

# [MS-CSDLBI]: Conceptual Schema Definition File Format with Business Intelligence Annotations

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## Revision Summary

Date	Revision History	Revision Class	Comments
07/16/2012	1.0	New	Released new document.
10/08/2012	2.0	Major	Significantly changed the technical content.
10/23/2012	2.1	Minor	Clarified the meaning of the technical content.

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# 1 Introduction

**Conceptual schema definition language with business intelligence annotations (CSDLBI)** is an XML-based file format that is used to annotate **Entity Data Model (EDM)**-based conceptual models. **Conceptual schema definition language (CSDL)** is a language that is based on XML and that can be used for defining EDM-based conceptual models. For more information on CSDL, see [\[MC-CSDL\]](#). Type names in CSDLBI are generally the same as in CSDL.

This specification describes the structure and semantics of CSDL **annotations** that are used in business intelligence (BI) applications. CSDLBI is used to annotate EDM-based conceptual models with specific information that is useful in BI applications.

Sections 1.7 and 2 of this specification are normative and can contain the terms MAY, SHOULD, MUST, MUST NOT, and SHOULD NOT as defined in RFC 2119. All other sections and examples in this specification are informative.

## 1.1 Glossary

The following terms are defined in [\[MS-OFCGLOS\]](#):

- complex type**
- hierarchy**
- simple type**
- XML namespace**
- XML schema**

The following terms are defined in [\[MC-CSDL\]](#):

- annotation**
- association**
- collection**
- conceptual schema definition language (CSDL)**
- entity**
- Entity Data Model (EDM)**
- identifier**
- namespace**
- property**
- schema**

The following terms are defined in [\[MS-SSAS\]](#):

- dimension**
- level**
- measure**

The following terms are specific to this document:

**conceptual schema definition language with business intelligence annotations (CSDLBI):** A language that is based on XML and that can be used to annotate EDM-based conceptual models with specific information that is useful in business intelligence applications.

**conceptual schema definition language with business intelligence annotations (CSDLBI) document:** A document that contains a conceptual model that is defined by using the CSDL and CSDLBI code.

**CSDLBI 1.0:** A version of CSDLBI that has a slightly reduced set of capabilities, which are identified in this document. CSDLBI 1.0 documents reference the following XML namespace: <http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions>. For more information, see [\[XMLNS3\]](#).

**CSDLBI 1.1:** The version of CSDLBI that is defined immediately following CSDLBI 1.0. CSDLBI 1.1 documents reference the following XML namespace: <http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions>. For more information, see [\[XMLNS3\]](#).

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

## 1.2 References

### 1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact [dochelp@microsoft.com](mailto:dochelp@microsoft.com). We will assist you in finding the relevant information. Please check the archive site, <http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624>, as an additional source.

[MC-CSDL] Microsoft Corporation, "[Conceptual Schema Definition File Format](#)".

[MS-SSAS] Microsoft Corporation, "[SQL Server Analysis Services Protocol](#)".

[MSDN-NLS] Microsoft Corporation, "National Language Support (NLS) API Reference", <http://msdn.microsoft.com/en-us/goglobal/bb896001.aspx>

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, <http://www.ietf.org/rfc/rfc2119.txt>

[XML1.0] Bray, T., Paoli, J., Sperberg-McQueen, C.M., and Maler, E., "Extensible Markup Language (XML) 1.0 (Second Edition)", W3C Recommendation, October 2000, <http://www.w3.org/TR/2000/REC-xml-20001006>

[XMLNS3] World Wide Web Consortium, "Namespaces in XML 1.0 (Third Edition)", December 2009, <http://www.w3.org/TR/2009/REC-xml-names-20091208/>

[XMLSCHEMA1] Thompson, H.S., Ed., Beech, D., Ed., Maloney, M., Ed., and Mendelsohn, N., Ed., "XML Schema Part 1: Structures", W3C Recommendation, May 2001, <http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/>

### 1.2.2 Informative References

[MS-GLOS] Microsoft Corporation, "[Windows Protocols Master Glossary](#)".

[MS-OFCGLOS] Microsoft Corporation, "[Microsoft Office Master Glossary](#)".

## 1.3 Overview

Conceptual schema definition language with business intelligence annotations (CSDLBI) is an XML-based file format that is used to annotate Entity Data Model (EDM)-based conceptual models and is

based on standards that are defined in [\[XML1.0\]](#) and [\[XMLSCHEMA1\]](#). Conceptually, a **CSDLBI document** has an overall structure that resembles the following.

```
<Schema>
  <Using/>
  <Using/>

  <ComplexType/>

  <Function/>
  <Function/>

  <EntityContainer>
    <EntitySet>
      <bi:EntitySet/>
    <EntitySet/>

    <EntitySet>
      <bi:EntitySet/>
    <EntitySet/>

    <AssociationSet>
      <End/>
      <End/>
      <bi:AssociationSet/>
    </AssociationSet>

    <AssociationSet>
      <End/>
      <End/>
      <bi:AssociationSet/>
    </AssociationSet>

    <bi:EntityContainer>
      <bi:CompareOptions/>
    </bi:EntityContainer>
  </EntityContainer>

  <EntityType>
    <Key>
      <PropertyRef/>
    </Key>

    <Property>
      <bi:Property>
    </Property>

    <Property>
      <bi:Property>
    </Property>

    <Property>
      <bi:Measure>
        <bi:Kpi>
          <bi:Goal>
            <bi:PropertyRef/>
          </bi:Goal>
        <bi:Status>
```

```

        <bi:PropertyRef/>
      </bi:Status>
    </bi:Kpi>
  </bi:Measure>
</Property>

<NavigationProperty>
  <bi:NavigationProperty/>
</NavigationProperty>

<bi:EntityType>
  <bi:Hierarchy>
    <bi:Level>
      <bi:Source>
        <bi:PropertyRef/>
      </bi:Source>
    </bi:Level>
    <bi:Level>
      <bi:Source>
        <bi:PropertyRef/>
      </bi:Source>
    </bi:Level>
  </bi:Hierarchy>
</bi:EntityType>
</EntityType>

<EntityType>
  <bi:EntityType>
    <bi:Hierarchy>
      <bi:Level>
        <bi:Source>
          <bi:PropertyRef/>
        </bi:Source>
      </bi:Level>
      <bi:Level>
        <bi:Source>
          <bi:PropertyRef/>
        </bi:Source>
      </bi:Level>
    </bi:Hierarchy>
  </bi:EntityType>
</EntityType>

<Association>
  <End/>
  <End/>
</Association>

<Association>
  <End/>
  <End/>
</Association>
</Schema>

```

**Note** The preceding example is not a detailed specification. It is meant to provide only a visual overview.



## 1.4 Relationship to Protocols and Other Structures

The CSDLBI format uses CSDL [\[MC-CSDL\]](#) to provide the structure and semantics.

The CSDLBI format is used to specify SQL Server Analysis Services database metadata, as described in [\[MS-SSAS\]](#).

There are no **schemas**, protocols, or other structures that extend CSDLBI.

## 1.5 Applicability Statement

CSDLBI is a file format for defining annotations to CSDL models that support business intelligence (BI) applications.

## 1.6 Versioning and Localization

This document describes the following CSDLBI versions for Microsoft SQL Server 2012 Service Pack 1 (SP1):

- **CSDLBI 1.0**
- **CSDLBI 1.1**

Aspects of CSDLBI 1.1 that do not apply to CSDLBI 1.0 are identified in the text.

## 1.7 Vendor-Extensible Fields

CSDLBI has no vendor-extensible fields.

## 2 Structures

Conceptual schema definition language (CSDL) supports application-specific customization and extension through the use of annotations. These annotations allow applications to embed application-specific and vendor-specific information into CSDL. The CSDL format does not specify how to process these custom-defined structures or how to distinguish structures from multiple vendors or layers. Parsers of CSDL can ignore annotations that are not expected or are not understood. Annotations can be of two types: **AnnotationElement**, which is defined in [\[MC-CSDL\]](#) section 2.1.22, and **AnnotationAttribute**, which is defined in [\[MC-CSDL\]](#) section 2.2.7.

Conceptual schema definition language with business intelligence annotations (CSDLBI) is defined by **complex types**, some of which include **simple types** and other complex types.

The following CSDL elements are annotated by the corresponding CSDLBI complex types, as shown in the table.

CSDL element	CSDLBI complex type
EntityContainer	TEntityContainer
EntitySet	TEntitySet
AssociationSet	TAssociationSet
EntityType	TEntityType
Property	TProperty
NavigationProperty	TNavigationProperty

Other CSDLBI complex types that are defined in the CSDLBI schema are included in the definitions of the complex types listed in the preceding table. These complex types are the following:

- TCompareOptions
- TBaseProperty
- TPropertyRefs
- TPropertyRef
- TMember
- TKpi (introduced in CSDLBI 1.1)
- TMemberRefs
- TMemberRef
- THierarchy (introduced in CSDLBI 1.1)
- TLevel (introduced in CSDLBI 1.1)
- TDocumentation

One more complex type that is defined in the CSDLBI schema is **TMeasure**, which is used to define the **Measure** element, a new element that is introduced in the CSDLBI 1.0 schema.

Some of the complex types include simple types. The simple types defined in the CSDLBI schema are the following:

- TState
- TDirectQueryMode
- TContents
- TDefaultAggregateFunction
- TGroupingBehavior
- TStability
- TAlignment
- TSortDirection
- TContextualNameRule
- TEntityContents

The CSDLBI schema defines a total of 18 complex types and 10 simple types. Section [2.1](#) contains a subsection for each of the complex types. Some of the complex types include simple types, and those simple types are defined in subsections under the complex type to which they belong.

An example of a CSDL model that is annotated by using these types is provided in Section [3](#) of this specification.

## 2.1 Complex and Simple Types

This section specifies each complex type that is defined by conceptual schema definition language with business intelligence annotations (CSDLBI). Each simple type that is part of a complex type is defined in a subsection about that complex type.

### 2.1.1 TEntityContainer

The **TEntityContainer** complex type annotates the **edm:EntityContainer** element that is defined in [\[MC-CSDL\]](#) section 2.1.14. The **EntityContainer** element is conceptually similar to a database or data source. It groups **EntitySet** and **AssociationSet** child elements that represent a data source.

The **TEntityContainer** complex type is defined in the schema as follows.

```
<xs:complexType name="TEntityContainer">
  <xs:sequence>
    <xs:element name="CompareOptions" type="bi:TCompareOptions" />
  </xs:sequence>
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="Culture" type="xs:string" />
  <xs:attribute name="DirectQueryMode" type="bi:TDirectQueryMode" />
</xs:complexType>
```

The prefix bi: refers to the following **XML namespace**:  
<http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions>.

The elements and attributes that are defined by **TEntityContainer** are specified in the following tables.

Element	Description
CompareOptions	Contains language-specific sorting and string comparison options for the model. The contents of the <b>CompareOptions</b> element are defined by the <b>TCompareOptions</b> complex type (section <a href="#">2.1.2</a> ).

Attribute	Description
Caption	Describes the database or data model.
Culture	Contains the culture name from the National Language Support (NLS) API reference <a href="#">[MSDN-NLS]</a> .
DirectQueryMode	Determines which mode is to be used for a query. The contents of the attribute are defined by the <b>TDirectQueryMode</b> simple type (section <a href="#">2.1.1.1</a> ).

### 2.1.1.1 TDirectQueryMode

The **TDirectQueryMode** simple type is an enumeration that indicates the type of query that will be conducted in DirectQuery mode. Data stores can opt to cache database information. In that case, the client can query the cache or the backing store, depending on user instructions.

The **TDirectQueryMode** type is defined in the schema as follows.

```
<xs:simpleType name="TDirectQueryMode">
  <xs:restriction base="xs:string">
    <xs:enumeration value="InMemory" />
    <xs:enumeration value="InMemoryWithDirectQuery" />
    <xs:enumeration value="DirectQueryWithInMemory" />
    <xs:enumeration value="DirectQuery" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for **TDirectQueryMode** are specified in the following table.

Value	Meaning
InMemory	Indicates that queries against the model will be conducted against the cache.
InMemoryWithDirectQuery	Indicates that queries against the model are conducted against the cache by default.
DirectQueryWithInMemory	Indicates that queries against the model primarily reference the relational data source but can use the cache, if the cache is available.
DirectQuery	Indicates that queries against the model reference only the relational data source.

## 2.1.2 TCompareOptions

The **TCompareOptions** complex type defines collation **properties** that are applied to the data model. The values for **CompareOptions** are based on the **Database.Collation** element, which is defined in [\[MS-SSAS\]](#) section 2.2.4.2.2.5.

The **TCompareOptions** type is defined in the schema as follows.

```
<xs:complexType name="TCompareOptions" >
  <xs:attribute name="IgnoreCase" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreNonSpace" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreKanaType" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreWidth" type="xs:boolean" default="false" />
</xs:complexType>
```

The attributes that are defined by the **TCompareOptions** type are specified in the following table.

Attribute	Description
IgnoreCase	Indicates whether the string comparison SHOULD ignore case.
IgnoreNonSpace	Indicates whether the string comparison SHOULD ignore nonspacing combining characters, such as diacritics.
IgnoreKanaType	Indicates whether the string comparison SHOULD ignore the Kana type.
IgnoreWidth	Indicates whether the string comparison SHOULD ignore the character width.

## 2.1.3 TEntitySet

The **TEntitySet** complex type annotates the **edm:EntitySet** element that is defined in [\[MC-CSDL\]](#) section 2.1.18. The **EntitySet** element defines a named set that can contain instances of an **entity**. More than one **EntitySet** element for a particular **EntityType** can be defined.

The **TEntitySet** type is defined in the schema as follows.

```
<xs:complexType name="TEntitySet">
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
  <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" use="optional"/>
</xs:complexType>
```

The attributes that are defined by **TEntitySet** are specified in the following table.

Attribute	Description
Caption	Contains a user-friendly display name for the entity. If no caption has been set in the model, no caption is displayed.
CollectionCaption	Contains the plural name for the entity.
ReferenceName	Contains the unmerged and fully qualified name of the entity; that is, the original

Attribute	Description
	<b>CubeDimension</b> ( <a href="#">[MS-SSAS]</a> section 2.2.4.2.2.9.1) name before munging.
Hidden	Indicates whether the entity is hidden. If the value of this attribute is "true", the entity is hidden.

## 2.1.4 TAssociationSet

The **TAssociationSet** complex type annotates the **edm:AssociationSet** element that is defined in [\[MC-CSDL\]](#) section 2.1.19. There is one **association** set for every relationship between two entity types (defined by **EntityType** elements). An association set provides a definition for grouping association instances so that they can be mapped to a data source.

The **TAssociationSet** type is defined in the schema as follows.

```
<xs:complexType name="TAssociationSet">
  <xs:attribute name="State" type="bi:TState" default="Active"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" />
</xs:complexType>
```

The attributes that are defined by **TAssociationSet** are specified in the following table.

Attribute	Description
State	Indicates the state of an association set. The contents of the <b>State</b> attribute are defined by the <b>TState</b> simple type (section <a href="#">2.1.4.1</a> ). Where multiple association sets connect two <b>EntitySets</b> , no more than one association set can be marked as active.
Hidden	Indicates whether the association set will be hidden from the client. If the value of this attribute is "true", the association set will be hidden.

### 2.1.4.1 TState

The **TState** simple type enumerates the states that can be assigned to an association set. The **TState** type is defined in the schema as follows.

```
<xs:simpleType name="TState">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Active" />
    <xs:enumeration value="Inactive" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for **TState** are specified in the following table.

Value	Meaning
Active	The association set is active.
Inactive	The association set is inactive.

## 2.1.5 TEntityType

The **TEntityType** complex type annotates the **edm:EntityType** element that is defined in [\[MC-CSDL\]](#) section 2.1.2. The **EntityType** element represents the structure of a top-level concept, such as a customer or order, in a conceptual model. An entity type is a template for instances of entity types in an application.

The **TEntityType** type is defined in the schema as follows.

```
<xs:complexType name ="TEntityType">
  <xs:sequence >
    <xs:element name="DisplayKey" type="bi:TMemberRefs" minOccurs="0"
      maxOccurs="1"/>
    <xs:element name="DefaultDetails" type="bi:TMemberRefs" minOccurs="0"
      maxOccurs="1"/>
    <xs:element name="DefaultImage" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1"
            maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="DefaultMeasure" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1"
            maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="SortMembers" type="bi:TMemberRefs" minOccurs="0"
      maxOccurs="1"/>
    <xs:element name="Hierarchy" type ="bi:THierarchy" minOccurs="0"
      maxOccurs="unbounded" />
  </xs:sequence>
  <xs:attribute name="Contents" type="bi:TEntityContents" default="Regular"
    use="optional"/>
  <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
</xs:complexType>
```

The elements and attributes that are defined by **TEntityType** are specified in the following tables.

Element	Description
DisplayKey	A list of references to columns or to role ends that constitutes a strong <b>identifier</b> that uniquely identifies an entity instance. The list SHOULD be unique; however, the SSAS protocol <a href="#">[MS-SSAS]</a> , which provides CSDLBI output, does not verify that the list is unique.
DefaultDetails	A list of property references that, together, represent the larger set of columns in the table. A single property MUST be a column or a <b>measure</b> .
DefaultImage	A reference to a column that contains the image that illustrates the entity. In the UDM, the <b>DefaultImage</b> element is represented by a binary attribute on the <b>dimension</b> attribute. If it is present, <b>DefaultImage</b> MUST contain exactly one <b>MemberRef</b>

Element	Description
	element whose contents are defined by the <b>TMemberRef</b> complex type (section <a href="#">2.1.7</a> ).
DefaultMeasure	A reference to a measure that is used as the default representation for multiple instances of the entity. If it is present, <b>DefaultMeasure</b> MUST contain exactly one <b>MemberRef</b> element whose contents are defined by the <b>TMemberRef</b> complex type (section <a href="#">2.1.7</a> ).
SortMembers	A list of properties on which to sort. <b>TSortDirection</b> (section <a href="#">2.1.13.2</a> ) provides a hint to the sort engine about whether the order is ascending or descending.
Hierarchy	A list of <b>hierarchies</b> ( <b>THierarchy</b> , section <a href="#">2.1.8</a> ).

Attribute	Description
Contents	The type of data in the entity. The contents of this attribute are defined by the <b>TEntityContents</b> simple type (section <a href="#">2.1.5.1</a> ).
ReferenceName	The identifier that references this entity in a Data Analysis Expressions (DAX) query. If the <b>ReferenceName</b> attribute is omitted, the field name is used.

### 2.1.5.1 TEntityContents

The **TEntityContents** simple type enumerates the possible types of data in an entity. The **TEntityContents** type is defined in the schema as follows.

```
<xs:simpleType name="TEntityContents">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Regular"/>
    <xs:enumeration value="Time"/>
    <xs:enumeration value="Geography"/>
    <xs:enumeration value="Organization"/>
    <xs:enumeration value="BillofMaterials"/>
    <xs:enumeration value="Accounts"/>
    <xs:enumeration value="Customers"/>
    <xs:enumeration value="Products"/>
    <xs:enumeration value="Scenario"/>
    <xs:enumeration value="Quantitative"/>
    <xs:enumeration value="Utility"/>
    <xs:enumeration value="Currency"/>
    <xs:enumeration value="Rates"/>
    <xs:enumeration value="Channel"/>
    <xs:enumeration value="Promotion"/>
  </xs:restriction>
</xs:simpleType>
```

The possible values for **TEntityContents** are specified in the following table.

Value	Meaning
Regular	A dimension whose type has not been set to a special dimension type.



Value	Meaning
Time	A dimension whose attributes represent time periods, such as years, semesters, quarters, months, or days.
Geography	A dimension whose attributes represent geographic information, such as cities or postal codes.
Organization	A dimension whose attributes represent organizational information, such as employees or subsidiaries.
BillOfMaterials	A dimension whose attributes represent inventory or manufacturing information, such as parts lists for products.
Accounts	A dimension whose attributes represent a chart of accounts for financial reporting purposes.
Customers	A dimension whose attributes represent customer or contact information.
Products	A dimension whose attributes represent product information.
Scenario	A dimension whose attributes represent planning or strategic analysis information.
Quantitative	A dimension whose attributes represent quantitative information.
Utility	A dimension whose attributes represent miscellaneous information.
Currency	A dimension that contains currency data and metadata.
Rates	A dimension whose attributes represent currency rate information.
Channel	A dimension whose attributes represent channel information.
Promotion	A dimension whose attributes represent marketing promotion information.

The default value is "Regular".

### 2.1.6 TMemberRefs

The **TMemberRefs** complex type defines a **collection** of members in which each member is contained in a **MemberRef** element. The **TMemberRefs** type is defined in the schema as follows.

```
<xs:complexType name="TMemberRefs" >
  <xs:sequence>
    <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1"
      maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>
```

The element that is defined by **TMemberRefs** is specified in the following table.

Element	Description
MemberRef	A collection of members.

## 2.1.7 TMemberRef

The **TMemberRef** complex type identifies the name of the property that is contained in a **MemberRef** element. The **TMemberRef** type is defined in the schema as follows.

```
<xs:complexType name="TMemberRef">
  <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>
```

The attribute that is defined by **TMemberRef** is specified in the following table.

Attribute	Description
Name	The name of the property contained in a <b>MemberRef</b> element.

## 2.1.8 THierarchy

In CSDLBI 1.1, the **THierarchy** complex type specifies the content of a hierarchy. A hierarchy exposes the same set of attributes as do other members, such as columns (that are exposed as properties) and measures. Therefore, the **THierarchy** type is derived from the base **TMember** type (section [2.1.9](#)).

The **THierarchy** type is defined in the schema as follows.

```
<xs:complexType name="THierarchy">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:sequence>
        <xs:element name="Documentation" type="bi:TDocumentation"
          minOccurs="0" maxOccurs="1" />
        <xs:element name="Level" type="bi:TLevel" minOccurs="1"
          maxOccurs="unbounded" />
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

The elements that are defined by **THierarchy** are specified in the following table.

Element	Description
Documentation	A description of the hierarchy. The contents of this element are defined by the <b>TDocumentation</b> complex type (section <a href="#">2.1.10</a> ).
Level	A single <b>level</b> of the hierarchy. The contents of this element are defined by the <b>TLevel</b> type (section <a href="#">2.1.11</a> ). The number of <b>Level</b> elements that can be specified is at least one, with no upper limit.

## 2.1.9 TMember

The **TMember** complex type is a base type. Its attributes can appear in columns, measures, navigation properties, hierarchies, and levels. The **TMember** type is defined in the schema as follows.

```
<xs:complexType name="TMember" abstract="true">
  <xs:attribute name="Name" type="xs:string" use="required" />
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="ContextualNameRule" type="bi:TContextualNameRule"
    default="None" />
  <xs:attribute name="Hidden" type="xs:boolean" default="false" />
  <xs:attribute name="ReferenceName" type="xs:string" use="optional" />
</xs:complexType>
```

The attributes that are defined by **TMember** are specified in the following table.

Attribute	Description
Name	The name given to the member (a column, measure, navigation property, hierarchy, or level) that is defined by the implementation of the <b>TMember</b> type.
Caption <sup>&lt;1&gt;</sup>	The display name for the member.
ContextualNameRule	The naming format that is used to disambiguate members. The contents of this attribute are defined by the <b>TContextualNameRule</b> simple type (section <a href="#">2.1.9.1</a> ).
Hidden	A boolean value that indicates whether the member will be hidden from the client. If the value of this attribute is "true", the member will be hidden.
ReferenceName	The identifier used to reference the member in a DAX query. If the <b>ReferenceName</b> attribute is omitted, the field name is used.

### 2.1.9.1 TContextualNameRule

The **TContextualNameRule** simple type enumerates the naming formats that can be used to disambiguate members. **TContextualNameRule** provides a hint to client applications for creating unambiguous names for **CalculationProperty**, which is defined in [\[MS-SSAS\]](#) section 2.2.4.2.2.10.1.

The **TContextualNameRule** type is defined in the schema as follows.

```
<xs:simpleType name="TContextualNameRule">
  <xs:restriction base="xs:string">
    <xs:enumeration value="None" />
    <xs:enumeration value="Context" />
    <xs:enumeration value="Merge" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for **TContextualNameRule** are specified in the following table.

Value	Meaning
-------	---------

Value	Meaning
None	Use the attribute name.
Context	Use the incoming relationship name.
Merge	Concatenate the incoming relationship name and the <b>CalculationProperty</b> name, in accordance with the language grammar.

### 2.1.10 TDocumentation

The **TDocumentation** complex type defines the contents of the **Documentation** element, which provides information about an object that is defined in the parent element that contains the **Documentation** element.

The **TDocumentation** type is defined in the schema as follows.

```
<xs:complexType name="TDocumentation">
  <xs:sequence>
    <xs:element name="Summary" type="xs:string" minOccurs="0" maxOccurs="1" />
  </xs:sequence>
</xs:complexType>
```

The element that is defined by **TDocumentation** is specified in the following table.

Element	Description
Summary	A description of a parent element's object.

### 2.1.11 TLevel

The **TLevel** complex type specifies a hierarchy level. The **TLevel** type is derived from the base **TMember** type (section [2.1.9](#)).

The **TLevel** type is defined in the schema as follows.

```
<xs:complexType name="TLevel">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:sequence>
        <xs:element name="Source" minOccurs="0" maxOccurs="1" >
          <xs:complexType >
            <xs:sequence>
              <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
                maxOccurs="1" />
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

The elements that are defined by **TLevel** are specified in the following table.

Element	Description
Source	A container element for the <b>PropertyRef</b> element.
Source.PropertyRef	A property reference that points back to an instance property. Caption, description, name, and reference name can be drawn from the referenced instance property, if it is not specified for <b>TLevel</b> .

### 2.1.12 TProperty

The **TProperty** complex type annotates the **edm:Property** element that is defined in [\[MC-CSDL\]](#) section 2.1.3. The **TProperty** type is an extension of the **TBaseProperty** type (section [2.1.13](#)) that adds attributes that appear only in instance columns.

The **TProperty** type is defined in the schema as follows.

```
<xs:complexType name="TProperty">
  <xs:complexContent>
    <xs:extension base="bi:TBaseProperty">
      <xs:sequence >
        <xs:element name="OrderBy" type="bi:TPropertyRefs" minOccurs="0"
          maxOccurs="1"/>
      </xs:sequence>
      <xs:attribute name="Contents" type="bi:TContents" use="optional"
        default="Regular"/>
      <xs:attribute name="DefaultAggregateFunction"
        type="bi:TDefaultAggregateFunction" default="Default" />
      <xs:attribute name="GroupingBehavior" type="bi:TGroupingBehavior"
        default="GroupOnValue"/>
      <xs:attribute name="Stability" type="bi:TStability" default="Stable"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

The element and attributes that are defined by **TProperty** are specified in the following tables.

Element	Description
OrderBy	A reference to another property within the model that defines the sort order for that property's values. The values for the two properties SHOULD have a 1-to-1 mapping; otherwise, the sort behavior is undefined. If <b>OrderBy</b> is omitted, the properties are sorted based on their values.

Attribute	Description
Contents	The type of data in a column. This value is drawn from <b>DimensionAttribute</b> , which is defined in <a href="#">[MS-SSAS]</a> section 2.2.4.2.2.8.1. The contents of this attribute are defined by the <b>TContents</b> simple type (section <a href="#">2.1.12.1</a> ).
DefaultAggregateFunction	A value indicating the default aggregate function, if any, that is typically used to summarize properties. The contents of this attribute are defined by the

Attribute	Description
	<b>TDefaultAggregateFunction</b> simple type (section <a href="#">2.1.12.2</a> ).
GroupingBehavior	A value that specifies how query results are grouped. The attribute's contents are defined by the <b>TGroupingBehavior</b> simple type (section <a href="#">2.1.12.3</a> ).
Stability	An attribute that specifies the stability of a declared property between refresh operations. The <b>Stability</b> attribute is set on columns that contain a row number or other volatile value (such as NOW()). This attribute is emitted only for an unstable value. The contents of this attribute are defined by the <b>TStability</b> simple type (section <a href="#">2.1.12.4</a> ).

### 2.1.12.1 TContents

The **TContents** simple type is a string that contains the possible types of data in a column. The **TContents** value is derived from the **DimensionAttributeTypeEnumType** simple type that is included in the definition of the **DimensionAttribute** complex type, as specified in [\[MS-SSAS\]](#) section 2.2.4.2.2.8.1. If the enumeration value in **DimensionAttributeTypeEnumType** is "ExtendedType", then the **TContents** value is derived from the **ExtendedType** element of **DimensionAttribute**. The client is not required to respond to these values.

The **TContents** type is defined in the schema as follows.

```
<xs:simpleType name="TContents">
  <xs:restriction base="xs:string" />
</xs:simpleType>
```

### 2.1.12.2 TDefaultAggregateFunction

The **TDefaultAggregateFunction** simple type enumerates the aggregate functions that can be used by reporting tools to summarize attribute values. The **TDefaultAggregateFunction** type is defined in the schema as follows.

```
<xs:simpleType name="TDefaultAggregateFunction" >
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="None" />
    <xs:enumeration value="Sum" />
    <xs:enumeration value="Count" />
    <xs:enumeration value="Average" />
    <xs:enumeration value="Min" />
    <xs:enumeration value="Max" />
    <xs:enumeration value="DistinctCount" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for **TDefaultAggregateFunction** are specified in the following table.

Value	Meaning
Default	Automatically selects the appropriate aggregate function based on the data type.

Value	Meaning
None	Does not use aggregate functions.
Sum	Uses the aggregate function <b>Sum</b> .
Count	Uses the aggregate function <b>Count</b> .
Average	Uses the aggregate function <b>Average</b> .
Min	Uses the aggregate function <b>Min</b> .
Max	Uses the aggregate function <b>Max</b> .
DistinctCount	Uses the aggregate function <b>DistinctCount</b> .

### 2.1.12.3 TGroupingBehavior

The **TGroupingBehavior** simple type enumerates the options that are available for building queries within a hierarchy. The **TGroupingBehavior** type is defined in the schema as follows.

```
<xs:simpleType name="TGroupingBehavior" >
  <xs:restriction base="xs:string" >
    <xs:enumeration value="GroupOnValue" />
    <xs:enumeration value="GroupOnEntityKey" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for **TGroupingBehavior** are specified in the following table.

Value	Meaning
GroupOnValue	Group by value.
GroupOnEntityKey	Group by entity key.

The following example illustrates the meaning of these two values. For example, to show the total payroll deductions for Brian Smith, and the value used is "GroupOnValue", the result shows the payroll deductions of all Brian Smiths that are in the database totaled together. If the value "GroupOnEntityKey" is used, the result shows the payroll deductions for each Brian Smith in the database.

### 2.1.12.4 TStability

The **TStability** simple type enumerates the acceptable values for specifying the stability of a declared property between refresh operations. The **TStability** type is defined in the schema as follows.

```
<xs:simpleType name="TStability">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Stable" />
    <xs:enumeration value="RowNumber" />
    <xs:enumeration value="Volatile" />
  </xs:restriction>
</xs:simpleType>
```

```

</xs:restriction>
</xs:simpleType>

```

The possible values for **TStability** are specified in the following table.

Value	Meaning
Stable	The property remains constant between refresh operations.
RowNumber	The property contains a row number.
Volatile	The property might not remain constant between refresh operations.

### 2.1.13 TBaseProperty

The **TBaseProperty** complex type is an extension of the **TMember** type (section [2.1.9](#)) that adds attributes that appear only in columns and measures.

The **TBaseProperty** type is defined in the schema as follows.

```

<xs:complexType name="TBaseProperty" abstract="true">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:attribute name="Alignment" type="bi:TAlignment" use="optional"/>
      <xs:attribute name="FormatString" type="xs:string" use="optional"/>
      <xs:attribute name="Units" type="xs:string" use="optional" />
      <xs:attribute name="SortDirection" type="bi:TSortDirection"
        default="Default"/>
      <xs:attribute name="IsRightToLeft" type="xs:boolean" default="false"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

The attributes that are defined by **TBaseProperty** are specified in the following table.

Attribute	Description
Alignment	A value that indicates how the field values SHOULD be aligned in a tabular presentation. If the <b>Alignment</b> attribute is omitted, the default determines the alignment based on the field's data type. The contents of this attribute are defined by the <b>TAlignment</b> simple type (section <a href="#">2.1.13.1</a> ).
FormatString	<p>A .NET format string that defines the default client formatting for date and time values. If the <b>FormatString</b> attribute is omitted, the following .NET format string values are assumed:</p> <ul style="list-style-type: none"> <li>▪ Integer fields: "g"</li> <li>▪ Decimal datatype fields: "#,0.00"</li> <li>▪ Double datatype fields: "#,0.00"</li> <li>▪ Date and time fields: "d"</li> </ul> <p>For all other types of fields, no format string applies.</p>



Attribute	Description
Units	The symbol that is applied to field values to express units. If the <b>Units</b> attribute is omitted, the units are assumed to be unknown.
SortDirection	A value that indicates how the field values are typically sorted. If the <b>SortDirection</b> attribute is omitted, the default value assigns a sort direction based on the field's data type. The contents of this attribute are defined by the <b>TSortDirection</b> simple type (section <a href="#">2.1.13.2</a> ).
IsRightToLeft	A boolean value that indicates whether the field contains text that MAY be read from right to left. If the <b>IsRightToLeft</b> attribute is omitted, the model setting is assumed.

### 2.1.13.1 TAlignment

The **TAlignment** simple type enumerates the types of justification that can be used within a column. The **TAlignment** type is defined in the schema as follows.

```
<xs:simpleType name="TAlignment">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="Left" />
    <xs:enumeration value="Right" />
    <xs:enumeration value="Center" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for type **TAlignment** are specified in the following table.

Value	Meaning
Default	Automatically sets the appropriate justification corresponding to the data type.
Left	Sets the justification to left-aligned.
Right	Sets the justification to right-aligned.
Center	Sets the justification to center-aligned.

### 2.1.13.2 TSortDirection

The **TSortDirection** simple type enumerates sort directions. The **TSortDirection** type is defined in the schema as follows.

```
<xs:simpleType name="TSortDirection">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="Ascending" />
    <xs:enumeration value="Descending" />
  </xs:restriction>
</xs:simpleType>
```

The possible values for **TSortDirection** are specified in the following table.

Value	Meaning
Default	The default sort direction. The default is based on data type.
Ascending	The ascending sort direction.
Descending	The descending sort direction.

### 2.1.14 TPropertyRefs

The **TPropertyRefs** complex type defines a collection of properties, with each property contained in a **PropertyRef** element. The **TPropertyRefs** type is defined in the schema as follows.

```
<xs:complexType name="TPropertyRefs" >
  <xs:sequence>
    <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
      maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>
```

The element that is defined by **TPropertyRefs** is specified in the following table.

Element	Description
PropertyRef	A collection of properties.

### 2.1.15 TPropertyRef

The **TPropertyRef** complex type identifies the name of the property that is contained in a **PropertyRef** element. The **PropertyRef** name MUST match the name of one of the **Property** elements within the same **EntityType**.

The **TPropertyRef** type is defined in the schema as follows.

```
<xs:complexType name="TPropertyRef">
  <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>
```

The attribute that is defined by **TPropertyRef** is specified in the following table.

Attribute	Description
Name	The name of a property that is contained in a <b>PropertyRef</b> element.

### 2.1.16 TMeasure

The **TMeasure** complex type is an extension of the **TProperty** type (section [2.1.12](#)), adding components that appear only in measures. The **TMeasure** type is defined in the schema as follows.

```
<xs:complexType name="TMeasure">
```

```

<xs:complexContent>
  <xs:extension base="bi:TProperty">
    <xs:sequence>
      <xs:element name="Kpi" type="bi:TKpi" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:attribute name="IsSimpleMeasure" type="xs:boolean" default="true"/>
  </xs:extension>
</xs:complexContent>
</xs:complexType>

```

The element and attribute that are defined by **TMeasure** are specified in the following tables.

Element	Description
Kpi	A key performance indicator (KPI). The contents of this element are defined by the <b>TKpi</b> complex type (section <a href="#">2.1.17</a> ).

Attribute	Description
IsSimpleMeasure	A boolean value that indicates whether the formula that is used in the measure is one of the simple aggregations (Sum, Count, Min, Max, Avg, DistinctCount). The value "true" means that one of the simple aggregations is used. The actual value is derived from the <b>IsSimpleMeasure</b> element in the model specified in <a href="#">[MS-SSAS] section 2.2.4.2.2.10.2</a> .

### 2.1.17 TKpi

In CSDLBI 1.1, the **TKpi** complex type defines a calculation that can be used as a KPI. In a business intelligence data model, a KPI is based on a measure. The definition of the KPI contains all the metadata that is associated with measures, as well as information needed for the presentation of the KPI values.

The **TKpi** type does not specify the formula that is contained in the measure definition; rather, it specifies the additional metadata that is associated with measures that are used as KPIs. After a measure is designated as a KPI, it SHOULD be exposed only as a KPI.

The **TKpi** type lists attributes that SHOULD be included only with a **TMeasure** type (section [2.1.16](#)).

The **TKpi** type is defined in the schema as follows.

```

<xs:complexType name="TKpi">
  <xs:sequence>
    <xs:element name="Documentation" type="bi:TDocumentation" minOccurs="0"
      maxOccurs="1" />
    <xs:element name="KpiGoal" minOccurs="1" maxOccurs="1" >
      <xs:complexType>
        <xs:sequence>
          <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
            maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

```

```

<xs:element name="KpiStatus" minOccurs="1" maxOccurs="1" >
  <xs:complexType >
    <xs:sequence>
      <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
        maxOccurs="1" />
    </xs:sequence>
  </xs:complexType>
</xs:element>
</xs:sequence>
<xs:attribute name="StatusGraphic" type="xs:string" use="required"/>
</xs:complexType>

```

The elements and attribute that are defined by **TKpi** are specified in the following tables.

Element	Description
Documentation <a href="#">&lt;2&gt;</a>	An element that contains information about the KPI. The contents of this element are defined by the <b>TDocumentation</b> complex type (section <a href="#">2.1.10</a> ).
KpiGoal	An element that contains the reference to the column that contains the KPI goal value. This element <b>MUST</b> contain exactly one <b>PropertyRef</b> element. The contents of this element are defined by the <b>TPropertyRef</b> complex type (section <a href="#">2.1.15</a> ).
KpiStatus	An element that contains the reference to a column that contains the value as the status indicator in a KPI. This element <b>MUST</b> contain exactly one <b>PropertyRef</b> element. The contents of this element are defined by the <b>TPropertyRef</b> complex type (section <a href="#">2.1.15</a> ).

Attribute	Description
StatusGraphic	A reference to an image that indicates negative, neutral, or positive progress against the targets defined in the KPI.

### 2.1.18 TNavigationProperty

The **TNavigationProperty** complex type annotates the **edm:NavigationProperty** element, which is defined in [\[MC-CSDL\]](#) section 2.1.4. The **TNavigationProperty** type is an extension of the **TMember** type (section [2.1.9](#)), adding an attribute that appears only in navigation properties.

The **TNavigationProperty** type is defined in the schema as follows.

```

<xs:complexType name="TNavigationProperty">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

The attribute that is defined by **TNavigationProperty** is specified in the following table.

Attribute	Description
CollectionCaption	Plural name for referring to a set of instances of the navigation property. If the <b>CollectionCaption</b> attribute is omitted, the <b>TMember.Caption</b> attribute is used.

### 3 Structure Examples

The following samples of CSDLBI code are annotated structures that are populated with values that represent common use cases. The examples illustrate the structures that are specified in this document, but do not cover all possible usage scenarios. These samples are not intended to replace this specification but only to clarify and enhance the specification.

#### 3.1 CSDLBI 1.0 Example

```
<Schema xmlns="http://schemas.microsoft.com/ado/2008/09/edm"
xmlns:edm_annotation="http://schemas.microsoft.com/ado/2009/02/edm/annotation"
xmlns:bi="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions" bi:Version="1.0"
Namespace="Sandbox">
  <EntityContainer Name="Sandbox">
    <Documentation>
      <Summary>DescriptionRolePlayingDimensionsDB</Summary>
    </Documentation>
    <EntitySet Name="DimCustomer" EntityType="Sandbox.DimCustomer">
      <Documentation>
        <Summary>Description_Dimension_DimCustomer</Summary>
      </Documentation>
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimEmployee" EntityType="Sandbox.DimEmployee">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimGeography" EntityType="Sandbox.DimGeography">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimProduct" EntityType="Sandbox.DimProduct">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimProductCategory" EntityType="Sandbox.DimProductCategory">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimProductSubcategory"
EntityType="Sandbox.DimProductSubcategory">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimStore" EntityType="Sandbox.DimStore">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="DimTime" EntityType="Sandbox.DimTime">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="FactInternetSales" EntityType="Sandbox.FactInternetSales">
      <bi:EntitySet />
    </EntitySet>
    <AssociationSet Name="DimCustomer_DimGeography_Geography"
Association="Sandbox.DimCustomer_DimGeography_Geography">
      <End EntitySet="DimCustomer" />
      <End EntitySet="DimGeography" />
      <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="DimProduct_DimProductSubcategory_Subcategory"
Association="Sandbox.DimProduct_DimProductSubcategory_Subcategory">
      <End EntitySet="DimProduct" />
```

```

        <End EntitySet="DimProductSubcategory" />
        <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="DimProductSubcategory_DimProductCategory_Category"
Association="Sandbox.DimProductSubcategory_DimProductCategory_Category">
        <End EntitySet="DimProductSubcategory" />
        <End EntitySet="DimProductCategory" />
        <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="DimStore_DimGeography_Geography2"
Association="Sandbox.DimStore_DimGeography_Geography2">
        <End EntitySet="DimStore" />
        <End EntitySet="DimGeography" />
        <bi:AssociationSet State="Inactive" />
    </AssociationSet>
    <AssociationSet Name="FactInternetSales_DimCustomer_Customer2"
Association="Sandbox.FactInternetSales_DimCustomer_Customer2">
        <End EntitySet="FactInternetSales" />
        <End EntitySet="DimCustomer" />
        <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="FactInternetSales_DimCustomer_Customer_2"
Association="Sandbox.FactInternetSales_DimCustomer_Customer_2">
        <End EntitySet="FactInternetSales" />
        <End EntitySet="DimCustomer" />
        <bi:AssociationSet State="Inactive" />
    </AssociationSet>
    <AssociationSet Name="FactInternetSales_DimTime_Time"
Association="Sandbox.FactInternetSales_DimTime_Time">
        <End EntitySet="FactInternetSales" />
        <End EntitySet="DimTime" />
        <bi:AssociationSet State="Inactive" />
    </AssociationSet>
    <AssociationSet Name="FactInternetSales_DimTime_Time_2"
Association="Sandbox.FactInternetSales_DimTime_Time_2">
        <End EntitySet="FactInternetSales" />
        <End EntitySet="DimTime" />
        <bi:AssociationSet State="Inactive" />
    </AssociationSet>
    <AssociationSet Name="FactInternetSales_DimTime_Time_3"
Association="Sandbox.FactInternetSales_DimTime_Time_3">
        <End EntitySet="FactInternetSales" />
        <End EntitySet="DimTime" />
        <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="FactInternetSales_DimStore_Store2"
Association="Sandbox.FactInternetSales_DimStore_Store2">
        <End EntitySet="FactInternetSales" />
        <End EntitySet="DimStore" />
        <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="FactInternetSales_DimEmployee_Employee"
Association="Sandbox.FactInternetSales_DimEmployee_Employee">
        <End EntitySet="FactInternetSales" />
        <End EntitySet="DimEmployee" />
        <bi:AssociationSet />
    </AssociationSet>
    <AssociationSet Name="FactInternetSales_DimProduct_Product2"
Association="Sandbox.FactInternetSales_DimProduct_Product2">
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```

```

        <End EntitySet="DimProduct" />
        <bi:AssociationSet />
    </AssociationSet>
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        <bi:CompareOptions IgnoreCase="true" IgnoreKanaType="true" IgnoreWidth="true"
/>

    </bi:EntityContainer>
</EntityContainer>
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    <Property Name="RowNumber" Type="Int64" Nullable="false">
        <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>
    <Property Name="CustomerKey" Type="Int64" Nullable="false">
        <Documentation>
            <Summary>Description_Dimension_CustomerKey</Summary>
        </Documentation>
        <bi:Property Caption="Caption_Dimension_CustomerKey" Hidden="true">
            <bi:OrderBy>
                <bi:PropertyRef Name="GeographyKey" />
            </bi:OrderBy>
        </bi:Property>
    </Property>
    <Property Name="GeographyKey" Type="Int64">
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Unicode="true" FixedLength="false">
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FixedLength="false">
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SortDirection="Ascending" IsRightToLeft="true" DefaultAggregateFunction="Max" />
    </Property>
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FixedLength="false">
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    </Property>
    <Property Name="MiddleName" Type="String" MaxLength="Max" Unicode="true"
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    </Property>
    <Property Name="LastName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
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    </Property>
    <Property Name="NameStyle" Type="Boolean">
        <bi:Property />
    </Property>
    <Property Name="BirthDate" Type="DateTime">
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    </Property>
    <Property Name="MaritalStatus" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
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        <Property Name="Suffix" Type="String" MaxLength="Max" Unicode="true"
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FixedLength="false">
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    </Property>
    <Property Name="EmailAddress" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="YearlyIncome" Type="Decimal" Precision="19" Scale="4">
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    </Property>
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    </Property>
    <Property Name="NumberChildrenAtHome" Type="Int64">
        <bi:Property />
    </Property>
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    </Property>
    <Property Name="SpanishEducation" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
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    </Property>
    <Property Name="FrenchEducation" Type="String" MaxLength="Max" Unicode="true"
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    </Property>
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    <Property Name="SpanishOccupation" Type="String" MaxLength="Max" Unicode="true"
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    <Property Name="FrenchOccupation" Type="String" MaxLength="Max" Unicode="true"
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    <Property Name="CommuteDistance" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
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Relationship="Sandbox.DimCustomer_DimGeography_Geography" FromRole="Customer"
ToRole="Geography">
        <Documentation>
            <Summary>DESCRIPTION_RelationshipEnd_Cust_Geog</Summary>
        </Documentation>
        <bi:NavigationProperty Caption="CAPTION_RelationshipEnd_Cust_Geog"
ContextualNameRule="Context" />
    </NavigationProperty>
    <bi:EntityType Contents="Customers">
        <bi:DisplayKey>
            <bi:MemberRef Name="Geography" />
            <bi:MemberRef Name="Title" />
        </bi:DisplayKey>
        <bi:DefaultDetails>
            <bi:MemberRef Name="Title" />
            <bi:MemberRef Name="Geography" />
        </bi:DefaultDetails>
        <bi:DefaultImage>
            <bi:MemberRef Name="Title" />
        </bi:DefaultImage>
        <bi:SortMembers>
            <bi:MemberRef Name="Title" />
        </bi:SortMembers>
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    </Property>
    <Property Name="EmployeeKey" Type="Int64" Nullable="false">
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    </Property>
    <Property Name="ParentEmployeeKey" Type="Int64">
        <bi:Property />
    </Property>
    <Property Name="EmployeeNationalIDAlternateKey" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
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    </Property>
    <Property Name="ParentEmployeeNationalIDAlternateKey" Type="String"
MaxLength="Max" Unicode="true" FixedLength="false">
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    </Property>
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    <Property Name="LastName" Type="String" MaxLength="Max" Unicode="true"
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        <bi:Property />
    </Property>
    <Property Name="MiddleName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="NameStyle" Type="Boolean">
        <bi:Property />
    </Property>
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FixedLength="false">
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        <bi:Property />
    </Property>
    <Property Name="BirthDate" Type="DateTime">
        <bi:Property />
    </Property>
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    </Property>
    <Property Name="EmailAddress" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
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FixedLength="false">
        <bi:Property />
    </Property>
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    </Property>
    <Property Name="EmergencyContactPhone" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Property />
    </Property>
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    </Property>
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FixedLength="false">
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</Property>
<Property Name="SickLeaveHours" Type="Int64">
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</Property>
<Property Name="CurrentFlag" Type="Boolean">
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</Property>
<Property Name="SalesPersonFlag" Type="Boolean">
  <bi:Property />
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FixedLength="false">
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  <bi:Property />
</Property>
<Property Name="EndDate" Type="DateTime">
  <bi:Property />
</Property>
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FixedLength="false">
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<EntityType Name="DimGeography">
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  </Key>
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  </Property>
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    <bi:Property />
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  </Property>
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FixedLength="false">
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  </Property>

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    <Property Name="FrenchCountryRegionName" Type="String" MaxLength="Max"
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FixedLength="false">
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FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="ProductSubcategoryKey" Type="Int64">
        <bi:Property />
    </Property>
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Unicode="true" FixedLength="false">
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    </Property>
    <Property Name="SizeUnitMeasureCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
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        <bi:Property />
    </Property>
    <Property Name="FrenchProductName" Type="String" MaxLength="Max" Unicode="true"
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    </Property>
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FixedLength="false">
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    </Property>
    <Property Name="SafetyStockLevel" Type="Int64">
      <bi:Property />
    </Property>
    <Property Name="ReorderPoint" Type="Int64">
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    </Property>
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FixedLength="false">
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    </Property>
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FixedLength="false">
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    </Property>
    <Property Name="DaysToManufacture" Type="Int64">
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    </Property>
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    <Property Name="HebrewDescription" Type="String" MaxLength="Max" Unicode="true"
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    </Property>
    <Property Name="EndDate" Type="DateTime">
        <bi:Property />
    </Property>
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FixedLength="false">
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Relationship="Sandbox.DimProduct_DimProductSubcategory_Subcategory" FromRole="Product"
ToRole="Subcategory">
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    </NavigationProperty>
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    </Property>
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    </Property>
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Unicode="true" FixedLength="false">
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    <Property Name="SpanishProductCategoryName" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
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Unicode="true" FixedLength="false">
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    <Property Name="SpanishProductSubcategoryName" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
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    </Property>
    <Property Name="FrenchProductSubcategoryName" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="ProductCategoryKey" Type="Int64">
        <bi:Property />
    </Property>
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Relationship="Sandbox.DimProductSubcategory_DimProductCategory_Category"
FromRole="Subcategory2" ToRole="Category">
        <bi:NavigationProperty ContextualNameRule="Merge" />
    </NavigationProperty>
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    </Property>
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        <bi:Property />
    </Property>
    <Property Name="Geography_Key" Type="Int64">
        <bi:Property Caption="Geography Key" ReferenceName="Geography Key" />
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    <Property Name="StoreName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="Number_of_Employees" Type="Int64">
        <bi:Property Caption="Number of Employees" ReferenceName="Number of Employees"
/>

    </Property>
    <Property Name="Sales" Type="Decimal" Precision="19" Scale="4">
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    </Property>
    <NavigationProperty Name="Geography2"
Relationship="Sandbox.DimStore_DimGeography_Geography2" FromRole="Store" ToRole="Geography2">
        <bi:NavigationProperty ContextualNameRule="Merge" />

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    </NavigationProperty>
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</EntityType>
<EntityType Name="DimTime">
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  </Key>
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  </Property>
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    <bi:Property />
  </Property>
  <Property Name="FullDateAlternateKey" Type="DateTime">
    <bi:Property />
  </Property>
  <Property Name="DayNumberOfWeek" Type="Int64">
    <bi:Property />
  </Property>
  <Property Name="EnglishDayNameOfWeek" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
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  </Property>
  <Property Name="SpanishDayNameOfWeek" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
    <bi:Property />
  </Property>
  <Property Name="FrenchDayNameOfWeek" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
    <bi:Property />
  </Property>
  <Property Name="DayNumberOfMonth" Type="Int64">
    <bi:Property />
  </Property>
  <Property Name="DayNumberOfYear" Type="Int64">
    <bi:Property />
  </Property>
  <Property Name="WeekNumberOfYear" Type="Int64">
    <bi:Property />
  </Property>
  <Property Name="EnglishMonthName" Type="String" MaxLength="Max" Unicode="true"
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  <Property Name="SpanishMonthName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
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  </Property>
  <Property Name="FrenchMonthName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
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  </Property>
  <Property Name="MonthNumberOfYear" Type="Int64">
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  </Property>
  <Property Name="CalendarQuarter" Type="Int64">
    <bi:Property />
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FixedLength="false">
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    </Property>
    <Property Name="DueDateKey" Type="Int64">
        <bi:Property />
    </Property>
    <Property Name="ShipDateKey" Type="Int64">
        <bi:Property />
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    <Property Name="CustomerKey" Type="Int64">
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    <Property Name="PromotionKey" Type="Int64">
        <bi:Property />
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    <Property Name="CurrencyKey" Type="Int64">
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    </Property>
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FixedLength="false">
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</Property>
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  <bi:Property />
</Property>
<Property Name="DiscountAmount" Type="Double">
  <bi:Property />
</Property>
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</Property>
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FixedLength="false">
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  <bi:Property />
</Property>
<Property Name="BillingCustomerKey" Type="Int64">
  <bi:Property />
</Property>
<Property Name="StoreKey" Type="Int64">
  <bi:Property />
</Property>
<Property Name="TotalSales" Type="Int64">
  <Documentation>
    <Summary>DescriptionRolePlayingDimensionsDB</Summary>
  </Documentation>
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ContextualNameRule="Context" Alignment="Right"
FormatString="&quot;,$&quot;#;0.00; (&quot;,$&quot;#;0.00); &quot;,$&quot;#;0.00" Units="money"
SortDirection="Ascending" IsRightToLeft="true" IsSimpleMeasure="true" />
</Property>

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Relationship="Sandbox.FactInternetSales_DimCustomer_Customer2" FromRole="Sales"
ToRole="Customer2">
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Relationship="Sandbox.FactInternetSales_DimCustomer_Customer_2" FromRole="Sales2"
ToRole="Customer_2">
        <bi:NavigationProperty ContextualNameRule="Merge" />
    </NavigationProperty>
    <NavigationProperty Name="Time"
Relationship="Sandbox.FactInternetSales_DimTime_Time" FromRole="Sales3" ToRole="Time">
        <bi:NavigationProperty ContextualNameRule="Merge" />
    </NavigationProperty>
    <NavigationProperty Name="Time_2"
Relationship="Sandbox.FactInternetSales_DimTime_Time_2" FromRole="Sales4" ToRole="Time_2">
        <bi:NavigationProperty ContextualNameRule="Merge" />
    </NavigationProperty>
    <NavigationProperty Name="Time_3"
Relationship="Sandbox.FactInternetSales_DimTime_Time_3" FromRole="Sales5" ToRole="Time_3">
        <bi:NavigationProperty ContextualNameRule="Merge" />
    </NavigationProperty>
    <NavigationProperty Name="Store2"
Relationship="Sandbox.FactInternetSales_DimStore_Store2" FromRole="Sales6" ToRole="Store2">
        <bi:NavigationProperty ContextualNameRule="Merge" />
    </NavigationProperty>
    <NavigationProperty Name="Employee"
Relationship="Sandbox.FactInternetSales_DimEmployee_Employee" FromRole="Sales7"
ToRole="Employee">
        <bi:NavigationProperty ContextualNameRule="Merge" />
    </NavigationProperty>
    <NavigationProperty Name="Product2"
Relationship="Sandbox.FactInternetSales_DimProduct_Product2" FromRole="FactInternetSales"
ToRole="Product2">
        <bi:NavigationProperty ContextualNameRule="Merge" />
    </NavigationProperty>
    <bi:EntityType>
        <bi:DefaultDetails>
            <bi:MemberRef Name="TotalSales" />
        </bi:DefaultDetails>
        <bi:DefaultMeasure>
            <bi:MemberRef Name="TotalSales" />
        </bi:DefaultMeasure>
    </bi:EntityType>
</EntityType>
<Association Name="DimCustomer_DimGeography_Geography">
    <End Role="Customer" Type="Sandbox.DimCustomer" Multiplicity="*" />
    <End Role="Geography" Type="Sandbox.DimGeography" Multiplicity="0..1" />
</Association>
<Association Name="DimProduct_DimProductSubcategory_Subcategory">
    <End Role="Product" Type="Sandbox.DimProduct" Multiplicity="*" />
    <End Role="Subcategory" Type="Sandbox.DimProductSubcategory" Multiplicity="0..1"
/>
</Association>
<Association Name="DimProductSubcategory_DimProductCategory_Category">
    <End Role="Subcategory2" Type="Sandbox.DimProductSubcategory" Multiplicity="*" />
    <End Role="Category" Type="Sandbox.DimProductCategory" Multiplicity="0..1" />
</Association>
<Association Name="DimStore_DimGeography_Geography2">
    <End Role="Store" Type="Sandbox.DimStore" Multiplicity="*" />

```

```

    <End Role="Geography2" Type="Sandbox.DimGeography" Multiplicity="0..1" />
  </Association>
  <Association Name="FactInternetSales_DimCustomer_Customer2">
    <End Role="Sales" Type="Sandbox.FactInternetSales" Multiplicity="*" />
    <End Role="Customer2" Type="Sandbox.DimCustomer" Multiplicity="0..1" />
  </Association>
  <Association Name="FactInternetSales_DimCustomer_Customer_2">
    <End Role="Sales2" Type="Sandbox.FactInternetSales" Multiplicity="*" />
    <End Role="Customer_2" Type="Sandbox.DimCustomer" Multiplicity="0..1" />
  </Association>
  <Association Name="FactInternetSales_DimTime_Time">
    <End Role="Sales3" Type="Sandbox.FactInternetSales" Multiplicity="*" />
    <End Role="Time" Type="Sandbox.DimTime" Multiplicity="0..1" />
  </Association>
  <Association Name="FactInternetSales_DimTime_Time_2">
    <End Role="Sales4" Type="Sandbox.FactInternetSales" Multiplicity="*" />
    <End Role="Time_2" Type="Sandbox.DimTime" Multiplicity="0..1" />
  </Association>
  <Association Name="FactInternetSales_DimTime_Time_3">
    <End Role="Sales5" Type="Sandbox.FactInternetSales" Multiplicity="*" />
    <End Role="Time_3" Type="Sandbox.DimTime" Multiplicity="0..1" />
  </Association>
  <Association Name="FactInternetSales_DimStore_Store2">
    <End Role="Sales6" Type="Sandbox.FactInternetSales" Multiplicity="*" />
    <End Role="Store2" Type="Sandbox.DimStore" Multiplicity="0..1" />
  </Association>
  <Association Name="FactInternetSales_DimEmployee_Employee">
    <End Role="Sales7" Type="Sandbox.FactInternetSales" Multiplicity="*" />
    <End Role="Employee" Type="Sandbox.DimEmployee" Multiplicity="0..1" />
  </Association>
  <Association Name="FactInternetSales_DimProduct_Product2">
    <End Role="FactInternetSales" Type="Sandbox.FactInternetSales" Multiplicity="*"
  />
    <End Role="Product2" Type="Sandbox.DimProduct" Multiplicity="0..1" />
  </Association>
</Schema>

```

### 3.2 CSDLBI 1.1 Example

```

<Schema xmlns="http://schemas.microsoft.com/ado/2008/09/edm"
xmlns:edm_annotation="http://schemas.microsoft.com/ado/2009/02/edm/annotation"
xmlns:bi="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions" bi:Version="1.1"
Namespace="Sandbox">
  <EntityContainer Name="Sandbox">
    <EntitySet Name="Bike" EntityType="Sandbox.Bike">
      <bi:EntitySet Hidden="true" />
    </EntitySet>
    <EntitySet Name="BikeSales" EntityType="Sandbox.BikeSales">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="BikeSubcategory" EntityType="Sandbox.BikeSubcategory">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="CalendarQuarter" EntityType="Sandbox.CalendarQuarter">
      <bi:EntitySet />
    </EntitySet>
    <EntitySet Name="Country" EntityType="Sandbox.Country">
      <bi:EntitySet />
    </EntitySet>
  </EntityContainer>

```

```

</EntitySet>
<EntitySet Name="Currency" EntityType="Sandbox.Currency">
  <bi:EntitySet />
</EntitySet>
<EntitySet Name="SalesChannel" EntityType="Sandbox.SalesChannel">
  <bi:EntitySet />
</EntitySet>
<AssociationSet Name="Bike_BikeSubcategory_BikeSubcategory_ProductSubcategoryKey"
Association="Sandbox.Bike_BikeSubcategory_BikeSubcategory_ProductSubcategoryKey">
  <End EntitySet="Bike" />
  <End EntitySet="BikeSubcategory" />
  <bi:AssociationSet Hidden="true" />
</AssociationSet>
<AssociationSet Name="BikeSales_Bike_Bike_ProductKey"
Association="Sandbox.BikeSales_Bike_Bike_ProductKey">
  <End EntitySet="BikeSales" />
  <End EntitySet="Bike" />
  <bi:AssociationSet />
</AssociationSet>
<AssociationSet Name="BikeSales_CalendarQuarter_CalendarQuarter_CalendarQuarter"
Association="Sandbox.BikeSales_CalendarQuarter_CalendarQuarter_CalendarQuarter">
  <End EntitySet="BikeSales" />
  <End EntitySet="CalendarQuarter" />
  <bi:AssociationSet />
</AssociationSet>
<AssociationSet Name="BikeSales_Country_Country_CountryCode"
Association="Sandbox.BikeSales_Country_Country_CountryCode">
  <End EntitySet="BikeSales" />
  <End EntitySet="Country" />
  <bi:AssociationSet />
</AssociationSet>
<AssociationSet Name="BikeSales_Currency_Currency_CurrencyKey"
Association="Sandbox.BikeSales_Currency_Currency_CurrencyKey">
  <End EntitySet="BikeSales" />
  <End EntitySet="Currency" />
  <bi:AssociationSet />
</AssociationSet>
<AssociationSet Name="BikeSales_SalesChannel_SalesChannel_SalesChannelCode"
Association="Sandbox.BikeSales_SalesChannel_SalesChannel_SalesChannelCode">
  <End EntitySet="BikeSales" />
  <End EntitySet="SalesChannel" />
  <bi:AssociationSet State="Inactive" />
</AssociationSet>
<bi:EntityContainer Caption="CSDLTest" Culture="en-US">
  <bi:CompareOptions IgnoreCase="true" />
</bi:EntityContainer>
</EntityContainer>
<EntityType Name="Bike">
  <Key>
    <PropertyRef Name="RowNumber" />
  </Key>
  <Property Name="RowNumber" Type="Int64" Nullable="false">
    <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
  </Property>
  <Property Name="ProductKey" Type="Int64" Nullable="false">
    <bi:Property />
  </Property>
  <Property Name="ProductAlternateKey" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">

```

```

        <bi:Property />
    </Property>
    <Property Name="ProductSubcategoryKey" Type="Int64">
        <bi:Property />
    </Property>
    <Property Name="ProductName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="StandardCost" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="FinishedGoodsFlag" Type="Boolean">
        <bi:Property />
    </Property>
    <Property Name="Color" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property ContextualNameRule="Context" Alignment="Left" Units="counts"
SortDirection="Descending" IsRightToLeft="true" DefaultAggregateFunction="Max" />
    </Property>
    <Property Name="ListPrice" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="Size" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="SizeRange" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="Weight" Type="Double">
        <bi:Property />
    </Property>
    <Property Name="DealerPrice" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="Class" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="Style" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="ModelName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="Description" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="WeightUnitMeasureCode" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="SizeUnitMeasureCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>

```

```

    </Property>
    <Property Name="SafetyStockLevel" Type="Int64">
      <bi:Property />
    </Property>
    <Property Name="ReorderPoint" Type="Int64">
      <bi:Property />
    </Property>
    <Property Name="DaysToManufacture" Type="Int64">
      <bi:Property />
    </Property>
    <Property Name="ProductLine" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
      <bi:Property />
    </Property>
    <NavigationProperty Name="BikeSubcategory_ProductSubcategoryKey"
Relationship="Sandbox.Bike_BikeSubcategory_BikeSubcategory_ProductSubcategoryKey"
FromRole="Bike_ProductSubcategoryKey" ToRole="BikeSubcategory_ProductSubcategoryKey">
      <bi:NavigationProperty />
    </NavigationProperty>
    <bi:EntityType>
      <bi:DisplayKey>
        <bi:MemberRef Name="Color" />
      </bi:DisplayKey>
      <bi:DefaultDetails>
        <bi:MemberRef Name="Color" />
      </bi:DefaultDetails>
      <bi:SortMembers>
        <bi:MemberRef Name="Color" />
      </bi:SortMembers>
      <bi:Hierarchy Name="Product_Hierarchy" Caption="Product Hierarchy"
ReferenceName="Product Hierarchy">
        <bi:Documentation>
          <bi:Summary>DESCRIPTION_ProductModelCateg_Hierarchies</bi:Summary>
        </bi:Documentation>
        <bi:Level Name="ProductLine">
          <bi:Source>
            <bi:PropertyRef Name="ProductLine" />
          </bi:Source>
        </bi:Level>
        <bi:Level Name="ModelName">
          <bi:Source>
            <bi:PropertyRef Name="ModelName" />
          </bi:Source>
        </bi:Level>
      </bi:Hierarchy>
    </bi:EntityType>
  </EntityType>
  <EntityType Name="BikeSales">
    <Key>
      <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
      <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>
    <Property Name="SalesOrderNumber" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
      <bi:Property />
    </Property>
    <Property Name="SalesOrderLineNumber" Type="Int64">

```



```

        <bi:Property />
    </Property>
    <Property Name="RevisionNumber" Type="Int64">
        <bi:Property />
    </Property>
    <Property Name="ProductKey" Type="Int64">
        <bi:Property />
    </Property>
    <Property Name="CountryCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="CurrencyKey" Type="Int64">
        <bi:Property />
    </Property>
    <Property Name="CalendarQuarter" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="SalesChannelCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="OrderQuantity" Type="Int64">
        <bi:Property />
    </Property>
    <Property Name="UnitPrice" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="ExtendedAmount" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="UnitPriceDiscountPct" Type="Double">
        <bi:Property />
    </Property>
    <Property Name="DiscountAmount" Type="Double">
        <bi:Property />
    </Property>
    <Property Name="ProductStandardCost" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="TotalProductCost" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="SalesAmount" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="TaxAmt" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="Freight" Type="Decimal" Precision="19" Scale="4">
        <bi:Property />
    </Property>
    <Property Name="CarrierTrackingNumber" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="CustomerPONumber" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">

```

```

        <bi:Property />
    </Property>
    <Property Name="CustomerAccountNumber" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
        <bi:Property />
    </Property>
    <Property Name="Sum_of_TotalProductCost" Type="Decimal" Precision="19" Scale="4">
        <bi:Measure Caption="Sum of TotalProductCost" ReferenceName="Sum of
TotalProductCost" FormatString="\$#,0.00; (\$#,0.00); \$#,0.00" />
    </Property>
    <Property Name="Sum_of_SalesAmount" Type="Decimal" Precision="19" Scale="4">
        <Documentation>
            <Summary>KPI Description</Summary>
        </Documentation>
        <bi:Measure Caption="Sum of SalesAmount" ReferenceName="Sum of SalesAmount"
FormatString="\$#,0.00; (\$#,0.00); \$#,0.00">
            <bi:Kpi StatusGraphic="Three Circles Colored">
                <bi:KpiGoal>
                    <bi:PropertyRef Name="v_Sum_of_SalesAmount_Goal" />
                </bi:KpiGoal>
                <bi:KpiStatus>
                    <bi:PropertyRef Name="v_Sum_of_SalesAmount_Status" />
                </bi:KpiStatus>
            </bi:Kpi>
        </bi:Measure>
    </Property>
    <NavigationProperty Name="Bike_ProductKey"
Relationship="Sandbox.BikeSales_Bike_Bike_ProductKey" FromRole="BikeSales_ProductKey"
ToRole="Bike_ProductKey">
        <bi:NavigationProperty />
    </NavigationProperty>
    <NavigationProperty Name="CalendarQuarter_CalendarQuarter"
Relationship="Sandbox.BikeSales_CalendarQuarter_CalendarQuarter_CalendarQuarter"
FromRole="BikeSales_CalendarQuarter" ToRole="CalendarQuarter_CalendarQuarter">
        <bi:NavigationProperty />
    </NavigationProperty>
    <NavigationProperty Name="Country_CountryCode"
Relationship="Sandbox.BikeSales_Country_Country_CountryCode" FromRole="BikeSales_CountryCode"
ToRole="Country_CountryCode">
        <bi:NavigationProperty />
    </NavigationProperty>
    <NavigationProperty Name="Currency_CurrencyKey"
Relationship="Sandbox.BikeSales_Currency_Currency_CurrencyKey"
FromRole="BikeSales_CurrencyKey" ToRole="Currency_CurrencyKey">
        <bi:NavigationProperty />
    </NavigationProperty>
    <NavigationProperty Name="SalesChannel_SalesChannelCode"
Relationship="Sandbox.BikeSales_SalesChannel_SalesChannel_SalesChannelCode"
FromRole="BikeSales_SalesChannelCode" ToRole="SalesChannel_SalesChannelCode">
        <bi:NavigationProperty />
    </NavigationProperty>
    <bi:EntityType />
</EntityType>
<EntityType Name="BikeSubcategory">
    <Key>
        <PropertyRef Name="RowNumber" />
    </Key>
    <Property Name="RowNumber" Type="Int64" Nullable="false">
        <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
    </Property>

```

```

        <Property Name="ProductSubcategoryKey" Type="Int64" Nullable="false">
            <bi:Property />
        </Property>
        <Property Name="Subcategory" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
            <bi:Property />
        </Property>
        <bi:EntityType />
    </EntityType>
    <EntityType Name="CalendarQuarter">
        <Key>
            <PropertyRef Name="RowNumber" />
        </Key>
        <Property Name="RowNumber" Type="Int64" Nullable="false">
            <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
        </Property>
        <Property Name="CalendarQuarter2" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
            <bi:Property Caption="CalendarQuarter" ReferenceName="CalendarQuarter" />
        </Property>
        <bi:EntityType />
    </EntityType>
    <EntityType Name="Country">
        <Key>
            <PropertyRef Name="RowNumber" />
        </Key>
        <Property Name="RowNumber" Type="Int64" Nullable="false">
            <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
        </Property>
        <Property Name="CountryCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
            <bi:Property />
        </Property>
        <Property Name="CountryName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
            <bi:Property />
        </Property>
        <bi:EntityType />
    </EntityType>
    <EntityType Name="Currency">
        <Key>
            <PropertyRef Name="RowNumber" />
        </Key>
        <Property Name="RowNumber" Type="Int64" Nullable="false">
            <bi:Property Hidden="true" Contents="RowNumber" Stability="RowNumber" />
        </Property>
        <Property Name="CurrencyKey" Type="Int64" Nullable="false">
            <bi:Property />
        </Property>
        <Property Name="CurrencyAlternateKey" Type="String" MaxLength="Max"
Unicode="true" FixedLength="false">
            <bi:Property />
        </Property>
        <Property Name="CurrencyName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
            <bi:Property />
        </Property>
        <bi:EntityType />
    </EntityType>

```

```

<EntityType Name="SalesChannel">
  <Key>
    <PropertyRef Name="RowIndex" />
  </Key>
  <Property Name="RowIndex" Type="Int64" Nullable="false">
    <bi:Property Hidden="true" Contents="RowIndex" Stability="RowIndex" />
  </Property>
  <Property Name="SalesChannelCode" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false" Nullable="false">
    <bi:Property />
  </Property>
  <Property Name="SalesChannelName" Type="String" MaxLength="Max" Unicode="true"
FixedLength="false">
    <bi:Property />
  </Property>
  <bi:EntityType />
</EntityType>
<Association Name="Bike_BikeSubcategory_BikeSubcategory_ProductSubcategoryKey">
  <End Role="Bike_ProductSubcategoryKey" Type="Sandbox.Bike" Multiplicity="*" />
  <End Role="BikeSubcategory_ProductSubcategoryKey" Type="Sandbox.BikeSubcategory"
Multiplicity="0..1" />
</Association>
<Association Name="BikeSales_Bike_Bike_ProductKey">
  <End Role="BikeSales_ProductKey" Type="Sandbox.BikeSales" Multiplicity="*" />
  <End Role="Bike_ProductKey" Type="Sandbox.Bike" Multiplicity="0..1" />
</Association>
<Association Name="BikeSales_CalendarQuarter_CalendarQuarter_CalendarQuarter">
  <End Role="BikeSales_CalendarQuarter" Type="Sandbox.BikeSales" Multiplicity="*"
/>
  <End Role="CalendarQuarter_CalendarQuarter" Type="Sandbox.CalendarQuarter"
Multiplicity="0..1" />
</Association>
<Association Name="BikeSales_Country_Country_CountryCode">
  <End Role="BikeSales_CountryCode" Type="Sandbox.BikeSales" Multiplicity="*" />
  <End Role="Country_CountryCode" Type="Sandbox.Country" Multiplicity="0..1" />
</Association>
<Association Name="BikeSales_Currency_Currency_CurrencyKey">
  <End Role="BikeSales_CurrencyKey" Type="Sandbox.BikeSales" Multiplicity="*" />
  <End Role="Currency_CurrencyKey" Type="Sandbox.Currency" Multiplicity="0..1" />
</Association>
<Association Name="BikeSales_SalesChannel_SalesChannel_SalesChannelCode">
  <End Role="BikeSales_SalesChannelCode" Type="Sandbox.BikeSales" Multiplicity="*"
/>
  <End Role="SalesChannel_SalesChannelCode" Type="Sandbox.SalesChannel"
Multiplicity="0..1" />
</Association>
</Schema>

```

## **4 Security**

### **4.1 Security Considerations for Implementers**

There are no known security considerations that are not covered in the preceding sections.

### **4.2 Index of Security Fields**

None.

## 5 Appendix A: Full XML Schema

For ease of implementation, the following are the full **XML schemas** for this protocol.

### 5.1 CSDLBI Schema 1.0

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema id="bi"
  targetNamespace="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions"
  elementFormDefault="qualified"
  xmlns:bi="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions"
  xmlns:edm="http://schemas.microsoft.com/ado/2008/09/edm"
  xmlns:xs="http://www.w3.org/2001/XMLSchema">

  <xs:import namespace="http://schemas.microsoft.com/ado/2008/09/edm"
    schemaLocation="System.Data.Resources.CSDLSchema_2.xs"/>

  <xs:element name="EntityContainer" type="bi:TEntityContainer"/>
  <xs:element name="EntitySet" type="bi:TEntitySet"/>
  <xs:element name="AssociationSet" type="bi:TAssociationSet"/>
  <xs:element name="EntityType" type="bi:TEntityType"/>
  <xs:element name="Property" type="bi:TProperty"/>
  <xs:element name="NavigationProperty" type="bi:TNavigationProperty"/>
  <xs:element name="Measure" type="bi:TMeasure"/>
  <xs:element name="SourceDescription" type="xs:string" />

  <xs:complexType name="TEntityContainer">
    <xs:sequence>
      <xs:element name="CompareOptions" type="bi:TCompareOptions" />
    </xs:sequence>
    <xs:attribute name="Caption" type="xs:string" use="optional"/>
    <xs:attribute name="Culture" type="xs:string" />
    <xs:attribute name="DirectQueryMode" type="bi:TDirectQueryMode" />
  </xs:complexType>

  <xs:simpleType name="TDirectQueryMode">
    <xs:restriction base="xs:string">
      <xs:enumeration value="InMemory" />
      <xs:enumeration value="InMemoryWithDirectQuery" />
      <xs:enumeration value="DirectQueryWithInMemory" />
      <xs:enumeration value="DirectQuery" />
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="TCompareOptions" >
    <xs:attribute name="IgnoreCase" type="xs:boolean" default="false" />
    <xs:attribute name="IgnoreNonSpace" type="xs:boolean" default="false" />
    <xs:attribute name="IgnoreKanaType" type="xs:boolean" default="false" />
    <xs:attribute name="IgnoreWidth" type="xs:boolean" default="false" />
  </xs:complexType>

  <xs:complexType name="TEntitySet">
    <xs:attribute name="Caption" type="xs:string" use="optional"/>
    <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
    <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
    <xs:attribute name="Hidden" type="xs:boolean" default="false" use="optional"/>
  </xs:complexType>
```

```

<xs:complexType name="TAssociationSet">
  <xs:attribute name="State" type="bi:TState" default="Active"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" />
</xs:complexType>

<xs:simpleType name="TState">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Active" />
    <xs:enumeration value="Inactive" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TEntityType">
  <xs:sequence >
    <xs:element name="DisplayKey" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1" />
    <xs:element name="DefaultDetails" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1"/>
    <xs:element name="DefaultImage" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="DefaultMeasure" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="SortMembers" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1" />
  </xs:sequence>
  <xs:attribute name="Contents" type="bi:TEntityContents" default="Regular"
  use="optional"/>
  <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
</xs:complexType>

<xs:simpleType name="TEntityContents">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Regular"/>
    <xs:enumeration value="Time"/>
    <xs:enumeration value="Geography"/>
    <xs:enumeration value="Organization"/>
    <xs:enumeration value="BillOfMaterials"/>
    <xs:enumeration value="Accounts"/>
    <xs:enumeration value="Customers"/>
    <xs:enumeration value="Products"/>
    <xs:enumeration value="Scenario"/>
    <xs:enumeration value="Quantitative"/>
    <xs:enumeration value="Utility"/>
    <xs:enumeration value="Currency"/>
    <xs:enumeration value="Rates"/>
    <xs:enumeration value="Channel"/>
    <xs:enumeration value="Promotion"/>
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TMemberRefs" >
  <xs:sequence>

```

```

        <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="unbounded"
/>
    </xs:sequence>
</xs:complexType>

<xs:complexType name="TMemberRef">
    <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>

<xs:complexType name="TMember" abstract="true">
    <xs:attribute name="Caption" type="xs:string" use="optional"/>
    <xs:attribute name="ContextualNameRule" type="bi:TContextualNameRule" default="None" />
        <xs:attribute name="Hidden" type="xs:boolean" default="false" />
    <xs:attribute name="ReferenceName" type="xs:string" use="optional" />
</xs:complexType>

<xs:simpleType name="TContextualNameRule">
    <xs:restriction base="xs:string">
        <xs:enumeration value="None" />
        <xs:enumeration value="Context" />
        <xs:enumeration value="Merge" />
    </xs:restriction>
</xs:simpleType>

<xs:complexType name="TDocumentation">
    <xs:sequence>
        <xs:element name="Summary" type="xs:string" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
</xs:complexType>

<xs:complexType name="TProperty">
    <xs:complexContent>
        <xs:extension base="bi:TBaseProperty">
            <xs:sequence >
                <xs:element name="OrderBy" type="bi:TPropertyRefs" minOccurs="0" maxOccurs="1"/>
            </xs:sequence>
            <xs:attribute name="Contents" type="bi:TContents" use="optional" default="Regular"/>
            <xs:attribute name="DefaultAggregateFunction" type="bi:TDefaultAggregateFunction"
default="Default" />
            <xs:attribute name="GroupingBehavior" type="bi:TGroupingBehavior"
default="GroupOnValue"/>
            <xs:attribute name="Stability" type="bi:TStability" default="Stable"/>
        </xs:extension>
    </xs:complexContent>
</xs:complexType>

<xs:simpleType name="TContents">
    <xs:restriction base="xs:string" />
</xs:simpleType>

<xs:simpleType name="TDefaultAggregateFunction" >
    <xs:restriction base="xs:string">
        <xs:enumeration value="Default" />
        <xs:enumeration value="None" />
        <xs:enumeration value="Sum" />
        <xs:enumeration value="Count" />
        <xs:enumeration value="Average" />
        <xs:enumeration value="Min" />
        <xs:enumeration value="Max" />
    </xs:restriction>
</xs:simpleType>

```



```

        <xs:enumeration value="DistinctCount" />
    </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TGroupingBehavior" >
    <xs:restriction base="xs:string" >
        <xs:enumeration value="GroupOnValue" />
        <xs:enumeration value="GroupOnEntityKey" />
    </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TStability">
    <xs:restriction base="xs:string">
        <xs:enumeration value="Stable" />
        <xs:enumeration value="RowNumber" />
        <xs:enumeration value="Volatile" />
    </xs:restriction>
</xs:simpleType>

<xs:complexType name="TBaseProperty" abstract="true">
    <xs:complexContent>
        <xs:extension base="bi:TMember">
            <xs:attribute name="Alignment" type="bi:TAlignment" use="optional"/>
            <xs:attribute name="FormatString" type="xs:string" use="optional"/>
            <xs:attribute name="Units" type="xs:string" use="optional" />
            <xs:attribute name="SortDirection" type="bi:TSortDirection" default="Default"/>
            <xs:attribute name="IsRightToLeft" type="xs:boolean" default="false"/>
        </xs:extension>
    </xs:complexContent>
</xs:complexType>

<xs:simpleType name="TAlignment">
    <xs:restriction base="xs:string">
        <xs:enumeration value="Default" />
        <xs:enumeration value="Left" />
        <xs:enumeration value="Right" />
        <xs:enumeration value="Center" />
    </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TSortDirection">
    <xs:restriction base="xs:string">
        <xs:enumeration value="Default" />
        <xs:enumeration value="Ascending" />
        <xs:enumeration value="Descending" />
    </xs:restriction>
</xs:simpleType>

<xs:complexType name="TPropertyRefs" >
    <xs:sequence>
        <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
maxOccurs="unbounded" />
    </xs:sequence>
</xs:complexType>

<xs:complexType name="TPropertyRef">
    <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>

```

```

<xs:complexType name ="TMeasure">
  <xs:complexContent>
    <xs:extension base="bi:TProperty">
      <xs:attribute name="IsSimpleMeasure" type="xs:boolean" default="true"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name ="TNavigationProperty">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

</xs:schema>

```

## 5.2 CSDLBI Schema 1.1

```

<?xml version="1.0" encoding="utf-8"?>
<xs:schema id="bi"
  targetNamespace="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions"
  elementFormDefault="qualified"
  xmlns:bi="http://schemas.microsoft.com/sqlbi/2010/10/edm/extensions"
  xmlns:edm="http://schemas.microsoft.com/ado/2008/09/edm"
  xmlns:xs="http://www.w3.org/2001/XMLSchema">

  <xs:import namespace="http://schemas.microsoft.com/ado/2008/09/edm"
  schemaLocation="System.Data.Resources.CSDLSchema_2.xs"/>

  <xs:element name="EntityContainer" type="bi:TEntityContainer"/>
  <xs:element name="EntitySet" type="bi:TEntitySet"/>
  <xs:element name="AssociationSet" type="bi:TAssociationSet"/>
  <xs:element name="EntityType" type="bi:TEntityType"/>
  <xs:element name="Property" type="bi:TProperty"/>
  <xs:element name="NavigationProperty" type="bi:TNavigationProperty"/>
  <xs:element name="Measure" type="bi:TMeasure"/>
  <xs:element name="SourceDescription" type="xs:string" />

  <xs:complexType name ="TEntityContainer">
    <xs:sequence>
      <xs:element name="CompareOptions" type="bi:TCompareOptions" />
    </xs:sequence>
    <xs:attribute name="Caption" type="xs:string" use="optional"/>
    <xs:attribute name="Culture" type="xs:string" />
    <xs:attribute name="DirectQueryMode" type="bi:TDirectQueryMode" />
  </xs:complexType>

  <xs:simpleType name="TDirectQueryMode">
    <xs:restriction base="xs:string">
      <xs:enumeration value="InMemory" />
      <xs:enumeration value="InMemoryWithDirectQuery" />
      <xs:enumeration value="DirectQueryWithInMemory" />
      <xs:enumeration value="DirectQuery" />
    </xs:restriction>
  </xs:simpleType>

```

```

<xs:complexType name="TCompareOptions" >
  <xs:attribute name="IgnoreCase" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreNonSpace" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreKanaType" type="xs:boolean" default="false" />
  <xs:attribute name="IgnoreWidth" type="xs:boolean" default="false" />
</xs:complexType>

<xs:complexType name="TEntitySet">
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
  <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" use="optional"/>
</xs:complexType>

<xs:complexType name="TAssociationSet">
  <xs:attribute name="State" type="bi:TState" default="Active"/>
  <xs:attribute name="Hidden" type="xs:boolean" default="false" />
</xs:complexType>

<xs:simpleType name="TState">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Active" />
    <xs:enumeration value="Inactive" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TEntityType">
  <xs:sequence >
    <xs:element name="DisplayKey" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1" />
    <xs:element name="DefaultDetails" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1"/>
    <xs:element name="DefaultImage" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="DefaultMeasure" minOccurs="0" maxOccurs="1" >
      <xs:complexType >
        <xs:sequence>
          <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="SortMembers" type="bi:TMemberRefs" minOccurs="0" maxOccurs="1" />
    <xs:element name="Hierarchy" type="bi:THierarchy" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
  <xs:attribute name="Contents" type="bi:TEntityContents" default="Regular" use="optional"/>
  <xs:attribute name="ReferenceName" type="xs:string" use="optional"/>
</xs:complexType>

<xs:simpleType name="TEntityContents">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Regular"/>
    <xs:enumeration value="Time"/>
    <xs:enumeration value="Geography"/>
  </xs:restriction>
</xs:simpleType>

```

```

    <xs:enumeration value="Organization"/>
    <xs:enumeration value="BillOfMaterials"/>
    <xs:enumeration value="Accounts"/>
    <xs:enumeration value="Customers"/>
    <xs:enumeration value="Products"/>
    <xs:enumeration value="Scenario"/>
    <xs:enumeration value="Quantitative"/>
    <xs:enumeration value="Utility"/>
    <xs:enumeration value="Currency"/>
    <xs:enumeration value="Rates"/>
    <xs:enumeration value="Channel"/>
    <xs:enumeration value="Promotion"/>
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TMemberRefs" >
  <xs:sequence>
    <xs:element name="MemberRef" type="bi:TMemberRef" minOccurs="1" maxOccurs="unbounded"
  />
  </xs:sequence>
</xs:complexType>

<xs:complexType name="TMemberRef">
  <xs:attribute name="Name" type="xs:string" use="required" />
</xs:complexType>

<xs:complexType name="THierarchy">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:sequence>
        <xs:element name="Documentation" type="bi:TDocumentation" minOccurs="0"
maxOccurs="1" />
        <xs:element name="Level" type="bi:TLevel" minOccurs="1" maxOccurs="unbounded" />
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="TMember" abstract="true">
  <xs:attribute name="Name" type="xs:string" use="required" />
  <xs:attribute name="Caption" type="xs:string" use="optional"/>
  <xs:attribute name="ContextualNameRule" type="bi:TContextualNameRule" default="None" />
  <xs:attribute name="Hidden" type="xs:boolean" default="false" />
  <xs:attribute name="ReferenceName" type="xs:string" use="optional" />
</xs:complexType>

<xs:simpleType name="TContextualNameRule">
  <xs:restriction base="xs:string">
    <xs:enumeration value="None" />
    <xs:enumeration value="Context" />
    <xs:enumeration value="Merge" />
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="TDocumentation">
  <xs:sequence>
    <xs:element name="Summary" type="xs:string" minOccurs="0" maxOccurs="1" />
  </xs:sequence>
</xs:complexType>

```

```

<xs:complexType name="TLevel">
  <xs:complexContent>
    <xs:extension base="bi:TMember">
      <xs:sequence>
        <xs:element name="Source" minOccurs="0" maxOccurs="1" >
          <xs:complexType >
            <xs:sequence>
              <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
                maxOccurs="1" />
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="TProperty">
  <xs:complexContent>
    <xs:extension base="bi:TBaseProperty">
      <xs:sequence >
        <xs:element name="OrderBy" type="bi:TPropertyRefs" minOccurs="0" maxOccurs="1"/>
      </xs:sequence>
      <xs:attribute name="Contents" type="bi:TContents" use="optional" default="Regular"/>
      <xs:attribute name="DefaultAggregateFunction" type="bi:TDefaultAggregateFunction"
default="Default" />
      <xs:attribute name="GroupingBehavior" type="bi:TGroupingBehavior"
default="GroupOnValue"/>
      <xs:attribute name="Stability" type="bi:TStability" default="Stable"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:simpleType name="TContents">
  <xs:restriction base="xs:string" />
</xs:simpleType>

<xs:simpleType name="TDefaultAggregateFunction" >
  <xs:restriction base="xs:string">
    <xs:enumeration value="Default" />
    <xs:enumeration value="None" />
    <xs:enumeration value="Sum" />
    <xs:enumeration value="Count" />
    <xs:enumeration value="Average" />
    <xs:enumeration value="Min" />
    <xs:enumeration value="Max" />
    <xs:enumeration value="DistinctCount" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TGroupingBehavior" >
  <xs:restriction base="xs:string" >
    <xs:enumeration value="GroupOnValue" />
    <xs:enumeration value="GroupOnEntityKey" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="TStability">

```

```

    <xs:restriction base="xs:string">
      <xs:enumeration value="Stable" />
      <xs:enumeration value="RowNumber" />
      <xs:enumeration value="Volatile" />
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="TBaseProperty" abstract="true">
    <xs:complexContent>
      <xs:extension base="bi:TMember">
        <xs:attribute name="Alignment" type="bi:TAlignment" use="optional"/>
        <xs:attribute name="FormatString" type="xs:string" use="optional"/>
        <xs:attribute name="Units" type="xs:string" use="optional" />
        <xs:attribute name="SortDirection" type="bi:TSortDirection" default="Default"/>
        <xs:attribute name="IsRightToLeft" type="xs:boolean" default="false"/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

  <xs:simpleType name="TAlignment">
    <xs:restriction base="xs:string">
      <xs:enumeration value="Default" />
      <xs:enumeration value="Left" />
      <xs:enumeration value="Right" />
      <xs:enumeration value="Center" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="TSortDirection">
    <xs:restriction base="xs:string">
      <xs:enumeration value="Default" />
      <xs:enumeration value="Ascending" />
      <xs:enumeration value="Descending" />
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="TPropertyRefs" >
    <xs:sequence>
      <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1"
maxOccurs="unbounded" />
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="TPropertyRef">
    <xs:attribute name="Name" type="xs:string" use="required" />
  </xs:complexType>

  <xs:complexType name="TMeasure">
    <xs:complexContent>
      <xs:extension base="bi:TProperty">
        <xs:sequence>
          <xs:element name="Kpi" type="bi:TKpi" minOccurs="0" maxOccurs="1" />
        </xs:sequence>
        <xs:attribute name="IsSimpleMeasure" type="xs:boolean" default="true"/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

  <xs:complexType name="TKpi">

```

```

    <xs:sequence >
      <xs:element name="Documentation" type="bi:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:element name="KpiGoal" minOccurs="1" maxOccurs="1" >
        <xs:complexType >
          <xs:sequence>
            <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1" maxOccurs="1"
/>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
      <xs:element name="KpiStatus" minOccurs="1" maxOccurs="1" >
        <xs:complexType >
          <xs:sequence>
            <xs:element name="PropertyRef" type="bi:TPropertyRef" minOccurs="1" maxOccurs="1"
/>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
    <xs:attribute name="StatusGraphic" type="xs:string" use="required"/>
  </xs:complexType>

  <xs:complexType name="TNavigationProperty">
    <xs:complexContent>
      <xs:extension base="bi:TMember">
        <xs:attribute name="CollectionCaption" type="xs:string" use="optional"/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:schema>

```

## 6 Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs:

- Microsoft SQL Server 2012 Service Pack 1 (SP1)

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product 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 2.1.9:](#) The **Caption** attribute is not included in SQL Server 2012 SP1.

[<2> Section 2.1.17:](#) The **Documentation** element is not serialized in SQL Server 2012 SP1.



## 7 Change Tracking

This section identifies changes that were made to the [MS-CSDLBI] protocol document between the October 2012 and October 2012 releases. Changes are classified as New, Major, Minor, Editorial, or No change.

The revision class **New** means that a new document is being released.

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 or functionality.
- An extensive rewrite, addition, or deletion of major portions of content.
- The removal of a document from the documentation set.
- Changes made for template compliance.

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 **Editorial** means that the language and formatting in the technical content was changed. Editorial changes apply to grammatical, formatting, and style issues.

The revision class **No change** means that no new technical or language changes were introduced. The technical content of the document is identical to the last released version, but minor editorial and formatting changes, as well as updates to the header and footer information, and to the revision summary, may have been made.

Major and minor changes can be described further using the following change types:

- New content added.
- Content updated.
- Content removed.
- New product behavior note added.
- Product behavior note updated.
- Product behavior note removed.
- New protocol syntax added.
- Protocol syntax updated.
- Protocol syntax removed.
- New content added due to protocol revision.
- Content updated due to protocol revision.
- Content removed due to protocol revision.
- New protocol syntax added due to protocol revision.

- Protocol syntax updated due to protocol revision.
- Protocol syntax removed due to protocol revision.
- New content added for template compliance.
- Content updated for template compliance.
- Content removed for template compliance.
- Obsolete document removed.

Editorial changes are always classified with the change type **Editorially updated**.

Some important terms used in the change type descriptions are defined as follows:

- **Protocol syntax** refers to data elements (such as packets, structures, enumerations, and methods) as well as interfaces.
- **Protocol revision** refers to changes made to a protocol that affect the bits that are sent over the wire.

The changes made to this document are listed in the following table. For more information, please contact [protocol@microsoft.com](mailto:protocol@microsoft.com).

<b>Section</b>	<b>Tracking number (if applicable) and description</b>	<b>Major change (Y or N)</b>	<b>Change type</b>
<a href="#">1.6 Versioning and Localization</a>	Clarified that Microsoft SQL Server 2012 includes Service Pack 1.	N	Content updated.
<a href="#">2.1.2 TCompareOptions</a>	Clarified basis of values for CompareOptions.	N	Content updated.

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