[MS-OLEDBSTR]:

OLEDB Connection String Structure

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1 Introduction

The OLE DB Connection String Structure is the format of the connection strings that are used by **OLE DB consumers**. A connection string is a string that is sent from an OLE DB consumer to an **OLE DB provider** and that specifies the information that is needed to establish a connection to a data source.

Sections 1.7 and 2 of this specification are normative. All other sections and examples in this specification are informative.

1.1 Glossary

This document uses the following terms:

authentication: The act of proving an identity to a server while providing key material that binds the identity to subsequent communications.

Authentication Service (AS): A service that issues ticket granting tickets (TGTs), which are used for authenticating principals within the realm or **domain** served by the **Authentication Service**.

code page: An ordered set of characters of a specific script in which a numerical index (code-point value) is associated with each character. Code pages are a means of providing support for character sets and keyboard layouts used in different countries. Devices such as the display and keyboard can be configured to use a specific code page and to switch from one code page (such as the United States) to another (such as Portugal) at the user's request.

connection string: A character string expression that uniquely identifies the data store to use for a particular query or set of queries and the methods, including authentication information and configuration options, for connecting to that data store.

data source object: An instance of a COM class that exposes a set of OLE DB interfaces. A data source object can be used to establish a connection to a data source.

database instance: A database that has a unique set of services that can have unique settings.

default database: The current database just after the connection is made.

domain: A set of users and computers sharing a common namespace and management infrastructure. At least one computer member of the set must act as a domain controller (DC) and host a member list that identifies all members of the domain, as well as optionally hosting the Active Directory service. The domain controller provides **authentication** of members, creating a unit of trust for its members. Each domain has an identifier that is shared among its members. For more information, see [MS-AUTHSOD] section 1.1.1.5 and [MS-ADTS].

encryption: In cryptography, the process of obscuring information to make it unreadable without special knowledge.

generic key: A keyword in a connection string, the meaning of which is the same across all drivers.

Internet Protocol version 4 (IPv4): An Internet protocol that has 32-bit source and destination addresses. IPv4 is the predecessor of IPv6.

Kerberos: An **authentication** system that enables two parties to exchange private information across an otherwise open network by assigning a unique key (called a ticket) to each user that logs on to the network and then embedding these tickets into messages sent by the users. For more information, see [MS-KILE].

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

named pipe: A named, one-way, or duplex pipe for communication between a pipe server and one or more pipe clients.

NT LAN Manager (NTLM) Authentication Protocol: A protocol using a challenge-response mechanism for **authentication** in which clients are able to verify their identities without sending a password to the server. It consists of three messages, commonly referred to as Type 1 (negotiation), Type 2 (challenge) and Type 3 (authentication). For more information, see [MS-NLMP].

OLE DB: A set of interfaces that are based on the Component Object Model (COM) programming model and expose data from a variety of sources. These interfaces support the amount of Database Management System (DBMS) functionality that is appropriate for a data store and they enable a data store to share data.

OLE DB consumer: A software component that requests information through a set of OLE DB interfaces.

OLE DB provider: A software component that returns information to an OLE DB consumer through a set of OLE DB interfaces. Each provider exposes data access to a particular type of data source.

original equipment manufacturer (OEM) character: An 8-bit encoding used in MS-DOS and Windows operating systems to associate a sequence of bits with specific characters. The ASCII character set maps the letters, numerals, and specified punctuation and control characters to the numbers from 0 to 127. The term "code page" is used to refer to extensions of the ASCII character set that map specified characters and symbols to the numbers from 128 to 255. These code pages are referred to as OEM character sets. For more information, see [MSCHARSET].

path: When referring to a file path on a file system, a hierarchical sequence of folders. When referring to a connection to a storage device, a connection through which a machine can communicate with the storage device.

plaintext: In cryptography, ordinary readable text before it is encrypted into ciphertext, or after it has been decrypted.

provider-specific key: A key in a connection string, the meaning of which is determined by an individual provider.

remote procedure call (RPC): A context-dependent term commonly overloaded with three meanings. Note that much of the industry literature concerning RPC technologies uses this term interchangeably for any of the three meanings. Following are the three definitions: (*) The runtime environment providing remote procedure call facilities. The preferred usage for this meaning is "RPC runtime". (*) The pattern of request and response message exchange between two parties (typically, a client and a server). The preferred usage for this meaning is "RPC exchange". (*) A single message from an exchange as defined in the previous definition. The preferred usage for this term is "RPC message". For more information about RPC, see [C706].

session: A unidirectional communication channel for a stream of messages that are addressed to one or more destinations. A destination is specified by a resource URL, an identity URL, and a device URL. More than one session can be multiplexed over a single connection.

stored procedure: A precompiled collection of SQL statements and, optionally, control-of-flow statements that are stored under a name and processed as a unit. They are stored in a SQL database and can be run with one call from an application. Stored procedures return an integer return code and can additionally return one or more result sets. Also referred to as sproc.

Unicode: A character encoding standard developed by the Unicode Consortium that represents almost all of the written languages of the world. The **Unicode** standard [UNICODE5.0.0/2007] provides three forms (UTF-8, UTF-16, and UTF-32) and seven schemes (UTF-8, UTF-16, UTF-16 BE, UTF-16 LE, UTF-32, UTF-32 LE, and UTF-32 BE).

XML: The Extensible Markup Language, as described in [XML1.0].

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

1.2 References

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

1.2.1 Normative References

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. We will assist you in finding the relevant information.

[MS-ODBCSTR] Microsoft Corporation, "ODBC Connection String Structure".

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

[MS-TDS] Microsoft Corporation, "Tabular Data Stream Protocol".

[RFC1002] Network Working Group, "Protocol Standard for a NetBIOS Service on a TCP/UDP Transport: Detailed Specifications", STD 19, RFC 1002, March 1987, http://www.rfc-editor.org/rfc/rfc1002.txt

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

[RFC2460] Deering, S., and Hinden, R., "Internet Protocol, Version 6 (IPv6) Specification", RFC 2460, December 1998, http://www.rfc-editor.org/rfc/rfc2460.txt

[RFC4234] Crocker, D., Ed., and Overell, P., "Augmented BNF for Syntax Specifications: ABNF", RFC 4234, October 2005, http://www.rfc-editor.org/rfc/rfc4234.txt

[RFC791] Postel, J., Ed., "Internet Protocol: DARPA Internet Program Protocol Specification", RFC 791, September 1981, http://www.rfc-editor.org/rfc/rfc791.txt

[RFC793] Postel, J., Ed., "Transmission Control Protocol: DARPA Internet Program Protocol Specification", RFC 793, September 1981, http://www.rfc-editor.org/rfc/rfc793.txt

1.2.2 Informative References

[MSDN-CDIM] Microsoft Corporation, "Impersonation Levels", http://msdn.microsoft.com/en-us/library/ms686632.aspx

[MSDN-COMCS] Microsoft Corporation, "COM+ (Component Services)", http://msdn.microsoft.com/en-us/library/ms685978.aspx

[MSDN-CSOLEDB] Microsoft Corporation, "The Cursor Service for OLE DB", http://msdn.microsoft.com/en-us/library/ms714397(VS.85).aspx

[MSDN-DAD] Microsoft Corporation, "Database Detach and Attach (SQL Server)", https://docs.microsoft.com/en-us/sql/relational-databases/databases/database-detach-and-attach-sql-server

[MSDN-NP] Microsoft Corporation, "Named Pipes", http://msdn.microsoft.com/en-us/library/aa365590.aspx

[MSDN-ODBS] Microsoft Corporation, "OLE DB Services", OLE DB Programmer's Guide, http://msdn.microsoft.com/en-us/library/ms717922.aspx

[MSDN-SD] Microsoft Corporation, "Selecting a Database", http://msdn.microsoft.com/en-us/library/ms180770.aspx

[MSDN-SQLOLEDB] Microsoft Corporation, "SQL Server Provider", http://msdn.microsoft.com/en-us/library/ms720897(VS.85).aspx

[MSDN-UNI] Microsoft Corporation, "Using Named Instances", http://msdn.microsoft.com/en-us/library/ms165614.aspx

[MSKB-313295] Microsoft Corporation, "How to use the server name parameter in a connection string to specify the client network library", http://support.microsoft.com/kb/313295

[MSKB-328383] Microsoft Corporation, "SQL Server clients may change protocols when the client computers try to connect to an instance of SQL Server", http://support.microsoft.com/kb/328383

[SSPI] Microsoft Corporation, "SSPI", http://msdn.microsoft.com/en-us/library/aa380493.aspx

1.3 Overview

A **connection string** consists of zero or more key/value pairs that specify a set of properties of a connection to a data source, including information such as the provider name, user ID, password, and provider-specific information.

1.4 Relationship to Protocols and Other Structures

None.

1.5 Applicability Statement

This document specifies a persistence format for **OLE DB connection strings**. The connection strings are used to facilitate establishing a connection between an **OLE DB consumer** and a data source in scenarios in which network or local connectivity is available. This persistence format provides interoperability with OLE DB consumers that create or use portions of documents that conform to this structure.

1.6 Versioning and Localization

None.

1.7 Vendor-Extensible Fields

Vendors can define **provider-specific keys** and can specify the meanings of these keys and the corresponding valid values. The name of a provider-specific key MUST conform to the naming rules that are specified in section 2.2 and MUST NOT be the same as the name of any **generic key** that is specified in section 2.3.

2 Structures

An **OLE DB connection string** MUST be a **Unicode** string and MUST conform to the ABNF [RFC4234] grammar that is specified in section 2.2.

2.1 Requirements for Connection Strings

2.1.1 Empty Connection String

A connection string can be empty.

2.1.2 Case-sensitivity

Keys are case-insensitive.

2.1.3 Multiple Occurrences of the Same Key

If the same key occurs multiple times in one connection string, the value from the last key/value pair MUST be used.

2.1.4 Conflicts Between Keys

If there are conflicts between values that are specified for different keys, the behavior of the provider is provider-specific.

2.2 ABNF Rules

2.2.1 Common ABNF Rules

The following ABNF [RFC4234] rules are used by sections 2.2.2 and 2.2.3 and are included for reference.

ABNF Syntax:

```
SC              = %x3B      ; semicolon
HTAB            = %x09      ; horizontal tab
SP              = %x20      ; space
WSP             = SP / HTAB ; space or horizontal tab
SQUOTE          = %x27      ; single quote
ESCAPEDSQUOTE   = 2SQUOTE   ; escaped single quote
DQUOTE          = %x22      ; double quote
ESCAPEDDQUOTE   = 2DQUOTE   ; escaped double quote
EQ              = %x3D      ; equals sign
ESCAPEDEQ       = 2EQ       ; escaped equal sign
PLUS            = %x2B      ; plus sign
MINUS           = %x2D      ; minus sign
```

2.2.2 OLE DB Connection String Format

OleDBConnectionString specifies a set of keys and associated values. The string MUST conform to the following ABNF [RFC4234] grammar:

```
OleDBConnectionString = *(ConnStringClause SC) [ConnStringClause [SC]]
```

```
 ConnStringClause = KeyValuePair / *WSP
 KeyValuePair = *WSP Key *WSP EQ *WSP Value *WSP
 Key = (ESCAPEDEQ / NonWSPSemiColonEqualChar) [*(ESCAPEDEQ / NonSemiColonEqualChar)
(ESCAPEDEQ / NonWSPSemiColonEqualChar)]
 Value = NotQuotedLiteralValue / SQUOTE SQuotedLiteralValue SQUOTE / DQUOTE
DQuotedLiteralValue DQUOTE / CompoundValue
 NotQuotedLiteralValue = [NonWSPQuoteSemiColonEqualChar [ *NonSemiColonChar
NonWSPSemiColonChar] ]
 SQuotedLiteralValue = *((ESCAPEDSQUOTE) / NonSQUOTEChar)
 DQuotedLiteralValue = *((ESCAPEDDQUOTE) / NonDQUOTEChar)
 NonWSPSemiColonEqualChar = %x01-08 / %x0A-1F / %x21-3A / %x3C / %x3E-FFFF
 NonSemiColonEqualChar = %x01-3A / %x3C / %x3E-FFFF
 NonWSPQuoteSemiColonEqualChar = %x01-08 / %x0A-1F / %x21 / %x23-26 / %x28-3A / %x3C / %x3E-
FFFF
 NonSemiColonChar = %x01-3A / %x3C-FFFF
 NonWSPSemiColonChar = %x01-08 / %x0A-1F/ %x21-3A / %x3C-FFFF
 NonSQUOTEChar = %x01-26 / %x28-FFFF
 NonDQUOTEChar = %x01-21 / %x23-FFFF
```

CompoundValue is specified in section 2.3.

2.2.2.1 KeyValuePair

A **KeyValuePair** is composed of a key and a value, separated by an "EQ".

2.2.2.2 Key

A key can be composed of any character except "%x00", "SC", or "EQ", unless the "EQ" is part of an "ESCAPEDEQ".

2.2.2.3 Value

A value that is a string can be enclosed by SQUOTE or DQUOTE. Any space that precedes the first quote is not a part of a key and MUST be ignored. Characters other than "WSP" MUST NOT be included after the second quote. To include preceding or trailing spaces in a value, the value MUST be enclosed in either SQUOTE or DQUOTE.

2.2.2.4 SQUOTE, DQUOTE, SC

SQUOTE, DQUOTE and SC each have a specific meaning in a connection string. If a value contains one of these characters, the value MUST be enclosed in either SQUOTE or DQUOTE.

To include a single quote character in an **SQuotedLiteralValue**, ESCAPEDSQUOTE MUST be used. To include a double quote character in a **DQuotedLiteralValue**, ESCAPEDDQUOTE MUST be used.

2.2.3 Keys with Compound Values

Some keys can have compound values. A compound value for a key consists of zero or more valid value components, separated by the pipe character (|). Either the symbolic names of the valid value components or their corresponding numeric values can be used. Symbolic names are case-insensitive.

CompoundValue specifies a compound value for a key. The format of the string MUST conform to the following ABNF [RFC4234] grammar:

```
 CompoundValue = *((SymbolicComponent / NumericComponent) *WSP "|" *WSP) (SymbolicComponent/
NumericComponent)
 SymbolicComponent = 1*SymbolicComponentChar
```

```
SymbolicComponentChar = %x01-08 / %x0A-1F / %x21-3A / %x3C / %x3E-7B / %x7D-FFFF
NumericComponent = HexValue / OctValue / DecValue
HexValue = ("+0" / "-0" / "0") ("x" / "X") 1*(HEXDIG / %x61-66)
OctValue = ("+0" / "-0" / "0") *%x30-37
DecValue = ("+" %x31-39 / "-" %x31-39) *DIGIT
```

2.2.4 Using Symbolic Names in Values

When a symbolic name is used in a value, the symbolic name is case-insensitive.

2.3 Generic Keys

The following table specifies **generic keys** that can be used in a **connection string**.<1> When an **OLE DB** provider does not support a given generic key or if the key has an invalid value, the behavior of the OLE DB provider is provider-specific.<2>

Key	Meaning
Provider	Specifies the name of the **OLE DB provider**.<3>
Cache Authentication	Specifies whether **authentication** information can be stored in a cache of the OLE DB provider. The valid values are "true" and "false".
Encrypt Password	Specifies whether the password is **encrypted** before it is sent to the data source. The valid values are "true" and "false".
Integrated Security	Specifies the name of the **Authentication Service (AS)** that the data source uses to identify the user who is using the identity that is provided by an authentication **domain**.<4>
Mask Password	Specifies whether the password cannot be sent to the data source in **plaintext**. The valid values are "true" and "false".
Password	Specifies the password to be used when connecting to the data source.
Persist Encrypted	Specifies whether the **OLE DB consumer** requests authentication information to be encrypted if the connection string is persisted.<5> The valid values are "true" and "false".
Persist Security Info	Specifies whether authentication information can be persisted by the OLE DB provider. The valid values are "true" and "false".
User ID	Specifies the user ID to be used when connecting to the data source.
Asynchronous Processing	Specifies the asynchronous processing operations that the OLE DB consumer requests to be performed on the **data source object**. This key can have a compound value. Only the following value component is valid: "Initialize": Specifies that the data source object is initialized asynchronously.<6> The corresponding numeric value is 0x1.
Bind Flags	Reserved. This key MUST NOT be used.
Initial Catalog	Specifies the name of the database to be used after the connection is established.
Data Source	Specifies the name of the data source to which to connect.<7>
General Timeout	Specifies the number of seconds before a request for a data source object times out. The valid values are signed integers that range from greater than or equal to -2147483648 to less than or equal to 2147483647.
Window Handle	Specifies the element of a graphical user interface that a provider can use to prompt for additional connection information. The valid values are signed integers that range from greater than or equal to -2147483648 to less than or equal to 2147483647 on a 32-bit platform and

Key	Meaning
	that range from greater than or equal to -9223372036854775808 to less than or equal to 9223372036854775807 on a 64-bit platform.
Impersonation Level	Specifies the OLE DB consumer-requested impersonation level that is to be used by the data source when it is impersonating the data source object. For more information about impersonation levels, see [MSDN-CDIM]. The valid values are the following: ▪ "Anonymous": Anonymous level. The corresponding numeric value is 0x0. ▪ "Identify": Identify level. The corresponding numeric value is 0x1. ▪ "Impersonate": Impersonate level. The corresponding numeric value is 0x2. ▪ "Delegate": Delegate level. The corresponding numeric value is 0x3.
Locale Identifier	Specifies the **language code identifier (LCID)** to be sent to the data source.<8> The valid values are an LCID or one of the following predefined literals: ▪ "User Default": The default LCID of the user of the OLE DB consumer. ▪ "System Default": The default LCID of the system of the OLE DB consumer.
Location	Specifies the **path** to the data source.<9>
Lock Owner	Reserved. This key MUST NOT be used.
Mode	Specifies the mode in which the OLE DB consumer requests to open the data source. This key can have a compound value. The valid value components are the following: ▪ "Read": Read-only access permission. The corresponding numeric value is 0x1. ▪ "Write": Write-only access permission. The corresponding numeric value is 0x2. ▪ "ReadWrite": Read/write access permission. The corresponding numeric value is 0x3. ▪ "Share Deny Read": Prevents other data source open requests from opening a connection in read mode. The corresponding numeric value is 0x4. ▪ "Share Deny Write": Prevents other data source open requests from opening a connection in write mode. The corresponding numeric value is 0x8. ▪ "Share Exclusive": Prevents other data source open requests from opening a connection in read/write mode. The corresponding numeric value is 0xC. ▪ "Share Deny None": Specifies that neither read nor write access can be denied to other data source open requests. The corresponding numeric value is 0x10.
OLE DB Services	Specifies the services that the OLE DB consumer requests the OLE DB Services component to enable or disable for the data source object. For more information about OLE DB Services, see [MSDN-ODBS]. This key can have a compound value. The valid value components are the following: ▪ "ResourcePooling": Resource pooling is enabled. The corresponding numeric value is 0x1. ▪ "TxnEnlistment": **Sessions** in a Component Services environment are automatically enlisted in a global transaction where required. For more information about component services and global transactions, see [MSDN-COMCS]. The corresponding numeric value is 0x2. ▪ "ClientCursor": The Client Cursor Engine is enabled.<10> For more information about the

Key	Meaning
	client-side cursor, see [MSDN-CSOLEDB]. The corresponding numeric value is 0x4. ▪ "AgrAfterSession": Services that operate beyond the session level, including the Client Cursor Engine, are enabled. The corresponding numeric value is 0x8. ▪ "EnableAll": All services are enabled. The corresponding numeric value is 0xFFFFFFFF. ▪ "DisableAll": All services are disabled. The corresponding numeric value is 0x0.
Prompt	Specifies the OLE DB consumer-requested level of prompting for connection information during initialization of a data source object. The connection information that is required is provider-specific. The valid values are the following: ▪ "Prompt": Always prompt for connection information. The corresponding numeric value is 0x1. ▪ "Complete": Prompt only if the connection string does not contain sufficient information to establish a connection. The corresponding numeric value is 0x2. ▪ "CompleteRequired": Prompt only for required information if more required information is needed. The corresponding numeric value is 0x3. ▪ "NoPrompt": Do not prompt for connection information. The corresponding numeric value is 0x4.
Protection Level	Specifies the OLE DB consumer-requested level of protection for the data that is sent between a data source object and a data source. This key applies only to network connections other than **remote procedure call (RPC)** connections. The valid values are the following: ▪ "None": Performs no authentication of data sent to the data source. The corresponding numeric value is 0x0. ▪ "Connect": Authenticates only when the data source object establishes the connection with the data source. The corresponding numeric value is 0x1. ▪ "Call": Authenticates the source of the data at the beginning of each request from the data source object to the data source. The corresponding numeric value is 0x2. ▪ "Pkt": Verifies that all data received is from the data source object. The corresponding numeric value is 0x3. ▪ "Pkt Integrity": Verifies that all data received is from the data source object and that it has not been changed in transit. The corresponding numeric value is 0x4. ▪ "Pkt Privacy": Verifies that all data received is from the data source object and that it has not been changed in transit, and encrypts the data. The corresponding numeric value is 0x5.
Extended Properties	Specifies provider-specific extended connection information.
Connect Timeout	Specifies the amount of time, in seconds, to wait for a connection to complete. The valid values are signed integers that range from greater than or equal to -2147483648 to less than or equal to 2147483647.

3 Structure Examples

The following examples illustrate the structure and syntax of OLE DB connection strings that are used in common scenarios.

Identical key/value pairs that occur in multiple examples are described in only the first example in which they occur but have the same meaning in each example.

3.1 Integrated Security

```
Provider=sqloledb;Data Source=ServerName;Integrated Security=SSPI;
```

"Provider=sqloledb" specifies that Microsoft OLE DB Provider for SQL Server is the OLE DB provider for this connection.

"Data Source=ServerName" specifies that "ServerName" is the name of the data source to which the connection is established.

"Integrated Security=SSPI" specifies that Security Support Provider Interface [SSPI] is used as the **Authentication Service (AS)** for this connection.

3.2 Standard Security Connection

```
Provider=sqloledb;Data Source=ServerName;User Id=UserName;Password=UserPassword;
```

"User ID=UserName" specifies that "UserName" is the name of the user who is establishing the connection.

"Password=UserPassword" specifies that "UserPassword" is the password of the user who is establishing the connection.

3.3 Named Instance

```
Provider=sqloledb;Data Source=ServerName\InstanceName;Integrated Security=SSPI;
```

"Data Source=ServerName\InstanceName" specifies that the connection is being established to the "InstanceName" named instance on the server whose name is "ServerName".

3.4 IP Address as Data Source

```
Provider=sqloledb;Data Source=192.168.2.1\InstanceName;Integrated Security=SSPI;
```

"Data Source=192.168.2.1\InstanceName" specifies that the connection is being established to the "InstanceName" named instance on the server whose **IPv4** address is 192.168.2.1.

3.5 Initial Catalog

```
Provider=sqloledb;Data Source=ServerName;Initial Catalog=DatabaseName;Integrated
Security=SSPI;
```

"Initial Catalog=DatabaseName" specifies that the database named "DatabaseName" is used after the connection is established.

3.6 Network Library

```
Provider=sqloledb;Data Source=ServerName;Integrated Security=SSPI;Network Library=DBMSSOCN;
```

"Network Library=DBMSSOCN" specifies that the name of the network component that is used to communicate with the data source is "DBMSSOCN".

3.7 Encryption

```
Provider=sqloledb;Data Source=ServerName;Integrated Security=SSPI;Use Encryption for
Data=true;
```

"Use Encryption for Data=true" specifies that the OLE DB consumer is requesting that the OLE DB provider **encrypt** the data.

3.8 Escaped Equals Sign

```
Provider=ProviderName;Data Source=ServerName;Verification==Security=True;Many====One=Valid
```

"Provider=ProviderName" specifies that "ProviderName" is the OLE DB provider for this connection.

"Verification==Security=True" specifies that the provider-specific key Verification**=Security** has the value "True".

"Many====One=Valid" specifies that the provider-specific key **Many==One** has the value "Valid".

3.9 Leading and Trailing Spaces

```
Provider=ProviderName;Data Source=ServerName;
MyKeyword1=" My Value1 ";MyKeyword2=' MyValue2 '
```

This example illustrates the use of leading and trailing spaces in the value of a key/value pair. To include preceding or trailing spaces in the value, the value is enclosed in either single or double quotes.

3.10 Spaces Within a Connection String

This example illustrates that white space between the parts of a connection string is ignored. The following connection string

```
Provider=sqloledb;Data Source=ServerName;Integrated Security=SSPI;
```

is equivalent to the following connection string:

```
Provider = sqloledb ; Data Source = ServerName  ; Integrated Security = SSPI ;
```

3.11 Multiple Occurrences of the Same Key

This example illustrates the fact that if multiple occurrences of the same key occur in a connection string, the value from the last key/value pair overrides all previous occurrences. For example, in the following connection string, "user2" is used as the value of the **User ID** key:

```
User ID = user1; User ID = user2
```

4 Security Considerations

4.1 Security Considerations for Implementers

A connection string can contain credential information in clear text. It is advised that applications take special care when accessing credential information and avoid passing this information in the connection string whenever possible. Instead, it is recommended that applications use the **Integrated Security** **generic key**.

4.2 Index of Security Parameters

Security Parameter	Section
Cache Authentication	2.3
Encrypt Password	2.3
Integrated Security	2.3
Impersonation Level	2.3
Mask Password	2.3
Password	2.3
Persist Encrypted	2.3
Persist Security Info	2.3
Protection Level	2.3
SSPI	5
Use Encryption for Data	5
User ID	2.3

5 Appendix A: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include updates to those products.

- 2007 Microsoft Office system
- Microsoft Office 2010 system
- Microsoft Office 2013 system
- Microsoft Office 2016
- Microsoft SQL Server 2005
- Microsoft SQL Server 2008
- Microsoft SQL Server 2008 R2
- Microsoft SQL Server 2012
- Microsoft SQL Server 2014
- Microsoft SQL Server 2016
- Microsoft SQL Server 2017
- Windows Vista operating system
- Windows Server 2008 operating system
- Windows 7 operating system
- Windows Server 2008 R2 operating system
- Windows 8 operating system
- Windows Server 2012 operating system
- Windows 8.1 operating system
- Windows Server 2012 R2 operating system
- Windows 10 operating system
- Windows Server 2016 operating system
- Windows Server operating system

Exceptions, if any, are noted in this section. If an update version, service pack or Knowledge Base (KB) number appears with a product name, the behavior changed in that update. The new behavior also applies to subsequent updates unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms "SHOULD" or "SHOULD NOT" implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term "MAY" implies that the product does not follow the prescription.

<1> Section 2.3: The following table specifies the generic keys that are supported by Microsoft OLE DB Provider for SQL Server (SQLOLEDB). For more information about SQLOLEDB, see [MSDN-SQLOLEDB].

Key	Microsoft OLE DB Provider for SQL Server requirements
General Timeout	The valid values are unsigned integers that range from greater than or equal to 0 to less than or equal to 65534. A value of 0 specifies an infinite time-out. The default value is 0.
Window Handle	This key does not have a default value.
Integrated Security	The valid values are "SSPI" or an empty string. The default value is an empty string. The value "SSPI" specifies that Security Support Provider Interface [SSPI] is used as the **Authentication Service (AS)** for this connection.
Locale Identifier	The **language code identifier (LCID)** that is specified is supported by the operating system on which the **data source object** resides.
Password	This key does not have a default value.
Persist Security Info	If the value of this key is "true", the provider persists the value of the **Password** key if requested to persist the connection information. If the value of this key is "false", the provider does not persist the value of the **Password** key.
User ID	This key is the SQL Server login name. This key does not have a default value.
Prompt	The default value is "NoPrompt".
Initial Catalog	If a value for this key is not specified in the **connection string**, the provider opens the user's default database on the data source by default. For more information about default databases, see [MSDN-SD].
Data Source	This key is the name of the SQL Server instance to which to connect. If a value for this key is not specified in the connection string, the provider connects to the database server on the same computer that is hosting the data source object by default.
Connect Timeout	The valid values are unsigned integers that range from greater than or equal to 0 to less than or equal to 65534. A value of 0 specifies an infinite time out. If a value for this key is not specified in the connection string, a connection fails if the login time exceeds 15 seconds.
Extended Properties	The provider accepts an ODBC connection string as specified in [MS-ODBCSTR]. This key does not have a default value.

The following table specifies the **generic keys** that are supported by the Microsoft **OLE DB Provider** for SQL Server (SQLOLEDB) in Microsoft SQL Server Analysis Services. For more information about Analysis Services, see [MS-SSAS].

Key	Microsoft OLE DB Provider for SQL Server Analysis Services requirements
General Timeout	The valid values are unsigned integers that range from greater than or equal to 0 to less than or equal to 65534. A value of 0 specifies an infinite time-out. The default value is 0.
Window Handle	This key does not have a default value.
Integrated Security	The valid values are "SSPI" or an empty string. The default value is "SSPI". The value "SSPI" specifies that Security Support Provider Interface [SSPI] is used as the Authentication Service (AS) for this connection.
Locale Identifier	The language code identifier (LCID) that is specified is supported by the operating system on which the data source object resides.
Password	This key does not have a default value.

Key	Microsoft OLE DB Provider for SQL Server Analysis Services requirements
Persist Security Info	If the value of this key is "true", the provider persists the value of the **Password** key if requested to persist the connection information. If the value of this key is "false", the provider does not persist the value of the **Password** key.
User ID	This key does not have a default value.
Prompt	The default value is "NoPrompt".
Initial Catalog	If a value for this key is not specified in the connection string, the provider can default to any database on the data source.
Data Source	This key is the name of the SQL Server Analysis Services instance to which to connect. The value for this key is specified.
Connect Timeout	The valid values are unsigned integers that range from greater than or equal to 0 to less than or equal to 65534. A value of 0 specifies an infinite time-out. The default value is 60 seconds.
Impersonation Level	The default value is "Impersonate".
Protection Level	The supported values are "None", "Connect", "Pkt Integrity" and "Pkt Privacy". The "Call" and "Pkt" values are not supported. The default value is "Pkt Privacy".

<2> Section 2.3: In an implementation that uses Microsoft OLE DB Provider for Microsoft SQL Server (SQLOLEDB), the connection string is an **OleDBConnectionString** that allows the following additional **provider-specific keys**.

Key	Meaning
Application Name	Specifies the name of the **OLE DB consumer**. This key does not have a default value.
Auto Translate	Specifies whether the OLE DB consumer requests the provider to convert **OEM characters** or ANSI characters between the **code page** of the OLE DB consumer and the code page of the database when characters are retrieved from or sent to the database. The valid values are "true" and "false." The default value is "true".
Current Language	Specifies the language that is used for database message selection and formatting. This key does not have a default value.
Network Address	Specifies the network address of an instance of the database server. If the value of the **Network Address** key is not specified, the default value is the value of the **Data Source** key. If the value of the **Data Source** key contains an instance name, the instance name that is contained in the value of the **Data Source** key is appended to the value of the **Network Address** key. For more information about instance names, see [MSDN-UNI]. The network address has to be in TCP format or NP format. ▪ **TCP format** tcp:<host name>\<instance name> tcp:<host name>,<TCP/IP port number> TCP format has to start with the prefix "tcp:" and is followed by the **database instance**, specified by a <host name> and an <instance name>. The <host name> has to be specified in one of three ways: ▪ NetBIOSName [RFC1002] ▪ IPv4Address [RFC791]

Key	Meaning
	▪ IPv6Address [RFC2460]. The <instance name> is used to resolve to a particular TCP/IP port number [RFC793] on which a database instance is hosted. Alternatively, a <TCP/IP port number> can be specified directly. If both <instance name> and <port number> are not present, the **default database** instance is used. ▪ **NP format** np:\\<host name>\pipe\<pipe name> NP format has to start with the prefix "np:" and is followed by a **named pipe** name. The <host name> has to be specified in one of three ways: ▪ NetBIOSName [RFC1002] ▪ IPv4Address [RFC791] ▪ IPv6Address [RFC2460]. The <pipe name> is used to identify the database instance to which to be connected. Only when the value of the Network key is specified as "DBNETLIB" can the protocol prefixes "tcp:" and "np:" be used. If any other value of the **Network Library** key is specified, the prefixes "tcp:" and "np:" cannot be used. For more information about the format of the **Network Address** key, see [MSKB-313295]. For more information about named pipes, see [MSDN-NP].
Network Library	This key is the name of the network component that is used to communicate with the database server. For Microsoft implementations, the values and their behaviors for the various components are described here. ▪ DBNMPNTW – This component implements the named pipes protocol [MSDN-NP]. ▪ DBMSSOCN – This component implements the TCP/IP protocol. ▪ DBMSSPXN – This component implements the NWLink IPX/SPX protocol. ▪ DBMSRPCN – This component implements the Multi-Protocol protocol. ▪ DBMSVINN – This component implements the Banyan Vines protocol. ▪ DBMSADSN – This component implements the ADSP protocol. ▪ DBMSSHRN – This component implements the Shared Memory protocol. ▪ DBMSLPCN – This component implements the Shared Memory protocol. ▪ DBNETLIB – The default search order of network component can be used. This key does not have a default value. If the value that is specified is not listed above or if the **Network** key is not specified, the default search order of network component can be used. For more information about the default search order of network component, see [MSKB-328383].
Packet Size	Sets the network packet size in bytes (as specified by the **PacketSize** field in section 2.2.6.4 of [MS-TDS]) to be used for data exchange between the data source object and the database. The valid values are unsigned integers that range from greater than or equal to 512 to less than or equal to 32767. The default packet size is 4096 bytes.
Use Procedure for Prepare	Specifies that the OLE DB consumer requests a temporary **stored procedure** to be created on the database when a command is prepared. The valid values are the following:

Key	Meaning
	"1": A temporary stored procedure is created when a command is prepared. All temporary stored procedures are dropped when the session is released. "2": A temporary stored procedure is created when a command is prepared. The procedure is dropped when the command is unprepared, when a new command is specified, or when all application references to the command are released. The default value is "1".
Workstation ID	Sets the workstation identifier as specified by the **ibHostName** and **cchHostName** fields in section 2.2.6.4 of [MS-TDS]. The default value is the name of the workstation that is running the OLE DB consumer.
Initial File Name	Sets the name of the primary file of an attachable database as specified by the **ibAtchDBFile** and **cchAtchDBFile** fields in section 2.2.6.4 of [MS-TDS]. This key does not have a default value. For more information about attachable databases, see [MSDN-DAD]. If a value for this key is specified, a value for the **Initial Catalog** key also has to be specified.
Use Encryption for Data	Specifies whether data ought to be **encrypted** before sending it over the network. The valid values are "true" and "false". The default value is "false".
Replication server name connect option	Sets the server name (as specified by the **ibServerName** and **cchServerName** fields in section 2.2.6.4 of [MS-TDS]) and replication login type (as specified by the **fUserType** field in section 2.2.6.4 of [MS-TDS]) that the OLE DB consumer requests to send to the database server.
Tag with column collation when possible	Specifies whether the OLE DB consumer requests that data be tagged with collation information that is obtained from the database server instead of from the code page on the provider. The valid values are "true" and "false". The default value is "false".

In the Analysis Services implementation that uses SQLOLEDB, the connection string is an **OleDBConnectionString** that allows the following additional provider-specific keys. For more information about Analysis Services, see [MS-SSAS].

Key	Meaning
SSPI	Specifies the type of Security Support Provider Interface that is requested by the OLE DB consumer. The valid values are the following: ▪ "Negotiate": Negotiate authentication ▪ "Kerberos": **Kerberos** authentication ▪ "NTLM": **NT LAN Manager (NTLM) Authentication Protocol** authentication ▪ "Anonymous": No authentication The default value is "Negotiate".
Protocol Format	Specifies the OLE DB consumer-requested encoding format for **XML** messages on this connection. The valid values are the following: ▪ "Default": Binary encoding ▪ "XML": Text encoding ▪ "Binary": Binary encoding
Transport Compression	Specifies whether the OLE DB consumer requests messages on this connection to be compressed. The valid values are the following: ▪ "Default": Messages are compressed.

Key	Meaning
	▪ "None": Messages are not compressed. ▪ "Compressed": Messages are compressed.
Compression Level	Specifies the OLE DB consumer-requested level of compression when the value of the **Transport Compression** key is "Compressed". A value of "0" specifies minimum compression, and a value of "9" specifies maximum compression. The valid values are integers that range from greater than or equal to 0 to less than or equal to 9. When the value of the **Transport Compression** key is not "Compressed", the value of the **Compression Level** key has to be ignored if present.
SessionID	Specifies the ID of the **session** to use in this connection. When a value for the **SessionID** key is not specified, a new session is created for the duration of this connection.
Auto Synch Period	Specifies the OLE DB consumer-requested frequency, in milliseconds, of synchronization between the OLE DB provider and the server. The default frequency is 10000 milliseconds.

<3> Section 2.3: In Microsoft implementations, when the **Provider** key is not specified in a connection string, OLE DB services (for more information, see [MSDN-ODBS]) uses the following default values:

- "MSDASQL" on 32-bit operating systems, including Microsoft Windows-32-bit-On-Windows-64-bit (WOW64).
- "SQLOLEDB" on 64-bit operating systems.

<4> Section 2.3: In Microsoft implementations, when a value is specified for the **Integrated Security** key, the values of the following keys are ignored if present: **Cache Authentication**, **Encrypt Password**, **Mask Password**, **Password**, **Persist Encrypted**, **Persist Security Info**, and **User ID**.

<5> Section 2.3: In Microsoft implementations, when the value of the **Persist Security Info** key is "false", the value of the **Persist Encrypted** key is ignored if present.

<6> Section 2.3: In Microsoft implementations, the initialization process returns immediately, but the actual initialization of the data source object is performed asynchronously. If the "Initialize" value is not specified, the data source object is initialized synchronously.

<7> Section 2.3: In Microsoft implementations, the OLE DB provider can use the value of the **Data Source** key together with the value of the **Location** key to determine the location of the data source.

<8> Section 2.3: In Microsoft implementations, using the **Locale Identifier** key does not guarantee that all text that is returned to the consumer will be translated according to the language code identifier (LCID).

<9> Section 2.3: In Microsoft implementations, the OLE DB provider can use the value of the **Location** key together with the value of the **Data Source** key to determine the location of the data source.

<10> Section 2.3: In Microsoft implementations, when the "ClientCursor" value is part of the compound value for the **OLE DB Services** key, the "AgrAfterSession" value is ignored if present.

6 Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.

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