" name="TraceID" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="TraceName" name="TraceName" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="LogFileName" name="LogFileName" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="LogFileSize" name="LogFileSize" type="xsd:long"
      minOccurs="0" />
    <xsd:element sql:field="LogFileRollover" name="LogFileRollover" type="xsd:boolean"
      minOccurs="0" />
    <xsd:element sql:field="AutoRestart" name="AutoRestart" type="xsd:boolean"
      minOccurs="0" />
    <xsd:element sql:field="CreationTime" name="CreationTime" type="xsd:dateTime"
      minOccurs="0" />
    <xsd:element sql:field="Type" name="Type" type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.37 DISCOVER_TRACE_DEFINITION_PROVIDERINFO

This schema rowset returns basic information about the trace provider, such as its name and description.

3.1.4.2.2.1.3.37.1 Columns

The **DISCOVER_TRACE_DEFINITION_PROVIDERINFO** rowset contains the following columns.

| Name | Type | Restriction | Description |
|------|------------|-------------|--|
| Data | xsd:string | | This column contains an encoded XML string that describes basic information about the trace provider. For information about what this XML string contains, see <code>Trace_Definition_ProviderInfo</code> (section 2.2.4.3.1). The DISCOVER response adds an extra TraceProvider element as a parent to the content of that cell. However, when sending the complex type for Create or Alter , it is not used. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="Data" name="Data" type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.38 DISCOVER_TRACE_COLUMNS

This schema rowset contains the **DISCOVER_TRACE_COLUMNS** schema rowset.

3.1.4.2.2.1.3.38.1 Columns

The **DISCOVER_TRACE_COLUMNS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|------|------------|-------------|--|
| Data | xsd:string | | This column contains an encoded XML string describing information about the trace columns provided by the trace provider. It contains the COLUMN element of the trace definition. See 2.2.4.3.3 for information about what this XML string contains. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="Data" name="Data" type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.39 DISCOVER_TRACE_EVENT_CATEGORIES

This schema rowset contains the **DISCOVER_TRACE_EVENT_CATEGORIES** schema rowset.

3.1.4.2.2.1.3.39.1 Columns

The **DISCOVER_TRACE_EVENT_CATEGORIES** rowset contains the following columns.

| Name | Type | Restriction | Description |
|------|------------|-------------|---|
| Data | xsd:string | | This column contains an encoded XML string describing event category information about the trace provider. See 2.2.4.3.2 for an explanation of what this XML document contains. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="Data" name="Data" type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.40 DISCOVER_MEMORYUSAGE

This schema rowset returns the **DISCOVER_MEMORYUSAGE** statistics for various objects allocated by the server.

3.1.4.2.2.1.3.40.1 Columns

The **DISCOVER_MEMORYUSAGE** rowset contains the following columns.

| Name | Type | Restriction | Description |
|----------------------|------------------|-------------|---|
| MemoryID | xsd:unsignedLong | | A number identifying the memory. |
| MemoryName | xsd:string | | The name of the object owning the memory. |
| SPID | xsd:unsignedInt | Yes | The session that allocated the memory. Zero indicates memory not tied to a specific session. |
| CreationTime | xsd:dateTime | | Either "the time the object was created" or "the time the memory was allocated." |
| BaseObjectType | xsd:unsignedInt | Yes | This is a number describing the type of the object. Objects with the same BaseObjectType have the same type. |
| MemoryUsed | xsd:unsignedLong | Yes | This is the current size of the object, which can be less than the memory allocated for use by the object. |
| MemoryAllocated | xsd:unsignedLong | | The amount of memory allocated for use by the object, which can be greater than the amount of memory actually used by the object. |
| MemoryAllocBase | xsd:unsignedLong | | The bytes initially allocated for the object itself (excluding additional allocations for object contents). |
| MemoryAllocFromAlloc | xsd:unsignedLong | | The memory allocated for the contents of this object. |

| Name | Type | Restriction | Description |
|------------------|-----------------|-------------|--|
| ElementCount | xsd:unsignedInt | | For a container object, this is the number of objects contained by that object. |
| Shrinkable | xsd:boolean | Yes<277> | A Boolean that indicates if the memory is shrinkable (can be evicted due to memory pressure). If true, the memory is shrinkable; if false, the memory is not shrinkable. |
| ObjectParentPath | xsd:string | | A string identifying the full path of this object. |
| ObjectId | xsd:string | | A string identifying the object. |
| Group | xsd:string | | The name of the group. The system tracker name is \$System. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="MemoryID" name="MemoryID" type="xsd:unsignedLong"
      minOccurs="0" />
    <xsd:element sql:field="MemoryName" name="MemoryName" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="SPID" name="SPID" type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="CreationTime" name="CreationTime" type="xsd:dateTime"
      minOccurs="0" />
    <xsd:element sql:field="BaseObjectType" name="BaseObjectType"
      type="xsd:unsignedInt" minOccurs="0" />
    <xsd:element sql:field="MemoryUsed" name="MemoryUsed" type="xsd:unsignedLong"
      minOccurs="0" />
    <xsd:element sql:field="MemoryAllocated" name="MemoryAllocated"
      type="xsd:unsignedLong" minOccurs="0" />
    <xsd:element sql:field="MemoryAllocBase" name="MemoryAllocBase"
      type="xsd:unsignedLong" minOccurs="0" />
    <xsd:element sql:field="MemoryAllocFromAlloc" name="MemoryAllocFromAlloc"
      type="xsd:unsignedLong" minOccurs="0" />
    <xsd:element sql:field="ElementCount" name="ElementCount" type="xsd:unsignedInt"
      minOccurs="0" />
    <xsd:element sql:field="Shrinkable" name="Shrinkable" type="xsd:boolean"
      minOccurs="0" />
    <xsd:element sql:field="ObjectParentPath" name="ObjectParentPath" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="ObjectId" name="ObjectId" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="Group" name="Group" type="xsd:string"
      minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.41 DISCOVER_MEMORYGRANT

This rowset returns a list of internal memory quota grants that are taken by jobs that are currently running on the server.

3.1.4.2.2.1.3.41.1 Columns

The **DISCOVER_MEMORYGRANT** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------|--------------|-------------|---|
| MemoryID | xsd:long | | A number that identifies the memory quota grant. Unique within the context of a single DISCOVER_MEMORYGRANT request. |
| SPID | xsd:int | Yes | The session ID. |
| CreationTime | xsd:dateTime | | The time the quota was granted. |
| LastRequestTime | xsd:dateTime | | The time the quota request was last modified. |
| MemoryUsed | xsd:int | | The amount of memory used in association with the quota. |
| MemoryGranted | xsd:int | | The amount of memory granted for use by the job that is obtaining the memory quota. |
| Blocked | xsd:boolean | | A Boolean that indicates the block status of the job. True indicates that the job is blocked waiting for another job to release sufficient quota to grant its quota request. False indicates that the job has received its quota and can execute. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="MemoryID" name="MemoryID" type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="SPID" name="SPID" type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="CreationTime" name="CreationTime" type="xsd:dateTime"
      minOccurs="0" />
    <xsd:element sql:field="LastRequestTime" name="LastRequestTime" type="xsd:dateTime"
      minOccurs="0" />
    <xsd:element sql:field="MemoryUsed" name="MemoryUsed" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="MemoryGranted" name="MemoryGranted" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="Blocked" name="Blocked" type="xsd:boolean" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.42 DISCOVER_LOCKS

This schema rowset provides information about the current standing locks on the server.

3.1.4.2.2.1.3.42.1 (Updated Section) Columns

The **DISCOVER_LOCKS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|---------------------|-----------------|-------------|--|
| SPID | xsd:int | Yes | The session ID. |
| LOCK_ID | uuid | | The unique identifier of the lock, as a GUID. |
| LOCK_TRANSACTION_ID | uuid | Yes | The unique identifier of the transaction, as a GUID. |
| LOCK_OBJECT_ID | xsd:xmlDocument | Yes | The unique identifier of the object being locked. |
| LOCK_STATUS | xsd:int | Yes | The lock status. <ul style="list-style-type: none"> 0 - The lock is granted. 1 - The system is waiting to lock the object. 1 - The lock is granted. |
| LOCK_TYPE | xsd:int | Yes | A bitmask of lock types. <ul style="list-style-type: none"> LOCK_NONE (0x0000000) - No lock. LOCK_SESSION_LOCK (0x0000001) - Inactive session; does not interfere with other locks. LOCK_READ (0x0000002) - Read lock during processing. LOCK_WRITE (0x0000004) - Write lock during processing. LOCK_COMMIT_READ (0x0000008) - Commit lock, shared. LOCK_COMMIT_WRITE (0x0000010) - Commit lock, exclusive. LOCK_COMMIT_ABORTABLE (0x0000020) - Abort at commit progress. LOCK_COMMIT_INPROGRESS (0x0000040) - Commit in progress. LOCK_INVALID (0x0000080) Invalid lock. |
| LOCK_CREATION_TIME | xsd:dateTime | | The UTC server time at the moment the lock was requested. |
| LOCK_GRANT_TIME | xsd:dateTime | | The UTC server time at the moment the lock was granted on the resource. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>

```

```

<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="xmlDocument">
  <xsd:sequence>
    <xsd:any />
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="SPID" name="SPID" type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="LOCK_ID" name="LOCK_ID" type="uuid" minOccurs="0" />
    <xsd:element sql:field="LOCK_TRANSACTION_ID" name="LOCK_TRANSACTION_ID" type="uuid"
      minOccurs="0" />
    <xsd:element sql:field="LOCK_OBJECT_ID" name="LOCK_OBJECT_ID" type="xmlDocument"
      minOccurs="0" />
    <xsd:element sql:field="LOCK_STATUS" name="LOCK_STATUS" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="LOCK_TYPE" name="LOCK_TYPE" type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="LOCK_CREATION_TIME" name="LOCK_CREATION_TIME"
      type="xsd:dateTime" minOccurs="0" />
    <xsd:element sql:field="LOCK_GRANT_TIME" name="LOCK_GRANT_TIME" type="xsd:dateTime"
      minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.42.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|-------------------|---------|--|
| LOCK_MIN_TOTAL_MS | xsd:int | Include only locks that have been held for at least this number of milliseconds. |

3.1.4.2.2.1.3.43 DISCOVER_CONNECTIONS

This schema rowset provides resource usage and activity information about the currently opened connections on the server.

3.1.4.2.2.1.3.43.1 Columns

The **DISCOVER_CONNECTIONS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------------------------|------------|-------------|---|
| CONNECTION_ID | xsd:int | Yes | A unique number that identifies the connection. |
| CONNECTION_USER_NAME | xsd:string | Yes | The user name under which the connection was initiated. |
| CONNECTION_IMPERSONATED_USER_NAME | xsd:string | Yes<278> | The impersonated user name, if any.<279> |
| CONNECTION_HOST_NAME | xsd:string | Yes | The name of the machine that initiated the connection. |

| Name | Type | Restriction | Description |
|---|--------------|-------------|--|
| CONNECTION_HOST_APPLICATION | xsd:string | | The name of the application that initiated the connection. |
| CONNECTION_START_TIME | xsd:dateTime | | The server UTC date and time when the connection was initiated. |
| CONNECTION_ELAPSED_TIME_MS | xsd:long | Yes<280> | Elapsed time, in milliseconds, since the start of the connection. |
| CONNECTION_LAST_COMMAND_START_TIME | xsd:dateTime | | The server UTC date and time when the last command initiated its execution. |
| CONNECTION_LAST_COMMAND_END_TIME | xsd:dateTime | | The server UTC date and time when the last command finished its execution. |
| CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS | xsd:long | Yes<281> | The time, in milliseconds, that it took for the last command to execute. If a command is in progress, the column returns the elapsed time, in milliseconds, since the start of the command.<282> |
| CONNECTION_IDLE_TIME_MS | xsd:long | Yes<283> | The idle time, in milliseconds, since the start of the connection. |
| CONNECTION_BYTES_SENT | xsd:long | | The accumulated number of bytes sent by the connection since the start of the connection. |
| CONNECTION_DATA_BYTES_SENT | xsd:long | | The accumulated number of data bytes sent by the connection since the start of the connection. Data travels compressed within the connection; this value represents the expanded data sent. |
| CONNECTION_BYTES_RECEIVED | xsd:long | | The accumulated number of bytes received by the connection since the start of the connection. |
| CONNECTION_DATA_BYTES_RECEIVED | xsd:long | | The accumulated number of data bytes received by the connection since the start of the connection. Data travels compressed within the connection; this value represents the |

| Name | Type | Restriction | Description |
|------|------|-------------|-------------------------|
| | | | expanded data received. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CONNECTION_ID" name="CONNECTION_ID"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="CONNECTION_USER_NAME" name="CONNECTION_USER_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CONNECTION_IMPERSONATED_USER_NAME"
      name="CONNECTION_IMPERSONATED_USER_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CONNECTION_HOST_NAME" name="CONNECTION_HOST_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CONNECTION_HOST_APPLICATION"
      name="CONNECTION_HOST_APPLICATION"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CONNECTION_START_TIME" name="CONNECTION_START_TIME"
      type="xsd:dateTime" minOccurs="0" />
    <xsd:element sql:field="CONNECTION_ELAPSED_TIME_MS"
      name="CONNECTION_ELAPSED_TIME_MS"
      type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="CONNECTION_LAST_COMMAND_START_TIME"
      name="CONNECTION_LAST_COMMAND_START_TIME"
      type="xsd:dateTime" minOccurs="0" />
    <xsd:element sql:field="CONNECTION_LAST_COMMAND_END_TIME"
      name="CONNECTION_LAST_COMMAND_END_TIME"
      type="xsd:dateTime" minOccurs="0" />
    <xsd:element sql:field="CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS"
      name="CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS"
      type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="CONNECTION_IDLE_TIME_MS" name="CONNECTION_IDLE_TIME_MS"
      type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="CONNECTION_BYTES_SENT" name="CONNECTION_BYTES_SENT"
      type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="CONNECTION_DATA_BYTES_SENT"
      name="CONNECTION_DATA_BYTES_SENT"
      type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="CONNECTION_BYTES_RECEIVED" name="CONNECTION_BYTES_RECEIVED"
      type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="CONNECTION_DATA_BYTES_RECEIVED"
      name="CONNECTION_DATA_BYTES_RECEIVED"
      type="xsd:long" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.44 DISCOVER_SESSIONS

This schema rowset provides resource usage and activity information about the currently opened sessions on the server.

3.1.4.2.2.1.3.44.1 (Updated Section) Columns

The **DISCOVER_SESSIONS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------------------------------|-----------------------|-------------|---|
| SESSION_ID | xsd:string | Yes<284> | The session unique identifier, as a GUID. |
| SESSION_SPID | xsd:int | Yes | The session ID. |
| SESSION_CONNECTION_ID | xsd:int | Yes | The connection identifier for the session. |
| SESSION_USER_NAME | xsd:string | Yes | The session user name. |
| SESSION_CURRENT_DATABASE | xsd:string | Yes | The name of the database that is being used by the current command execution, or the database that was used by the last command executed. |
| SESSION_USED_MEMORY | xsd:int | | The current size of memory used by the session in kilobytes. |
| SESSION_PROPERTIES | xsd:string | | Reserved for future use. |
| SESSION_START_TIME | xsd:dateTime | | The date and time the session started as UTC time to the server. |
| SESSION_ELAPSED_TIME_MS | xsd:unsignedLong | Yes<285> | Elapsed time, in milliseconds, since the start of the session. |
| SESSION_LAST_COMMAND_START_TIME | xsd:dateTime | | The UTC server time at the moment the last command started executing. |
| SESSION_LAST_COMMAND_END_TIME | xsd:dateTime | | The UTC server time at the moment the last command finished executing. |
| SESSION_LAST_COMMAND_ELAPSED_TIME_MS | xsd:unsignedLong | | The time, in milliseconds, since the start of SESSION_LAST_COMMAND. |
| SESSION_IDLE_TIME_MS | xsd:unsignedLong<286> | Yes | The idle time, in milliseconds, since the start of the session. |
| SESSION_CPU_TIME_MS | xsd:unsignedLong | Yes | The CPU time, in milliseconds, consumed by all requests since the beginning of the session. |
| SESSION_LAST_COMMAND | xsd:string | | The text of the current command executing or the last command executed. |
| SESSION_LAST_COMMAND_CPU_TIME_MS | xsd:unsignedLong | | The CPU time, in milliseconds, consumed by SESSION_LAST_COMMAND. |
| SESSION_STATUS | xsd:int | Yes<287> | The activity status of the session. <ul style="list-style-type: none"> ▪ 0 - Idle: No current |

| Name | Type | Restriction | Description |
|-------------------------|------------------|-------------|---|
| | | | <p>activity is ongoing.</p> <ul style="list-style-type: none"> ▪ 1 - Active: The session is executing some requested task. ▪ 2 - Blocked: The session is waiting for a resource to continue executing the suspended task. |
| SESSION_READS | xsd:unsignedLong | | The accumulated number of disk reads since the start of the session. |
| SESSION_WRITES | xsd:unsignedLong | | The accumulated number of disk writes since the start of the session. |
| SESSION_READS_READ_KB | xsd:unsignedLong | | The accumulated value of data read from disk, in kilobytes, since the start of the session. |
| SESSION_WRITES_WRITE_KB | xsd:unsignedLong | | The accumulated value of data written to the disk, in kilobytes, since the start of the session. |
| SESSION_COMMAND_COUNT | xsd:int | | The number of commands that started execution since the beginning of the session. |
| RESTRICT_CATALOG_NAME | xsd:string | | Unused. |
| RESTRICT_CATALOG_ID | xsd:string | | Unused. |
| THREAD_POOL_USED | xsd:string | | The name of the thread pool on which the command is executing. |
| REQUEST_ACTIVITY_ID | uuid | | The unique identifier of the request activity. |
| CLIENT_ACTIVITY_ID | uuid | | The unique identifier of the client activity. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>

```

```

</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="SESSION_ID" name="SESSION_ID" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="SESSION_SPID" name="SESSION_SPID" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="SESSION_CONNECTION_ID" name="SESSION_CONNECTION_ID"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="SESSION_USER_NAME" name="SESSION_USER_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="SESSION_CURRENT_DATABASE" name="SESSION_CURRENT_DATABASE"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="SESSION_USED_MEMORY" name="SESSION_USED_MEMORY"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="SESSION_PROPERTIES" name="SESSION_PROPERTIES"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="SESSION_START_TIME" name="SESSION_START_TIME"
      type="xsd:dateTime" minOccurs="0" />
    <xsd:element sql:field="SESSION_ELAPSED_TIME_MS" name="SESSION_ELAPSED_TIME_MS"
      type="xsd:unsignedLong" minOccurs="0" />
    <xsd:element sql:field="SESSION_LAST_COMMAND_START_TIME"
      name="SESSION_LAST_COMMAND_START_TIME" type="xsd:dateTime"
      minOccurs="0" />
    <xsd:element sql:field="SESSION_LAST_COMMAND_END_TIME"
      name="SESSION_LAST_COMMAND_END_TIME" type="xsd:dateTime"
      minOccurs="0" />
    <xsd:element sql:field="SESSION_LAST_COMMAND_ELAPSED_TIME_MS"
      name="SESSION_LAST_COMMAND_ELAPSED_TIME_MS" type="xsd:unsignedLong"
      minOccurs="0" />
    <xsd:element sql:field="SESSION_IDLE_TIME_MS" name="SESSION_IDLE_TIME_MS"
      type="xsd:unsignedLong" minOccurs="0" />
    <xsd:element sql:field="SESSION_CPU_TIME_MS" name="SESSION_CPU_TIME_MS"
      type="xsd:unsignedLong" minOccurs="0" />
    <xsd:element sql:field="SESSION_LAST_COMMAND" name="SESSION_LAST_COMMAND"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="SESSION_LAST_COMMAND_CPU_TIME_MS"
      name="SESSION_LAST_COMMAND_CPU_TIME_MS" type="xsd:unsignedLong"
      minOccurs="0" />
    <xsd:element sql:field="SESSION_STATUS" name="SESSION_STATUS" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="SESSION_READS" name="SESSION_READS" type="xsd:unsignedLong"
      minOccurs="0" />
    <xsd:element sql:field="SESSION_WRITES" name="SESSION_WRITES"
      type="xsd:unsignedLong" minOccurs="0" />
    <xsd:element sql:field="SESSION_READ_KB" name="SESSION_READ_KB"
      type="xsd:unsignedLong" minOccurs="0" />
    <xsd:element sql:field="SESSION_WRITE_KB" name="SESSION_WRITE_KB"
      type="xsd:unsignedLong" minOccurs="0" />
    <xsd:element sql:field="SESSION_COMMAND_COUNT" name="SESSION_COMMAND_COUNT"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="RESTRICT_CATALOG_NAME" name="RESTRICT_CATALOG_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="RESTRICT_CATALOG_ID" name="RESTRICT_CATALOG_ID"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="THREAD_POOL_USED" name="THREAD_POOL_USED" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="REQUEST_ACTIVITY_ID" name="REQUEST_ACTIVITY_ID" type="uuid"
      minOccurs="0" />
    <xsd:element sql:field="CLIENT_ACTIVITY_ID" name="CLIENT_ACTIVITY_ID" type="uuid"
      minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.45 DISCOVER_JOBS

This schema rowset provides information about the active jobs executing on the server. A job is a part of a command that executes a specific task on behalf of the command.

3.1.4.2.2.1.3.45.1 Columns

The **DISCOVER_JOBS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------------|--------------|-------------|---|
| SPID | xsd:int | Yes | The session ID. |
| JOB_ID | xsd:int | Yes | The unique identifier of the job. |
| JOB_DESCRIPTION | xsd:string | Yes | The job description assigned by the server. |
| JOB_CREATION_TIME | xsd:dateTime | | The server UTC date and time when the job was created. |
| JOB_TOTAL_TIME_MS | xsd:long | | The time, in milliseconds, since the job started. |
| JOB_START_TIME | xsd:dateTime | | The server UTC date and time when the job was started. |
| JOB_EXECUTION_TIME_MS | xsd:long | | The time, in milliseconds, that the job is active. |
| JOB_THREADPOOL_ID | xsd:int | Yes | The thread pool from which the current job was started. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="SPID" name="SPID" type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="JOB_ID" name="JOB_ID" type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="JOB_DESCRIPTION" name="JOB_DESCRIPTION" type="xsd:string"
minOccurs="0" />
    <xsd:element sql:field="JOB_CREATION_TIME" name="JOB_CREATION_TIME"
type="xsd:dateTime" minOccurs="0" />
    <xsd:element sql:field="JOB_TOTAL_TIME_MS" name="JOB_TOTAL_TIME_MS"
type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="JOB_START_TIME" name="JOB_START_TIME" type="xsd:dateTime"
minOccurs="0" />
    <xsd:element sql:field="JOB_EXECUTION_TIME_MS" name="JOB_EXECUTION_TIME_MS"
type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="JOB_THREADPOOL_ID" name="JOB_THREADPOOL_ID" type="xsd:int"
minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.45.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|-----------------------|----------|---|
| JOB_MIN_TOTAL_TIME_MS | xsd:long | The minimum time, in milliseconds, since the job started. If present, |

| Name | Type | Description |
|------|------|--|
| | | results will exclude jobs that have been running for less than the specified amount of time. |

3.1.4.2.2.1.3.46 DISCOVER_TRANSACTIONS

This schema rowset returns the current set of pending transactions on the system.

3.1.4.2.2.1.3.46.1 Columns

The **DISCOVER_TRANSACTION** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------------------|--------------|-------------|---|
| TRANSACTION_ID | xsd:string | Yes | The transaction unique identifier, as a GUID. |
| TRANSACTION_SESSION_ID | xsd:string | Yes | The transaction session unique identifier, as a GUID. |
| TRANSACTION_START_TIME | xsd:dateTime | | The server UTC date and time when the transaction was started. |
| TRANSACTION_ELAPSED_TIME_MS | xsd:long | | The elapsed time, in milliseconds, since the start of the transaction. |
| TRANSACTION_CPU_TIME_MS | xsd:long | | The CPU time, in milliseconds, consumed by all requests since the beginning of the transaction. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="TRANSACTION_ID" name="TRANSACTION_ID" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="TRANSACTION_SESSION_ID" name="TRANSACTION_SESSION_ID"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="TRANSACTION_START_TIME" name="TRANSACTION_START_TIME"
      type="xsd:dateTime" minOccurs="0" />
    <xsd:element sql:field="TRANSACTION_ELAPSED_TIME_MS"
      name="TRANSACTION_ELAPSED_TIME_MS" type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="TRANSACTION_CPU_TIME_MS" name="TRANSACTION_CPU_TIME_MS"
      type="xsd:long" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.47 DISCOVER_DB_CONNECTIONS

This schema rowset provides resource usage and activity information about the currently opened connections from the server to a database.

3.1.4.2.2.1.3.47.1 Columns

The **DISCOVER_DB_CONNECTIONS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|------------------------------------|--------------|-------------|--|
| CONNECTION_ID | xsd:int | Yes | A unique number that identifies the connection. |
| CONNECTION_START_TIME | xsd:dateTime | | The server UTC date and time when the connection was initiated. |
| CONNECTION_LAST_COMMAND_START_TIME | xsd:dateTime | | The server UTC date and time when the last command initiated its execution. |
| CONNECTION_LAST_COMMAND_END_TIME | xsd:dateTime | | The server UTC date and time when the last command finished its execution. |
| CONNECTION_IDLE_TIME_MS | xsd:long | | The idle time, in milliseconds, since the start of the connection. |
| CONNECTION_USAGE_TIME_MS | xsd:long | | The connection active time, in milliseconds, since the start of the connection. |
| CONNECTION_IN_USE | xsd:boolean | Yes | The connection status. This column indicates whether the connection is active (1) or idle (0). |
| CONNECTION_SERVER_NAME | xsd:string | Yes | The name of the currently connected server. |
| CONNECTION_CATALOG_NAME | xsd:string | Yes | The database name of the currently connected database. |
| CONNECTION_SPID | xsd:int | Yes | The session ID. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CONNECTION_ID" name="CONNECTION_ID" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="CONNECTION_START_TIME" name="CONNECTION_START_TIME"
      type="xsd:dateTime" minOccurs="0" />
    <xsd:element sql:field="CONNECTION_LAST_COMMAND_START_TIME"
      name="CONNECTION_LAST_COMMAND_START_TIME" type="xsd:dateTime"
      minOccurs="0" />
    <xsd:element sql:field="CONNECTION_LAST_COMMAND_END_TIME"
      name="CONNECTION_LAST_COMMAND_END_TIME" type="xsd:dateTime"
      minOccurs="0" />
    <xsd:element sql:field="CONNECTION_IDLE_TIME_MS" name="CONNECTION_IDLE_TIME_MS"
```

```

        type="xsd:long" minOccurs="0" />
<xsd:element sql:field="CONNECTION_USAGE_TIME_MS" name="CONNECTION_USAGE_TIME_MS"
type="xsd:long" minOccurs="0" />
<xsd:element sql:field="CONNECTION_IN_USE" name="CONNECTION_IN_USE"
type="xsd:boolean" minOccurs="0" />
<xsd:element sql:field="CONNECTION_SERVER_NAME" name="CONNECTION_SERVER_NAME"
type="xsd:string" minOccurs="0" />
<xsd:element sql:field="CONNECTION_CATALOG_NAME" name="CONNECTION_CATALOG_NAME"
type="xsd:string" minOccurs="0" />
<xsd:element sql:field="CONNECTION_SPID" name="CONNECTION_SPID" type="xsd:int"
minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.48 DISCOVER_MASTER_KEY

This schema rowset returns the server's master encryption key (the key that is used by the server to encrypt sensitive data on disk).

3.1.4.2.2.1.3.48.1 Columns

The **DISCOVER_MASTER_KEY** rowset contains the following columns.

| Name | Type | Restriction | Description |
|------|------------|-------------|-------------------------------------|
| KEY | xsd:string | Yes<288> | The server's master encryption key. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="KEY" name="KEY" type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.49 DISCOVER_PERFORMANCE_COUNTERS

This schema rowset returns the value of one or more specified performance counters. It does not support counters that return information about usage over time (such as disk reads per second and percentage of CPU usage).

3.1.4.2.2.1.3.49.1 (Updated Section) Columns

The **DISCOVER_PERFORMANCE_COUNTERS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-------------------|------------|-------------|--|
| PERF_COUNTER_NAME | xsd:string | Yes | The name of the PERF_COUNTER performance counter. <289> |

| Name | Type | Restriction | Description |
|--------------------|------------|-------------|---|
| PERF_COUNTER_VALUE | xsd:double | | The value of the PERF_COUNTER performance counter. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="PERF_COUNTER_NAME" name="PERF_COUNTER_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="PERF_COUNTER_VALUE" name="PERF_COUNTER_VALUE"
      type="xsd:double" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.50 DISCOVER_LOCATIONS

This element returns information about the contents of a backup file. The user issuing the request MUST have access to the backup file location.

3.1.4.2.2.1.3.50.1 Columns

The **DISCOVER_LOCATIONS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------------------------|------------|-------------|--|
| LOCATION_BACKUP_FILE_PATHNAME | xsd:string | [Required] | The location of the backup file. <290> |
| LOCATION_PARTITION_OBJECTPATH | xsd:string | | The path to the partition relative to the data folder. |
| LOCATION_PARTITION_DATASOURCEID | xsd:string | | The data source ID used for processing the partition. |
| LOCATION_PARTITION_DATASOURCENAME | xsd:string | | The name of the data source used for processing. |
| LOCATION_PARTITION_NAME | xsd:string | | The partition name. |
| LOCATION_PARTITION_SIZE | xsd:string | | The approximate size of the partition. |
| LOCATION_CONNECTION_STRING | xsd:string | | The connection string for the data source used in processing. |
| LOCATION_PARTITION_FOLDER | xsd:string | | The original location of this partition when the backup file was produced. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
```

```

<xsd:complexType>
  <xsd:sequence minOccurs="0" maxOccurs="unbounded">
    <xsd:element name="row" type="row" />
  </xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="LOCATION_BACKUP_FILE_PATHNAME"
      name="LOCATION_BACKUP_FILE_PATHNAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LOCATION_PARTITION_OBJECTPATH"
      name="LOCATION_PARTITION_OBJECTPATH"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LOCATION_PARTITION_DATASOURCEID"
      name="LOCATION_PARTITION_DATASOURCEID"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LOCATION_PARTITION_DATASOURCENAME"
      name="LOCATION_PARTITION_DATASOURCENAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LOCATION_PARTITION_NAME" name="LOCATION_PARTITION_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LOCATION_PARTITION_SIZE" name="LOCATION_PARTITION_SIZE"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LOCATION_CONNECTION_STRING"
      name="LOCATION_CONNECTION_STRING"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="LOCATION_PARTITION_FOLDER" name="LOCATION_PARTITION_FOLDER"
      type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.50.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|-------------------|------------|---|
| LOCATION_PASSWORD | xsd:string | The password to access the backup file. This restriction MUST be used. This restriction is not used to restrict the rows returned. It is used to provide the password to access the location. |

3.1.4.2.2.1.3.51 DISCOVER_PARTITION_DIMENSION_STAT

This schema rowset returns statistics on the dimension that is associated with a partition.

3.1.4.2.2.1.3.51.1 Columns

The **DISCOVER_PARTITION_DIMENSION_STAT** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------------|------------|-------------|--------------------------------|
| DATABASE_NAME | xsd:string | [Required] | The name of the database. |
| CUBE_NAME | xsd:string | [Required] | The name of the cube. |
| MEASURE_GROUP_NAME | xsd:string | [Required] | The name of the measure group. |
| PARTITION_NAME | xsd:string | [Required] | The name of the partition. |
| DIMENSION_NAME | xsd:string | | The name of the dimension. |

| Name | Type | Restriction | Description |
|---------------------|-------------|-------------|--|
| ATTRIBUTE_NAME | xsd:string | | The name of the attribute. |
| ATTRIBUTE_INDEXED | xsd:boolean | | When true, indicates that the attribute is indexed; otherwise false. |
| ATTRIBUTE_COUNT_MIN | xsd:long | | The minimum attribute count. |
| ATTRIBUTE_COUNT_MAX | xsd:long | | The maximum attribute count. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="DATABASE_NAME" name="DATABASE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="MEASURE_GROUP_NAME" name="MEASURE_GROUP_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="PARTITION_NAME" name="PARTITION_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="DIMENSION_NAME" name="DIMENSION_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="ATTRIBUTE_NAME" name="ATTRIBUTE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="ATTRIBUTE_INDEXED" name="ATTRIBUTE_INDEXED"
      type="xsd:boolean" minOccurs="0" />
    <xsd:element sql:field="ATTRIBUTE_COUNT_MIN" name="ATTRIBUTE_COUNT_MIN"
      type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="ATTRIBUTE_COUNT_MAX" name="ATTRIBUTE_COUNT_MAX"
      type="xsd:long" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.52 DISCOVER_PARTITION_STAT

This schema rowset returns statistics on aggregations in a particular partition.

3.1.4.2.2.1.3.52.1 Columns

The **DISCOVER_PARTITION_STAT** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------------|------------|-------------|--------------------------------|
| DATABASE_NAME | xsd:string | [Required] | The name of the database. |
| CUBE_NAME | xsd:string | [Required] | The name of the cube. |
| MEASURE_GROUP_NAME | xsd:string | [Required] | The name of the measure group. |
| PARTITION_NAME | xsd:string | [Required] | The name of the partition. |

| Name | Type | Restriction | Description |
|------------------|------------|-------------|------------------------------|
| AGGREGATION_NAME | xsd:string | | The name of the aggregation. |
| AGGREGATION_SIZE | xsd:long | | The size of the aggregation. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="DATABASE_NAME" name="DATABASE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="MEASURE_GROUP_NAME" name="MEASURE_GROUP_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="PARTITION_NAME" name="PARTITION_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="AGGREGATION_NAME" name="AGGREGATION_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="AGGREGATION_SIZE" name="AGGREGATION_SIZE" type="xsd:long"
      minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.53 DISCOVER_DIMENSION_STAT

This schema rowset returns statistics on the specified dimension.

3.1.4.2.2.1.3.53.1 Columns

The **DISCOVER_DIMENSION_STAT** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------|------------|-------------|----------------------------|
| DATABASE_NAME | xsd:string | [Required] | The name of the database. |
| DIMENSION_NAME | xsd:string | [Required] | The name of the dimension. |
| ATTRIBUTE_NAME | xsd:string | | The name of the attribute. |
| ATTRIBUTE_COUNT | xsd:long | | The attribute count. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
```

```

</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="DATABASE_NAME" name="DATABASE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="DIMENSION_NAME" name="DIMENSION_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="ATTRIBUTE_NAME" name="ATTRIBUTE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="ATTRIBUTE_COUNT" name="ATTRIBUTE_COUNT" type="xsd:long"
      minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.54 DISCOVER_COMMANDS

This schema rowset provides resource usage and activity information about the currently executing or last executed commands in the opened connections on the server.

3.1.4.2.2.1.3.54.1 Columns

The **DISCOVER_COMMANDS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-------------------------|--------------|-------------|--|
| SESSION_SPID | xsd:int | Yes | The session ID. |
| SESSION_COMMAND_COUNT | xsd:int | | The number of commands executed since the start of the session. |
| COMMAND_START_TIME | xsd:dateTime | | The date and time the last command started, expressed as UTC time on the server. |
| COMMAND_ELAPSED_TIME_MS | xsd:long | | The elapsed time, in milliseconds, since the start of the command. |
| COMMAND_CPU_TIME_MS | xsd:long | | The CPU time, in milliseconds, consumed by the command since the start of the command execution. |
| COMMAND_READS | xsd:long | | The accumulated number of disk reads since the start of the command. |
| COMMAND_READ_KB | xsd:long | | The accumulated value of data read from disk, in kilobytes, since the start of the command. |
| COMMAND_WRITES | xsd:long | | The accumulated number of disk writes since the start of the command. |
| COMMAND_WRITE_KB | xsd:long | | The accumulated value of data written to disk, in kilobytes, since the start of the command. |
| COMMAND_TEXT | xsd:string | | The command text. |
| COMMAND_END_TIME | xsd:dateTime | | The server UTC date and time when the command finishes its execution. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>

```

```

    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="SESSION_SPID" name="SESSION_SPID" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="SESSION_COMMAND_COUNT" name="SESSION_COMMAND_COUNT"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="COMMAND_START_TIME" name="COMMAND_START_TIME"
      type="xsd:dateTime" minOccurs="0" />
    <xsd:element sql:field="COMMAND_ELAPSED_TIME_MS" name="COMMAND_ELAPSED_TIME_MS"
      type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="COMMAND_CPU_TIME_MS" name="COMMAND_CPU_TIME_MS"
      type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="COMMAND_READS" name="COMMAND_READS" type="xsd:long"
      minOccurs="0" />
    <xsd:element sql:field="COMMAND_READ_KB" name="COMMAND_READ_KB" type="xsd:long"
      minOccurs="0" />
    <xsd:element sql:field="COMMAND_WRITES" name="COMMAND_WRITES" type="xsd:long"
      minOccurs="0" />
    <xsd:element sql:field="COMMAND_WRITE_KB" name="COMMAND_WRITE_KB" type="xsd:long"
      minOccurs="0" />
    <xsd:element sql:field="COMMAND_TEXT" name="COMMAND_TEXT" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="COMMAND_END_TIME" name="COMMAND_END_TIME"
      type="xsd:dateTime" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.55 DISCOVER_COMMAND_OBJECTS

This schema rowset provides resource usage and activity information about the objects in use by the referenced command.

3.1.4.2.2.1.3.55.1 Columns

The **DISCOVER_COMMAND_OBJECTS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------------|------------|-------------|---|
| SESSION_SPID | xsd:int | Yes | The session ID. |
| SESSION_ID | xsd:string | Yes | The session unique identifier, as a GUID. |
| SESSION_COMMAND_COUNT | xsd:int | | The command sequence number. |
| OBJECT_PARENT_PATH | xsd:string | Yes | The path to the parent of the current object. |
| OBJECT_ID | xsd:string | Yes | The ID of the object as defined when it was created. |
| OBJECT_VERSION | xsd:int | | The metadata version number of the object. This number changes every time the object is altered. |
| OBJECT_DATA_VERSION | xsd:int | | The lineage number of the data in the object. This number increments each time the object is processed. |
| OBJECT_CPU_TIME_MS | xsd:long | | The CPU time, in milliseconds, consumed by the object since the start of the command. |
| OBJECTS_READS | xsd:long | | The accumulated number of read operations by the object since the start of the command. |

| Name | Type | Restriction | Description |
|----------------------|----------|-------------|--|
| OBJECTS_READ_KB | xsd:long | | The accumulated value of data, in kilobytes, read by the object since the start of the command. |
| OBJECTS_WRITES | xsd:long | | The accumulated number of write operations by the object since the start of the command. |
| OBJECTS_WRITE_KB | xsd:long | | The accumulated value of data, in kilobytes, written by the object since the start of the command. |
| OBJECT_ROWS_SCANNED | xsd:long | | The number of rows scanned by the object since the start of the command. |
| OBJECT_ROWS_RETURNED | xsd:long | | The number of rows returned by the object to the caller since the start of the command. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="SESSION_SPID" name="SESSION_SPID" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="SESSION_ID" name="SESSION_ID" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="SESSION_COMMAND_COUNT" name="SESSION_COMMAND_COUNT"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="OBJECT_PARENT_PATH" name="OBJECT_PARENT_PATH"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="OBJECT_ID" name="OBJECT_ID" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="OBJECT_VERSION" name="OBJECT_VERSION" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="OBJECT_DATA_VERSION" name="OBJECT_DATA_VERSION"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="OBJECT_CPU_TIME_MS" name="OBJECT_CPU_TIME_MS"
      type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="OBJECT_READS" name="OBJECT_READS" type="xsd:long"
      minOccurs="0" />
    <xsd:element sql:field="OBJECT_READ_KB" name="OBJECT_READ_KB" type="xsd:long"
      minOccurs="0" />
    <xsd:element sql:field="OBJECT_WRITES" name="OBJECT_WRITES" type="xsd:long"
      minOccurs="0" />
    <xsd:element sql:field="OBJECT_WRITE_KB" name="OBJECT_WRITE_KB" type="xsd:long"
      minOccurs="0" />
    <xsd:element sql:field="OBJECT_ROWS_SCANNED" name="OBJECT_ROWS_SCANNED"
      type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="OBJECT_ROWS_RETURNED" name="OBJECT_ROWS_RETURNED"
      type="xsd:long" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.56 DISCOVER_OBJECT_ACTIVITY

This schema rowset provides resource usage per object since the start of the service.

3.1.4.2.2.1.3.56.1 Columns

The **DISCOVER_OBJECT_ACTIVITY** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-------------------------|------------|-------------|---|
| OBJECT_PARENT_PATH | xsd:string | Yes | The path to the parent of the current object. |
| OBJECT_ID | xsd:string | Yes | The ID of the object as defined at creation time. |
| OBJECT_CPU_TIME_MS | xsd:long | | The CPU time, in milliseconds, consumed by the object since the start of the service. |
| OBJECT_READS | xsd:long | | The accumulated number of read operations by the object since the start of the service. |
| OBJECT_READ_KB | xsd:long | | The accumulated value of data read by the object since the start of the service, in kilobytes. |
| OBJECT_WRITES | xsd:long | | The accumulated number of write operations by the object since the start of the service. |
| OBJECT_WRITE_KB | xsd:long | | The accumulated value of data written by the object since the start of the service, in kilobytes. |
| OBJECT_AGGREGATION_HIT | xsd:long | | The number of times an aggregation of the object has been hit since the start of the service. |
| OBJECT_AGGREGATION_MISS | xsd:long | | The number of times an existing aggregation of the object has not been used since the start of the service. |
| OBJECT_HIT | xsd:long | | The number of times the object has been hit in the cache since the start of the service. |
| OBJECT_MISS | xsd:long | | The number of times the object has been missed in the cache since the start of the service. |
| OBJECT_VERSION | xsd:int | | The metadata version number of the object; this number changes every time the object is altered. |
| OBJECT_DATA_VERSION | xsd:int | | The lineage number of the data in the object. This number increments each time the object is processed. |
| OBJECT_ROWS_SCANNED | xsd:long | | The number of rows scanned by the object since the start of the service. |
| OBJECT_ROWS_RETURNED | xsd:long | | The number of rows returned by the object to the caller since the start of the service. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
```



```

<xsd:element sql:field="OBJECT_PARENT_PATH" name="OBJECT_PARENT_PATH"
  type="xsd:string" minOccurs="0" />
<xsd:element sql:field="OBJECT_ID" name="OBJECT_ID" type="xsd:string"
  minOccurs="0" />
<xsd:element sql:field="OBJECT_CPU_TIME_MS" name="OBJECT_CPU_TIME_MS"
  type="xsd:long" minOccurs="0" />
<xsd:element sql:field="OBJECT_READS" name="OBJECT_READS" type="xsd:long"
  minOccurs="0" />
<xsd:element sql:field="OBJECT_READ_KB" name="OBJECT_READ_KB" type="xsd:long"
  minOccurs="0" />
<xsd:element sql:field="OBJECT_WRITES" name="OBJECT_WRITES" type="xsd:long"
  minOccurs="0" />
<xsd:element sql:field="OBJECT_WRITE_KB" name="OBJECT_WRITE_KB" type="xsd:long"
  minOccurs="0" />
<xsd:element sql:field="OBJECT_AGGREGATION_HIT" name="OBJECT_AGGREGATION_HIT"
  type="xsd:long" minOccurs="0" />
<xsd:element sql:field="OBJECT_AGGREGATION_MISS" name="OBJECT_AGGREGATION_MISS"
  type="xsd:long" minOccurs="0" />
<xsd:element sql:field="OBJECT_HIT" name="OBJECT_HIT" type="xsd:long"
  minOccurs="0" />
<xsd:element sql:field="OBJECT_MISS" name="OBJECT_MISS" type="xsd:long"
  minOccurs="0" />
<xsd:element sql:field="OBJECT_VERSION" name="OBJECT_VERSION" type="xsd:int"
  minOccurs="0" />
<xsd:element sql:field="OBJECT_DATA_VERSION" name="OBJECT_DATA_VERSION"
  type="xsd:int" minOccurs="0" />
<xsd:element sql:field="OBJECT_ROWS_SCANNED" name="OBJECT_ROWS_SCANNED"
  type="xsd:long" minOccurs="0" />
<xsd:element sql:field="OBJECT_ROWS_RETURNED" name="OBJECT_ROWS_RETURNED"
  type="xsd:long" minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.57 DISCOVER_OBJECT_MEMORY_USAGE

This schema rowset provides information about memory resources used by objects.

3.1.4.2.2.1.3.57.1 Columns

The **DISCOVER_OBJECT_MEMORY_USAGE** rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------------------|------------|-------------|--|
| OBJECT_PARENT_PATH | xsd:string | Yes<291> | The path to the parent of the current object. The format of the string is that each ancestor object ID is listed, separated by '.'. |
| OBJECT_ID | xsd:string | Yes<292> | The ID of the object as defined at creation time. |
| OBJECT_MEMORY_SHRINKABLE | xsd:long | | The total amount of memory used by all the shrinkable objects that are directly owned by the current object. The current value does not include memory from objects owned by named objects that are owned by the current object. |
| OBJECT_MEMORY_NONSHRINKABLE | xsd:long | | The amount of memory of all non-shrinkable objects directly owned by current |

| Name | Type | Restriction | Description |
|--|--------------|-------------|---|
| | | | object. The current value does not include memory from objects owned by named objects that are owned by the current object. |
| OBJECT_VERSION | xsd:int | | The metadata version number of the object. This number changes each time the object is altered. |
| OBJECT_DATA_VERSION | xsd:int | | The lineage number of the data in the object. This number increments each time the object is processed. |
| OBJECT_TYPE_ID | xsd:int | | Reserved for future use. |
| OBJECT_TIME_CREATED | xsd:dateTime | | The UTC server time at the moment the object was created. |
| OBJECT_MEMORY_CHILD_SHRINKABLE<293> | xsd:long | | The total amount of memory used by all the shrinkable objects that are directly owned by all the named objects that are directly or indirectly owned by the current object. The current value does not include the memory from the shrinkable objects directly owned by the current object. |
| OBJECT_MEMORY_CHILD_NONSHRINKABLE<294> | xsd:long | | The total amount of memory used by all the non-shrinkable objects that are directly owned by all the named objects that are directly or indirectly owned by the current object. The current value does not include the memory from the non-shrinkable objects directly owned by the current object. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="OBJECT_PARENT_PATH" name="OBJECT_PARENT_PATH"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="OBJECT_ID" name="OBJECT_ID" type="xsd:string"

```

```

        minOccurs="0" />
<xsd:element sql:field="OBJECT_MEMORY_SHRINKABLE" name="OBJECT_MEMORY_SHRINKABLE"
type="xsd:long" minOccurs="0" />
<xsd:element sql:field="OBJECT_MEMORY_NONSHRINKABLE"
name="OBJECT_MEMORY_NONSHRINKABLE" type="xsd:long" minOccurs="0" />
<xsd:element sql:field="OBJECT_VERSION" name="OBJECT_VERSION" type="xsd:int"
minOccurs="0" />
<xsd:element sql:field="OBJECT_DATA_VERSION" name="OBJECT_DATA_VERSION"
type="xsd:int" minOccurs="0" />
<xsd:element sql:field="OBJECT_TYPE_ID" name="OBJECT_TYPE_ID" type="xsd:int"
minOccurs="0" />
<xsd:element sql:field="OBJECT_TIME_CREATED" name="OBJECT_TIME_CREATED"
type="xsd:dateTime" minOccurs="0" />
<xsd:element sql:field="OBJECT_MEMORY_CHILD_SHRINKABLE"
name="OBJECT_MEMORY_CHILD_SHRINKABLE" type="xsd:long" minOccurs="0" />
<xsd:element sql:field="OBJECT_MEMORY_CHILD_NONSHRINKABLE"
name="OBJECT_MEMORY_CHILD_NONSHRINKABLE" type="xsd:long"
minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.58 DISCOVER_STORAGE_TABLES

This schema rowset returns statistics about in-memory tables available to the server.<295>

3.1.4.2.2.1.3.58.1 (Updated Section) Columns

The **DISCOVER_STORAGE_TABLES** rowset contains the following columns.

| Name | Type | Restriction | Description |
|---|------------|-------------|--|
| DATABASE_NAME | xsd:string | Yes<296> | The name of the database. |
| CUBE_NAME | xsd:string | Yes<297> | The name of the cube. |
| MEASURE_GROUP_NAME | xsd:string | Yes<298> | The name of the measure group. |
| PARTITION_NAME | xsd:string | Yes<299> | The name of the partition. |
| DIMENSION_NAME | xsd:string | | The name of the dimension. |
| TABLE_ID | xsd:string | | The ID of the table. |
| TABLE_PARTITIONS_COUNT | xsd:long | | The table partition count. |
| HINT_TABLE_TYPE | xsd:string | | The hint of the table type. |
| ROWS_COUNT | xsd:long | | The row count. |
| RIVOLIATIONCOUNT RIVOLIATION COUNT | xsd:long | | The number of relationships that have RI violations. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">

```

```

<xsd:sequence>
  <xsd:element sql:field="DATABASE_NAME" name="DATABASE_NAME" type="xsd:string"
    minOccurs="0" />
  <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string"
    minOccurs="0" />
  <xsd:element sql:field="MEASURE_GROUP_NAME" name="MEASURE_GROUP_NAME"
    type="xsd:string" minOccurs="0" />
  <xsd:element sql:field="PARTITION_NAME" name="PARTITION_NAME" type="xsd:string"
    minOccurs="0" />
  <xsd:element sql:field="DIMENSION_NAME" name="DIMENSION_NAME" type="xsd:string"
    minOccurs="0" />
  <xsd:element sql:field="TABLE_ID" name="TABLE_ID" type="xsd:string"
    minOccurs="0" />
  <xsd:element sql:field="TABLE_PARTITIONS_COUNT" name="TABLE_PARTITIONS_COUNT"
    type="xsd:long" minOccurs="0" />
  <xsd:element sql:field="HINT_TABLE_TYPE" name="HINT_TABLE_TYPE" type="xsd:string"
    minOccurs="0" />
  <xsd:element sql:field="ROWS_COUNT" name="ROWS_COUNT" type="xsd:long"
    minOccurs="0" />
  <xsd:element sql:field="RIVIOIATION_COUNT" name="RIVIOIATION_COUNT" type="xsd:long"
    minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.59 DISCOVER_STORAGE_TABLE_COLUMNS

This schema rowset contains information about the columns used for representing the columns of an in-memory table.<300>

3.1.4.2.2.1.3.59.1 Columns

The **DISCOVER_STORAGE_TABLE_COLUMNS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|--------------------|------------|-------------|---|
| DATABASE_NAME | xsd:string | Yes<301> | The name of the database. |
| CUBE_NAME | xsd:string | Yes<302> | The name of the cube. |
| MEASURE_GROUP_NAME | xsd:string | Yes<303> | The name of the measure group. |
| DIMENSION_NAME | xsd:string | | The name of the dimension. |
| ATTRIBUTE_NAME | xsd:string | | The name of the attribute. |
| TABLE_ID | xsd:string | | The ID of the table. |
| COLUMN_ID | xsd:string | | The ID of the column. |
| COLUMN_TYPE | xsd:string | | <p>The type of the column. The values are as follows:</p> <ul style="list-style-type: none"> ▪ BASIC_DATA – This column contains data provided by an external data source. ▪ CALCULATED_DATA – This column contains data created by calculations. ▪ RELATIONSHIP – This column contains information about relationship between tables. ▪ HIERARCHY_POSITION_TO_DATAID – This column contains information mapping position of a value in the hierarchy to the Data ID. ▪ HIERARCHY_DATAID_TO_POSITION – This column |

| Name | Type | Restriction | Description |
|-----------------|------------|-------------|---|
| | | | <p>contains information mapping a Data ID to the position of a value in the hierarchy.</p> <ul style="list-style-type: none"> ▪ UNKNOWN – The column type is not known. |
| COLUMN_ENCODING | xsd:long | | <p>The encoding method used on the column. The method can be one of the following:</p> <ul style="list-style-type: none"> ▪ 0 – The system automatically selects a column encoding. ▪ 1 – The column uses hash encoding. ▪ 2 – The column uses value encoding. |
| DATATYPE | xsd:string | Yes<304> | <p>The type of the column data. The values are as follows:</p> <ul style="list-style-type: none"> ▪ N/A – Indicates that no data type information is available. ▪ DBTYPE_EMPTY - Indicates that no value was specified. ▪ DBTYPE_I2 - Indicates a two-byte signed integer. ▪ DBTYPE_I4 - Indicates a four-byte signed integer. ▪ DBTYPE_R4 - Indicates a single-precision floating-point value. ▪ DBTYPE_R8 - Indicates a double-precision floating-point value. ▪ DBTYPE_CY - Indicates a currency value. Currency is a fixed-point number that has four digits to the right of the decimal point and that is stored in an eight-byte signed integer scaled by 10,000. ▪ DBTYPE_DATE - Indicates a date value. Date values are stored as Double, the whole part of which is the number of days since December 30, 1899, and the fractional part of which is the fraction of a day. ▪ DBTYPE_BSTR - Indicates a null-terminated character string (Unicode). ▪ DBTYPE_ERROR - Indicates a 32-bit error code. ▪ DBTYPE_BOOL - Indicates a Boolean value. ▪ DBTYPE_DECIMAL - Indicates an exact numeric value with a fixed precision and scale. The scale is between 0 and 28. ▪ DBTYPE_I1 - Indicates a one-byte signed integer. ▪ DBTYPE_UI1 - Indicates a one-byte unsigned integer. ▪ DBTYPE_UI2 - Indicates a two-byte unsigned integer. |

| Name | Type | Restriction | Description |
|----------------------|-------------|-------------|---|
| | | | <ul style="list-style-type: none"> ▪ DBTYPE_UI4 - Indicates a four-byte unsigned integer. ▪ DBTYPE_I8 - Indicates an eight-byte signed integer. ▪ DBTYPE_UI8 - Indicates an eight-byte unsigned integer. ▪ DBTYPE_GUID - Indicates a GUID. ▪ DBTYPE_BYTES - Indicates a binary value. ▪ DBTYPE_STR - Indicates a string value. ▪ DBTYPE_WSTR - Indicates a null-terminated Unicode character string. ▪ DBTYPE_NUMERIC - Indicates an exact numeric value with a fixed precision and scale. The scale is between 0 and 38. ▪ DBTYPE_DBDATE - Indicates a date value (yyyymmdd). ▪ DBTYPE_DBTIME - Indicates a time value (hhmmss). ▪ DBTYPE_DBTIMESTAMP - Indicates a date-time stamp (yyyymmddhhmmss plus a fraction in billionths). |
| ISKEY | xsd:boolean | | Indicates whether the column is a key column. |
| ISUNIQUE | xsd:boolean | | Indicates whether the column contains unique values. |
| ISNULLABLE | xsd:boolean | | Indicates whether the column can contain NULL values. |
| ISROWNUMBER | xsd:boolean | | Indicates whether the column is a Row Number column. |
| DICTIONARY_SIZE<305> | xsd:long | | Indicates the amount of memory that is used by the dictionary data structure associated with the column, in bytes. The dictionary data structure maps column data IDs to the actual values. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="DATABASE_NAME" name="DATABASE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string"
      minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

```

<xsd:element sql:field="MEASURE_GROUP_NAME" name="MEASURE_GROUP_NAME"
type="xsd:string" minOccurs="0" />
<xsd:element sql:field="DIMENSION_NAME" name="DIMENSION_NAME" type="xsd:string"
minOccurs="0" />
<xsd:element sql:field="ATTRIBUTE_NAME" name="ATTRIBUTE_NAME" type="xsd:string"
minOccurs="0" />
<xsd:element sql:field="TABLE_ID" name="TABLE_ID" type="xsd:string"
minOccurs="0" />
<xsd:element sql:field="COLUMN_ID" name="COLUMN_ID" type="xsd:string"
minOccurs="0" />
<xsd:element sql:field="COLUMN_TYPE" name="COLUMN_TYPE" type="xsd:string"
minOccurs="0" />
<xsd:element sql:field="COLUMN_ENCODING" name="COLUMN_ENCODING" type="xsd:long"
minOccurs="0" />
<xsd:element sql:field="DATATYPE" name="DATATYPE" type="xsd:string"
minOccurs="0" />
<xsd:element sql:field="ISKEY" name="ISKEY" type="xsd:boolean" minOccurs="0" />
<xsd:element sql:field="ISUNIQUE" name="ISUNIQUE" type="xsd:boolean"
minOccurs="0" />
<xsd:element sql:field="ISNULLABLE" name="ISNULLABLE" type="xsd:boolean"
minOccurs="0" />
<xsd:element sql:field="ISROWNUMBER" name="ISROWNUMBER" type="xsd:boolean"
minOccurs="0" />
<xsd:element sql:field="DICTIONARY_SIZE" name="DICTIONARY_SIZE" type="xsd:long"
minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.60 DISCOVER_STORAGE_TABLE_COLUMN_SEGMENTS

The DISCOVER_STORAGE_TABLE_COLUMN_SEGMENTS schema rowset returns information about the column segments used for storing data for in-memory tables.<306>

3.1.4.2.2.1.3.60.1 Columns

The **DISCOVER_STORAGE_TABLE_COLUMN_SEGMENTS** rowset contains the following columns.

| Name | Type | Restriction | Description |
|------------------------|------------------|-------------|---|
| DATABASE_NAME | xsd:string | Yes<307> | The name of the database. |
| CUBE_NAME | xsd:string | Yes<308> | The name of the cube. |
| MEASURE_GROUP_NAME | xsd:string | Yes<309> | The name of the measure group. |
| DIMENSION_NAME | xsd:string | | The name of the dimension. |
| TABLE_ID | xsd:string | | The ID of the table. |
| COLUMN_ID | xsd:string | | The ID of the column. |
| SEGMENT_NUMBER | xsd:long | | The numeric value of the segment. |
| TABLE_PARTITION_NUMBER | xsd:long | | The numeric value of the partition table. |
| RECORDS_COUNT | xsd:long | | The number of records. |
| ALLOCATED_SIZE | xsd:unsignedLong | | The size of allocated data. |
| USED_SIZE | xsd:unsignedLong | | The size of the data used. |
| COMPRESSION_TYPE | xsd:string | | The type of compression. Currently, this value is always "NOSPLIT". The compression value is intended for internal server use only. |

| Name | Type | Restriction | Description |
|---------------------|------------|-------------|--|
| BITS_COUNT | xsd:long | | The count of bits required to store the Data IDs. |
| BOOKMARK_BITS_COUNT | xsd:long | | The bookmark count of BITS. |
| VERTIPAQ_STATE | xsd:string | | The state of the VertiPaq compression for this column segment. The value is one of the following: <ul style="list-style-type: none"> COMPLETED – The VertiPaq compression completed successfully. TIMEBOXED – The VertiPaq compression was timeboxed. SKIPPED – The VertiPaq compression was skipped. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="DATABASE_NAME" name="DATABASE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="CUBE_NAME" name="CUBE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="MEASURE_GROUP_NAME" name="MEASURE_GROUP_NAME"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DIMENSION_NAME" name="DIMENSION_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="TABLE_ID" name="TABLE_ID" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="COLUMN_ID" name="COLUMN_ID" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="SEGMENT_NUMBER" name="SEGMENT_NUMBER" type="xsd:long"
      minOccurs="0" />
    <xsd:element sql:field="TABLE_PARTITION_NUMBER" name="TABLE_PARTITION_NUMBER"
      type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="RECORDS_COUNT" name="RECORDS_COUNT" type="xsd:long"
      minOccurs="0" />
    <xsd:element sql:field="ALLOCATED_SIZE" name="ALLOCATED_SIZE"
      type="xsd:unsignedLong" minOccurs="0" />
    <xsd:element sql:field="USED_SIZE" name="USED_SIZE" type="xsd:unsignedLong"
      minOccurs="0" />
    <xsd:element sql:field="COMPRESSION_TYPE" name="COMPRESSION_TYPE" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="BITS_COUNT" name="BITS_COUNT" type="xsd:long"
      minOccurs="0" />
    <xsd:element sql:field="BOOKMARK_BITS_COUNT" name="BOOKMARK_BITS_COUNT"
      type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="VERTIPAQ_STATE" name="VERTIPAQ_STATE" type="xsd:string"
      minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```


3.1.4.2.2.1.3.61 DISCOVER_CSDL_METADATA

The DISCOVER_CSDL_METADATA<310> schema rowset returns information about database metadata for in-memory databases. When the Perspectives restriction is included in DISCOVER_CSDL_METADATA, the output, which is the XML documented in [MS-CSDLBI], SHOULD<311> include the objects that are not part of the perspectives in the XML output, and these objects SHOULD be marked as hidden.

3.1.4.2.2.1.3.61.1 (Updated Section) Columns

The DISCOVER_CSDL_METADATA rowset contains the following columns.

| Name | Type | Restriction | Description |
|----------|-------------|-------------|---|
| METADATA | xmlDocument | No | The conceptual schema definition language (CSDL) representation of the database metadata. For more details, see [MS-CSDLBI]. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="xmlDocument">
  <xsd:sequence>
    <xsd:any />
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="METADATA" name="METADATA" type="xmlDocument" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.61.2 Additional Restrictions

The following restrictions can apply to this rowset.

| Name | Type | Restriction | Description |
|------------------|------------|-------------|---|
| CATALOG_NAME | xsd:string | [Required] | The name of the catalog. |
| PERSPECTIVE_NAME | xsd:string | | The perspective name. |
| VERSION | xsd:string | | The version of CSDL that is requested by the client. This MUST be of the format <integer>.<integer>.<312> |

3.1.4.2.2.1.3.62 DISCOVER_CALC_DEPENDENCY

The DISCOVER_CALC_DEPENDENCY<313> schema rowset returns information about the calculation dependency for an object that is specified in a Tabular database or in a DAX query that is executed against a Tabular database. For more information about Tabular databases at compatibility levels equal to or greater than 1200, see [MS-SSAS-T].

3.1.4.2.2.1.3.62.1 Columns

The DISCOVER_CALC_DEPENDENCY rowset contains the following columns.

| Name | Type | Restriction | Description |
|---------------|------------|-------------|--|
| DATABASE_NAME | xsd:string | Yes | The name of the database. |
| OBJECT_TYPE | xsd:string | Yes | <p>Indicates the type of the object for which dependency analysis is requested.</p> <p>For objects that are in Tabular models at compatibility level 1100 or 1103, the following are the possible types:</p> <ul style="list-style-type: none"> ▪ QUERY: A query. ▪ COLUMN: A regular column. ▪ CALC_COLUMN: A calculated column. ▪ HIERARCHY: A hierarchy. ▪ MEASURE: A measure. ▪ ACTIVE_RELATIONSHIP: An active relationship. ▪ RELATIONSHIP: A relationship. ▪ ROWS_ALLOWED: The number of rows allowed. <p>For objects that are in Tabular models at compatibility level 1200 or higher, the following are the possible types:</p> <ul style="list-style-type: none"> ▪ CALC_COLUMN: A calculated column. ▪ MEASURE: A measure. ▪ RELATIONSHIP: A relationship. ▪ ACTIVE_RELATIONSHIP: An active relationship. ▪ CALC_TABLE: A calculated table. ▪ HIERARCHY: A hierarchy. ▪ ATTRIBUTE_HIERARCHY: An attribute hierarchy. ▪ ROWS_ALLOWED: The number of rows allowed. ▪ DETAIL_ROWS_EXPR: A detail rows definition. ▪ PARTITION: A partition. ▪ M_EXPRESSION: An M expression, as defined in [MS-SSAS-T]. Requires compatibility level 1400 or higher ▪ QUERY: A query. |

| Name | Type | Restriction | Description |
|------------------------|------------|-------------|---|
| TABLE | xsd:string | | The name of the table that contains the object for which dependency information is sought. |
| OBJECT | xsd:string | | The name of the object for which dependency information is sought. |
| EXPRESSION | xsd:string | | The formula of the object for which dependency information is sought. |
| REFERENCED_OBJECT_TYPE | xsd:string | | <p>Returns the type of the object that has a dependency on the referenced object.</p> <p>For objects that are returned by Tabular models at compatibility level 1100 or 1103, the following are the possible types:</p> <ul style="list-style-type: none"> ▪ CALC_COLUMN: A calculated column. ▪ COLUMN: A column of data. ▪ MEASURE: A measure. ▪ RELATIONSHIP: A relationship. <p>For objects that are returned by Tabular models at compatibility level 1200 or higher, the following are the possible types:</p> <ul style="list-style-type: none"> ▪ COLUMN: A column of data. ▪ CALC_COLUMN: A calculated column. ▪ MEASURE: A measure. ▪ RELATIONSHIP: A relationship. ▪ ACTIVE_RELATIONSHIP: An active relationship. ▪ TABLE: A table. ▪ CALC_TABLE: A calculated table. ▪ ATTRIBUTE_HIERARCHY: An attribute hierarchy. ▪ DETAIL_ROWS_EXPR: A detail rows definition. ▪ DATASOURCE: A data source. ▪ M_EXPRESSION: An M expression, as defined in [MS-SSAS-T]. Requires compatibility level 1400 or higher |
| REFERENCED_TABLE | xsd:string | | The name of the table that contains the dependent object. |
| REFERENCED_OBJECT | xsd:string | | The name of the object that has a dependency on the referenced object. |
| REFERENCED_EXPRESSION | xsd:string | | A formula that is dependent on the referenced object. In a calculated table, a calculated column, or a measure, the formula can be a DAX expression. In a partition, the formula can be a provider data source expression or an M language expression. |

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="xmlDocument">
  <xsd:sequence>
    <xsd:any />
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="DATABASE_NAME" name="DATABASE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="OBJECT_TYPE" name="OBJECT_TYPE" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="TABLE" name="TABLE" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="OBJECT" name="OBJECT" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="EXPRESSION" name="EXPRESSION" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="REFERENCED_OBJECT_TYPE" name="REFERENCED_OBJECT_TYPE"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="REFERENCED_TABLE" name="REFERENCED_TABLE"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="REFERENCED_OBJECT" name="REFERENCED_OBJECT"
      type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="REFERENCED_EXPRESSION" name="REFERENCED_EXPRESSION"
      type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.62.2 (Updated Section) Additional Restrictions

The following restrictions can apply to this rowset.

| Name | Type | Description |
|----------------------|------------|---|
| QUERY<314> | xsd:string | Given a specific Data Analysis Expressions (DAX) query, if the query contains a measure, the rowset shows each object on which the DAX query has a dependency. |
| DATABASE_NAME<315> | xsd:string | The name of the database. |
| OBJECT_TYPE<316> | xsd:string | A string that indicates the type of the object for which dependency analysis is requested. |
| OBJECT_CATEGORY<317> | xsd:string | A string that specifies the categorization of an object as being about data access versus analysis. The possible values are the following: <ul style="list-style-type: none"> DATA_ACCESS – Returns partitions, M objects, and data sources. ANALYSIS – Returns anything considered by a query on a cached model, such as calculated table partitions, tables, columns, |

| Name | Type | Description |
|-----------|------------|--|
| | | hierarchies, relationships, and measures. Values DATA_ACCESS and ANALYSIS are mutually exclusive. |
| KIND<318> | xsd:string | A string that specifies the kind of reference that is used to compute the dependency. The possible values are the following: <ul style="list-style-type: none"> DATA – Is used for data references and applies to DAX expressions, M expressions, and metadata/structural dependencies, such as hierarchies and relationships. NAMED – Is used for explicitly named references and applies to DAX expressions and M expressions only. An M expression is always both a named dependency and a data dependency. A DAX expression can be either or both. Values NAMED and DATA are not mutually exclusive, and many dependencies are both. |

Both OBJECT_CATEGORY and KIND restrictions MUST be satisfied. If either restriction is not satisfied, the schema rowset output is not returned. Dependency is allowed by current OBJECT_CATEGORY and KIND restriction settings as described in the following table.

| Restriction | OBJECT_CATEGORY | | | KIND | | |
|---|-----------------|----------|-------------|------|-------|-------------|
| | DATA_ACCESS | ANALYSIS | Not present | DATA | NAMED | Not present |
| Dependency | | | | | | |
| Data and structural (such as hierarchy and relationship) dependency | | Yes | Yes | Yes | Yes | Yes |
| Mashup dependency | Yes | | Yes | Yes | Yes | Yes |
| Partition with provider data source dependency | Yes | | Yes | Yes | Yes | Yes |
| Named dependency | | Yes | Yes | | | Yes |

3.1.4.2.2.1.3.63 MDSHEMA_FUNCTIONS

The MDSHEMA_FUNCTIONS schema rowset returns information about the functions that are currently available for use in the DAX and MDX languages.

3.1.4.2.2.1.3.63.1 (Updated Section) Columns

The MDSHEMA_FUNCTIONS rowset contains the following columns.

| Name | Type | Restriction | Description |
|----------------|------------|-------------|--|
| FUNCTION_NAME | xsd:string | No | The name of the function. |
| DESCRIPTION | xsd:string | No | A description of the function. |
| PARAMETER_LIST | xsd:string | No | A description the parameters accepted by the |

| Name | Type | Restriction | Description |
|----------------------|---------------|-------------|---|
| | | | function. |
| RETURN_TYPE | xsd:int | No | The OLE DB data type (DBTYPE) that is returned by the function. |
| ORIGIN | xsd:int | Yes | The possible values are as follows: <ul style="list-style-type: none"> (0x1) MSOLAP (0x2) UDF (0x3) RELATIONAL (0x4) SCALAR |
| INTERFACE_NAME | xsd:string | Yes | A logical classification of the type of function. For example: <ul style="list-style-type: none"> DATETIME LOGICAL FILTER |
| LIBRARY_NAME | xsd:string | Yes | The library that implements the function. |
| DLL_NAME | xsd:string | No | Unused |
| HELP_FILE | xsd:string | No | Unused |
| HELP_CONTEXT | xsd:int | No | Unused |
| OBJECT | xsd:string | No | The type of object on which this function can be called. For example, the Children MDX function can be called on a Member object. |
| CAPTION | xsd:string | No | The caption of the function. |
| PARAMETERINFO | nested rowset | No | The parameters that can be provided to this function. |
| DIRECTQUERY_PUSHABLE | xsd:int | No | A bitmask that indicates the scenarios in which this function can be used when the model is in DirectQuery mode. The possible values are as follows: <ul style="list-style-type: none"> (0x1) MEASURE: This function can be used in measure expressions. (0x2) CALCCOL: This function can be used in calculated column expressions. |

The PARAMETERINFO column is a nested rowset. The following table describes the columns of that rowset.

| Name | Type | Restriction | Description |
|------|------------|-------------|----------------------------|
| NAME | xsd:string | No | The name of the parameter. |

| Name | Type | Restriction | Description |
|-------------|-------------|-------------|--|
| DESCRIPTION | xsd:string | No | The description of the parameter. |
| OPTIONAL | xsd:boolean | No | A Boolean that, when true, indicates that the parameter is optional. |
| REPEATABLE | xsd:boolean | No | A Boolean that, when true, indicates that multiple values can be specified for this parameter. |
| REPEATGROUP | xsd:int | No | The index of the repeat group of this parameter. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="FUNCTION_NAME" name="FUNCTION_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="PARAMETER_LIST" name="PARAMETER_LIST" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="RETURN_TYPE" name="RETURN_TYPE" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="ORIGIN" name="ORIGIN" type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="INTERFACE_NAME" name="INTERFACE_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="LIBRARY_NAME" name="LIBRARY_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="DLL_NAME" name="DLL_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="HELP_FILE" name="HELP_FILE" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="HELP_CONTEXT" name="HELP_CONTEXT" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="OBJECT" name="OBJECT" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CAPTION" name="CAPTION" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="PARAMETERINFO" name="PARAMETERINFO" minOccurs="0"
      maxOccurs="unbounded">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element sql:field="NAME" name="NAME" type="xsd:string" minOccurs="0" />
          <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
            minOccurs="0" />
          <xsd:element sql:field="OPTIONAL" name="OPTIONAL" type="xsd:boolean"
            minOccurs="0" />
          <xsd:element sql:field="REPEATABLE" name="REPEATABLE" type="xsd:boolean"
            minOccurs="0" />
          <xsd:element sql:field="REPEATGROUP" name="REPEATGROUP" type="xsd:int"
            minOccurs="0" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element sql:field="DIRECTQUERY_PUSHABLE" name="DIRECTQUERY_PUSHABLE"
      type="xsd:int" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.64 DISCOVER_RING_BUFFERS

The DISCOVER_RING_BUFFERS schema rowset SHOULD<319> return information about the current XEvent ring buffers on the server.

3.1.4.2.2.1.3.64.1 Columns

The DISCOVER_RING_BUFFERS rowset contains the following columns.

| Name | Type | Restriction | Description |
|---------------------|--------------|-------------|---|
| SESSION_NAME | xsd:string | | The name of the XEvent session. |
| EVENT_NAME | xsd:string | | The name of the XEvent event. |
| EVENT_CREATION_TIME | xsd:dateTime | | The server UTC date and time at the moment the event was created. |

The rowset is not sorted. In addition to the above columns, additional columns will be dynamically added based on the fields in the XEvents.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="xmlDocument">
  <xsd:sequence>
    <xsd:any />
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="SESSION_NAME" name="SESSION_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="EVENT_NAME" name="EVENT_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="EVENT_CREATION_TIME" name="EVENT_CREATION_TIME"
      type="xsd:dateTime" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.64.2 Additional Restrictions

In addition to the column restrictions indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|---------------|------------|---------------------------------|
| XESessionName | xsd:string | The name of the XEvent session. |

3.1.4.2.2.1.3.65 DISCOVER_XEVENT_TRACE_DEFINITION

The DISCOVER_XEVENT_TRACE_DEFINITION schema rowset SHOULD<320> provide information about the XEvent traces that are currently active on the server.

3.1.4.2.2.1.3.65.1 Columns

The DISCOVER_XEVENT_TRACE_DEFINITION rowset contains the following columns.

| Name | Type | Restriction | Description |
|------|------------|-------------|---|
| Data | xsd:string | Yes | The XML definition of the XEvent trace. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="Data" name="Data" type="xsd:string" minOccurs="1" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.2.2.1.3.66 DISCOVER_XEVENT_PACKAGES

The DISCOVER_XEVENT_PACKAGES schema rowset SHOULD<321> provide information about the XEvent packages that are defined on the server.

3.1.4.2.2.1.3.66.1 Columns

The DISCOVER_XEVENT_PACKAGES rowset contains the following columns.

| Name | Type | Restriction | Description |
|-------------------|------------|-------------|--|
| NAME | xsd:string | Yes | The name of the XEvent package. |
| ID | uuid | Yes | The unique identifier of the XEvent package, as a GUID. |
| DESCRIPTION | xsd:string | | A description of the package. |
| CAPABILITIES | xsd:int | | A bitmask that describes the capabilities of this package. |
| CAPABILITIES_DESC | xsd:string | | A list of all the possible capabilities of this package. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

```

    </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-
zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="NAME" name="NAME" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="ID" name="ID" type="uuid" minOccurs="0" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string"
minOccurs="0" />
    <xsd:element sql:field="CAPABILITIES" name="CAPABILITIES" type="xsd:int"
minOccurs="0" />
    <xsd:element sql:field="CAPABILITIES_DESC" name="CAPABILITIES_DESC" type="xsd:string"
minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.67 DISCOVER_XEVENT_OBJECTS

The DISCOVER_XEVENT_OBJECTS schema rowset SHOULD<322> provide information about the XEvent objects that are defined on the server.

3.1.4.2.2.1.3.67.1 Columns

The DISCOVER_XEVENT_OBJECTS rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------|------------|-------------|--|
| NAME | xsd:string | Yes | The name of the object. The name is unique within a package for a specific object type. |
| OBJECT_TYPE | xsd:string | Yes | The type of the object. Valid values are: <ul style="list-style-type: none"> ▪ Event ▪ Action ▪ Target ▪ pred_source ▪ pred_compare ▪ Type |
| PACKAGE_ID | uuid | | The unique identifier of the XEvent package that exposes this object, as a GUID. |
| DESCRIPTION | xsd:string | | A description of the object. |
| TYPE_NAME | xsd:string | | The name for pred_source and pred_compare objects. |
| TYPE_PACKAGE_ID | uuid | | The unique identifier of the XEvent package that exposes the type of this object, as a GUID. |
| TYPE_SIZE | xsd:int | | The size in bytes of the data type. This value is used only for valid object types. |
| CAPABILITIES | xsd:int | | A bitmask that describes the capabilities of the object. |

| Name | Type | Restriction | Description |
|-------------------|------------|-------------|---|
| CAPABILITIES_DESC | xsd:string | | A list of all the capabilities of the object. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="NAME" name="NAME" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="OBJECT_TYPE" name="OBJECT_TYPE" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="PACKAGE_ID" name="PACKAGE_ID" type="uuid" minOccurs="0" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="TYPE_NAME" name="TYPE_NAME" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="TYPE_PACKAGE_ID" name="TYPE_PACKAGE_ID" type="uuid" minOccurs="0" />
    <xsd:element sql:field="TYPE_SIZE" name="TYPE_SIZE" type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="CAPABILITIES" name="CAPABILITIES" type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="CAPABILITIES_DESC" name="CAPABILITIES_DESC" type="xsd:string" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.68 DISCOVER_XEVENT_OBJECT_COLUMNS

The DISCOVER_XEVENT_OBJECT_COLUMNS schema rowset SHOULD<323> provide information about the schema of XEvent objects that are defined on the server.

3.1.4.2.2.1.3.68.1 Columns

The DISCOVER_XEVENT_OBJECT_COLUMNS rowset contains the following columns.

| Name | Type | Restriction | Description |
|-------------------|------------|-------------|--|
| NAME | xsd:string | | The name of the column. The name is unique within the object. |
| COLUMN_ID | xsd:int | | The identifier of the column. The COLUMN_ID is unique within the object. |
| OBJECT_NAME | xsd:string | Yes | The name of the object class to which this column belongs. |
| OBJECT_PACKAGE_ID | uuid | | The unique identifier of the XEvent package that contains the object, as a GUID. |
| DESCRIPTION | xsd:string | | The description of the object column. |

| Name | Type | Restriction | Description |
|-------------------|------------|-------------|--|
| TYPE_NAME | xsd:string | | The name of the type for this column. |
| TYPE_PACKAGE_ID | uuid | | The unique identifier of the XEvent package that contains the column data type, as a GUID. |
| COLUMN_VALUE | xsd:string | | Displays static values associated with the object column. |
| COLUMN_TYPE | xsd:string | | Indicates how this column is used. Valid values are: <ul style="list-style-type: none"> ▪ Readonly - The column contains a static value that cannot be changed. ▪ Data - The column contains run-time data exposed by the object. ▪ Customizable - The column contains a value that can be changed. |
| CAPABILITIES | xsd:int | | A bitmask that describes the capabilities of the column. |
| CAPABILITIES_DESC | xsd:string | | A description of the capabilities of this object column. Valid values are: <ul style="list-style-type: none"> ▪ Mandatory - The value MUST be set when binding the parent object to an event session. ▪ NULL |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="NAME" name="NAME" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="COLUMN_ID" name="COLUMN_ID" type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="OBJECT_NAME" name="OBJECT_NAME" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="OBJECT_PACKAGE_ID" name="OBJECT_PACKAGE_ID" type="uuid" minOccurs="0" />
    <xsd:element sql:field="DESCRIPTION" name="DESCRIPTION" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="TYPE_NAME" name="TYPE_NAME" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="TYPE_PACKAGE_ID" name="TYPE_PACKAGE_ID" type="uuid" minOccurs="0" />
    <xsd:element sql:field="COLUMN_VALUE" name="COLUMN_VALUE" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="COLUMN_TYPE" name="COLUMN_TYPE" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CAPABILITIES" name="CAPABILITIES" type="xsd:int" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

```

    <xsd:element sql:field="CAPABILITIES_DESC" name="CAPABILITIES_DESC" type="xsd:string"
        minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.69 DISCOVER_XEVENT_SESSIONS

The DISCOVER_XEVENT_SESSIONS schema rowset SHOULD<324> provide information about the current XEvent sessions on the server.

3.1.4.2.2.1.3.69.1 Columns

The DISCOVER_XEVENT_SESSIONS rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------------|------------|-------------|---|
| SESSION_NAME | xsd:string | | The name of the session. The name is unique across the local system. |
| PENDING_BUFFERS | xsd:int | | The number of full buffers that are pending processing. |
| TOTAL_PENDING_BUFFERS | xsd:int | | The total number of regular buffers that are associated with the session. |
| REGULAR_BUFFER_SIZE | xsd:long | | The regular buffer size, in bytes. |
| TOTAL_LARGE_BUFFERS | xsd:int | | The total number of large buffers. |
| LARGE_BUFFER_SIZE | xsd:long | | The large buffer size, in bytes. |
| TOTAL_BUFFER_SIZE | xsd:long | | The total size of the memory buffer that is used to store events for the session, in bytes. |
| BUFFER_POLICY_FLAGS | xsd:int | | A bitmask that indicates how session event buffers behave when all the buffers are full and a new event is fired. |
| BUFFER_POLICY_DESC | xsd:string | | A description of how session event buffers behave when all the buffers are full and a new event is fired. Valid values are: <ul style="list-style-type: none"> ▪ Drop event ▪ Do not drop events ▪ Drop full buffer ▪ Allocate new buffer |
| FLAGS | xsd:int | | A bitmask that indicates the flags that have been set on the session. |
| FLAGS_DESC | xsd:string | | A description of the flags set on the session. Valid values include any combination of the following: <ul style="list-style-type: none"> ▪ Flush buffers on close ▪ Dedicated dispatcher ▪ Allow recursive events |

| Name | Type | Restriction | Description |
|----------------------------|--------------|-------------|--|
| DROPPED_EVENT_COUNT | xsd:int | | The number of events that were dropped when the buffers were full. This value is 0 if the buffer policy is "Drop full buffer" or "Do not drop events". |
| DROPPED_BUFFER_COUNT | xsd:int | | The number of buffers that were dropped when the buffers were full. This value is 0 if the buffer policy is "Drop event" or "Do not drop events". |
| BLOCKED_EVENT_FIRE_TIME | xsd:int | | The length of time that event firings were blocked when buffers were full. This value is 0 if the buffer policy is "Drop full buffer" or "Drop event". |
| CREATE_TIME | xsd:dateTime | | The time that the session was created. |
| LARGEST_EVENT_DROPPED_SIZE | xsd:int | | The size of the largest event that did not fit into the session buffer. |

The rowset is not sorted.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="SESSION_NAME" name="SESSION_NAME" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="PENDING_BUFFERS" name="PENDING_BUFFERS" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="TOTAL_PENDING_BUFFERS" name="TOTAL_PENDING_BUFFERS"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="REGULAR_BUFFER_SIZE" name="REGULAR_BUFFER_SIZE" type="xsd:long"
      minOccurs="0" />
    <xsd:element sql:field="TOTAL_LARGE_BUFFERS" name="TOTAL_LARGE_BUFFERS" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="LARGE_BUFFER_SIZE" name="LARGE_BUFFER_SIZE" type="xsd:long"
      minOccurs="0" />
    <xsd:element sql:field="TOTAL_BUFFER_SIZE" name="TOTAL_BUFFER_SIZE" type="xsd:long"
      minOccurs="0" />
    <xsd:element sql:field="BUFFER_POLICY_FLAGS" name="BUFFER_POLICY_FLAGS" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="BUFFER_POLICY_DESC" name="BUFFER_POLICY_DESC" type="xsd:string"
      minOccurs="0" />
    <xsd:element sql:field="FLAGS" name="FLAGS" type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="FLAGS_DESC" name="FLAGS_DESC" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="DROPPED_EVENT_COUNT" name="DROPPED_EVENT_COUNT" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="DROPPED_BUFFER_COUNT" name="DROPPED_BUFFER_COUNT" type="xsd:int"
      minOccurs="0" />
    <xsd:element sql:field="BLOCKED_EVENT_FIRE_TIME" name="BLOCKED_EVENT_FIRE_TIME"
      type="xsd:int" minOccurs="0" />
    <xsd:element sql:field="CREATE_TIME" name="CREATE_TIME" type="xsd:dateTime"
      minOccurs="0" />
    <xsd:element sql:field="LARGEST_EVENT_DROPPED_SIZE" name="LARGEST_EVENT_DROPPED_SIZE"
      type="xsd:int" minOccurs="0" />
  </xsd:sequence>

```

</xsd:complexType>

3.1.4.2.2.1.3.69.2 Additional Restrictions

In addition to the column restrictions that are indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|---------------|------------|---|
| XESessionName | xsd:string | The name of the session. XESessionName is essentially the same as SESSION_NAME. |

3.1.4.2.2.1.3.70 DISCOVER_XEVENT_SESSION_TARGETS

The DISCOVER_XEVENT_SESSION_TARGETS schema rowset SHOULD<325> provide information about the current XEvent session targets on the server.

3.1.4.2.2.1.3.70.1 Columns

The DISCOVER_XEVENT_SESSION_TARGETS rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------------|------------|-------------|--|
| SESSION_NAME | xsd:string | | The name of the event session. |
| NAME | xsd:string | | The name of the target within a session. |
| PACKAGE_ID | uuid | | The unique identifier of the XEvent package that contains the target, as a GUID. |
| EXECUTION_COUNT | xsd:long | | The number of times that the target has been executed for the session. |
| EXECUTION_DURATION_MS | xsd:long | | The total amount of time, in milliseconds, that the target has been executing. |
| TARGET_DATA | xsd:string | | The data that the target maintains, such as event aggregation information. |

The rowset is not sorted.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="SESSION_NAME" name="SESSION_NAME" type="xsd:string" />
  </xsd:sequence>
</xsd:complexType>
</xsd:schema>
```

```

        minOccurs="0" />
<xsd:element sql:field="NAME" name="NAME" type="xsd:string" minOccurs="0" />
<xsd:element sql:field="PACKAGE_ID" name="PACKAGE_ID" type="uuid " minOccurs="0" />
<xsd:element sql:field="EXECUTION_COUNT" name="EXECUTION_COUNT" type="xsd:long"
minOccurs="0" />
<xsd:element sql:field="EXECUTION_DURATION_MS" name="EXECUTION_DURATION_MS"
type="xsd:long" minOccurs="0"/>
<xsd:element sql:field="TARGET_DATA" name="TARGET_DATA" type="xsd:string"
minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.70.2 Additional Restrictions

In addition to the column restrictions that are indicated in the previous section, the following restrictions can apply to this rowset.

| Name | Type | Description |
|---------------|------------|---|
| XESessionName | xsd:string | The name of the session. XESessionName is essentially the same as SESSION_NAME. |

3.1.4.2.2.1.3.71 DISCOVER_MEM_STATS

The DISCOVER_MEM_STATS schema rowset SHOULD<326> provide fine-grained information about all the memory trackers that are active on the server.

3.1.4.2.2.1.3.71.1 Columns

The DISCOVER_MEM_STATS rowset contains the following columns.

| Name | Type | Restriction | Description |
|---------------------|------------|-------------|--|
| CATALOG_NAME | xsd:string | Yes | The name of the online database. The system tracker name is \$System. |
| PARENT_TRACKER_TYPE | xsd:string | | The type of the parent memory tracker. The available types are System and Database. |
| PARENT_TRACKER_NAME | xsd:string | | The name of the parent memory tracker. The database tracker name is Database, and the system tracker name is \$System. |
| PARENT_TRACKER_ID | xsd:string | | The identifier of the parent memory tracker. The value is Database ID for the database tracker and \$System for the system tracker. |
| CHILD_TRACKER_TYPE | xsd:string | | The type of the child memory tracker. The available types are Database and Request. |
| CHILD_TRACKER_NAME | xsd:string | | The name of the child memory tracker. The database tracker name is Database, the active request tracker name is \$active, and the proxy tracker name is \$proxy. |
| CHILD_TRACKER_ID | xsd:string | | The identifier of the child memory tracker. The value is Database ID for the database tracker and request identifier for the request tracker. |

| Name | Type | Restriction | Description |
|------------------------|------------------|-------------|---|
| OWNED_MEMORY_KB | xsd:long | | The total amount of memory, in kilobytes, that is allocated for this tracker. This value is reported only for the active tracker. |
| ALLOCATIONS_COUNT | xsd:unsignedLong | | The number of individual allocations that are tracked by the current child tracker. |
| REQUEST_PEAK_MEMORY_KB | xsd:long | | The amount of peak memory that is allocated for the request tracker. This column is empty for the system and database trackers. |

The rowset is sorted on CATALOG_NAME.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="xmlDocument">
  <xsd:sequence>
    <xsd:any />
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="PARENT_TRACKER_TYPE" name="PARENT_TRACKER_TYPE" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="PARENT_TRACKER_NAME" name="PARENT_TRACKER_NAME" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="PARENT_TRACKER_ID" name="PARENT_TRACKER_ID" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CHILD_TRACKER_TYPE" name="CHILD_TRACKER_TYPE" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CHILD_TRACKER_NAME" name="CHILD_TRACKER_NAME" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="CHILD_TRACKER_ID" name="CHILD_TRACKER_ID" type="xsd:string" minOccurs="0" />
    <xsd:element sql:field="OWNED_MEMORY_KB" name="OWNED_MEMORY_KB" type="xsd:long" minOccurs="0" />
    <xsd:element sql:field="ALLOCATIONS_COUNT" name="ALLOCATIONS_COUNT" type="xsd:unsignedLong" minOccurs="0" />
    <xsd:element sql:field="REQUEST_PEAK_MEMORY_KB" name="REQUEST_PEAK_MEMORY_KB" type="xsd:long" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.72 DISCOVER_DB_MEM_STATS

The DISCOVER_DB_MEM_STATS schema rowset SHOULD<327> provide coarse-grained information about the memory trackers that are active on the server. The data is aggregated at the database and system level.

3.1.4.2.2.1.3.72.1 Columns

The DISCOVER_DB_MEM_STATS rowset contains the following columns.

| Name | Type | Restriction | Description |
|----------------------------------|------------------|-------------|--|
| CATALOG_NAME | xsd:string | Yes | The name of the online database. The system tracker name is \$System. |
| DATABASE_ID | xsd:string | | The identifier of the online database. |
| DATABASE_GUID | uuid | | The GUID of the online database. The value is empty for the system tracker. |
| CURRENTLY_USED | xsd:boolean | | A Boolean that indicates whether any requests are currently running against this database. The value is empty for the system tracker. |
| POPULARITY | xsd:float | | A measure of how frequently the database is used. The value is empty for the system tracker. |
| WEIGHTEDPOPULARITY | xsd:double | | A measure of how frequently the database is used, expressed as a fraction with respect to the other databases. The value is empty for the system tracker. |
| OWNED_MEMORY_KB | xsd:long | | The total amount of memory that is owned by the database or system, including all of the proxy requests memory that was transferred to the database tracker. |
| ACTIVE_REQUESTS_MEMORY_KB | xsd:long | | The total amount of memory that is owned by the active request trackers. |
| ACTIVE_REQUESTS_COUNT | xsd:unsignedInt | | The number of active requests that are running against the database or the system tracker. |
| PROXY_REQUESTS_COUNT | xsd:unsignedInt | | The number of request trackers that are proxies of the current database. |
| PROXY_REQUESTS_ALLOCATIONS_COUNT | xsd:unsignedLong | | The number of individual allocations tracked by the requests trackers that are proxies of the database or system tracker. |

| Name | Type | Restriction | Description |
|-------------------------------------|------------------|-------------|--|
| DB_PROXY_TRACKERS_COUNT | xsd:unsignedInt | | The number of database trackers that are proxies of the system tracker. This value is reported only by the system tracker. |
| DB_PROXY_TRACKERS_ALLOCATIONS_COUNT | xsd:unsignedLong | | The number of individual allocations tracked by database trackers that are proxies of the system tracker. This value is reported only by the system tracker. |

The rowset is sorted on CATALOG_NAME.

The response has the following definition.

```

<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="xmlDocument">
  <xsd:sequence>
    <xsd:any />
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="CATALOG_NAME" name="CATALOG_NAME" type="xsd:string" minOccurs="0" />
  </xsd:sequence>
  <xsd:element sql:field="DATABASE_ID" name="DATABASE_ID" type="xsd:string" minOccurs="0" />
  <xsd:element sql:field="DATABASE_GUID" name="DATABASE_GUID" type="uuid" minOccurs="0" />
  <xsd:element sql:field="CURRENTLY_USED" name="CURRENTLY_USED" type="xsd:boolean" minOccurs="0" />
  <xsd:element sql:field="POPULARITY" name="POPULARITY" type="xsd:float" minOccurs="0" />
  <xsd:element sql:field="WEIGHTEDPOPULARITY" name="WEIGHTEDPOPULARITY" type="xsd:double" minOccurs="0" />
  <xsd:element sql:field="OWNED_MEMORY_KB" name="OWNED_MEMORY_KB" type="xsd:long" minOccurs="0" />
  <xsd:element sql:field="ACTIVE_REQUESTS_MEMORY_KB" name="ACTIVE_REQUESTS_MEMORY_KB" type="xsd:long" minOccurs="0" />
  <xsd:element sql:field="ACTIVE_REQUESTS_COUNT" name="ACTIVE_REQUESTS_COUNT" type="xsd:unsignedInt" minOccurs="0" />
  <xsd:element sql:field="PROXY_REQUESTS_COUNT" name="PROXY_REQUESTS_COUNT" type="xsd:unsignedInt" minOccurs="0" />
  <xsd:element sql:field="PROXY_REQUESTS_ALLOCATIONS_COUNT" name="PROXY_REQUESTS_ALLOCATIONS_COUNT" type="xsd:unsignedLong" minOccurs="0" />
  <xsd:element sql:field="DB_PROXY_TRACKERS_COUNT" name="DB_PROXY_TRACKERS_COUNT" type="xsd:unsignedInt" minOccurs="0" />
  <xsd:element sql:field="DB_PROXY_TRACKERS_ALLOCATIONS_COUNT" name="DB_PROXY_TRACKERS_ALLOCATIONS_COUNT" type="xsd:unsignedLong" minOccurs="0" />
  </xsd:sequence>
</xsd:complexType>

```

3.1.4.2.2.1.3.73 DISCOVER_OBJECT_COUNTERS

The DISCOVER_OBJECT_COUNTERS schema rowset MAY<328> return coarse-grained information about the number of in-memory objects of the specified class that are cached in engine memory. This rowset is intended for diagnostic investigations only.

3.1.4.2.2.1.3.73.1 Columns

The DISCOVER_OBJECT_COUNTERS rowset contains the following columns.

| Name | Type | Restriction | Description |
|-----------------|------------|-------------|--|
| OBJECT_NAME | xsd:string | | The name of the object class to which this column belongs. |
| INSTANCES | xsd:long | | The total number of instances of the specified object. |
| INSTANCE_SIZEOF | xsd:long | | The size, in bytes, of the object in memory, excluding its dynamic suballocations. |

The rowset is sorted on OBJECT_NAME.

The response has the following definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="xmlDocument">
  <xsd:sequence>
    <xsd:any />
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="OBJECT_NAME" name="OBJECT_NAME" type="xsd:string" minOccurs="0" />
  </xsd:sequence>
  <xsd:element sql:field="INSTANCES" name="INSTANCES" type="xsd:long" minOccurs="0" />
  <xsd:element sql:field="INSTANCE_SIZEOF" name="INSTANCE_SIZEOF" type="xsd:long" minOccurs="0" />
</xsd:complexType>
```

3.1.4.2.2.2 DiscoverResponse

The **DiscoverResponse** element has the following definition.

```
<xsd:element name="DiscoverResponse">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="return" minOccurs="0" maxOccurs="1">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="root" ref="xmla-rs:root" minOccurs="0" maxOccurs="1">
            </xsd:element>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

```

        </xsd:element>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>
</xsd:sequence>
</xsd:complexType>
</xsd:element>

```

3.1.4.2.2.1 return Element

The Discover method returns the return element that is described in section 3.1.4.3.2.2.1. The **root** element that is returned by **Discover** will be of type **xmla-rs:rowset** (for more information, see section 2.2.4.1.3).

3.1.4.3 Execute

This operation is used for sending commands to the server.

The following WSDL describes the **Execute** operation.

```

<wsdl:operation name="Execute">
  <wsdl:input message=" ExecuteSoapIn" />
  <wsdl:output message=" ExecuteSoapOut" />
</wsdl:operation>

```

The protocol client sends an ExecuteSoapIn request message, and the protocol server responds with an ExecuteSoapOut response message.

3.1.4.3.1 Messages

The following WSDL message definitions are specific to this operation.

3.1.4.3.1.1 ExecuteSoapIn

This message is the request message for the Execute operation.

The SOAP action value of the message is defined as follows.

```
"urn:schemas-microsoft-com:xml-analysis:Execute"
```

The SOAP body contains an **Execute** element.

```

<message name="ExecuteSoapIn">
  <part name="parameters" element="xmla:Execute" />
</message>

```

3.1.4.3.1.2 ExecuteSoapOut

This message is the response message for the Execute operation.

The SOAP action value of the message is defined as follows.

```
"urn:schemas-microsoft-com:xml-analysis:Execute"
```

The SOAP body contains an ExecuteResponse element.

```

<message name="ExecuteSoapOut">
  <part name="parameters" element="xsla:ExecuteResponse" />
</message>

```

3.1.4.3.2 Elements

The following XML schema element definitions are specific to this operation.

Some attributes in the following XML element definitions have a default value. If the attribute is not specified in an instance within a command, the attribute has the value given. If an attribute **MUST** be specified, it is described as having [Required] as the default value.

Some elements in the following XML element definitions have a default value. If the element is not specified in an instance within a command, the default value of the element is used. If an element **MUST** be specified, it is described as having [Required] as the default value.

3.1.4.3.2.1 Execute

The **Execute** element has the following definition:

```

<xsd:complexType name="Execute">
  <xsd:sequence>
    <xsd:element name="Command" type="Command" />
    <xsd:element name="Properties" minOccurs="1" maxOccurs="1" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="PropertyList" minOccurs="0" maxOccurs="1"
            type="PropertyList" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Parameters" minOccurs="0">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Parameter" type="ExecuteParameter"
            minOccurs="0" maxOccurs="unbounded" />
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>

```

| Element | Default value | Description |
|------------|---------------|--|
| Command | [Required] | The Command element is defined in section 3.1.4.3.2.1.1. The available commands are described in the subsections to that section. |
| Properties | [Required] | The Properties element contains a PropertyList element. The PropertyList element is used to set properties on the server. The available properties to be set are described in section 3.1.4.2.2.1.2.1. |
| Parameters | Empty | A collection of Parameter elements of type ExecuteParameter . Some commands accept parameters, and the values for those parameters SHOULD be set in this collection. The ExecuteParameter type is defined in section 3.1.4.3.2.1.3.1. |

3.1.4.3.2.1.1 Command Element

The **Command** element contains one of the available commands that can be sent to the server.

```
<xsd:complexType name="Command">
  <xsd:choice>
    <xsd:element name="Statement" type="xsd:string" minOccurs="0" />
    <xsd:element name="Create" type="Create" minOccurs="0" />
    <xsd:element name="Alter" type="Alter" minOccurs="0" />
    <xsd:element name="Delete" type="Delete" minOccurs="0" />
    <xsd:element name="Process" type="Process" minOccurs="0" />
    <xsd:element name="MergePartitions" type="MergePartitions" minOccurs="0" />
    <xsd:element name="DesignAggregations" type="DesignAggregations" minOccurs="0" />
    <xsd:element name="ClearCache" type="ClearCache" minOccurs="0" />
    <xsd:element name="Subscribe" type="Subscribe" minOccurs="0" />
    <xsd:element name="Unsubscribe" type="Unsubscribe" minOccurs="0" />
    <xsd:element name="Cancel" type="Cancel" minOccurs="0" />
    <xsd:element name="BeginTransaction" type="BeginTransaction" minOccurs="0" />
    <xsd:element name="CommitTransaction" type="CommitTransaction" minOccurs="0" />
    <xsd:element name="RollbackTransaction" type="RollbackTransaction" minOccurs="0" />
    <xsd:element name="Lock" type="Lock" minOccurs="0" />
    <xsd:element name="Unlock" type="Unlock" minOccurs="0" />
    <xsd:element name="Backup" type="Backup" minOccurs="0" />
    <xsd:element name="Restore" type="Restore" minOccurs="0" />
    <xsd:element name="Synchronize" type="Synchronize" minOccurs="0" />
    <xsd:element name="Attach" type="Attach" minOccurs="0" />
    <xsd:element name="Detach" type="Detach" minOccurs="0" />
    <xsd:element name="Insert" type="Insert" minOccurs="0" />
    <xsd:element name="Update" type="Update" minOccurs="0" />
    <xsd:element name="Drop" type="Drop" minOccurs="0" />
    <xsd:element name="UpdateCells" type="UpdateCells" minOccurs="0" />
    <xsd:element name="NotifyTableChange" type="NotifyTableChange" minOccurs="0" />
    <xsd:element name="Batch" type="Batch" minOccurs="0" />
    <xsd:element name="ImageLoad" type="ImageLoad" minOccurs="0" />
    <xsd:element name="ImageSave" type="ImageSave" minOccurs="0" />
    <xsd:element name="CloneDatabase" type="CloneDatabase" minOccurs="0" />
    <xsd:element name="SetAuthContext" type="SetAuthContext" minOccurs="0" />
    <xsd:element name="DBCC" type="DBCC" minOccurs="0" />
  </xsd:choice>
</xsd:complexType>
```

The following subsections define the types for all of the commands.

In addition to the above commands, [MS-SSAS-T] extends the allowed commands to support databases in Tabular mode with a compatibility level greater than or equal to 1200.

3.1.4.3.2.1.1.1 ObjectReference Type

Many of the commands require an element that is of type **ObjectReference**. An **ObjectReference** consists of a hierarchical list of references that, when concatenated, reference an object by its full path in the server object hierarchy.

Only a MajorObject (section 2.2.4.2.2.1) can be referenced by an **ObjectReference**.

```
<xsd:complexType name="ObjectReference">
  <xsd:all>
    <xsd:element name="ServerID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DatabaseID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="RoleID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="TraceID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="AssemblyID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DimensionID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DimensionPermissionID" type="xsd:string"
      minOccurs="0"/>
    <xsd:element name="DataSourceID" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DataSourcePermissionID" type="xsd:string"
      minOccurs="0"/>
  </xsd:all>
</xsd:complexType>
```

```

<xsd:element name="DatabasePermissionID" type="xsd:string"
  minOccurs="0"/>
<xsd:element name="DataSourceViewID" type="xsd:string" minOccurs="0"/>
<xsd:element name="CubeID" type="xsd:string" minOccurs="0"/>
<xsd:element name="MiningStructureID" type="xsd:string" minOccurs="0"/>
<xsd:element name="MeasureGroupID" type="xsd:string" minOccurs="0"/>
<xsd:element name="PerspectiveID" type="xsd:string" minOccurs="0"/>
<xsd:element name="CubePermissionID" type="xsd:string" minOccurs="0"/>
<xsd:element name="MdxScriptID" type="xsd:string" minOccurs="0"/>
<xsd:element name="PartitionID" type="xsd:string" minOccurs="0"/>
<xsd:element name="AggregationDesignID" type="xsd:string" minOccurs="0"/>
<xsd:element name="MiningModelID" type="xsd:string" minOccurs="0"/>
<xsd:element name="MiningModelPermissionID" type="xsd:string"
  minOccurs="0"/>
<xsd:element name="MiningStructurePermissionID" type="xsd:string"
  minOccurs="0"/>
</xsd:all>
</xsd:complexType>

```

The following table lists the elements that are needed to reference each of the major objects.

ServerID is always optional when referencing a major object, because the current server is used.

| Major object to be referenced | Element to be used |
|-------------------------------|---|
| Server | ServerID |
| Assembly (Server Assembly) | ServerID, AssemblyID |
| Assembly (Database Assembly) | ServerID, DatabaseID, AssemblyID |
| Trace | ServerID, TraceID |
| Database | ServerID, DatabaseID |
| DatabasePermission | ServerID, DatabaseID, DatabasePermissionID |
| Role (on Server) | ServerID, RoleID |
| Role (on Database) | ServerID, RoleID, DatabaseID |
| DataSource | ServerID, RoleID, DatabaseID, DataSourceID |
| DataSourcePermission | ServerID, RoleID, DatabaseID, DataSourceID, DataSourcePermissionID |
| DataSourceView | ServerID, RoleID, DatabaseID, DataSourceViewID |
| Dimension | ServerID, RoleID, DatabaseID, DimensionID |
| DimensionPermission | ServerID, RoleID, DatabaseID, DimensionID, DimensionPermissionID |
| MiningStructure | ServerID, RoleID, DatabaseID, MiningStructureID |
| MiningStructurePermission | ServerID, RoleID, DatabaseID, MiningStructureID, MiningStructurePermissionID |
| MiningModel | ServerID, RoleID, DatabaseID, MiningStructureID, MiningModelID |
| MiningModelPermission | ServerID, RoleID, DatabaseID, MiningStructureID, MiningModelID, MiningModelPermissionID |
| Cube | ServerID, RoleID, DatabaseID, CubeID |
| CubePermission | ServerID, RoleID, DatabaseID, CubeID, CubePermissionID |

| Major object to be referenced | Element to be used |
|-------------------------------|---|
| MeasureGroup | ServerID, RoleID, DatabaseID, CubeID, MeasureGroupID |
| AggregationDesign | ServerID, RoleID, DatabaseID, CubeID, MeasureGroupID, AggregationDesignID |
| Partition | ServerID, RoleID, DatabaseID, CubeID, MeasureGroupID, PartitionID |
| Perspective | ServerID, RoleID, DatabaseID, CubeID, PerspectiveID |
| MdxScript | ServerID, RoleID, DatabaseID, CubeID, MdxScriptID |

3.1.4.3.2.1.1.2 Statement

The **Statement** command consists of a string. This MUST be a valid string in a language that is understood by the server, such as MDX, DMX, or SQL.

```
<xsd:complexType name="Statement" >
  <xsd:all>
    <xsd:element name="Statement" type="xsd:string" minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

The return result type for the **Statement** command depends on the syntax that is contained in the statement; it is either the xmla-ds:mddataset complex type or the xmla-rs:rowset complex type.

3.1.4.3.2.1.1.3 Create

The **Create** command is used to create an object on a server.

```
<xsd:complexType name="Create">
  <xsd:all>
    <xsd:element name="ParentObject" type="ObjectReference" minOccurs="0" />
    <xsd:element name="ObjectDefinition" type="MajorObject" />
  </xsd:all>
  <xsd:attribute name="Scope" >
    <xsd:simpleType>
      <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="Session" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:attribute>
  <xsd:attribute name="AllowOverwrite" type="xsd:boolean" />
</xsd:complexType>
```

The following table describes the elements allowed in the **Create** command.

| Element | Default value | Description |
|------------------|---------------|--|
| ParentObject | Server object | The parent object under which the new object is created. The ObjectReference type is defined in section 3.1.4.3.2.1.1.1. |
| ObjectDefinition | [Required] | The full XML that defines an object that is derived from MajorObject , as described in section 2.2.4.2. However, the Permission object cannot be created with a Create command even though it is derived from MajorObject . A Permission object MUST NOT be specified in the ObjectDefinition element. |

| Element | Default value | Description |
|---------|---------------|--|
| | | Only one of the objects that is an extension of Permission can be created with a Create command. |

The following table describes the XML attributes that are allowed in the **Create** command.

| Attribute | Default value | Description |
|----------------|---------------|--|
| Scope | Empty | If Scope is specified as "Session", the object is created with session scope. If this XML attribute is present, any value other than "Session", including an empty value, will return an error. |
| AllowOverwrite | False | A Boolean that determines how to handle an object that already exists. If true, the object is overwritten; if false, the server raises an error. |

The return result type for the **Create** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.4 Alter

The **Alter** command is used to alter an object that already exists on a server.

```
<xsd:complexType name="Alter">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" minOccurs="0" />
    <xsd:element name="ObjectDefinition" type="MajorObject" />
  </xsd:all>
  <xsd:attribute name="Scope" >
    <xsd:simpleType>
      <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="Session" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:attribute>
  <xsd:attribute name="AllowCreate" type="xsd:boolean" />
  <xsd:attribute name="ObjectExpansion" >
    <xsd:simpleType>
      <xsd:restriction base="xsd:string" >
        <xsd:enumeration value="ObjectProperties" />
        <xsd:enumeration value="ExpandFull" />
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:attribute>
</xsd:complexType>
```

The following table describes the XML elements allowed in the **Alter** command.

| Element | Default value | Description |
|------------------|---------------|---|
| Object | Server object | The object to alter. The ObjectReference type is defined in section 3.1.4.3.2.1.1.1. |
| ObjectDefinition | [Required] | The ObjectDefinition is the full XML that defines an object derived from MajorObject (2.2.4.2.2.1). Depending on the value of ObjectExpansion , objects contained by a major object MAY be defined with the XML. |

The following table describes the XML attributes allowed in the Alter command.

| Attribute | Default value | Description |
|-----------------|--------------------|---|
| Scope | Empty | If Scope is specified as "Session", the object is altered as a session object. If this XML attribute is present, any value other than "Session", including an empty value, will return an error. |
| AllowCreate | False | A Boolean that specifies what to do if the object does not exist. If true, the server creates a new object; if false, the server raises an error. |
| ObjectExpansion | "ObjectProperties" | An enumeration value that specifies whether to alter only the object, or the object and all of its descendants. |

The return result type for the **Alter** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.5 Delete

The **Delete** command is used to delete an object from a server.

```
<xsd:complexType name="Delete">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
  </xsd:all>
  <xsd:attribute name="IgnoreFailures" type="xsd:boolean" />
</xsd:complexType>
```

The following table shows the XML elements included in the **Delete** command.

| Element | Default value | Description |
|---------|---------------|--|
| Object | Server object | The object to delete. The ObjectReference type is defined in section 3.1.4.3.2.1.1.1. |

The following table describes the XML attributes allowed in the **Delete** command.

| Attribute | Default value | Description |
|----------------|---------------|---|
| IgnoreFailures | False | A Boolean that indicates how to handle failures related to network and remote partitions. If true, the server ignores failures; if false, the server raises an error. |

The return result type for the **Delete** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.6 Process

The **Process** command is used to process objects on the server.

```
<xsd:complexType name="Process">
  <xsd:all>
    <xsd:element name="Type" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="ProcessFull" />
          <xsd:enumeration value="ProcessAdd" />
          <xsd:enumeration value="ProcessUpdate" />
          <xsd:enumeration value="ProcessIndexes" />
          <xsd:enumeration value="ProcessScriptCache" />
          <xsd:enumeration value="ProcessData" />
          <xsd:enumeration value="ProcessDefault" />
          <xsd:enumeration value="ProcessClear" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

```

        <xsd:enumeration value="ProcessStructure" />
        <xsd:enumeration value="ProcessClearStructureOnly" />
        <xsd:enumeration value="ProcessClearIndexes" />
        <xsd:enumeration value="ProcessDefrag" />
    </xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="Object" type="ObjectReference" />
<xsd:element name="Bindings" minOccurs="0" >
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="Binding" type="OutOfLineBinding" minOccurs="0"
                maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:complexType>
</xsd:element>
<xsd:element name="DataSource" type="DataSource" minOccurs="0" />
<xsd:element name="DataSourceView" type="DataSourceView" minOccurs="0" />
<xsd:element name="ErrorConfiguration" type="ErrorConfiguration"
    minOccurs="0" />
<xsd:element name="WriteBackTableCreation" minOccurs="0" >
    <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
            <xsd:enumeration value="Create" />
            <xsd:enumeration value="CreateAlways" />
            <xsd:enumeration value="UseExisting" />
        </xsd:restriction>
    </xsd:simpleType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

The following table shows the XML elements included in the **Process** command.

| Element | Default value | Description |
|------------------------|---------------|---|
| Type | [Required] | An enumeration value that specifies the type of processing being done. |
| Object | [Required] | The object to process. The ObjectReference type is defined in section 3.1.4.3.2.1.1.1. |
| Bindings | Empty | The optional bindings that can be specified for any of the objects that are to be processed. If any are specified, they override the binding specified for the objects that are stored with the object definition on the server. |
| DataSource | Empty | The optional data source that can be specified for any of the objects that are to be processed. If any are specified, they override the data source that is specified for the objects that are stored with the object definition on the server. The DataSource type is defined in section 2.2.4.2.2.6. |
| DataSourceView | Empty | The optional data source view that can be specified for any of the objects that are to be processed. If any are specified, they override the data source view that is specified for the objects that are stored with the object definition on the server. The DataSourceView type is defined in section 2.2.4.2.2.7. |
| ErrorConfiguration | Empty | The error configuration used for this processing operation. It overrides any error configuration object that is stored as part of object definitions on the server. The ErrorConfiguration type is defined in section 2.2.4.2.2.30. |
| WriteBackTableCreation | "Create" | An enumeration value that specifies whether to create or use an existing Writeback table. |

The return result type for the **Process** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.6.1 OutOfLineBinding

The **OutOfLineBinding** type is used for overriding the bindings on an object set in a Create or Alter command. It consists of a set of IDs that reference the object and the bindings to be overridden. The bindings have the same restrictions as those on the object that they override.

```
<xsd:complexType name="OutOfLineBinding" >
  <xsd:all>
    <xsd:element name="DatabaseID" minOccurs="0" type="xsd:string" />
    <xsd:element name="DimensionID" minOccurs="0" type="xsd:string" />
    <xsd:element name="CubeID" minOccurs="0" type="xsd:string" />
    <xsd:element name="MeasureGroupID" minOccurs="0" type="xsd:string" />
    <xsd:element name="PartitionID" minOccurs="0" type="xsd:string" />
    <xsd:element name="MiningModelID" minOccurs="0" type="xsd:string" />
    <xsd:element name="MiningStructureID" minOccurs="0" type="xsd:string" />
    <xsd:element name="AttributeID" minOccurs="0" type="xsd:string" />
    <xsd:element name="CubeDimensionID" minOccurs="0" type="xsd:string" />
    <xsd:element name="MeasureID" minOccurs="0" type="xsd:string" />
    <xsd:element name="ParentColumnID" minOccurs="0" type="xsd:string" />
    <xsd:element name="ColumnID" minOccurs="0" type="xsd:string" />
    <xsd:element name="Source" minOccurs="0" type="Binding" />
    <xsd:element name="NameColumn" minOccurs="0" >
      <xsd:complexType>
        <xsd:all>
          <xsd:element name="Source" minOccurs="0" type="Binding" />
        </xsd:all>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="SkippedLevelsColumn" minOccurs="0" >
      <xsd:complexType>
        <xsd:all>
          <xsd:element name="Source" minOccurs="0" type="Binding" />
        </xsd:all>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="CustomRollupColumn" minOccurs="0" >
      <xsd:complexType>
        <xsd:all>
          <xsd:element name="Source" minOccurs="0" type="Binding" />
        </xsd:all>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="CustomRollupPropertiesColumn" minOccurs="0" >
      <xsd:complexType>
        <xsd:all>
          <xsd:element name="Source" minOccurs="0" type="Binding" />
        </xsd:all>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="ValueColumn" minOccurs="0" >
      <xsd:complexType>
        <xsd:all>
          <xsd:element name="Source" minOccurs="0" type="Binding" />
        </xsd:all>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="UnaryOperatorColumn" minOccurs="0" >
      <xsd:complexType>
        <xsd:all>
          <xsd:element name="Source" minOccurs="0" type="Binding" />
        </xsd:all>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="KeyColumns" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
```

```

<xsd:element name="KeyColumn" minOccurs="0" maxOccurs="unbounded">
  <xsd:complexType>
    <xsd:all>
      <xsd:element name="Source" minOccurs="0" type="Binding" />
    </xsd:all>
  </xsd:complexType>
</xsd:element>
</xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:element name="ForeignKeyColumns" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="ForeignKeyColumn" minOccurs="0"
        maxOccurs="unbounded">
        <xsd:complexType>
          <xsd:all>
            <xsd:element name="Source" minOccurs="0" type="Binding" />
          </xsd:all>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="Translations" minOccurs="0" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Translation" minOccurs="0" maxOccurs="unbounded">
        <xsd:complexType>
          <xsd:all>
            <xsd:element name="Language" type="xsd:int" />
            <xsd:element name="Source" minOccurs="0" type="Binding" />
          </xsd:all>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

| Element | Default value | Description |
|-------------------|---------------|--|
| DatabaseID | Empty | The ID of the Database that this binding applies to. |
| DimensionID | Empty | The ID of the Dimension that this binding applies to. |
| CubeID | Empty | The ID of the Cube that this binding applies to. |
| MeasureGroupID | Empty | The ID of the MeasureGroup that this binding applies to. |
| PartitionID | Empty | The ID of the Partition that this binding applies to. |
| MiningModelID | Empty | The ID of the MiningModel that this binding applies to. |
| MiningStructureID | Empty | The ID of the MiningStructure that this binding applies to. |
| AttributeID | Empty | The ID of the Attribute that this binding applies to. |
| CubeDimensionID | Empty | The ID of the CubeDimension that this binding applies to. |
| MeasureID | Empty | The ID of the Measure that this binding applies to. |
| ParentColumnID | Empty | The ID of the Column that is the parent column in a nested table. |

| Element | Default value | Description |
|------------------------------|---------------|--|
| ColumnID | Empty | The ID of the Column that this binding applies to. |
| Source | Empty | The Source binding for the referenced object. |
| NameColumn | Empty | The NameColumn binding for the referenced DimensionAttribute or MiningStructureColumn. |
| SkippedLevelsColumn | Empty | The SkippedLevelsColumn binding for the referenced DimensionAttribute . |
| CustomRollupColumn | Empty | The CustomRollupColumn binding for the referenced DimensionAttribute . |
| CustomRollupPropertiesColumn | Empty | The CustomRollupPropertiesColumn binding for the referenced DimensionAttribute . |
| ValueColumn | Empty | The ValueColumn binding for the referenced DimensionAttribute . |
| UnaryOperatorColumn | Empty | The UnaryOperatorColumn binding for the referenced DimensionAttribute . |
| KeyColumns | Empty | A collection of KeyColumn bindings for the referenced DimensionAttribute or MiningStructureColumn . |
| ForeignKeyColumns | Empty | A collection of ForeignKeyColumn bindings for the referenced MiningStructureColumn . |
| Translations | Empty | A collection of CaptionColumn bindings for each Translation of the referenced DimensionAttribute . |

3.1.4.3.2.1.1.7 MergePartitions

This command merges the data of one or more source partitions into a target partition and deletes the source partitions. The Source and **Target** object references MUST point to distinct partitions in the same measure group. Otherwise, an error is raised.

```
<xsd:complexType name="MergePartitions">
  <xsd:all>
    <xsd:element name="Sources" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Source" type="ObjectReference" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Target" type="ObjectReference" />
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|---------|---------------|---|
| Sources | [Required] | A collection of ObjectReferences that define the source partitions for the MergePartitions command. This is a collection of Source elements, each of type |

| Element | Default value | Description |
|---------|---------------|---|
| | | ObjectReference . The ObjectReference type is defined in section 3.1.4.3.2.1.1.1. |
| Target | [Required] | The target partition for the MergePartitions command. |

The return result type for the **MergePartitions** command is `xmla-e:emptyresult`.

3.1.4.3.2.1.1.8 DesignAggregations

This command designs aggregations on an **AggregationDesign** object and returns a rowset containing the statistics of the design. The **Object** element **MUST** point to an existing aggregation design object. Otherwise, an error is raised.

```
<xsd:complexType name="DesignAggregations">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
    <xsd:element name="Time" type="xsd:duration" minOccurs="0" />
    <xsd:element name="Steps" type="xsd:integer" minOccurs="0" />
    <xsd:element name="Optimization" type="xsd:double" minOccurs="0" />
    <xsd:element name="Storage" type="xsd:long" minOccurs="0" />
    <xsd:element name="Materialize" type="xsd:boolean" minOccurs="0" />
    <xsd:element name="Queries" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Query" type="xsd:string" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|--------------|---------------|--|
| Object | [Required] | An ObjectReference to the AggregationDesign object for which aggregations are being designed. The ObjectReference type is defined in section 3.1.4.3.2.1.1.1. |
| Time | Zero | A duration that specifies the time limit for aggregation design. |
| Steps | Zero | An integer that specifies the number of aggregation design steps. |
| Optimization | Zero | A double that specifies the percent optimization threshold for design of aggregations. |
| Storage | Zero | A long integer that specifies the storage limit in bytes. |
| Materialize | False | A Boolean that, when true, indicates that the aggregations are to be materialized; otherwise, false. |
| Queries | Empty | A collection of string elements that represent queries, which are used to optimize the aggregation design. |

The return result type for the **DesignAggregations** command is `xmla-e:emptyresult`.

3.1.4.3.2.1.1.9 ClearCache

The **ClearCache** command clears the in-memory cache of the specified object.


```

<xsd:complexType name="ClearCache">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
  </xsd:all>
</xsd:complexType>

```

| Element | Default value | Description |
|---------|---------------|---|
| Object | [Required] | The object to clear from the cache. The object MUST be one of the following: Database, Dimension, Cube, or MeasureGroup. The ObjectReference type is defined in section 3.1.4.3.2.1.1.1. |

The return result type for the **ClearCache** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.10 Subscribe

The **Subscribe** command subscribes to a Trace object for events.

```

<xsd:complexType name="Subscribe">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" minOccurs="0" />
    <xsd:element name="eng800:SubscriptionId" type="xsd:string" minOccurs="0" />
  </xsd:all>
</xsd:complexType>

```

| Element | Default value | Description |
|----------------|---------------|--|
| Object | [Required] | The Trace object to be subscribed to. The ObjectReference type is defined in section 3.1.4.3.2.1.1.1. |
| SubscriptionId | Empty | A client identifier that SHOULD<329> be associated with the subscription. This identifier can be used later to terminate the subscription by using the Unsubscribe command. |

The return result type for the **Subscribe** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.11 Unsubscribe

The **Unsubscribe** command SHOULD<330> terminate an ongoing subscription to the events of a Trace object.

```

<xsd:complexType name="Unsubscribe">
  <xsd:all>
    <xsd:element name="eng800:SubscriptionId" type="xsd:string" minOccurs="0" />
  </xsd:all>
</xsd:complexType>

```

| Element | Default value | Description |
|----------------|---------------|---|
| SubscriptionId | [Required] | The client identifier that is associated with the subscription. This identifier matches the identifier that was sent as part of the Subscribe command. |

The return result type for the **Unsubscribe** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.12 Cancel

The **Cancel** command cancels the currently running command on the specified connection.

```
<xsd:complexType name="Cancel">
  <xsd:all>
    <xsd:element name="ConnectionID" type="xsd:integer" minOccurs="0" />
    <xsd:element name="SessionID" type="xsd:string" minOccurs="0" />
    <xsd:element name="SPID" type="xsd:integer" minOccurs="0" />
    <xsd:element name="CancelAssociated" type="xsd:boolean" minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|------------------|---------------|---|
| ConnectionID | Empty | The connection ID. -1 means current connection. |
| SessionID | Empty | The session ID. If neither ConnectionID , SessionID , nor SPID are specified, the current session is canceled. |
| SPID | Empty | The SPID. -1 means current session. |
| CancelAssociated | False | A Boolean that, when true, indicates that the associated sessions are to be canceled; otherwise false. |

The return result type for the **Cancel** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.13 BeginTransaction

The **BeginTransaction** command begins a transaction on the current session.

```
<xsd:complexType name="BeginTransaction" />
```

The return result type for the **BeginTransaction** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.14 CommitTransaction

The **CommitTransaction** command commits a transaction on the current session.

```
<xsd:complexType name="CommitTransaction">
  <xsd:all>
    <xsd:element name="DurabilityGuarantee" minOccurs="0">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="LocalDisk" />
          <xsd:enumeration value="Full" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|--------------------------|---------------|--|
| DurabilityGuarantee<331> | Full | The durability guarantee of the committed transaction. The following |

| Element | Default value | Description |
|---------|---------------|--|
| | | <p>values are allowed:</p> <ul style="list-style-type: none"> LocalDisk – Data is committed on the local disk of the machine. This has relevance in cloud systems. However, specifying this setting does not guarantee durability in reliable persistent storage (RPS). In case of a node crash, the data might be lost. Full – In cloud systems, data is fully committed in RPS. In on-premises systems, data is committed to the local disk. |

The return result type for the **CommitTransaction** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.15 RollbackTransaction

The **RollbackTransaction** command rolls back a transaction on the current session.

```
<xsd:complexType name="RollbackTransaction" />
```

The return result type for the **RollbackTransaction** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.16 Lock

The **Lock** command locks an object in the context of the current transaction.<332>

```
<xsd:complexType name="Lock">
  <xsd:all>
    <xsd:element name="ID">
      <xsd:simpleType>
        <xsd:restriction base="xsd:token">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}"/>
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="Object" type="ObjectReference" />
    <xsd:element name="Mode" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="CommitShared" />
          <xsd:enumeration value="CommitExclusive" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|---------|---------------|---|
| ID | [Required] | The lock ID. |
| Object | [Required] | The object to be locked. The ObjectReference type is defined in section 3.1.4.3.2.1.1.1. |
| Mode | [Required] | An enumeration that specifies the type of locking to apply. The possible values are: |

| Element | Default value | Description |
|---------|---------------|---|
| | | <ul style="list-style-type: none"> CommitShared - A shared lock is established on the specified object. CommitExclusive - An exclusive lock is established on the specified object. |

The return result type for the **Lock** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.17 Unlock

The **Unlock** command unlocks an object in the context of the current transaction.

```
<xsd:complexType name="Unlock">
  <xsd:all>
    <xsd:element name="ID">
      <xsd:simpleType>
        <xsd:restriction base="xsd:token">
          <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}"/>
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|---------|---------------|------------------------------------|
| ID | [Required] | The ID of the lock to be released. |

The return result type for the **Unlock** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.18 Backup

The **Backup** command backs up the specified database.

```
<xsd:complexType name="Backup">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
    <xsd:element name="File" type="xsd:string" />
    <xsd:element name="Security" minOccurs="0" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="SkipMembership" />
          <xsd:enumeration value="CopyAll" />
          <xsd:enumeration value="IgnoreSecurity" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="ApplyCompression" type="xsd:boolean" minOccurs="0" />
    <xsd:element name="AllowOverwrite" type="xsd:boolean" minOccurs="0" />
    <xsd:element name="Password" type="xsd:string" minOccurs="0" />
    <xsd:element name="BackupRemotePartitions" type="xsd:boolean" minOccurs="0" />
    <xsd:element name="Locations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Location" type="Location_Backup" minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

```

    </xsd:element>
  </xsd:all>
</xsd:complexType>

```

| Element | Default value | Description |
|------------------------|---------------|---|
| Object | [Required] | The database object to be backed up. The ObjectReference type is defined in section 3.1.4.3.2.1.1.1. |
| File | [Required] | The backup file name/path. |
| Security | "CopyAll" | An enumeration value that specifies how to back up security definitions, such as roles and permissions. |
| ApplyCompression | True | A Boolean that, when true, indicates that backup files are compressed; otherwise false. |
| AllowOverwrite | False | A Boolean that, when true, indicates that a backup file that already exists will be overwritten; otherwise false. |
| Password | Empty | The password to use for encrypting the backup file. |
| BackupRemotePartitions | False | A Boolean that, when true, indicates that remote partitions are backed up; otherwise, false. |
| Locations | Empty | A collection of type Location_Backup that stores the location mappings for remote partitions. |

The return result type for the **Backup** command is `xm1a-e:emptyresult`.

3.1.4.3.2.1.1.18.1 Location_Backup

The **Location_Backup** type identifies remote locations that are to be backed up by a Backup command.

```

<xsd:complexType name="Location_Backup">
  <xsd:all>
    <xsd:element name="File" type="xsd:string" />
    <xsd:element name="DataSourceID" type="xsd:string" />
  </xsd:all>
</xsd:complexType>

```

| Element | Default value | Description |
|--------------|---------------|--------------------------------------|
| File | [Required] | The backup file name/path. |
| DataSourceID | [Required] | The remote partition data source ID. |

3.1.4.3.2.1.1.19 Restore

The **Restore** command restores a database from a backup file.

```

<xsd:complexType name="Restore">
  <xsd:all>
    <xsd:element name="DatabaseName" type="xsd:string" minOccurs="0" />
    <xsd:element name="DatabaseID" type="xsd:string" minOccurs="0" />
    <xsd:element name="File" type="xsd:string" />
  </xsd:all>
</xsd:complexType>

```

```

<xsd:element name="Security" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="SkipMembership" />
      <xsd:enumeration value="CopyAll" />
      <xsd:enumeration value="IgnoreSecurity" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="AllowOverwrite" type="xsd:boolean" minOccurs="0" />
<xsd:element name="Password" type="xsd:string" minOccurs="0" />
<xsd:element ref="eng100_100:DbStorageLocation" minOccurs="0" />
<xsd:element name="eng100:ReadWriteMode" minOccurs="0" >
  <xsd:simpleType>
    <xsd:restriction base="xsd:string" >
      <xsd:enumeration value="ReadWrite" />
      <xsd:enumeration value="ReadOnlyExclusive" />
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="Locations" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Location" type="Location" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
</xsd:all>
</xsd:complexType>

```

See the **Synchronize** command (section 3.1.4.3.2.1.1.20) for a definition of the **DbStorageLocation** element in the namespace **eng100_100**.

| Element | Default value | Description |
|-------------------|---------------|---|
| DatabaseName | Empty | The name of the restored database. |
| DatabaseID | Empty | The ID of the restored database. If the DatabaseID element is present, the DatabaseName element MUST also be present. |
| File | [Required] | The backup file name/path. |
| Security | "CopyAll" | An enumeration value that specifies how to restore security definitions. The possible values are as follows: <ul style="list-style-type: none"> ▪ SkipMembership – Include security definitions, but exclude membership information. ▪ CopyAll – Include security definitions and membership information. ▪ IgnoreSecurity – Exclude security definitions. |
| AllowOverwrite | False | A Boolean that, when true, indicates that a database that already exists is overwritten; otherwise false. |
| Password | Empty | The password used to encrypt the backup file when it was created. |
| DbStorageLocation | Empty | Storage location for the restored database. |
| ReadWriteMode | "ReadWrite" | An enumeration value that indicates the access modes allowed to the database. The possible values are as follows. |

| Element | Default value | Description |
|-----------|---------------|---|
| | | <ul style="list-style-type: none"> ReadWrite – Read-write access is allowed. ReadOnlyExclusive – Read-only exclusive access is allowed. |
| Locations | Empty | A collection of objects of type Location that stores the location mappings for remote partitions. |

The return result type for the **Restore** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.19.1 Location

The **Location** type contains the location mappings for remote partitions. It is used by the Restore and the Synchronize commands. It is an extension of the Location_Backup type.

```

<xsd:complexType name="Location">
  <xsd:complexContent>
    <xsd:extension base="Location_Backup" >
      <xsd:all>
        <xsd:element name="DataSourceType" minOccurs="0" >
          <xsd:simpleType>
            <xsd:restriction base="xsd:string" >
              <xsd:enumeration value="Remote" />
              <xsd:enumeration value="Local" />
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="ConnectionString" type="xsd:string"
          minOccurs="0" />
        <xsd:element name="Folders" minOccurs="0" >
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Folder" type="Folder" minOccurs="0"
                maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:all>
    </xsd:extension >
  </xsd:complexContent>
</xsd:complexType>

```

The following table includes only the elements that are extended beyond those that are already contained in **Location_Backup**.

| Element | Default value | Description |
|------------------|---------------|--|
| DataSourceType | "Remote" | An enumeration value that indicates whether the DataSource is remote or local. |
| ConnectionString | Empty | The data source connection string. |
| Folders | Empty | A collection of objects of type Folder that indicates the mapping of the folder name from the original name to the new name. |

3.1.4.3.2.1.1.19.2 Folder

The **Folder** type contains folder mappings for the restored database.

```
<xsd:complexType name="Folder">
  <xsd:all>
    <xsd:element name="Original" type="xsd:string" />
    <xsd:element name="New" type="xsd:string" />
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|----------|---------------|-----------------------------------|
| Original | [Required] | The path for the original folder. |
| New | [Required] | The path for the new folder. |

3.1.4.3.2.1.1.20 Synchronize

The **Synchronize** command synchronizes the contents of a database from a source server.

```
<xsd:complexType name="Synchronize">
  <xsd:all>
    <xsd:element name="Source" type="Source" />
    <xsd:element name="SynchronizeSecurity" minOccurs="0" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="SkipMembership" />
          <xsd:enumeration value="CopyAll" />
          <xsd:enumeration value="IgnoreSecurity" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="ApplyCompression" type="xsd:boolean" minOccurs="0" />
    <xsd:element ref="eng100_100:DbStorageLocation" minOccurs="0" />
    <xsd:element name="Locations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Location" type="Location" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

The XSD for **Synchronize** depends upon the definitions of elements in a namespace other than the default namespace. The following element is defined in the namespace **eng100_100**.

```
<xsd:element name="DbStorageLocation" type="xsd:string" minOccurs="0" />
```

| Element | Default value | Description |
|---------------------|------------------|---|
| Source | [Required] | An object of type Source that indicates the source of synchronization. |
| SynchronizeSecurity | "SkipMembership" | An enumeration value that specifies how to restore security definitions, including roles and permissions. |

| Element | Default value | Description |
|-------------------|---------------|--|
| ApplyCompression | True | A Boolean that, when true, indicates that compression will be applied to a backup file; otherwise false. |
| DbStorageLocation | Empty | A string that specifies a storage location for the database. |
| Locations | Empty | A collection of objects of type Location that specifies location mappings for remote partitions. |

The return result type for the **Synchronize** command is `xmla-e:emptyresult`.

3.1.4.3.2.1.1.20.1 Source

The **Source** type specifies the source for the Synchronization command.

```
<xsd:complexType name="Source">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
    <xsd:element name="ConnectionString" type="xsd:string" />
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|------------------|---------------|---|
| Object | [Required] | An ObjectReference to the database that is the source of the synchronization. The ObjectReference type is defined in section 3.1.4.3.2.1.1.1. |
| ConnectionString | [Required] | The connection string to the source server. |

3.1.4.3.2.1.1.21 Attach

The **Attach** command attaches a database from a database folder.

```
<xsd:complexType name="Attach">
  <xsd:all>
    <xsd:element name="Folder" type="xsd:string" />
    <xsd:element name="Password" type="xsd:string" minOccurs="0" />
    <xsd:element name="AllowOverwrite" type="xsd:boolean" minOccurs="0" />
    <xsd:element ref="eng100:ReadWriteMode" minOccurs="0" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="ReadWrite" />
          <xsd:enumeration value="ReadOnly" />
          <xsd:enumeration value="ReadOnlyExclusive" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|---------|---------------|----------------------------------|
| Folder | [Required] | The path to the database folder. |

| Element | Default value | Description |
|----------------|---------------|--|
| Password | Empty | An optional password to encrypt secrets. |
| AllowOverwrite | False | A Boolean that, when true, indicates that a database that already exists is to be overwritten; otherwise, false. |
| ReadWriteMode | ReadWrite | An enumeration value that indicates the access modes that are allowed for the database. The possible values are as follows: <ul style="list-style-type: none"> ReadWrite – Read-write access is allowed. ReadOnly – Read-only access is allowed. ReadOnlyExclusive – Read-only exclusive access is allowed. |

The return result type for the **Attach** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.22 Detach

The **Detach** command detaches a database.

```
<xsd:complexType name="Detach">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
    <xsd:element name="Password" type="xsd:string" minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|----------|---------------|---|
| Object | [Required] | The Database object to detach. The ObjectReference type is defined in section 3.1.4.3.2.1.1.1. |
| Password | Empty | An optional password to encrypt secrets. |

The return result type for the **Detach** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.23 Insert

The **Insert** command inserts a new member into a dimension.

```
<xsd:complexType name="Insert">
  <xsd:all>
    <xsd:element name="Object" type="Object" />
    <xsd:element name="Attributes" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Attribute" type="Attribute_InsertUpdate"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|------------|---------------|--|
| Object | [required] | Specifies the dimension. |
| Attributes | Empty | A collection of objects of type Attribute_InsertUpdate, which describes the member to be inserted. |

The return result type for the **Insert** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.23.1 Object

The **Object** type identifies the dimension that the Insert, Update, and Drop commands operate on. It differs from an ObjectReference Type in that it uses the name of the objects rather than the ID.

```
<xsd:complexType name="Object">
  <xsd:all>
    <xsd:element name="Database" type="xsd:string" />
    <xsd:element name="Cube" type="xsd:string" />
    <xsd:element name="Dimension" type="xsd:string" />
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|-----------|---------------|---------------------|
| Database | [Required] | The Database name. |
| Cube | [Required] | The Cube name. |
| Dimension | [Required] | The Dimension name. |

3.1.4.3.2.1.1.23.2 Attribute_InsertUpdate

This type contains the data associated with a member of an attribute being inserted into or updated.

```
<xsd:complexType name="Attribute_InsertUpdate">
  <xsd:all>
    <xsd:element name="AttributeName" type="xsd:string" />
    <xsd:element name="Name" type="xsd:string" minOccurs="0" />
    <xsd:element name="Keys" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Key" type="xsd:anySimpleType" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Translations" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Translation" type="Translation_InsertUpdate"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Value" type="xsd:string" minOccurs="0" />
    <xsd:element name="CUSTOM_ROLLUP" type="xsd:string" minOccurs="0" />
    <xsd:element name="CUSTOM_ROLLUP_PROPERTIES" type="xsd:string" minOccurs="0" />
    <xsd:element name="UNARY_OPERATOR" type="xsd:string" minOccurs="0" />
    <xsd:element name="SKIPPED_LEVELS" type="xsd:integer" minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

```
</xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|--------------------------|---------------|---|
| AttributeName | [Required] | The name of the attribute. |
| Name | Empty | The name of the member. |
| Keys | Empty | A collection of keys for the member. |
| Translations | Empty | A collection of objects of type Translation_InsertUpdate. |
| Value | Empty | The value of the member. |
| CUSTOM_ROLLUP | Empty | The custom rollup formula of the member. |
| CUSTOM_ROLLUP_PROPERTIES | Empty | The custom rollup properties of the member. |
| UNARY_OPERATOR | Empty | The unary operator of the member. |
| SKIPPED_LEVELS | Zero | The skipped levels of the member. |

3.1.4.3.2.1.1.23.3 Translation_InsertUpdate

The **Translation_InsertUpdate** type contains the translation data associated with a member of an attribute being inserted into or updated.

```
<xsd:complexType name="Translation_InsertUpdate">
  <xsd:all>
    <xsd:element name="Language" type="xsd:integer" />
    <xsd:element name="Name" type="xsd:string" minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|----------|---------------|---|
| Language | [Required] | The LCID that represents the language/locale of the object. |
| Name | Empty | The caption of the member in the specified language. |

3.1.4.3.2.1.1.24 Update

The **Update** command updates a dimension member.

```
<xsd:complexType name="Update">
  <xsd:all>
    <xsd:element name="Object" type="Object" />
    <xsd:element name="Attributes" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Attribute" type="Attribute_InsertUpdate"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
```

```

<xsd:element name="MoveWithDescendants" type="xsd:boolean"
  minOccurs="0"/>
<xsd:element name="MoveToRoot" type="xsd:boolean"
  minOccurs="0"/>
  <xsd:element name="Where" type="Where" />
</xsd:all>
</xsd:complexType>

```

| Element | Default value | Description |
|---------------------|---------------|---|
| Object | [Required] | Specifies the dimension. |
| Attributes | Empty | A collection of objects of type Attribute_InsertUpdate that describes the member to be updated. |
| MoveWithDescendants | False | A Boolean that, when true, indicates that the descendants of the member will be moved along with it; otherwise false. This element can be used only with parent-child dimensions. |
| MoveToRoot | False | A Boolean that, when true, causes a member to be moved to the root of a parent-child dimension; otherwise false. |
| Where | [Required] | A collection of objects of type Where that identify the members to be updated. |

The return result type for the **Update** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.24.1 Where

The **Where** type identifies which members of a dimension are to be updated or dropped.

```

<xsd:complexType name="Where">
  <xsd:all>
    <xsd:element name="Attribute" type="Where_Attribute" />
  </xsd:all>
</xsd:complexType>

```

| Element | Default value | Description |
|-----------|---------------|------------------------------------|
| Attribute | [Required] | An object of type Where_Attribute. |

3.1.4.3.2.1.1.24.2 Where_Attribute

The **Where_Attribute** type specifies the name of the attribute to be updated or dropped and the key values.

```

<xsd:complexType name="Where_Attribute">
  <xsd:all>
    <xsd:element name="AttributeName" type="xsd:string" />
    <xsd:element name="Keys" minOccurs="0" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Key" type="xsd:anySimpleType" minOccurs="0"
            maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>

```

```

</xsd:all>
</xsd:complexType>

```

| Element | Default value | Description |
|---------------|---------------|--|
| AttributeName | [Required] | The attribute name. |
| Keys | Empty | The keys for the member. The types that are accepted are a subset of xsd:anySimpleType , and are those that are enumerated in the Data Type element of the DataItem. |

3.1.4.3.2.1.1.25 Drop

The **Drop** command deletes a dimension member.

```

<xsd:complexType name="Drop">
  <xsd:all>
    <xsd:element name="Object" type="Object" />
    <xsd:element name="DeleteWithDescendants" type="xsd:boolean"
      minOccurs="0" />
    <xsd:element name="Where" type="Where" />
  </xsd:all>
</xsd:complexType>

```

| Element | Default value | Description |
|-----------------------|---------------|--|
| Object | [Required] | Specifies the dimension. |
| DeleteWithDescendants | False | A Boolean that, when true, causes the descendants of the member to be deleted along with it (parent-child dimensions only); otherwise false. |
| Where | [Required] | A collection of objects of type Where that identify the members to be dropped. |

The return result type for the **Drop** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.26 UpdateCells

The **UpdateCells** command updates the values of the specified cells.

```

<xsd:complexType name="UpdateCells">
  <xsd:sequence>
    <xsd:element name="Cell" type="Cell" minOccurs="0"
      maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

```

| Element | Default value | Description |
|---------|---------------|---------------------------------------|
| Cell | Empty | A collection of objects of type Cell. |

The **UpdateCells** command is stateful and therefore is used in conjunction with SOAP header elements. When the client has defined an mddataset result that the client requests to update by using

the **UpdateCells** command, the client MUST tell the server to keep the result available for updating. However, a **KeepResult** element is added to the SOAP header.

The XSD Schema definition of the **KeepResult** element is as follows.

```
<xsd:element name="KeepResult" >
  <xsd:complexType >
    <xsd:sequence>
      <!--The KeepResult element MUST be empty-->
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

The server responds to the presence of a **KeepResult** element in the SOAP header that it receives with a **Result** element in the SOAP header of the response. The **Result** element contains a **ResultID** attribute. This attribute contains the token that the client and server will use to refer to this **Result** in subsequent commands.

The XSD Schema definition of the **Result** element and its complex type is as follows.

```
<xsd:element name="Result" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="ResultId" type="xsd:string" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

The client can now include a **Result** element in the SOAP header of subsequent commands that it sends to the server. In this SOAP header, the client can update that result with the **UpdateCells** command.

When the client is finished with the result and will no longer use the result for further **UpdateCells** commands, it includes a **ClearResult** element in the SOAP header.

The XSD Schema definition of the **ClearResult** element and its complex type is as follows.

```
<xsd:element name="ClearResult" >
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="ResultId" type="xsd:string" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

The return result type for the **UpdateCells** command is `xm1a-e:emptyresult`.

3.1.4.3.2.1.1.26.1 Cell

The **Cell** type specifies the ordinal of a cell and its new value.

```
<xsd:complexType name="Cell">
  <xsd:all>
    <xsd:element name="Value" type="xsd:anySimpleType" />
  </xsd:all>
  <xsd:attribute name="CellOrdinal" type="xsd:long" />
</xsd:complexType>
```

The following tables describe the XML element and attribute of the **Cell** object.

| Element | Default value | Description |
|---------|---------------|--|
| Value | [Required] | The new value to update the cell with. |

| Attribute | Default | Description |
|-------------|------------|--------------------------------------|
| CellOrdinal | [Required] | The ordinal of a cell to be updated. |

3.1.4.3.2.1.1.27 NotifyTableChange

The **NotifyTableChange** command notifies the server about changes in source tables so that the server can drop any cached data from these tables.

```
<xsd:complexType name="NotifyTableChange">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
    <xsd:element name="TableNotifications" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="TableNotification" type="TableNotification"
            minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|--------------------|---------------|---|
| Object | [Required] | The object that is referenced MUST be a DataSource object. The ObjectReference type is defined in section 3.1.4.3.2.1.1.1. |
| TableNotifications | [Required] | A collection of objects of type TableNotification. Each TableNotification object gives information about one table. |

The return result type for the **NotifyTableChange** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.28 (Updated Section) Batch

The **Batch** command contains multiple commands that are executed in a single request.

```
<xsd:complexType name="Batch">
  <xsd:sequence>
    <xsd:element name="Parallel" minOccurs="0" maxOccurs="unbounded" >
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="Process" type="Process" minOccurs="0"
            maxOccurs="unbounded" />
        </xsd:sequence>
        <xsd:attribute name="MaxParallel" type="xsd:int" default="0" />
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="Bindings" minOccurs="0" type="OutOfLineBinding" />
  </xsd:sequence>
</xsd:complexType>
```



```

<xsd:element name="DataSource" minOccurs="0" type="DataSource" />
<xsd:element name="DataSourceView" type="DataSourceView"
  minOccurs="0" />
<xsd:element name="ErrorConfiguration" type="ErrorConfiguration"
  minOccurs="0" />
<xsd:element name="Create" type="Create" minOccurs="0"
  maxOccurs="unbounded" />
<xsd:element name="Alter" type="Alter" minOccurs="0"
  maxOccurs="unbounded" />
<xsd:element name="Delete" type="Delete" minOccurs="0"
  maxOccurs="unbounded" />
<xsd:element name="Process" type="Process" minOccurs="0"
  maxOccurs="unbounded" />
<xsd:element name="MergePartitions" type="MergePartitions"
  minOccurs="0" maxOccurs="unbounded" />
<xsd:element name="DesignAggregations" type="DesignAggregations"
  minOccurs="0" maxOccurs="unbounded" />
<xsd:element name="NotifyTableChange" type="NotifyTableChange"
  minOccurs="0" maxOccurs="unbounded" />
<xsd:element name="Insert" minOccurs="0" type="Insert"
  maxOccurs="unbounded" />
<xsd:element name="Update" minOccurs="0" type="Update"
  maxOccurs="unbounded" />
<xsd:element name="Drop" minOccurs="0" type="Drop"
  maxOccurs="unbounded" />
<xsd:element name="UpdateCells" minOccurs="0" type="UpdateCells"
  maxOccurs="unbounded" />
<xsd:element name="Backup" minOccurs="0" type="Backup"
  maxOccurs="unbounded" />
<xsd:element name="Restore" minOccurs="0" type="Restore"
  maxOccurs="unbounded" />
<xsd:element name="Synchronize" minOccurs="0" type="Synchronize"
  maxOccurs="unbounded" />
<xsd:element name="Cancel" minOccurs="0" type="Cancel"
  maxOccurs="unbounded" />
<xsd:element name="ClearCache" minOccurs="0" type="ClearCache"
  maxOccurs="unbounded" />
<xsd:element name="Detach" minOccurs="0" type="Detach"
  maxOccurs="unbounded" />
<xsd:element name="Attach" minOccurs="0" type="Attach"
  maxOccurs="unbounded" />
<xsd:element name="Lock" minOccurs="0" type="Lock"
  maxOccurs="unbounded" />
<xsd:element name="Unlock" minOccurs="0" type="Unlock"
  maxOccurs="unbounded" />
<xsd:element name="DBCC" type="DBCC"
  minOccurs="0" />
<xsd:element name="Discover" minOccurs="0" type="Discover"
  maxOccurs="unbounded" />
</xsd:sequence>
<xsd:attribute name="Transaction" type="xsd:boolean" />
<xsd:attribute name="ProcessAffectedObjects" type="xsd:boolean" />
</xsd:complexType>

```

The following table shows the XML elements for the **Batch** command.

| Element | Default value | Description |
|------------|---------------|---|
| Parallel | Empty | A Parallel element can contain an unbounded number of Process commands. The Process commands are executed in parallel, up to the limit in the maxParallel XML attribute to this element. |
| Bindings | Empty | A collection of objects of type OutOfLineBinding. These bindings replace the bindings that might have been specified for the objects at their creation time. |
| DataSource | Empty | A DataSource that, if specified, replaces a DataSource that might have been |

| Element | Default value | Description |
|--------------------|---------------|--|
| | | specified for the objects at their creation time. |
| DataSourceView | Empty | A DataSourceView that, if specified, replaces a DataSourceView that might have been specified for the objects at their creation time. |
| ErrorConfiguration | Empty | An ErrorConfiguration object that designates the error configuration to be used for processing. |

In addition to the above elements, the **Batch** command can contain any number of each of the commands that are defined as available to the Command element, except the **Batch** command itself. <333>

Other restrictions MAY<334> apply to the commands within **Batch**.

The following table shows the XML attributes for the **Batch** command.

| Element | Default value | Description |
|------------------------|---------------|--|
| Transaction | True | A Boolean that, when true, indicates that all commands in the batch are executed in a single transaction; otherwise false. |
| ProcessAffectedObjects | False | A Boolean that, when true, indicates that affected objects are also to be processed; otherwise false. |

The return result type for the **Batch** command is xmla-e:emptyresult. <335>

3.1.4.3.2.1.1.29 (Updated Section) ImageLoad

The **ImageLoad** command<336> loads a tabular database from a database folder.

The following is the XSD sample.

```
<xsd:complexType name="ImageLoad">
  <xsd:all>
    <xsd:element ref="eng200_200:ImagePath" minOccurs="0" maxOccurs="1" />
    <xsd:element ref="eng200_200:ImageUrl" minOccurs="0" maxOccurs="1" />
    <xsd:element ref="eng200_200:ImageUniqueID" minOccurs="0" maxOccurs="1" />
    <xsd:element ref="eng200_200:ImageVersion" minOccurs="0" maxOccurs="1" />
    <xsd:element ref="eng100:ReadWriteMode" minOccurs="1" maxOccurs="1" >
      <xsd:simpleType>
        <xsd:restriction base="xsd:string" >
          <xsd:enumeration value="ReadWrite" />
          <xsd:enumeration value="ReadOnlyExclusive" />
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element ref="eng100_100:DbStorageLocation" minOccurs="0" />
    <xsd:element name="DatabaseName" type="xsd:string" minOccurs="1" maxOccurs="1" />
    <xsd:element name="DatabaseID" type="xsd:string" minOccurs="1" maxOccurs="1" />
    <xsd:complexType name="Data">
      <xsd:element name="DataBlock" type="xsd:string" minOccurs="0"
        maxOccurs="unbounded"/>
    </xsd:complexType>
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|-------------------|---|--|
| ImagePath | Empty if Data/DataBlock is specified | The UNC path of the file from which the database is to be loaded. This is a required property if the data block is not specified. |
| ImageUrl | Empty | The URL of the file from which this database is to be loaded. |
| ImageUniqueID | Empty | The unique ID of the file from which the database is to be loaded. This element is empty if the database is not loaded from a URL location. |
| ImageVersion | Empty | A string that represents the time stamp of the file from which the database is to be loaded. The string format is MM/dd/yyyy HH:mm:ss [AM/PM]. This element is empty if the database is not loaded from a file. |
| ReadWriteMode | Empty | An enumeration value that specifies the read/write mode for the database that is to be attached. For the definition of eng100:ReadWriteMode , see Database. The possible values are as follows: <ul style="list-style-type: none"> ▪ ReadWrite – Read-write access is allowed. ▪ ReadOnlyExclusive – Read-only exclusive access is allowed. |
| DbStorageLocation | Empty | A valid UNC path for where the server stores the data for this database. |
| DatabaseName | [Required] | The name of the restored database. |
| DatabaseID | [Required] | The ID of the restored database. |
| Data/DataBlock | Empty if ImagePath is specified | The binary contents of a database backup. The data block can include multiple blocks of varying sizes. This is a required property if the ImagePath property is not specified. |

The return result type for the **ImageLoad** command is `xmla-e:emptyresult`.

3.1.4.3.2.1.1.30 ImageSave

The **ImageSave** command<337> saves a database back to a location or file that is specified when the database loads by using the ImageLoad command.

```
<xsd:complexType name="ImageSave">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" />
    <xsd:element name="Data" type="xsd:boolean" minOccurs="0" />
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|---------|---------------|---|
| Object | [Required] | The Database object to ImageSave . The ObjectReference type is defined in ObjectReference Type (section 3.1.4.3.2.1.1.1). |
| Data | False | A flag to indicate whether the image data is to be returned as part of the ExecuteResponse (section 3.1.4.3.2.2) message. |

The return result type for the **ImageSave** command is `xmla-e:emptyresult` when **Data** contains the default value `False`. When the **Data** element is set to `true`, the result of the **ImageSave** command has the following response definition.

```
<xsd:element name="root">
  <xsd:complexType>
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="row" type="row" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:simpleType name="uuid">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="xmlDocument">
  <xsd:sequence>
    <xsd:any />
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="row">
  <xsd:sequence>
    <xsd:element sql:field="Data" name="Data" type="xsd:string" />
  </xsd:sequence>
</xsd:complexType>
```

3.1.4.3.2.1.1.31 CloneDatabase

The **CloneDatabase** command<338> clones an existing database to a new database that has a specified name and id at a specified location.

```
<xsd:complexType name="CloneDatabase">
  <xsd:all>
    <xsd:complexType name="Object" >
      <xsd:element name="DatabaseID" type="ObjectReference" minOccurs="1" maxOccurs="1" />
    </xsd:complexType>
    <xsd:complexType name="Target">
      <xsd:element ref="eng100_100:DbStorageLocation" minOccurs="0" />
      <xsd:element name="DatabaseName" type="xsd:string" minOccurs="1" maxOccurs="1"/>
      <xsd:element name="DatabaseID" type="xsd:string" minOccurs="1" maxOccurs="1"/>
    </xsd:complexType>
  </xsd:all>
</xsd:complexType>
```

The XSD for **CloneDatabase** depends upon the definitions of elements in a namespace other than the default namespace. The following element is defined in the namespace **eng100_100**.

```
<xsd:element name="DbStorageLocation" type="xsd:string" minOccurs="0" />
```

| Element | Default value | Description |
|--------------------------|---------------|---|
| Object/DatabaseID | [Required] | The Database object to perform CloneDatabase . The ObjectReference type is defined in ObjectReference Type (section 3.1.4.3.2.1.1.1). |
| Target/DbStorageLocation | Empty | The storage location for the database. This is the path to the |

| Element | Default value | Description |
|---------------------|---------------|---|
| | | directory where database needs to be cloned. |
| Target/DatabaseName | [Required] | The name of the target Database object to be cloned. |
| Target/DatabaseID | [Required] | The ID of the Database object to be cloned. The ObjectReference type is defined in ObjectReference Type. |

The return result type for the **CloneDatabase** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.32 SetAuthContext

The **SetAuthContext** command<339> changes the access scope of a specific user from a system administrator who has access to all databases to a system administrator who has access to only the database that is specified.

```
<xsd:complexType name="SetAuthContext">
  <xsd:all>
    <xsd:element ref="eng200_200:Token" minOccurs="1" maxOccurs="1" />
    <xsd:element name="DatabaseID" type="xsd:string" minOccurs="1" />
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|------------|---------------|--|
| Token | [Required] | This represents the token for a specific user who is connecting to the server. |
| DatabaseID | [Required] | The Database object to perform SetAuthContext . The ObjectReference type is defined in ObjectReference Type (section 3.1.4.3.2.1.1.1). |

The return result type for the **SetAuthContext** command is xmla-e:emptyresult.

3.1.4.3.2.1.1.33 DBCC

The Database Consistency Check (DBCC) command<340> is used to check consistency of objects on the server. This command applies to databases that are in Multidimensional storage mode.

```
<xsd:complexType name="DBCC">
  <xsd:all>
    <xsd:element name="Object" type="ObjectReference" minOccurs="0" maxOccurs="1"/>
  </xsd:all>
</xsd:complexType>
```

The following table shows the XML elements included in the DBCC command.

| Element | Default value | Description |
|---------|---------------|---|
| Object | Empty | The object to check for consistency. The ObjectReference type is defined in section 3.1.4.3.2.1.1.1. |

The return result type for the DBCC command is xmla-e:emptyresult.

3.1.4.3.2.1.2 Properties Element

The **Properties** element is shared between the Discover and Execute methods and is described in section 3.1.4.2.2.1.2.1.

3.1.4.3.2.1.3 Parameters

The **Parameters** type specifies a list of name-value parameter pairs that can be included in an Execute message.

```
<xsd:element name="Parameters" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="Parameter" type="ExecuteParameter" minOccurs="0"
        maxOccurs="unbounded" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

3.1.4.3.2.1.3.1 ExecuteParameter

The **ExecuteParameter** type specifies the value of a parameter in a command.

```
<xsd:complexType name="ExecuteParameter">
  <xsd:all>
    <xsd:element name="Name" minOccurs="1" type="xsd:string" />
    <xsd:element name="Value" minOccurs="1" type="xsd:anyType" />
  </xsd:all>
</xsd:complexType>
```

| Element | Default value | Description |
|---------|---------------|--|
| Name | [Required] | The name of the parameter. |
| Value | [Required] | The value of the parameter. The value can be of type anySimpleType or xmla- rs:root (see section 2.2.4.1.3). |

3.1.4.3.2.2 ExecuteResponse

The server response to an execute request contains the **ExecuteResponse** element as the root of the response. The **ExecuteResponse** element has the following definition.

```
<xsd:complexType name="ExecuteResponse" >
  <xsd:sequence>
    <xsd:element name="return" minOccurs="1" maxOccurs="1" type="return" >
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```

The return element is described in the following section.

3.1.4.3.2.2.1 return Element

The **return** element contains the result that is returned by the server. The content of the result that is contained in the **return** element is dependent upon the command and the properties that were specified in the Execute method call.

```

<xsd:complexType name="return">
  <xsd:choice>
    <xsd:element ref="xmla-ds:root" />
    <xsd:element ref="xmla-rs:root" />
    <xsd:element ref="xmla-e:root" />
    <xsd:element ref="xmla-m:results" />
  </xsd:choice>
</xsd:complexType>

```

The definition of the **xmla-ds:root** element is as follows.

```
<xsd:element name="root" type="xmla-ds:mddataset" />
```

For the definition of the **xmla-ds:mddataset** complex type, see section 2.2.4.1.1.

The definition of the **xmla-rs:root** element is as follows.

```
<xsd:element name="root" type="xmla-rs:rowset" />
```

For the definition of the **xmla-rs:rowset** complex type, see section 2.2.4.1.3.

The definition of the **xmla-e:root** element is as follows.

```
<xsd:element name="root" type="xmla-e:emptyresult" />
```

For the definition of the **xmla-e:emptyresult** complex type, see section 2.2.4.1.2.

The definition of the **xmla-m:results** element is as follows.

```
<xsd:element name="results" type="xmla-m:results" />
```

For the definition of the **xmla-m:results** complex type, see section 2.2.4.1.4.

| Element | Description |
|----------------|--|
| xmla-m:results | A results element is part of the ExecuteResponse only if it is the return result from a Batch command. The xmla-m:results element contains a root element for each command in the batch. |
| xmla-ds:root | The xmla-ds:root element is returned if the result of the command is of type mddataset . For a description of the xmla-ds:root type, see section 2.2.4.1.1. |
| xmla-rs:root | The xmla-rs:root type is returned if the result of the command is of type rowset . For a description of the xmla-rs:root type, see section 2.2.4.1.3. |
| xmla-e:root | The xmla-e:root element is returned if the return result of the command is empty. For a description of the xmla-e:root return type, see section 2.2.4.1.2. |

3.1.5 Timer Events

None. All protocol requests are initiated by the client.

3.1.6 Other Local Events

None.

3.2 Transport-Specific Protocol Details

3.2.1 Connection

To connect to a server by using TCP or HTTP/HTTPS, the client **MUST** know the IP address and port number of the server. The default HTTP port number is 80, and the default HTTPS port number is 443. However, the server **MAY**<341> be configured to listen on other port numbers.

3.2.2 Authentication and Encryption

To use an authenticated or encrypted connection using TCP, both the client and server **MUST** use GSS-API [RFC4178]. This requires the exchange of security tokens between the client and server. The client sends its security token using the **Authenticate** request (AuthenticateSoapIn) and the server responds with its security token in the **AuthenticateResponse** message (AuthenticateSoapOut). This exchange of security tokens continues back and forth until GSS-API reports completion or error. After it has completed, the client and server can call the GSS-API to determine if encryption or hashing is turned on for the connection.

When using HTTP/HTTPS, the server supports authenticated connections. If the client requires messages to be encrypted, it **SHOULD** use the HTTPS protocol.

3.2.3 Content Type Negotiation

Because the support for binary XML [MS-BINXML] and compression is optional, the client and server **MUST** negotiate the content type of the messages for the duration of the connection. The negotiation is based on the preferences and capabilities of the client and server.

The first request sent by the client and the server response are both always text XML. Depending on whether the transport is TCP or HTTP/HTTPS, the **DIME OPTIONS** field or the **HTTP X-Transport-Caps-Negotiation-Flags** header is used by client and server to indicate the content type of the messages for the connection.

The process of negotiation is controlled by the client, and the server does not need to remember the current state of negotiation between requests. The **NEGO** flag is used by the client to inform the server that negotiation is in progress. The client **SHOULD** set this flag to 0 in the first request and set it to 1 in all subsequent requests (since the negotiation is complete).

The **REQ_SX**, **REQ_XPRESS**, **RESP_SX** and **RESP_XPRESS** flags are used for the negotiation to represent binary XML in requests, compression in requests, binary XML in responses and compression in responses. The value 0 indicates that the capability is off or not supported. The value 1 indicates that the capability is on or supported.

The client uses the **RESP_SX** and **RESP_XPRESS** flags to inform the server whether it supports responses with binary XML and compression.

The server uses the **RESP_SX** and **RESP_XPRESS** flags to inform the client whether it will use binary XML and compression in its responses. This decision is based on what the client supports as well as the server capabilities.

Because the server does not remember the current state of negotiation, the client and server **MUST** send these flags in every request and response.

3.2.4 Generating and Parsing Messages

After the connection has been established and authentication and content type negotiation has been completed, the client and server know whether encryption, compression and binary XML are enabled for requests and responses.

To generate a message, the following steps **MUST** be followed.

TCP

1. Generate the SOAP envelope.
2. If binary XML is enabled, encode the SOAP message as described in 2.1.5 and [MS-BINXML]. Otherwise, encode the SOAP message in text XML.
3. If compression is enabled, compress the message as described in Compression. The message can be divided into multiple compression data blocks.
4. If encryption is enabled, encrypt the message using GSS-API. The message can be divided into multiple encryption data blocks.
5. Compose the message into DIME records and send it via TCP. The message can be divided into multiple DIME records.

HTTP/HTTPS

1. Generate the SOAP envelope.
2. If binary XML is enabled, encode the SOAP message as described in 2.1.5 and [MS-BINXML]. Otherwise, encode the SOAP message in text XML.
3. If compression is enabled, compress the message as described in **Compression**. The message can be divided into multiple compression data blocks.
4. Send the message via HTTP/HTTPS along with the appropriate HTTP headers.

To parse a message, the following steps **MUST** be followed.

TCP

1. Combine all the DIME records into a single data block.
2. If encryption is enabled, decrypt all the encryption data blocks and combine them into a single decrypted data block.
3. If compression is enabled, decompress all the compression data blocks as described in **Compression**, and then combine them into a single decompressed data block.
4. If binary XML is enabled, decode the data block as described in 2.1.5 and [MS-BINXML]. Otherwise, decode the data block as text XML.
5. Parse the SOAP envelope.

HTTP/HTTPS

1. If compression is enabled, decompress all the compression data blocks as described in **Compression**, and then combine them into a single decompressed data block.
2. If binary XML is enabled, decode the data block as described in 2.1.5 and [MS-BINXML]. Otherwise, decode the data block as text XML.
3. Parse the SOAP envelope.

3.2.5 Compression

The client or server can choose any compression algorithm as long as the compressed data blocks can be decompressed using the following decompression algorithm.

The decompression algorithm takes a buffer of compressed data in the form of a byte array (**InputBuffer**), an output buffer in the form of a byte array (**OutputBuffer**), and the size of the output buffer (**OutputBufferSize**).

```
SET KindBit to 0
SET HaveNibble to FALSE
SET OutputBufferIndex to 0
SET InputBufferIndex to 0
WHILE OutputBufferIndex < OutputBufferSize
  IF KindBit is 0 THEN
    SET Kind to InputBuffer[InputBufferIndex] +
      (InputBuffer[InputBufferIndex+1] << 8) +
      (InputBuffer[InputBufferIndex+2] << 16) +
      (InputBuffer[InputBufferIndex+3] << 24)
    INCREMENT InputBufferIndex by 4
    SET KindBit to 32
  ENDIF
  DECREMENT KindBit
  IF (Kind & (1 << KindBit)) is 0 THEN
    SET OutputBuffer[OutputBufferIndex] to InputBuffer[InputBufferIndex]
    INCREMENT InputBufferIndex
    INCREMENT OutputBufferIndex
  ELSE
    SET Length to InputBuffer[InputBufferIndex] +
      (InputBuffer[InputBufferIndex+1] << 8)
    INCREMENT InputBufferIndex by 2
    SET Offset to (Length >> 3)
    SET Length to (Length & 7)
    IF Length is 7 THEN
      IF HaveNibble is FALSE THEN
        SET HaveNibble to TRUE
        Set NibbleValue to InputBuffer[InputBufferIndex]
        SET Length to (InputBuffer[InputBufferIndex] & 15)
        INCREMENT InputBufferIndex
      ELSE
        SET Length to (NibbleValue >> 4)
        SET HaveNibble to FALSE
      ENDIF
    IF Length is 15 THEN
      SET Length to InputBuffer[InputBufferIndex]
      INCREMENT InputBufferIndex
      IF Length is 255 THEN
        SET Length to InputBuffer[InputBufferIndex] +
          (InputBuffer[InputBufferIndex+1] << 8)
        INCREMENT InputBufferIndex by 2
        DECREMENT Length by 22
      ENDIF
      INCREMENT Length by 15
    ENDIF
    INCREMENT Length by 7
  ENDIF
  INCREMENT Length by 3
  WHILE Length is not 0
    SET OutputBuffer[OutputBufferIndex] to
      OutputBuffer[OutputBufferIndex-Offset-1]
    INCREMENT OutputBufferIndex
    DECREMENT Length
  ENDWHILE
ENDIF
ENDWHILE
```

4 Protocol Examples

4.1 Client Obtains a List of Databases from the Server over TCP

In this example, the client connects to the server by using TCP and obtains server information by sending a **DBSCHEMA_CATALOGS** request.

4.1.1 Connection

The server listens on a TCP port for incoming requests from clients. The client creates a TCP connection to the server.

4.1.2 Authentication

After the connection is established, the client sends an authentication request to the server:

```
0E 10 00 04 00 00 00 08 00 00 01 3C 00 00 00 00 .....<....
74 65 78 74 2F 78 6D 6C EF BB BF 3C 45 6E 76 65 text/xml???<Enve
6C 6F 70 65 20 78 6D 6C 6E 73 3D 22 68 74 74 70 lope xmlns="http
3A 2F 2F 73 63 68 65 6D 61 73 2E 78 6D 6C 73 6F ://schemas.xmlso
61 70 2E 6F 72 67 2F 73 6F 61 70 2F 65 6E 76 65 ap.org/soap/enve
6C 6F 70 65 2F 22 3E 0D 0A 20 20 3C 42 6F 64 79 lope/>.. <Body
3E 0D 0A 20 20 20 20 3C 41 75 74 68 65 6E 74 69 >.. <Authenti
63 61 74 65 20 78 6D 6C 6E 73 3D 22 68 74 74 70 cate xmlns="http
3A 2F 2F 73 63 68 65 6D 61 73 2E 6D 69 63 72 6F ://schemas.micro
73 6F 66 74 2E 63 6F 6D 2F 61 6E 61 6C 79 73 69 soft.com/analysi
73 73 65 72 76 69 63 65 73 2F 32 30 30 33 2F 65 sservices/2003/e
78 74 22 3E 0D 0A 20 20 20 20 20 20 3C 53 73 70 xt">.. <Ssp
69 48 61 6E 64 73 68 61 6B 65 3E 54 6C 52 4D 54 iHandshake>TlRMT
56 4E 54 55 41 41 42 41 41 41 41 42 37 49 49 6F VNTUAABAAAAB7IIo
67 63 41 42 77 41 78 41 41 41 41 43 51 41 4A 41 gcABwAxAAAACQAJA
43 67 41 41 41 41 46 41 73 34 4F 41 41 41 41 44 CgAAAFAs4OAAAD
31 5A 42 54 45 56 53 53 55 73 77 4D 31 4A 46 52 1ZBTEVSSUswM1JFR
45 31 50 54 6B 51 3D 3C 2F 53 73 70 69 48 61 6E ElPtQ=</SspiHan
64 73 68 61 6B 65 3E 0D 0A 20 20 20 20 3C 2F 41 dshake>.. </A
75 74 68 65 6E 74 69 63 61 74 65 3E 0D 0A 20 20 uthenticate>..
3C 2F 42 6F 64 79 3E 0D 0A 3C 2F 45 6E 76 65 6C </Body>..</Envel
6F 70 65 3E .. .. .. .. .. .. .. .. .. .. ope>
```

- VERSION: 1
- MB: 1
- ME: 1
- CF: 0
- TYPE_T: 1
- RESERVED: 0
- OPTIONS_LENGTH: 4
- ID_LENGTH: 0
- TYPE_LENGTH: 8
- DATA_LENGTH: 316
- OPTIONS:

- NEGO: 0
- REQ_SX: 0
- REQ_XPRESS: 0
- RESP_SX: 0
- RESP_XPRESS: 0
- RESERVED: 0
- TYPE: text/xml

The server responds with an authentication handshake response; that is, an initial negotiation between a peer and an authenticator that establishes the parameters of their transactions:

```

0E 10 00 04 00 00 00 08 00 00 02 95 00 00 00 00 .....?....
74 65 78 74 2F 78 6D 6C 3C 73 6F 61 70 3A 45 6E text/xml<soap:En
76 65 6C 6F 70 65 20 78 6D 6C 6E 73 3A 73 6F 61 velope xmlns:soa
70 3D 22 68 74 74 70 3A 2F 2F 73 63 68 65 6D 61 p="http://schema
73 2E 78 6D 6C 73 6F 61 70 2E 6F 72 67 2F 73 6F s.xmlsoap.org/so
61 70 2F 65 6E 76 65 6C 6F 70 65 2F 22 3E 3C 73 ap/envelope/"><s
6F 61 70 3A 42 6F 64 79 3E 3C 41 75 74 68 65 6E oap:Body><Authen
74 69 63 61 74 65 52 65 73 70 6F 6E 73 65 20 78 ticateResponse x
6D 6C 6E 73 3D 22 68 74 74 70 3A 2F 2F 73 63 68 mlns="http://sch
65 6D 61 73 2E 6D 69 63 72 6F 73 6F 66 74 2E 63 emas.microsoft.c
6F 6D 2F 61 6E 61 6C 79 73 69 73 73 65 72 76 69 om/analysisservi
63 65 73 2F 32 30 30 33 2F 65 78 74 22 3E 3C 72 ces/2003/ext"><r
65 74 75 72 6E 3E 3C 53 73 70 69 48 61 6E 64 73 eturn><SspiHand
68 61 6B 65 3E 54 6C 52 4D 54 56 4E 54 55 41 41 shake>TlRMTVNTUAA
43 41 41 41 41 44 67 41 4F 41 44 67 41 41 41 41 CAAAADgA0ADgAAAA
46 77 6F 6D 69 30 34 54 6F 55 79 59 54 71 38 70 Fwomi04ToUyYtq8p
67 71 4A 6F 41 41 41 41 41 41 4E 67 41 32 41 42 ggJoAAAAAANGA2AB
47 41 41 41 41 42 51 4C 4F 44 67 41 41 41 41 39 GAAAABQLODgAAAA9
53 20 0A 41 45 55 41 52 41 42 4E 41 45 38 41 54 S .AEUARABNAE8AT
67 42 45 41 41 49 41 44 67 42 53 41 45 55 41 52 gBEAAIADgBSAEUAR
41 42 4E 41 45 38 41 54 67 42 45 41 41 45 41 45 ABNAE8ATgBEAEAE
67 42 57 41 45 45 41 54 41 42 46 41 46 49 41 53 gBWAEETABFAFIAS
51 42 4C 41 44 41 41 4D 77 41 45 41 44 51 41 20 QBLADAAMwAeADQA
0A 63 67 42 6C 41 47 51 41 62 51 42 76 41 47 34 .cgBlAGQAbQBvAG4
41 5A 41 41 75 41 47 4D 41 62 77 42 79 41 48 41 AZAAuAGMabwByAHA
41 4C 67 42 74 41 47 6B 41 59 77 42 79 41 47 38 ALgBtAGkAYwByAG8
41 63 77 42 76 41 47 59 41 64 41 41 75 41 47 4D AcwBvAGYAdAAuAGM
41 62 77 42 74 41 41 4D 41 53 41 42 32 20 0A 41 AbwBtAAMASAB2 .A
47 45 41 62 41 42 6C 41 48 49 41 61 51 42 72 41 GEAbABLAHIAaQBrA
44 41 41 4D 77 41 75 41 48 49 41 5A 51 42 6B 41 DAAMwAuAHIAZQBkA
47 30 41 62 77 42 75 41 47 51 41 4C 67 42 6A 41 GOAbwBuAGQALgBjA
47 38 41 63 67 42 77 41 43 34 41 62 51 42 70 41 G8AcgBwAC4AbQBpA
47 4D 41 63 67 42 76 41 48 4D 41 20 0A 62 77 42 GMAcgBvAHMA .bwB
6D 41 48 51 41 4C 67 42 6A 41 47 38 41 62 51 41 mAHQALgBjAG8AbQA
46 41 43 51 41 59 77 42 76 41 48 49 41 63 41 41 FACQAYwBvAHIAcAA
75 41 47 30 41 61 51 42 6A 41 48 49 41 62 77 42 uAG0AaQBjAHIAbwB
7A 41 47 38 41 5A 67 42 30 41 43 34 41 59 77 42 zAG8AZgB0AC4AYwB
76 41 47 30 41 41 41 41 41 20 0A 41 41 3D 3D 20 vAG0AAAAA .AA==
0A 3C 2F 53 73 70 69 48 61 6E 64 73 68 61 6B 65 .</SspiHandshake
3E 3C 2F 72 65 74 75 72 6E 3E 3C 2F 41 75 74 68 ></return></Auth
65 6E 74 69 63 61 74 65 52 65 73 70 6F 6E 73 65 enticateResponse
3E 3C 2F 73 6F 61 70 3A 42 6F 64 79 3E 3C 2F 73 ></soap:Body></s
6F 61 70 3A 45 6E 76 65 6C 6F 70 65 3E CC CC CC oap:Envelope>???
```

- VERSION: 1
- MB: 1

- ME: 1
- CF: 0
- TYPE_T: 1
- RESERVED: 0
- OPTIONS_LENGTH: 4
- ID_LENGTH: 0
- TYPE_LENGTH: 8
- DATA_LENGTH: 661
- OPTIONS:
- NEGO: 0
- REQ_SX: 0
- REQ_XPRESS: 0
- RESP_SX: 0
- RESP_XPRESS: 0
- RESERVED: 0
- TYPE: text/xml

The client continues the authentication handshake:

| | |
|---|---|
| <pre> 0E 10 00 04 00 00 00 08 00 00 01 50 01 00 00 00 74 65 78 74 2F 78 6D 6C EF BB BF 3C 45 6E 76 65 6C 6F 70 65 20 78 6D 6C 6E 73 3D 22 68 74 74 70 3A 2F 2F 73 63 68 65 6D 61 73 2E 78 6D 6C 73 6F 61 70 2E 6F 72 67 2F 73 6F 61 70 2F 65 6E 76 65 6C 6F 70 65 2F 22 3E 0D 0A 20 20 3C 42 6F 64 79 3E 0D 0A 20 20 20 20 3C 41 75 74 68 65 6E 74 69 63 61 74 65 20 78 6D 6C 6E 73 3D 22 68 74 74 70 3A 2F 2F 73 63 68 65 6D 61 73 2E 6D 69 63 72 6F 73 6F 66 74 2E 63 6F 6D 2F 61 6E 61 6C 79 73 69 73 73 65 72 76 69 63 65 73 2F 32 30 30 33 2F 65 78 74 22 3E 0D 0A 20 20 20 20 20 3C 53 73 70 69 48 61 6E 64 73 68 61 6B 65 3E 54 6C 52 4D 54 56 4E 54 55 41 41 44 41 41 41 41 41 41 41 41 41 45 67 41 41 41 41 41 41 41 41 41 41 53 41 41 41 41 41 41 41 41 41 42 49 41 41 41 41 41 41 41 41 41 45 67 41 41 41 41 41 41 41 41 41 41 53 41 41 41 41 41 41 41 41 41 42 49 41 41 41 41 42 63 4B 49 6F 67 55 43 7A 67 34 41 41 41 41 50 3C 2F 53 73 70 69 48 61 6E 64 73 68 61 6B 65 3E 0D 0A 20 20 20 20 3C 2F 41 75 74 68 65 6E 74 69 63 61 74 65 3E 0D 0A 20 20 3C 2F 42 6F 64 79 3E 0D 0A 3C 2F 45 6E 76 65 6C 6F 70 65 3E </pre> | <pre>P.... text/xml???<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">.. <Body>.. <Authenticate xmlns="http://schemas.microsoft.com/analysiservices/2003/ext">.. <SspiHandshake>TLRMTVNTUAADAAAAAAAAAAEgAAAAAAAAASAAAAA AAAAABIAAAAAAAAAAAEgAAAAAAAAASAAAAA AAAAABIAAAAAbcKIOgUCzg4AAAP</SspiHandshake>.. </Authenticate>.. </Body>..</Envelope> </pre> |
|---|---|

- VERSION: 1
- MB: 1
- ME: 1

- CF: 0
- TYPE_T: 1
- RESERVED: 0
- OPTIONS_LENGTH: 4
- ID_LENGTH: 0
- TYPE_LENGTH: 8
- DATA_LENGTH: 336
- OPTIONS:
- NEGO: 1
- REQ_SX: 0
- REQ_XPRESS: 0
- RESP_SX: 0
- RESP_XPRESS: 0
- RESERVED: 0
- TYPE: text/xml

The server responds with the authentication handshake completion:

| | |
|--|--|
| <pre> 0E 10 00 04 00 00 00 08 00 00 00 FA 00 00 00 00 74 65 78 74 2F 78 6D 6C 3C 73 6F 61 70 3A 45 6E 76 65 6C 6F 70 65 20 78 6D 6C 6E 73 3A 73 6F 61 70 3D 22 68 74 74 70 3A 2F 2F 73 63 68 65 6D 61 73 2E 78 6D 6C 73 6F 61 70 2E 6F 72 67 2F 73 6F 61 70 2F 65 6E 76 65 6C 6F 70 65 2F 22 3E 3C 73 6F 61 70 3A 42 6F 64 79 3E 3C 41 75 74 68 65 6E 74 69 63 61 74 65 52 65 73 70 6F 6E 73 65 20 78 6D 6C 6E 73 3D 22 68 74 74 70 3A 2F 2F 73 63 68 65 6D 61 73 2E 6D 69 63 72 6F 73 6F 66 74 2E 63 6F 6D 2F 61 6E 61 6C 79 73 69 73 73 65 72 76 69 63 65 73 2F 32 30 30 33 2F 65 78 74 22 3E 3C 72 65 74 75 72 6E 3E 3C 53 73 70 69 48 61 6E 64 73 68 61 6B 65 2F 3E 3C 2F 72 65 74 75 72 6E 3E 3C 2F 41 75 74 68 65 6E 74 69 63 61 74 65 52 65 73 70 6F 6E 73 65 3E 3C 2F 73 6F 61 70 3A 42 6F 64 79 3E 3C 2F 73 6F 61 70 3A 45 6E 76 65 6C 6F 70 65 3E CC CC</pre> | <pre>?.... text/xml<soap:En velope xmlns:soa p="http://schema s.xmlsoap.org/so ap/envelope/"><s oap:Body><Authen ticateResponse x mlns="http://sch emas.microsoft.c om/analysisservi ces/2003/ext"><r eturn><SspiHand shake/></return>< /AuthenticateRes ponse></soap:Bo dy></soap:Envelop e???</pre> |
|--|--|

- VERSION: 1
- MB: 1
- ME: 1
- CF: 0
- TYPE_T: 1
- RESERVED: 0

- OPTIONS_LENGTH: 4
- ID_LENGTH: 0
- TYPE_LENGTH: 8
- DATA_LENGTH: 250
- OPTIONS:
- NEGO: 0
- REQ_SX: 0
- REQ_XPRESS: 0
- RESP_SX: 0
- RESP_XPRESS: 0
- RESERVED: 0
- TYPE: text/xml

4.1.3 New Session Request

The client sends a request to start a new session.

| | |
|---|--|
| <pre> 0E 10 00 04 00 00 00 08 00 00 02 89 01 00 00 00 74 65 78 74 2F 78 6D 6C EF BB BF 3C 45 6E 76 65 6C 6F 70 65 20 78 6D 6C 6E 73 3D 22 68 74 74 70 3A 2F 2F 73 63 68 65 6D 61 73 2E 78 6D 6C 73 6F 61 70 2E 6F 72 67 2F 73 6F 61 70 2F 65 6E 76 65 6C 6F 70 65 2F 22 3E 0D 0A 20 20 3C 48 65 61 64 65 72 3E 0D 0A 20 20 20 20 3C 42 65 67 69 6E 53 65 73 73 69 6F 6E 20 73 6F 61 70 3A 6D 75 73 74 55 6E 64 65 72 73 74 61 6E 64 3D 22 31 22 20 78 6D 6C 6E 73 3A 73 6F 61 70 3D 22 68 74 74 70 3A 2F 2F 73 63 68 65 6D 61 73 2E 78 6D 6C 73 6F 61 70 2E 6F 72 67 2F 73 6F 61 70 2F 65 6E 76 65 6C 6F 70 65 2F 22 20 78 6D 6C 6E 73 3D 22 75 72 6E 3A 73 63 68 65 6D 61 73 2D 6D 69 63 72 6F 73 6F 66 74 2D 63 6F 6D 3A 78 6D 6C 2D 61 6E 61 6C 79 73 69 73 22 20 2F 3E 0D 0A 20 20 20 20 3C 56 65 72 73 69 6F 6E 20 53 65 71 75 65 6E 63 65 3D 22 31 30 30 22 20 78 6D 6C 6E 73 3D 22 68 74 74 70 3A 2F 2F 73 63 68 65 6D 61 73 2E 6D 69 63 72 6F 73 6F 66 74 2E 63 6F 6D 2F 61 6E 61 6C 79 73 69 73 73 65 72 76 69 63 65 73 2F 32 30 30 33 2F 65 6E 67 69 6E 65 2F 32 22 20 2F 3E 0D 0A 20 20 3C 2F 48 65 61 64 65 72 3E 0D 0A 20 20 3C 42 6F 64 79 3E 0D 0A 20 20 20 20 3C 45 78 65 63 75 74 65 20 78 6D 6C 6E 73 3D 22 75 72 6E 3A 73 63 68 65 6D 61 73 2D 6D 69 63 72 6F 73 6F 66 74 2D 63 6F 6D 3A 78 6D 6C 2D 61 6E 61 6C 79 73 69 73 22 3E 0D 0A 20 20 20 20 20 20 3C 43 6F 6D 6D 61 6E 64 3E 0D 0A 20 20 20 20 20 20 3C 53 74 61 74 65 6D 65 6E 74 20 2F 3E 0D 0A 20 20 20 20 20 3C 2F 43 6F 6D 6D 61 6E 64 3E 0D 0A 20 20 20 20 20 20 3C 50 72 6F 72 6F 70 65 72 74 69 65 73 3E 0D 0A 20 20 20 20 20 20 20 20 3C 50 72 6F 70 65 72 74 79 4C 69 73 74 3E 0D 0A 20 20 20 20 20 20 20 20 20 20 3C 4C 6F 63 61 6C 65 49 64 65 6E 74 69 66 69 65 72 3E 31 30 33 33 3C 2F 4C 6F 63 61 6C 65 49 64 65 6E 74 69 66 69 65 72 3E 0D 0A 20 20 20 </pre> | <pre>?.... text/xml???<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">.. <Header>.. <BeginSession soap:mustUnderstand="1" xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns="urn:schemas-microsoft-com:xml-analysis" />.. <Version Sequence="100" xmlns="http://schemas.microsoft.com/analysiservices/2003/engine/2" />.. </Header>.. <Body>.. <Execute xmlns="urn:schemas-microsoft-com:xml-analysis">.. <Command>.. <Statement />.. </Command>.. <Properties>.. <PropertyList>.. <LocaleIdentifier>1033</LocaleIdentifier>.. </pre> |
|---|--|

```

20 20 20 20 20 3C 2F 50 72 6F 70 65 72 74 79 4C
69 73 74 3E 0D 0A 20 20 20 20 20 20 3C 2F 50 72
6F 70 65 72 74 69 65 73 3E 0D 0A 20 20 20 20 3C
2F 45 78 65 63 75 74 65 3E 0D 0A 20 20 3C 2F 42
6F 64 79 3E 0D 0A 3C 2F 45 6E 76 65 6C 6F 70 65
3E CC CC CC .. .. .. .. .. .. .. .. .. .. .. ..
</PropertyL
ist>.. </Pr
operties>.. <
/Execute>.. </B
ody>..</Envelope
>???

```

- VERSION: 1
- MB: 1
- ME: 1
- CF: 0
- TYPE_T: 1
- RESERVED: 0
- OPTIONS_LENGTH: 4
- ID_LENGTH: 0
- TYPE_LENGTH: 8
- DATA_LENGTH: 649
- OPTIONS:
- NEGO: 1
- REQ_SX: 0
- REQ_XPRESS: 0
- RESP_SX: 0
- RESP_XPRESS: 0
- RESERVED: 0
- TYPE: text/xml

The server responds with the ID of a newly created session.

```

0E 10 00 04 00 00 00 08 00 00 01 91 00 00 00 00 .....?....
74 65 78 74 2F 78 6D 6C 3C 73 6F 61 70 3A 45 6E text/xml<soap:En
76 65 6C 6F 70 65 20 78 6D 6C 6E 73 3A 73 6F 61 velope xmlns:soa
70 3D 22 68 74 74 70 3A 2F 2F 73 63 68 65 6D 61 p="http://schema
73 2E 78 6D 6C 73 6F 61 70 2E 6F 72 67 2F 73 6F s.xmlsoap.org/so
61 70 2F 65 6E 76 65 6C 6F 70 65 2F 22 3E 3C 73 ap/envelope/"><s
6F 61 70 3A 48 65 61 64 65 72 3E 3C 53 65 73 73 oap:Header><Sess
69 6F 6E 20 78 6D 6C 6E 73 3D 22 75 72 6E 3A 73 ion xmlns="urn:s
63 68 65 6D 61 73 2D 6D 69 63 72 6F 73 6F 66 74 chemas-microsoft
2D 63 6F 6D 3A 78 6D 6C 2D 61 6E 61 6C 79 73 69 -com:xml-analysi
73 22 20 53 65 73 73 69 6F 6E 49 64 3D 22 46 39 s" SessionId="F9
44 37 44 42 37 30 2D 32 42 45 32 2D 34 43 35 32 D7DB70-2BE2-4C52
2D 38 46 46 44 2D 31 31 33 44 39 44 31 46 39 44 -8FFD-113D9D1F9D
32 34 22 2F 3E 3C 2F 73 6F 61 70 3A 48 65 61 64 24"/></soap:Head
65 72 3E 3C 73 6F 61 70 3A 42 6F 64 79 3E 3C 45 er><soap:Body><E
78 65 63 75 74 65 52 65 73 70 6F 6E 73 65 20 78 xecuteResponse x
6D 6C 6E 73 3D 22 75 72 6E 3A 73 63 68 65 6D 61 mlns="urn:schema
73 2D 6D 69 63 72 6F 73 6F 66 74 2D 63 6F 6D 3A s-microsoft-com:
78 6D 6C 2D 61 6E 61 6C 79 73 69 73 22 3E 3C 72 xml-analysis"><r

```



```

65 74 75 72 6E 3E 3C 72 6F 6F 74 20 78 6D 6C 6E      eturn><root xmln
73 3D 22 75 72 6E 3A 73 63 68 65 6D 61 73 2D 6D      s="urn:schemas-m
69 63 72 6F 73 6F 66 74 2D 63 6F 6D 3A 78 6D 6C      icrosoft-com:xml
2D 61 6E 61 6C 79 73 69 73 3A 65 6D 70 74 79 22      -analysis:empty"
2F 3E 3C 2F 72 65 74 75 72 6E 3E 3C 2F 45 78 65      /></return></Exe
63 75 74 65 52 65 73 70 6F 6E 73 65 3E 3C 2F 73      cuteResponse></s
6F 61 70 3A 42 6F 64 79 3E 3C 2F 73 6F 61 70 3A      oap:Body></soap:
45 6E 76 65 6C 6F 70 65 3E CC CC CC .. .. .. ..      Envelope>???
```

- VERSION: 1
- MB: 1
- ME: 1
- CF: 0
- TYPE_T: 1
- RESERVED: 0
- OPTIONS_LENGTH: 4
- ID_LENGTH: 0
- TYPE_LENGTH: 8
- DATA_LENGTH: 401
- OPTIONS:
- NEGO: 0
- REQ_SX: 0
- REQ_XPRESS: 0
- RESP_SX: 0
- RESP_XPRESS: 0
- RESERVED: 0
- TYPE: text/xml

4.1.4 Request for List of Catalogs

The client sends a **DBSCHEMA_CATALOGS** request:

```

0E 10 00 04 00 00 00 08 00 00 02 3E 01 00 00 00      .....>....
74 65 78 74 2F 78 6D 6C EF BB BF 3C 45 6E 76 65      text/xml??<Enve
6C 6F 70 65 20 78 6D 6C 6E 73 3D 22 68 74 74 70      lope xmlns="http
3A 2F 2F 73 63 68 65 6D 61 73 2E 78 6D 6C 73 6F      ://schemas.xmlso
61 70 2E 6F 72 67 2F 73 6F 61 70 2F 65 6E 76 65      ap.org/soap/enve
6C 6F 70 65 2F 22 3E 0D 0A 20 20 3C 48 65 61 64      lope/">.. <Head
65 72 3E 0D 0A 20 20 20 20 3C 58 41 3A 53 65 73      er>.. <XA:Ses
73 69 6F 6E 20 73 6F 61 70 3A 6D 75 73 74 55 6E      sion soap:mustUn
64 65 72 73 74 61 6E 64 3D 22 31 22 20 53 65 73      derstand="1" Ses
73 69 6F 6E 49 64 3D 22 46 39 44 37 44 42 37 30      sionId="F9D7DB70
2D 32 42 45 32 2D 34 43 35 32 2D 38 46 46 44 2D      -2BE2-4C52-8FFD-
31 31 33 44 39 44 31 46 39 44 32 34 22 20 78 6D      113D9D1F9D24" xm
6C 6E 73 3A 73 6F 61 70 3D 22 68 74 74 70 3A 2F      lns:soap="http:/
2F 73 63 68 65 6D 61 73 2E 78 6D 6C 73 6F 61 70      /schemas.xmlsoap
```

```

2E 6F 72 67 2F 73 6F 61 70 2F 65 6E 76 65 6C 6F .org/soap/envelo
70 65 2F 22 20 78 6D 6C 6E 73 3A 58 41 3D 22 75 pe/" xmlns:XA="u
72 6E 3A 73 63 68 65 6D 61 73 2D 6D 69 63 72 6F rn:schemas-micro
73 6F 66 74 2D 63 6F 6D 3A 78 6D 6C 2D 61 6E 61 soft-com:xml-ana
6C 79 73 69 73 22 20 2F 3E 0D 0A 20 20 3C 2F 48 lysis" />.. </H
65 61 64 65 72 3E 0D 0A 20 20 3C 42 6F 64 79 3E eader>.. <Body>
0D 0A 20 20 20 20 3C 44 69 73 63 6F 76 65 72 20 .. <Discover
78 6D 6C 6E 73 3D 22 75 72 6E 3A 73 63 68 65 6D xmlns="urn:schem
61 73 2D 6D 69 63 72 6F 73 6F 66 74 2D 63 6F 6D as-microsoft-com
3A 78 6D 6C 2D 61 6E 61 6C 79 73 69 73 22 3E 0D :xml-analysis">.
0A 20 20 20 20 20 20 3C 52 65 71 75 65 73 74 54 . <RequestT
79 70 65 3E 44 42 53 43 48 45 4D 41 5F 43 41 54 ype>DBSCHEMA_CAT
41 4C 4F 47 53 3C 2F 52 65 71 75 65 73 74 54 79 ALOGS</RequestTy
70 65 3E 0D 0A 20 20 20 20 20 20 20 3C 52 65 73 74 pe>.. <Rest
72 69 63 74 69 6F 6E 73 3E 3C 2F 52 65 73 74 72 rictions></Restr
69 63 74 69 6F 6E 73 3E 0D 0A 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
3C 50 72 6F 70 65 72 74 69 65 73 3E 3C 50 72 6F <Properties><Pro
70 65 72 74 79 4C 69 73 74 3E 3C 43 6F 6E 74 65 pertyList><Conte
6E 74 3E 44 61 74 61 3C 2F 43 6F 6E 74 65 6E 74 nt>Data</Content
3E 3C 2F 50 72 6F 70 65 72 74 79 4C 69 73 74 3E ></PropertyList>
3C 2F 50 72 6F 70 65 72 74 69 65 73 3E 0D 0A 20 </Properties>..
20 20 20 3C 2F 44 69 73 63 6F 76 65 72 3E 0D 0A </Discover>..
20 20 3C 2F 42 6F 64 79 3E 0D 0A 3C 2F 45 6E 76 </Body>..</Env
65 6C 6F 70 65 3E CC CC .. .. .. .. .. .. .. .. elope??>

```

- VERSION: 1
- MB: 1
- ME: 1
- CF: 0
- TYPE_T: 1
- RESERVED: 0
- OPTIONS_LENGTH: 4
- ID_LENGTH: 0
- TYPE_LENGTH: 8
- DATA_LENGTH: 574
- OPTIONS:
- NEGO: 1
- REQ_SX: 0
- REQ_XPRESS: 0
- RESP_SX: 0
- RESP_XPRESS: 0
- RESERVED: 0
- TYPE: text/xml

The server responds with the list of catalogs:

```

0E 10 00 04 00 00 00 08 00 00 03 5D 00 00 00 00 .....]....

```

```

74 65 78 74 2F 78 6D 6C 3C 73 6F 61 70 3A 45 6E text/xml<soap:En
76 65 6C 6F 70 65 20 78 6D 6C 6E 73 3A 73 6F 61 velope xmlns:soa
70 3D 22 68 74 74 70 3A 2F 2F 73 63 68 65 6D 61 p="http://schemas
73 2E 78 6D 6C 73 6F 61 70 2E 6F 72 67 2F 73 6F s.xmlsoap.org/so
61 70 2F 65 6E 76 65 6C 6F 70 65 2F 22 3E 3C 73 ap/envelope/"><s
6F 61 70 3A 42 6F 64 79 3E 3C 44 69 73 63 6F 76 oap:Body><Discov
65 72 52 65 73 70 6F 6E 73 65 20 78 6D 6C 6E 73 erResponse xmlns
3D 22 75 72 6E 3A 73 63 68 65 6D 61 73 2D 6D 69 ="urn:schemas-mi
63 72 6F 73 6F 66 74 2D 63 6F 6D 3A 78 6D 6C 2D crosoft-com:xml-
61 6E 61 6C 79 73 69 73 22 20 78 6D 6C 6E 73 3A analysis" xmlns:
64 64 6C 32 3D 22 68 74 74 70 3A 2F 2F 73 63 68 ddl2="http://sch
65 6D 61 73 2E 6D 69 63 72 6F 73 6F 66 74 2E 63 emas.microsoft.c
6F 6D 2F 61 6E 61 6C 79 73 69 73 73 65 72 76 69 om/analysisservi
63 65 73 2F 32 30 30 33 2F 65 6E 67 69 6E 65 2F ces/2003/engine/
32 22 20 78 6D 6C 6E 73 3A 64 64 6C 32 5F 32 3D 2" xmlns:ddl2_2=
22 68 74 74 70 3A 2F 2F 73 63 68 65 6D 61 73 2E "http://schemas.
6D 69 63 72 6F 73 6F 66 74 2E 63 6F 6D 2F 61 6E microsoft.com/an
61 6C 79 73 69 73 63 65 72 76 69 63 65 73 2F 32 alysiservices/2
30 30 33 2F 65 6E 67 69 6E 65 2F 32 2F 32 22 20 003/engine/2/2"
78 6D 6C 6E 73 3A 64 64 6C 31 30 30 3D 22 68 74 xmlns:ddl100="ht
74 70 3A 2F 2F 73 63 68 65 6D 61 73 2E 6D 69 63 tp://schemas.mic
72 6F 73 6F 66 74 2E 63 6F 6D 2F 61 6E 61 6C 79 rosoft.com/analy
73 69 73 73 65 72 76 69 63 65 73 2F 32 30 30 38 sisservices/2008
2F 65 6E 67 69 6E 65 2F 31 30 30 22 20 78 6D 6C /engine/100" xmln
6E 73 3A 64 64 6C 31 30 30 5F 31 30 30 3D 22 68 ns:ddl100_100="h
74 74 70 3A 2F 2F 73 63 68 65 6D 61 73 2E 6D 69 ttp://schemas.mi
63 72 6F 73 6F 66 74 2E 63 6F 6D 2F 61 6E 61 6C crosoft.com/anal
79 73 69 73 73 65 72 76 69 63 65 73 2F 32 30 30 ysiservices/200
38 2F 65 6E 67 69 6E 65 2F 31 30 30 2F 31 30 30 8/engine/100/100
22 3E 3C 72 65 74 75 72 6E 3E 3C 72 6F 6F 74 20 "><return><root
78 6D 6C 6E 73 3D 22 75 72 6E 3A 73 63 68 65 6D xmlns="urn:schem
61 73 2D 6D 69 63 72 6F 73 6F 66 74 2D 63 6F 6D as-microsoft-com
3A 78 6D 6C 2D 61 6E 61 6C 79 73 69 73 3A 72 6F :xml-analysis:ro
77 73 65 74 22 20 78 6D 6C 6E 73 3A 78 73 69 3D wset" xmlns:xsi=
22 68 74 74 70 3A 2F 2F 77 77 77 2E 77 33 2E 6F "http://www.w3.o
72 67 2F 32 30 30 31 2F 58 4D 4C 53 63 68 65 6D rg/2001/XMLSchem
61 2D 69 6E 73 74 61 6E 63 65 22 20 78 6D 6C 6E a-instance" xmln
73 3A 78 73 64 3D 22 68 74 74 70 3A 2F 2F 77 77 s:xsd="http://ww
77 2E 77 33 2E 6F 72 67 2F 32 30 30 31 2F 58 4D w.w3.org/2001/XM
4C 53 63 68 65 6D 61 22 3E 3C 72 6F 77 3E 3C 43 LSchema"><row><C
41 54 41 4C 4F 47 5F 4E 41 4D 45 3E 44 44 4C 54 ATALOG_NAME>DDL
65 73 74 44 42 3C 2F 43 41 54 41 4C 4F 47 5F 4E estDB</CATALOG_N
41 4D 45 3E 3C 44 45 53 43 52 49 50 54 49 4F 4E AME><DESCRIPTION
3E 4D 69 63 72 6F 73 6F 66 74 20 53 61 6D 70 6C >Microsoft Sampl
65 20 44 61 74 61 62 61 73 65 3C 2F 44 45 53 43 e Database</DESC
52 49 50 54 49 4F 4E 3E 3C 52 4F 4C 45 53 3E 2A RIPTION><ROLES>*
2C 72 61 2C 72 62 3C 2F 52 4F 4C 45 53 3E 3C 44 ,ra,rb</ROLES><D
41 54 45 5F 4D 4F 44 49 46 49 45 44 3E 32 30 30 ATE_MODIFIED>200
38 2D 30 32 2D 30 38 54 30 32 3A 34 37 3A 35 34 8-02-08T02:47:54
3C 2F 44 41 54 45 5F 4D 4F 44 49 46 49 45 44 3E </DATE_MODIFIED>
3C 2F 72 6F 77 3E 3C 2F 72 6F 6F 74 3E 3C 2F 72 </row></root></r
65 74 75 72 6E 3E 3C 2F 44 69 73 63 6F 76 65 72 eturn></Discover
52 65 73 70 6F 6E 73 65 3E 3C 2F 73 6F 61 70 3A Response></soap:
42 6F 64 79 3E 3C 2F 73 6F 61 70 3A 45 6E 76 65 Body></soap:Enve
6C 6F 70 65 3E CC CC CC .. .. .. .. .. .. .. .. lope>???
```

- VERSION: 1
- MB: 1
- ME: 1
- CF: 0
- TYPE_T: 1
- RESERVED: 0

- OPTIONS_LENGTH: 4
- ID_LENGTH: 0
- TYPE_LENGTH: 8
- DATA_LENGTH: 861
- OPTIONS:
- NEGO: 0
- REQ_SX: 0
- REQ_XPRESS: 0
- RESP_SX: 0
- RESP_XPRESS: 0
- RESERVED: 0
- TYPE: text/xml

4.1.5 End of Session

The client sends a request to end this session:

| | |
|--|---|
| <pre> 0E 10 00 04 00 00 00 08 00 00 02 54 01 00 00 00 74 65 78 74 2F 78 6D 6C EF BB BF 3C 45 6E 76 65 6C 6F 70 65 20 78 6D 6C 6E 73 3D 22 68 74 74 70 3A 2F 2F 73 63 68 65 6D 61 73 2E 78 6D 6C 73 6F 61 70 2E 6F 72 67 2F 73 6F 61 70 2F 65 6E 76 65 6C 6F 70 65 2F 22 3E 0D 0A 20 20 3C 48 65 61 64 65 72 3E 0D 0A 20 20 20 20 3C 45 6E 64 53 65 73 73 69 6F 6E 20 73 6F 61 70 3A 6D 75 73 74 55 6E 64 65 72 73 74 61 6E 64 3D 22 31 22 20 53 65 73 73 69 6F 6E 49 64 3D 22 46 39 44 37 44 42 37 30 2D 32 42 45 32 2D 34 43 35 32 2D 38 46 46 44 2D 31 31 33 44 39 44 31 46 39 44 32 34 22 20 78 6D 6C 6E 73 3A 73 6F 61 70 3D 22 68 74 74 70 3A 2F 2F 73 63 68 65 6D 61 73 2E 78 6D 6C 73 6F 61 70 2E 6F 72 67 2F 73 6F 61 70 2F 65 6E 76 65 6C 6F 70 65 2F 22 20 78 6D 6C 6E 73 3D 22 75 72 6E 3A 73 63 68 65 6D 61 73 2D 6D 69 63 72 6F 73 6F 66 74 2D 63 6F 6D 3A 78 6D 6C 2D 61 6E 61 6C 79 73 69 73 22 20 2F 3E 0D 0A 20 20 3C 2F 48 65 61 64 65 72 3E 0D 0A 20 20 3C 42 6F 64 79 3E 0D 0A 20 20 20 20 3C 45 78 65 63 75 74 65 20 78 6D 6C 6E 73 3D 22 75 72 6E 3A 73 63 68 65 6D 61 73 2D 6D 69 63 72 6F 73 6F 66 74 2D 63 6F 6D 3A 78 6D 6C 2D 61 6E 61 6C 79 73 69 73 22 3E 0D 0A 20 20 20 20 20 20 3C 43 6F 6D 6D 61 6E 64 3E 0D 0A 20 20 20 20 20 20 20 20 3C 53 74 61 74 65 6D 65 6E 74 20 2F 3E 0D 0A 20 20 20 20 20 20 3C 2F 43 6F 6D 6D 61 6E 64 3E 0D 0A 20 20 20 20 20 20 3C 50 72 6F 70 65 72 74 69 65 73 3E 0D 0A 20 20 20 20 20 20 20 20 3C 50 72 6F 70 65 72 74 79 4C 69 73 74 3E 0D 0A 20 20 20 20 20 20 20 20 3C 4C 6F 63 61 6C 65 49 64 65 6E 74 69 66 69 65 72 3E 31 30 33 33 3C 2F 4C 6F 63 61 6C 65 49 64 65 6E 74 69 66 69 65 72 3E 0D 0A 20 20 20 20 20 20 20 20 3C 2F 50 72 6F 70 65 72 74 79 4C 69 73 74 3E 0D 0A 20 20 20 20 20 20 3C 2F 50 72 6F 70 65 72 74 69 65 73 3E 0D 0A 20 20 20 20 3C 2F 45 78 65 63 </pre> | <pre>T.... text/xml???<Enve lope xmlns="http ://schemas.xmlso ap.org/soap/enve lope/">.. <Head er>.. <EndSes sion soap:mustUn derstand="1" Ses sionId="F9D7DB70 -2BE2-4C52-8FFD- 113D9D1F9D24" xm lns:soap="http:/ /schemas.xmlsoap .org/soap/envelo pe/" xmlns="urn: schemas-microsof t-com:xml-analys is" />.. </Head er>.. <Body>.. <Execute xmln s="urn:schemas-m icrosoft-com:xml -analysis">.. <Command>.. <Statement />.. </Com mand>.. <Pr operties>.. <PropertyList >.. <Lo caleIdentifier>1 033</LocaleIdent ifier>.. </PropertyList>. .</Propert ies>.. </Exec </pre> |
|--|---|

```

75 74 65 3E 0D 0A 20 20 3C 2F 42 6F 64 79 3E 0D   ute>.. </Body>.
0A 3C 2F 45 6E 76 65 6C 6F 70 65 3E .. .. .. .. .</Envelope>

```

- VERSION: 1
- MB: 1
- ME: 1
- CF: 0
- TYPE_T: 1
- RESERVED: 0
- OPTIONS_LENGTH: 4
- ID_LENGTH: 0
- TYPE_LENGTH: 8
- DATA_LENGTH: 596
- OPTIONS:
- NEGO: 1
- REQ_SX: 0
- REQ_XPRESS: 0
- RESP_SX: 0
- RESP_XPRESS: 0
- RESERVED: 0
- TYPE: text/xml

The server responds with a confirmation:

```

0E 10 00 04 00 00 00 08 00 00 01 0C 00 00 00 00   .....
74 65 78 74 2F 78 6D 6C 3C 73 6F 61 70 3A 45 6E   text/xml<soap:En
76 65 6C 6F 70 65 20 78 6D 6C 6E 73 3A 73 6F 61   velope xmlns:soa
70 3D 22 68 74 74 70 3A 2F 2F 73 63 68 65 6D 61   p="http://schema
73 2E 78 6D 6C 73 6F 61 70 2E 6F 72 67 2F 73 6F   s.xmlsoap.org/so
61 70 2F 65 6E 76 65 6C 6F 70 65 2F 22 3E 3C 73   ap/envelope/"><s
6F 61 70 3A 42 6F 64 79 3E 3C 45 78 65 63 75 74   oap:Body><Execut
65 52 65 73 70 6F 6E 73 65 20 78 6D 6C 6E 73 3D   eResponse xmlns=
22 75 72 6E 3A 73 63 68 65 6D 61 73 2D 6D 69 63   "urn:schemas-mic
72 6F 73 6F 66 74 2D 63 6F 6D 3A 78 6D 6C 2D 61   rosoft-com:xml-a
6E 61 6C 79 73 69 73 22 3E 3C 72 65 74 75 72 6E   nalysis"><return
3E 3C 72 6F 6F 74 20 78 6D 6C 6E 73 3D 22 75 72   ><root xmlns="ur
6E 3A 73 63 68 65 6D 61 73 2D 6D 69 63 72 6F 73   n:schemas-micros
6F 66 74 2D 63 6F 6D 3A 78 6D 6C 2D 61 6E 61 6C   oft-com:xml-anal
79 73 69 73 3A 65 6D 70 74 79 22 2F 3E 3C 2F 72   ysis:empty"/></r
65 74 75 72 6E 3E 3C 2F 45 78 65 63 75 74 65 52   eturn></ExecuteR
65 73 70 6F 6E 73 65 3E 3C 2F 73 6F 61 70 3A 42   esponse></soap:B
6F 64 79 3E 3C 2F 73 6F 61 70 3A 45 6E 76 65 6C   ody></soap:Envel
6F 70 65 3E .. .. .. .. .. .. .. .. .. .. .. ..   ope>

```

- VERSION: 1

- MB: 1
- ME: 1
- CF: 0
- TYPE_T: 1
- RESERVED: 0
- OPTIONS_LENGTH: 4
- ID_LENGTH: 0
- TYPE_LENGTH: 8
- DATA_LENGTH: 268
- OPTIONS:
- NEGO: 0
- REQ_SX: 0
- REQ_XPRESS: 0
- RESP_SX: 0
- RESP_XPRESS: 0
- RESERVED: 0
- TYPE: text/xml

The client disconnects from the server.

4.2 Client Obtains a List of Cubes from the Server over HTTP

In this example, the client creates an unauthenticated connection to the server by using HTTP and sends an **MDSHEMA_CUBES** request.

4.2.1 Connection

The server listens on a TCP port for incoming HTTP requests from clients. The client creates a TCP connection to the server.

4.2.2 New Session Request

The client sends an HTTP header with the request to create a session:

```
POST /as/msmdpump.dll HTTP/1.1
User-Agent: XmlaClient
Content-Type: text/xml
SOAPAction: "urn:schemas-microsoft-com:xml-analysis:Execute"
X-Transport-Caps-Negotiation-Flags: 0,0,0,0,1
Host: testserver:2390
Content-Length: 647
Expect: 100-continue
Connection: Keep-Alive
```

The server responds with a confirmation:

```
HTTP/1.1 100 Continue
```

The client sends the payload part of the request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <BeginSession soap:mustUnderstand="1"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns="urn:schemas-microsoft-com:xml-
analysis" />
  </Header>
  <Body>
    <Execute xmlns="urn:schemas-microsoft-com:xml-analysis">
      <Command>
        <Statement />
      </Command>
      <Properties>
        <PropertyList>
          <LocaleIdentifier>1033</LocaleIdentifier>
        </PropertyList>
      </Properties>
    </Execute>
  </Body>
</Envelope>
```

The server responds with the newly created session ID:

```
HTTP/1.1 200 OK
Date: Sat, 16 Feb 2008 00:30:34 GMT
Server: Microsoft-IIS/6.0
X-Powered-By: ASP.NET
Transfer-Encoding: chunked
X-Transport-Caps-Negotiation-Flags: 0,0,0,0,0
Content-Type: text/xml
191
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Header><Session xmlns="urn:schemas-microsoft-com:xml-analysis" SessionId="537C61C6-
827C-4305-83A6-C8CE4A91001B"/>
</soap:Header>
  <soap:Body>
    <ExecuteResponse xmlns="urn:schemas-microsoft-com:xml-analysis">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty"/>
      </return>
    </ExecuteResponse>
  </soap:Body>
</soap:Envelope>
```

4.2.3 Request for List of Cubes

The client sends a header for an **MDSHEMA_CUBES** request:

```
POST /as/msmdpump.dll HTTP/1.1
User-Agent: XmlaClient
Content-Type: text/xml
SOAPAction: "urn:schemas-microsoft-com:xml-analysis:Discover"
X-Transport-Caps-Negotiation-Flags: 1,0,0,0,0
Host: testserver:2390
Content-Length: 571
Expect: 100-continue
```

The server responds with a confirmation:

```
HTTP/1.1 100 Continue
```

The client sends the payload portion of the request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <XA:Session soap:mustUnderstand="1" SessionId="537C61C6-827C-4305-83A6-C8CE4A91001B"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
com:xml-analysis" />
  </Header>
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>MDSHEMA_CUBES</RequestType>
      <Restrictions></Restrictions>
      <Properties><PropertyList><Content>Data</Content></PropertyList></Properties>
    </Discover>
  </Body>
</Envelope>
```

The server responds with an empty list of cubes:

```
HTTP/1.1 200 OK
Date: Sat, 16 Feb 2008 00:30:34 GMT
Server: Microsoft-IIS/6.0
X-Powered-By: ASP.NET
Transfer-Encoding: chunked
X-Transport-Caps-Negotiation-Flags: 0,0,0,0
Content-Type: text/xml
208
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"/>
      </return>
    </DiscoverResponse>
  </soap:Body>
</soap:Envelope>
```

4.2.4 End of Session

The client sends a header of the request to end this session:

```
POST /as/msmdpump.dll HTTP/1.1
User-Agent: XmlaClient
Content-Type: text/xml
SOAPAction: "urn:schemas-microsoft-com:xml-analysis:Execute"
X-Transport-Caps-Negotiation-Flags: 1,0,0,0
Host: testserver:2390
Content-Length: 596
Expect: 100-continue
```

The server responds with a confirmation:

HTTP/1.1 100 Continue

The client sends the payload portion of the request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <EndSession soap:mustUnderstand="1" SessionId="537C61C6-827C-4305-83A6-C8CE4A91001B"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns="urn:schemas-microsoft-com:xml-
analysis" />
  </Header>
  <Body>
    <Execute xmlns="urn:schemas-microsoft-com:xml-analysis">
      <Command>
        <Statement />
      </Command>
      <Properties>
        <PropertyList>
          <LocaleIdentifier>1033</LocaleIdentifier>
        </PropertyList>
      </Properties>
    </Execute>
  </Body>
</Envelope>
```

The server responds with a confirmation:

```
HTTP/1.1 200 OK
Date: Sat, 16 Feb 2008 00:30:35 GMT
Server: Microsoft-IIS/6.0
X-Powered-By: ASP.NET
Transfer-Encoding: chunked
X-Transport-Caps-Negotiation-Flags: 0,0,0,0
Content-Type: text/xml
10c
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <ExecuteResponse xmlns="urn:schemas-microsoft-com:xml-analysis">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty"/>
      </return>
    </ExecuteResponse>
  </soap:Body>
</soap:Envelope>
```

The client closes the connection.

4.3 Client Obtains a List of Measures from the Server

In this example, the client sends an **MDSHEMA_MEASURES** request.

4.3.1 Client Sends Request

The client sends the following **Discover** request.

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <XA:Session soap:mustUnderstand="1" SessionId="24AD6CD1-2341-4BCE-AC06-740B5AA88CA2"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
com:xml-analysis" />
  </Header>
```

```

<Body>
  <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
    <RequestType>MDSHEMA_MEASURES</RequestType>
    <Restrictions></Restrictions>
    <Properties><PropertyList><Content>Data</Content></PropertyList></Properties>
  </Discover>
</Body>
</Envelope>

```

4.3.2 Server Response

The server responds with a list of measures.

```

<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
      xmlns:ddl2="http://schemas.microsoft.com/analysisisservices/2003/engine/2"
      xmlns:ddl2_2="http://schemas.microsoft.com/analysisisservices/2003/engine/2/2"
      xmlns:ddl100="http://schemas.microsoft.com/analysisisservices/2008/engine/100"
      xmlns:ddl100_100="http://schemas.microsoft.com/analysisisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
          xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <row>
            <CATALOG_NAME>AdventureWorks_SSAS</CATALOG_NAME>
            <CUBE_NAME>AdventureWorksDW2008Cube</CUBE_NAME>
            <MEASURE_NAME>Order Quantity</MEASURE_NAME>
            <MEASURE_UNIQUE_NAME>[Measures].[Order Quantity]</MEASURE_UNIQUE_NAME>
            <MEASURE_CAPTION>Order Quantity</MEASURE_CAPTION>
            <MEASURE_AGGREGATOR>1</MEASURE_AGGREGATOR>
            <DATA_TYPE>3</DATA_TYPE>
            <NUMERIC_PRECISION>10</NUMERIC_PRECISION>
            <NUMERIC_SCALE>-1</NUMERIC_SCALE>
            <DESCRIPTION />
            <MEASURE_IS_VISIBLE>true</MEASURE_IS_VISIBLE>
            <MEASURE_NAME_SQL_COLUMN_NAME>Order Quantity</MEASURE_NAME_SQL_COLUMN_NAME>
            <MEASURE_UNQUALIFIED_CAPTION>Order Quantity</MEASURE_UNQUALIFIED_CAPTION>
            <MEASUREGROUP_NAME>Fact Internet Sales</MEASUREGROUP_NAME>
            <MEASURE_DISPLAY_FOLDER />
            <DEFAULT_FORMAT_STRING />
          </row>
          <row>
            <CATALOG_NAME>AdventureWorks_SSAS</CATALOG_NAME>
            <CUBE_NAME>AdventureWorksDW2008Cube</CUBE_NAME>
            <MEASURE_NAME>Sales Amount</MEASURE_NAME>
            <MEASURE_UNIQUE_NAME>[Measures].[Sales Amount]</MEASURE_UNIQUE_NAME>
            <MEASURE_CAPTION>Sales Amount</MEASURE_CAPTION>
            <MEASURE_AGGREGATOR>1</MEASURE_AGGREGATOR>
            <DATA_TYPE>5</DATA_TYPE>
            <NUMERIC_PRECISION>16</NUMERIC_PRECISION>
            <NUMERIC_SCALE>-1</NUMERIC_SCALE>
            <DESCRIPTION />
            <MEASURE_IS_VISIBLE>true</MEASURE_IS_VISIBLE>
            <MEASURE_NAME_SQL_COLUMN_NAME>Sales Amount</MEASURE_NAME_SQL_COLUMN_NAME>
            <MEASURE_UNQUALIFIED_CAPTION>Sales Amount</MEASURE_UNQUALIFIED_CAPTION>
            <MEASUREGROUP_NAME>Fact Internet Sales</MEASUREGROUP_NAME>
            <MEASURE_DISPLAY_FOLDER />
            <DEFAULT_FORMAT_STRING />
          </row>
          <row>
            <CATALOG_NAME>AdventureWorks_SSAS</CATALOG_NAME>
            <CUBE_NAME>AdventureWorksDW2008Cube</CUBE_NAME>
            <MEASURE_NAME>Tax Amt</MEASURE_NAME>
            <MEASURE_UNIQUE_NAME>[Measures].[Tax Amt]</MEASURE_UNIQUE_NAME>
            <MEASURE_CAPTION>Tax Amt</MEASURE_CAPTION>
            <MEASURE_AGGREGATOR>1</MEASURE_AGGREGATOR>

```

```

    <DATA_TYPE>5</DATA_TYPE>
    <NUMERIC_PRECISION>16</NUMERIC_PRECISION>
    <NUMERIC_SCALE>-1</NUMERIC_SCALE>
    <DESCRIPTION />
    <MEASURE_IS_VISIBLE>true</MEASURE_IS_VISIBLE>
    <MEASURE_NAME_SQL_COLUMN_NAME>Tax Amt</MEASURE_NAME_SQL_COLUMN_NAME>
    <MEASURE_UNQUALIFIED_CAPTION>Tax Amt</MEASURE_UNQUALIFIED_CAPTION>
    <MEASUREGROUP_NAME>Fact Internet Sales</MEASUREGROUP_NAME>
    <MEASURE_DISPLAY_FOLDER />
    <DEFAULT_FORMAT_STRING />
  </row>
  <row>
    <CATALOG_NAME>AdventureWorks_SSAS</CATALOG_NAME>
    <CUBE_NAME>AdventureWorksDW2008Cube</CUBE_NAME>
    <MEASURE_NAME>Fact Internet Sales Count</MEASURE_NAME>
    <MEASURE_UNIQUE_NAME>[Measures].[Fact Internet Sales Count]</MEASURE_UNIQUE_NAME>
    <MEASURE_CAPTION>Fact Internet Sales Count</MEASURE_CAPTION>
    <MEASURE_AGGREGATOR>2</MEASURE_AGGREGATOR>
    <DATA_TYPE>3</DATA_TYPE>
    <NUMERIC_PRECISION>10</NUMERIC_PRECISION>
    <NUMERIC_SCALE>-1</NUMERIC_SCALE>
    <DESCRIPTION />
    <MEASURE_IS_VISIBLE>true</MEASURE_IS_VISIBLE>
    <MEASURE_NAME_SQL_COLUMN_NAME>Fact Internet Sales
Count</MEASURE_NAME_SQL_COLUMN_NAME>
    <MEASURE_UNQUALIFIED_CAPTION>Fact Internet Sales
Count</MEASURE_UNQUALIFIED_CAPTION>
    <MEASUREGROUP_NAME>Fact Internet Sales</MEASUREGROUP_NAME>
    <MEASURE_DISPLAY_FOLDER />
    <DEFAULT_FORMAT_STRING />
  </row>
  <row>
    <CATALOG_NAME>AdventureWorks_SSAS</CATALOG_NAME>
    <CUBE_NAME>AdventureWorksDW2008Cube</CUBE_NAME>
    <MEASURE_NAME>Total Amount</MEASURE_NAME>
    <MEASURE_UNIQUE_NAME>[Measures].[Total Amount]</MEASURE_UNIQUE_NAME>
    <MEASURE_CAPTION>Total Amount</MEASURE_CAPTION>
    <MEASURE_AGGREGATOR>1</MEASURE_AGGREGATOR>
    <DATA_TYPE>5</DATA_TYPE>
    <NUMERIC_PRECISION>16</NUMERIC_PRECISION>
    <NUMERIC_SCALE>-1</NUMERIC_SCALE>
    <DESCRIPTION />
    <MEASURE_IS_VISIBLE>true</MEASURE_IS_VISIBLE>
    <MEASURE_NAME_SQL_COLUMN_NAME>Total Amount</MEASURE_NAME_SQL_COLUMN_NAME>
    <MEASURE_UNQUALIFIED_CAPTION>Total Amount</MEASURE_UNQUALIFIED_CAPTION>
    <MEASUREGROUP_NAME>Fact Internet Sales</MEASUREGROUP_NAME>
    <MEASURE_DISPLAY_FOLDER />
    <DEFAULT_FORMAT_STRING />
  </row>
</root>
</return>
</DiscoverResponse>
</soap:Body>
</soap:Envelope>

```

4.4 Client Obtains a List of Properties from the Server

In this example, the client sends a **DISCOVER_PROPERTIES** request.

4.4.1 Client Sends Request

The client sends the following request:

```

<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>

```

```

    <XA:Session soap:mustUnderstand="1" SessionId="24AD6CD1-2341-4BCE-AC06-740B5AA88CA2"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
com:xml-analysis" />
  </Header>
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DISCOVER_PROPERTIES</RequestType>
      <Restrictions></Restrictions>
      <Properties><PropertyList><Content>Data</Content></PropertyList></Properties>
    </Discover>
  </Body>
</Envelope>

```

4.4.2 Server Response

The server responds with a list of properties:

```

<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
xmlns:ddl2="http://schemas.microsoft.com/analysisisservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysisisservices/2003/engine/2/2"
xmlns:ddl100="http://schemas.microsoft.com/analysisisservices/2008/engine/100"
xmlns:ddl100_100="http://schemas.microsoft.com/analysisisservices/2008/engine/100/100">
      <return xmlns="urn:schemas-microsoft-com:xml-analysis">
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:msxmla="http://schemas.microsoft.com/analysisisservices/2003/xmla">
          <row>
            <PropertyName>Catalog</PropertyName>
            <PropertyDescription>Catalog</PropertyDescription>
            <PropertyType>string</PropertyType>
            <PropertyAccessType>ReadWrite</PropertyAccessType>
            <IsRequired>>false</IsRequired>
            <Value>AdventureWorks_SSAS</Value>
          </row>
          <row>
            <PropertyName>Timeout</PropertyName>
            <PropertyDescription>Timeout</PropertyDescription>
            <PropertyType>int</PropertyType>
            <PropertyAccessType>ReadWrite</PropertyAccessType>
            <IsRequired>>false</IsRequired>
          </row>
          <row>
            <PropertyName>Content</PropertyName>
            <PropertyDescription>Content</PropertyDescription>
            <PropertyType>string</PropertyType>
            <PropertyAccessType>Write</PropertyAccessType>
            <IsRequired>>false</IsRequired>
            <Value>SchemaData</Value>
          </row>
          <row>
            <PropertyName>Format</PropertyName>
            <PropertyDescription>Format</PropertyDescription>
            <PropertyType>string</PropertyType>
            <PropertyAccessType>Write</PropertyAccessType>
            <IsRequired>>false</IsRequired>
            <Value>Native</Value>
          </row>
          <row>
            <PropertyName>AxisFormat</PropertyName>
            <PropertyDescription>AxisFormat</PropertyDescription>
            <PropertyType>string</PropertyType>
            <PropertyAccessType>Write</PropertyAccessType>
            <IsRequired>>false</IsRequired>
            <Value>TupleFormat</Value>
          </row>
        </root>
      </return>
    </DiscoverResponse>
  </soap:Body>
</soap:Envelope>

```

```

</row>
<row>
  <PropertyName>BeginRange</PropertyName>
  <PropertyDescription>BeginRange</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>>false</IsRequired>
  <Value>-1</Value>
</row>
<row>
  <PropertyName>EndRange</PropertyName>
  <PropertyDescription>EndRange</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>>false</IsRequired>
  <Value>-1</Value>
</row>
<row>
  <PropertyName>ShowHiddenCubes</PropertyName>
  <PropertyDescription>ShowHiddenCubes</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>>false</IsRequired>
  <Value>>false</Value>
</row>
<row>
  <PropertyName>MaximumRows</PropertyName>
  <PropertyDescription>MaximumRows</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>>false</IsRequired>
</row>
<row>
  <PropertyName>VisualMode</PropertyName>
  <PropertyDescription>VisualMode</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>DbpropMsmcCachePolicy</PropertyName>
  <PropertyDescription>DbpropMsmcCachePolicy</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>>false</IsRequired>
</row>
<row>
  <PropertyName>DbpropMsmcCacheRatio</PropertyName>
  <PropertyDescription>DbpropMsmcCacheRatio</PropertyDescription>
  <PropertyType>double</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>>false</IsRequired>
</row>
<row>
  <PropertyName>DbpropMsmcCacheMode</PropertyName>
  <PropertyDescription>DbpropMsmcCacheMode</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>>false</IsRequired>
</row>
<row>
  <PropertyName>DbpropMsmcFlattened2</PropertyName>
  <PropertyDescription>DbpropMsmcFlattened2</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>>false</IsRequired>
  <Value>>false</Value>
</row>
<row>

```

```

    <PropertyName>DbpropInitMode</PropertyName>
    <PropertyDescription>DbpropInitMode</PropertyDescription>
    <PropertyType>int</PropertyType>
    <PropertyAccessType>ReadWrite</PropertyAccessType>
    <IsRequired>>false</IsRequired>
</row>
<row>
    <PropertyName>SspropInitAppName</PropertyName>
    <PropertyDescription>SspropInitAppName</PropertyDescription>
    <PropertyType>string</PropertyType>
    <PropertyAccessType>ReadWrite</PropertyAccessType>
    <IsRequired>>false</IsRequired>
</row>
<row>
    <PropertyName>SecuredCellValue</PropertyName>
    <PropertyDescription>SecuredCellValue</PropertyDescription>
    <PropertyType>int</PropertyType>
    <PropertyAccessType>ReadWrite</PropertyAccessType>
    <IsRequired>>false</IsRequired>
    <Value>0</Value>
</row>
<row>
    <PropertyName>NonEmptyThreshold</PropertyName>
    <PropertyDescription>NonEmptyThreshold</PropertyDescription>
    <PropertyType>int</PropertyType>
    <PropertyAccessType>ReadWrite</PropertyAccessType>
    <IsRequired>>false</IsRequired>
</row>
<row>
    <PropertyName>SafetyOptions</PropertyName>
    <PropertyDescription>SafetyOptions</PropertyDescription>
    <PropertyType>int</PropertyType>
    <PropertyAccessType>ReadWrite</PropertyAccessType>
    <IsRequired>>false</IsRequired>
</row>
<row>
    <PropertyName>DbpropMsmcCacheRatio2</PropertyName>
    <PropertyDescription>DbpropMsmcCacheRatio2</PropertyDescription>
    <PropertyType>double</PropertyType>
    <PropertyAccessType>ReadWrite</PropertyAccessType>
    <IsRequired>>false</IsRequired>
</row>
<row>
    <PropertyName>DbpropMsmcUseFormulaCache</PropertyName>
    <PropertyDescription>DbpropMsmcUseFormulaCache</PropertyDescription>
    <PropertyType>string</PropertyType>
    <PropertyAccessType>ReadWrite</PropertyAccessType>
    <IsRequired>>false</IsRequired>
</row>
<row>
    <PropertyName>DbpropMsmcDynamicDebugLimit</PropertyName>
    <PropertyDescription>DbpropMsmcDynamicDebugLimit</PropertyDescription>
    <PropertyType>int</PropertyType>
    <PropertyAccessType>ReadWrite</PropertyAccessType>
    <IsRequired>>false</IsRequired>
</row>
<row>
    <PropertyName>DbpropMsmcDebugMode</PropertyName>
    <PropertyDescription>DbpropMsmcDebugMode</PropertyDescription>
    <PropertyType>string</PropertyType>
    <PropertyAccessType>ReadWrite</PropertyAccessType>
    <IsRequired>>false</IsRequired>
</row>
<row>
    <PropertyName>Dialect</PropertyName>
    <PropertyDescription>Dialect</PropertyDescription>
    <PropertyType>string</PropertyType>
    <PropertyAccessType>ReadWrite</PropertyAccessType>
    <IsRequired>>false</IsRequired>
</row>

```

```

<row>
  <PropertyName>ImpactAnalysis</PropertyName>
  <PropertyDescription>ImpactAnalysis</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>SQLQueryMode</PropertyName>
  <PropertyDescription>SQLQueryMode</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>Calculated</Value>
</row>
<row>
  <PropertyName>ClientProcessID</PropertyName>
  <PropertyDescription>ClientProcessID</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>Cube</PropertyName>
  <PropertyDescription>Cube</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>ReturnCellProperties</PropertyName>
  <PropertyDescription>ReturnCellProperties</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>false</Value>
</row>
<row>
  <PropertyName>CommitTimeout</PropertyName>
  <PropertyDescription>CommitTimeout</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>ForceCommitTimeout</PropertyName>
  <PropertyDescription>ForceCommitTimeout</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>ExecutionMode</PropertyName>
  <PropertyDescription>ExecutionMode</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>Execute</Value>
</row>
<row>
  <PropertyName>RealTimeOlap</PropertyName>
  <PropertyDescription>RealTimeOlap</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>false</Value>
</row>

```

```

<row>
  <PropertyName>MdxMissingMemberMode</PropertyName>
  <PropertyDescription>MdxMissingMemberMode</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>Default</Value>
</row>
<row>
  <PropertyName>DisablePrefetchFacts</PropertyName>
  <PropertyDescription>DisablePrefetchFacts</PropertyDescription>
  <PropertyType>boolean</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>>false</Value>
</row>
<row>
  <PropertyName>UpdateIsolationLevel</PropertyName>
  <PropertyDescription>UpdateIsolationLevel</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>2</Value>
</row>
<row>
  <PropertyName>CharacterEncoding</PropertyName>
  <PropertyDescription>CharacterEncoding</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>Default</Value>
</row>
<row>
  <PropertyName>DbpropMsmdOptimizeResponse</PropertyName>
  <PropertyDescription>DbpropMsmdOptimizeResponse</PropertyDescription>
  <PropertyType>long</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>0</Value>
</row>
<row>
  <PropertyName>DataSourceInfo</PropertyName>
  <PropertyDescription>DataSourceInfo</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>true</IsRequired>
</row>
<row>
  <PropertyName>Password</PropertyName>
  <PropertyDescription>Password</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>Write</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>
  <PropertyName>LocaleIdentifier</PropertyName>
  <PropertyDescription>LocaleIdentifier</PropertyDescription>
  <PropertyType>int</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
  <Value>1033</Value>
</row>
<row>
  <PropertyName>Roles</PropertyName>
  <PropertyDescription>Roles</PropertyDescription>
  <PropertyType>string</PropertyType>
  <PropertyAccessType>ReadWrite</PropertyAccessType>
  <IsRequired>false</IsRequired>
</row>
<row>

```



```

    <PropertyName>EffectiveRoles</PropertyName>
    <PropertyDescription>EffectiveRoles</PropertyDescription>
    <PropertyType>string</PropertyType>
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```

```

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```

```

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```

```

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```

```

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  <Value>>false</Value>
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  <PropertyAccessType>Read</PropertyAccessType>
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  <Value>0</Value>
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```

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    <PropertyAccessType>Read</PropertyAccessType>
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    <PropertyAccessType>Read</PropertyAccessType>
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    <PropertyAccessType>Read</PropertyAccessType>
    <IsRequired>>false</IsRequired>
    <Value>63</Value>
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```

```

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    <PropertyAccessType>Read</PropertyAccessType>
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    <Value>496</Value>
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    <Value>0</Value>
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    <PropertyAccessType>Read</PropertyAccessType>
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    <Value>true</Value>
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    <IsRequired>false</IsRequired>
    <Value>524287</Value>

```



```

</row>
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  <IsRequired>>false</IsRequired>
  <Value>15</Value>
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  <Value>3</Value>
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  <PropertyName>MdpropMdxSubqueries</PropertyName>
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  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>>false</IsRequired>
  <Value>15</Value>
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  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>>false</IsRequired>
  <Value>15</Value>
</row>
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  <PropertyType>int</PropertyType>
  <PropertyAccessType>Read</PropertyAccessType>
  <IsRequired>>false</IsRequired>
  <Value>31</Value>
</row>
</root>
</return>
</DiscoverResponse>
</soap:Body>
</soap:Envelope>

```

4.5 Client Obtains a List of Mining Models from the Server

In this example, the client sends a **DMSHEMA_MINING_MODELS** request.

4.5.1 Client Sends Request

The client sends the following request:

```

<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>

```

```

    <XA:Session soap:mustUnderstand="1" SessionId="7F865E20-41AE-4156-8B38-B6D90D7134E8"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
com:xml-analysis" />
  </Header>
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DMSHEMA_MINING_MODELS</RequestType>
      <Restrictions></Restrictions>
      <Properties><PropertyList><Content>Data</Content></PropertyList></Properties>
    </Discover>
  </Body>
</Envelope>

```

4.5.2 Server Response

The server responds with a list of mining models:

```

<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
xmlns:ddl2="http://schemas.microsoft.com/analysiservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysiservices/2003/engine/2/2"
xmlns:ddl100="http://schemas.microsoft.com/analysiservices/2008/engine/100"
xmlns:ddl100_100="http://schemas.microsoft.com/analysiservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <row>
            <MODEL_CATALOG>AdventureWorks_SSAS</MODEL_CATALOG>
            <MODEL_NAME>Dim Product</MODEL_NAME>
            <MODEL_GUID>BC9EA693-C163-4609-89F2-FD38A498B43E</MODEL_GUID>
            <DESCRIPTION />
            <DATE_CREATED>2009-03-08T08:50:23</DATE_CREATED>
            <DATE_MODIFIED>2009-03-10T06:53:43</DATE_MODIFIED>
            <SERVICE_TYPE_ID>1</SERVICE_TYPE_ID>
            <SERVICE_NAME>Microsoft_Decision_Trees</SERVICE_NAME>
            <PREDICTION_ENTITY>Sales Amount</PREDICTION_ENTITY>
            <IS_POPULATED>true</IS_POPULATED>

            <MINING_PARAMETERS>COMPLEXITY_PENALTY=0.5,MAXIMUM_INPUT_ATTRIBUTES=255,MAXIMUM_OUTPUT_ATTRIBU
TES=255,MINIMUM_SUPPORT=10,SCORE_METHOD=4,SPLIT_METHOD=3,FORCE_REGRESSOR=</MINING_PARAMETERS>
            <MINING_STRUCTURE>Dim Product Mining</MINING_STRUCTURE>
            <LAST_PROCESSED>2009-03-08T08:50:33</LAST_PROCESSED>
            <MSOLAP_IS_DRILLTHROUGH_ENABLED>true</MSOLAP_IS_DRILLTHROUGH_ENABLED>
            <FILTER />
            <TRAINING_SET_SIZE>354</TRAINING_SET_SIZE>
          </row>
        </root>
      </return>
    </DiscoverResponse>
  </soap:Body>
</soap:Envelope>

```

4.6 Client Obtains a List of Traces from the Server

In this example, the client sends a **DISCOVER_TRACES** request.

4.6.1 Client Sends Request

The client sends the following request:

```

<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">

```

```

<Header>
  <XA:Session soap:mustUnderstand="1" SessionId="65F72973-83ED-4F34-9C55-EA577E7BFBD8"
  xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
  com:xml-analysis" />
</Header>
<Body>
  <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
    <RequestType>DISCOVER_TRACES</RequestType>
    <Restrictions></Restrictions>
    <Properties>
      <PropertyList>
        <Content>Data</Content>
      </PropertyList>
    </Properties>
  </Discover>
</Body>
</Envelope>

```

4.6.2 Server Response

The server responds with a list of traces:

```

<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
    xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"
    xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2"
    xmlns:ddl100="http://schemas.microsoft.com/analysisservices/2008/engine/100"
    xmlns:ddl100_100="http://schemas.microsoft.com/analysisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <row>
            <TraceID>FlightRecorder</TraceID>
            <TraceName>FlightRecorder</TraceName>
            <LogFileName>\\?\C:\Program Files\Microsoft SQL
            Server\MSAS10.MSSQLSERVER\OLAP\Log\FlightRecorderCurrent.trc</LogFileName>
            <LogFileSize>10485760</LogFileSize>
            <LogFileRollover>true</LogFileRollover>
            <AutoRestart>false</AutoRestart>
            <CreationTime>2009-03-16T02:13:25</CreationTime>
          </row>
        </root>
      </return>
    </DiscoverResponse>
  </soap:Body>
</soap:Envelope>

```

4.7 Client Obtains a List of Connections from the Server

In this example, the client sends a **DISCOVER_CONNECTIONS** request.

4.7.1 Client Sends Request

The client sends the following request:

```

<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <XA:Session soap:mustUnderstand="1" SessionId="09157399-DA20-4FB7-A316-E7EC153F3BE6"
    xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
    com:xml-analysis" />
  </Header>

```

```

<Body>
  <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
    <RequestType>DISCOVER_CONNECTIONS</RequestType>
    <Restrictions></Restrictions>
    <Properties>
      <PropertyList>
        <Content>Data</Content>
      </PropertyList>
    </Properties>
  </Discover>
</Body>
</Envelope>

```

4.7.2 Server Response

The server responds with a list of connections.

```

<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
      xmlns:ddl2="http://schemas.microsoft.com/analysisisservices/2003/engine/2"
      xmlns:ddl2_2="http://schemas.microsoft.com/analysisisservices/2003/engine/2/2"
      xmlns:ddl100="http://schemas.microsoft.com/analysisisservices/2008/engine/100"
      xmlns:ddl100_100="http://schemas.microsoft.com/analysisisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
          xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <row>
            <CONNECTION_ID>2</CONNECTION_ID>
            <CONNECTION_USER_NAME>NY-SQL-02\Student</CONNECTION_USER_NAME>
            <CONNECTION_HOST_NAME>[::1]:49168</CONNECTION_HOST_NAME>
            <CONNECTION_HOST_APPLICATION>Microsoft SQL Server Management Studio -
Query</CONNECTION_HOST_APPLICATION>
            <CONNECTION_START_TIME>2009-03-16T02:21:46</CONNECTION_START_TIME>
            <CONNECTION_ELAPSED_TIME_MS>6520603</CONNECTION_ELAPSED_TIME_MS>
            <CONNECTION_LAST_COMMAND_START_TIME>2009-03-
16T03:32:30</CONNECTION_LAST_COMMAND_START_TIME>
            <CONNECTION_LAST_COMMAND_END_TIME>2009-03-
16T03:32:30</CONNECTION_LAST_COMMAND_END_TIME>
            <CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>3</CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>
            <CONNECTION_IDLE_TIME_MS>2276705</CONNECTION_IDLE_TIME_MS>
            <CONNECTION_BYTES_SENT>11036</CONNECTION_BYTES_SENT>
            <CONNECTION_DATA_BYTES_SENT>22252</CONNECTION_DATA_BYTES_SENT>
            <CONNECTION_BYTES_RECEIVED>12416</CONNECTION_BYTES_RECEIVED>
            <CONNECTION_DATA_BYTES_RECEIVED>12416</CONNECTION_DATA_BYTES_RECEIVED>
          </row>
          <row>
            <CONNECTION_ID>5</CONNECTION_ID>
            <CONNECTION_USER_NAME>NY-SQL-02\Student</CONNECTION_USER_NAME>
            <CONNECTION_HOST_NAME>[::1]:49169</CONNECTION_HOST_NAME>
            <CONNECTION_HOST_APPLICATION>Microsoft SQL Server Management Studio -
Query</CONNECTION_HOST_APPLICATION>
            <CONNECTION_START_TIME>2009-03-16T02:22:02</CONNECTION_START_TIME>
            <CONNECTION_ELAPSED_TIME_MS>6504734</CONNECTION_ELAPSED_TIME_MS>
            <CONNECTION_LAST_COMMAND_START_TIME>2009-03-
16T04:10:26</CONNECTION_LAST_COMMAND_START_TIME>
            <CONNECTION_LAST_COMMAND_END_TIME>2009-03-
16T04:10:26</CONNECTION_LAST_COMMAND_END_TIME>
            <CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>5</CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>
            <CONNECTION_IDLE_TIME_MS>764</CONNECTION_IDLE_TIME_MS>
            <CONNECTION_BYTES_SENT>39804</CONNECTION_BYTES_SENT>
            <CONNECTION_DATA_BYTES_SENT>84863</CONNECTION_DATA_BYTES_SENT>
            <CONNECTION_BYTES_RECEIVED>43388</CONNECTION_BYTES_RECEIVED>
            <CONNECTION_DATA_BYTES_RECEIVED>43388</CONNECTION_DATA_BYTES_RECEIVED>
          </row>
        </root>
      </return>
    </DiscoverResponse>
  </soap:Body>
</soap:Envelope>

```

```

</row>
<row>
  <CONNECTION_ID>6</CONNECTION_ID>
  <CONNECTION_USER_NAME>NY-SQL-02\Student</CONNECTION_USER_NAME>
  <CONNECTION_HOST_NAME>[::1]:49173</CONNECTION_HOST_NAME>
  <CONNECTION_HOST_APPLICATION>Microsoft SQL Server Management Studio -
Query</CONNECTION_HOST_APPLICATION>
  <CONNECTION_START_TIME>2009-03-16T02:22:20</CONNECTION_START_TIME>
  <CONNECTION_ELAPSED_TIME_MS>6486485</CONNECTION_ELAPSED_TIME_MS>
  <CONNECTION_LAST_COMMAND_START_TIME>2009-03-
16T04:09:44</CONNECTION_LAST_COMMAND_START_TIME>
  <CONNECTION_LAST_COMMAND_END_TIME>2009-03-
16T04:09:44</CONNECTION_LAST_COMMAND_END_TIME>

  <CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>3</CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>
  <CONNECTION_IDLE_TIME_MS>43001</CONNECTION_IDLE_TIME_MS>
  <CONNECTION_BYTES_SENT>26908</CONNECTION_BYTES_SENT>
  <CONNECTION_DATA_BYTES_SENT>56796</CONNECTION_DATA_BYTES_SENT>
  <CONNECTION_BYTES_RECEIVED>29504</CONNECTION_BYTES_RECEIVED>
  <CONNECTION_DATA_BYTES_RECEIVED>29504</CONNECTION_DATA_BYTES_RECEIVED>
</row>
<row>
  <CONNECTION_ID>142</CONNECTION_ID>
  <CONNECTION_USER_NAME>NY-SQL-02\Student</CONNECTION_USER_NAME>
  <CONNECTION_HOST_NAME>[::1]:49319</CONNECTION_HOST_NAME>
  <CONNECTION_HOST_APPLICATION>Microsoft SQL Server Management Studio -
Query</CONNECTION_HOST_APPLICATION>
  <CONNECTION_START_TIME>2009-03-16T04:10:26</CONNECTION_START_TIME>
  <CONNECTION_ELAPSED_TIME_MS>651</CONNECTION_ELAPSED_TIME_MS>
  <CONNECTION_LAST_COMMAND_START_TIME>2009-03-
16T04:10:26</CONNECTION_LAST_COMMAND_START_TIME>
  <CONNECTION_LAST_COMMAND_END_TIME>2009-03-
16T04:10:26</CONNECTION_LAST_COMMAND_END_TIME>

  <CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>23</CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>
  <CONNECTION_IDLE_TIME_MS>605</CONNECTION_IDLE_TIME_MS>
  <CONNECTION_BYTES_SENT>6444</CONNECTION_BYTES_SENT>
  <CONNECTION_DATA_BYTES_SENT>28584</CONNECTION_DATA_BYTES_SENT>
  <CONNECTION_BYTES_RECEIVED>2628</CONNECTION_BYTES_RECEIVED>
  <CONNECTION_DATA_BYTES_RECEIVED>2628</CONNECTION_DATA_BYTES_RECEIVED>
</row>
<row>
  <CONNECTION_ID>141</CONNECTION_ID>
  <CONNECTION_USER_NAME>NY-SQL-02\Student</CONNECTION_USER_NAME>
  <CONNECTION_HOST_NAME>[::1]:49320</CONNECTION_HOST_NAME>
  <CONNECTION_HOST_APPLICATION>Microsoft SQL Server Management Studio -
Query</CONNECTION_HOST_APPLICATION>
  <CONNECTION_START_TIME>2009-03-16T04:10:26</CONNECTION_START_TIME>
  <CONNECTION_ELAPSED_TIME_MS>573</CONNECTION_ELAPSED_TIME_MS>
  <CONNECTION_LAST_COMMAND_START_TIME>2009-03-
16T04:10:26</CONNECTION_LAST_COMMAND_START_TIME>
  <CONNECTION_LAST_COMMAND_END_TIME>2009-03-
16T04:10:26</CONNECTION_LAST_COMMAND_END_TIME>

  <CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>562</CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>
  <CONNECTION_IDLE_TIME_MS>0</CONNECTION_IDLE_TIME_MS>
  <CONNECTION_BYTES_SENT>1980</CONNECTION_BYTES_SENT>
  <CONNECTION_DATA_BYTES_SENT>7949</CONNECTION_DATA_BYTES_SENT>
  <CONNECTION_BYTES_RECEIVED>1640</CONNECTION_BYTES_RECEIVED>
  <CONNECTION_DATA_BYTES_RECEIVED>1640</CONNECTION_DATA_BYTES_RECEIVED>
</row>
<row>
  <CONNECTION_ID>143</CONNECTION_ID>
  <CONNECTION_USER_NAME>NY-SQL-02\Student</CONNECTION_USER_NAME>
  <CONNECTION_HOST_NAME>[::1]:49321</CONNECTION_HOST_NAME>
  <CONNECTION_HOST_APPLICATION />
  <CONNECTION_START_TIME>2009-03-16T04:10:27</CONNECTION_START_TIME>
  <CONNECTION_ELAPSED_TIME_MS>25</CONNECTION_ELAPSED_TIME_MS>
  <CONNECTION_LAST_COMMAND_START_TIME>2009-03-
16T04:10:27</CONNECTION_LAST_COMMAND_START_TIME>

```

```

        <CONNECTION_LAST_COMMAND_END_TIME>2009-03-
16T04:10:27</CONNECTION_LAST_COMMAND_END_TIME>

<CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>2</CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS>
    <CONNECTION_IDLE_TIME_MS>0</CONNECTION_IDLE_TIME_MS>
    <CONNECTION_BYTES_SENT>780</CONNECTION_BYTES_SENT>
    <CONNECTION_DATA_BYTES_SENT>250</CONNECTION_DATA_BYTES_SENT>
    <CONNECTION_BYTES_RECEIVED>1412</CONNECTION_BYTES_RECEIVED>
    <CONNECTION_DATA_BYTES_RECEIVED>1412</CONNECTION_DATA_BYTES_RECEIVED>
  </row>
</root>
</return>
</DiscoverResponse>
</soap:Body>
</soap:Envelope>

```

4.8 Client Obtains a List of Locks from the Server

In this example, the client sends a **DISCOVER_LOCKS** request.

4.8.1 Client Sends Request

The client sends the following request:

```

<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <XA:Session soap:mustUnderstand="1" SessionId="34EDB056-482C-48FE-B4A1-720CB76301B5"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
com:xml-analysis" />
  </Header>
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DISCOVER_LOCKS</RequestType>
      <Restrictions></Restrictions>
      <Properties><PropertyList><Content>Data</Content></PropertyList></Properties>
    </Discover>
  </Body>
</Envelope>

```

4.8.2 Server Response

The server responds with a list of locks:

```

<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
xmlns:ddl2="http://schemas.microsoft.com/analysisisservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysisisservices/2003/engine/2/2"
xmlns:ddl100="http://schemas.microsoft.com/analysisisservices/2008/engine/100"
xmlns:ddl100_100="http://schemas.microsoft.com/analysisisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <row>
            <SPID>1082</SPID>
            <LOCK_ID>BF4953EF-C616-4400-93CC-E025C774651B</LOCK_ID>
            <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
            <LOCK_OBJECT_ID>
              <Object>
                <DatabaseID>Adventure_SSAS</DatabaseID>
                <CubeID>Dim Product Mining ~MC</CubeID>
              </Object>
            </row>
          </root>
        </return>
      </DiscoverResponse>
    </soap:Body>
  </soap:Envelope>

```

```

</LOCK_OBJECT_ID>
<LOCK_STATUS>1</LOCK_STATUS>
<LOCK_TYPE>4</LOCK_TYPE>
<LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
<LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
<SPID>1082</SPID>
<LOCK_ID>0277E1A7-0685-4741-996E-A7AEE9ECF868</LOCK_ID>
<LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
<LOCK_OBJECT_ID>
  <Object>
    <DatabaseID>Adventure_SSAS</DatabaseID>
    <DimensionID>Dim Product</DimensionID>
  </Object>
</LOCK_OBJECT_ID>
<LOCK_STATUS>1</LOCK_STATUS>
<LOCK_TYPE>4</LOCK_TYPE>
<LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
<LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
<SPID>1082</SPID>
<LOCK_ID>0B6E6372-6274-4F9F-9FD1-D8BB73AFE074</LOCK_ID>
<LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
<LOCK_OBJECT_ID>
  <Object>
    <DatabaseID>Adventure_SSAS</DatabaseID>
    <DimensionID>Dim Sales Territory</DimensionID>
  </Object>
</LOCK_OBJECT_ID>
<LOCK_STATUS>1</LOCK_STATUS>
<LOCK_TYPE>4</LOCK_TYPE>
<LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
<LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
<SPID>1082</SPID>
<LOCK_ID>EDC8CFCA-3EEA-4977-9D0E-95F1BFE8465E</LOCK_ID>
<LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
<LOCK_OBJECT_ID>
  <Object>
    <DatabaseID>Adventure_SSAS</DatabaseID>
    <CubeID>Dim Product Mining ~MC</CubeID>
    <MeasureGroupID>~CaseDetail ~MG</MeasureGroupID>
    <PartitionID>~CaseDetail ~MG</PartitionID>
  </Object>
</LOCK_OBJECT_ID>
<LOCK_STATUS>1</LOCK_STATUS>
<LOCK_TYPE>4</LOCK_TYPE>
<LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
<LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
<SPID>1082</SPID>
<LOCK_ID>B852030E-51BE-4DC5-AC0E-A73188AE50F3</LOCK_ID>
<LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
<LOCK_OBJECT_ID>
  <Object>
    <DatabaseID>Adventure_SSAS</DatabaseID>
    <DataSourceID>dsAdventureWorksDW2008</DataSourceID>
  </Object>
</LOCK_OBJECT_ID>
<LOCK_STATUS>1</LOCK_STATUS>
<LOCK_TYPE>2</LOCK_TYPE>
<LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
<LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
<SPID>1082</SPID>

```

```

<LOCK_ID>B0402B00-17B2-4D0B-940D-C56B247ED3CF</LOCK_ID>
<LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
<LOCK_OBJECT_ID>
  <Object>
    <DatabaseID>Adventure_SSAS</DatabaseID>
    <DimensionID>Dim Customer</DimensionID>
  </Object>
</LOCK_OBJECT_ID>
<LOCK_STATUS>1</LOCK_STATUS>
<LOCK_TYPE>4</LOCK_TYPE>
<LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
<LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
  <SPID>1082</SPID>
  <LOCK_ID>B0BA172A-83F2-408F-BC41-A5A476869E85</LOCK_ID>
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
      <CubeID>AdventureWorksDW2008Cube</CubeID>
      <MeasureGroupID>Fact Internet Sales</MeasureGroupID>
      <PartitionID>Fact Internet Sales</PartitionID>
    </Object>
  </LOCK_OBJECT_ID>
  <LOCK_STATUS>1</LOCK_STATUS>
  <LOCK_TYPE>4</LOCK_TYPE>
  <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
  <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
  <SPID>1082</SPID>
  <LOCK_ID>AD3FA52F-8AD3-401E-AE5C-B69AC764C5BD</LOCK_ID>
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
    </Object>
  </LOCK_OBJECT_ID>
  <LOCK_STATUS>1</LOCK_STATUS>
  <LOCK_TYPE>4</LOCK_TYPE>
  <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
  <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
  <SPID>1082</SPID>
  <LOCK_ID>F5479F08-CE88-4FD9-B2AF-6D466939DAAA</LOCK_ID>
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
      <CubeID>Dim Product Mining ~MC</CubeID>
      <MeasureGroupID>~CaseDetail ~MG</MeasureGroupID>
    </Object>
  </LOCK_OBJECT_ID>
  <LOCK_STATUS>1</LOCK_STATUS>
  <LOCK_TYPE>4</LOCK_TYPE>
  <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
  <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
  <SPID>1082</SPID>
  <LOCK_ID>A8E932B1-ED39-41FF-8020-9AFF95768129</LOCK_ID>
  <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
  <LOCK_OBJECT_ID>
    <Object>
      <DatabaseID>Adventure_SSAS</DatabaseID>
      <CubeID>AdventureWorksDW2008Cube</CubeID>
    </Object>
  </LOCK_OBJECT_ID>

```



```

<LOCK_STATUS>1</LOCK_STATUS>
<LOCK_TYPE>4</LOCK_TYPE>
<LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
<LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
<SPID>1082</SPID>
<LOCK_ID>21FE086C-52E8-4090-A310-8943C3B1A554</LOCK_ID>
<LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
<LOCK_OBJECT_ID>
  <Object>
    <DatabaseID>Adventure_SSAS</DatabaseID>
    <CubeID>AdventureWorksDW2008Cube</CubeID>
    <MeasureGroupID>Fact Internet Sales</MeasureGroupID>
    <AggregationDesignID>AggregationDesign</AggregationDesignID>
  </Object>
</LOCK_OBJECT_ID>
<LOCK_STATUS>1</LOCK_STATUS>
<LOCK_TYPE>2</LOCK_TYPE>
<LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
<LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
<SPID>1082</SPID>
<LOCK_ID>FDA4A3D2-93EE-4794-8408-15DFA4616EAD</LOCK_ID>
<LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
<LOCK_OBJECT_ID>
  <Object>
    <DatabaseID>Adventure_SSAS</DatabaseID>
    <MiningStructureID>Dim Product Mining</MiningStructureID>
  </Object>
</LOCK_OBJECT_ID>
<LOCK_STATUS>1</LOCK_STATUS>
<LOCK_TYPE>4</LOCK_TYPE>
<LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
<LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
<SPID>1082</SPID>
<LOCK_ID>85B5F285-1DE1-4278-B5BD-F648624D414F</LOCK_ID>
<LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
<LOCK_OBJECT_ID>
  <Object>
    <DatabaseID>Adventure_SSAS</DatabaseID>
    <CubeID>AdventureWorksDW2008Cube</CubeID>
    <MeasureGroupID>Fact Internet Sales</MeasureGroupID>
  </Object>
</LOCK_OBJECT_ID>
<LOCK_STATUS>1</LOCK_STATUS>
<LOCK_TYPE>4</LOCK_TYPE>
<LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
<LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>
<SPID>1082</SPID>
<LOCK_ID>216C80EC-0DA2-4A97-8664-5B618052D3C5</LOCK_ID>
<LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
<LOCK_OBJECT_ID>
  <Object>
    <DatabaseID>Adventure_SSAS</DatabaseID>
    <MiningModelID>Dim Product</MiningModelID>
    <MiningStructureID>Dim Product Mining</MiningStructureID>
  </Object>
</LOCK_OBJECT_ID>
<LOCK_STATUS>1</LOCK_STATUS>
<LOCK_TYPE>4</LOCK_TYPE>
<LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
<LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
</row>
<row>

```

```

    <SPID>1082</SPID>
    <LOCK_ID>2F87CDAE-51F3-4628-B30E-0E8107FAFF69</LOCK_ID>
    <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
    <LOCK_OBJECT_ID>
      <Object>
        <DatabaseID>Adventure_SSAS</DatabaseID>
        <DataSourceViewID>dsvAdventureWorksDW2008</DataSourceViewID>
      </Object>
    </LOCK_OBJECT_ID>
    <LOCK_STATUS>1</LOCK_STATUS>
    <LOCK_TYPE>2</LOCK_TYPE>
    <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
    <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
  </row>
  <row>
    <SPID>1082</SPID>
    <LOCK_ID>32D7E6AC-4DD1-4A53-B60A-7C9C6D54AA41</LOCK_ID>
    <LOCK_TRANSACTION_ID>D140962E-4660-4C98-BB6D-9F32E1F32A64</LOCK_TRANSACTION_ID>
    <LOCK_OBJECT_ID>
      <Object>
        <DatabaseID>Adventure_SSAS</DatabaseID>
        <DimensionID>Dim Date</DimensionID>
      </Object>
    </LOCK_OBJECT_ID>
    <LOCK_STATUS>1</LOCK_STATUS>
    <LOCK_TYPE>4</LOCK_TYPE>
    <LOCK_CREATION_TIME>2009-04-13T17:39:47</LOCK_CREATION_TIME>
    <LOCK_GRANT_TIME>2009-04-13T17:39:47</LOCK_GRANT_TIME>
  </row>
</root>
</return>
</DiscoverResponse>
</soap:Body>
</soap:Envelope>

```

4.9 Client Obtains a List of Commands from the Server

In this example, the client sends a **DISCOVER_COMMANDS** request.

4.9.1 Client Sends Request

The client sends the following request:

```

<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <XA:Session soap:mustUnderstand="1" SessionId="93B50BA3-307A-40D4-8E2D-E3184EFD19A1"
    xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:XA="urn:schemas-microsoft-
    com:xml-analysis" />
  </Header>
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DISCOVER_COMMANDS</RequestType>
      <Restrictions></Restrictions>
      <Properties>
        <PropertyList>
          <Content>Data</Content>
        </PropertyList>
      </Properties>
    </Discover>
  </Body>
</Envelope>

```

4.9.2 Server Response

The server responds with a list of commands:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
      xmlns:ddl2="http://schemas.microsoft.com/analysisisservices/2003/engine/2"
      xmlns:ddl2_2="http://schemas.microsoft.com/analysisisservices/2003/engine/2/2"
      xmlns:ddl100="http://schemas.microsoft.com/analysisisservices/2008/engine/100"
      xmlns:ddl100_100="http://schemas.microsoft.com/analysisisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
          xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <row>
            <SESSION_SPID>143</SESSION_SPID>
            <SESSION_COMMAND_COUNT>32</SESSION_COMMAND_COUNT>
            <COMMAND_START_TIME>2009-03-16T04:21:05</COMMAND_START_TIME>
            <COMMAND_ELAPSED_TIME_MS>0</COMMAND_ELAPSED_TIME_MS>
            <COMMAND_CPU_TIME_MS>10</COMMAND_CPU_TIME_MS>
            <COMMAND_READS>0</COMMAND_READS>
            <COMMAND_READ_KB>0</COMMAND_READ_KB>
            <COMMAND_WRITES>0</COMMAND_WRITES>
            <COMMAND_WRITE_KB>0</COMMAND_WRITE_KB>
            <COMMAND_TEXT>DISCOVER_PROPERTIES</COMMAND_TEXT>
            <COMMAND_END_TIME>2009-03-16T04:21:05</COMMAND_END_TIME>
          </row>
          <row>
            <SESSION_SPID>148</SESSION_SPID>
            <SESSION_COMMAND_COUNT>86</SESSION_COMMAND_COUNT>
            <COMMAND_START_TIME>2009-03-16T04:31:02</COMMAND_START_TIME>
            <COMMAND_ELAPSED_TIME_MS>0</COMMAND_ELAPSED_TIME_MS>
            <COMMAND_CPU_TIME_MS>0</COMMAND_CPU_TIME_MS>
            <COMMAND_READS>0</COMMAND_READS>
            <COMMAND_READ_KB>0</COMMAND_READ_KB>
            <COMMAND_WRITES>0</COMMAND_WRITES>
            <COMMAND_WRITE_KB>0</COMMAND_WRITE_KB>
            <COMMAND_TEXT>DISCOVER_PROPERTIES</COMMAND_TEXT>
            <COMMAND_END_TIME>2009-03-16T04:31:02</COMMAND_END_TIME>
          </row>
          <row>
            <SESSION_SPID>153</SESSION_SPID>
            <SESSION_COMMAND_COUNT>64</SESSION_COMMAND_COUNT>
            <COMMAND_START_TIME>2009-03-16T04:30:21</COMMAND_START_TIME>
            <COMMAND_ELAPSED_TIME_MS>0</COMMAND_ELAPSED_TIME_MS>
            <COMMAND_CPU_TIME_MS>10</COMMAND_CPU_TIME_MS>
            <COMMAND_READS>0</COMMAND_READS>
            <COMMAND_READ_KB>0</COMMAND_READ_KB>
            <COMMAND_WRITES>0</COMMAND_WRITES>
            <COMMAND_WRITE_KB>0</COMMAND_WRITE_KB>
            <COMMAND_TEXT>DISCOVER_PROPERTIES</COMMAND_TEXT>
            <COMMAND_END_TIME>2009-03-16T04:30:21</COMMAND_END_TIME>
          </row>
          <row>
            <SESSION_SPID>2089</SESSION_SPID>
            <SESSION_COMMAND_COUNT>2</SESSION_COMMAND_COUNT>
            <COMMAND_START_TIME>2009-03-16T04:31:02</COMMAND_START_TIME>
            <COMMAND_ELAPSED_TIME_MS>33</COMMAND_ELAPSED_TIME_MS>
            <COMMAND_CPU_TIME_MS>0</COMMAND_CPU_TIME_MS>
            <COMMAND_READS>0</COMMAND_READS>
            <COMMAND_READ_KB>0</COMMAND_READ_KB>
            <COMMAND_WRITES>0</COMMAND_WRITES>
            <COMMAND_WRITE_KB>0</COMMAND_WRITE_KB>
            <COMMAND_TEXT>DISCOVER_COMMANDS</COMMAND_TEXT>
          </row>
          <row>
            <SESSION_SPID>2099</SESSION_SPID>
            <SESSION_COMMAND_COUNT>3</SESSION_COMMAND_COUNT>
          </row>
        </root>
      </return>
    </DiscoverResponse>
  </soap:Body>
</soap:Envelope>
```

```

        <COMMAND_START_TIME>2009-03-16T04:31:02</COMMAND_START_TIME>
        <COMMAND_ELAPSED_TIME_MS>0</COMMAND_ELAPSED_TIME_MS>
        <COMMAND_CPU_TIME_MS>10</COMMAND_CPU_TIME_MS>
        <COMMAND_READS>0</COMMAND_READS>
        <COMMAND_READ_KB>0</COMMAND_READ_KB>
        <COMMAND_WRITES>0</COMMAND_WRITES>
        <COMMAND_WRITE_KB>0</COMMAND_WRITE_KB>
        <COMMAND_TEXT>&lt;Subscribe
xmlns="http://schemas.microsoft.com/analysisservices/2003/engine"/&gt;</COMMAND_TEXT>
        <COMMAND_END_TIME>2009-03-16T04:31:02</COMMAND_END_TIME>
    </row>
</root>
</return>
</DiscoverResponse>
</soap:Body>
</soap:Envelope>

```

4.10 Client Obtains Trace Provider Information

In this example, the client sends a **DISCOVER_TRACE_DEFINITION_PROVIDERINFO** request. The results of this request represent the actual Trace Provider information sent from Microsoft SQL Server Analysis Services.

4.10.1 Client Sends Request

The client sends the following request:

```

<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DISCOVER_TRACE_DEFINITION_PROVIDERINFO</RequestType>
      <Restrictions>
        <RestrictionList></RestrictionList>
      </Restrictions>
      <Properties>
        <PropertyList>
          <Catalog>Adventure Works DW 2008</Catalog>
        </PropertyList>
      </Properties>
    </Discover>
  </Body>
</Envelope>

```

4.10.2 Server Response

The server responds with a list of trace providers:

```

<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2"
xmlns:ddl100="http://schemas.microsoft.com/analysisservices/2008/engine/100"
xmlns:ddl100_100="http://schemas.microsoft.com/analysisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">

```

```

<xsd:schema targetNamespace="urn:schemas-microsoft-com:xml-analysis:rowset"
  xmlns:sql="urn:schemas-microsoft-com:xml-sql"
  elementFormDefault="qualified">
  <xsd:element name="root">
    <xsd:complexType>
      <xsd:sequence minOccurs="0" maxOccurs="unbounded">
        <xsd:element name="row" type="row" />
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>
  <xsd:simpleType name="uuid">
    <xsd:restriction base="xsd:string">
      <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-
        [0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
    </xsd:restriction>
  </xsd:simpleType>
  <xsd:complexType name="xmlDocument">
    <xsd:sequence>
      <xsd:any />
    </xsd:sequence>
  </xsd:complexType>
  <xsd:complexType name="row">
    <xsd:sequence>
      <xsd:element sql:field="Data" name="Data"
        type="xsd:string" minOccurs="0" />
    </xsd:sequence>
  </xsd:complexType>
</xsd:schema>
<row>
  <Data>
    &lt;TRACEPROVIDER&gt;
    &lt;NAME&gt;Microsoft Analysis Services&lt;/NAME&gt;
    &lt;VERSION&gt;
    &lt;MAJOR&gt;10&lt;/MAJOR&gt;
    &lt;MINOR&gt;0&lt;/MINOR&gt;
    &lt;BUILDNUMBER&gt;1600&lt;/BUILDNUMBER&gt;
    &lt;/VERSION&gt;
    &lt;TYPE&gt;RTM&lt;/TYPE&gt;
    &lt;DESCRIPTION&gt;Normal trace definition&lt;/DESCRIPTION&gt;
    &lt;/TRACEPROVIDER&gt;
  </Data>
</row>
</root>
</return>
</DiscoverResponse>
</soap:Body>
</soap:Envelope>

```

4.11 Client Obtains List of Trace Column Definitions

In this example, the client sends a **DISCOVER_TRACE_COLUMNS** request. The results of this request represent the actual Trace Columns supported by Analysis Services.

4.11.1 Client Sends Request

The client sends the following request:

```

<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DISCOVER_TRACE_COLUMNS</RequestType>
      <Restrictions>
        <RestrictionList></RestrictionList>
      </Restrictions>
      <Properties>

```

```

    <PropertyList>
      <Catalog>Adventure Works DW 2008</Catalog>
    </PropertyList>
  </Properties>
</Discover>
</Body>
</Envelope>

```

4.11.2 Server Response

The server responds with a list of trace column definitions:

```

<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"

xmlns:ddl2="http://schemas.microsoft.com/analysisisservices/2003/engine/2"

xmlns:ddl2_2="http://schemas.microsoft.com/analysisisservices/2003/engine/2/2"

xmlns:ddl100="http://schemas.microsoft.com/analysisisservices/2008/engine/100"

xmlns:ddl100_100="http://schemas.microsoft.com/analysisisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
          xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <xsd:schema targetNamespace="urn:schemas-microsoft-com:xml-analysis:rowset"
            xmlns:sql="urn:schemas-microsoft-com:xml-sql"
            elementFormDefault="qualified">
            <xsd:element name="root">
              <xsd:complexType>
                <xsd:sequence minOccurs="0" maxOccurs="unbounded">
                  <xsd:element name="row" type="row" />
                </xsd:sequence>
              </xsd:complexType>
            </xsd:element>
            <xsd:simpleType name="uuid">
              <xsd:restriction base="xsd:string">
                <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-
                  [0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
              </xsd:restriction>
            </xsd:simpleType>
            <xsd:complexType name="xmlDocument">
              <xsd:sequence>
                <xsd:any />
              </xsd:sequence>
            </xsd:complexType>
            <xsd:complexType name="row">
              <xsd:sequence>
                <xsd:element sql:field="Data" name="Data"
                  type="xsd:string" minOccurs="0" />
              </xsd:sequence>
            </xsd:complexType>
          </xsd:schema>
          <row>
            <Data>
              &lt;COLUMN&gt;
              &lt;ID&gt;0&lt;/ID&gt;
              &lt;TYPE&gt;1&lt;/TYPE&gt;
              &lt;NAME&gt;EventClass&lt;/NAME&gt;
              &lt;DESCRIPTION&gt;Event Class is used to categorize events.
              &lt;/DESCRIPTION&gt;
              &lt;FILTERABLE&gt;false&lt;/FILTERABLE&gt;
              &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
              &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
              &lt;/COLUMN&gt;
            </Data>
          </row>
        </return>
      </DiscoverResponse>
    </soap:Body>
  </soap:Envelope>

```

```

    </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;1&lt;/ID&gt;
    &lt;TYPE&gt;1&lt;/TYPE&gt;
    &lt;NAME&gt;EventSubclass&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Event Subclass provides additional
    information about each event class.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;2&lt;/ID&gt;
    &lt;TYPE&gt;5&lt;/TYPE&gt;
    &lt;NAME&gt;CurrentTime&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Time at which the event started, when available.
    For filtering, expected formats are 'YYYY-MM-DD' and 'YYYY-MM-DD HH:MM:SS'.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;3&lt;/ID&gt;
    &lt;TYPE&gt;5&lt;/TYPE&gt;
    &lt;NAME&gt;StartTime&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Time at which the event started, when available.
    For filtering, expected formats are 'YYYY-MM-DD' and 'YYYY-MM-DD HH:MM:SS'.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;4&lt;/ID&gt;
    &lt;TYPE&gt;5&lt;/TYPE&gt;
    &lt;NAME&gt;EndTime&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Time at which the event ended.
    This column is not populated for starting event classes, such as
    SQL:BatchStarting or SP:Starting. For filtering, expected formats are
    'YYYY-MM-DD' and 'YYYY-MM-DD HH:MM:SS'.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;5&lt;/ID&gt;
    &lt;TYPE&gt;2&lt;/TYPE&gt;
    &lt;NAME&gt;Duration&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Amount of time (in milliseconds) taken by the event.
    &lt;/DESCRIPTION&gt;
  </Data>
</row>

```

```

        &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
        &lt;REPEATABLE&gt>false&lt;/REPEATABLE&gt;
        &lt;REPEATEDBASE&gt>false&lt;/REPEATEDBASE&gt;
        &lt;/COLUMN&gt;
    </Data>
</row>
<row>
    <Data>
        &lt;COLUMN&gt;
        &lt;ID&gt;6&lt;/ID&gt;
        &lt;TYPE&gt;2&lt;/TYPE&gt;
        &lt;NAME&gt;CPUtime&lt;/NAME&gt;
        &lt;DESCRIPTION&gt;Amount of CPU time (in milliseconds) used by the event.
        &lt;/DESCRIPTION&gt;
        &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
        &lt;REPEATABLE&gt>false&lt;/REPEATABLE&gt;
        &lt;REPEATEDBASE&gt>false&lt;/REPEATEDBASE&gt;
        &lt;/COLUMN&gt;
    </Data>
</row>
<row>
    <Data>
        &lt;COLUMN&gt;
        &lt;ID&gt;7&lt;/ID&gt;
        &lt;TYPE&gt;1&lt;/TYPE&gt;
        &lt;NAME&gt;JobID&lt;/NAME&gt;
        &lt;DESCRIPTION&gt;Job ID for progress.&lt;/DESCRIPTION&gt;
        &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
        &lt;REPEATABLE&gt>false&lt;/REPEATABLE&gt;
        &lt;REPEATEDBASE&gt>false&lt;/REPEATEDBASE&gt;
        &lt;/COLUMN&gt;
    </Data>
</row>
<row>
    <Data>
        &lt;COLUMN&gt;
        &lt;ID&gt;8&lt;/ID&gt;
        &lt;TYPE&gt;8&lt;/TYPE&gt;
        &lt;NAME&gt;SessionType&lt;/NAME&gt;
        &lt;DESCRIPTION&gt;Session type (what entity caused the operation).
        &lt;/DESCRIPTION&gt;
        &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
        &lt;REPEATABLE&gt>false&lt;/REPEATABLE&gt;
        &lt;REPEATEDBASE&gt>false&lt;/REPEATEDBASE&gt;
        &lt;/COLUMN&gt;
    </Data>
</row>
<row>
    <Data>
        &lt;COLUMN&gt;
        &lt;ID&gt;9&lt;/ID&gt;
        &lt;TYPE&gt;1&lt;/TYPE&gt;
        &lt;NAME&gt;ProgressTotal&lt;/NAME&gt;
        &lt;DESCRIPTION&gt;Progress total.&lt;/DESCRIPTION&gt;
        &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
        &lt;REPEATABLE&gt>false&lt;/REPEATABLE&gt;
        &lt;REPEATEDBASE&gt>false&lt;/REPEATEDBASE&gt;
        &lt;/COLUMN&gt;
    </Data>
</row>
<row>
    <Data>
        &lt;COLUMN&gt;
        &lt;ID&gt;10&lt;/ID&gt;
        &lt;TYPE&gt;1&lt;/TYPE&gt;
        &lt;NAME&gt;IntegerData&lt;/NAME&gt;
        &lt;DESCRIPTION&gt;Integer data.&lt;/DESCRIPTION&gt;
        &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
        &lt;REPEATABLE&gt>false&lt;/REPEATABLE&gt;
        &lt;REPEATEDBASE&gt>false&lt;/REPEATEDBASE&gt;

```



```

        <lt;/COLUMN>
    </Data>
</row>
<row>
    <Data>
        <lt; COLUMN>
        <lt; ID>11</ID>
        <lt; TYPE>8</TYPE>
        <lt; NAME>ObjectID</NAME>
        <lt; DESCRIPTION>Object ID (note this is a string).</DESCRIPTION>
        <lt; FILTERABLE>true</FILTERABLE>
        <lt; REPEATABLE>false</REPEATABLE>
        <lt; REPEATEDBASE>false</REPEATEDBASE>
        <lt;/COLUMN>
    </Data>
</row>
<row>
    <Data>
        <lt; COLUMN>
        <lt; ID>12</ID>
        <lt; TYPE>1</TYPE>
        <lt; NAME>ObjectType</NAME>
        <lt; DESCRIPTION>Object type.</DESCRIPTION>
        <lt; FILTERABLE>true</FILTERABLE>
        <lt; REPEATABLE>false</REPEATABLE>
        <lt; REPEATEDBASE>false</REPEATEDBASE>
        <lt;/COLUMN>
    </Data>
</row>
<row>
    <Data>
        <lt; COLUMN>
        <lt; ID>13</ID>
        <lt; TYPE>8</TYPE>
        <lt; NAME>ObjectName</NAME>
        <lt; DESCRIPTION>Object name.</DESCRIPTION>
        <lt; FILTERABLE>true</FILTERABLE>
        <lt; REPEATABLE>false</REPEATABLE>
        <lt; REPEATEDBASE>false</REPEATEDBASE>
        <lt;/COLUMN>
    </Data>
</row>
<row>
    <Data>
        <lt; COLUMN>
        <lt; ID>14</ID>
        <lt; TYPE>8</TYPE>
        <lt; NAME>ObjectPath</NAME>
        <lt; DESCRIPTION>Object path. A comma-separated list of parents,
        starting with the object's parent.</DESCRIPTION>
        <lt; FILTERABLE>true</FILTERABLE>
        <lt; REPEATABLE>false</REPEATABLE>
        <lt; REPEATEDBASE>false</REPEATEDBASE>
        <lt;/COLUMN>
    </Data>
</row>
<row>
    <Data>
        <lt; COLUMN>
        <lt; ID>15</ID>
        <lt; TYPE>8</TYPE>
        <lt; NAME>ObjectReference</NAME>
        <lt; DESCRIPTION>Object reference. Encoded as XML for all parents,
        using tags to describe the object.</DESCRIPTION>
        <lt; FILTERABLE>true</FILTERABLE>
        <lt; REPEATABLE>false</REPEATABLE>
        <lt; REPEATEDBASE>false</REPEATEDBASE>
        <lt;/COLUMN>
    </Data>
</row>

```

```

<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;22&lt;/ID&gt;
    &lt;TYPE&gt;1&lt;/TYPE&gt;
    &lt;NAME&gt;Severity&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Severity level of an exception.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
<row>
  <Data>
    &lt;COLUMN&gt;
    &lt;ID&gt;23&lt;/ID&gt;
    &lt;TYPE&gt;1&lt;/TYPE&gt;
    &lt;NAME&gt;Success&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;1 = success. 0 = failure (for example,
check) .
    a 1 means success of a permissions check and a 0 means a failure of that
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
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    &lt;DESCRIPTION&gt;Error number of a given event.&lt;/DESCRIPTION&gt;
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    &lt;NAME&gt;ConnectionID&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Unique connection ID.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
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    &lt;NAME&gt;DatabaseName&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Name of the database in which the
statement of the user is running.&lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;false&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
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  &lt;DESCRIPTION&gt;Windows user name.&lt;/DESCRIPTION&gt;
  &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
  &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
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    &lt;TYPE&gt;8&lt;/TYPE&gt;
    &lt;NAME&gt;NTDomainName&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Windows domain to which the user belongs.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
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    &lt;TYPE&gt;8&lt;/TYPE&gt;
    &lt;NAME&gt;ClientHostName&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Name of the computer on which the client is running.
    This data column is populated if the host name is provided by the client.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
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    &lt;TYPE&gt;1&lt;/TYPE&gt;
    &lt;NAME&gt;ClientProcessID&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;The process ID of the client application.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
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    &lt;ID&gt;37&lt;/ID&gt;
    &lt;TYPE&gt;8&lt;/TYPE&gt;
    &lt;NAME&gt;ApplicationName&lt;/NAME&gt;
    &lt;DESCRIPTION&gt;Name of the client application that created the
    connection to the server. This column is populated with the values
    passed by the application rather than the displayed name of the program.
    &lt;/DESCRIPTION&gt;
    &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
    &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
    &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
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      &lt;NAME&gt;SessionID&lt;/NAME&gt;
      &lt;DESCRIPTION&gt;Session GUID.&lt;/DESCRIPTION&gt;
      &lt;FILTERABLE&gt;false&lt;/FILTERABLE&gt;
      &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
      &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
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      &lt;ID&gt;40&lt;/ID&gt;
      &lt;TYPE&gt;8&lt;/TYPE&gt;
      &lt;NAME&gt;NTCanonicalUserName&lt;/NAME&gt;
      &lt;DESCRIPTION&gt;User name in canonical form. For example,
engineering.microsoft.com/software/someone.&lt;/DESCRIPTION&gt;
      &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
      &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
      &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
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      &lt;ID&gt;41&lt;/ID&gt;
      &lt;TYPE&gt;1&lt;/TYPE&gt;
      &lt;NAME&gt;SPID&lt;/NAME&gt;
      &lt;DESCRIPTION&gt;Server process ID. This uniquely identifies a
user session. This directly corresponds to the session GUID used by XML/A.
      &lt;/DESCRIPTION&gt;
      &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
      &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
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      &lt;NAME&gt;TextData&lt;/NAME&gt;
      &lt;DESCRIPTION&gt;Text data associated with the event.
      &lt;/DESCRIPTION&gt;
      &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
      &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
      &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
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      &lt;TYPE&gt;8&lt;/TYPE&gt;
      &lt;NAME&gt;ServerName&lt;/NAME&gt;
      &lt;DESCRIPTION&gt;Name of the server producing the event.
      &lt;/DESCRIPTION&gt;
      &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
      &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
      &lt;REPEATEDBASE&gt;false&lt;/REPEATEDBASE&gt;
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      &lt;NAME&gt;RequestParameters&lt;/NAME&gt;
      &lt;DESCRIPTION&gt;Parameters for parameterized queries and commands.
      &lt;/DESCRIPTION&gt;
      &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
      &lt;REPEATABLE&gt;true&lt;/REPEATABLE&gt;
      &lt;REPEATEDBASE&gt>false&lt;/REPEATEDBASE&gt;
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      &lt;TYPE&gt;9&lt;/TYPE&gt;
      &lt;NAME&gt;RequestProperties&lt;/NAME&gt;
      &lt;DESCRIPTION&gt;XMLA request properties.&lt;/DESCRIPTION&gt;
      &lt;FILTERABLE&gt;true&lt;/FILTERABLE&gt;
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      &lt;REPEATEDBASE&gt>false&lt;/REPEATEDBASE&gt;
    &lt;/COLUMN&gt;
  </Data>
</row>
</root>
</return>
</DiscoverResponse>
</soap:Body>
</soap:Envelope>

```

4.12 Client Obtains List of Trace Event Categories

In this example, the client sends a **DISCOVER_TRACE_EVENT_CATEGORIES** request. The results of this request represent the actual Trace Event Categories supported by Analysis Services.

4.12.1 Client Sends Request

The client sends the following request:

```

<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Body>
    <Discover xmlns="urn:schemas-microsoft-com:xml-analysis">
      <RequestType>DISCOVER_TRACE_EVENT_CATEGORIES</RequestType>
      <Restrictions>
        <RestrictionList></RestrictionList>
      </Restrictions>
      <Properties>
        <PropertyList>
          <Catalog>Adventure Works DW 2008</Catalog>
        </PropertyList>
      </Properties>
    </Discover>
  </Body>
</Envelope>

```

4.12.2 Server Response

The server responds with a list of trace event categories:

```

<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <DiscoverResponse xmlns="urn:schemas-microsoft-com:xml-analysis"
xmlns:ddl2="http://schemas.microsoft.com/analysisisservices/2003/engine/2"
xmlns:ddl2_2="http://schemas.microsoft.com/analysisisservices/2003/engine/2/2"
xmlns:ddl100="http://schemas.microsoft.com/analysisisservices/2008/engine/100"
xmlns:ddl100_100="http://schemas.microsoft.com/analysisisservices/2008/engine/100/100">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:rowset"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <xsd:schema targetNamespace="urn:schemas-microsoft-com:xml-analysis:rowset"
xmlns:sql="urn:schemas-microsoft-com:xml-sql"
elementFormDefault="qualified">
            <xsd:element name="root">
              <xsd:complexType>
                <xsd:sequence minOccurs="0" maxOccurs="unbounded">
                  <xsd:element name="row" type="row" />
                </xsd:sequence>
              </xsd:complexType>
            </xsd:element>
            <xsd:simpleType name="uuid">
              <xsd:restriction base="xsd:string">
                <xsd:pattern value="[0-9a-zA-Z]{8}-[0-9a-zA-Z]{4}-
-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{4}-[0-9a-zA-Z]{12}" />
              </xsd:restriction>
            </xsd:simpleType>
            <xsd:complexType name="xmlDocument">
              <xsd:sequence>
                <xsd:any />
              </xsd:sequence>
            </xsd:complexType>
            <xsd:complexType name="row">
              <xsd:sequence>
                <xsd:element sql:field="Data" name="Data" type="xsd:string"
minOccurs="0" />
              </xsd:sequence>
            </xsd:complexType>
          </xsd:schema>
          <row>
            <Data>
              &lt;EVENTCATEGORY&gt;
              &lt;NAME&gt;Security Audit&lt;/NAME&gt;
              &lt;TYPE&gt;0&lt;/TYPE&gt;
              &lt;DESCRIPTION&gt;Collection of database audit event classes.
              &lt;/DESCRIPTION&gt;
              &lt;EVENTLIST&gt;
              &lt;EVENT&gt;
              &lt;ID&gt;1&lt;/ID&gt;
              &lt;NAME&gt;Audit Login&lt;/NAME&gt;
              &lt;DESCRIPTION&gt;Collects all new connection events since
              the trace was started, such as when a client requests a connection
              to a server running an instance of SQL Server.&lt;/DESCRIPTION&gt;
              &lt;EVENTCOLUMNLIST&gt;
              &lt;EVENTCOLUMN&gt;
              &lt;ID&gt;0&lt;/ID&gt;
              &lt;/EVENTCOLUMN&gt;
              &lt;EVENTCOLUMN&gt;
              &lt;ID&gt;2&lt;/ID&gt;
              &lt;/EVENTCOLUMN&gt;
              &lt;EVENTCOLUMN&gt;
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              &lt;/EVENTCOLUMN&gt;
              &lt;EVENTCOLUMN&gt;
              &lt;ID&gt;22&lt;/ID&gt;
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          </row>
        </root>
      </return>
    </DiscoverResponse>
  </soap:Body>
</soap:Envelope>

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&lt;/EVENT&gt;
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&lt;NAME&gt;Audit Logout&lt;/NAME&gt;
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since the trace was started, such as when a client issues a
disconnect command.&lt;/DESCRIPTION&gt;
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&lt;/EVENT&gt;
&lt;EVENT&gt;
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&lt;NAME&gt;Audit Server Starts And Stops&lt;/NAME&gt;
&lt;DESCRIPTION&gt;Records service shut down, start, and
pause activities.&lt;/DESCRIPTION&gt;
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    &lt;EVENTCOLUMN&gt;
    &lt;ID&gt;41&lt;/ID&gt;
    &lt;/EVENTCOLUMN&gt;
    &lt;EVENTCOLUMN&gt;
    &lt;ID&gt;42&lt;/ID&gt;
    &lt;/EVENTCOLUMN&gt;
    &lt;EVENTCOLUMN&gt;
    &lt;ID&gt;43&lt;/ID&gt;
    &lt;/EVENTCOLUMN&gt;
    &lt;/EVENTCOLUMNLIST&gt;
    &lt;/EVENT&gt;
    &lt;/EVENTLIST&gt;
    &lt;/EVENTCATEGORY&gt;
  </Data>
</row>
</root>
</return>
</DiscoverResponse>
</soap:Body>

```



```
</soap:Envelope>
```

4.13 Client Sends MDX Query and Receives mddataset Result

In this example, the client sends an **Execute** command, with an MDX query in the **Statement** element.

4.13.1 Client Sends Request

The client sends the following request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Body>
    <Execute xmlns="urn:schemas-microsoft-com:xml-analysis">
      <Command>
        <Statement>select Measures.members on 0 from [Adventure Works]
        </Statement>
      </Command>
      <Properties>
        <PropertyList>
          <Catalog>Adventure Works DW 2008</Catalog>
        </PropertyList>
      </Properties>
    </Execute>
  </Body>
</Envelope>
```

4.13.2 Server Response

The server responds with an **mddataset** result.

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <ExecuteResponse xmlns="urn:schemas-microsoft-com:xml-analysis">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:mddataset"
          xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xmlns:xsd="http://www.w3.org/2001/XMLSchema">
          <xs:schema targetNamespace=
            "urn:schemas-microsoft-com:xml-analysis:mddataset"
            elementFormDefault="qualified"
            xmlns="urn:schemas-microsoft-com:xml-analysis:mddataset"
            xmlns:xs="http://www.w3.org/2001/XMLSchema">
            <xs:complexType name="MemberType">
              <xs:sequence>
                <xs:any namespace="##targetNamespace" minOccurs="0"
                  maxOccurs="unbounded" processContents="skip" />
              </xs:sequence>
              <xs:attribute name="Hierarchy" type="xs:string" />
            </xs:complexType>
            <xs:complexType name="PropType">
              <xs:sequence>
                <xs:element name="Default" minOccurs="0" />
              </xs:sequence>
              <xs:attribute name="name" type="xs:string" use="required" />
              <xs:attribute name="type" type="xs:QName" />
            </xs:complexType>
            <xs:complexType name="TupleType">
              <xs:sequence>
                <xs:element name="Member" type="MemberType"
                  maxOccurs="unbounded" />
              </xs:sequence>
            </xs:complexType>
          </root>
        </return>
      </ExecuteResponse>
    </soap:Body>
  </soap:Envelope>
```

```

</xs:complexType>
<xs:complexType name="MembersType">
  <xs:sequence>
    <xs:element name="Member" type="MemberType" minOccurs="0"
      maxOccurs="unbounded" />
  </xs:sequence>
  <xs:attribute name="Hierarchy" type="xs:string" use="required" />
</xs:complexType>
<xs:complexType name="TuplesType">
  <xs:sequence>
    <xs:element name="Tuple" type="TupleType" minOccurs="0"
      maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>
<xs:group name="SetType">
  <xs:choice>
    <xs:element name="Members" type="MembersType" />
    <xs:element name="Tuples" type="TuplesType" />
    <xs:element name="CrossProduct" type="SetListType" />
  <xs:element ref="msxmla:NormTupleSet" />
  <xs:element name="Union">
    <xs:complexType>
      <xs:group ref="SetType" minOccurs="0" maxOccurs="unbounded" />
    </xs:complexType>
  </xs:element>
</xs:choice>
</xs:group>
<xs:complexType name="SetListType">
  <xs:group ref="SetType" minOccurs="0" maxOccurs="unbounded" />
  <xs:attribute name="Size" type="xs:unsignedInt" />
</xs:complexType>
<xs:complexType name="OlapInfo">
  <xs:sequence>
    <xs:element name="CubeInfo">
      <xs:complexType>
        <xs:sequence>
          <xs:element name="Cube" maxOccurs="unbounded">
            <xs:complexType>
              <xs:sequence>
                <xs:element name="CubeName" type="xs:string" />
                <xs:element name="LastDataUpdate" minOccurs="0"
                  type="xs:dateTime" />
                <xs:element name="LastSchemaUpdate" minOccurs="0"
                  type="xs:dateTime" />
              </xs:sequence>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="AxesInfo">
      <xs:complexType>
        <xs:sequence>
          <xs:element name="AxisInfo" maxOccurs="unbounded">
            <xs:complexType>
              <xs:sequence>
                <xs:element name="HierarchyInfo" minOccurs="0"
                  maxOccurs="unbounded">
                  <xs:complexType>
                    <xs:sequence>
                      <xs:any namespace="##targetNamespace"
                        minOccurs="0" maxOccurs="unbounded"
                        processContents="skip" />
                    </xs:sequence>
                    <xs:attribute name="name" type="xs:string"
                      use="required" />
                  </xs:complexType>
                </xs:element>
              </xs:sequence>
            </xs:complexType>
          </xs:element>
          <xs:attribute name="name" type="xs:string" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>

```

```

        </xs:complexType>
    </xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="CellInfo">
    <xs:complexType>
        <xs:choice minOccurs="0" maxOccurs="unbounded">
            <xs:any namespace="##targetNamespace" minOccurs="0"
                maxOccurs="unbounded" processContents="skip" />
        </xs:choice>
    </xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>
<xs:complexType name="Axes">
    <xs:sequence>
        <xs:element name="Axis" maxOccurs="unbounded">
            <xs:complexType>
                <xs:group ref="SetType" minOccurs="0" maxOccurs="unbounded" />
                <xs:attribute name="name" type="xs:string" />
            </xs:complexType>
        </xs:element>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CellData">
    <xs:sequence>
        <xs:element name="Cell" minOccurs="0" maxOccurs="unbounded">
            <xs:complexType>
                <xs:sequence>
                    <xs:any namespace="##targetNamespace" minOccurs="0"
                        maxOccurs="unbounded" processContents="skip" />
                </xs:sequence>
                <xs:attribute name="CellOrdinal" type="xs:unsignedInt"
                    use="required" />
            </xs:complexType>
        </xs:element>
    </xs:sequence>
</xs:complexType>
<xs:element name="root">
    <xs:complexType>
        <xs:sequence>
            <xs:any namespace="http://www.w3.org/2001/XMLSchema"
                processContents="strict" minOccurs="0" />
            <xs:element name="OlapInfo" type="OlapInfo" minOccurs="0" />
            <xs:element name="Axes" type="Axes" minOccurs="0" />
            <xs:element name="CellData" type="CellData" minOccurs="0" />
        </xs:sequence>
    </xs:complexType>
</xs:element>
</xs:schema>
<OlapInfo>
    <CubeInfo>
        <Cube>
            <CubeName>Adventure Works</CubeName>
            <LastDataUpdate xmlns=
                "http://schemas.microsoft.com/analysisisservices/2003/engine">
                2009-05-30T19:26:25
            </LastDataUpdate>
            <LastSchemaUpdate xmlns=
                "http://schemas.microsoft.com/analysisisservices/2003/engine">
                2009-04-07T19:40:30
            </LastSchemaUpdate>
        </Cube>
    </CubeInfo>
    <AxesInfo>
        <AxisInfo name="Axis0">
            <HierarchyInfo name="[Measures]">
                <UName name="[Measures].[MEMBER_UNIQUE_NAME]"
                    type="xsd:string" />
            </HierarchyInfo>
        </AxisInfo>
    </AxesInfo>

```

```

    <Caption name="[Measures].[MEMBER_CAPTION]"
      type="xsd:string" />
    <LName name="[Measures].[LEVEL_UNIQUE_NAME]"
      type="xsd:string" />
    <LNum name="[Measures].[LEVEL_NUMBER]"
      type="xsd:int" />
    <DisplayInfo name="[Measures].[DISPLAY_INFO]"
      type="xsd:unsignedInt" />
  </HierarchyInfo>
</AxisInfo>
<AxisInfo name="SlicerAxis">
  <HierarchyInfo name="[Date].[Fiscal]">
    <UName name="[Date].[Fiscal].[MEMBER_UNIQUE_NAME]"
      type="xsd:string" />
    <Caption name="[Date].[Fiscal].[MEMBER_CAPTION]"
      type="xsd:string" />
    <LName name="[Date].[Fiscal].[LEVEL_UNIQUE_NAME]"
      type="xsd:string" />
    <LNum name="[Date].[Fiscal].[LEVEL_NUMBER]"
      type="xsd:int" />
    <DisplayInfo name="[Date].[Fiscal].[DISPLAY_INFO]"
      type="xsd:unsignedInt" />
  </HierarchyInfo>
  <HierarchyInfo name="[Date].[Calendar]">
    <UName name="[Date].[Calendar].[MEMBER_UNIQUE_NAME]"
      type="xsd:string" />
    <Caption name="[Date].[Calendar].[MEMBER_CAPTION]"
      type="xsd:string" />
    <LName name="[Date].[Calendar].[LEVEL_UNIQUE_NAME]"
      type="xsd:string" />
    <LNum name="[Date].[Calendar].[LEVEL_NUMBER]"
      type="xsd:int" />
    <DisplayInfo name="[Date].[Calendar].[DISPLAY_INFO]"
      type="xsd:unsignedInt" />
  </HierarchyInfo>
  <HierarchyInfo name="[Date].[Calendar Weeks]">
    <UName name="[Date].[Calendar Weeks].[MEMBER_UNIQUE_NAME]"
      type="xsd:string" />
    <Caption name="[Date].[Calendar Weeks].[MEMBER_CAPTION]"
      type="xsd:string" />
    <LName name="[Date].[Calendar Weeks].[LEVEL_UNIQUE_NAME]"
      type="xsd:string" />
    <LNum name="[Date].[Calendar Weeks].[LEVEL_NUMBER]"
      type="xsd:int" />
    <DisplayInfo name="[Date].[Calendar Weeks].[DISPLAY_INFO]"
      type="xsd:unsignedInt" />
  </HierarchyInfo>
  <HierarchyInfo name="[Date].[Fiscal Weeks]">
    <UName name="[Date].[Fiscal Weeks].[MEMBER_UNIQUE_NAME]"
      type="xsd:string" />
    <Caption name="[Date].[Fiscal Weeks].[MEMBER_CAPTION]"
      type="xsd:string" />
    <LName name="[Date].[Fiscal Weeks].[LEVEL_UNIQUE_NAME]"
      type="xsd:string" />
    <LNum name="[Date].[Fiscal Weeks].[LEVEL_NUMBER]"
      type="xsd:int" />
    <DisplayInfo name="[Date].[Fiscal Weeks].[DISPLAY_INFO]"
      type="xsd:unsignedInt" />
  </HierarchyInfo>
  <HierarchyInfo name="[Date].[Fiscal Year]">
    <UName name="[Date].[Fiscal Year].[MEMBER_UNIQUE_NAME]"
      type="xsd:string" />
    <Caption name="[Date].[Fiscal Year].[MEMBER_CAPTION]"
      type="xsd:string" />
    <LName name="[Date].[Fiscal Year].[LEVEL_UNIQUE_NAME]"
      type="xsd:string" />
    <LNum name="[Date].[Fiscal Year].[LEVEL_NUMBER]"
      type="xsd:int" />
    <DisplayInfo name="[Date].[Fiscal Year].[DISPLAY_INFO]"
      type="xsd:unsignedInt" />
  </HierarchyInfo>

```

```

</HierarchyInfo>
<HierarchyInfo name="[Date].[Date]">
  <UName name="[Date].[Date].[MEMBER_UNIQUE_NAME]"
    type="xsd:string" />
  <Caption name="[Date].[Date].[MEMBER_CAPTION]"
    type="xsd:string" />
  <LName name="[Date].[Date].[LEVEL_UNIQUE_NAME]"
    type="xsd:string" />
  <LNum name="[Date].[Date].[LEVEL_NUMBER]"
    type="xsd:int" />
  <DisplayInfo name="[Date].[Date].[DISPLAY_INFO]"
    type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Date].[Day of Week]">
  <UName name="[Date].[Day of Week].[MEMBER_UNIQUE_NAME]"
    type="xsd:string" />
  <Caption name="[Date].[Day of Week].[MEMBER_CAPTION]"
    type="xsd:string" />
  <LName name="[Date].[Day of Week].[LEVEL_UNIQUE_NAME]"
    type="xsd:string" />
  <LNum name="[Date].[Day of Week].[LEVEL_NUMBER]"
    type="xsd:int" />
  <DisplayInfo name="[Date].[Day of Week].[DISPLAY_INFO]"
    type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Date].[Day Name]">
  <UName name="[Date].[Day Name].[MEMBER_UNIQUE_NAME]"
    type="xsd:string" />
  <Caption name="[Date].[Day Name].[MEMBER_CAPTION]"
    type="xsd:string" />
  <LName name="[Date].[Day Name].[LEVEL_UNIQUE_NAME]"
    type="xsd:string" />
  <LNum name="[Date].[Day Name].[LEVEL_NUMBER]"
    type="xsd:int" />
  <DisplayInfo name="[Date].[Day Name].[DISPLAY_INFO]"
    type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Date].[Day of Month]">
  <UName name="[Date].[Day of Month].[MEMBER_UNIQUE_NAME]"
    type="xsd:string" />
  <Caption name="[Date].[Day of Month].[MEMBER_CAPTION]"
    type="xsd:string" />
  <LName name="[Date].[Day of Month].[LEVEL_UNIQUE_NAME]"
    type="xsd:string" />
  <LNum name="[Date].[Day of Month].[LEVEL_NUMBER]"
    type="xsd:int" />
  <DisplayInfo name="[Date].[Day of Month].[DISPLAY_INFO]"
    type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Date].[Day of Year]">
  <UName name="[Date].[Day of Year].[MEMBER_UNIQUE_NAME]"
    type="xsd:string" />
  <Caption name="[Date].[Day of Year].[MEMBER_CAPTION]"
    type="xsd:string" />
  <LName name="[Date].[Day of Year].[LEVEL_UNIQUE_NAME]"
    type="xsd:string" />
  <LNum name="[Date].[Day of Year].[LEVEL_NUMBER]"
    type="xsd:int" />
  <DisplayInfo name="[Date].[Day of Year].[DISPLAY_INFO]"
    type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Date].[Calendar Year]">
  <UName name="[Date].[Calendar Year].[MEMBER_UNIQUE_NAME]"
    type="xsd:string" />
  <Caption name="[Date].[Calendar Year].[MEMBER_CAPTION]"
    type="xsd:string" />
  <LName name="[Date].[Calendar Year].[LEVEL_UNIQUE_NAME]"
    type="xsd:string" />
  <LNum name="[Date].[Calendar Year].[LEVEL_NUMBER]"
    type="xsd:int" />

```

```

    <DisplayInfo name="[Date].[Calendar Year].[DISPLAY_INFO]"
        type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Date].[Fiscal Semester of Year]">
    <UName name="[Date].[Fiscal Semester of Year].[MEMBER_UNIQUE_NAME]"
        type="xsd:string" />
    <Caption name="[Date].[Fiscal Semester of Year].[MEMBER_CAPTION]"
        type="xsd:string" />
    <LName name="[Date].[Fiscal Semester of Year].[LEVEL_UNIQUE_NAME]"
        type="xsd:string" />
    <LNum name="[Date].[Fiscal Semester of Year].[LEVEL_NUMBER]"
        type="xsd:int" />
    <DisplayInfo name="[Date].[Fiscal Semester of Year].[DISPLAY_INFO]"
        type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Date].[Calendar Semester of Year]">
    <UName name="[Date].[Calendar Semester of Year].[MEMBER_UNIQUE_NAME]"
        type="xsd:string" />
    <Caption name="[Date].[Calendar Semester of Year].[MEMBER_CAPTION]"
        type="xsd:string" />
    <LName name="[Date].[Calendar Semester of Year].[LEVEL_UNIQUE_NAME]"
        type="xsd:string" />
    <LNum name="[Date].[Calendar Semester of Year].[LEVEL_NUMBER]"
        type="xsd:int" />
    <DisplayInfo name="[Date].[Calendar Semester of Year].[DISPLAY_INFO]"
        type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Date].[Fiscal Quarter of Year]">
    <UName name="[Date].[Fiscal Quarter of Year].[MEMBER_UNIQUE_NAME]"
        type="xsd:string" />
    <Caption name="[Date].[Fiscal Quarter of Year].[MEMBER_CAPTION]"
        type="xsd:string" />
    <LName name="[Date].[Fiscal Quarter of Year].[LEVEL_UNIQUE_NAME]"
        type="xsd:string" />
    <LNum name="[Date].[Fiscal Quarter of Year].[LEVEL_NUMBER]"
        type="xsd:int" />
    <DisplayInfo name="[Date].[Fiscal Quarter of Year].[DISPLAY_INFO]"
        type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Date].[Calendar Quarter of Year]">
    <UName name="[Date].[Calendar Quarter of Year].[MEMBER_UNIQUE_NAME]"
        type="xsd:string" />
    <Caption name="[Date].[Calendar Quarter of Year].[MEMBER_CAPTION]"
        type="xsd:string" />
    <LName name="[Date].[Calendar Quarter of Year].[LEVEL_UNIQUE_NAME]"
        type="xsd:string" />
    <LNum name="[Date].[Calendar Quarter of Year].[LEVEL_NUMBER]"
        type="xsd:int" />
    <DisplayInfo name="[Date].[Calendar Quarter of Year].[DISPLAY_INFO]"
        type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Date].[Month of Year]">
    <UName name="[Date].[Month of Year].[MEMBER_UNIQUE_NAME]"
        type="xsd:string" />
    <Caption name="[Date].[Month of Year].[MEMBER_CAPTION]"
        type="xsd:string" />
    <LName name="[Date].[Month of Year].[LEVEL_UNIQUE_NAME]"
        type="xsd:string" />
    <LNum name="[Date].[Month of Year].[LEVEL_NUMBER]"
        type="xsd:int" />
    <DisplayInfo name="[Date].[Month of Year].[DISPLAY_INFO]"
        type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Date].[Calendar Week of Year]">
    <UName name="[Date].[Calendar Week of Year].[MEMBER_UNIQUE_NAME]"
        type="xsd:string" />
    <Caption name="[Date].[Calendar Week of Year].[MEMBER_CAPTION]"
        type="xsd:string" />
    <LName name="[Date].[Calendar Week of Year].[LEVEL_UNIQUE_NAME]"
        type="xsd:string" />

```

```

<LNum name="[Date].[Calendar Week of Year].[LEVEL_NUMBER]"
  type="xsd:int" />
<DisplayInfo name="[Date].[Calendar Week of Year].[DISPLAY_INFO]"
  type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Date].[Fiscal Week of Year]">
  <UName name="[Date].[Fiscal Week of Year].[MEMBER_UNIQUE_NAME]"
    type="xsd:string" />
  <Caption name="[Date].[Fiscal Week of Year].[MEMBER_CAPTION]"
    type="xsd:string" />
  <LName name="[Date].[Fiscal Week of Year].[LEVEL_UNIQUE_NAME]"
    type="xsd:string" />
  <LNum name="[Date].[Fiscal Week of Year].[LEVEL_NUMBER]"
    type="xsd:int" />
  <DisplayInfo name="[Date].[Fiscal Week of Year].[DISPLAY_INFO]"
    type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Ship Date].[Fiscal]">
  <UName name="[Ship Date].[Fiscal].[MEMBER_UNIQUE_NAME]"
    type="xsd:string" />
  <Caption name="[Ship Date].[Fiscal].[MEMBER_CAPTION]"
    type="xsd:string" />
  <LName name="[Ship Date].[Fiscal].[LEVEL_UNIQUE_NAME]"
    type="xsd:string" />
  <LNum name="[Ship Date].[Fiscal].[LEVEL_NUMBER]"
    type="xsd:int" />
  <DisplayInfo name="[Ship Date].[Fiscal].[DISPLAY_INFO]"
    type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Ship Date].[Calendar]">
  <UName name="[Ship Date].[Calendar].[MEMBER_UNIQUE_NAME]"
    type="xsd:string" />
  <Caption name="[Ship Date].[Calendar].[MEMBER_CAPTION]"
    type="xsd:string" />
  <LName name="[Ship Date].[Calendar].[LEVEL_UNIQUE_NAME]"
    type="xsd:string" />
  <LNum name="[Ship Date].[Calendar].[LEVEL_NUMBER]"
    type="xsd:int" />
  <DisplayInfo name="[Ship Date].[Calendar].[DISPLAY_INFO]"
    type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Ship Date].[Calendar Weeks]">
  <UName name="[Ship Date].[Calendar Weeks].[MEMBER_UNIQUE_NAME]"
    type="xsd:string" />
  <Caption name="[Ship Date].[Calendar Weeks].[MEMBER_CAPTION]"
    type="xsd:string" />
  <LName name="[Ship Date].[Calendar Weeks].[LEVEL_UNIQUE_NAME]"
    type="xsd:string" />
  <LNum name="[Ship Date].[Calendar Weeks].[LEVEL_NUMBER]"
    type="xsd:int" />
  <DisplayInfo name="[Ship Date].[Calendar Weeks].[DISPLAY_INFO]"
    type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Ship Date].[Fiscal Weeks]">
  <UName name="[Ship Date].[Fiscal Weeks].[MEMBER_UNIQUE_NAME]"
    type="xsd:string" />
  <Caption name="[Ship Date].[Fiscal Weeks].[MEMBER_CAPTION]"
    type="xsd:string" />
  <LName name="[Ship Date].[Fiscal Weeks].[LEVEL_UNIQUE_NAME]"
    type="xsd:string" />
  <LNum name="[Ship Date].[Fiscal Weeks].[LEVEL_NUMBER]"
    type="xsd:int" />
  <DisplayInfo name="[Ship Date].[Fiscal Weeks].[DISPLAY_INFO]"
    type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Ship Date].[Fiscal Year]">
  <UName name="[Ship Date].[Fiscal Year].[MEMBER_UNIQUE_NAME]"
    type="xsd:string" />
  <Caption name="[Ship Date].[Fiscal Year].[MEMBER_CAPTION]"
    type="xsd:string" />

```

```

    <LName name="[Ship Date].[Fiscal Year].[LEVEL_UNIQUE_NAME]"
        type="xsd:string" />
    <LNum name="[Ship Date].[Fiscal Year].[LEVEL_NUMBER]"
        type="xsd:int" />
    <DisplayInfo name="[Ship Date].[Fiscal Year].[DISPLAY_INFO]"
        type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Ship Date].[Date]">
    <UName name="[Ship Date].[Date].[MEMBER_UNIQUE_NAME]"
        type="xsd:string" />
    <Caption name="[Ship Date].[Date].[MEMBER_CAPTION]"
        type="xsd:string" />
    <LName name="[Ship Date].[Date].[LEVEL_UNIQUE_NAME]"
        type="xsd:string" />
    <LNum name="[Ship Date].[Date].[LEVEL_NUMBER]"
        type="xsd:int" />
    <DisplayInfo name="[Ship Date].[Date].[DISPLAY_INFO]"
        type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Ship Date].[Day of Week]">
    <UName name="[Ship Date].[Day of Week].[MEMBER_UNIQUE_NAME]"
        type="xsd:string" />
    <Caption name="[Ship Date].[Day of Week].[MEMBER_CAPTION]"
        type="xsd:string" />
    <LName name="[Ship Date].[Day of Week].[LEVEL_UNIQUE_NAME]"
        type="xsd:string" />
    <LNum name="[Ship Date].[Day of Week].[LEVEL_NUMBER]"
        type="xsd:int" />
    <DisplayInfo name="[Ship Date].[Day of Week].[DISPLAY_INFO]"
        type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Ship Date].[Day Name]">
    <UName name="[Ship Date].[Day Name].[MEMBER_UNIQUE_NAME]"
        type="xsd:string" />
    <Caption name="[Ship Date].[Day Name].[MEMBER_CAPTION]"
        type="xsd:string" />
    <LName name="[Ship Date].[Day Name].[LEVEL_UNIQUE_NAME]"
        type="xsd:string" />
    <LNum name="[Ship Date].[Day Name].[LEVEL_NUMBER]"
        type="xsd:int" />
    <DisplayInfo name="[Ship Date].[Day Name].[DISPLAY_INFO]"
        type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Ship Date].[Day of Month]">
    <UName name="[Ship Date].[Day of Month].[MEMBER_UNIQUE_NAME]"
        type="xsd:string" />
    <Caption name="[Ship Date].[Day of Month].[MEMBER_CAPTION]"
        type="xsd:string" />
    <LName name="[Ship Date].[Day of Month].[LEVEL_UNIQUE_NAME]"
        type="xsd:string" />
    <LNum name="[Ship Date].[Day of Month].[LEVEL_NUMBER]"
        type="xsd:int" />
    <DisplayInfo name="[Ship Date].[Day of Month].[DISPLAY_INFO]"
        type="xsd:unsignedInt" />
</HierarchyInfo>
<HierarchyInfo name="[Ship Date].[Day of Year]">
    <UName name="[Ship Date].[Day of Year].[MEMBER_UNIQUE_NAME]"
        type="xsd:string" />
    <Caption name="[Ship Date].[Day of Year].[MEMBER_CAPTION]"
        type="xsd:string" />
    <LName name="[Ship Date].[Day of Year].[LEVEL_UNIQUE_NAME]"
        type="xsd:string" />
    <LNum name="[Ship Date].[Day of Year].[LEVEL_NUMBER]"
        type="xsd:int" />
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        type="xsd:unsignedInt" />
</HierarchyInfo>
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    <UName name="[Ship Date].[Calendar Year].[MEMBER_UNIQUE_NAME]"
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  type="xsd:int" />
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  <LNum name="[Ship Date].[Calendar Semester of Year].[LEVEL_NUMBER]"
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  <LName name="[Ship Date].[Month of Year].[LEVEL_UNIQUE_NAME]"
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  <LNum name="[Ship Date].[Month of Year].[LEVEL_NUMBER]"
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</HierarchyInfo>
<HierarchyInfo name="[Ship Date].[Calendar Week of Year]">

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  <LNum name="[Ship Date].[Fiscal Week of Year].[LEVEL_NUMBER]"
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    type="xsd:string" />
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    type="xsd:string" />
  <LNum name="[Delivery Date].[Calendar Weeks].[LEVEL_NUMBER]"
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  <LNum name="[Delivery Date].[Fiscal Weeks].[LEVEL_NUMBER]"
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  <LNum name="[Delivery Date].[Day of Week].[LEVEL_NUMBER]"
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  <LNum name="[Delivery Date].[Day of Month].[LEVEL_NUMBER]"
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  <LName name="[Delivery Date].[Day of Year].[LEVEL_UNIQUE_NAME]"
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        <LNum name="[Delivery Date].[Calendar Year].[LEVEL_NUMBER]"
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Year].[DISPLAY_INFO]"
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Year].[DISPLAY_INFO]"
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        <DisplayInfo name="[Delivery Date].[Fiscal Quarter of Year].[DISPLAY_INFO]"
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Year].[DISPLAY_INFO]"

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  <LName name="[Delivery Date].[Month of Year].[LEVEL_UNIQUE_NAME]"
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  <LNum name="[Delivery Date].[Month of Year].[LEVEL_NUMBER]"
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  <LName name="[Delivery Date].[Calendar Week of Year].[LEVEL_UNIQUE_NAME]"
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  <LNum name="[Delivery Date].[Calendar Week of Year].[LEVEL_NUMBER]"
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  <LNum name="[Customer].[Customer].[LEVEL_NUMBER]"
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    type="xsd:string" />
  <LName name="[Customer].[Postal Code].[LEVEL_UNIQUE_NAME]"
    type="xsd:string" />
  <LNum name="[Customer].[Postal Code].[LEVEL_NUMBER]"

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            type="xsd:string" />
        <LName name="[Customer].[Number of Children At Home].[LEVEL_UNIQUE_NAME]"
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        <LNum name="[Customer].[Number of Children At Home].[LEVEL_NUMBER]"
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    </HierarchyInfo>
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            type="xsd:string" />
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    <LNum name="[Employee].[Hire Date].[LEVEL_NUMBER]"
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    <Value xsi:type="xsd:decimal">17277793.5757</Value>
    <FmtValue>$17,277,793.58</FmtValue>
  </Cell>
  <Cell CellOrdinal="6">
    <Value xsi:type="xsd:decimal">17277793.5757</Value>
    <FmtValue>$17,277,793.58</FmtValue>
  </Cell>
  <Cell CellOrdinal="7">
    <Value xsi:type="xsd:int">27659</Value>

```

```

    <FmtValue>27,659</FmtValue>
</Cell>
<Cell CellOrdinal="8">
    <Value xsi:type="xsd:int">18484</Value>
    <FmtValue>18,484</FmtValue>
</Cell>
<Cell CellOrdinal="9">
    <Value xsi:type="xsd:decimal">80450596.9823</Value>
    <FmtValue>$80,450,596.98</FmtValue>
</Cell>
<Cell CellOrdinal="10">
    <Value xsi:type="xsd:int">214378</Value>
    <FmtValue>214,378</FmtValue>
</Cell>
<Cell CellOrdinal="11">
    <Value xsi:type="xsd:decimal">80978104.8707</Value>
    <FmtValue>$80,978,104.87</FmtValue>
</Cell>
<Cell CellOrdinal="12">
    <Value xsi:type="xsd:decimal">6436047.6066</Value>
    <FmtValue>$6,436,047.61</FmtValue>
</Cell>
<Cell CellOrdinal="13">
    <Value xsi:type="xsd:decimal">2011265.9158</Value>
    <FmtValue>$2,011,265.92</FmtValue>
</Cell>
<Cell CellOrdinal="14">
    <Value xsi:type="xsd:double">5.2750792619999995E5</Value>
    <FmtValue>$527,507.93</FmtValue>
</Cell>
<Cell CellOrdinal="15">
    <Value xsi:type="xsd:decimal">79980114.379</Value>
    <FmtValue>$79,980,114.38</FmtValue>
</Cell>
<Cell CellOrdinal="16">
    <Value xsi:type="xsd:decimal">26693830.5727</Value>
    <FmtValue>$26,693,830.57</FmtValue>
</Cell>
<Cell CellOrdinal="17">
    <Value xsi:type="xsd:int">3796</Value>
    <FmtValue>3,796</FmtValue>
</Cell>
<Cell CellOrdinal="18">
    <Value xsi:type="xsd:int">274776</Value>
    <FmtValue>274,776</FmtValue>
</Cell>
<Cell CellOrdinal="19">
    <Value xsi:type="xsd:double">1.1033678209139487E8</Value>
    <FmtValue>$110,336,782.09</FmtValue>
</Cell>
<Cell CellOrdinal="20">
    <Value xsi:type="xsd:double">4.3971624148397945E7</Value>
    <FmtValue>$43,971,624.15</FmtValue>
</Cell>
<Cell CellOrdinal="21">
    <Value xsi:type="xsd:double">9.725790795469773E7</Value>
    <FmtValue>$97,257,907.95</FmtValue>
</Cell>
<Cell CellOrdinal="22">
    <Value xsi:type="xsd:double">1.098092742029948E8</Value>
    <FmtValue>$109,809,274.20</FmtValue>
</Cell>
<Cell CellOrdinal="23">
    <Value xsi:type="xsd:double">8.7847418366998E6</Value>
    <FmtValue>$8,784,741.84</FmtValue>
</Cell>
<Cell CellOrdinal="24">
    <Value xsi:type="xsd:double">2.745235524899713E6</Value>
    <FmtValue>$2,745,235.52</FmtValue>
</Cell>

```



```

    <Cell CellOrdinal="25">
      <Value xsi:type="xsd:int">31455</Value>
      <FmtValue>31,455</FmtValue>
    </Cell>
    <Cell CellOrdinal="26">
      <Value xsi:type="xsd:double">1.1425355E8</Value>
      <FmtValue>$114,253,550.00</FmtValue>
    </Cell>
    <Cell CellOrdinal="27">
      <Value xsi:type="xsd:double">1.2609503E7</Value>
      <FmtValue>$12,609,503.00</FmtValue>
    </Cell>
    <Cell CellOrdinal="28">
      <Value xsi:type="xsd:double">1.</Value>
      <FmtValue>1.00</FmtValue>
    </Cell>
    <Cell CellOrdinal="29">
      <Value xsi:type="xsd:double">1.</Value>
      <FmtValue>1.00</FmtValue>
    </Cell>
  </CellData>
</root>
</return>
</ExecuteResponse>
</soap:Body>
</soap:Envelope>

```

4.14 Create

In this example, the client sends an **XMLA Create** command to the server.

4.14.1 Client Sends Request

The client sends the following request:

```

<Create xmlns="http://schemas.microsoft.com/analysisservices/2003/engine">
  <ObjectDefinition>
    <Database xmlns:xsd="http://www.w3.org/2001/XMLSchema"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xmlns:ddl2="http://schemas.microsoft.com/analysisservices/2003/engine/2"
      xmlns:ddl2_2="http://schemas.microsoft.com/analysisservices/2003/engine/2/2"
      xmlns:ddl100_100="http://schemas.microsoft.com/analysisservices/2008/engine/100/100">
      <ID>Adventure_SSAS</ID>
      <Name>Adventure_SSAS</Name>
      <Language>1033</Language>
      <Collation>Latin1_General_CI_AS</Collation>
      <DataSourceImpersonationInfo>
        <ImpersonationMode>Default</ImpersonationMode>
      </DataSourceImpersonationInfo>
      <Dimensions>
        <Dimension>
          <ID>Dim Date</ID>
          <Name>Date</Name>
          <Annotations>
            <Annotation>
              <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramLayout</Name>
              <Value>
                <dds xmlns="">
                  <diagram fontclsid="{0BE35203-8F91-11CE-9DE3-00AA004BB851}"
                    mouseiconclsid="{0BE35204-8F91-11CE-9DE3-00AA004BB851}" defaultlayout="MSDDS.Rectilinear"
                    defaultlineroute="MSDDS.Rectilinear" version="7" nextobject="2" scale="100"
                    pagebreakanchorx="0" pagebreakanchory="0" pagebreaksizex="0" pagebreaksizey="0" scrollleft="-1356"
                    scrolltop="-4617" gridx="150" gridy="150" marginx="5000" marginy="5000" zoom="100"
                    x="7276" y="14235" bgcolor="15334399" defaultpersistence="2" PrintPageNumbersMode="3"
                    PrintMarginTop="0" PrintMarginBottom="635" PrintMarginLeft="0" PrintMarginRight="0"

```

```

marqueeselectionmode="0" mousepointer="0" snaptogrid="0" autotypeannotation="1"
showscrollbars="0" viewpagebreaks="0" donotforceconnectorsbehindshapes="1"
backpictureclsid="{00000000-0000-0000-0000-000000000000}">
    <font>
        <ddxmlobjectstreamwrapper binary="01000000900144420100065461686f6d61"
    />
    </font>
    <mouseicon>
        <ddxmlobjectstreamwrapper binary="6c74000000000000" />
    </mouseicon>
</diagram>
<layoutmanager>
    <ddxmlobj />
</layoutmanager>
<ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimDate" left="20" top="0" logicalid="1" controlid="1" masterid="0" hint1="0"
hint2="0" width="4524" height="5000" noresize="0" nomove="0" nodefaultattachpoints="0"
autodrag="1" usedefaultiddshape="1" selectable="1" showselectionhandles="1" allownudging="1"
isannotation="0" dontautolayout="0" groupcollapsed="0" tabstop="1" visible="1"
snaptogrid="0">
    <control>
        <ddxmlobjectstreaminitwrapper binary="00080000ac11000088130000" />
    </control>
    <layoutobject>
        <ddxmlobj>
            <property name="LogicalObject" value="dbo_DimDate" vartype="8" />
        </ddxmlobj>
    </layoutobject>
    <shape groupshapeid="0" groupnode="0" />
</ddscontrol>
</dds>
</Value>
</Annotation>
<Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowFriendlyNames</Name>
    <Value>true</Value>
</Annotation>
<Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowRelationshipNames</Name>
    <Value>>false</Value>
</Annotation>
<Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:UseDiagramDefaultLayout</Name>
    <Value>true</Value>
</Annotation>
<Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortLeft</Name>
    <Value>-1356</Value>
</Annotation>
<Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortTop</Name>
    <Value>-4617</Value>
</Annotation>
<Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingLeft</Name>
    <Value>20</Value>
</Annotation>
<Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingTop</Name>
    <Value>0</Value>
</Annotation>
<Annotation>

```

```

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramZoom</Name>
  <Value>100</Value>
</Annotation>
<Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ARDiagramLayout</Name>
  <Value>
    <DiagramLayout ZoomPercent="100" ViewPortX="0" ViewPortY="0" xmlns="">
      <Shapes NodeWidth="161">
        <Shape Id="Date Key" Expanded="true">
          <Attributes>
            <Attribute Id="Date Key" />
          </Attributes>
          <Position x="20" y="20" />
        </Shape>
        <Shape Id="Calendar Quarter" Expanded="false">
          <Attributes>
            <Attribute Id="Calendar Quarter" />
          </Attributes>
          <Position x="226" y="20" />
        </Shape>
        <Shape Id="English Month Name" Expanded="false">
          <Attributes>
            <Attribute Id="English Month Name" />
          </Attributes>
          <Position x="226" y="68" />
        </Shape>
        <Shape Id="Week Number Of Year" Expanded="false">
          <Attributes>
            <Attribute Id="Week Number Of Year" />
          </Attributes>
          <Position x="226" y="116" />
        </Shape>
        <Shape Id="Full Date Alternate Key" Expanded="false">
          <Attributes>
            <Attribute Id="Full Date Alternate Key" />
          </Attributes>
          <Position x="226" y="164" />
        </Shape>
      </Shapes>
    </DiagramLayout>
  </Value>
</Annotation>
</Annotations>
<Source xsi:type="DataSourceViewBinding">
  <DataSourceViewID>dsvAdventureWorksDW2008</DataSourceViewID>
</Source>
<ErrorConfiguration>
  <KeyNotFound>ReportAndStop</KeyNotFound>
  <KeyDuplicate>ReportAndStop</KeyDuplicate>
  <NullKeyNotAllowed>ReportAndStop</NullKeyNotAllowed>
</ErrorConfiguration>
<Language>1033</Language>
<Collation>Latin1_General_CI_AS</Collation>
<UnknownMemberName>Unknown</UnknownMemberName>
<Attributes>
  <Attribute>
    <ID>Date Key</ID>
    <Name>Date Key</Name>
    <Usage>Key</Usage>
    <EstimatedCount>1188</EstimatedCount>
    <KeyColumns>
      <KeyColumn>
        <DataType>Integer</DataType>
        <Source xsi:type="ColumnBinding">
          <TableID>dbo_DimDate</TableID>
          <ColumnID>DateKey</ColumnID>
        </Source>
      </KeyColumn>
    </KeyColumns>
  </Attribute>

```

```

</KeyColumns>
<NameColumn>
  <DataType>WChar</DataType>
  <Source xsi:type="ColumnBinding">
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    <ColumnID>DateKey</ColumnID>
  </Source>
</NameColumn>
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  <AttributeRelationship>
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    <Name>Full Date Alternate Key</Name>
  </AttributeRelationship>
  <AttributeRelationship>
    <AttributeID>Week Number Of Year</AttributeID>
    <Name>Week Number Of Year</Name>
  </AttributeRelationship>
  <AttributeRelationship>
    <AttributeID>Calendar Quarter</AttributeID>
    <Name>Calendar Quarter</Name>
  </AttributeRelationship>
  <AttributeRelationship>
    <AttributeID>English Month Name</AttributeID>
    <Name>English Month Name</Name>
  </AttributeRelationship>
  <AttributeRelationship>
    <AttributeID>Calendar Year</AttributeID>
    <Name>Calendar Year</Name>
  </AttributeRelationship>
</AttributeRelationships>
</Attribute>
<Attribute>
  <ID>Full Date Alternate Key</ID>
  <Name>Full Date Alternate Key</Name>
  <KeyColumns>
    <KeyColumn>
      <DataType>Date</DataType>
      <Source xsi:type="ColumnBinding">
        <TableID>dbo_DimDate</TableID>
        <ColumnID>FullDateAlternateKey</ColumnID>
      </Source>
    </KeyColumn>
  </KeyColumns>
</NameColumn>
  <DataType>WChar</DataType>
  <Source xsi:type="ColumnBinding">
    <TableID>dbo_DimDate</TableID>
    <ColumnID>FullDateAlternateKey</ColumnID>
  </Source>
</NameColumn>
</Attribute>
<Attribute>
  <ID>Week Number Of Year</ID>
  <Name>Week Number Of Year</Name>
  <KeyColumns>
    <KeyColumn>
      <DataType>UnsignedTinyInt</DataType>
      <Source xsi:type="ColumnBinding">
        <TableID>dbo_DimDate</TableID>
        <ColumnID>WeekNumberOfYear</ColumnID>
      </Source>
    </KeyColumn>
  </KeyColumns>
</NameColumn>
  <DataType>WChar</DataType>
  <Source xsi:type="ColumnBinding">
    <TableID>dbo_DimDate</TableID>
    <ColumnID>WeekNumberOfYear</ColumnID>
  </Source>
</NameColumn>

```

```

    <OrderBy>Key</OrderBy>
  </Attribute>
</Attribute>
<Attribute>
  <ID>Calendar Quarter</ID>
  <Name>Calendar Quarter</Name>
  <KeyColumns>
    <KeyColumn>
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        <ColumnID>CalendarQuarter</ColumnID>
      </Source>
    </KeyColumn>
  </KeyColumns>
  <NameColumn>
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    <Source xsi:type="ColumnBinding">
      <TableID>dbo_DimDate</TableID>
      <ColumnID>CalendarQuarter</ColumnID>
    </Source>
  </NameColumn>
  <OrderBy>Key</OrderBy>
</Attribute>
</Attribute>
<Attribute>
  <ID>English Month Name</ID>
  <Name>English Month Name</Name>
  <KeyColumns>
    <KeyColumn>
      <DataType>WChar</DataType>
      <DataSize>10</DataSize>
      <Source xsi:type="ColumnBinding">
        <TableID>dbo_DimDate</TableID>
        <ColumnID>EnglishMonthName</ColumnID>
      </Source>
    </KeyColumn>
  </KeyColumns>
  <NameColumn>
    <DataType>WChar</DataType>
    <DataSize>10</DataSize>
    <Source xsi:type="ColumnBinding">
      <TableID>dbo_DimDate</TableID>
      <ColumnID>EnglishMonthName</ColumnID>
    </Source>
  </NameColumn>
  <OrderBy>Key</OrderBy>
</Attribute>
</Attribute>
<Attribute>
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  <Name>Calendar Year</Name>
  <EstimatedCount>5</EstimatedCount>
  <KeyColumns>
    <KeyColumn>
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        <TableID>dbo_DimDate</TableID>
        <ColumnID>CalendarYear</ColumnID>
      </Source>
    </KeyColumn>
  </KeyColumns>
  <NameColumn>
    <DataType>WChar</DataType>
    <Source xsi:type="ColumnBinding">
      <TableID>dbo_DimDate</TableID>
      <ColumnID>CalendarYear</ColumnID>
    </Source>
  </NameColumn>
  <OrderBy>Key</OrderBy>
</Attribute>
</Attributes>
<Hierarchies>

```

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  <Name>Calendar Hierarchy</Name>
  <Levels>
    <Level>
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      <Name>Calendar Year</Name>
      <SourceAttributeID>Calendar Year</SourceAttributeID>
    </Level>
    <Level>
      <ID>Calendar Quarter</ID>
      <Name>Calendar Quarter</Name>
      <SourceAttributeID>Calendar Quarter</SourceAttributeID>
    </Level>
    <Level>
      <ID>English Month Name</ID>
      <Name>English Month Name</Name>
      <SourceAttributeID>English Month Name</SourceAttributeID>
    </Level>
    <Level>
      <ID>Week Number Of Year</ID>
      <Name>Week Number Of Year</Name>
      <SourceAttributeID>Week Number Of Year</SourceAttributeID>
    </Level>
    <Level>
      <ID>Full Date Alternate Key</ID>
      <Name>Full Date Alternate Key</Name>
      <SourceAttributeID>Full Date Alternate Key</SourceAttributeID>
    </Level>
  </Levels>
</Hierarchy>
</Hierarchies>
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  <SilenceInterval>-PT1S</SilenceInterval>
  <Latency>-PT1S</Latency>
  <SilenceOverrideInterval>-PT1S</SilenceOverrideInterval>
  <ForceRebuildInterval>-PT1S</ForceRebuildInterval>
  <Source xsi:type="ProactiveCachingInheritedBinding" />
</ProactiveCaching>
</Dimension>
<Dimension>
  <ID>Dim Customer</ID>
  <Name>Customer</Name>
  <Annotations>
    <Annotation>

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  </Annotation>
  <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowFriendlyNames</Name>
  <Value>true</Value>
  </Annotation>
  <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowRelationshipNames</Name>
  <Value>>false</Value>
  </Annotation>
  <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:UseDiagramDefaultLayout</Name>
  <Value>true</Value>
  </Annotation>
  <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortLeft</Name>
  <Value>0</Value>
  </Annotation>
  <Annotation>

```

```

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortTop</Name>
  <Value>0</Value>
</Annotation>
<Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingLeft</Name>
  <Value>0</Value>
</Annotation>
<Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingTop</Name>
  <Value>0</Value>
</Annotation>
<Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramZoom</Name>
  <Value>100</Value>
</Annotation>
</Annotations>
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  <DataSourceViewID>dsvAdventureWorksDW2008</DataSourceViewID>
</Source>
<ErrorConfiguration>
  <KeyNotFound>ReportAndStop</KeyNotFound>
  <KeyDuplicate>ReportAndStop</KeyDuplicate>
  <NullKeyNotAllowed>ReportAndStop</NullKeyNotAllowed>
</ErrorConfiguration>
<Language>1033</Language>
<Collation>Latin1_General_CI_AS</Collation>
<UnknownMemberName>Unknown</UnknownMemberName>
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  <Attribute>
    <ID>Customer Key</ID>
    <Name>Customer Key</Name>
    <Usage>Key</Usage>
    <EstimatedCount>18484</EstimatedCount>
    <KeyColumns>
      <KeyColumn>
        <DataType>Integer</DataType>
        <Source xsi:type="ColumnBinding">
          <TableID>dbo_DimCustomer</TableID>
          <ColumnID>CustomerKey</ColumnID>
        </Source>
      </KeyColumn>
    </KeyColumns>
    <NameColumn>
      <DataType>WChar</DataType>
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        <TableID>dbo_DimCustomer</TableID>
        <ColumnID>CustomerKey</ColumnID>
      </Source>
    </NameColumn>
    <OrderBy>Key</OrderBy>
  </Attribute>
</Attributes>
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  <Latency>-PT1S</Latency>
  <SilenceOverrideInterval>-PT1S</SilenceOverrideInterval>
  <ForceRebuildInterval>-PT1S</ForceRebuildInterval>
  <Source xsi:type="ProactiveCachingInheritedBinding" />
</ProactiveCaching>
</Dimension>
<Dimension>
  <ID>Dim Sales Territory</ID>
  <Name>Sales Territory</Name>
  <Annotations>
    <Annotation>

```

```

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramLayout</Name>
  </Annotation>
  <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowFriendlyNames</Name>
  <Value>>true</Value>
  </Annotation>
  <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowRelationshipNames</Name>
  <Value>>false</Value>
  </Annotation>
  <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:UseDiagramDefaultLayout</Name>
  <Value>>true</Value>
  </Annotation>
  <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortLeft</Name>
  <Value>0</Value>
  </Annotation>
  <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortTop</Name>
  <Value>0</Value>
  </Annotation>
  <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingLeft</Name>
  <Value>0</Value>
  </Annotation>
  <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingTop</Name>
  <Value>0</Value>
  </Annotation>
  <Annotation>

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramZoom</Name>
  <Value>100</Value>
  </Annotation>
</Annotations>
<Source xsi:type="DataSourceViewBinding">
  <DataSourceViewID>dsvAdventureWorksDW2008</DataSourceViewID>
</Source>
<ErrorConfiguration>
  <KeyNotFound>ReportAndStop</KeyNotFound>
  <KeyDuplicate>ReportAndStop</KeyDuplicate>
  <NullKeyNotAllowed>ReportAndStop</NullKeyNotAllowed>
</ErrorConfiguration>
<Language>1033</Language>
<Collation>Latin1_General_CI_AS</Collation>
<UnknownMemberName>Unknown</UnknownMemberName>
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  <Attribute>
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    <Name>Sales Territory Key</Name>
    <Usage>Key</Usage>
    <EstimatedCount>11</EstimatedCount>
    <KeyColumns>
      <KeyColumn>
        <DataType>Integer</DataType>
        <Source xsi:type="ColumnBinding">
          <TableID>dbo_DimSalesTerritory</TableID>
          <ColumnID>SalesTerritoryKey</ColumnID>
        </Source>
      </KeyColumn>
    </KeyColumns>
  </Attribute>

```



```

        <NameColumn>
          <DataType>WChar</DataType>
          <Source xsi:type="ColumnBinding">
            <TableID>dbo_DimSalesTerritory</TableID>
            <ColumnID>SalesTerritoryKey</ColumnID>
          </Source>
        </NameColumn>
        <OrderBy>Key</OrderBy>
      </Attribute>
    </Attributes>
    <ProactiveCaching>
      <SilenceInterval>-PT1S</SilenceInterval>
      <Latency>-PT1S</Latency>
      <SilenceOverrideInterval>-PT1S</SilenceOverrideInterval>
      <ForceRebuildInterval>-PT1S</ForceRebuildInterval>
      <Source xsi:type="ProactiveCachingInheritedBinding" />
    </ProactiveCaching>
  </Dimension>
  <Dimension>
    <ID>Dim Product</ID>
    <Name>Product</Name>
    <Annotations>
      <Annotation>
        <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramLayout</Name>
        <Value>
          <dds xmlns="">
            <diagram fontclsid="{0BE35203-8F91-11CE-9DE3-00AA004BB851}"
              mouseiconclsid="{0BE35204-8F91-11CE-9DE3-00AA004BB851}" defaultlayout="MSDDS.Rectilinear"
              defaultlineroute="MSDDS.Rectilinear" version="7" nextobject="12" scale="100"
              pagebreakanchorx="0" pagebreakanchory="0" pagebreaksize="0" pagebreaksizey="0"
              scrollleft="1715" scrolltop="-2135" gridx="150" gridy="150" marginx="5000" marginy="5000"
              zoom="75" x="11695" y="14235" bgcolor="15334399" defaultpersistence="2"
              PrintPageNumbersMode="3" PrintMarginTop="0" PrintMarginBottom="635" PrintMarginLeft="0"
              PrintMarginRight="0" marqueeselectionmode="0" mousepointer="0" snaptogrid="0"
              autotypeannotation="1" showscrollbars="0" viewpagebreaks="0"
              donotforceconnectorsbehindshapes="1" backpictureclsid="{00000000-0000-0000-0000-000000000000}">
              <font>
                <ddsxmlobjectstreamwrapper binary="01000000900144420100065461686f6d61"
              />
              </font>
              <mouseicon>
                <ddsxmlobjectstreamwrapper binary="6c74000000000000" />
              </mouseicon>
            </diagram>
            <layoutmanager>
              <ddsxmlobj />
            </layoutmanager>
            <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
              tooltip="DimProductCategory" left="2870" top="-353" logicalid="6" controlid="1" masterid="0"
              hint1="0" hint2="0" width="6818" height="3149" noresize="0" nomove="0"
              nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
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              groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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              </control>
              <layoutobject>
                <ddsxmlobj>
                  <property name="LogicalObject" value="dbo_DimProductCategory"
                vartype="8" />
                </ddsxmlobj>
              </layoutobject>
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              nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"

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groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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  </control>
  <layoutobject>
    <ddxmlobj>
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    </ddxmlobj>
  </layoutobject>
  <shape groupshapeid="0" groupnode="0" />
</ddscontrol>
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tooltip="DimProductSubcategory" left="2913" top="4126" logicalid="8" controlid="3"
masterid="0" hint1="0" hint2="0" width="8423" height="3572" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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  </control>
  <layoutobject>
    <ddxmlobj>
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vartype="8" />
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  </layoutobject>
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</ddscontrol>
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logicalid="9" controlid="4" masterid="0" hint1="0" hint2="0" width="7594" height="2129"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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    <ddxmlobj>
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linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1" />
    </ddxmlobj>
  </control>
  <layoutobject>
    <ddxmlobj>
      <property name="LogicalObject"
value="dataSet.Relations[FK_DimProductSubcategory_DimProductCategory]" vartype="8" />
      <property name="Virtual" value="0" vartype="11" />
      <property name="VisibleAP" value="0" vartype="3" />
    </ddxmlobj>
  </layoutobject>
  <connector lineroutestyle="MSDDS.Rectilinear" sourceid="1" destid="3"
sourceattachpoint="1" destattachpoint="24" segmenteditmode="0" bendpointeditmode="0"
bendpointvisibility="0" relatedid="0" virtual="0">
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    <point x="2979" y="3726" />
    <point x="9874" y="3726" />
    <point x="9874" y="4126" />
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logicalid="10" controlid="5" masterid="0" hint1="0" hint2="0" width="1161" height="2213"
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selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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    <ddxmlobj>
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linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1" />
    </ddxmlobj>
  </control>
  <layoutobject>
    <ddxmlobj>

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        <property name="LogicalObject"
value="dataSet.Relations[FK_DimProduct_DimProductSubcategory]" vartype="8" />
        <property name="Virtual" value="0" vartype="11" />
        <property name="VisibleAP" value="0" vartype="3" />
    </ddsxmlobj>
</layoutobject>
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sourceattachpoint="1" destattachpoint="0" segmenteditmode="0" bendpointeditmode="0"
bendpointvisibility="0" relatedid="0" virtual="0">
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</dds>
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<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowRelationshipNames</Name>
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<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:UseDiagramDefaultLayout</Name>
    <Value>>true</Value>
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<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortLeft</Name>
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<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortTop</Name>
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<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingLeft</Name>
    <Value>2870</Value>
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<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingTop</Name>
    <Value>-353</Value>
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<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramZoom</Name>
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<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ARDiagramLayout</Name>
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                <Shape Id="Product Key" Expanded="true">
                    <Attributes>
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                    </Attributes>
                </Shape>
            </Shapes>
        </DiagramLayout>
    </Value>

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        <Position x="20" y="20" />
    </Shape>
    <Shape Id="English Product Name" Expanded="false">
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        </Attributes>
        <Position x="246" y="20" />
    </Shape>
</Shapes>
</DiagramLayout>
</Value>
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</Annotations>
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    <DataSourceViewID>dsvAdventureWorksDW2008</DataSourceViewID>
</Source>
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<ErrorConfiguration>
    <KeyNotFound>ReportAndStop</KeyNotFound>
    <KeyDuplicate>ReportAndStop</KeyDuplicate>
    <NullKeyNotAllowed>ReportAndStop</NullKeyNotAllowed>
</ErrorConfiguration>
<Language>1033</Language>
<Collation>Latin1_General_CI_AS</Collation>
<UnknownMemberName>Unknown</UnknownMemberName>
<Attributes>
    <Attribute>
        <ID>Product Key</ID>
        <Name>Product Key</Name>
        <Usage>Key</Usage>
        <EstimatedCount>606</EstimatedCount>
        <KeyColumns>
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                <Source xsi:type="ColumnBinding">
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        </NameColumn>
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            </AttributeRelationship>
            <AttributeRelationship>
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                <Name>English Product Subcategory Name</Name>
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                <Name>Product Subcategory Key</Name>
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            <AttributeRelationship>
                <AttributeID>English Product Category Name</AttributeID>
                <Name>English Product Category Name</Name>
            </AttributeRelationship>
        </AttributeRelationships>
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</Attribute>
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  <Name>English Product Name</Name>
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  </NameColumn>
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  <Name>Product Category Key</Name>
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        <Name>English Product Category Name</Name>
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  <Latency>-PT1S</Latency>
  <SilenceOverrideInterval>-PT1S</SilenceOverrideInterval>
  <ForceRebuildInterval>-PT1S</ForceRebuildInterval>
  <Source xsi:type="ProactiveCachingInheritedBinding" />
</ProactiveCaching>
</Dimension>

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</Dimensions>
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mouseiconclsid="{0BE35204-8F91-11CE-9DE3-00AA004BB851}" defaultlayout="MSDDS.Rectilinear"
defaultlineroute="MSDDS.Rectilinear" version="7" nextobject="32" scale="100"
pagebreakanchorx="0" pagebreakanchory="0" pagebreaksizex="0" pagebreaksizey="0" scrollleft="-
2240" scrolltop="5062" gridx="150" gridy="150" marginx="5000" marginy="5000" zoom="75"
x="16034" y="10821" backcolor="15334399" defaultpersistence="2" PrintPageNumbersMode="3"
PrintMarginTop="0" PrintMarginBottom="635" PrintMarginLeft="0" PrintMarginRight="0"
marqueeselectionmode="0" mousepointer="0" snaptogrid="0" autotypeannotation="1"
showscrollbars="1" viewpagebreaks="0" donotforceconnectorsbehindshapes="1"
backpictureclsid="{00000000-0000-0000-0000-000000000000}">
      <font>
        <ddsxmlobjectstreamwrapper binary="01000000900144420100065461686f6d61"
/>
      </font>
      <mouseicon>
        <ddsxmlobjectstreamwrapper binary="6c74000000000000" />
      </mouseicon>
      </diagram>
      <layoutmanager>
        <ddsxmlobj />
      </layoutmanager>
      <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimSalesTerritory" left="-1850" top="1213" logicalid="16" controlid="1" masterid="0"
hint1="0" hint2="0" width="4498" height="3149" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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          <ddsxmlobjectstreaminitwrapper binary="00080000921100004d0c0000" />
        </control>
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          <ddsxmlobj>
            <property name="LogicalObject" value="dbo_DimSalesTerritory"
vartype="8" />
          </ddsxmlobj>
        </layoutobject>
        <shape groupshapeid="0" groupnode="0" />
      </ddscontrol>
      <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="FactInternetSales" left="6494" top="3004" logicalid="17" controlid="2" masterid="0"
hint1="0" hint2="0" width="4101" height="5000" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
        <control>
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vartype="8" />
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        </layoutobject>
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tooltip="DimCustomer" left="9185" top="10454" logicalid="18" controlid="3" masterid="0"
hint1="0" hint2="0" width="4207" height="5000" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"

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tooltip="DimProductSubcategory" left="15782" top="6836" logicalid="19" controlid="4"
masterid="0" hint1="0" hint2="0" width="5530" height="3572" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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vartype="8" />
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  </layoutobject>
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tooltip="DimProductCategory" left="16020" top="12808" logicalid="20" controlid="5"
masterid="0" hint1="0" hint2="0" width="5054" height="3149" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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vartype="8" />
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</ddscontrol>
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tooltip="DimDate" left="479" top="10128" logicalid="21" controlid="6" masterid="0" hint1="0"
hint2="0" width="4524" height="5000" noresize="0" nomove="0" nodefaultattachpoints="0"
autodrag="1" usedefaultiddshape="1" selectable="1" showselectionhandles="1" allownudging="1"
isannotation="0" dontautolayout="0" groupcollapsed="0" tabstop="1" visible="1"
snaptogrid="0">
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tooltip="DimProduct" left="16364" top="-564" logicalid="22" controlid="7" masterid="0"
hint1="0" hint2="0" width="4366" height="5000" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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        </control>
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selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1" />
            </ddsxmlobj>
        </control>
        <layoutobject>
            <ddsxmlobj>
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value="dataSet.Relations[FK_FactInternetSales_DimSalesTerritory]" vartype="8" />
                <property name="Virtual" value="0" vartype="11" />
                <property name="VisibleAP" value="0" vartype="3" />
            </ddsxmlobj>
        </layoutobject>
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sourceattachpoint="15" destattachpoint="22" segmenteditmode="0" bendpointeditmode="0"
bendpointvisibility="0" relatedid="0" virtual="0">
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            <point x="6494" y="5504" />
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    </ddscontrol>
    <ddscontrol controlprogid="MSDDS.Polyline" left="3992" top="7704"
logicalid="24" controlid="9" masterid="0" hint1="0" hint2="0" width="4302" height="2924"
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selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
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            </ddsxmlobj>
        </control>
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value="dataSet.Relations[FK_FactInternetSales_DimDate]" vartype="8" />
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The CALCULATE command controls the aggregation of leaf cells in the cube.

is affected. If the CALCULATE command is deleted or modified, the data within the cube is aggregated. You should edit this command only if you manually specify how the cube is aggregated.

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nodefaultattachpoints="0" autodrag="1" usedefaulttiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
              <control>
                <ddsxmlobjectstreaminitwrapper binary="00080000151200065130000"
/>
              </control>
            </layoutobject>
            <ddsxmlobj>
              <property name="LogicalObject" value="dbo_FactInternetSales"
vartype="8" />
            </ddsxmlobj>
          </layoutobject>
          <shape groupshapeid="0" groupnode="0" />
        </ddscontrol>
      <ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimProduct" left="13981" top="0" logicalid="17" controlid="2" masterid="0" hint1="0"
hint2="0" width="4366" height="5000" noresize="0" nomove="0" nodefaultattachpoints="0"
autodrag="1" usedefaulttiddshape="1" selectable="1" showselectionhandles="1" allownudging="1"

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isannotation="0" dontautolayout="0" groupcollapsed="0" tabstop="1" visible="1"
snaptogrid="0">
    <control>
        <ddsexmlobjectstreaminitwrapper binary="000800000e11000088130000"
/>
    </control>
</layoutobject>
<ddsexmlobj>
    <property name="LogicalObject" value="dbo_DimProduct"
vartype="8" />
    </ddsexmlobj>
</layoutobject>
<shape groupshapeid="0" groupnode="0" />
</ddscontrol>
<ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimSalesTerritory" left="0" top="10385" logicalid="18" controlid="3" masterid="0"
hint1="0" hint2="0" width="4498" height="3149" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
    <control>
        <ddsexmlobjectstreaminitwrapper binary="00080000921100004d0c0000"
/>
    </control>
</layoutobject>
<ddsexmlobj>
    <property name="LogicalObject" value="dbo_DimSalesTerritory"
vartype="8" />
    </ddsexmlobj>
</layoutobject>
<shape groupshapeid="0" groupnode="0" />
</ddscontrol>
<ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimDate" left="3383" top="26320" logicalid="19" controlid="4" masterid="0" hint1="0"
hint2="0" width="4524" height="5000" noresize="0" nomove="0" nodefaultattachpoints="0"
autodrag="1" usedefaultiddshape="1" selectable="1" showselectionhandles="1" allownudging="1"
isannotation="0" dontautolayout="0" groupcollapsed="0" tabstop="1" visible="1"
snaptogrid="0">
    <control>
        <ddsexmlobjectstreaminitwrapper binary="00080000ac11000088130000"
/>
    </control>
</layoutobject>
<ddsexmlobj>
    <property name="LogicalObject" value="dbo_DimDate" vartype="8"
/>
    </ddsexmlobj>
</layoutobject>
<shape groupshapeid="0" groupnode="0" />
</ddscontrol>
<ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimCustomer" left="10307" top="26320" logicalid="20" controlid="5" masterid="0"
hint1="0" hint2="0" width="4207" height="5000" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaultiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
    <control>
        <ddsexmlobjectstreaminitwrapper binary="000800006f10000088130000"
/>
    </control>
</layoutobject>
<ddsexmlobj>
    <property name="LogicalObject" value="dbo_DimCustomer"
vartype="8" />
    </ddsexmlobj>
</layoutobject>
<shape groupshapeid="0" groupnode="0" />
</ddscontrol>
<ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimProductCategory" left="13637" top="13372" logicalid="21" controlid="6"

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masterid="0" hint1="0" hint2="0" width="5054" height="3149" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaulttiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
    <control>
        <ddsxmlobjectstreaminitwrapper binary="00080000be1300004d0c0000"
/>
    </control>
</layoutobject>
<ddsxmlobj>
    <property name="LogicalObject" value="dbo_DimProductCategory"
vartype="8" />
    </ddsxmlobj>
</layoutobject>
<shape groupshapeid="0" groupnode="0" />
</ddscontrol>
<ddscontrol controlprogid="DdsShapes.DdsObjectManagedBridge.2"
tooltip="DimProductSubcategory" left="13399" top="7400" logicalid="22" controlid="7"
masterid="0" hint1="0" hint2="0" width="5530" height="3572" noresize="0" nomove="0"
nodefaultattachpoints="0" autodrag="1" usedefaulttiddshape="1" selectable="1"
showselectionhandles="1" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
    <control>
        <ddsxmlobjectstreaminitwrapper binary="000800009a150000f40d0000"
/>
    </control>
</layoutobject>
<ddsxmlobj>
    <property name="LogicalObject"
value="dbo_DimProductSubcategory" vartype="8" />
    </ddsxmlobj>
</layoutobject>
<shape groupshapeid="0" groupnode="0" />
</ddscontrol>
<ddscontrol controlprogid="MSDDS.Polyline" left="6896" top="14125"
logicalid="23" controlid="8" masterid="0" hint1="0" hint2="0" width="1840" height="12695"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaulttiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
    <control>
        <ddsxmlobj>
            <polyline endtypedst="6" endtypesrc="3" usercolor="0"
linestyle="0" linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
/>
        </ddsxmlobj>
    </control>
</layoutobject>
<ddsxmlobj>
    <property name="LogicalObject"
value="dataSet.Relations[FK_FactInternetSales_DimDate]" vartype="8" />
    <property name="Virtual" value="0" vartype="11" />
    <property name="VisibleAP" value="0" vartype="3" />
    </ddsxmlobj>
</layoutobject>
<connector lineroutestyle="MSDDS.Rectilinear" sourceid="4"
destid="1" sourceattachpoint="12" destattachpoint="9" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
    <point x="7295" y="26320" />
    <point x="7295" y="20390" />
    <point x="8436" y="20390" />
    <point x="8436" y="14425" />
</connector>
</ddscontrol>
<ddscontrol controlprogid="MSDDS.Polyline" left="6346" top="14125"
logicalid="24" controlid="9" masterid="0" hint1="0" hint2="0" width="1840" height="12695"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaulttiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
    <control>
        <ddsxmlobj>

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        <polyline endtypedst="6" endtypesrc="3" usercolor="0"
linestyle="0" linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
/>
    </ddsxmlobj>
</control>
<layoutobject>
    <ddsxmlobj>
        <property name="LogicalObject"
value="dataSet.Relations[FK_FactInternetSales_DimDate2]" vartype="8" />
        <property name="Virtual" value="0" vartype="11" />
        <property name="VisibleAP" value="0" vartype="3" />
    </ddsxmlobj>
</layoutobject>
    <connector lineroutestyle="MSDDS.Rectilinear" sourceid="4"
destid="1" sourceattachpoint="10" destattachpoint="7" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
        <point x="6745" y="26320" />
        <point x="6745" y="20390" />
        <point x="7886" y="20390" />
        <point x="7886" y="14425" />
    </connector>
</ddscontrol>
    <ddscontrol controlprogid="MSDDS.Polyline" left="5796" top="14125"
logicalid="25" controlid="10" masterid="0" hint1="0" hint2="0" width="1840" height="12695"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
    <control>
        <ddsxmlobj>
            <polyline endtypedst="6" endtypesrc="3" usercolor="0"
linestyle="0" linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
/>
        </ddsxmlobj>
    </control>
<layoutobject>
    <ddsxmlobj>
        <property name="LogicalObject"
value="dataSet.Relations[FK_FactInternetSales_DimDate1]" vartype="8" />
        <property name="Virtual" value="0" vartype="11" />
        <property name="VisibleAP" value="0" vartype="3" />
    </ddsxmlobj>
</layoutobject>
    <connector lineroutestyle="MSDDS.Rectilinear" sourceid="4"
destid="1" sourceattachpoint="8" destattachpoint="5" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
        <point x="6195" y="26320" />
        <point x="6195" y="20390" />
        <point x="7336" y="20390" />
        <point x="7336" y="14425" />
    </connector>
</ddscontrol>
    <ddscontrol controlprogid="MSDDS.Polyline" left="10451" top="13842"
logicalid="26" controlid="11" masterid="0" hint1="0" hint2="0" width="2359" height="12978"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
    <control>
        <ddsxmlobj>
            <polyline endtypedst="6" endtypesrc="3" usercolor="0"
linestyle="0" linerender="2" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
/>
        </ddsxmlobj>
    </control>
<layoutobject>
    <ddsxmlobj>
        <property name="LogicalObject"
value="dataSet.Relations[FK_FactInternetSales_DimCustomer]" vartype="8" />
        <property name="Virtual" value="0" vartype="11" />
        <property name="VisibleAP" value="0" vartype="3" />
    </ddsxmlobj>

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        </layoutobject>
        <connector lineroutestyle="MSDDS.Rectilinear" sourceid="5"
destid="1" sourceattachpoint="6" destattachpoint="35" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
            <point x="12410" y="26320" />
            <point x="12410" y="20390" />
            <point x="11828" y="20390" />
            <point x="11828" y="14142" />
            <point x="10751" y="14142" />
        </connector>
    </ddscontrol>
    <ddscontrol controlprogid="MSDDS.Polyline" left="4198" top="11560"
logicalid="27" controlid="12" masterid="0" hint1="0" hint2="0" width="2224" height="799"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
        <control>
            <ddsxmlobj>
                <polyline endtypedst="6" endtypesrc="3" usercolor="0"
linestyle="0" linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
/>
            </ddsxmlobj>
        </control>
    </layoutobject>
    <ddsxmlobj>
        <property name="LogicalObject"
value="dataSet.Relations[FK_FactInternetSales_DimSalesTerritory]" vartype="8" />
        <property name="Virtual" value="0" vartype="11" />
        <property name="VisibleAP" value="0" vartype="3" />
    </ddsxmlobj>
</layoutobject>
    <connector lineroutestyle="MSDDS.Rectilinear" sourceid="3"
destid="1" sourceattachpoint="19" destattachpoint="26" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
            <point x="4498" y="11959" />
            <point x="5698" y="11959" />
            <point x="5698" y="11942" />
            <point x="6122" y="11942" />
        </connector>
    </ddscontrol>
    <ddscontrol controlprogid="MSDDS.Polyline" left="10451" top="2101"
logicalid="28" controlid="13" masterid="0" hint1="0" hint2="0" width="3830" height="9041"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
        <control>
            <ddsxmlobj>
                <polyline endtypedst="6" endtypesrc="3" usercolor="0"
linestyle="0" linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
/>
            </ddsxmlobj>
        </control>
    </layoutobject>
    <ddsxmlobj>
        <property name="LogicalObject"
value="dataSet.Relations[FK_FactInternetSales_DimProduct]" vartype="8" />
        <property name="Virtual" value="0" vartype="11" />
        <property name="VisibleAP" value="0" vartype="3" />
    </ddsxmlobj>
</layoutobject>
    <connector lineroutestyle="MSDDS.Rectilinear" sourceid="2"
destid="1" sourceattachpoint="22" destattachpoint="23" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
            <point x="13981" y="2500" />
            <point x="12490" y="2500" />
            <point x="12490" y="10842" />
            <point x="10751" y="10842" />
        </connector>
    </ddscontrol>

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        <ddscontrol controlprogid="MSDDS.Polyline" left="15765" top="4700"
logicalid="29" controlid="14" masterid="0" hint1="0" hint2="0" width="799" height="3200"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
    <control>
        <ddsxmlobj>
            <polyline endtypedst="6" endtypesrc="3" usercolor="0"
linestyle="0" linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
/>
        </ddsxmlobj>
    </control>
</layoutobject>
<ddsxmlobj>
    <property name="LogicalObject"
value="dataSet.Relations[FK_DimProduct_DimProductSubcategory]" vartype="8" />
    <property name="Virtual" value="0" vartype="11" />
    <property name="VisibleAP" value="0" vartype="3" />
</ddsxmlobj>
</layoutobject>
<connector lineroutestyle="MSDDS.Rectilinear" sourceid="7"
destid="2" sourceattachpoint="8" destattachpoint="7" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
    <point x="16164" y="7400" />
    <point x="16164" y="5000" />
</connector>
</ddscontrol>
        <ddscontrol controlprogid="MSDDS.Polyline" left="15765" top="10672"
logicalid="30" controlid="15" masterid="0" hint1="0" hint2="0" width="799" height="3200"
noresize="0" nomove="0" nodefaultattachpoints="1" autodrag="0" usedefaultiddshape="0"
selectable="1" showselectionhandles="0" allownudging="1" isannotation="0" dontautolayout="0"
groupcollapsed="0" tabstop="1" visible="1" snaptogrid="0">
    <control>
        <ddsxmlobj>
            <polyline endtypedst="6" endtypesrc="3" usercolor="0"
linestyle="0" linerender="1" customendtypedstid="0" customendtypesrcid="0" adornsvisible="1"
/>
        </ddsxmlobj>
    </control>
</layoutobject>
<ddsxmlobj>
    <property name="LogicalObject"
value="dataSet.Relations[FK_DimProductSubcategory_DimProductCategory]" vartype="8" />
    <property name="Virtual" value="0" vartype="11" />
    <property name="VisibleAP" value="0" vartype="3" />
</ddsxmlobj>
</layoutobject>
<connector lineroutestyle="MSDDS.Rectilinear" sourceid="6"
destid="7" sourceattachpoint="8" destattachpoint="9" segmenteditmode="0"
bendpointeditmode="0" bendpointvisibility="0" relatedid="0" virtual="0">
    <point x="16164" y="13372" />
    <point x="16164" y="10972" />
</connector>
</ddscontrol>
</dds>
</DiagramLayout>
<ShowRelationshipNames>False</ShowRelationshipNames>
<UseDiagramDefaultLayout>True</UseDiagramDefaultLayout>
<DiagramViewPortLeft>4450</DiagramViewPortLeft>
<DiagramViewPortTop>7616</DiagramViewPortTop>
<DiagramBoundingLeft>0</DiagramBoundingLeft>
<DiagramBoundingTop>0</DiagramBoundingTop>
<DiagramZoom>75</DiagramZoom>
</Diagram>
</Layouts>
</Value>
</Annotation>
</Annotations>
<DataSourceID>dsAdventureWorksDW2008</DataSourceID>
<Schema>

```

```

    <xs:schema id="dsvAdventureWorksDW2008" xmlns=""
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:msdata="urn:schemas-microsoft-com:xml-
msdata" xmlns:msprop="urn:schemas-microsoft-com:xml-msprop">
    <xs:element name="dsvAdventureWorksDW2008" msdata:IsDataSet="true">
msdata:UseCurrentLocale="true">
    <xs:complexType>
    <xs:choice minOccurs="0" maxOccurs="unbounded">
    <xs:element name="dbo_FactInternetSales"
msprop:FriendlyName="FactInternetSales" msprop:DbSchemaName="dbo"
msprop:DbTableName="vwFactInternetSales" msprop:TableType="View">
    <xs:complexType>
    <xs:sequence>
    <xs:element name="ProductKey" msprop:FriendlyName="ProductKey"
msprop:DbColumnName="ProductKey" type="xs:int" />
    <xs:element name="OrderDateKey" msprop:FriendlyName="OrderDateKey"
msprop:DbColumnName="OrderDateKey" type="xs:int" />
    <xs:element name="DueDateKey" msprop:FriendlyName="DueDateKey"
msprop:DbColumnName="DueDateKey" type="xs:int" />
    <xs:element name="ShipDateKey" msprop:FriendlyName="ShipDateKey"
msprop:DbColumnName="ShipDateKey" type="xs:int" />
    <xs:element name="CustomerKey" msprop:FriendlyName="CustomerKey"
msprop:DbColumnName="CustomerKey" type="xs:int" />
    <xs:element name="SalesTerritoryKey"
msprop:FriendlyName="SalesTerritoryKey" msprop:DbColumnName="SalesTerritoryKey" type="xs:int"
/>
    <xs:element name="OrderQuantity"
msprop:FriendlyName="OrderQuantity" msprop:DbColumnName="OrderQuantity" type="xs:short" />
    <xs:element name="SalesAmount" msprop:FriendlyName="SalesAmount"
msprop:DbColumnName="SalesAmount" type="xs:decimal" />
    <xs:element name="TaxAmt" msprop:FriendlyName="TaxAmt"
msprop:DbColumnName="TaxAmt" type="xs:decimal" />
    <xs:element name="Total_x0020_Amount" msdata:ReadOnly="true"
msprop:DbColumnName="Total Amount" msprop:ComputedColumnExpression="([SalesAmount]+[TaxAmt])"
msprop:Description="" msprop:IsLogical="True" type="xs:decimal" minOccurs="0" />
    </xs:sequence>
    </xs:complexType>
    </xs:element>
    <xs:element name="dbo_DimProduct" msprop:FriendlyName="DimProduct"
msprop:DbSchemaName="dbo" msprop:DbTableName="DimProduct" msprop:TableType="Table">
    <xs:complexType>
    <xs:sequence>
    <xs:element name="ProductKey" msdata:ReadOnly="true"
msdata:AutoIncrement="true" msprop:FriendlyName="ProductKey" msprop:DbColumnName="ProductKey"
type="xs:int" />
    <xs:element name="ProductAlternateKey"
msprop:FriendlyName="ProductAlternateKey" msprop:DbColumnName="ProductAlternateKey"
minOccurs="0">
    <xs:simpleType>
    <xs:restriction base="xs:string">
    <xs:maxLength value="25" />
    </xs:restriction>
    </xs:simpleType>
    </xs:element>
    <xs:element name="ProductSubcategoryKey"
msprop:FriendlyName="ProductSubcategoryKey" msprop:DbColumnName="ProductSubcategoryKey"
type="xs:int" minOccurs="0" />
    <xs:element name="WeightUnitMeasureCode"
msprop:FriendlyName="WeightUnitMeasureCode" msprop:DbColumnName="WeightUnitMeasureCode"
minOccurs="0">
    <xs:simpleType>
    <xs:restriction base="xs:string">
    <xs:maxLength value="3" />
    </xs:restriction>
    </xs:simpleType>
    </xs:element>
    <xs:element name="SizeUnitMeasureCode"
msprop:FriendlyName="SizeUnitMeasureCode" msprop:DbColumnName="SizeUnitMeasureCode"
minOccurs="0">
    <xs:simpleType>
    <xs:restriction base="xs:string">

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        <xs:maxLength value="3" />
    </xs:restriction>
</xs:simpleType>
</xs:element>
<xs:element name="EnglishProductName"
msprop:FriendlyName="EnglishProductName" msprop:DbColumnName="EnglishProductName">
    <xs:simpleType>
        <xs:restriction base="xs:string">
            <xs:maxLength value="50" />
        </xs:restriction>
    </xs:simpleType>
</xs:element>
<xs:element name="SpanishProductName"
msprop:FriendlyName="SpanishProductName" msprop:DbColumnName="SpanishProductName">
    <xs:simpleType>
        <xs:restriction base="xs:string">
            <xs:maxLength value="50" />
        </xs:restriction>
    </xs:simpleType>
</xs:element>
<xs:element name="FrenchProductName"
msprop:FriendlyName="FrenchProductName" msprop:DbColumnName="FrenchProductName">
    <xs:simpleType>
        <xs:restriction base="xs:string">
            <xs:maxLength value="50" />
        </xs:restriction>
    </xs:simpleType>
</xs:element>
<xs:element name="StandardCost" msprop:FriendlyName="StandardCost"
msprop:DbColumnName="StandardCost" type="xs:decimal" minOccurs="0" />
<xs:element name="FinishedGoodsFlag"
msprop:FriendlyName="FinishedGoodsFlag" msprop:DbColumnName="FinishedGoodsFlag"
type="xs:boolean" />
<xs:element name="Color" msprop:FriendlyName="Color"
msprop:DbColumnName="Color">
    <xs:simpleType>
        <xs:restriction base="xs:string">
            <xs:maxLength value="15" />
        </xs:restriction>
    </xs:simpleType>
</xs:element>
<xs:element name="SafetyStockLevel"
msprop:FriendlyName="SafetyStockLevel" msprop:DbColumnName="SafetyStockLevel" type="xs:short"
minOccurs="0" />
<xs:element name="ReorderPoint" msprop:FriendlyName="ReorderPoint"
msprop:DbColumnName="ReorderPoint" type="xs:short" minOccurs="0" />
<xs:element name="ListPrice" msprop:FriendlyName="ListPrice"
msprop:DbColumnName="ListPrice" type="xs:decimal" minOccurs="0" />
<xs:element name="Size" msprop:FriendlyName="Size"
msprop:DbColumnName="Size" minOccurs="0">
    <xs:simpleType>
        <xs:restriction base="xs:string">
            <xs:maxLength value="50" />
        </xs:restriction>
    </xs:simpleType>
</xs:element>
<xs:element name="SizeRange" msprop:FriendlyName="SizeRange"
msprop:DbColumnName="SizeRange" minOccurs="0">
    <xs:simpleType>
        <xs:restriction base="xs:string">
            <xs:maxLength value="50" />
        </xs:restriction>
    </xs:simpleType>
</xs:element>
<xs:element name="Weight" msprop:FriendlyName="Weight"
msprop:DbColumnName="Weight" type="xs:double" minOccurs="0" />
<xs:element name="DaysToManufacture"
msprop:FriendlyName="DaysToManufacture" msprop:DbColumnName="DaysToManufacture" type="xs:int"
minOccurs="0" />

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        <xs:element name="ProductLine" msprop:FriendlyName="ProductLine"
msprop:DbColumnName="ProductLine" minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="2" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="DealerPrice" msprop:FriendlyName="DealerPrice"
msprop:DbColumnName="DealerPrice" type="xs:decimal" minOccurs="0" />
        <xs:element name="Class" msprop:FriendlyName="Class"
msprop:DbColumnName="Class" minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="2" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="Style" msprop:FriendlyName="Style"
msprop:DbColumnName="Style" minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="2" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="ModelName" msprop:FriendlyName="ModelName"
msprop:DbColumnName="ModelName" minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="50" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="LargePhoto" msprop:FriendlyName="LargePhoto"
msprop:DbColumnName="LargePhoto" msprop:DataSize="0" type="xs:base64Binary" minOccurs="0" />
        <xs:element name="EnglishDescription"
msprop:FriendlyName="EnglishDescription" msprop:DbColumnName="EnglishDescription"
minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="400" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="FrenchDescription"
msprop:FriendlyName="FrenchDescription" msprop:DbColumnName="FrenchDescription"
minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="400" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="ChineseDescription"
msprop:FriendlyName="ChineseDescription" msprop:DbColumnName="ChineseDescription"
minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="400" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="ArabicDescription"
msprop:FriendlyName="ArabicDescription" msprop:DbColumnName="ArabicDescription"
minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="400" />
        </xs:restriction>

```

```

        </xs:simpleType>
    </xs:element>
    <xs:element name="HebrewDescription"
msprop:FriendlyName="HebrewDescription" msprop:DbColumnName="HebrewDescription"
minOccurs="0">
        <xs:simpleType>
            <xs:restriction base="xs:string">
                <xs:maxLength value="400" />
            </xs:restriction>
        </xs:simpleType>
    </xs:element>
    <xs:element name="ThaiDescription"
msprop:FriendlyName="ThaiDescription" msprop:DbColumnName="ThaiDescription" minOccurs="0">
        <xs:simpleType>
            <xs:restriction base="xs:string">
                <xs:maxLength value="400" />
            </xs:restriction>
        </xs:simpleType>
    </xs:element>
    <xs:element name="GermanDescription"
msprop:FriendlyName="GermanDescription" msprop:DbColumnName="GermanDescription"
minOccurs="0">
        <xs:simpleType>
            <xs:restriction base="xs:string">
                <xs:maxLength value="400" />
            </xs:restriction>
        </xs:simpleType>
    </xs:element>
    <xs:element name="JapaneseDescription"
msprop:FriendlyName="JapaneseDescription" msprop:DbColumnName="JapaneseDescription"
minOccurs="0">
        <xs:simpleType>
            <xs:restriction base="xs:string">
                <xs:maxLength value="400" />
            </xs:restriction>
        </xs:simpleType>
    </xs:element>
    <xs:element name="TurkishDescription"
msprop:FriendlyName="TurkishDescription" msprop:DbColumnName="TurkishDescription"
minOccurs="0">
        <xs:simpleType>
            <xs:restriction base="xs:string">
                <xs:maxLength value="400" />
            </xs:restriction>
        </xs:simpleType>
    </xs:element>
    <xs:element name="StartDate" msprop:FriendlyName="StartDate"
msprop:DbColumnName="StartDate" type="xs:dateTime" minOccurs="0" />
    <xs:element name="EndDate" msprop:FriendlyName="EndDate"
msprop:DbColumnName="EndDate" type="xs:dateTime" minOccurs="0" />
    <xs:element name="Status" msprop:FriendlyName="Status"
msprop:DbColumnName="Status" minOccurs="0">
        <xs:simpleType>
            <xs:restriction base="xs:string">
                <xs:maxLength value="7" />
            </xs:restriction>
        </xs:simpleType>
    </xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
    <xs:element name="dbo_DimSalesTerritory"
msprop:FriendlyName="DimSalesTerritory" msprop:DbSchemaName="dbo"
msprop:DbTableName="DimSalesTerritory" msprop:TableType="Table">
        <xs:complexType>
            <xs:sequence>
                <xs:element name="SalesTerritoryKey" msdata:ReadOnly="true"
msdata:AutoIncrement="true" msprop:FriendlyName="SalesTerritoryKey"
msprop:DbColumnName="SalesTerritoryKey" type="xs:int" />

```

```

        <xs:element name="SalesTerritoryAlternateKey"
msprop:FriendlyName="SalesTerritoryAlternateKey"
msprop:DbColumnName="SalesTerritoryAlternateKey" type="xs:int" minOccurs="0" />
        <xs:element name="SalesTerritoryRegion"
msprop:FriendlyName="SalesTerritoryRegion" msprop:DbColumnName="SalesTerritoryRegion">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:maxLength value="50" />
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
        <xs:element name="SalesTerritoryCountry"
msprop:FriendlyName="SalesTerritoryCountry" msprop:DbColumnName="SalesTerritoryCountry">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:maxLength value="50" />
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
        <xs:element name="SalesTerritoryGroup"
msprop:FriendlyName="SalesTerritoryGroup" msprop:DbColumnName="SalesTerritoryGroup"
minOccurs="0">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:maxLength value="50" />
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
    </xs:sequence>
</xs:complexType>
</xs:element>
    <xs:element name="dbo_DimDate" msprop:FriendlyName="DimDate"
msprop:DbSchemaName="dbo" msprop:DbTableName="DimDate" msprop:TableType="Table">
        <xs:complexType>
            <xs:sequence>
                <xs:element name="DateKey" msprop:FriendlyName="DateKey"
msprop:DbColumnName="DateKey" type="xs:int" />
                <xs:element name="FullDateAlternateKey"
msprop:FriendlyName="FullDateAlternateKey" msprop:DbColumnName="FullDateAlternateKey"
type="xs:dateTime" />
                <xs:element name="DayNumberOfWeek"
msprop:FriendlyName="DayNumberOfWeek" msprop:DbColumnName="DayNumberOfWeek"
type="xs:unsignedByte" />
                <xs:element name="EnglishDayNameOfWeek"
msprop:FriendlyName="EnglishDayNameOfWeek" msprop:DbColumnName="EnglishDayNameOfWeek">
                    <xs:simpleType>
                        <xs:restriction base="xs:string">
                            <xs:maxLength value="10" />
                        </xs:restriction>
                    </xs:simpleType>
                </xs:element>
                <xs:element name="SpanishDayNameOfWeek"
msprop:FriendlyName="SpanishDayNameOfWeek" msprop:DbColumnName="SpanishDayNameOfWeek">
                    <xs:simpleType>
                        <xs:restriction base="xs:string">
                            <xs:maxLength value="10" />
                        </xs:restriction>
                    </xs:simpleType>
                </xs:element>
                <xs:element name="FrenchDayNameOfWeek"
msprop:FriendlyName="FrenchDayNameOfWeek" msprop:DbColumnName="FrenchDayNameOfWeek">
                    <xs:simpleType>
                        <xs:restriction base="xs:string">
                            <xs:maxLength value="10" />
                        </xs:restriction>
                    </xs:simpleType>
                </xs:element>
                <xs:element name="DayNumberOfMonth"
msprop:FriendlyName="DayNumberOfMonth" msprop:DbColumnName="DayNumberOfMonth"
type="xs:unsignedByte" />
            </xs:sequence>
        </xs:complexType>
    </xs:element>

```



```

        <xs:element name="DayNumberOfYear"
msprop:FriendlyName="DayNumberOfYear" msprop:DbColumnName="DayNumberOfYear" type="xs:short"
/>
        <xs:element name="WeekNumberOfYear"
msprop:FriendlyName="WeekNumberOfYear" msprop:DbColumnName="WeekNumberOfYear"
type="xs:unsignedByte" />
        <xs:element name="EnglishMonthName"
msprop:FriendlyName="EnglishMonthName" msprop:DbColumnName="EnglishMonthName">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="10" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="SpanishMonthName"
msprop:FriendlyName="SpanishMonthName" msprop:DbColumnName="SpanishMonthName">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="10" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="FrenchMonthName"
msprop:FriendlyName="FrenchMonthName" msprop:DbColumnName="FrenchMonthName">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="10" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="MonthNumberOfYear"
msprop:FriendlyName="MonthNumberOfYear" msprop:DbColumnName="MonthNumberOfYear"
type="xs:unsignedByte" />
        <xs:element name="CalendarQuarter"
msprop:FriendlyName="CalendarQuarter" msprop:DbColumnName="CalendarQuarter"
type="xs:unsignedByte" />
        <xs:element name="CalendarYear" msprop:FriendlyName="CalendarYear"
msprop:DbColumnName="CalendarYear" type="xs:short" />
        <xs:element name="CalendarSemester"
msprop:FriendlyName="CalendarSemester" msprop:DbColumnName="CalendarSemester"
type="xs:unsignedByte" />
        <xs:element name="FiscalQuarter"
msprop:FriendlyName="FiscalQuarter" msprop:DbColumnName="FiscalQuarter"
type="xs:unsignedByte" />
        <xs:element name="FiscalYear" msprop:FriendlyName="FiscalYear"
msprop:DbColumnName="FiscalYear" type="xs:short" />
        <xs:element name="FiscalSemester"
msprop:FriendlyName="FiscalSemester" msprop:DbColumnName="FiscalSemester"
type="xs:unsignedByte" />
        </xs:sequence>
    </xs:complexType>
</xs:element>
    <xs:element name="dbo_DimCustomer" msprop:FriendlyName="DimCustomer"
msprop:DbSchemaName="dbo" msprop:DbTableName="DimCustomer" msprop:TableType="Table">
    <xs:complexType>
    <xs:sequence>
    <xs:element name="CustomerKey" msdata:ReadOnly="true"
msdata:AutoIncrement="true" msprop:FriendlyName="CustomerKey"
msprop:DbColumnName="CustomerKey" type="xs:int" />
    <xs:element name="GeographyKey" msprop:FriendlyName="GeographyKey"
msprop:DbColumnName="GeographyKey" type="xs:int" minOccurs="0" />
    <xs:element name="CustomerAlternateKey"
msprop:FriendlyName="CustomerAlternateKey" msprop:DbColumnName="CustomerAlternateKey">
    <xs:simpleType>
    <xs:restriction base="xs:string">
    <xs:maxLength value="15" />
    </xs:restriction>
    </xs:simpleType>
    </xs:element>

```

```

        <xs:element name="Title" msprop:FriendlyName="Title"
msprop:DbColumnName="Title" minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="8" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="FirstName" msprop:FriendlyName="FirstName"
msprop:DbColumnName="FirstName" minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="50" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="MiddleName" msprop:FriendlyName="MiddleName"
msprop:DbColumnName="MiddleName" minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="50" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="LastName" msprop:FriendlyName="LastName"
msprop:DbColumnName="LastName" minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="50" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="NameStyle" msprop:FriendlyName="NameStyle"
msprop:DbColumnName="NameStyle" type="xs:boolean" minOccurs="0" />
        <xs:element name="BirthDate" msprop:FriendlyName="BirthDate"
msprop:DbColumnName="BirthDate" type="xs:dateTime" minOccurs="0" />
        <xs:element name="MaritalStatus"
msprop:FriendlyName="MaritalStatus" msprop:DbColumnName="MaritalStatus" minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="1" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="Suffix" msprop:FriendlyName="Suffix"
msprop:DbColumnName="Suffix" minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="10" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="Gender" msprop:FriendlyName="Gender"
msprop:DbColumnName="Gender" minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="1" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="EmailAddress" msprop:FriendlyName="EmailAddress"
msprop:DbColumnName="EmailAddress" minOccurs="0">
        <xs:simpleType>
        <xs:restriction base="xs:string">
        <xs:maxLength value="50" />
        </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="YearlyIncome" msprop:FriendlyName="YearlyIncome"
msprop:DbColumnName="YearlyIncome" type="xs:decimal" minOccurs="0" />

```

```

        <xs:element name="TotalChildren"
msprop:FriendlyName="TotalChildren" msprop:DbColumnName="TotalChildren"
type="xs:unsignedByte" minOccurs="0" />
        <xs:element name="NumberChildrenAtHome"
msprop:FriendlyName="NumberChildrenAtHome" msprop:DbColumnName="NumberChildrenAtHome"
type="xs:unsignedByte" minOccurs="0" />
        <xs:element name="EnglishEducation"
msprop:FriendlyName="EnglishEducation" msprop:DbColumnName="EnglishEducation" minOccurs="0">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:maxLength value="40" />
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
        <xs:element name="SpanishEducation"
msprop:FriendlyName="SpanishEducation" msprop:DbColumnName="SpanishEducation" minOccurs="0">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:maxLength value="40" />
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
        <xs:element name="FrenchEducation"
msprop:FriendlyName="FrenchEducation" msprop:DbColumnName="FrenchEducation" minOccurs="0">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:maxLength value="40" />
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
        <xs:element name="EnglishOccupation"
msprop:FriendlyName="EnglishOccupation" msprop:DbColumnName="EnglishOccupation"
minOccurs="0">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:maxLength value="100" />
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
        <xs:element name="SpanishOccupation"
msprop:FriendlyName="SpanishOccupation" msprop:DbColumnName="SpanishOccupation"
minOccurs="0">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:maxLength value="100" />
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
        <xs:element name="FrenchOccupation"
msprop:FriendlyName="FrenchOccupation" msprop:DbColumnName="FrenchOccupation" minOccurs="0">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:maxLength value="100" />
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
        <xs:element name="HouseOwnerFlag"
msprop:FriendlyName="HouseOwnerFlag" msprop:DbColumnName="HouseOwnerFlag" minOccurs="0">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:maxLength value="1" />
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
        <xs:element name="NumberCarsOwned"
msprop:FriendlyName="NumberCarsOwned" msprop:DbColumnName="NumberCarsOwned"
type="xs:unsignedByte" minOccurs="0" />
        <xs:element name="AddressLine1" msprop:FriendlyName="AddressLine1"
msprop:DbColumnName="AddressLine1" minOccurs="0">
            <xs:simpleType>

```

```

        <xs:restriction base="xs:string">
          <xs:maxLength value="120" />
        </xs:restriction>
      </xs:simpleType>
    </xs:element>
    <xs:element name="AddressLine2" msprop:FriendlyName="AddressLine2"
msprop:DbColumnName="AddressLine2" minOccurs="0">
      <xs:simpleType>
        <xs:restriction base="xs:string">
          <xs:maxLength value="120" />
        </xs:restriction>
      </xs:simpleType>
    </xs:element>
    <xs:element name="Phone" msprop:FriendlyName="Phone"
msprop:DbColumnName="Phone" minOccurs="0">
      <xs:simpleType>
        <xs:restriction base="xs:string">
          <xs:maxLength value="20" />
        </xs:restriction>
      </xs:simpleType>
    </xs:element>
    <xs:element name="DateFirstPurchase"
msprop:FriendlyName="DateFirstPurchase" msprop:DbColumnName="DateFirstPurchase"
type="xs:dateTime" minOccurs="0" />
    <xs:element name="CommuteDistance"
msprop:FriendlyName="CommuteDistance" msprop:DbColumnName="CommuteDistance" minOccurs="0">
      <xs:simpleType>
        <xs:restriction base="xs:string">
          <xs:maxLength value="15" />
        </xs:restriction>
      </xs:simpleType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
</xs:element>
  <xs:element name="dbo_DimProductCategory"
msprop:FriendlyName="DimProductCategory" msprop:DbSchemaName="dbo"
msprop:DbTableName="DimProductCategory" msprop:TableType="Table">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="ProductCategoryKey" msdata:ReadOnly="true"
msdata:AutoIncrement="true" msprop:FriendlyName="ProductCategoryKey"
msprop:DbColumnName="ProductCategoryKey" type="xs:int" />
      <xs:element name="ProductCategoryAlternateKey"
msprop:FriendlyName="ProductCategoryAlternateKey"
msprop:DbColumnName="ProductCategoryAlternateKey" type="xs:int" minOccurs="0" />
      <xs:element name="EnglishProductCategoryName"
msprop:FriendlyName="EnglishProductCategoryName"
msprop:DbColumnName="EnglishProductCategoryName">
        <xs:simpleType>
          <xs:restriction base="xs:string">
            <xs:maxLength value="50" />
          </xs:restriction>
        </xs:simpleType>
      </xs:element>
      <xs:element name="SpanishProductCategoryName"
msprop:FriendlyName="SpanishProductCategoryName"
msprop:DbColumnName="SpanishProductCategoryName">
        <xs:simpleType>
          <xs:restriction base="xs:string">
            <xs:maxLength value="50" />
          </xs:restriction>
        </xs:simpleType>
      </xs:element>
      <xs:element name="FrenchProductCategoryName"
msprop:FriendlyName="FrenchProductCategoryName"
msprop:DbColumnName="FrenchProductCategoryName">
        <xs:simpleType>
          <xs:restriction base="xs:string">
            <xs:maxLength value="50" />
          </xs:restriction>
        </xs:simpleType>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
</xs:element>

```

```

        </xs:restriction>
    </xs:simpleType>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="dbo_DimProductSubcategory"
msprop:FriendlyName="DimProductSubcategory" msprop:DbSchemaName="dbo"
msprop:DbTableName="DimProductSubcategory" msprop:TableType="Table">
    <xs:complexType>
        <xs:sequence>
            <xs:element name="ProductSubcategoryKey" msdata:ReadOnly="true"
msdata:AutoIncrement="true" msprop:FriendlyName="ProductSubcategoryKey"
msprop:DbColumnName="ProductSubcategoryKey" type="xs:int" />
            <xs:element name="ProductSubcategoryAlternateKey"
msprop:FriendlyName="ProductSubcategoryAlternateKey"
msprop:DbColumnName="ProductSubcategoryAlternateKey" type="xs:int" minOccurs="0" />
            <xs:element name="EnglishProductSubcategoryName"
msprop:FriendlyName="EnglishProductSubcategoryName"
msprop:DbColumnName="EnglishProductSubcategoryName">
                <xs:simpleType>
                    <xs:restriction base="xs:string">
                        <xs:maxLength value="50" />
                    </xs:restriction>
                </xs:simpleType>
            </xs:element>
            <xs:element name="SpanishProductSubcategoryName"
msprop:FriendlyName="SpanishProductSubcategoryName"
msprop:DbColumnName="SpanishProductSubcategoryName">
                <xs:simpleType>
                    <xs:restriction base="xs:string">
                        <xs:maxLength value="50" />
                    </xs:restriction>
                </xs:simpleType>
            </xs:element>
            <xs:element name="FrenchProductSubcategoryName"
msprop:FriendlyName="FrenchProductSubcategoryName"
msprop:DbColumnName="FrenchProductSubcategoryName">
                <xs:simpleType>
                    <xs:restriction base="xs:string">
                        <xs:maxLength value="50" />
                    </xs:restriction>
                </xs:simpleType>
            </xs:element>
            <xs:element name="ProductCategoryKey"
msprop:FriendlyName="ProductCategoryKey" msprop:DbColumnName="ProductCategoryKey"
type="xs:int" minOccurs="0" />
        </xs:sequence>
    </xs:complexType>
</xs:element>
</xs:choice>
</xs:complexType>
<xs:unique name="Constraint1" msdata:PrimaryKey="true">
    <xs:selector xpath="//dbo_DimProduct" />
    <xs:field xpath="ProductKey" />
</xs:unique>
<xs:unique name="dbo_DimSalesTerritory_Constraint1"
msdata:ConstraintName="Constraint1" msdata:PrimaryKey="true">
    <xs:selector xpath="//dbo_DimSalesTerritory" />
    <xs:field xpath="SalesTerritoryKey" />
</xs:unique>
<xs:unique name="dbo_DimDate_Constraint1" msdata:ConstraintName="Constraint1"
msdata:PrimaryKey="true">
    <xs:selector xpath="//dbo_DimDate" />
    <xs:field xpath="DateKey" />
</xs:unique>
<xs:unique name="dbo_DimCustomer_Constraint1"
msdata:ConstraintName="Constraint1" msdata:PrimaryKey="true">
    <xs:selector xpath="//dbo_DimCustomer" />
    <xs:field xpath="CustomerKey" />

```

```

        </xs:unique>
        <xs:unique name="dbo_DimProductCategory_Constraint1"
msdata:ConstraintName="Constraint1" msdata:PrimaryKey="true">
        <xs:selector xpath="//dbo_DimProductCategory" />
        <xs:field xpath="ProductCategoryKey" />
        </xs:unique>
        <xs:unique name="dbo_DimProductSubcategory_Constraint1"
msdata:ConstraintName="Constraint1" msdata:PrimaryKey="true">
        <xs:selector xpath="//dbo_DimProductSubcategory" />
        <xs:field xpath="ProductSubcategoryKey" />
        </xs:unique>
        <xs:keyref name="FK_DimProductSubcategory_DimProductCategory"
refer="dbo_DimProductCategory_Constraint1">
        <xs:selector xpath="//dbo_DimProductSubcategory" />
        <xs:field xpath="ProductCategoryKey" />
        </xs:keyref>
        <xs:keyref name="FK_DimProduct_DimProductSubcategory"
refer="dbo_DimProductSubcategory_Constraint1">
        <xs:selector xpath="//dbo_DimProduct" />
        <xs:field xpath="ProductSubcategoryKey" />
        </xs:keyref>
        <xs:keyref name="FK_FactInternetSales_DimDate"
refer="dbo_DimDate_Constraint1">
        <xs:selector xpath="//dbo_FactInternetSales" />
        <xs:field xpath="OrderDateKey" />
        </xs:keyref>
        <xs:keyref name="FK_FactInternetSales_DimDate2"
refer="dbo_DimDate_Constraint1">
        <xs:selector xpath="//dbo_FactInternetSales" />
        <xs:field xpath="ShipDateKey" />
        </xs:keyref>
        <xs:keyref name="FK_FactInternetSales_DimDate1"
refer="dbo_DimDate_Constraint1">
        <xs:selector xpath="//dbo_FactInternetSales" />
        <xs:field xpath="DueDateKey" />
        </xs:keyref>
        <xs:keyref name="FK_FactInternetSales_DimCustomer"
refer="dbo_DimCustomer_Constraint1">
        <xs:selector xpath="//dbo_FactInternetSales" />
        <xs:field xpath="CustomerKey" />
        </xs:keyref>
        <xs:keyref name="FK_FactInternetSales_DimSalesTerritory"
refer="dbo_DimSalesTerritory_Constraint1">
        <xs:selector xpath="//dbo_FactInternetSales" />
        <xs:field xpath="SalesTerritoryKey" />
        </xs:keyref>
        <xs:keyref name="FK_FactInternetSales_DimProduct" refer="Constraint1">
        <xs:selector xpath="//dbo_FactInternetSales" />
        <xs:field xpath="ProductKey" />
        </xs:keyref>
    </xs:element>
</xs:schema>
<diffgr:diffgram xmlns:msdata="urn:schemas-microsoft-com:xml-msdata"
xmlns:diffgr="urn:schemas-microsoft-com:xml-diffgram-v1" />
</Schema>
</DataSourceView>
</DataSourceViews>
<Roles>
    <Role>
        <ID>Role</ID>
        <Name>StudentAdmin</Name>
        <Members>
            <Member>
                <Name>NY-SQL-02\Student</Name>
                <Sid>S-1-5-21-170207-3540798901-1547344715-1000</Sid>
            </Member>
        </Members>
    </Role>
</Roles>
<DatabasePermissions>

```

```

    <DatabasePermission>
      <ID>DatabasePermission</ID>
      <Name>DatabasePermission</Name>
      <RoleID>Role</RoleID>
      <Process>>true</Process>
      <ReadDefinition>Allowed</ReadDefinition>
      <Read>Allowed</Read>
      <Administer>>true</Administer>
    </DatabasePermission>
  </DatabasePermissions>
</Database>
</ObjectDefinition>
</Create>

```

4.14.2 Server Response

The server responds with the results of the **Create** command.

```

<return xmlns="urn:schemas-microsoft-com:xml-analysis">
  <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
</return>

```

4.15 Alter

In this example, the client sends an **XMLA Alter** command to the server.

4.15.1 Client Sends Request

The client sends the following request:

```

<Alter xmlns="http://schemas.microsoft.com/analysiservices/2003/engine">
  <Object>
    <DatabaseID>AdventureWorks_SSAS_Alter</DatabaseID>
    <DimensionID>Dim Customer</DimensionID>
  </Object>
  <ObjectDefinition>
    <Dimension xmlns:xsd="http://www.w3.org/2001/XMLSchema"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xmlns:ddl2="http://schemas.microsoft.com/analysiservices/2003/engine/2"
      xmlns:ddl2_2="http://schemas.microsoft.com/analysiservices/2003/engine/2/2"
      xmlns:ddl100_100="http://schemas.microsoft.com/analysiservices/2008/engine/100/100">
      <ID>Dim Customer</ID>
      <Name>Customer</Name>
      <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramLayout</Name>
      <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowFriendlyNames</Name>
      <Value>>true</Value>
      <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:ShowRelationshipNames</Name>
      <Value>>false</Value>
      <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:UseDiagramDefaultLayout</Name>
      <Value>>true</Value>
      <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortLeft</Name>
      <Value>0</Value>
      <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramViewPortTop</Name>
      <Value>0</Value>
      <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingLeft</Name>
      <Value>0</Value>
    </Dimension>
  </ObjectDefinition>
</Alter>

```

```

<Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramBoundingTop</Name>
  <Value>0</Value>
  <Name>http://schemas.microsoft.com/DataWarehouse/Designer/1.0:DiagramZoom</Name>
  <Value>100</Value>
  <Source xsi:type="DataSourceViewBinding">
    <DataSourceViewID>dsvAdventureWorksDW2008</DataSourceViewID>
  </Source>
  <ErrorConfiguration>
    <KeyNotFound>ReportAndStop</KeyNotFound>
    <KeyDuplicate>ReportAndStop</KeyDuplicate>
    <NullKeyNotAllowed>ReportAndStop</NullKeyNotAllowed>
  </ErrorConfiguration>
  <Language>1033</Language>
  <Collation>Latin1_General_CI_AS</Collation>
  <UnknownMemberName>Unknown</UnknownMemberName>
  <Attributes>
    <Attribute>
      <ID>Customer Key</ID>
      <Name>Customer Key</Name>
      <Usage>Key</Usage>
      <EstimatedCount>18484</EstimatedCount>
      <KeyColumns>
        <KeyColumn>
          <DataType>Integer</DataType>
          <Source xsi:type="ColumnBinding">
            <TableID>dbo_DimCustomer</TableID>
            <ColumnID>CustomerKey</ColumnID>
          </Source>
        </KeyColumn>
      </KeyColumns>
      <NameColumn>
        <DataType>WChar</DataType>
        <Source xsi:type="ColumnBinding">
          <TableID>dbo_DimCustomer</TableID>
          <ColumnID>CustomerKey</ColumnID>
        </Source>
      </NameColumn>
      <OrderBy>Key</OrderBy>
    </Attribute>
  </Attributes>
  <ProactiveCaching>
    <SilenceInterval>-PT1S</SilenceInterval>
    <Latency>-PT1S</Latency>
    <SilenceOverrideInterval>-PT1S</SilenceOverrideInterval>
    <ForceRebuildInterval>-PT1S</ForceRebuildInterval>
    <Source xsi:type="ProactiveCachingInheritedBinding"/>
  </ProactiveCaching>
</Dimension>
</ObjectDefinition>
</Alter>

```

4.15.2 Server Response

The server responds with the results of the **Alter** command:

```

<return xmlns="urn:schemas-microsoft-com:xml-analysis">
  <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
</return>

```

4.16 Delete

In this example, the client sends an **XMLA Delete** command to the server.

4.16.1 Client Sends Request

The client sends the following request:

```
<Delete xmlns="http://schemas.microsoft.com/analysiservices/2003/engine">
  <Object>
    <DatabaseID>AdventureWorksDW2008_Create</DatabaseID>
  </Object>
</Delete>
```

4.16.2 Server Response

The server responds with the results of the **Delete** command:

```
<return xmlns="urn:schemas-microsoft-com:xml-analysis">
  <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
</return>
```

4.17 Process

In this example, the client sends an **XMLA Process** command to the server.

4.17.1 Client Sends Request

The client sends the following request:

```
<Process xmlns="http://schemas.microsoft.com/analysiservices/2003/engine">
  <Object>
    <DatabaseID>AdventureWorks_SSAS</DatabaseID>
  </Object>
  <Type>ProcessFull</Type>
  <WriteBackTableCreation>UseExisting</WriteBackTableCreation>
</Process>
```

4.17.2 Server Response

The server responds with the results of the **Process** command:

```
<return xmlns="urn:schemas-microsoft-com:xml-analysis">
  <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty">
    <Messages xmlns="urn:schemas-microsoft-com:xml-analysis:exception">
      <Warning WarningCode="1091960948" Description="Informational (Data mining): Decision
Trees found no splits for model, Dim Product." Source="Microsoft SQL Server 2008 Analysis
Services" HelpFile="" />
    </Messages>
  </root>
</return>
```

4.18 Backup

In this example, the client sends an **XMLA Backup** command to the server.

4.18.1 Client Sends Request

The client sends the following request:

```

<Backup xmlns="http://schemas.microsoft.com/analysiservices/2003/engine">
  <Object>
    <DatabaseID>AdventureWorks_SSAS</DatabaseID>
  </Object>
  <File>C:\Program Files\Microsoft SQL
Server\MSAS10.MSSQLSERVER\OLAP\Backup\AdventureWorks_SSAS.abf</File>
  <Password>pw</Password>
</Backup>

```

4.18.2 Server Response

The server responds with the results of the **Backup** command:

```

<return xmlns="urn:schemas-microsoft-com:xml-analysis">
  <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
</return>

```

4.19 Restore

In this example, the client sends an **XMLA Restore** command to the server.

4.19.1 Client Sends Request

The client sends the following request:

```

<Restore xmlns="http://schemas.microsoft.com/analysiservices/2003/engine">
  <File>C:\Program Files\Microsoft SQL
Server\MSAS10.MSSQLSERVER\OLAP\Backup\AdventureWorks_SSAS.abf</File>
  <DatabaseName>AdventureWorksDW2008_Create</DatabaseName>
  <AllowOverwrite>true</AllowOverwrite>
  <Password>pw</Password>
</Restore>

```

4.19.2 Server Response

The server responds with the results of the **Restore** command:

```

<return xmlns="urn:schemas-microsoft-com:xml-analysis">
  <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
</return>

```

4.20 Begin Transaction

In this example, the client sends an **XMLA BeginTransaction** command to the server.

4.20.1 Client Sends Request

The client sends the following request:

```

<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <BeginSession xmlns="urn:schemas-microsoft-com:xml-analysis"/>
  </Header>
  <Body>
    <Execute xmlns="urn:schemas-microsoft-com:xml-analysis">

```

```

<Command>
  <BeginTransaction xmlns="http://schemas.microsoft.com/analysisisservices/2003/engine">
  </BeginTransaction>
</Command>
<Properties>
  <PropertyList>
    <LocaleIdentifier>1033</LocaleIdentifier>
  </PropertyList>
</Properties>
</Execute>
</Body>
</Envelope>

```

4.20.2 Server Response

The server responds with the results of the **BeginTransaction** command.

```

<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Header>
    <Session xmlns="urn:schemas-microsoft-com:xml-analysis" SessionId="DB0399CD-5B61-40C9-89E1-8C673280F885" />
  </soap:Header>
  <soap:Body>
    <ExecuteResponse xmlns="urn:schemas-microsoft-com:xml-analysis">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
      </return>
    </ExecuteResponse>
  </soap:Body>
</soap:Envelope>

```

4.21 Commit Transaction

In this example, the client sends an **XMLA CommitTransaction** command to the server.

4.21.1 Client Sends Request

The client sends the following request:

```

<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <Session xmlns="urn:schemas-microsoft-com:xml-analysis" SessionId="34B67555-85B9-46CE-8803-4BEC7D6AEE13" />
  </Header>
  <Body>
    <Execute xmlns="urn:schemas-microsoft-com:xml-analysis">
      <Command>
        <CommitTransaction xmlns="http://schemas.microsoft.com/analysisisservices/2003/engine" />
      </Command>
    </Execute>
  </Body>
</Envelope>

```

4.21.2 Server Response

The server responds with the results of the **CommitTransaction** command.

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <ExecuteResponse xmlns="urn:schemas-microsoft-com:xml-analysis">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
      </return>
    </ExecuteResponse>
  </soap:Body>
</soap:Envelope>
```

4.22 Rollback Transaction

In this example, the client sends an **XMLA RollbackTransaction** command to the server.

4.22.1 Client Sends Request

The client sends the following request:

```
<Envelope xmlns="http://schemas.xmlsoap.org/soap/envelope/">
  <Header>
    <Session xmlns="urn:schemas-microsoft-com:xml-analysis"
      SessionId="34B67555-85B9-46CE-8803-4BEC7D6AEE13" />
  </Header>
  <Body>
    <Execute xmlns="urn:schemas-microsoft-com:xml-analysis">
      <Command>
        <RollbackTransaction
xmlns="http://schemas.microsoft.com/analysisservices/2003/engine" />
      </Command>
      <Properties>
        <PropertyList>
          <LocaleIdentifier>1033</LocaleIdentifier>
        </PropertyList>
      </Properties>
    </Execute>
  </Body>
</Envelope>
```

4.22.2 Server Response

The server responds with the results of the **RollbackTransaction** command:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <ExecuteResponse xmlns="urn:schemas-microsoft-com:xml-analysis">
      <return>
        <root xmlns="urn:schemas-microsoft-com:xml-analysis:empty" />
      </return>
    </ExecuteResponse>
  </soap:Body>
</soap:Envelope>
```

5 Security

5.1 Security Considerations for Implementers

The server could be returning potentially sensitive data in its responses. Therefore, it is strongly recommended that the server be configured to use GSS-API based encryption over TCP or Secure Sockets Layer (SSL) over HTTPS to ensure the integrity of the data and to prevent tampering and unauthorized access.

There are two strategies for reducing the impact of denial-of-service (DOS) attacks against the server:

- Turn on authentication and deny access to unauthenticated clients. This will allow a user to quickly disable access to rogue client machines.
- Make sure that no single request takes too much processing time on the server. That will ensure that any attacker needs to maintain a steady stream of requests to deny access to the server. Therefore, a simple network trace will allow one to identify the offending machine and shut it down. This applies to requests sent by "spoof clients" (for example, a virus emulating a client that might try to pass an unbounded request or a long-running MDX query).

5.2 Index of Security Parameters

None.

6 (Updated Section) Appendix A: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include updates to those products.

- Microsoft Office 2010 system
- Microsoft Office 2013 system
- Microsoft Office 2016
- Microsoft Office 2019
- Microsoft SQL Server 2005
- Microsoft SQL Server 2008
- Microsoft SQL Server 2008 R2
- Microsoft SQL Server 2012
- Microsoft SQL Server 2014
- Microsoft SQL Server 2016
- Microsoft SQL Server 2017
- Microsoft SQL Server 2019

Exceptions, if any, are noted in this section. If an update version, service pack or Knowledge Base (KB) number appears with a product name, the behavior changed in that update. The new behavior also applies to subsequent updates unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms "SHOULD" or "SHOULD NOT" implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term "MAY" implies that the product does not follow the prescription.

<1> Section 2.1.1: Microsoft SQL Server Analysis Services does break down DIME messages into multiple records.

<2> Section 2.1.1: Analysis Services sets the RESERVED field in the DIME record to 0.

<3> Section 2.1.1: By default, Analysis Services uses the content type **application/sx+express**. However, it can be configured to use the other content types (**text/xml**, **application/sx**, or **application/xml+express**).

<4> Section 2.1.2: With the exception of Microsoft SQL Server 2005 Analysis Services and Microsoft SQL Server 2008 Analysis Services, Microsoft SQL Server supports HTTP connectivity by using the following format, where DataSource points to an Analysis Services database on PowerPivot for SharePoint along with the corresponding locale ID. The client application can optionally include an initial XMLA message as the body of the POST.

```
POST
http://mysharepointsite/_vti_bin/PowerPivot/Redirector.svc/?DataSource=/PowerPivot%20Gallery/MyPPWorkbook.xlsx&LocaleID=1033 HTTP/1.1
```

The client receives the database ID from Analysis Services. The database ID needs to be included in subsequent POSTs. The following is an example of the post with the database ID.

```
POST http:// mysharepointsite/_vti_bin/PowerPivot/Redirector.svc/?DatabaseId=26551F5D-C357-48AD-B3D0-FABBF4E795C HTTP/1.1
```

<5> Section 2.1.2: X-AS-ActivityID is used only when an Analysis Services client is connecting to Office 365. X-AS-ActivityID is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to Microsoft SQL Server 2012 Service Pack 1 (SP1).

<6> Section 2.1.2: X-AS-GetSessionToken is used only when an Analysis Services client is connecting to Office 365. X-AS-GetSessionToken is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<7> Section 2.1.2: X-AS-RequestID is used only when an Analysis Services client is connecting to Office 365. X-AS-RequestID is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<8> Section 2.1.2: X-AS-SessionID is used only when an Analysis Services client is connecting to Office 365. X-AS-SessionID is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<9> Section 2.1.2: Content-Encoding is used only when an Analysis Services client is connecting to Office 365. Content-Encoding is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<10> Section 2.1.2: Authorization is used only when an Analysis Services client is connecting to Office 365. Authorization is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<11> Section 2.2.1: The eng100 namespace is not supported by SQL Server 2005.

<12> Section 2.2.1: The eng100_100 namespace is not supported by SQL Server 2005.

<13> Section 2.2.1: The eng200 namespace is not supported by SQL Server 2005 and SQL Server 2008.

<14> Section 2.2.1: The eng200_200 namespace is not supported by SQL Server 2005 and SQL Server 2008.

<15> Section 2.2.1: The eng300 namespace is not supported by SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2.

<16> Section 2.2.1: The eng300_300 namespace is not supported by SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2.

<17> Section 2.2.1: The eng400 namespace is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<18> Section 2.2.1: The eng400_400 namespace is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<19> Section 2.2.1: The eng500 namespace is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, and SQL Server 2014.

<20> Section 2.2.1: The eng500_500 namespace is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, and SQL Server 2014.

<21> Section 2.2.1: The eng600 namespace is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, and SQL Server 2016.

<22> Section 2.2.1: The eng600_600 namespace is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, and SQL Server 2016.

<23> Section 2.2.1: The eng800 namespace is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, SQL Server 2016, and SQL Server 2017.

<24> Section 2.2.1: The eng800_800 namespace is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, SQL Server 2016, and SQL Server 2017.

<25> Section 2.2.4.1.1.2.1.1: Analysis Services supports only the **Tuples** set type. It does not support **Members**, **CrossProduct**, and **Union** set types.

<26> Section 2.2.4.1.1.2.1.2: The **NormType** model group is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1. The **NormType** model group is supported only when Analysis Services is running in Tabular mode. However, Analysis Services always returns the **SetType** model group, even when the MDX query statement is sent with the **DbpropMsmdOptimizeResponse** property set to "7".

<27> Section 2.2.4.1.1.2.1.2.1: The **MetadatasType** type is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1. The **MetadatasType** type is supported only when Analysis Services is running in Tabular mode.

<28> Section 2.2.4.1.1.2.1.2.2: The **MetadataType** type is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1. The **MetadataType** type is supported only when Analysis Services is running in Tabular mode.

<29> Section 2.2.4.1.1.2.1.2.2: The **MemberFormatString** attribute is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<30> Section 2.2.4.1.1.2.1.2.3: The **TuplesNormType** type is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1. The **TuplesNormType** type is supported only when Analysis Services is running in Tabular mode.

<31> Section 2.2.4.1.1.2.1.2.4: The **KeysNormType** type is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1. The **KeysNormType** type is supported only when Analysis Services is running in Tabular mode.

<32> Section 2.2.4.1.1.2.1.2.5: The **KeyNormType** type is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1. The **KeyNormType** type is supported only when Analysis Services is running in Tabular mode.

<33> Section 2.2.4.1.1.2.1.2.6: The **MeasureFormatStringsNormType** attribute is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1. The **MeasureFormatStringsNormType** type is supported only when Analysis Services is running in Tabular mode.

<34> Section 2.2.4.1.1.2.1.2.7: The **MeasureFormatStringNormType** attribute is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1. The **MeasureFormatStringNormType** type is supported only when Analysis Services is running in Tabular mode.

<35> Section 2.2.4.2.1.1: Analysis Services has additional rules that apply to names and IDs:

- The maximum number of characters is 100.
- There are no special requirements for the first character of an identifier. Same rules as for other valid characters apply.
- The following reserved names are not to be used:

- AUX
 - CLOCK\$
 - COM1 through COM9 (COM1, COM2, COM3, and so on)
 - CON
 - LPT1 through LPT9 (LPT1, LPT2, LPT3, and so on)
 - NUL
 - PRN
- NULL is not used as a character in any string within the XML.

The following table lists invalid characters for each type of object:

| Object | Invalid Characters |
|-------------------------|---|
| Server | The name has to follow the rules that are supported by the Windows operating system for computer names. (IP addresses are not valid.) |
| Data Source | : / \ * ? " () [] { } < > |
| Level and Attribute | , , ; ' ` : / \ * ? " & % \$! + = [] { } < > |
| Dimension and Hierarchy | , , ; ' ` : / \ * ? " & % \$! + = () [] { } < , > |
| All other objects | , , ; ' ` : / \ * ? " & % \$! + = () [] { } < > |

A DataSource reference that consists of a single period means the current database of the current analysis server. For example, DataSourceID./DataSourceID points to the current database of the current analysis server instance.

<36> Section 2.2.4.2.1.1: When the deployment mode of a server that is running Analysis Services is set to 1 or 2 and the database compatibility level is set to 1103 or higher, the name validation is relaxed. That is, for the **DimensionAttribute**, **Hierarchy**, **Level**, **Measure** (which is a DAX measure that is declared in **MdxScript**), and **KPI** objects, the characters , ; ' ` : / \ * | ? " & % \$! + = [] { } < > () are valid and the reserved names AUX and COM1 through COM9 (COM1, COM2, COM3, and so on) can be used. This behavior is not supported in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<37> Section 2.2.4.2.1.2: In Analysis Services, the following cases are handled by the server when they are encountered and they are the values of string elements:

- Leading and trailing white space is trimmed.
- Internal white space is preserved.
- The following characters are stripped out:
 - Values below 0x20 (except 0x09, 0x0A, and 0x0D).
 - Values above and including 0x110000.

<38> Section 2.2.4.2.1.4: Analysis Services does not enforce that elements be in a stated sequence.

<39> Section 2.2.4.2.2.2: In Analysis Services, the ID for the edition is obtained from sqlboot.dll Zero for local cubes.

<40> Section 2.2.4.2.2.2: In Analysis Services, the product version is obtained from sqlver.h.

<41> Section 2.2.4.2.2.2.1: Server properties that are supported by Analysis Services are described in the following table.

Note Some of the properties in this table are returned by DISCOVER_XML_METADATA. If a property is not returned by DISCOVER_XML_METADATA, it can be found in the configuration file on a server that is running Analysis Services. This file is named msmdsrv.ini and can be found in the installation folder tree after the product is installed.

| Property | Default value | Description |
|----------------------------|---------------|--|
| AdminTimeout | 0 | A signed 32-bit integer property that defines the administrator timeout in seconds. |
| AllowedBrowsingFolders | "\data" | A string property that defines the names of the folders where logs, backups, and other objects are allowed to be created on the server, in the form of a comma-separated list. |
| BackupDir | Empty | A string property that identifies the name of the directory where backup files are created by default, in the event a path is not specified as part of the Backup command. |
| CollationName | Empty | A string property that identifies the server collation. For more information, see [MSDN-LCAS]. |
| CommitTimeout | 0 | A signed 32-bit integer property that defines the number of milliseconds before pending commit operations time out. Zero indicates that the server will not time out commit operations. |
| CoordinatorBuildMaxThreads | 4 | A signed 32-bit integer property that defines the maximum number of threads allocated to building partition indexes. Increase this value in order to speed-up partition indexing, at the cost of memory usage. |
| CoordinatorCancelCount | 1000 | A signed 32-bit integer property that defines how frequently the server is to check whether a Cancel event occurred (based on internal iteration count). Decrease this number in order to check for Cancel more frequently, at the expense of general performance. |
| CoordinatorExecutionMode | -4 | A signed 32-bit integer property that defines the maximum number of parallel operations the server will attempt, including processing and querying operations. Zero (0) indicates that the server will decide, based on an internal algorithm. A positive number indicates the maximum number of operations in total. A negative number, with the sign reversed, indicates the maximum number of operations per processor. |

| Property | Default value | Description |
|---------------------------|---------------|--|
| DataDir | "\data" | A string property that identifies the name of the directory where data is stored. |
| ExternalCommandTimeout | 3600 | A signed 32-bit integer property that defines the timeout, in seconds, for commands issued to external servers, including relational data sources and external servers that are running Analysis Services. |
| ExternalConnectionTimeout | 60 | A signed 32-bit integer property that defines the timeout, in seconds, for creating connections to external servers, including relational data sources and external servers that are running Analysis Services. |
| ForceCommitTimeout | 30000 | A signed 32-bit integer property that defines the timeout, in milliseconds, before a commit is to cancel other commands that preceded the current command, including queries in process. |
| IdleConnectionTimeout | 0 | A signed 32-bit integer property that defines the idle connection timeout, in seconds. The value zero (0) indicates that idle connections will not be timed out. |
| IdleOrphanSessionTimeout | 120 | A signed 32-bit integer property that defines how long orphaned sessions will be retained in server memory in seconds. |
| InstanceVisible | true | When true, indicates that the server instance is visible to discover instance requests; otherwise, false. |
| Language | 0 | A string property that defines the language, including error messages and number formatting. This property overrides the CollationName property. Blank indicates that the CollationName property defines the language. |
| LogDir | Empty | A string property that identifies the name of the directory that contains server logs. This property only applies when disk files are used for logging, as opposed to database tables (the default behavior). |
| MaxIdleSessionTimeout | 0 | A signed 32-bit integer property that defines the maximum idle session timeout, in seconds. |
| MinIdleSessionTimeout | 2700 | A signed 32-bit integer property that defines the minimum time, in seconds, that idle sessions will timeout. After this time expires, the server is permitted to end the idle session, but will only do so as memory is needed. |
| Port | 0 | A signed 32-bit integer property that defines the port number on which server will listen for client connections. If not set, |

| Property | Default value | Description |
|---|---------------|---|
| | | server dynamically finds first unused port. Zero (0) means that port 2383 will be used. |
| ServerTimeout | 3600 | A signed 32-bit integer property that defines the timeout in seconds for queries. |
| TempDir | Empty | A string property that identifies the name of the directory for defining temporary files used for processing, restoring, and other operations. If not specified, the default is the Data directory. |
| DataMining\Algorithms\Microsoft_Association_Rules\Enabled | true | When true, indicates that the Microsoft_Association_Rules algorithm is enabled; otherwise, false. |
| DataMining\Algorithms\Microsoft_Clustering\Enabled | true | When true, indicates that the Microsoft_Clustering algorithm is enabled; otherwise, false. |
| DataMining\Algorithms\Microsoft_Decision_Trees\Enabled | true | When true, indicates that the Microsoft_DecisionTrees algorithm is enabled; otherwise, false. |
| DataMining\Algorithms\Microsoft_Linear_Regression\Enabled | true | When true, indicates that the Microsoft_Linear_Regression algorithm is enabled; otherwise, false. |
| DataMining\Algorithms\Microsoft_Logistic_Regression\Enabled | true | When true, indicates that the Microsoft_Logistic_Regression algorithm is enabled; otherwise, false. |
| DataMining\Algorithms\Microsoft_Naive_Bayes\Enabled | true | When true, indicates that the Microsoft_Naive_Bayes algorithm is enabled; otherwise, false. |
| DataMining\Algorithms\Microsoft_Neural_Network\Enabled | true | When true, indicates that the Microsoft_Neural_Network algorithm is enabled; otherwise, false. |
| DataMining\Algorithms\Microsoft_Sequence_Clustering\Enabled | true | When true, indicates that the Microsoft_Sequence_Clustering algorithm is enabled; otherwise, false. |
| DataMining\Algorithms\Microsoft_Time_Series\Enabled | true | When true, indicates that the Microsoft_Time_Series algorithm is enabled; otherwise, false. |
| DataMining\AllowAdHocOpenRowsetQueries | false | When true, indicates that ad hoc open rowset queries are allowed; otherwise, false. |
| DataMining\AllowedProvidersInOpenRowset | Empty | A string property that identifies which providers are allowed in an open rowset, consisting of a comma/semi-colon separated list of provider ProgIDs, or else [All]. |
| DataMining\AllowSessionMiningModels | false | When true, indicates that session mining models can be created; otherwise, false. |
| DataMining\MaxConcurrentPredi | 0 | A signed 32-bit integer property that |

| Property | Default value | Description |
|--------------------------------------|---------------|---|
| ctionQueries | | defines the maximum number of concurrent prediction queries. |
| DSO\LocksDirectory | Empty | LocksDirectory is a folder where DSO keeps locking information. Locking information is created and deleted in this folder without any user intervention. Complete access to create, modify, and delete files is required in this folder for all DSO applications. LocksDirectory contains the path of the folder. |
| DSO\RemoteLocksDirectory | Empty | RemoteLocksDirectory contains the path of a shared folder where locks are kept for DSO applications. |
| DSO\RemoteRepositoryConnectionString | Empty | RemoteRepositoryConnectionString is a standard OLEDB SQL Server connection string that points to the SQL Server Analysis Services repository. If repository is a Microsoft Access database (an .mdb file), then the path of the file is a path of a shared folder. RemoteRepositoryConnectionString is used by DSO when the repository is located on a remote server. DSO checks the name of the server. If the name of the server is localhost or it is the name of the computer, then DSO uses RepositoryConnectionString, otherwise DSO uses RemoteRepositoryConnectionString. |
| DSO\RepositoryConnectionString | Empty | RepositoryConnectionString is a standard OLEDB connection string that points to the SQL Server repository. If the repository is a Microsoft Access database (an .mdb file), then the path of the file is a local path. RepositoryConnectionString is used by DSO when repository is locally available on the server. DSO checks the name of the server. If the name of the server is localhost or it is the name of the computer, then DSO uses RepositoryConnectionString, otherwise DSO uses RemoteRepositoryConnectionString. |
| Feature\ComUdfEnabled | false | When true, indicates that user-defined functions defined as com objects are enabled; otherwise, false. |
| Feature\LinkFromOtherInstanceEnabled | false | When true, indicates that objects can be linked to from other server instances; otherwise, false. |
| Feature\LinkInsideInstanceEnabled | true | When true, indicates that a linked object can be created inside the same server instance; otherwise, false. |
| Feature\LinkToOtherInstanceEnabled | false | When true, indicates that objects on remote servers can be linked to; otherwise, false. |

| Property | Default value | Description |
|--|---------------|--|
| Log\ErrorLog\ErrorLogFileName | Empty | A property used as a default during processing operation performed by the server. |
| Log\ErrorLog\ErrorLogFileSize | 4 | A property used as a default during processing operation performed by the server. |
| Log\ErrorLog\KeyErrorAction | 0 | A property used as a default during processing operation performed by the server. |
| Log\ErrorLog\KeyErrorLimit | 0 | A property used as a default during processing operation performed by the server. |
| Log\ErrorLog\KeyErrorLimitAction | 0 | A property used as a default during processing operation performed by the server. |
| Log\ErrorLog\KeyErrorLogFile | Empty | A property used as a default during processing operation performed by the server. |
| Log\ErrorLog\LogErrorTypes\KeyDuplicate | 0 | A property used as a default during processing operation performed by the server. |
| Log\ErrorLog\LogErrorTypes\KeyNotFound | 1 | A property used as a default during processing operation performed by the server. |
| Log\ErrorLog\LogErrorTypes\NullKeyConvertedToUnknown | 0 | A property used as a default during processing operation performed by the server. |
| Log\ErrorLog\LogErrorTypes\NullKeyNotAllowed | 1 | A property used as a default during processing operation performed by the server. |
| Log\File | "msmdsrv.log" | A string property that identifies the name of the server log file. This property only applies when a disk file is used for logging, as opposed to a database table (the default behavior). |
| Log\FlightRecorder\Enabled | true | When true, indicates that the flight recorder feature is enabled; otherwise, false. |
| Log\FlightRecorder\FileSizeMB | 10 | A signed 32-bit integer property that defines the size of the flight recorder disk file, in megabytes. |
| Log\FlightRecorder\LogDurationSec | 3600 | A signed 32-bit integer property that defines the frequency that the flight recorder is rolled over, in seconds. |
| Log\FlightRecorder\SnapshotDefinitionFile | Empty | A string property that defines the name of the snapshot definition file, containing discover commands that are issued to the server when a snapshot is taken. Blank signifies file name |

| Property | Default value | Description |
|---|--|--|
| | | FlightRecorderSnapshotDef.xml. |
| Log\FlightRecorder\SnapshotFrequencySec | 120 | A signed 32-bit integer property that defines the snapshot frequency, in seconds. |
| Log\FlightRecorder\TraceDefinitionFile | Empty | A string property that specifies the name of the flight recorder trace definition file. Blank indicates FlightRecorderTraceDef.xml. |
| Log\MessageLogs | "File;Console;System" | It is advised that this advanced property not be changed, except under the guidance of Microsoft support. |
| Log\QueryLog\CreateQueryLogTable | false | When true, specifies to create the query log table; otherwise, false. |
| Log\QueryLog\QueryLogConnectionString | Empty | A string property that specifies the connection to the query log database. |
| Log\QueryLog\QueryLogFileNames | Empty | A string property that specifies the name of the query log file. This property only applies when a disk file is used for logging, as opposed to a database table (the default behavior). |
| Log\QueryLog\QueryLogSampling | 10 | A signed 32-bit integer property that specifies the query log sampling rate. 10, for example, means that 1 out of every 10 server queries is logged. |
| Log\QueryLog\QueryLogTableName | "OlapQueryLog" | A string property that specifies the name of the query log table. |
| Log\Trace\TraceReportFQDN | 0 | It is advised that this advanced property not be changed, except under the guidance of Microsoft support. |
| Memory\HardMemoryLimit | 0 | The target maximum memory use for the server. If memory use exceeds this value, the server will free all shrinkable memory, and if memory use still exceeds the limit after freeing all shrinkable memory, the server will kill all running commands. Default is (TotalMemoryLimit + min (system physical memory, system total available virtual memory))/2. |
| Memory\HeapTypeForObjects | 0 In Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the default value is 1. | It is advised that this advanced property not be changed, except under the guidance of Microsoft support. |
| Memory\LowMemoryLimit | 65 | A signed 64-bit double-precision floating-point number property that defines the point at which the server is low on memory, expressed as percentage of total physical memory. When this threshold is reached, the server aggressively looks for |

| Property | Default value | Description |
|--|--|---|
| | | opportunities to free up memory. |
| Memory\MemoryHeapType | 2 In Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the default value is 1. | It is advised that this advanced property not be changed, except under the guidance of Microsoft support. |
| Memory\QueryMemoryLimit | 0 | An advanced property that controls how much memory can be used during a query, expressed as a percentage of available memory. An estimate of the memory used by the query is computed. If the estimate exceeds the stated limit, an error can be raised. The default value of 0 means that there is no limit. |
| Memory\TotalMemoryLimit | 80 | A property that defines the maximum physical memory the server will use, expressed as percentage of total physical memory. |
| Network\Listener\IPV4Support | 2 In Analysis Services in SQL Server 2005 and SQL Server 2008, the default value is 1. | A signed 32-bit integer property that defines support for IPv4 protocol. This property can have one of the following values: <ul style="list-style-type: none"> ▪ 0 – IPv4 disabled ▪ 1 – IPv4 required ▪ 2 – IPv4 optional |
| Network\Listener\IPV6Support | 2 | A signed 32-bit integer property that defines support for IPv6 protocol. This property can have one of the following values: <ul style="list-style-type: none"> ▪ 0 – IPv6 disabled ▪ 1 – IPv6 required ▪ 2 – IPv6 optional |
| Network\Listener\MaxAllowedRequestSize | 0 | It is advised that this advanced property not be changed, except under the guidance of Microsoft support. |
| Network\ListenOnlyOnLocalConnections | false | When true, specifies to listen only on local connections, for example localhost; otherwise, false. |
| Network\Requests\EnableBinaryXML | false | When true, specifies that the server will recognize requests binary xml format; otherwise, false. |
| Network\Requests\EnableCompression | false | When true, specifies that compression is enabled for requests; otherwise, false. |
| Network\Responses\EnableBinaryXML | true | When true, specifies that the server is enabled for binary xml responses; |

| Property | Default value | Description |
|---|---------------|---|
| | | otherwise, false. |
| Network\Responses\EnableCompression | true | When true, specifies that compression is enabled for responses to client requests; otherwise, false. |
| OLAP\LazyProcessing\Enabled | true | When true, specifies that lazy aggregation processing is enabled; otherwise, false. |
| OLAP\LazyProcessing\MaxCPUUsage | 0.5 | A signed 64-bit double-precision floating-point number property that defines maximum CPU usage for lazy processing, expressed as a percentage. The server monitors average CPU use based on snapshots. It is normal behavior for the CPU to spike above this threshold. |
| OLAP\LazyProcessing\MaxObjectsInParallel | 2 | A signed 32-bit integer property that specifies the maximum number of partitions that can be lazily processed in parallel. |
| OLAP\LazyProcessing\MaxRetries | 3 | A signed 32-bit integer property that defines the number of retries in the event that lazy processing fails before an error is raised. |
| OLAP\LazyProcessing\SleepIntervalSecs | 5 | A signed 32-bit integer property that defines the interval, in seconds, that the server checks whether there are lazy processing jobs pending. |
| OLAP\Process\AggregationMemoryLimitMax | 80 | A signed 64-bit double-precision floating-point number property that defines the maximum amount of memory that can be devoted to aggregation processing, expressed as a percentage of physical memory. |
| OLAP\Process\AggregationMemoryLimitMin | 10 | A signed 64-bit double-precision floating-point number property that defines the minimum amount of memory that can be devoted to aggregation processing, expressed as a percentage of physical memory. A larger value can speed up aggregation processing at the cost of memory usage. |
| OLAP\Process\BufferMemoryLimit | 60 | A signed 64-bit double-precision floating-point number property that defines the processing buffer memory limit, expressed as a percent of physical memory. |
| OLAP\Process\CheckDistinctRecordSortOrder | 1 | An int property that defines if the sort order for the results of a distinct count query are meaningful when processing partitions. True indicates that the sort order is not meaningful and has to be checked by the server. When processing partitions with distinct count measure, query sent to SQL with order-by. Set to false to speed up processing. |

| Property | Default value | Description |
|---|---------------|---|
| OLAP\Process\DatabaseConnectionPoolConnectTimeout | 60 | A signed 32-bit integer property that specifies timeout when opening a new connection in seconds. |
| OLAP\Process\DatabaseConnectionPoolGeneralTimeout | 60 | A signed 32-bit integer property that specifies database connection timeout for use with external OLEDB connections in seconds. |
| OLAP\Process\DatabaseConnectionPoolMax | 50 | A signed 32-bit integer property that specifies the maximum number of pooled database connections. |
| OLAP\Process\DatabaseConnectionPoolTimeout | 120000 | It is advised that this advanced property not be changed, except under the guidance of Microsoft support. |
| OLAP\Process\DeepCompressValue | 1 | An int property applying to measures with Double data type that specifies whether numbers can be compressed, causing a loss in numeric precision. A value of False indicates no compression and no precision loss. |
| OLAP\Process\IndexBuildThreshold | 4096 | A signed 32-bit integer property that specifies a row count threshold below which indexes will not be built for partitions. |
| OLAP\Process\RecordsReportGranularity | 10000 | A signed 32-bit integer property that specifies how often the server records Trace events during processing, in rows. |
| OLAP\Process\ROLAPDimensionProcessingEffort | 300000 | It is advised that this advanced property not be changed, except under the guidance of Microsoft support. |
| OLAP\ProcessPlan\EnableRolapDimensionQueryTableGrouping | 1 | A Boolean property that specifies whether table grouping is enabled for ROLAP dimensions. If true, when querying ROLAP dimensions at runtime, entire ROLAP dimension tables are queried at once, as opposed to separate queries for each attribute. |
| OLAP\ProcessPlan\MemoryLimitErrorEnabled | true | It is advised that this advanced property not be changed, except under the guidance of Microsoft support. |
| OLAP\Query\DefaultDrillthroughMaxRows | 10000 | A signed 32-bit integer property that specifies the maximum number of rows that will return from a drillthrough query. |
| OLAP\Query\DisableCalcExpressNonEmpty | 0 | It is advised that this advanced property not be changed, except under the guidance of Microsoft support. |
| OLAP\Query\NonEmptyBehaviorMode | 1 | Defines default for Non_Empty_behavior MDX property. |
| OLAP\Query\RowsetSerializationLimit | -1 | A signed 32-bit integer property that defines the maximum number of rows that are serialized in an XMLA response that |

| Property | Default value | Description |
|--|---------------|--|
| | | contains a rowset. A negative value indicates that there is no limit. A positive value specifies the maximum number of rows. |
| OLAP\Query\QueryOptimizerRatio | -1 | It is advised that this advanced property not be changed, except under the guidance of Microsoft support. |
| Security\BuiltinAdminsAreServerAdmins | true | When true, indicates that members of the local machine administrators group are Analysis Services administrators; otherwise, false. |
| Security\CellPermissionMode | 0 | It is advised that this advanced property not be changed, except under the guidance of Microsoft support. |
| Security\DataProtection\RequireProtectionLevel | 1 | A signed 32-bit integer property that defines the required protection level for all client requests. This property can have one of the following values: <ul style="list-style-type: none"> ▪ 0 – None disabled ▪ 1 – Encryption required ▪ 2 – Clear-text requests allowed but only with signatures |
| Security\DisableClientImpersonation | false | When true, indicates that client impersonation (for example, from stored procedures) is disabled; otherwise, false. |
| Security\RequireClientAuthentication | true | When true, indicates that client authentication is required; otherwise, false. |
| Security\SecurityPackageList | Empty | A string property that contains a comma-separated list of SSPI packages used by server for client authentication. |
| Security\ServiceAccountIsServerAdmin | true | When true, indicates that the service account is a server administrator; otherwise, false. |
| ThreadPool\SchedulingBehavior | -1 | An integer that specifies how tasks are scheduled in the thread pools. This property can have one of the following values: <ul style="list-style-type: none"> ▪ -1 – The engine will choose the default behavior. ▪ 0 – First in, first out (FIFO). Tasks are run in the order in which they are submitted. ▪ 1 – Short query bias. The engine gradually throttles long-running queries when under pressure in favor of fast queries. |

| Property | Default value | Description |
|---|---|---|
| ThreadPool\Process\MaxThreads | 0 The default value of 0 causes the server to choose a dynamic default based on system hardware properties. In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the default value is 64. | The target maximum number of threads for the thread pool used by processing operations. In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, where the default is 64, if a value less than 64 is specified, the server will use the default value. |
| ThreadPool\Process\MinThreads | 0 The default value of 0 causes the server to choose a dynamic default based on system hardware properties. In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the default value is 1. | The minimum number of threads for the thread pool used by processing operations. |
| ThreadPool\Query\MaxThreads | 0 The default value of 0 causes the server to choose a dynamic default based on system hardware properties. In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the default value is 10. | A signed 32-bit integer property that defines the maximum number of threads. |
| ThreadPool\Query\MinThreads | 0 The default value of 0 causes the server to choose a dynamic default based on system hardware properties. In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the default value is 1. | A signed 32-bit integer property that defines the minimum number of threads for queries. |
| ASPaaS\AlwaysUseGateway | false | When true, indicates that all data sources are accessed through the on-premises data gateway; otherwise, false. |
| JsonErrorMode | -1 The default value of -1, as well as 1, causes the server to propagate an error code and raise an error. A value of 0 causes the server to raise a general error. | A signed 32-bit integer property that controls whether to format a JSON error. |
| ResourceGovernance\DecayIntervalCPUTime | 60000 | An integer representing the CPU time in milliseconds that a query spends before it decays. If the system is under CPU |

| Property | Default value | Description |
|--|---------------|---|
| | | pressure, decayed queries are limited to the remaining cores that are not reserved for fast queries. The default value is 60,000, which represents 1 minute of CPU time, not elapsed calendar time. |
| ResourceGovernance\ReservedComputeForFastQueries | 75 | An integer between 0 and 100. The unit of measure is the percentage of cores that are reserved for fast queries. For example, a value of 50 on a server with 32 cores reserves 16 cores for fast queries. This property rounds up to the number of cores. In the example, a value of 51 on a server would round up to 17 cores. |
| ResourceGovernance\ReservedComputeForProcessing | 75 | An integer between 0 and 100. The unit of measure is the percentage of cores reserved for fast queries that are reserved for any other processing request in a Tabular model. For example, on a server with 32 cores, if the value of the ResourceGovernance\ReservedComputeForFastQueries property is 50 and the value of the ResourceGovernance\ReservedComputeForProcessing property is 50, 16 cores are reserved for fast queries and 8 cores are reserved for any other processing requests in a Tabular model. This property rounds up to the number of cores. |

<42> Section 2.2.4.2.2.4: If **LogFileSize** is set to a negative value, the result for Analysis Services is undetermined.

<43> Section 2.2.4.2.2.4: The **Filter** element is not supported by SQL Server 2005 Analysis Services.

<44> Section 2.2.4.2.2.4.3: The **event_session** complex type is not supported by SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2.

<45> Section 2.2.4.2.2.4.3.1: The **event** complex type is not supported by SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2.

<46> Section 2.2.4.2.2.4.3.2: The **action** complex type is not supported by SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2.

<47> Section 2.2.4.2.2.4.3.3: The **target** complex type is not supported by SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2.

<48> Section 2.2.4.2.2.4.3.4: The **objectNames** attribute group is not supported by SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2.

<49> Section 2.2.4.2.2.4.3.5: The **parameter** complex type is not supported by SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2.

<50> Section 2.2.4.2.2.4.3.6: The **unary_expr** complex type is not supported by SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2.

<51> Section 2.2.4.2.2.4.3.6: DISCOVER_XEVENT_OBJECTS is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, and SQL Server 2014.

<52> Section 2.2.4.2.2.5: To create a **Database** object on the server, only the **Name** element is required for the server to return a response with a success message. However, in Microsoft SQL Server 2019 Analysis Services, both the **Name** and **ID** elements need to be specified to create a **Database** object on the server and result in a success-message response.

<53> Section 2.2.4.2.2.5: Analysis Services supports the LCID values that are described in the following table.

| Language | LCID |
|-----------------------|------|
| Neutral | 0 |
| Arabic | 1025 |
| Bulgarian | 1026 |
| Catalan | 1027 |
| Chinese - Traditional | 1028 |
| German | 1031 |
| English-US | 1033 |
| French | 1036 |
| Hebrew | 1037 |
| Icelandic | 1039 |
| Italian | 1040 |
| Japanese | 1041 |
| Korean | 1042 |
| Dutch | 1043 |
| Norwegian (Bokmål) | 1044 |
| Brazilian | 1046 |
| Romanian | 1048 |
| Russian | 1049 |
| Croatian | 1050 |
| Slovak | 1051 |
| Swedish | 1053 |
| Thai | 1054 |
| Urdu | 1056 |
| Indonesian | 1057 |

| Language | LCID |
|------------------------------|------|
| Ukrainian | 1058 |
| Slovenian | 1060 |
| Latvian | 1062 |
| Lithuanian | 1063 |
| Vietnamese | 1066 |
| Hindi | 1081 |
| Malay - Malaysia | 1086 |
| Bengali | 1093 |
| Punjabi | 1094 |
| Gujarati | 1095 |
| Tamil | 1097 |
| Telugu | 1098 |
| Kannada | 1099 |
| Malayalam | 1100 |
| Marathi | 1102 |
| Chinese - Simplified | 2052 |
| British English | 2057 |
| Portuguese | 2070 |
| Serbian (Latin) | 2074 |
| Chinese (Hong Kong SAR, PRC) | 3076 |
| Spanish | 3082 |
| Serbian (Cyrillic) | 3098 |
| Chinese (Singapore) | 4100 |
| Chinese (Macau SAR) | 5124 |

<54> Section 2.2.4.2.2.5: Analysis Services uses the value provided by the server administrator in the server configuration file as the default if the language value is empty.

<55> Section 2.2.4.2.2.5: The **CompatibilityLevel** property is not supported by SQL Server 2005 Analysis Services or SQL Server 2008 Analysis Services. Microsoft SQL Server 2008 R2 Analysis Services supports a compatibility level set to 1050 but does not support a compatibility level set to 1100, 1103, or 1200. SQL Server 2012 Analysis Services and SQL Server 2014 Analysis Services do not support a compatibility level set to 1200. SQL Server 2016 Analysis Services does not support a compatibility level set to 1400. SQL Server 2017 Analysis Services does not support a compatibility level set to 1500.

- <56> Section 2.2.4.2.2.8: For the **Type** element, the server that is running Analysis Services implements functionality for the enumeration values "Account" and "Time". All other enumeration values are only informational.
- <57> Section 2.2.4.2.2.8: Analysis Services uses the value provided by the server administrator in the server configuration file as the default if the language value is empty.
- <58> Section 2.2.4.2.2.8: Enhanced string handling capabilities are not supported by SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2. The enhancements include allowing for a larger number of strings and a longer length of strings.
- <59> Section 2.2.4.2.2.8.1: The **ProcessingState** element is not supported by SQL Server 2005 and SQL Server 2008.
- <60> Section 2.2.4.2.2.8.1: The **AttributeHierarchyProcessingState** element is not supported by SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2.
- <61> Section 2.2.4.2.2.8.1: The **ImageUrl** enumeration value is not supported by SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2.
- <62> Section 2.2.4.2.2.8.1: The **ExtendedType** enumeration value and the **ExtendedType** property are not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.
- <63> Section 2.2.4.2.2.8.2: The **MemberKeysUnique** element is not supported by SQL Server 2005 and Microsoft SQL Server 2005 Service Pack 1 (SP1).
- <64> Section 2.2.4.2.2.8.3: The **Relationship** complex type is not supported by SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2.
- <65> Section 2.2.4.2.2.9: Analysis Services uses the value provided by the server administrator in the server configuration file as the default if this value is empty.
- <66> Section 2.2.4.2.2.9: The **Collation** element uses the Analysis Services form of a character set name followed by an underscore (_) character, followed by the sorting sequence name. For more information about Analysis Services collation, see [MSDN-LCAS].
- <67> Section 2.2.4.2.2.9: The **DaxOptimizationMode** element is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, SQL Server 2016, and SQL Server 2017.
- <68> Section 2.2.4.2.2.9.1: Analysis Services implicitly includes any attributes not specified in the collection with their default values.
- <69> Section 2.2.4.2.2.9.1: Analysis Services implicitly includes hierarchies not specified in the collection with their default values.
- <70> Section 2.2.4.2.2.9.4: Analysis Services provides list of known graphics such as arrow and chart; however, other values are possible.
- <71> Section 2.2.4.2.2.9.4: Analysis Services provides a list of known values; however, other values are possible.
- <72> Section 2.2.4.2.2.10.1: Analysis Services uses the value provided by the server administrator in the server configuration file as the default if this value is empty.
- <73> Section 2.2.4.2.2.10.3: The **Annotations** element is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.
- <74> Section 2.2.4.2.2.11.1.2: In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, and SQL Server 2016, the default value of Cardinality is "Many".

<75> Section 2.2.4.2.2.11.1.2: Analysis Services populates attributes that are not specified in the collection with default element values.

<76> Section 2.2.4.2.2.11.3: This is the RGB format that is used in the Windows operating system.

<77> Section 2.2.4.2.2.11.3: This is the RGB format that is used in the Windows operating system.

<78> Section 2.2.4.2.2.13: Enhanced string handling capabilities are not supported by SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2. The enhancements include allowing for a larger number of strings and a longer length of strings.

<79> Section 2.2.4.2.2.14.1.1: The **DefaultMember** element is not used in Analysis Services.

<80> Section 2.2.4.2.2.15: Analysis Services uses the value provided by the server administrator in the server configuration file as the default if this value is empty.

<81> Section 2.2.4.2.2.16: Analysis Services supports the following values for the **Algorithm** element:

- Microsoft_Decision_Trees
- Microsoft_Naive_Bayes
- Microsoft_Clustering
- Microsoft_Neural_Network
- Microsoft_Logistic_Regression
- Microsoft_Linear_Regression
- Microsoft_Association_Rules
- Microsoft_Time_Series
- Microsoft_Sequence_Clustering

<82> Section 2.2.4.2.2.16: The **FoldingParameters** element is not supported by SQL Server 2005.

<83> Section 2.2.4.2.2.16: The **Filter** element is not supported by SQL Server 2005.

<84> Section 2.2.4.2.2.16.1: Analysis Services supports certain **ModelingFlag** values as built in to algorithms included in the server, such as **MODEL_EXISTENCE_ONLY** and **REGRESSOR**.

<85> Section 2.2.4.2.2.16.2: When the value of **Usage** is "None", Analysis Services does not send any value to the server by default. Therefore, the **Usage** attribute is not included in the request/response.

<86> Section 2.2.4.2.2.16.2: The **Filter** element is not supported by SQL Server 2005.

<87> Section 2.2.4.2.2.16.4: The **FoldingParameters** element is not supported by SQL Server 2005.

<88> Section 2.2.4.2.2.16.4: The **FoldIndex** element is not supported by SQL Server 2005.

<89> Section 2.2.4.2.2.16.4: The **FoldCount** element is not supported by SQL Server 2005.

<90> Section 2.2.4.2.2.16.4: The **FoldMaxCases** element is not supported by SQL Server 2005.

<91> Section 2.2.4.2.2.16.4: The **FoldTargetAttribute** element is not supported by SQL Server 2005.

<92> Section 2.2.4.2.2.17: Microsoft does not guarantee that the **Annotation\Name** element produced by Microsoft products is in a style that references the vendor's XML namespace, although in many cases, it might be so.

<93> Section 2.2.4.2.2.17: Analysis Services ignores the **Visibility** element.

<94> Section 2.2.4.2.2.17.1: The **LinguisticSchemas** annotation is not supported by SQL Server.

<95> Section 2.2.4.2.2.17.1.1: The **LinguisticSchema** complex type is not supported by SQL Server.

<96> Section 2.2.4.2.2.17.1.1.1: The **EntityType** complex type is not supported by SQL Server.

<97> Section 2.2.4.2.2.19: For the **Automatic** value of NullProcessing, a server that is running Analysis Services uses "ZeroOrBlank" (for OLAP) and "UnknownMember" (for DM).

<98> Section 2.2.4.2.2.20.25: In Analysis Services, the **RowNumberBinding** type can be used only if the **Database**, **Cube**, or **MeasureGroup** uses memory storage mode.

<99> Section 2.2.4.2.2.21: For **DimensionPermission**, "None" is not an allowed value for the **Read** element. However, the server does not reject this value, but automatically changes the value "None" to "Allowed", which is always returned by a query that returns the current value.

<100> Section 2.2.4.2.2.24: The **AllowedRowsExpression** element can be set only for Tabular projects on a server that is running Analysis Services and cannot be set for any table within an Microsoft Office Excel workbook (regardless of whether or not it is on SharePoint), nor for any MOLAP dimension. For more information about installing Analysis Services in Tabular mode, see [MSDN-InstallASTabMode].

<101> Section 2.2.4.2.2.31: In Analysis Services, the behavior of the value "Default" is dependent upon the context in which impersonation is used.

<102> Section 3.1.3.1: Analysis Services supports sessions.

<103> Section 3.1.3.1: Analysis Services ends sessions automatically after a period of inactivity that can be configured by the server administrator by using the **MinIdleSessionTimeout** property.

<104> Section 3.1.3.2 ~~<104> Section 3.1.3.2:~~ Analysis Services supports sessions.

<105> Section 3.1.3.2: Analysis Services ends sessions automatically after a period of inactivity that can be configured by the server administrator by using the **MinIdleSessionTimeout** property.

<106> Section 3.1.4.2.1.1: Analysis Services ignores the HTTP header's SOAP action value.

<107> Section 3.1.4.2.2.1.2.1: Analysis Services ignores this value, and it is always treated as if "TupleFormat" were specified.

<108> Section 3.1.4.2.2.1.2.1: Although the expected value for **ProviderType** is 0x00000003L, Analysis Services always returns the value 0x00000006L.

<109> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "512" for **SQLSupport**.

<110> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "1" for **CatalogLocation**.

<111> Section 3.1.4.2.2.1.2.1: Analysis Services returns the value "Database" for **DbpropCatalogTerm**.

<112> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "0" for **DbpropCatalogUsage**.

<113> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "0" for **DbpropColumnDefinition**.

<114> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "1" for **DbpropConcatNullBehavior**.

<115> Section 3.1.4.2.2.1.2.1: Analysis Services returns the value false for **DbpropDataSourceReadOnly**.

<116> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "2" for **DbpropGroupBy**.

<117> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "0" for **DbpropHeterogeneousTables**.

<118> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "8" for **DbpropIdentifierCase**.

<119> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "0" for **DbpropMaxIndexSize**.

<120> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "0" for **DbpropMaxOpenChapters**.

<121> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "0" for **DbpropMaxRowSize**.

<122> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value true for **DbpropMaxRowSizeIncludeBlob**.

<123> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "1" for **DbpropMaxTablesInSelect**.

<124> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value false for **DbpropMultiTableUpdate**.

<125> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "4" for **DbpropNullCollation**.

<126> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value false for **DbpropOrderByColumnsInSelect**.

<127> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "1" for **DbpropOutputParameterAvailable**.

<128> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "4" for **DbpropPersistentIdType**.

<129> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "1" for **DbpropPrepareAbortBehavior**.

<130> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "1" for **DbpropPrepareCommitBehavior**.

<131> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "Calculated member" for **DbpropProcedureTerm**.

<132> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "8" for **DbpropQuotedIdentifierCase**.

<133> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "0" for **DbpropSchemausage**.

<134> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "512" for **DbpropSqlSupport**.

<135> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "0" for **DbpropSubqueries**.

<136> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "0" for **DbpropSupportedTxnDdl**.

<137> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "4096" for **DbpropSupportedTxnIsoLevels**.

<138> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "292" for **DbpropSupportedTxnIsoRetain**.

<139> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "Cube" for **DbpropTableTerm**.

<140> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "4" for **MdpropAggregateCellUpdate**.

<141> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "2147483647" for **MdpropAxes**.

<142> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "1" for **MdpropFlatteningSupport**.

<143> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "3" for **MdpropMdxCaseSupport**.

<144> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "7" for **MdpropMdxDescFlags**.

<145> Section 3.1.4.2.2.1.2.1: MDPROPVAL_MDF_ASYMMETRIC is not supported by Analysis Services in SQL Server 2005 and SQL Server 2005 SP1.

<146> Section 3.1.4.2.2.1.2.1: MDPROPVAL_MDF_CALC_MEMBERS is not supported by Analysis Services in SQL Server 2005 and SQL Server 2008.

<147> Section 3.1.4.2.2.1.2.1: Analysis Services in SQL Server 2005 and SQL Server 2008 returns the value "3". Otherwise, Analysis Services returns the value "7" for **MdpropMdxDrillFunctions**.

<148> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "63" for **MdpropMdxFormulas**.

<149> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "1" for **MdpropMdxJoinCubes**.

<150> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "15" for **MdpropMdxMemberFunctions**.

<151> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "0" for **MdpropMdxNonMeasureExpressions**.

<152> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "2047" for **MdpropMdxNumericFunctions**.

<153> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "496" for **MdpropMdxObjQualification**.

- <154> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "0" for **MdpropMdxOuterReference**.
- <155> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value true for **MdpropMdxQueryByProperty**.
- <156> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "4" for **MdpropMdxRangeRowset**.
- <157> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "524287" for **MdpropMdxSetFunctions**.
- <158> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "2" for **MdpropMdxSlicer**.
- <159> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "15" for **MdpropMdxStringCompop**.
- <160> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "3" for **MdpropNamedLevels**.
- <161> Section 3.1.4.2.2.1.2.1: Analysis Services always returns the value "Core" for **MDXSupport**.
- <162> Section 3.1.4.2.2.1.2.1: Analysis Services ignores the value for **DbpropInitMode**.
- <163> Section 3.1.4.2.2.1.2.1: Analysis Services attempts to deduce the dialect from the content of the command statement, but uses the value provided in the **Dialect** property if the command contains a value for this property.
- <164> Section 3.1.4.2.2.1.2.1: For **MdpropMdxSubqueries**, Analysis Services in SQL Server 2005 returns the value "3", in SQL Server 2008 returns the value "15", and in SQL Server 2008 R2, SQL Server 2012, and SQL Server 2014 returns the value "31". Otherwise, Analysis Services returns the value "63".
- <165> Section 3.1.4.2.2.1.2.1: MDPROPVAL_MSQ_CALCMEMBERS is not supported by Analysis Services in SQL Server 2005.
- <166> Section 3.1.4.2.2.1.2.1: MDPROPVAL_MSQ_CALCMEMBERS2 is not supported by Analysis Services in SQL Server 2005 and SQL Server 2008.
- <167> Section 3.1.4.2.2.1.2.1: MDPROPVAL_MSQ_DRILLTHROUGH is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, and SQL Server 2014.
- <168> Section 3.1.4.2.2.1.2.1: For **DbpropMsmSubqueries**, the values "0" and "1" are not supported by Analysis Services in SQL Server 2005. The value "2" is not supported by Analysis Services in SQL Server 2005 and SQL Server 2008.
- <169> Section 3.1.4.2.2.1.2.1: The **MdpropMdxDdlExtensions** property is not supported by Analysis Services in SQL Server 2005 and SQL Server 2008.
- <170> Section 3.1.4.2.2.1.2.1: In Analysis Services, the value "31" is returned for MOLAP servers, and the value "23" is returned for in-memory storage servers.
- <171> Section 3.1.4.2.2.1.2.1: The **ResponseEncoding** property is not supported by Analysis Services in SQL Server 2005 and SQL Server 2008.
- <172> Section 3.1.4.2.2.1.2.1: The **MemoryLockingMode** property is not supported by Analysis Services in SQL Server 2005 and SQL Server 2008.
- <173> Section 3.1.4.2.2.1.2.1: The **DbpropMsmOptimizeResponse** property is not supported by Analysis Services in SQL Server 2005 and SQL Server 2008.

<174> Section 3.1.4.2.2.1.2.1: The **DbpropMsmidActivityID** element is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<175> Section 3.1.4.2.2.1.2.1: The **DbpropMsmidRequestID** element is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<176> Section 3.1.4.2.2.1.2.1: The **ReturnAffectedObjects** element is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, and SQL Server 2014. It can be set only for Tabular databases that have the compatibility level set to 1200 or greater.

<177> Section 3.1.4.2.2.1.2.1: The **DbpropMsmidRequestMemoryLimit** element is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, SQL Server 2016, and SQL Server 2017.

<178> Section 3.1.4.2.2.1.2.1: The **ApplicationContext** element is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, SQL Server 2016, and SQL Server 2017.

<179> Section 3.1.4.2.2.1.3.1.1: Analysis Services includes an asterisk (*) in the ROLES column if the current user is a server administrator or database administrator. Analysis Services includes the system user name as a role if one of the roles uses dynamic security.

<180> Section 3.1.4.2.2.1.3.1.1: The CLIENTCACHEREFRESHPOLICY element is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, SQL Server 2016, and SQL Server 2017.

<181> Section 3.1.4.2.2.1.3.2.1: In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, any restriction set on TABLE_TYPE in the DBSCHEMA_TABLES request returns all table types (SCHEMA, SYSTEM TABLE, and TABLE), regardless of the types that are specified.

<182> Section 3.1.4.2.2.1.3.2.1: In SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2, any restriction set on TABLE_OLAP_TYPE in the DBSCHEMA_TABLES request returns a response in which the OLAP type is SCHEMA.

<183> Section 3.1.4.2.2.1.3.3.1: Analysis Services does not support COLUMN_HAS_DEFAULT and does not report whether the column has a default.

<184> Section 3.1.4.2.2.1.3.3.1: Analysis Services does not support COLUMN_DEFAULT.

<185> Section 3.1.4.2.2.1.3.3.1: Analysis Services returns the value false for IS_NULLABLE.

<186> Section 3.1.4.2.2.1.3.3.1: Analysis Services returns the value -1 for all numeric types except currency.

<187> Section 3.1.4.2.2.1.3.3.1: Analysis Services does not support this column and returns NULL.

<188> Section 3.1.4.2.2.1.3.4.1: Analysis Services returns one of the following values:

- SHORT
- LONG
- FLOAT
- DOUBLE
- CURRENCY

- DATE
- BSTR
- USHORT
- ULONG
- CHAR
- WCHAR
- VARIANT

<189> Section 3.1.4.2.2.1.3.4.1: Analysis Services always returns the value true for IS_NULLABLE.

<190> Section 3.1.4.2.2.1.3.4.1: Analysis Services always returns the value "3" for SEARCHABLE.

<191> Section 3.1.4.2.2.1.3.4.1: Analysis Services always returns the value false for FIXED_PREC_SCALE.

<192> Section 3.1.4.2.2.1.3.4.1: Analysis Services always returns the value false for AUTO_UNIQUE_VALUE.

<193> Section 3.1.4.2.2.1.3.4.1: Analysis Services always returns the value false for IS_LONG.

<194> Section 3.1.4.2.2.1.3.4.1: Analysis Services ignores any restriction placed on BEST_MATCH.

<195> Section 3.1.4.2.2.1.3.4.1: Analysis Services always returns the value true for BEST_MATCH.

<196> Section 3.1.4.2.2.1.3.5.1: Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses containing this column.

<197> Section 3.1.4.2.2.1.3.5.1: Analysis Services does not store this information and always returns NULL.

<198> Section 3.1.4.2.2.1.3.5.1: Analysis Services does not store this information and always returns NULL.

<199> Section 3.1.4.2.2.1.3.5.1: Analysis Services does not store this information and always returns NULL.

<200> Section 3.1.4.2.2.1.3.5.1: Analysis Services always returns the value true for the IS_DRILLTHROUGH_ENABLED column.

<201> Section 3.1.4.2.2.1.3.5.1: In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the output includes cube objects and does not include dimension objects.

<202> Section 3.1.4.2.2.1.3.5.1: The PREFERRED_QUERY_PATTERNS property is not supported by SQL Server 2005 and SQL Server 2008

<203> Section 3.1.4.2.2.1.3.6.1: Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses that contain the SCHEMA_NAME column.

<204> Section 3.1.4.2.2.1.3.6.1: Analysis Services always returns the value false for the IS_VIRTUAL column.

<205> Section 3.1.4.2.2.1.3.6.2: In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the output includes cube objects and does not include dimension objects.

<206> Section 3.1.4.2.2.1.3.7.1: Analysis Services does not support the concept of schemas and returns NULL for SCHEMA_NAME in all Discover responses that contain the SCHEMA_NAME column.

<207> Section 3.1.4.2.2.1.3.7.1: For Analysis Services providers that generate unique names by qualification, each component of DIMENSION_UNIQUE_NAME is delimited.

<208> Section 3.1.4.2.2.1.3.7.1: Analysis Services always returns a value for the HIERARCHY_NAME column.

<209> Section 3.1.4.2.2.1.3.7.1: Analysis Services always returns the value false for the IS_VIRTUAL column.

<210> Section 3.1.4.2.2.1.3.7.1: Analysis Services returns the value 0x01 for the DIMENSION_UNIQUE_SETTINGS column.

<211> Section 3.1.4.2.2.1.3.7.1: Analysis Services does not support the DIMENSION_MASTER_UNIQUE_NAME column.

<212> Section 3.1.4.2.2.1.3.7.1: Analysis Services returns the value true for the DIMENSION_IS_VISIBLE column. If the dimension is not visible, it will not appear in the schema rowset.

<213> Section 3.1.4.2.2.1.3.7.1: Analysis Services returns the value true for the DIMENSION_IS_SHARED column.

<214> Section 3.1.4.2.2.1.3.7.2: In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the output includes cube objects and does not include dimension objects.

<215> Section 3.1.4.2.2.1.3.8.1: Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses that contain the SCHEMA_NAME column.

<216> Section 3.1.4.2.2.1.3.8.1: For Analysis Services providers that generate unique names by qualification, each component of DIMENSION_UNIQUE_NAME is delimited.

<217> Section 3.1.4.2.2.1.3.8.1: Analysis Services returns the LEVEL_NAME column if a caption does not exist.

<218> Section 3.1.4.2.2.1.3.8.2: In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the output includes cube objects and does not include dimension objects.

<219> Section 3.1.4.2.2.1.3.9.1: Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses that contain the SCHEMA_NAME column.

<220> Section 3.1.4.2.2.1.3.9.1: Analysis Services returns the value -1 for all numeric types except currency.

<221> Section 3.1.4.2.2.1.3.9.1: In Analysis Services, folder names are separated by a semicolon and nested folders are indicated by a backslash (\).

<222> Section 3.1.4.2.2.1.3.9.2: In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the output includes cube objects and does not include dimension objects.

<223> Section 3.1.4.2.2.1.3.10.1: Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses that contain the SCHEMA_NAME column.

<224> Section 3.1.4.2.2.1.3.10.1: Analysis Services returns the PROPERTY_NAME column if a caption does not exist.

<225> Section 3.1.4.2.2.1.3.10.1: Analysis Services returns the value -1 for all numeric types except currency.

<226> Section 3.1.4.2.2.1.3.10.2: In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the output includes cube objects and does not include dimension objects.

<227> Section 3.1.4.2.2.1.3.11.1: Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses that contain the SCHEMA_NAME column.

<228> Section 3.1.4.2.2.1.3.11.1: In Analysis Services, the member type value 4 (formula) takes precedence over the member type value 3 (measure). For example, if there is a formula (calculated) member on the Measures dimension, Analysis Services returns the value 4 for the MEMBER_TYPE column.

<229> Section 3.1.4.2.2.1.3.11.2: In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the output includes cube objects and does not include dimension objects.

<230> Section 3.1.4.2.2.1.3.12.1: Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses that contain the SCHEMA_NAME column.

<231> Section 3.1.4.2.2.1.3.12.2: In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the output includes cube objects and does not include dimension objects.

<232> Section 3.1.4.2.2.1.3.13.1: Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses that contain the SCHEMA_NAME column.

<233> Section 3.1.4.2.2.1.3.13.2: In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the output includes cube objects and does not include dimension objects.

<234> Section 3.1.4.2.2.1.3.15.1: Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses that contain the SCHEMA_NAME column.

<235> Section 3.1.4.2.2.1.3.15.2: In SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1, the output includes cube objects and does not include dimension objects.

<236> Section 3.1.4.2.2.1.3.16.1: Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses that contain the SCHEMA_NAME column.

<237> Section 3.1.4.2.2.1.3.17.1: Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses that contain the SCHEMA_NAME column.

<238> Section 3.1.4.2.2.1.3.18.1: Analysis Services does not support the concept of schemas and always returns NULL for SCHEMA_NAME in all Discover responses that contain the SCHEMA_NAME column.

<239> Section 3.1.4.2.2.1.3.19.1: Analysis Services populates the SERVICE_TYPE_ID column with one of the following values:

- DM_SERVICETYPE_CLASSIFICATION (1)
- DM_SERVICETYPE_CLUSTERING (2)
- DM_SERVICETYPE_ASSOCIATION (4)
- DM_SERVICETYPE_DENSITY_ESTIMATE (8)
- DM_SERVICETYPE_SEQUENCE (16)

<240> Section 3.1.4.2.2.1.3.19.1: Analysis Services ignores the case of the values in the SUPPORTED_DISTRIBUTION_FLAGS column.

<241> Section 3.1.4.2.2.1.3.19.1: Analysis Services ignores the case of the values in the SUPPORTED_INPUT_CONTENT_TYPES column.

<242> Section 3.1.4.2.2.1.3.19.1: Analysis Services ignores the case of the values in the SUPPORTED_PREDICTION_CONTENT_TYPES column.

<243> Section 3.1.4.2.2.1.3.21: SQL Server 2005 does not support these data mining algorithms.

<244> Section 3.1.4.2.2.1.3.22.1: Analysis Services does not support the concept of schemas and always returns NULL for MODEL_SCHEMA in all Discover responses that contain the MODEL_SCHEMA column.

<245> Section 3.1.4.2.2.1.3.22.1: SQL Server 2005 Analysis Services does not support DM_NODE_TYPE_ARIMA_ROOT (27).

<246> Section 3.1.4.2.2.1.3.22.1: SQL Server 2005 Analysis Services does not support DM_NODE_TYPE_ARIMA_PERIODICSTRUCTURE (28).

<247> Section 3.1.4.2.2.1.3.22.1: SQL Server 2005 Analysis Services does not support DM_NODE_TYPE_ARIMA_AUTOREGRESSIVE (29).

<248> Section 3.1.4.2.2.1.3.22.1: SQL Server 2005 Analysis Services does not support DM_NODE_TYPE_ARIMA_MOVINGAVERAGE (30).

<249> Section 3.1.4.2.2.1.3.22.1: The NODE_GUID column is not supported by Analysis Services and always contains NULL.

<250> Section 3.1.4.2.2.1.3.23: Analysis Services supports only the following algorithms for the DMSHEMA_MINING_MODEL_XML rowset:

- Microsoft Decision Trees algorithm
- Microsoft Clustering algorithm

All other algorithms result in a fault if the DMSHEMA_MINING_MODEL_XML rowset is requested.

<251> Section 3.1.4.2.2.1.3.23.1: Analysis Services does not support the concept of schemas and always returns NULL for MODEL_SCHEMA in all Discover responses that contain the MODEL_SCHEMA column.

<252> Section 3.1.4.2.2.1.3.23.1: Analysis Services ignores any restriction placed on MODEL_TYPE.

<253> Section 3.1.4.2.2.1.3.24: Analysis Services supports only the following algorithms for the DMSHEMA_MINING_MODEL_CONTENT_PMML rowset:

- Microsoft Decision Trees algorithm

- Microsoft Clustering algorithm

All other algorithms result in a fault if the DMSHEMA_MINING_MODEL_CONTENT_PMML rowset is requested.

<254> Section 3.1.4.2.2.1.3.24.1: Analysis Services does not support the concept of schemas and always returns NULL for MODEL_SCHEMA in all Discover responses that contain the MODEL_SCHEMA column.

<255> Section 3.1.4.2.2.1.3.24.1: Analysis Services ignores any restriction placed on MODEL_TYPE.

<256> Section 3.1.4.2.2.1.3.25.1: Analysis Services does not support the concept of schemas and always returns NULL for MODEL_SCHEMA in all Discover responses that contain the MODEL_SCHEMA column.

<257> Section 3.1.4.2.2.1.3.25.1: This column is not supported by Analysis Services; it is always NULL.

<258> Section 3.1.4.2.2.1.3.26.1: Analysis Services does not support the concept of schemas and is always NULL for MODEL_SCHEMA in all Discover responses that contain the MODEL_SCHEMA column.

<259> Section 3.1.4.2.2.1.3.26.1: Analysis Services returns the value -1 for all numeric types except currency.

<260> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<261> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<262> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<263> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<264> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<265> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<266> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<267> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<268> Section 3.1.4.2.2.1.3.26.1: This column is not supported by Analysis Services; it always contains NULL.

<269> Section 3.1.4.2.2.1.3.27.1: This column is not supported by Analysis Services; it is always NULL.

<270> Section 3.1.4.2.2.1.3.28.1: This column is not supported by Analysis Services; it is always NULL.

<271> Section 3.1.4.2.2.1.3.28.1: Analysis Services always returns the value FALSE for the COLUMN_HAS_DEFAULT column.

<272> Section 3.1.4.2.2.1.3.28.1: Analysis Services does not support the COLUMN_DEFAULT column.

<273> Section 3.1.4.2.2.1.3.28.1: SQL Server Analysis Services returns the value -1 for all numeric types except currency.

<274> Section 3.1.4.2.2.1.3.28.1: This column is not supported by Analysis Services; it is always NULL.

<275> Section 3.1.4.2.2.1.3.33.1: Analysis Services always returns the values MDP, TDP, and DMP for **ProviderType**.

<276> Section 3.1.4.2.2.1.3.33.1: Analysis Services always returns the value "Authenticated" for **AuthenticationMode**. Integrated Security provided by Microsoft Internet Information Services (IIS) is an example of an underlying security mode.

<277> Section 3.1.4.2.2.1.3.40.1: When a restriction is applied to the **Shrinkable** column, Analysis Services interprets values 0 as false and -1 as true. Any other values result in no rows being returned.

<278> Section 3.1.4.2.2.1.3.43.1: Analysis Services ignores any restriction placed on CONNECTION_IMPERSONATED_USER_NAME.

<279> Section 3.1.4.2.2.1.3.43.1: This column is not supported by Analysis Services; it is always NULL.

<280> Section 3.1.4.2.2.1.3.43.1: Analysis Services ignores any restriction placed on CONNECTION_ELAPSED_TIME_MS.

<281> Section 3.1.4.2.2.1.3.43.1: Analysis Services in SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2 ignores any restriction placed on CONNECTION_LAST_COMMAND_ELAPSED_TIME_MS.

<282> Section 3.1.4.2.2.1.3.43.1: Analysis Services returns only those connections that are currently executing commands and in which the elapsed time since the start of the last command is greater than the specified restriction value.

<283> Section 3.1.4.2.2.1.3.43.1: Analysis Services ignores any restriction placed on CONNECTION_IDLE_TIME_MS.

<284> Section 3.1.4.2.2.1.3.44.1: In Analysis Services, any restriction set on SESSION_ID in a DISCOVER_SESSIONS request always returns an empty response.

<285> Section 3.1.4.2.2.1.3.44.1: Analysis Services ignores any restriction placed on SESSION_ELAPSED_TIME_MS.

<286> Section 3.1.4.2.2.1.3.44.1: Analysis Services supports restrictions on SESSION_IDLE_TIME_MS up to 429,496. Behavior is undefined for larger values of this restriction.

<287> Section 3.1.4.2.2.1.3.44.1: Analysis Services ignores any restriction placed on SESSION_STATUS.

<288> Section 3.1.4.2.2.1.3.48.1: Analysis Services ignores any restriction placed on KEY.

<289> Section 3.1.4.2.2.1.3.49.1: Analysis Services uses the performance counters provided by SQL Server. For more information, see [MSDN-SSPTP].

<290> Section 3.1.4.2.2.1.3.50.1: An input validation in the product requires the LOCATION_BACKUP_FILE_PATHNAME to be provided as input to the DISCOVER_LOCATIONS request.

<291> Section 3.1.4.2.2.1.3.57.1: Analysis Services ignores any restriction placed on OBJECT_PARENT_PATH.

<292> Section 3.1.4.2.2.1.3.57.1: Analysis Services ignores any restriction placed on OBJECT_ID.

<293> Section 3.1.4.2.2.1.3.57.1: The OBJECT_MEMORY_CHILD_SHRINKABLE column is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<294> Section 3.1.4.2.2.1.3.57.1: The OBJECT_MEMORY_CHILD_NONSHRINKABLE column is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<295> Section 3.1.4.2.2.1.3.58: A server that is running Analysis Services has to have the **DeploymentMode** property set to 2 for DISCOVER_STORAGE_TABLES to function. The **DeploymentMode** property is set in the msmdsrv.ini file. DISCOVER_PROPERTIES does not return the value of the **DeploymentMode** property. DISCOVER_STORAGE_TABLES is not supported by Analysis Services in SQL Server 2005 and SQL Server 2008.

<296> Section 3.1.4.2.2.1.3.58.1: SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2 ignore any restriction placed on DATABASE_NAME.

<297> Section 3.1.4.2.2.1.3.58.1: Analysis Services ignores any restriction placed on CUBE_NAME.

<298> Section 3.1.4.2.2.1.3.58.1: Analysis Services ignores any restriction placed on MEASURE_GROUP_NAME.

<299> Section 3.1.4.2.2.1.3.58.1: Analysis Services ignores any restriction placed on PARTITION_NAME.

<300> Section 3.1.4.2.2.1.3.59: A server that is running Analysis Services has to have the **DeploymentMode** property set to 2 for DISCOVER_STORAGE_TABLE_COLUMNS to function. The **DeploymentMode** property is set in the msmdsrv.ini file. DISCOVER_PROPERTIES does not return the value of the **DeploymentMode** property. DISCOVER_STORAGE_TABLE_COLUMNS is not supported by Analysis Services in SQL Server 2005 and SQL Server 2008.

<301> Section 3.1.4.2.2.1.3.59.1: SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2 ignore any restriction placed on DATABASE_NAME.

<302> Section 3.1.4.2.2.1.3.59.1: Analysis Services ignores any restriction placed on CUBE_NAME.

<303> Section 3.1.4.2.2.1.3.59.1: Analysis Services ignores any restriction placed on MEASURE_GROUP_NAME.

<304> Section 3.1.4.2.2.1.3.59.1: Analysis Services ignores any restriction placed on DATATYPE.

<305> Section 3.1.4.2.2.1.3.59.1: DICTIONARY_SIZE is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<306> Section 3.1.4.2.2.1.3.60: A server that is running Analysis Services has to have the **DeploymentMode** property set to 2 for DISCOVER_STORAGE_TABLE_COLUMN_SEGMENTS to function. The **DeploymentMode** property is set in the msmdsrv.ini file. DISCOVER_PROPERTIES does not return the value of the **DeploymentMode** property. DISCOVER_STORAGE_TABLE_COLUMN_SEGMENTS is not supported by Analysis Services in SQL Server 2005 and SQL Server 2008.

<307> Section 3.1.4.2.2.1.3.60.1: SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2 ignore any restriction placed on DATABASE_NAME.

<308> Section 3.1.4.2.2.1.3.60.1: Analysis Services ignores any restriction placed on CUBE_NAME.

<309> Section 3.1.4.2.2.1.3.60.1: Analysis Services ignores any restriction placed on MEASURE_GROUP_NAME.

<310> Section 3.1.4.2.2.1.3.61: DISCOVER_CSDL_METADATA is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2. For this request type, the deployment mode of the server is set to 0, 1, or 2. Analysis Services in SQL Server 2012 prior to SQL Server 2012 SP1 supports only settings 1 and 2 for DISCOVER_CSDL_METADATA.

<311> Section 3.1.4.2.2.1.3.61: In SQL Server 2012 prior to SQL Server 2012 SP1, the objects are not included in the output.

<312> Section 3.1.4.2.2.1.3.61.2: The VERSION restriction is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<313> Section 3.1.4.2.2.1.3.62: DISCOVER_CALC_DEPENDENCY is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, and SQL Server 2008 R2. For this request type, the deployment mode of the server is set to 0, 1, or 2. Analysis Services in SQL Server 2012 prior to SQL Server 2012 SP1 supports only settings 1 and 2 for DISCOVER_CALC_DEPENDENCY.

<314> Section 3.1.4.2.2.1.3.62.2: The QUERY restriction is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

<315> Section 3.1.4.2.2.1.3.62.2: The DATABASE_NAME restriction is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, and SQL Server 2016.

<316> Section 3.1.4.2.2.1.3.62.2: The OBJECT_TYPE restriction is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, and SQL Server 2016.

<317> Section 3.1.4.2.2.1.3.62.2: The OBJECT_CATEGORY restriction is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, and SQL Server 2016.

<318> Section 3.1.4.2.2.1.3.62.2: The KIND restriction is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, and SQL Server 2016.

<319> Section 3.1.4.2.2.1.3.64: DISCOVER_RING_BUFFERS is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, and SQL Server 2014.

<320> Section 3.1.4.2.2.1.3.65: DISCOVER_XE_EVENT_TRACE_DEFINITION is supported only by Analysis Services in SQL Server 2012 and SQL Server 2014.

<321> Section 3.1.4.2.2.1.3.66: DISCOVER_XE_EVENT_PACKAGES is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, and SQL Server 2014.

<322> Section 3.1.4.2.2.1.3.67: DISCOVER_XE_EVENT_OBJECTS is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, and SQL Server 2014.

<323> Section 3.1.4.2.2.1.3.68: DISCOVER_XE_EVENT_OBJECT_COLUMNS is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, and SQL Server 2014.

<324> Section 3.1.4.2.2.1.3.69: DISCOVER_XE_EVENT_SESSIONS is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, and SQL Server 2014.

- <325> Section 3.1.4.2.2.1.3.70: ~~<325> Section 3.1.4.2.2.1.3.70:~~ DISCOVER_XEVENT_SESSION_TARGETS is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, and SQL Server 2014.
- <326> Section 3.1.4.2.2.1.3.71: DISCOVER_MEM_STATS is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, SQL Server 2016, and SQL Server 2017.
- <327> Section 3.1.4.2.2.1.3.72: DISCOVER_DB_MEM_STATS is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, SQL Server 2016, and SQL Server 2017.
- <328> Section 3.1.4.2.2.1.3.73: DISCOVER_OBJECT_COUNTERS is not supported by Analysis Services in SQL Server.
- <329> Section 3.1.4.3.2.1.1.10: The **SubscriptionId** element is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, SQL Server 2016, and SQL Server 2017.
- <330> Section 3.1.4.3.2.1.1.11: The **Unsubscribe** command is not supported by SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, SQL Server 2016, and SQL Server 2017.
- <331> Section 3.1.4.3.2.1.1.14: **DurabilityGuarantee** is not supported by SQL Server.
- <332> Section 3.1.4.3.2.1.1.16: In Analysis Services, locks are held in the context of the current transaction. When the transaction commits or rolls back, the locks are automatically released.
- <333> Section 3.1.4.3.2.1.1.28: Analysis Services does not support the **Statement** command within a **Batch**.
- <334> Section 3.1.4.3.2.1.1.28: Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, and SQL Server 2014 does not support execution of the **Discover** command within a **Batch**.
- <335> Section 3.1.4.3.2.1.1.28: With the exception of SQL Server 2005 Analysis Services and SQL Server 2008 Analysis Services, additional empty result sets can be returned. Clients can choose to ignore the additional empty result elements.
- <336> Section 3.1.4.3.2.1.1.29: A server that is running Analysis Services has to have the deployment mode set to 1 to be able to execute the **ImageLoad** command. **ImageLoad** is not supported by Analysis Services in SQL Server 2005 and SQL Server 2008. The **Data/DataBlock** element that is used in **ImageLoad** is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.
- <337> Section 3.1.4.3.2.1.1.30: A server that is running Analysis Services has to have the deployment mode set to 1 to be able to execute the **ImageSave** command. **ImageSave** is not supported by Analysis Services in SQL Server 2005 and SQL Server 2008. The **Data** element that is used in **ImageSave** is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.
- <338> Section 3.1.4.3.2.1.1.31: A server that is running Analysis Services has to have the deployment mode set to 1 to be able to execute the **CloneDatabase** command. **CloneDatabase** is not supported by Analysis Services in SQL Server 2005 and SQL Server 2008. The **Data** element that is used in **CloneDatabase** is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.
- <339> Section 3.1.4.3.2.1.1.32: A server that is running Analysis Services has to have the deployment mode set to 1 to be able to execute the **SetAuthContext** command. **SetAuthContext** is

not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, and SQL Server 2012 prior to SQL Server 2012 SP1.

| <340> Section 3.1.4.3.2.1.1.33 ~~<340> Section 3.1.4.3.2.1.1.33:~~ The DBCC command is not supported by Analysis Services in SQL Server 2005, SQL Server 2008, SQL Server 2008 R2, SQL Server 2012, and SQL Server 2014.

<341> Section 3.2.1: Analysis Services supports one default instance and multiple named instances of the server on a single computer. The default TCP port number for the default instance is 2383. To connect to a named instance, the client first connects to the SQL Browser service on port 2382, gets the list of named instances on the computer by sending a DISCOVER_INSTANCES request, and then examines the response to determine the TCP port number corresponding to the desired named instance.

7 Change Tracking

This section identifies changes that were made to this document since the last release. Changes are classified as Major, Minor, or None.

The revision class **Major** means that the technical content in the document was significantly revised. Major changes affect protocol interoperability or implementation. Examples of major changes are:

- A document revision that incorporates changes to interoperability requirements.
- A document revision that captures changes to protocol functionality.

The revision class **Minor** means that the meaning of the technical content was clarified. Minor changes do not affect protocol interoperability or implementation. Examples of minor changes are updates to clarify ambiguity at the sentence, paragraph, or table level.

The revision class **None** means that no new technical changes were introduced. Minor editorial and formatting changes may have been made, but the relevant technical content is identical to the last released version.

The changes made to this document are listed in the following table. For more information, please contact dochelp@microsoft.com.

| Section | Description | Revision class |
|--|--|----------------|
| 2.1.5 Binary XML | Clarified the binary XML type of the xsd:unsignedByte XSD type. | Major |
| 2.2.4.1.1.2.1 Axis | Clarified the name of the DbpropMsmdOptimizeResponse flag. | Major |
| 2.2.4.1.1.2.1.1.6 msxmla:NormTupleSet Complex Type | Added descriptions of the MemberOrdinal and MemberDispInfo elements. | Major |
| 2.2.4.1.1.2.1.2.5 KeyNormType Complex Type | Clarified the use of the HierUName element. | Major |
| 2.2.4.1.1.3 xmla-ds:CellData Complex Type | Clarified the name of the DbpropMsmdOptimizeResponse flag. | Major |
| 2.2.4.1.1.3.2 CellSetType ComplexType | Clarified the name of the DbpropMsmdOptimizeResponse flag. | Major |
| 2.2.4.2.2.8 Dimension | Clarified the description of the UnknownMemberName element. | Major |
| 2.2.4.2.2.8.2 Hierarchy | Clarified the naming of the All member and the description of the AllMemberName element. | Major |
| 2.2.4.2.2.15.1.2 TableMiningStructureColumn | Clarified the description of the SourceMeasureGroup element. | Major |
| 2.2.4.2.2.30 ErrorConfiguration | Added a description of the CalculationError element. | Major |
| 3.1.4.2.2.1.3.42.1 Columns | Clarified the values for the LOCK_STATUS column. | Major |
| 3.1.4.2.2.1.3.63.1 Columns | Clarified the description of the RETURN_TYPE column. | Major |

8 Index

A

- Abstract data model
 - server 213
- Applicability 21
- Attribute groups 212
- Attributes 212
- Authenticate 217
- Authentication – transport-specific protocol details 440

B

- Binary XML 26

C

- Change tracking 705
- Complex type - PropertyList 223
- Complex types 28
 - object definition 48
 - Object Definition Complex Types 48
 - return value 29
 - trace definition 208
 - TraceDefinition Complex Types 208
- Compression 26
 - transport-specific protocol details 442
- Connection – transport-specific protocol details 440
- Content type negotiation – transport-specific protocol details 440

D

- Data model - abstract
 - server 213
- Discover 219

E

- Elements 28
- Encryption 25
 - transport-specific protocol details 440
- Events
 - local - server 440
 - timer - server 439
- Execute 405

F

- Fields - vendor-extensible 22

G

- Generating messages – transport-specific protocol details 441
- Glossary 14
- Groups 212
 - attribute 212

H

- HTTP/HTTPS 25

I

- Implementer - security considerations 669
- Index of security parameters 669
- Informative references 18
- Initialization
 - HTTP transport 215
 - non-HTTP transport 214
 - server 213
- Introduction 14

L

- Local events
 - server 440

M

- Message processing
 - server 217
- Message processing events 217
- Messages
 - attribute groups 212
 - attributes 212
 - complex types 28
 - elements 28
 - enumerated 28
 - generating and parsing 441
 - groups 212
 - namespaces 27
 - Object Definition Complex Types complex type 48
 - simple types 212
 - syntax 27
 - TraceDefinition Complex Types complex type 208
 - transport 23

N

- Namespaces 27
- Normative references 17

O

- Object definition complex types 48
- Object Definition Complex Types complex type 48
- Operations
 - Authenticate 217
 - Discover 219
 - Execute 405
- Other protocols – relationship to 20
- Overview (synopsis) 19

P

- Parameters - security index 669
- Parsing messages – transport-specific protocol details 441
- Preconditions 21
- Prerequisites 21
- Product behavior 670
- PropertyList complex type 223
- Protocol Details
 - overview 213
- Protocol examples
 - Alter command 663

- Backup command 665
- BeginTransaction command 666
- client obtains a list of commands from the server 482
- client obtains a list of connections from the server 475
- client obtains a list of cubes from the server over HTTP 454
- client obtains a list of databases from the server over TCP 443
- client obtains a list of locks from the server 478
- client obtains a list of measures from the server 457
- client obtains a list of mining models from the server 473
- client obtains a list of properties from the server 459
- client obtains a list of traces from the server 474
- client obtains list of trace column definitions 485
- client obtains list of trace event categories 493
- client obtains trace provider information 484
- client sends MDX query and receives back mddataset result 553
- CommitTransaction command 667
- Create command 609
- Delete command 664
- Process command 665
- Restore command 666
- RollbackTransaction command 668

R

- References 17
 - informative 18
 - normative 17
- Relationship to other protocols 20
- Return value complex types 29

S

- Security
 - implementer considerations 669
 - parameter index 669
- Sequencing rules 217
 - server 217
- Server
 - abstract data model 213
 - Authenticate operation 217
 - Discover operation 219
 - Execute operation 405
 - initialization 213
 - local events 440
 - message processing 217
 - sequencing rules 217
 - timer events 439
 - timers 213
- Simple types 212
- Standards assignments 22
- Syntax
 - messages - overview 27

T

- TCP 23
- Timer events
 - server 439
- Timers
 - server 213
- Trace definition complex types 208
- TraceDefinition Complex Types complex type 208
- Tracking changes 705
- Transport 23
- Transport-specific protocol details

- authentication and encryption 440
- compression 442
- connection 440
- content type negotiation 440
- generating and parsing messages 441

Types

- complex 28
- simple 212

V

- Vendor-extensible fields 22

X

- XML -binary 26