Microsoft OLE DB Provider for DB2

Version 4.0

Product Documentation

(Last updated 31st January, 2012)

The Microsoft OLE DB Provider for DB2 V 4.0 documentation provides information for installing and using version 4 of the Microsoft OLE DB Provider for DB2 (Data Provider).

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Getting Started

The following sections provide help for learning about, installing and configuring the Microsoft OLE DB Provider for DB2 Version 4.0 (Data Provider).

In This Section

Overview of Data Provider

The Microsoft OLE DB Provider for DB2 Version 4.0 (Data Provider) lets you create distributed applications targeting IBM DB2 databases. The Data Provider takes advantage of Microsoft SQL Server data access architecture together with a Microsoft network client for DB2 that functions as a Distributed Relational Database Architecture (DRDA) application requester. The Data Provider converts Microsoft Component Object Model (COM) OLE DB commands and data types to DRDA protocol code points and data formats.
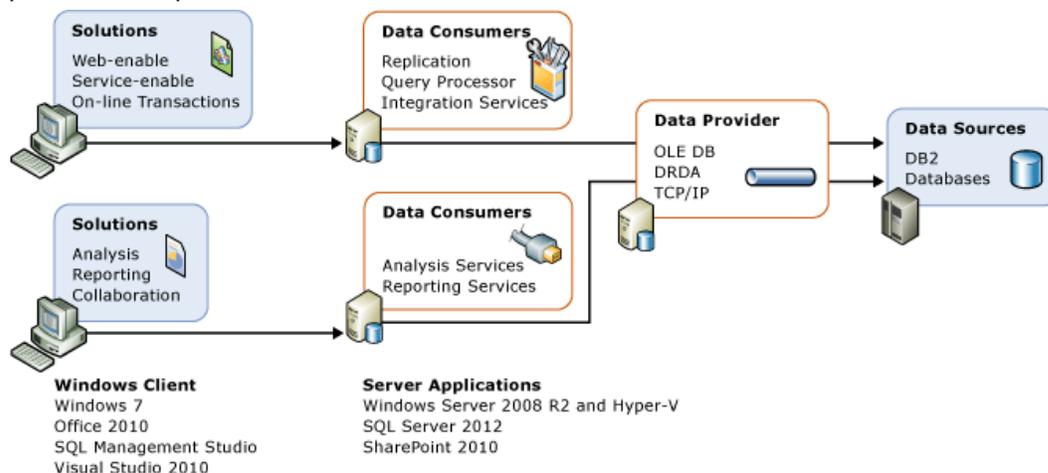
Data Provider Features

The Data Provider offers the following features:

- Installation using an interactive and scriptable program.
- Support for Windows 32-bit x86 and 64-bit x64 operating systems.
- Access to DB2 server computers across a TCP/IP network connection.

- Execution of DB2 dynamic SQL commands within remote unit of work transactions.
- Tools for creating, testing, modifying and storing data source definitions.
- A trace utility for recording flows and commands to enable troubleshooting of problems.
- Help through on-line user documentation.

The Data Provider is designed and tested for use with Microsoft SQL Server 2012 and Microsoft SQL Server 2008 R2. The Data Provider is based on technology in Microsoft Host Integration Server 2010. For more information about HIS 2010, see Host Integration Server 2010 (http://go.microsoft.com/fwlink/?LinkID=180445).

What's New in Version 4.0

The Microsoft OLE DB Provider for DB2 version 4.0 offers the following improvements:
- Simplified installation program
- Connectivity to DB2 for z/OS V10
- Connectivity to DB2 for i5/OS V7R1
- Client Transaction Load Balancing
- OpenRowset using FastLoad when connecting to DB2 for z/OS and DB2 for LUW
- Reading DB2 Binary Large Object (BLOB) and Character Large Object (CLOB) data types
- Writing DB2 BLOB and CLOB data types using Command with Parameters
- DB2 Decimal as OLE DB Numeric data type mapping
- SQL Server DATETIME2 data type
- DB2 long object identifiers
- Accessing DB2 tables with large number of columns and parameters
- Reading schema information stored in DB2 shadow catalog tables
- Session and command source identifiers
- Reason codes included in error information
- Extended error documentation

Installing Data Provider

This topic provides instructions to install the Data Provider.

Installing Data Provider

Supported Operating Systems

The Data Provider (32-bit x86 or 64-bit x64) will install on these Microsoft operating systems.
- Windows Server 2008 R2 SP1

- Windows 7 SP1
- Windows Server 2008 SP2

Prerequisite Software

The Data Provider requires the following software products as installation prerequisites.

- Microsoft SQL Server 2012 (Enterprise, Developer or Evaluation Edition) or Microsoft SQL Server 2008 R2 (Datacenter, Enterprise, Developer or Evaluation Edition)
- Microsoft .NET Framework 4.0
- Microsoft Visual C++ 2010 Redistributable Package (x86)
- Microsoft Visual C++ 2010 Redistributable Package (x64)

  📝 **Note**

  When installing on a 64-bit (x64) operating system, you must install both x86 and x64 of Visual Studio 2010 C++ packages.

Upgrade from Previous Version

Microsoft OLE DB Provider for DB2 V 4.0 does not upgrade previous releases. If you have the following previous versions installed, then you must remove them prior to installing the Microsoft OLE DB Provider for DB2 V 4.0.

- Microsoft OLE DB Provider for DB2 V1.0
- Microsoft OLE DB Provider for DB2 V1.0 with SP1
- Microsoft OLE DB Provider for DB2 V2.0
- Microsoft OLE DB Provider for DB2 V3.0

To Install the Product

There are two options for installing the Data Provider, including interactive installation and unattended installation. The following steps guide you through interactive installation.

1. Go to the [Microsoft Download Center](#).
2. Download either the x86 (32-bit) or the x64 (64-bit) version of **DB2OLEDB4_x64.msi** installation program.
3. Double-click the **.msi** file to start the **Installation Wizard**.
4. Click **Next** to get started.
5. On the **License Agreement** page, review the license terms, click the **I accept the terms in the license agreement** option, and then click **Next**.
6. On the **Registration Information** page, enter your **Name** and **Company**, and then click **Next**.

7. On the **Feature Selection** page, optionally click **Browse** to change the **Folder name** in which to install the product, optionally click **Disk Cost** to space required to install the product, and then click **Next**.

8. On the **Ready to Install the Program** page, click **Install**.

9. When prompted by Windows **User Account Control**, click **Yes**.

10. On the **Installing** page, view the status of the installation process.

11. On the **Completion** page, click **Finish**.

To install the product unattended

There are two options for installing the Service for DRDA, including interactive installation and unattended installation. The following steps guide you through unattended installation.

1. On the **Start** menu, point to **All Programs**, point to **Microsoft Visual Studio 2010**, point to **Visual Studio Tools**, right click **Visual Studio x64 Win64 Command Prompt (2010)**, and click **Run as administrator**. The **User Account Control** dialog will appear. Click **Yes** to continue.

2. In the **Visual Studio x64 Win64 Command Prompt (2010)** window, locate the installation folder in which you downloaded the installation program, enter **DB2OLEDB4_x64.msi /quiet**.

3. To verify the installation, locate the installed product in **C:\Program Files\Microsoft OLE DB Provider for DB2**.

   📝 **Note**

   Optionally, to generate a log, add **/l <log file name>** to the command string. To verify the installation, enter **notepad <log file name>**, and then click **Enter**.

To repair the product installation

You can use **Windows Programs and Features** to launch the Program Maintenance to repair the installation.

1. Click **Control Panel**, click **Programs**, and then click **Programs and Features**. The **Uninstall or change a program** dialog appears.

2. In the **Name** list, double click **Microsoft OLE DB Provider for DB2 Version 4.0**. The Data Provider **Installation Wizard** appears.

3. Click **Next** to get started.

4. On the **Program Maintenance** dialog, click **Repair**.

5. On the **Ready to Repair the Program** dialog, click **Repair**.

6. When prompted by Windows **User Account Control**, click **Yes**.

7. On the **Completion** page, click **Finish**.

To uninstall the product

You can use Windows Programs and Features to remove the product.

1. Click **Control Panel**, click **Programs**, and then click **Programs and Features**. The **Uninstall or change a program** dialog appears.
2. In the **Name** list, double click **Microsoft OLE DB Provider for DB2 Version 4.0**. The Data Provider **Installation Wizard** appears.
3. Click **Next** to get started.
4. On the **Program Maintenance** dialog, click **Remove**.
5. On the **Remove the Program** dialog, click **Remove**.
6. When prompted by Windows **User Account Control**, click **Yes**.
7. On the **Completion** page, click **Finish**.

To uninstall the product unattended

You can use an unattended command to uninstall the product.

1. On the **Start** menu, point to **All Programs**, point to **Microsoft Visual Studio 2010**, point to **Visual Studio Tools**, right click **Visual Studio x64 Win64 Command Prompt (2010)**, and click **Run as administrator**. The **User Account Control** dialog will appear. Click **Yes** to continue.
2. In the **Visual Studio x64 Win64 Command Prompt (2010)** window, locate the installation folder in which you downloaded the installation program, enter **DB2OLEDB4_x64.msi /uninstall /quiet**, and then click **Enter**.
3. To verify the removal, locate the installed product in **C:\Program Files\ Microsoft OLE DB Provider for DB2**.

   📝 **Note**

   Optionally, to generate a log, add **/l <log file name>** to the command string. To verify the installation, enter **notepad <log file name>**, and then click **Enter**.

Planning and Architecture

The following sections provide help for planning and architecting solutions using Data Provider.

In This Section

1. [Planning](#)
2. [Architecture](#)

Planning

Enterprise developers who are using on-line transactional processing (OLTP) and business intelligence (BI) technologies can take advantage of the SQL Server data access architecture to connect IBM DB2 databases to new solutions built by using SQL Server integration, analysis, reporting, replication and distributed query technologies. The Data Provider supports SQL commands. This allows for interoperability between COM OLE DB-enabled consumer services and tools in Microsoft SQL Server and remote IBM DB2 relational database management systems. You can execute data definition language (DDL) or data manipulation language (DML) SQL statements that include read and write operations based on dynamic SQL in addition to stored procedures within remote unit of work (RUW) transactions.

Planning various components

Data Provider

Microsoft OLE DB Provider for DB2 Version 4.0 (Data Provider) allows IT professionals and enterprise developers using Microsoft SQL Server Microsoft SQL Server 2012 or Microsoft SQL Server 2008 R2 technologies and tools to access, read, and write vital information stored in IBM DB2 relational database management systems. The Data Provider connects to DB2 using an underlying Microsoft network client for DB2 that functions as a DB2 DRDA Application Requester.

DB2 Servers

You can use the Data Provider to interact with IBM DB2 database servers on the following platforms using a DRDA over TCP/IP network connection.

- IBM DB2 for z/OS V8.1, V9.1, and V10
- IBM DB2 for i5/OS V5R4, V6R1, and V7R1
- IBM DB2 for Windows, AIX, HP-UX, Solaris, Linux V9.1, V9.5, and V9.7

The Data Provider is designed and tested for use with Microsoft SQL Server 2012 and SQL Server 2008 R2. The Data Provider is based on technology in Microsoft Host Integration Server 2010. For more information about HIS 2010, see [Host Integration Server 2010](http://go.microsoft.com/fwlink/?LinkID=180445) (http://go.microsoft.com/fwlink/?LinkID=180445).

SQL Server Products

The Data Provider requires the following Microsoft SQL Server software products as installation dependencies.

- Microsoft SQL Server 2012 Enterprise, Developer or Evaluation Edition
- Microsoft SQL Server 2008 R2 Datacenter, Enterprise, Developer or Evaluation Edition

The Data Provider must be installed on the same computer as SQL Server 2012 or SQL Server 2008 R2 for use in-process with the Data Consumer application.

SQL Server Data Consumers

SQL Server Integration Services, SQL Server Analysis Services, and SQL Server Reporting Services interact indirectly with the Data Provider through the Microsoft ADO.NET Data Provider for OLE DB. Distributed query processing interacts with the Data Provider directly through OLE DB. SQL Server Replication requires a DQP-defined linked server for specifying the initial connectivity information, but will use ADO.NET to OLE DB integration at run time when synchronizing data. SQL Server provides a rich array of tools that you can use to create DB2 solutions with SQL Server consumers.

Data Conversion

The Data Provider converts to and from DRDA formatted data types and OLE DB data types. Depending on the SQL Server Consumer, IT professionals can control the conversion using an XML data type mapping configuration file or SQL Server data type mapping system table.

Code Page Conversion

Organizations often have to develop solutions that are globalized for deployment in multiple locales. IT professionals can configure the Data Provider to process string conversions based on standard Coded Character Set Identifiers (CCSIDs) and code pages, including support for single-byte, mixed-byte, double-byte, EBCDIC, ANSI, OEM PC, UNICODE, Arabic and Hebrew bi-directional layout conversion.

Security

Enterprise IT organizations seek ways to secure the authentication credentials and user data that flows across the network. The Data Provider offers technologies for authentication encryption, data encryption, or both authentication and data encryption. IT professionals can configure the Data Provider to use 256-bit Advanced Encryption Standard (AES) to secure the authentication credentials, as well as 56-bit Data Encryption Standard (DES) to secure both the authentication credentials and user data. At the TCP/IP network layer, the Data Provider supports either Secure Sockets Layer (Version 3.0) or Transport Layer Security (TLS Version 1.0) to encrypt both authentication credentials and user data. The Data Provider supports optional use of Enterprise Single Sign-On Version 4.5 to map foreign credentials (e.g. RACF Username) to Windows Active directory credentials. ESSO is a separately installable feature of Microsoft Host Integration Server 2010 licensed as supplemental technology to Microsoft BizTalk Server 2010. For more information about HIS 2010, see Host Integration Server 2010 (http://go.microsoft.com/fwlink/?LinkID=180445).

Architecture

The Data Provider connects Microsoft SQL Server 2012 data consumers to remote IBM DB2 database servers running on a variety of operating systems, including IBM mainframe z/OS and IBM midrange i5/OS. The Data Provider offers cross-platform interoperability capabilities, such as code page conversion and data conversion. The Data Provider offers security and protection features for authentication and data encryption.
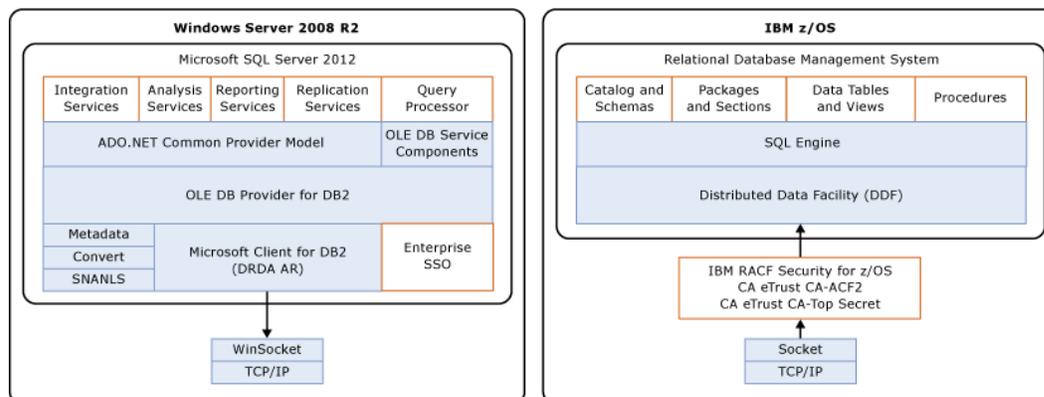
Data Provider

Data Provider Tools

The Data Provider includes tools for use by the IT professional and enterprise developer.

Data Access Tool with Data Source Wizard

The Data Access Tool is a graphical utility for defining, updating, cataloging and using connectivity definitions, in the form of OLE DB Data Link files. From within the Data Access Tool (DAT), you can launch the Data Source Wizard (DSW), which guides you through defining and testing UDL files. The DAT and DSW allow you to test, create DB2 static SQL packages (that contain required CREATE CURSOR statements), change DB2 passwords, and sample query the system catalog table SYSIBM.SYSTABLES.

Data Links

Separately, the OLE DB Data Links graphical utility offers a simpler method of defining and testing UDL files. Most Data Consumers will launch the Data Links tool from within their configuration and deployment tools. The Connection dialog of the Data Links tool includes a Browse button for locating previously-defined UDL files, providing a method to re-use UDL files defined using the DAT and DSW.

Trace Utility

The Data Provider includes a Trace Utility for initiating DB2 network library (client) traces. Also, IT professionals can use Windows Network Monitor to trace DRDA over TCP/IP flows.

SQL Server Tools

SQL Server Data Tools (SSDT)

SQL Server Data Tools (SSDT) is the primary development environment for creating business solutions using Analysis Services, Integration Services, and Reporting Services. SSDT provides templates, designers, and wizards that are specific to each consumer. For more information, see SQL Server Data Tools (http://go.microsoft.com/fwlink/?LinkId=241509).

SQL Server Management Studio

SQL Server Management Studio is an integrated environment for accessing, configuring, managing, administering, and developing all components of SQL Server. You can use the graphical tools and script editors in SQL Server Management Studio to work with DB2 data and SQL Server data. In addition, SQL Server Management Studio works with all components of SQL Server such as Reporting Services and Integration Services. For more information, see Introducing SQL Server Management Studio (http://go.microsoft.com/fwlink/?LinkId=241507).

SQL Server Data Consumers

Integration Services

SQL Server Data Tools (SSDT) provides the Integration Services project in which you create packages, their data sources, and data source views. For more information, see Integration Services and Studio Environments (http://go.microsoft.com/fwlink/?LinkId=241506).

You can also use the Namespaces in the provided here (http://go.microsoft.com/fwlink/?LinkId=241512) to programmatically create and manage packages. For more information about how to create Integration Services solutions, see the Integration Services Developer InfoCenter (http://go.microsoft.com/fwlink/?LinkID=180761). For the documentation on SQL Server Integration Services, see SQL Server Integration Services (http://go.microsoft.com/fwlink/?LinkId=241513).

Query Processor

Distributed Queries in SQL Server 2012 provide distributed concurrent access to multiple data sources. The Distributed Query Processor (DQP) allows you to create heterogeneous queries that join tables in SQL Server with tables in DB2, Host File systems, Oracle, or any other data

source accessible by an OLE DB provider. You can use DQP to create SQL Server views over DB2 tables so that developers can write directly to SQL Server and integrate both Windows-based and host-based data in their applications.

For more information about SQL Server distributed queries, see Distributed Queries (http://go.microsoft.com/fwlink/?LinkId=241510).
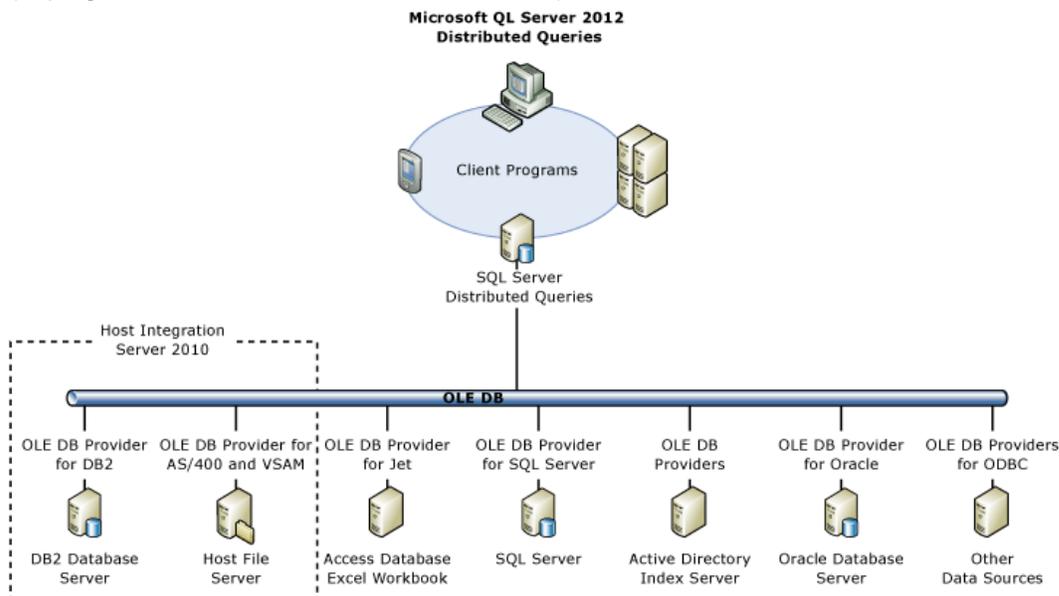
Analysis Services

 You can use the SSDT to develop Online Analytical Processing (OLAP) cubes and data mining models in SQL Server Analysis Services. This project type includes templates for cubes, dimensions, mining structures, data sources, data source views, and roles, and provides the tools for working with these objects.

For the Analysis Services documentation, see SQL Server Analysis Services - Multidimensional Data (http://go.microsoft.com/fwlink/?LinkId=241511) and SQL Server Analysis Services - Data Mining (http://go.microsoft.com/fwlink/?LinkId=241514).

Reporting Services

You can use the Report Model and Report Server projects in Business Intelligence Development Studio for developing Reporting Services solutions that access DB2 data. The Report Model project type includes the templates for report models, data sources, and data source views, and provides the tools for working with these objects. The Report Server project includes the templates for working with reports and shared data sources. For more information, see Reporting Services in Business Intelligence Development Studio (http://go.microsoft.com/fwlink/?LinkId=241516).

For the Reporting Services documentation, see SQL Server Reporting Services (http://go.microsoft.com/fwlink/?LinkId=241515).

Replication

Administrators can move data from SQL Server to DB2 using Replication wizards in SQL Server Management Studio, as part of either snapshot or transactional replication operations. For Replication, SQL Server uses linked servers for connectivity and Integration Services for synchronizing data with DB2.For the SQL Server Replication documentation, see SQL Server Replication (http://go.microsoft.com/fwlink/?LinkId=241517).

Deployment

The following sections provide help in deploying Data Provider.

In This Section

- Data Access Tool
- Data Source Wizard
- Data Link Tool

Data Access Tool

The Data Access Tool enables administrators and developers to be more efficient when they define and test connections to remote IBM DB2 database servers. The Data Access Tool displays configured data sources in a scope and results pane, similar to Windows Explorer. The Data Access Tool offers an intuitive Data Source Wizard, which guides you through the process of defining, test-verifying, and storing connection information. The Data Access Tool simplifies configuring network, security and database information and helps you create packages on the DB2 system. You can use it to test connections, run sample queries and convert data sources.

Data Access Tool User Interface

Data Access Tool windows

The Data Access Tool lets you configure and manage your data sources. The tool is divided into three windows:

- A scope pane (folder browser) that offers a tree view of data sources, with separate folders for data source type.
- A results pane (list item details) that offers a list view of data sources, with common details such as platform and date modified.
- A result pane view that displays either the output of a command or current connection string.

Menu commands and toolbar

Commands can be accessed through the main menu and a context-sensitive menu which appears when you right-click any section of a window. For example, when you right-click a data source item, you can view, edit, test, delete, or rename that data source item. In addition, the **F5** key updates the tree view, the **Delete** key deletes the currently selected item, and the **F1** key opens the online Help.

Data Access Tool Common Tasks

Creating a Data Source

To launch the Data Source Wizard, click **New Data Source** from the **File** or context menu.

1. In the Data Access Tool window, click the **File** menu.
2. Click **New Data Source**.

Opening a Data Source

You can use the Open Data Source command on the File menu) to select a Universal Data Link (*.udl) file using the Windows File Open dialog box. This command opens the data source for editing within the Data Source Wizard.

1. In the Data Access Tool window, click the **File** menu.
2. Click **Open Data Source**. The File Open dialog box appears.
3. Find the data source that you want, and then click **Open**. The Data Source Wizard appears.

Importing a Data Source

You can use the **Import DB2 Connect File** command (File menu) to import a configuration defined for use with IBM DB2 Connect.

1. In the Data Source Browser, click the **File** menu.
2. Click **Import**, and then select the file that you want.
3. Click **File**, and then click **Open** to view item in Data Source Wizard. The Data Source Wizard appears.

For more information about IBM DB2 Connect files, see the IBM DB2 Connect documentation.

Editing a Data Source

You can use the Edit Data Source command from the Actions or context menu to select a Universal Data Link (*.udl) file. This command opens the data source for editing in the Data Source Wizard.

1. In the Data Source Browser window, click the **Actions** menu.

2. Click **Edit Data Source**. The Data Source Wizard will appear.

Testing a Connection

The **Test Connection** command on the **Actions** or context menu enables you to verify the data source, and to display information such as the host platform and version. Output from testing a connection to a DB2 server resembles the following.

Successfully connected to data source 'DB2DSN1'

Server class: DB2/MVS

Server version: 09.01.0005

If you did not save the user name and password in the connection configuration, an **Authentication** dialog box will appear, prompting you to enter a valid user name and password.

Running a Sample Query

You can use the **Sample Query** command on the **Actions** and context menu to execute a sample query against the remote data source. The sample query retrieves a list of tables from the system catalog by using the default schema property configured in the data source. The data is displayed in the results pane as two tabs: an **Output** window.

1. In the Data Source Browser window, select the data source and click the **Actions** menu.

2. Click **Sample Query**. The **Output** window and **Grid** window display the results of the sample query.

Successfully retrieved 1000 rows from data source 'DB2DSN1'.

Creating Packages

You can use the **Create Packages** command on the Actions and context menu to create packages on a remote DB2 relational database server.

1. In the Data Source Browser window, click the **Actions** menu.

2. Click **Create Packages**. The **Create Packages** dialog box will appear.

If you did not save the user name and password in the connection configuration, an Authentication dialog box appears, prompting you to enter a valid user name and password.

Displaying a Connection String

When you select a data source in the Data Source Browser, the Output pane displays the **Connection String** dialog box. You can copy the connection string from the dialog box and paste it into other applications. You can use this technique in SQL Server Management Studio to define a Linked Server for use with the Query Processor.

Changing a Password

You can replace your current password using **Change Password** command on the Actions and context menu to access the DB2 password change management (PCM) function.

1. In the Data Source Browser window, select the data source, and then click the **Actions** menu.
2. Click **Change Password**. The Authentication dialog appears.
3. Enter the current credentials in the **User name** and **Password** text boxes.
4. Enter the new password in both the **New password** and **Confirm password** text boxes. The Output window displays the results of the Change Password command.

Successfully changed the password on data source 'DB2DSN1'.

Locating a Connection Definition

The Locate command on the context menu enables you to navigate to a Universal Data Link (*.udl) file using the Windows Explorer dialog box.

Setting Options

You can use the Options dialog on the View menu to specify the directory that the Data Access Tool uses to view, edit and save Universal Data Link (*.udl) files.

Obtaining Help

You can use the Help command on the context menu and Dynamic Help on the Help menu to load the product documentation to learn more about using the Data Access Tool.

Completing Other Tasks

In addition to the tasks described in the previous topics, you can also use the Edit, View and Help menus to perform the following actions.

1. Use the **Edit** menu to **Undo**, **Cut**, **Copy**, or **Paste** strings, and to **Delete** or **Rename** data sources.
2. Use the **View** menu to **Refresh** the browser or view the **Options** dialog box.
3. Use the **Help** menu to access context-sensitive dynamic help, HIS DevCenter (MSDN), HIS TechCenter (TechNet), HIS Forum, HIS Feedback (Connect), and About (version and license).

Data Source Wizard

You can use the Data Source Wizard to guide you through the steps to configure and save data source information that is required to connect the Data Provider for DB2 (Data Provider) to remote IBM DB2 database servers. Data Source Wizard helps to simplify configuring and testing network connections, working with packages, defining character string code page conversions, working with security and encryption, and validating and saving the configuration. The following sections describe the Data Access Wizard dialogs and the actions that you can perform on each dialog.

Welcome

Optionally, you can select the check box to omit displaying this welcome dialog.

Data Source

You can use the Data Source dialog to configure the DB2 database server platform.

Data source platform

Optionally, to increase performance and reduce impact to the remote database, select the data source platform on which the remote DB2 database is deployed. The Data Provider uses this value to convert data types to a format supported by this platform.

The default value is DB2/MVS (DB2 for z/OS). Other values include DB2/400 (DB2 for i5/OS), DB2/NT (DB2 for Windows), and DB2/6000 (DB2 for AIX, Linux, and Solaris).

Network type

The Data Provider supports TCP/IP network connections to remote IBM DB2 database servers.

The SNA LU6.2 (APPC) network connection option is disabled in the Microsoft OLE DB Provider for DB2 that is used with Microsoft SQL Server 2012. It is enabled with the version of the provider that is used with Host Integration Server.

TCP/IP Network Connection

The TCP/IP Network Connection dialog must be used to configure required parameters, such as network address (or alias) and port number.

Address or alias

You must enter a valid IP address or alias in either IPv4 or IPv6 format.

Port

You must specify an IP port number. For DB2/400, the default value is TCP/IP port 446. Other IBM DB2 platforms support multiple concurrent database instances, each with a unique TCP/IP port number.

Certificate common name

Optionally, you can specify a server certificate common name to instruct the Data Provider to utilize Secure Sockets Layer (SSL) V3.0 or Transport Layer Security (TLS) V1.0 encryption. If you use SSL or TLS, it will improve security by encrypting authentication credentials and data. By default, this value is set to empty string (no SSL or TLS).

Distributed transactions

This property is disabled in the Microsoft OLE DB Provider for DB2 that is used with Microsoft SQL Server 2012. It is enabled with the version of the provider that is used with Host Integration Server 2010.

DB2 Database

The DB2 Database dialog must be used to configure required database parameters, such as the initial catalog and package collection.

Initial catalog

The Data Provider uses this value to connect to an initial catalog on the DB2 database server.

- DB2 for z/OS accepts a 16 byte string (catalog is also known as a location).
- DB2 for i5/OS accepts an 18 byte string (catalog is also known as a relational database).
- DB2 for LUW accepts an 8 byte string (catalog is also known as a database).

Package collection

The package collection is required to instruct the Data Provider into which DB2 schema to create a set of packages. Each package is divided into sections with static SQL statements, such as CREATE CURSOR, used to retrieve data when querying the database.

- DB2 for z/OS accepts a 128 byte string (schema is also known as a collection).
- DB2 for i5/OS accepts a 10 byte string (schema is also known as a collection or library).
- DB2 for LUW accepts a 30 byte string.

The Data Provider creates packages in one of two ways.

- Automatic for single-user environment. At runtime, the Data Provider creates and binds a single package for the current isolation level (the default is cursor stability). The Data Provider grants execute permissions to the current user.
- Manual for multi-user environment. At design-time when you use the Data Access Tool menu option, Data Source Wizard, Data Access Library or Data Links, the Data Provider creates and binds a set of 4 packages (5 packages for DB2 for i5/OS). The Data Provider grants execute permissions to the PUBLIC group.

The Data Provider creates 4-5 packages, depending on database server platform and environment. The following table describes the packages and isolation levels.

Microsoft Package Name	DB2 Isolation Level Name	OLE DB Isolation Level Name
MSNC001	NO COMMIT	N/A (DB2 for i5/OS only)
MSUR001	UNCOMMITTED READ	ISOLATIONLEVEL_READUNCOMMITTED
MSCS001	CURSOR STABILITY	ISOLATIONLEVEL_READCOMMITTED
MSRS001	READ STABILITY	ISOLATIONLEVEL_REPEATABLEREAD
MSRR001	REPEATABLE READ	ISOLATIONLEVEL_SERIALIZABLE

Default schema

DB2 database objects are organized into logical groups called schemas. The schema name is used to catalog SQL objects such as tables and views, using a two-part naming convention <SCHEMA>.<OBJECTNAME>. At design time, to construct SQL such as SELECT statements, SQL Server consumers can present to the user a list of all objects in the database catalog. Optionally, you can specify a string to instruct the Data Provider to restrict schema queries to a single database schema, which improves efficiency and performance. The default is an empty string.

- DB2 for z/OS accepts a 128 byte string (schema is also known as a collection).
- DB2 for i5/OS accepts a 10 byte string (schema is also known as a collection or library).
- DB2 for LUW accepts a 30 byte string.

Default qualifier

Optionally, you can specify a string to instruct the Data Provider to set an environment option for a default qualifier, with which to inform the DB2 server in which schema to locate database objects. The default is an empty string. At connection time, the Data Provider can set an environment option to specify a default qualifier. This informs the DB2 server in which schema to locate the object. The value of default qualifier must match an existing DB2 schema name, or an error may be returned by the DB2 server.

- DB2 for z/OS accepts a 128 byte string (schema is also known as a collection).
- DB2 for i5/OS accepts a 10 byte string (schema is also known as a collection or library).
- DB2 for LUW accepts a 30 byte string.

Database name

DB2 databases can be divided into multiple logical databases for administration purposes, each containing separate table spaces and index spaces. The optional database name instructs the Data Provider to use the IN DATABASE clause in SQL statements. DB2 for z/OS accepts an 8 byte string for database name and an 8 byte string for table space name. You can specify the database name only or database name combined with table space name, for example DBASE1.TSPACE1.

Locale

Optionally, to increase performance and reduce the impact on the remote database, you can select the coded character set identifier (CCSID) for the remote DB2 database (host) and local SQL Server consumer (computer). The Data Provider uses these values to convert character strings to a code page supported by these platforms. The Data Provider supports a combination of single byte character sets (SBCS), mixed-byte character sets (MBCS) double-byte character sets (DBCS), and Unicode - UTF8 [1208], which is an 8-bit Unicode transformation format. For more information, see SNA Internationalization Programmer's Reference (http://go.microsoft.com/fwlink/?LinkID=181017).

Host CCSID

The Data Provider requires a value for Host CCSID (Coded Character Set Identifier) with which to perform code page conversions on string data. The default Host CCSID value is EBCDIC – U.S./Canada [37]. Typically, IBM DB2 database servers for z/OS and i5/OS utilize EBCDIC (Extended Binary Coded Decimal Interchange Code). For more information, see SNA Internationalization Programmer's Reference (http://go.microsoft.com/fwlink/?LinkID=181017).

PC Code Page

The Data Provider requires a value for PC Code Page with which to perform code page conversions on string data. The default PC code page is ANSI – Latin I [1252]. Typically, data consumers use either ANSI (American National Standards Institute) or Unicode. For more information, see SNA Internationalization Programmer's Reference (http://go.microsoft.com/fwlink/?LinkID=181017).

Process binary as character

The optional Process binary (CCSID 65535) as character instructs the Data Provider to convert DB2 bytes to and from Windows character strings, based on an optional Binary Code Page property that is configured in the Data Source Wizard All Properties dialog. The default is false.

Security

The Security dialog enables you to configure one of three security methods: interactive sign-on, single sign-on, or Kerberos.

Security method - Interactive sign-on

Interactive sign-on security relies on a username and password that is entered at runtime or that is stored in a configuration file or data consumer configuration store, such as an Integration Services package. Optionally, interactive sign-on can utilize one of four authentication methods that define authentication and/or data encryption.

User name
- DB2 for z/OS accepts an 8 byte string.
- DB2 for i5/OS accepts a 10 byte string.
- DB2 for Linux or UNIX accepts an 8 byte string.
- DB2 for Windows accepts a 30 byte string.

Password
- DB2 for z/OS accepts an 8 byte string.
- DB2 for i5/OS accepts a 128 byte string.
- DB2 for Linux or UNIX accepts an 8 byte string.
- DB2 for Windows accepts a 32 byte string.

Password confirmation

Interactive sign-on requires the user to enter the password twice for confirmation.

Authentication method

The authentication method property sets the authentication method for the connection. The default value is Server using interactive sign-on security, which relies on a username and password with no encryption.
- The **Server_Encrypt_Pwd** option instructs the Data Provider to encrypt the password only. IT professionals can configure the data providers to use 256-bit Advanced Encryption Standard (AES) to secure the authentication credentials.

- The **Server_Encrypt_UsrPwd** instructs the Data Provider to encrypt both the username and password. IT professionals can configure the data providers to use 256-bit Advanced Encryption Standard (AES) to secure the authentication credentials.
- The **Data_Encrypt** option instructs the Data Provider to encrypt the username, password, and user data.

> ⚠️ **Warning**
> The Data Provider can encrypt authentication using either strong 256-bit Advanced Encryption Standard (AES) or weak 56-bit Data Encryption Standard (DES), depending on the remote DB2 server configuration. We recommend that you use a security method that uses strong authentication encryption, such as AES, Kerberos, SSL V3.0 or TLS V1.0.The Data Provider can encrypt data using weak 56-bit Data Encryption Standard (DES). We recommend that you use a security method that uses strong data encryption, such as SSL V3.0 or TLS V1.0.

Save password

Optionally, you can save the password in the OLE DB Universal Data Link (UDL) or text file by clicking the **Allow saving password** check box. Choosing this option saves the user name and password in plain text. It is not possible to encrypt the user name or password using this method. Server security can be compromised if an attacker can gain access to the file share on which the UDL or text file is located.

Security method - Single sign-on

Single sign-on relies on a username and password that are stored in an encrypted Enterprise Single Sign-On database.

Affiliate Application

This property is required for use with Enterprise Single Sign-On.

Security method - Kerberos

Kerberos relies on a ticket that contains encrypted credentials. For more information, see Microsoft Kerberos (http://go.microsoft.com/fwlink/?LinkID=180764).

Principle name

This property is required for use with Kerberos authentication.

Advanced Options

The Advanced Settings dialog lets you configure additional optional settings.

Connection pooling

Optionally, you can specify TRUE to instruct the Data Provider to use client-side connection pooling. The default is FALSE (no pooling).

Read Only

Optionally, the Data Provider can declare the read-only access method when connecting to the DB2 database server.

Defer Prepare

Optionally, you can specify TRUE to instruct the Data Provider to optimize the processing of parameterized database commands. The default value is FALSE. For the INSERT, UPDATE, and DELETE commands, the Data Provider can combine PREPARE, EXECUTE, and COMMIT commands into one network flow to the remote database. For the SELECT command, the Data Provider combines PREPARE and EXECUTE commands into one network flow. This optimization minimizes network traffic and can improve overall performance.

Derive Parameters

The Data Provider will derive parameter information on request of data consumers, such as SQL Server Integration Services package designer and import/export wizards. The default is TRUE.

All Properties

The All Properties dialog lets you configure more detailed and optional properties. These properties may be edited by selecting a property from the list, and then selecting or editing the value in the right column. You can edit the following properties from this dialog.

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
Affiliate Application	Security	Connection	This property instructs the Data Provider to retrieve credentials from an Enterprise Single Sign-On database.
Alternate TP Name	All	All	This property is disabled in the Microsoft OLE DB Provider for DB2 v4.0. It is enabled with the version of the provider that is used with

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			Host Integration Server 2010.
APPC Local LU Alias	All	APPC Network Settings	This property is disabled in the Microsoft OLE DB Provider for DB2 v4.0. It is enabled with the version of the provider that is used with Host Integration Server 2010.
APPC Mode Name	All	APPC Network Settings	This property is disabled in the Microsoft OLE DB Provider for DB2 v4.0. It is enabled with the version of the provider that is used with Host Integration Server 2010.
APPC Remote LU Alias	All	APPC Network Settings	This property is disabled in the Microsoft OLE DB Provider for DB2 v4.0. It is enabled with the version of the provider that is used with Host Integration Server 2010.
APPC Security Type	All	APPC Network Settings	This property is disabled in the Microsoft OLE DB Provider for DB2 v4.0. It is enabled with the version of the provider that is used with Host Integration Server 2010.
Authentication	Security	All	Sets the authentication method for the connection. The default value is Server, which is authentication based on a username and password with no encryption. Server_Encrypt_Pwd instructs the Data Provider to encrypt the password only. Server_Encrypt_UsrPwd instructs the Data Provider to encrypt both the username and password. Data_Encrypt instructs the Data Provider to encrypt the username, password, and data.
Auto Commit	All	All (AutoCommit)	Optionally, you can instruct the Data Provider to not execute an implicit COMMIT on all SQL statements by specifying FALSE. By default, this Boolean property is set to TRUE. The AutoCommit mode can reduce the network flow and may improve overall performance. AutoCommit mode is appropriate for most common transactions that consist of a single SQL statement. However, this mode does not

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			allow for unit of work rollback. For more information, see http://support.microsoft.com/kb/218590.
Binary Code Page	All	All (Binary Codepage)	The Data Provider requires a binary codepage number when supporting process binary as character. By default, this value is set to 0 (no code page conversion). Specify a positive four-digit numeric value for the Host CCSID, which corresponds to a coded character code set identifier (CCSID) supported by SNA National Language Support (SNANLS) in Host Integration Server. For more information, see SNA Internationalization Programmer's Reference (http://go.microsoft.com/fwlink/?LinkID=181017).
Cache Authenticatio n	All	All	Optionally, you can specify TRUE to instruct the data consumer or service component to cache sensitive authentication information, such as password, in an internal cache. By default, this Boolean value is set to FALSE. Service components, such as OLE DB resource pooling, require this property to set to TRUE.
Certificate Common Name	TCP/IP Network Connection	TCP/IP Network Settings	Optionally, you can specify a server certificate common name to instruct the Data Provider to use Secure Sockets Layer (SSL) V3.0 or Transport Layer Security (TLS) V1.0 encryption. Using SSL or TLS will improve security by encrypting authentication credentials and data. By default, this value is set to empty string (no SSL or TLS).
Client Accounting	All	All	Optionally, you can specify a 200-byte string to instruct the Data Provider to submit client accounting information when connecting to the IBM DB2 database server. DB2 administrators can use this information for accounting, logging and troubleshooting

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			purposes. By default this value is an empty string (do not submit any data).
Client Application Name	All	All	Optionally, you can specify a 32-byte string to instruct the Data Provider to submit a client application name when connecting to the IBM DB2 database server. DB2 administrators can use this information for accounting, logging and troubleshooting purposes. By default this value is an empty string (do not submit any data).
Client User ID	All	All	Optionally, you can specify a 16-byte string to instruct the Data Provider to submit a client user identifier when connecting to the IBM DB2 database server. DB2 administrators can use this information for accounting, logging and troubleshooting purposes. By default this value is an empty string (do not submit any data).
Client Workstation Name	All	All	Optionally, specify an 18-byte string to instruct the Data Provider to submit a client workstation name when connecting to the IBM DB2 database server. DB2 administrators can use this information for accounting, logging and troubleshooting purposes. By default this value is an empty string (do not submit any data).
Connect Timeout	All	All	Optionally, you can specify a number of seconds, to instruct the Data Provider to wait to establish connections using client-side pooling. When all connections in a pool are in use and the timeout period expires, then the Data Provider will return an error to the data consumer ("connection not available"). The default is 15 seconds. There is no upper limit for the Connect Timeout property. Specify -1 to instruct the Data Provider to wait indefinitely for an open connection in the

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			client-side connection pool.
Connection Pooling	Advanced Options	All	Optionally, you can specify TRUE to instruct the Data Provider to use client-side connection pooling. The default is FALSE (no pooling).
Data Source	Saving Information	Connection	An optional parameter that can be used to describe the data source. There is no default value.
Database Name	DB2 Database	All	Optionally, you can specify an 8-byte string to instruct the Data Provider to utilize an IN DATABASE clause in SQL statements. DB2 administrators can divide DB2 for z/OS into multiple logical databases for each containing separate table spaces and index spaces. The default is an empty string.
DateTime As Char	All	All	Optional OLE DB data source initialization property that instructs the Data Provider to expose DB2 DATE, TIME, and TIMESTAMP columns as character columns using IdbSchemaRowsets::GetSchemas (DBSCHEMA_COLUMNS). This instructs the Data Provider to treat DB2 DATE, TIME, and TIMESTAMP column values as string literals. You must use the optional DateTime As Char connection option to enable Distributed Query Processor and other SQL Server consumers to select a DB2 default DATE value (0001-01-01) in a DATE or TIMESTAMP column. The default value for this Boolean property is false. You can set this property in the initialization string DateTime As Char=True or on the Data Links All tab. This property is exposed in the Data Source Wizard All Properties screen. ⚠️ **Warning** You cannot use both DateTime As Char=True and DateTime As

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			Date=True in the same connection. To use these two features, you must use separate connections.
DateTime As Date	All	All	Optional OLE DB data source initialization property that instructs the Data Provider to delete the time information in the value of the SQL Server datetime data value, passing only the date information to the IBM DB2 database. You must use the optional DateTime As Date connection option to allow the distributed query processor and other SQL Server consumers to write SQL Server datetime data values using INSERT and UPDATE statements, or to use SQL Server datetime data values in parameters using SELECT, INSERT, UPDATE, and DELETE statements. The default value is false. You can set this property in the initialization string DateTime As Date=True or on the Data Links All tab. This property is exposed in the Data Source Wizard All Properties screen. ⚠️ **Warning** You cannot use both DateTime As Char=True and DateTime As Date=True in the same connection. To use these two features, you must use separate connections.
DBMS Platform	Data Source (aka Data source platform)	Advanced	Optionally, you can instruct the Data Provider to connect the IBM DB2 database servers based on a relational database management systems platform designation. The Data Provider supports these string values: DB2/MVS, DB2/400, DB2/6000, and DB2/NT. The default is DB2/MVS.
Decimal As Numeric	All	All	Optional OLE DB data source initialization property that instructs the Data Provider to

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			map DB2 Decimal (OLE DB DBTYPE_DECIMAL) to DB2 Numeric (DBTYPE_NUMERIC). This option allows OLE DB consumers that support DBTYPE_NUMERIC but not DBTYPE_DECIMAL to read and write DB2 Decimal data. The default value is false. You can set this property in the initialization string Decimal As Numeric=True or on the Data Links All tab. This property is exposed in the Data Source Wizard All Properties screen.
Default Qualifier	DB2 Database	Connection	DB2 database objects are organized into logical groups called schemas. The schema name is used to identify SQL objects such as tables and views, using a two-part naming convention <SCHEMA>.<OBJECTNAME>. SQL Server consumers may issue SQL statements with one-part or unqualified object names. Optionally, you can specify a string to instruct the Data Provider to set an environment option for a default qualifier, with which to inform the DB2 server in which schema to locate database objects. The default is an empty string. ● DB2 for z/OS accepts a 128 byte string (schema is also known as a collection). ● DB2 for i5/OS accepts a 10 byte string (schema is also known as a collection or library). ● DB2 for LUW accepts a 30 byte string.
Default Schema	DB2 Database	Connection	DB2 database objects are organized into logical groups called schemas. The schema name is used to catalog SQL objects such as tables and views, employing a two-part naming convention <SCHEMA>.<OBJECTNAME>. At design time, to construct SQL such as SELECT

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			statements, SQL Server consumers can present to the user a list of all objects in the database catalog. Optionally, you can specify a string to instruct the Data Provider to restrict schema queries to a single database schema, which improves efficiency and performance. The default is an empty string. • DB2 for z/OS accepts a 128 byte string (schema is also known as a collection). • DB2 for i5/OS accepts a 10 byte string (schema is also known as a collection or library). • DB2 for LUW accepts a 30 byte string.
Defer Prepare	Advanced Options	All	Optionally, you can specify TRUE to instruct the Data Provider to optimize the processing of parameterized database commands. The default value is FALSE.. For the INSERT, UPDATE, and DELETE commands, the Data Provider can combine PREPARE, EXECUTE, and COMMIT commands into one network flow to the remote database. For the SELECT command, the Data Provider combines PREPARE and EXECUTE commands into one network flow. This optimization minimizes network traffic and can improve overall performance.
Derive Parameters	Advanced Options	All	The Data Provider will verify and correct parameter lengths for character data types, on behalf of data consumers such as SQL Server Integration Services package designer and import/export wizard. Optionally, you can specify FALSE to instruct the Data Provider to not derive parameter data types. The default is TRUE. This feature is not required when you are using SQL Server Replication Services or other SQL Server consumers.
Extended Properties	All	All	Optionally, you can specify additional comma-separated property value pairs that

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			the consumer will pass to the Data Provider at connection time.
Host CCSID	LocaleAdvanced		The Data Provider requires a value for Host CCSID (Coded Character Set Identifier) with which to perform code page conversions on string data. The default Host CCSID value is EBCDIC – U.S./Canada [37]. Typically, IBM DB2 database servers for z/OS and i5/OS utilize EBCDIC (Extended Binary Coded Decimal Interchange Code). For more information, see SNA Internationalization Programmer's Reference (http://go.microsoft.com/fwlink/?LinkID=181017).
Initial Catalog	DB2 Database	Connection	The Data Provider requires this value to connect to an initial catalog on the DB2 database server.DB2 for z/OS accepts a 16 byte string (catalog is also known as a location). DB2 for i5/OS accepts an 18 byte string (catalog is also known as a relational database). DB2 for LUW accepts an 8 byte string (catalog is also known as a database).
Integrated Security	Security (aka Single sign-on)	Connection (aka Single sign-on)	Optionally, you can specify a string to instruct the Data Provider to use Enterprise Single Sign-On or Kerberos authentication. When using ESSO, you need to specify a concurrent string value for the separate Affiliate Application property. When using Kerberos, you need to specify a concurrent string value for Principle Name. The default is an empty string, which instructs the Data Provider to use interactive sign-on with user name and password derived from the connection object.
LoadBalancin	All	All	Instructs the Data Provider to utilize the server list returned by a DB2 for z/OS

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
g			database server, to re-connect to the most available server in a data sharing group, in support of client transaction load balancing and fault tolerant failover. The default value for this property is FALSE.
Max Pool	All	All	Optional OLE DB data source initialization property that specifies the maximum number of connections that can exist in the connection pool when connection pooling is enabled for the data source. The default is 100. There is no upper limit for the Max Pool Size property. If you configure a value that is less than 0 for the Max Pool Size property, the default value of 100 is used.
Mode	(aka Read only)	All	Optionally, you can specify read to instruct the Data Provider to declare read-only access method when connecting to the DB2 database server. The default is read/write.
Network Address	TCP/IP Network Connection	TCP/IP Network Settings	The Data Provider requires an IP address or IP alias in either IPv4 or IPv6 format, when connecting to the IBM DB2 database server using a TCP/IP network connection.
Network Port	TCP/IP Network Connection	TCP/IP Network Settings	The Data Provider requires an IP port number, when connecting to the IBM DB2 database server using a TCP/IP network connection. For DB2/400, the default value is TCP/IP port 446. Other IBM DB2 platforms support multiple concurrent database instances, each with a unique TCP/IP port number.
Network Transport Library	Data Source	Connection	The Data Provider supports TCP/IP network connections to remote IBM DB2 database servers. The SNA LU6.2 (APPC) network connection option is disabled in the Microsoft OLE DB Provider for DB2 v4.0. It is enabled with the version of the provider that is used with Host Integration Server.

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
New Password	Security	All	Optionally, you can specify a string value to instruct the Data Provider to use PCM (Password Change Management) to replace an existing password with a new password. The following table describes the DB2 database version and accepted string types.
Package Collection	DB2 Database	Connection	The package collection is required to instruct the Data Provider into which DB2 schema to create a set of packages. Each package is divided into sections with static SQL statements, such as CREATE CURSOR, used to retrieve data when querying the database.
Password	Security	Connection	Interactive sign-on security relies on a username and password that you enter at runtime or that is stored in a configuration file or data consumer configuration store, such as an Integration Services package.
	PC Code Page	LocaleAdvanced	The Data Provider requires a value for PC Code Page with which to perform code page conversions on string data. The default PC code page is ANSI – Latin I [1252]. Typically, data consumers use either ANSI (American National Standards Institute) or Unicode. For more information, see [SNA Internationalization Programmer's Reference](http://go.microsoft.com/fwlink/?LinkID=181017) (http://go.microsoft.com/fwlink/?LinkID=181017).
Persist Security Info	Security	Connection	Optionally, you can specify TRUE to instruct the data consumer or service component to persist security information, such as password, together with other authentication information. By default, this Boolean value is set to FALSE. Choosing this option saves the user name and password in plain text. It is not possible to encrypt the user name or password using

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			this method. Server security can be compromised if an attacker can gain access to the file share on which the UDL or text file is located.
Principle Name	Security	Connection	This property is required for use with Kerberos authentication.
Process Binary As Character	Locale	Advanced	The optional Process binary (CCSID 65535) as character instructs the Data Provider to convert DB2 bytes to and from Windows character strings, based on an optional Binary Code Page.
Read Only	Advanced Options	Advanced	Optionally, you can specify read to instruct the Data Provider to declare read-only access method when connecting to the DB2 database server. The default is FALSE.
Rowset Cache Size	All	All	Optional OLE DB data source initialization property that instructs the Data Provider to pre-fetch rows from DB2 while concurrently processing and returning rows to the data consumer on calls to IRowset::GetNextRows. This feature may improve performance in bulk read-only operations on multiprocessor computers. The default value for this property is 0, which indicates that the optional pre-fetch feature is off. We recommend setting a value between 50 and 200, with an initial recommended value of 100. This instructs the Data Provider to pre-fetch up to the specified number of row batches, which are stored in the Data Provider's rowset cache. The size of the row batches is automatically determined based on the value for cRows on the OLE DB IRowset::GetNextRows interface specified by the consumer. You can set this property from the Advanced Options page of the Data Source Wizard, or from the All tab of the Data Links dialog box.

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			You can also specify this property in an OLE DB initialization string or connection string by setting Rowset Cache Size=100.
Security Method	Security	Connection	The Security method property enables you to configure one of three security methods: Interactive sign-on, Single sign-on, or Kerberos.
Shadow Catalog	All	All	Optionally, you can specify TRUE to instruct the Data Provider to retrieve schema information from a DB2 shadow catalog, which can improve concurrent access to metadata and increase performance. The default is FALSE.
Shadow Catalog	All	All	Optionally, you can specify TRUE to instruct the Data Provider to retrieve schema information from a DB2 shadow catalog, which can improve concurrent access to metadata and increase performance. The default is FALSE.
Units of Work	(Distributed transactions)	Advanced	The Microsoft OLE DB Provider for DB2 v4.0 supports a value of RUW, defined as Remote Unit of Work. The Data Provider that is used with Host Integration Server supports both RUW and DUW, which is defined as two-phase commit protected Distributed Unit of Work.
Use Early Metadata	All	All	Optionally, you can specify TRUE to instruct the Data Provider to use early metadata to data consumers, when supporting user-defined data types. May be used with SQL Server Distributed Query Processor and linked server queries that contain binary large object (BLOB), character large object (CLOB), or user-defined data types.
User ID	Security	Connection	Interactive sign-on security relies on a username and password that the user enters at runtime or that is stored in a configuration

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			file or data consumer configuration store, such as an Integration Services package.

Data Access Library

You can use the .NET Framework classes in the **Microsoft.HostIntegration.DataAccessLibrary** Namespace to automate defining packages and data sources. For the reference documentation, see Microsoft.HostIntegration.DataAccessLibrary Namespace (http://go.microsoft.com/fwlink/?LinkID=180763).

Data Link Tool

To access information in DB2 servers using the Data Provider, you must first configure connection information in the form of a data source definition. The Data Link Tool can save a data source definition as an OLE DB universal data link (UDL) file. The data source definition is used by SQL Server data consumer programs, such as SQL Server Integration Services, to connect to a target DB2 server at runtime. This section represents an update to the content published on MSDN for Host Integration Server 2010, and contains new information relevant to DB2. It contains the following sub-sections.

Creating a Data Link

You can use the Microsoft Data Link tool to create a data source definition, which can then be saved in the form of a universal data link (UDL) file. You can also use the Data Source Wizard in the Microsoft Data Access Tool to create a UDL file. You can also create a new data link by clicking the Data Access Tool shortcut in the Microsoft OLE DB Provider for DB2 program folder. You can then modify the UDL using the Data Links tool by opening the file from Windows Explorer, which loads the standard OLE DB Data Links user interface. To start the Data Access tool, click the Data Access Tool shortcut in the Microsoft OLE DB Provider for DB2 program folder or click **Start**, **Programs**, **Microsoft OLE DB Provider for DB2** and then click **Data Access Tool**.

Provider

Use the **Provider** tab to select the **Microsoft OLE DB Provider for DB2** (the provider name string) from a list of possible OLE DB providers.

Connection

Use the Connection tab to configure the basic properties required to connect to a data source. This section describes the properties that are specific to Microsoft OLE DB Provider for DB2 v4.0 connections.

Data Source

Specify a string to describe the data source. When you create a data link file using the Data Source Wizard, the Data Source property names the Universal Data Link (UDL) file or connection string file.

Network

You must select **TCP/IP Connection** from the drop-down list. The Microsoft OLE DB Provider for DB2 v4.0 does not support an LU6.2 APPC connection.Once you select TCP/IP Connection, click the ellipsis (…) to open the dialog box for configuring TCP/IP network settings.

TCP/IP Network Settings

The Data Provider requires an **IP address** or IP alias in either IPv4 or IPv6 format, when you connect to the IBM DB2 database server by using a TCP/IP network connection.The Data Provider requires an IP **network port number**, when you connect to the IBM DB2 database server by using a TCP/IP network connection. For DB2/400, the default value is TCP/IP port 446. Other IBM DB2 platforms support multiple concurrent database instances, each with a unique TCP/IP port number.

When you use Secure Sockets Layer (SSL) or Transport Layer Security (TLS) encryption, you must enter a value for **certificate common name**.

Security

The **Security method** property enables you to configure one of three security methods: Interactive sign-on, Single sign-on, or Kerberos. The configuration controls in the **Security** options group change depending on which **Security method** option that you select.

Security method - Interactive sign-on

Data Provider relies on a username and password stored in a configuration file or data consumer configuration store. For example, a Universal Data Link (UDL) file is a configuration file.

User name

- DB2 for z/OS accepts an 8 byte string.
- DB2 for i5/OS accepts a 128 byte string.
- DB2 for Linux or UNIX accepts an 8 byte string.
- DB2 for Windows accepts a 30 byte string.

Password

- DB2 for z/OS accepts an 8 byte string.
- DB2 for i5/OS accepts a 128 byte string.
- DB2 for Linux or UNIX accepts an 8 byte string.
- DB2 for Windows accepts a 32 byte string.

    You can save the password in a UDL or text file by clicking the Allow saving password check box.

    ⚠ **Warning**

    Authentication information, such as user names and passwords, is saved in plain text in a UDL or text file. Encryption of UDL or text files is not supported.

Security method - Single sign-on

Data Provider relies on a username and password stored in an encrypted Enterprise Single Sign-On database.

Affiliate application

Data Provider requires a string value for Affiliate Application, when supporting the optional Enterprise Single Sign-On (SSO) security mechanism. Affiliate applications are logical entities that represent a system or sub-system such as a host, back-end system, or IBM DB2 database server. Contact your SSO administrator for the SSO Affiliate Application name. For more information, see Understanding Enterprise Single Sign-On (http://msdn.microsoft.com/en-US/library/aa754070(v=BTS.10).aspx).

Security method - Kerberos

Data Provider relies on a ticket that contains encrypted credentials.

Principal name

Required for use with Kerberos authentication.

Database

Initial catalog

The Data Provider uses this value to connect to an initial catalog on the DB2 database server.

- DB2 for z/OS accepts a 16 byte string (catalog is also known as a location).
- DB2 for i5/OS accepts an 18 byte string (catalog is also known as a relational database).
- DB2 for LUW accepts an 8 byte string (catalog is also known as a database).

Package collection

The Data Provider requires this value to create packages with static SQL statements (example: CREATE CURSOR), that are used to retrieve data when querying the database.

- DB2 for z/OS accepts a 128 byte string (schema is also known as a collection).
- DB2 for i5/OS accepts a 10 byte string (schema is also known as a collection or library).
- DB2 for LUW accepts a 30 byte string.

The Data Provider creates packages using one of the following options.

- Automatic for single-user environment. At runtime, the Data Provider creates and binds a single package for the current isolation level (the default is cursor stability). The Data Provider grants execute permissions to the current user.
- Manual for multi-user environment. At design-time when you use the Data Access Tool menu option, Data Source Wizard, Data Access Library or Data Links, the Data Provider creates and binds a set of 4 packages (5 packages for DB2 for i5/OS). The Data Provider grants execute permissions to the PUBLIC group.

The Data Provider creates 4-5 packages, depending on database server platform and environment. The following table describes the packages and isolation levels.

Microsoft Package Name	DB2 Isolation Level Name	OLE DB Isolation Level Name
MSNC001	NO COMMIT	N/A (DB2 for i5/OS only)
MSUR001	UNCOMMITTED READ	ISOLATIONLEVEL_READUNCOMMITTED
MSCS001	CURSOR STABILITY	ISOLATIONLEVEL_READCOMMITTED
MSRS001	READ STABILITY	ISOLATIONLEVEL_REPEATABLEREAD
MSRR001	REPEATABLE READ	ISOLATIONLEVEL_SERIALIZABLE

Default schema

DB2 database objects are organized into logical groups called schemas. The schema name is used to catalog SQL objects such as tables and views, using a two-part naming convention <SCHEMA>.<OBJECTNAME>. At design time, to construct SQL such as SELECT statements, SQL Server consumers can present to the user a list of all objects in the database catalog. Optionally, you can specify a string to instruct the Data Provider to restrict schema queries to a single database schema, which improves efficiency and performance. The default is an empty string.

- DB2 for z/OS accepts a 128 byte string (schema is also known as a collection).
- DB2 for i5/OS accepts a 10 byte string (schema is also known as a collection or library).
- DB2 for LUW accepts a 30 byte string.

Connection Actions

The Connection tab includes three buttons:

- The **Browse** button opens an existing UDL file.
- The **Packages** button instructs the Data Provider to create packages on the DB2 database server.
- The **Test** connection button instructs the Data Provider to connect to the remote IBM DB2 database server by using the defined network connection.

Advanced Options

This section describes the properties that you can configure in the Advanced tab.

DBMS Platform

Optionally, to increase performance and reduce impact to the remote database, select the data source platform on which the remote DB2 database is deployed. The Data Provider uses this value to convert data types to a format supported by this platform.

The default value is DB2/MVS (which refers to DB2 for z/OS). Other values include DB2/400 (which refers to DB2 for i5/OS), DB2/NT (which refers to DB2 for Windows), and DB2/6000 (which refers to DB2 for Linux or UNIX).

Default Qualifier

DB2 database objects are organized into logical groups called schemas. The schema name is used to identify SQL objects such as tables and views, using a two-part naming convention <SCHEMA>.<OBJECTNAME>. SQL Server consumers may issue SQL statements with one-part or unqualified object names. Optionally, you can specify a string to instruct the Data Provider to

set an environment option for a default qualifier, with which to inform the DB2 server in which schema to locate database objects. The default is an empty string.

- DB2 for z/OS accepts a 128 byte string (schema is also known as a collection).
- DB2 for i5/OS accepts a 10 byte string (schema is also known as a collection or library).
- DB2 for LUW accepts a 30 byte string.

Host CCSID

The Data Provider requires a value for Host CCSID (Coded Character Set Identifier) with which to perform code page conversions on string data. The default Host CCSID value is EBCDIC – U.S./Canada [37]. Typically, IBM DB2 database servers for z/OS and i5/OS utilize EBCDIC (Extended Binary Coded Decimal Interchange Code).For more information, see SNA Internationalization Programmer's Reference (http://go.microsoft.com/fwlink/?LinkID=181017).

PC Code Page

The Data Provider requires a value for PC Code Page with which to perform code page conversions on string data. The default PC code page is ANSI – Latin I [1252]. Typically, data consumers use either ANSI (American National Standards Institute) or Unicode. For more information, see SNA Internationalization Programmer's Reference (http://go.microsoft.com/fwlink/?LinkID=181017).

Process Binary as Character

The optional Process binary (CCSID 65535) as character instructs the Data Provider to convert DB2 bytes to and from Windows character strings, based on an optional Binary Code Page.

The default is false.

Distributed transactions

This property is disabled in the Microsoft OLE DB Provider for DB2 v4.0. It is enabled with the version of the provider that is used with Host Integration Server 2010.

All Properties

The All Properties dialog lets you configure more detailed and optional properties. These properties may be edited by selecting a property from the list, and then selecting or editing the value in the right column. You can edit the following properties from this dialog.

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
Affiliate Application	Security	Connection	This property instructs the Data Provider to retrieve credentials from an Enterprise Single Sign-On database.
Alternate TP Name	All	All	This property is disabled in the Microsoft OLE DB Provider for DB2 v4.0. It is enabled with the version of the provider that is used with Host Integration Server 2010.
APPC Local LU Alias	All	APPC Network Settings	This property is disabled in the Microsoft OLE DB Provider for DB2 v4.0. It is enabled with the version of the provider that is used with Host Integration Server 2010.
APPC Mode Name	All	APPC Network Settings	This property is disabled in the Microsoft OLE DB Provider for DB2 v4.0. It is enabled with the version of the provider that is used with Host Integration Server 2010.
APPC Remote LU Alias	All	APPC Network Settings	This property is disabled in the Microsoft OLE DB Provider for DB2 v4.0. It is enabled with the version of the provider that is used with Host Integration Server 2010.
APPC Security Type	All	APPC Network Settings	This property is disabled in the Microsoft OLE DB Provider for DB2 v4.0. It is enabled with the version of the provider that is used with Host Integration Server 2010.
Authentication	Security	All	Sets the authentication method for the connection. The default value is Server, which is authentication based on a username and password with no encryption. Server_Encrypt_Pwd instructs the Data Provider to encrypt the password only. Server_Encrypt_UsrPwd instructs the Data Provider to encrypt both the username and password. Data_Encrypt instructs the Data Provider to encrypt the username, password, and data.
Auto Commit	All	All (AutoCommit)	Optionally, you can instruct the Data Provider to execute an implicit COMMIT on all SQL

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			statements by specifying TRUE. By default, this Boolean property is set to FALSE. The AutoCommit mode can reduce the network flow and may improve overall performance. AutoCommit mode is appropriate for most common transactions that consist of a single SQL statement. However, this mode does not allow for unit of work rollback. For more information, see http://support.microsoft.com/kb/218590.
Binary Code Page	All	All (Binary Codepage)	The Data Provider requires a binary codepage number when supporting process binary as character. By default, this value is set to 0 (no code page conversion). Specify a positive four-digit numeric value for the Host CCSID, which corresponds to a coded character code set identifier (CCSID) supported by SNA National Language Support (SNANLS) in Host Integration Server. For more information, see SNA Internationalization Programmer's Reference (http://go.microsoft.com/fwlink/?LinkID=181017).
Cache Authenticatio n	All	All	Optionally, you can specify TRUE to instruct the data consumer or service component to cache sensitive authentication information, such as password, in an internal cache. By default, this Boolean value is set to FALSE. Service components, such as OLE DB resource pooling, require this property to set to TRUE.
Certificate Common Name	TCP/IP Network Connection	TCP/IP Network Settings	Optionally, you can specify a server certificate common name to instruct the Data Provider to use Secure Sockets Layer (SSL) V3.0 or Transport Layer Security (TLS) V1.0 encryption. Using SSL or TLS will improve security by encrypting authentication credentials and data. By default, this value is

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			set to empty string (no SSL or TLS).
Client Accounting	All	All	Optionally, you can specify a 200-byte string to instruct the Data Provider to submit client accounting information when connecting to the IBM DB2 database server. DB2 administrators can use this information for accounting, logging and troubleshooting purposes. By default this value is an empty string (do not submit any data).
Client Application Name	All	All	Optionally, you can specify a 32-byte string to instruct the Data Provider to submit a client application name when connecting to the IBM DB2 database server. DB2 administrators can use this information for accounting, logging and troubleshooting purposes. By default this value is an empty string (do not submit any data).
Client User ID	All	All	Optionally, you can specify a 16-byte string to instruct the Data Provider to submit a client user identifier when connecting to the IBM DB2 database server. DB2 administrators can use this information for accounting, logging and troubleshooting purposes. By default this value is an empty string (do not submit any data).
Client Workstation Name	All	All	Optionally, specify an 18-byte string to instruct the Data Provider to submit a client workstation name when connecting to the IBM DB2 database server. DB2 administrators can use this information for accounting, logging and troubleshooting purposes. By default this value is an empty string (do not submit any data).
Connect Timeout	All	All	Optionally, you can specify a number of seconds, to instruct the Data Provider to wait to establish connections using client-side pooling. When all connections in a pool are in

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			use and the timeout period expires, then the Data Provider will return an error to the data consumer ("connection not available"). The default is 15 seconds. There is no upper limit for the Connect Timeout property. Specify -1 to instruct the Data Provider to wait indefinitely for an open connection in the client-side connection pool.
Connection Pooling	Advanced Options	All	Optionally, you can specify TRUE to instruct the Data Provider to use client-side connection pooling. The default is FALSE (no pooling).
Data Source	Saving Information	Connection	An optional parameter that can be used to describe the data source. There is no default value.
Database Name	DB2 Database	All	Optionally, you can specify an 8-byte string to instruct the Data Provider to utilize an IN DATABASE clause in SQL statements. DB2 administrators can divide DB2 for z/OS into multiple logical databases for each containing separate table spaces and index spaces. The default is an empty string.
DateTime As Char	All	All	Optional OLE DB data source initialization property that instructs the Data Provider to expose DB2 DATE, TIME, and TIMESTAMP columns as character columns using IdbSchemaRowsets::GetSchemas (DBSCHEMA_COLUMNS). This instructs the Data Provider to treat DB2 DATE, TIME, and TIMESTAMP column values as string literals. You must use the optional DateTime As Char connection option to enable Distributed Query Processor and other SQL Server consumers to select a DB2 default DATE value (0001-01-01) in a DATE or TIMESTAMP column. The default value for this Boolean property is false. You can set this property in the initialization string DateTime As Char=True or

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			on the Data Links All tab. This property is exposed in the Data Source Wizard All Properties screen. ⚠️ **Warning** You cannot use both DateTime As Char=True and DateTime As Date=True in the same connection. To use these two features, you must use separate connections.
DateTime As Date	All	All	Optional OLE DB data source initialization property that instructs the Data Provider to delete the time information in the value of the SQL Server datetime data value, passing only the date information to the IBM DB2 database. You must use the optional DateTime As Date connection option to allow the distributed query processor and other SQL Server consumers to write SQL Server datetime data values using INSERT and UPDATE statements, or to use SQL Server datetime data values in parameters using SELECT, INSERT, UPDATE, and DELETE statements. The default value is false. You can set this property in the initialization string DateTime As Date=True or on the Data Links All tab. This property is exposed in the Data Source Wizard All Properties screen. ⚠️ **Warning** You cannot use both DateTime As Char=True and DateTime As Date=True in the same connection. To use these two features, you must use separate connections.
DBMS Platform	Data Source (aka Data source	Advanced	Optionally, you can instruct the Data Provider to connect the IBM DB2 database servers based on a relational database management

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
platform)			systems platform designation. The Data Provider supports these string values: DB2/MVS, DB2/400, DB2/6000, and DB2/NT. The default is DB2/MVS.
Decimal As Numeric	All	All	Optional OLE DB data source initialization property that instructs the Data Provider to map DB2 Decimal (OLE DB DBTYPE_DECIMAL) to DB2 Numeric (DBTYPE_NUMERIC). This option allows OLE DB consumers that support DBTYPE_NUMERIC but not DBTYPE_DECIMAL to read and write DB2 Decimal data. The default value is false. You can set this property in the initialization string Decimal As Numeric=True or on the Data Links All tab. This property is exposed in the Data Source Wizard All Properties screen.
Default Qualifier	DB2 Database	Connection	DB2 database objects are organized into logical groups called schemas. The schema name is used to identify SQL objects such as tables and views, using a two-part naming convention <SCHEMA>.<OBJECTNAME>. SQL Server consumers may issue SQL statements with one-part or unqualified object names. Optionally, you can specify a string to instruct the Data Provider to set an environment option for a default qualifier, with which to inform the DB2 server in which schema to locate database objects. The default is an empty string. ● DB2 for z/OS accepts a 128 byte string (schema is also known as a collection). ● DB2 for i5/OS accepts a 10 byte string (schema is also known as a collection or library). ● DB2 for LUW accepts a 30 byte string.
Default	DB2 Database	Connection	DB2 database objects are organized into

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
Schema			logical groups called schemas. The schema name is used to catalog SQL objects such as tables and views, employing a two-part naming convention <SCHEMA>.<OBJECTNAME>. At design time, to construct SQL such as SELECT statements, SQL Server consumers can present to the user a list of all objects in the database catalog. Optionally, you can specify a string to instruct the Data Provider to restrict schema queries to a single database schema, which improves efficiency and performance. The default is an empty string. ● DB2 for z/OS accepts a 128 byte string (schema is also known as a collection). ● DB2 for i5/OS accepts a 10 byte string (schema is also known as a collection or library). ● DB2 for LUW accepts a 30 byte string.
Defer Prepare	Advanced Options	All	Optionally, you can specify TRUE to instruct the Data Provider to optimize the processing of parameterized database commands. The default value is FALSE.. For the INSERT, UPDATE, and DELETE commands, the Data Provider can combine PREPARE, EXECUTE, and COMMIT commands into one network flow to the remote database. For the SELECT command, the Data Provider combines PREPARE and EXECUTE commands into one network flow. This optimization minimizes network traffic and can improve overall performance.
Derive Parameters	Advanced Options	All	The Data Provider will verify and correct parameter lengths for character data types, on behalf of data consumers such as SQL Server Integration Services package designer and import/export wizard. Optionally, you can specify FALSE to instruct the Data Provider

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			to not derive parameter data types. The default is TRUE. This feature is not required when you are using SQL Server Replication Services or other SQL Server consumers.
Extended Properties	All	All	Optionally, you can specify additional comma-separated property value pairs that the consumer will pass to the Data Provider at connection time.
Host CCSID	LocaleAdvanced		The Data Provider requires a value for Host CCSID (Coded Character Set Identifier) with which to perform code page conversions on string data. The default Host CCSID value is EBCDIC – U.S./Canada [37]. Typically, IBM DB2 database servers for z/OS and i5/OS utilize EBCDIC (Extended Binary Coded Decimal Interchange Code). For more information, see SNA Internationalization Programmer's Reference (http://go.microsoft.com/fwlink/?LinkID=181017).
Initial Catalog	DB2 Database	Connection	The Data Provider requires this value to connect to an initial catalog on the DB2 database server.DB2 for z/OS accepts a 16 byte string (catalog is also known as a location). DB2 for i5/OS accepts an 18 byte string (catalog is also known as a relational database). DB2 for LUW accepts an 8 byte string (catalog is also known as a database).
Integrated Security	Security (aka Single sign-on)	Connection (aka Single sign-on)	Optionally, you can specify SSPI to instruct the Data Provider to use Enterprise Single Sign-On or Kerberos authentication. When using ESSO, you need to specify a concurrent string value for the separate Affiliate Application property. When using Kerberos, you need to specify a concurrent

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			string value for Principle Name.
LoadBalancing	All	All	Instructs the Data Provider to utilize the server list returned by a DB2 for z/OS database server, to re-connect to the most available server in a data sharing group, in support of client transaction load balancing and fault tolerant failover. The default value for this property is FALSE.
Max Pool	All	All	Optional OLE DB data source initialization property that specifies the maximum number of connections that can exist in the connection pool when connection pooling is enabled for the data source. The default is 100. There is no upper limit for the Max Pool Size property. If you configure a value that is less than 0 for the Max Pool Size property, the default value of 100 is used.
Mode	(aka Read only)	All	Optionally, you can specify read to instruct the Data Provider to declare read-only access method when connecting to the DB2 database server. The default is read/write.
Network Address	TCP/IP Network Connection	TCP/IP Network Settings	The Data Provider requires an IP address or IP alias in either IPv4 or IPv6 format, when connecting to the IBM DB2 database server using a TCP/IP network connection.
Network Port	TCP/IP Network Connection	TCP/IP Network Settings	The Data Provider requires an IP port number, when connecting to the IBM DB2 database server using a TCP/IP network connection. For DB2/400, the default value is TCP/IP port 446. Other IBM DB2 platforms support multiple concurrent database instances, each with a unique TCP/IP port number.
Network Transport Library	Data Source	Connection	The Data Provider supports TCP/IP network connections to remote IBM DB2 database servers. The SNA LU6.2 (APPC) network connection option is disabled in the Microsoft

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			OLE DB Provider for DB2 v4.0. It is enabled with the version of the provider that is used with Host Integration Server.
New Password	Security	All	Optionally, you can specify a string value to instruct the Data Provider to use PCM (Password Change Management) to replace an existing password with a new password. The following table describes the DB2 database version and accepted string types.
Package Collection	DB2 Database	Connection	The package collection is required to instruct the Data Provider into which DB2 schema to create a set of packages. Each package is divided into sections with static SQL statements, such as CREATE CURSOR, used to retrieve data when querying the database.
Password	Security	Connection	Interactive sign-on security relies on a username and password that you enter at runtime or that is stored in a configuration file or data consumer configuration store, such as an Integration Services package.
	PC Code Page	LocaleAdvanced	The Data Provider requires a value for PC Code Page with which to perform code page conversions on string data. The default PC code page is ANSI – Latin I [1252]. Typically, data consumers use either ANSI (American National Standards Institute) or Unicode. For more information, see [SNA Internationalization Programmer's Reference](http://go.microsoft.com/fwlink/?LinkID=181017) (http://go.microsoft.com/fwlink/?LinkID=181017).
Persist Security Info	Security	Connection	Optionally, you can specify TRUE to instruct the data consumer or service component to persist security information, such as password, together with other authentication information. By default, this Boolean value is set to FALSE.

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			Choosing this option saves the user name and password in plain text. It is not possible to encrypt the user name or password using this method. Server security can be compromised if an attacker can gain access to the file share on which the UDL or text file is located.
Principal Name	Security	Connection	This property is required for use with Kerberos authentication.
Process Binary As Character	Locale	Advanced	The optional Process binary (CCSID 65535) as character instructs the Data Provider to convert DB2 bytes to and from Windows character strings, based on an optional Binary Code Page.
Read Only	Advanced Options	Advanced	Optionally, you can specify read to instruct the Data Provider to declare read-only access method when connecting to the DB2 database server. The default is FALSE.
Rowset Cache Size	All	All	Optional OLE DB data source initialization property that instructs the Data Provider to pre-fetch rows from DB2 while concurrently processing and returning rows to the data consumer on calls to IRowset::GetNextRows. This feature may improve performance in bulk read-only operations on multiprocessor computers. The default value for this property is 0, which indicates that the optional pre-fetch feature is off. We recommend setting a value between 50 and 200, with an initial recommended value of 100. This instructs the Data Provider to pre-fetch up to the specified number of row batches, which are stored in the Data Provider's rowset cache. The size of the row batches is automatically determined based on the value for cRows on the OLE DB IRowset::GetNextRows interface specified by the consumer.

Data Source Wizard property name	Data Source Wizard dialog(s)	Data Links dialog(s)	Description
			You can set this property from the Advanced Options page of the Data Source Wizard, or from the All tab of the Data Links dialog box. You can also specify this property in an OLE DB initialization string or connection string by setting Rowset Cache Size=100.
Security Method	Security	Connection	The Security method property enables you to configure one of three security methods: Interactive sign-on, Single sign-on, or Kerberos.
Shadow Catalog	All	All	Optionally, you can specify TRUE to instruct the Data Provider to retrieve schema information from a DB2 shadow catalog, which can improve concurrent access to metadata and increase performance. The default is FALSE.
Units of WorkTCP/IP Network Connection	(Distributed transactions)	Advanced	The Microsoft OLE DB Provider for DB2 v4.0 supports a value of RUW, defined as Remote Unit of Work. The Data Provider that is used with Host Integration Server supports both RUW and DUW, which is defined as two-phase commit protected Distributed Unit of Work.
Use Early Metadata	All	All	Optionally, you can specify TRUE to instruct the Data Provider to use early metadata to data consumers, when supporting user-defined data types. May be used with SQL Server Distributed Query Processor and linked server queries that contain binary large object (BLOB), character large object (CLOB), or user-defined data types.
User ID	Security	Connection	Interactive sign-on security relies on a username and password that the user enters at runtime or that is stored in a configuration file or data consumer configuration store, such as an Integration Services package.

Operations

This section details code page conversions, data type mapping, and performance of the data provider.

In This Section

- Code Page Conversions
- Data Type Mapping
- Performance

Code Page Conversions

The Data Provider supports a combination of single byte character sets (SBCS), mixed-byte character sets (MBCS) double-byte character sets (DBCS), and Unicode - UTF8 [1208], which is an 8-bit Unicode transformation format. For more information, see SNA Internationalization Programmer's Reference (http://go.microsoft.com/fwlink/?LinkID=181017).

Host CCSID

The Data Provider requires a value for Host CCSID (Coded Character Set Identifier) with which to perform code page conversions on string data. The default Host CCSID value is EBCDIC – U.S./Canada [37]. Typically, IBM DB2 database servers for z/OS and i5/OS utilize EBCDIC

(Extended Binary Coded Decimal Interchange Code). For more information, see SNA Internationalization Programmer's Reference (http://go.microsoft.com/fwlink/?LinkID=181017).

PC Code Page

The Data Provider requires a value for PC Code Page with which to perform code page conversions on string data. The default PC code page is ANSI – Latin I [1252]. Typically, data consumers use either ANSI (American National Standards Institute) or Unicode. For more information, see SNA Internationalization Programmer's Reference (http://go.microsoft.com/fwlink/?LinkID=181017).

Process Binary as Character

The optional Process binary (CCSID 65535) as character instructs the Data Provider to convert DB2 bytes to and from Windows character strings, based on an optional Binary Code Page property that is configured in the Data Source Wizard All Properties dialog. The default is false.

Binary Code Page

The Data Provider requires a binary code page number when supporting process binary as character. By default, this value is set to 0 (no code page conversion). Specify a positive four-digit numeric value for the Host CCSID, which corresponds to a coded character code set identifier (CCSID) supported by SNA National Language Support (SNANLS) in Host Integration Server. For more information, see SNA Internationalization Programmer's Reference (http://go.microsoft.com/fwlink/?LinkID=181017).

Data Type Mapping

This topic describes all data type mappings to OLE DB data types.

DB2 to OLE DB Data Type Mapping

The following table describes DB2 data type mappings to OLE DB data types.

OLE DB data type	DB2 data type	Description
DBTYPE_I8	Bigint	A big integer (BIGINT) is an 8-byte binary integer.
DBTYPE_Bytes	BLOB	A binary large object (BLOB) is a varying-length string used to store non textual or binary data.

DBTYPE_Bytes	Char() for BIT Data	A character () for bit data is a fixed-length binary string containing character data.
DBTYPE_STR	Char	A character is a fixed-length SBCS or MBCS string.
DBTYPE_WSTR	Char	A Unicode character is a fixed-length MBCS string.
DBTYPE_STR	CLOB	A varying-length character large object (CLOB) is a varying-length string. The maximum length of the string depends on the DB2 platform and version.
DBTYPE_Data	Date	A date is a 10-byte string.
DBTYPE_Decimal	Decimal	A decimal is a packed decimal number.
DBTYPE_R8	Double	A double is an 8-byte double-precision floating point number.
DBTYPE_R8	Float	A float is an 8-byte double-precision floating point number.
DBTYPE_WSTR	Graphic	A graphic is a fixed-length DBCS only string.
DBTYPE_I4	Integer	An integer is a 4-byte binary integer.
DBTYPE_Numeric	Numeric	A numeric is a packed decimal number.
DBTYPE_I2	Smallint	A small integer (SMALLINT) is a two-byte binary integer.
DBTYPE_R4	Real	A real is a 4-byte single-precision floating point number.
DBTYPE_DBTime	Time	A time is an 8-byte time string.
DBTYPE_DBTimesStamp	TimesStamp	A timestamp is a 26-byte

		string representing the date, time, and microseconds.
DBTYPE_Bytes	Varchar() For BIT Data	A varying character () for bit data is a varying-length binary string containing character data.
DBTYPE_STR	Varchar	A varying character is a varying-length SBCS or MBCS character string.
DBTYPE_WSTR	Varchar	A varying character Unicode varchar is a varying-length Unicode string.
DBTYPE_WSTR	VarGraphic	A varying graphic is a varying-length DBCS only string.

Data Types by DB2 Platform

Schema information in OLE DB is retrieved using predefined schema rowsets with IDBSchemaRowset::GetRowset. The Data Provider exposed the PROVIDER_TYPES Rowset to indicate the DB2 to OLE DB data type support (types, mappings, limits), based on the IBM DB2 platform and version.

DB2 for z/OS V9R1

The Data Provider supports accessing these data types when connected to DB2 for z/OS (based on V9R1).

DB2 Type_name	OLE DB data_type	Column_size	Minimum_scale	Maximum_scale
Smallint	DBType_12	5		
Integer	DBType_14	10		
Bigint	DBType_18	19		
Real	DBType_R4	7		
Float	DBType_R8	15		
Double	DBType_ R8	15		

Decimal	DBType_ Decimal	31	0	31
Graphic	DBType_ WSTR	127		
VarGraphic	DBType_ WSTR	16336		
Char	DBType_STR	254		
Varchar	DBType_STR	32672		
Char	DBType_WSTR	254		
Varchar	DBType_ WSTR	32672		
Char() for BIT data	DBType_ Bytes	254		
Varchar() for BIT data	DBType_ Bytes	32672		
Numeric	DBType_Numeric	31	0	31
Date	DBType_ DBDate	10		
Time	DBType_DBTime	8		
TimeStamp	DBType_ TimesStamp	26		
BLOB	DBType_ Bytes	2147483647		
CLOB	DBType_STR	2147483647		

DB2 for i5/OS V6R1

The Data Provider supports accessing these data types when connected to DB2 for i5/OS (based on V6R1).

DB2 Type_name	OLE DB data_type	Column_size	Minimum_scale	Maximum_scale
Smallint	DBType_12	5		
Integer	DBType_14	10		
Bigint	DBType_18	19		
Real	DBType_R4	7		
Float	DBType_R8	15		
Double	DBType_ R8	15		

Decimal	DBType_ Decimal	31	0	31
Graphic	DBType_ WSTR	127		
VarGraphic	DBType_ WSTR	16336		
Char	DBType_STR	254		
Varchar	DBType_STR	32672		
Char	DBType_WSTR	254		
Varchar	DBType_ WSTR	32672		
Char() for BIT data	DBType_ Bytes	254		
Varchar() for BIT data	DBType_ Bytes	32672		
Numeric	DBType_Numeric	31	0	31
Date	DBType_ DBDate	10		
Time	DBType_DBTime	8		
TimeStamp	DBType_ TimesStamp	26		
BLOB	DBType_ Bytes	2147483647		
CLOB	DBType_STR	2147483647		

DB2 for LUW V9.7

The Data Provider supports accessing these data types when connected to DB2 for LUW (based on V9.7).

DB2 Type_name	OLE DB data_type	Column_size	Minimum_scale	Maximum_scale
Smallint	DBType_12	5		
Integer	DBType_14	10		
Bigint	DBType_18	19		
Real	DBType_R4	7		
Float	DBType_R8	15		
Double	DBType_ R8	15		

Decimal	DBType_ Decimal	31	0	31
Graphic	DBType_ WSTR	127		
VarGraphic	DBType_ WSTR	16336		
Char	DBType_STR	254		
Varchar	DBType_STR	32672		
Char	DBType_WSTR	254		
Varchar	DBType_ WSTR	32672		
Char() for BIT data	DBType_ Bytes	254		
Varchar() for BIT data	DBType_ Bytes	32672		
Numeric	DBType_Numeric	31	0	31
Date	DBType_ DBDate	10		
Time	DBType_DBTime	8		
TimeStamp	DBType_ TimesStamp	26		
BLOB	DBType_ Bytes	2147483647		
CLOB	DBType_STR	2147483647		

SQL Server Integration Services

When using the SQL Server Integration Services Import and Export Wizards from the Microsoft SQL Server Management Studio, you can customize the default data conversions by editing the XML mapping files. The XML files are located at ate C:\Program Files\Microsoft SQL Server\100\DTS\MappingFiles.

SQL Server Replication Services

SQL Server Replication may convert data incorrectly, based on the default mappings from SQL Server to DB2 data types. We recommend that the administrator and developer review and revise the Replication data type mappings using the following SQL Server system stored procedures.

- sp_helpdatatypemap
- sp_getdefaultdatatypemapping
- sp_setdefaultdatatypemapping

For more information, see the System Stored Procedures (Transact-SQL)
(http://go.microsoft.com/fwlink/?LinkId=241519) topic in SQL Server Books Online.

Performance

This topic will help you maximize performance when using Data Provider.

Configuring for Performance

To improve performance, configure the providers in the following ways.

Pool OLE DB resources to reduce connection startup time

OLE DB Resource Pooling and Provider Connection Pooling may increase performance by
reducing connection startup time. Resource Pooling is enabled through OLE DB Service
Components that are part of the Windows operating system. You can enable OLE DB Resource
Pooling by setting OLE DB initialization properties and registry settings. For more information,
see OLE DB Resource Pooling (http://go.microsoft.com/fwlink/?LinkID=180446).

Pool provider resources to reduce connection startup time

Connection Pooling is a client-side optimization that reduces connection startup time, while
reducing memory utilization on the client computer. The ADO.NET provider, OLE DB provider,
Entity provider, and BizTalk Adapter support connection pooling. You can specify pooling using
the ADO.NET connection string or OLE DB data source initialization string (**Connection
Pooling=True**). Also, you can configure pooling using the **Advanced** dialog of the Data Source
Wizard and **All** dialog of Data Links.

The provider maintains a cache of connections, based on a Max Pool Size property. The default
pool size is 100 connections (**Max Pool Size=100**), which you can adjust using the **All** dialog of
the Data Source Wizard or Data Links. There is no upper limit for the Max Pool Size property. If
you configure a value that is less than 0 for the Max Pool Size property, the default value of 100
is used. Optionally, you can specify a number of seconds, to instruct the data provider to wait to
establish connections using client-side pooling. When all connections in a pool are in use and the
timeout period expires, then the data provider will return an error to the data consumer
("connection not available"). The default is 15 seconds (**Connect Timeout=15**), which you can
adjust using the **All** dialog of the Data Source Wizard or Data Links. There is no upper limit for
the Connect Timeout property. Specify -1 to instruct the data provider to wait indefinitely for an
open connection in the client-side connection pool.

Optimize the rowset cache when getting data

The RowsetCacheSize property instructs the data provider to pre-fetch rows from DB2 while
concurrently processing and returning rows to the data consumer. This feature may improve

performance in bulk read-only operations on multi-processor or multi-core computers. The default value for this property is 0 (**RowsetCacheSize=0**), which indicates that the optional pre-fetch feature is "off". We recommend setting a value between 10 and 100, with an initial recommended value of 10, which you can adjust using the **All** dialog of the Data Source Wizard or Data Links. This property instructs the data provider to pre-fetch up to the specified number of row batches, which are stored in the data provider's rowset cache. The size of the row batches is automatically determined based on the value for cRows on the OLE DB IRowset::GetNextRows interface specified by the consumer.

Deferring preparing of commands with parameters until execution

Defer Prepare instructs the data provider to optimize the processing of parameterized INSERT, UPDATE, DELETE, and SELECT commands. You can specify this option using the ADO.NET connection string or OLE DB data source initialization string (**Defer Prepare=True**). Also, you can configure pooling using the **Advanced** dialog of the Data Source Wizard and **All** dialog of Data Links. For the INSERT, UPDATE, and DELETE commands, the Data Provider combines prepare, execute, and commit commands into one network flow to the remote database. For the SELECT command, the Data Provider combines prepare and execute commands into one network flow. This minimizes network traffic and frequently improves overall performance.

Retrieving schema information from DB2 shadow catalog

The Shadow Catalog property instructs the Data Provider to retrieve schema information from a DB2 shadow catalog. The DB2 administrator can define a shadow catalog to contain the schema information for tables, columns, primary keys, and indexes. All data consumers use this schema information at design time. Some data consumers use this information at runtime. The DB2 schema catalog can become inaccessible due to locks during writes (create and alter statement execution). Also, the default DB2 schema can be large, adding latency to design-time and run-time data consumer operations. A shadow catalog can reduce contention and improve performance, when performing schema fetch operations.

Sending multiple rows in a single unit of work

The Data Provider supports the OLE DB IRowsetFastLoad interface to enable consumers, such as Integration Services, to execute multiple INSERT, UPDATE, DELETE or CALL statements in optimized batches. This better uses TCP/IP network packets and increases overall performance. You select RowsetFastLoad when configuring OLE DB Destinations in Data Flows within Integration Services packages using the Business Intelligence Developer Studio package designer. The IRowsetFastLoad interface is supported when inserting, updating or deleting rows into DB2 for z/OS V8 and V9, DB2 for i5/OS V5R4 and V6R1, and DB2 for LUW V9. For more information, see Access Mode for Integration Services OLE DB Destination Custom Properties (http://go.microsoft.com/fwlink/?LinkId=241518).

Command time-out to terminate long-running queries

The Data Provider offers a command timeout property, to let you automatically terminate long-running queries that may adversely affect performance. The default value for the OLE DB Rowset DBPROP_COMMANDTIMEOUT is 0, which means no timeout.

You can specify the value for command timeout from a number of consumers. The Data Provider offers an OLE DB Rowset DBPROP_COMMANDTIMEOUT property, to let developers automatically terminate long-running queries that may adversely affect performance. Integration Services and Analysis Services expose this property through the Data Source Query Timeout option in the Business Intelligence Development Studio. Reporting Services exposes this property through the Dataset Properties Timeout option in the Business Intelligence Development Studio. Replication and Query Processor expose this property through the sp_serveroption, @optname=query time-out.

Measuring Performance

To measure performance, the Data Provider offers performance counters. By default performance counters are turned off. They can be turned on by changing value of the following registry key to 1:

```
HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Host Integration Server\Data
Integration\UpdateCounters = 1
```

The Data Provider performance counters capture information about open connections, open statements, packets and bytes sent/received, average host (DB2 server) processing time, command executions, data fetches, and transaction commits/rollbacks. For more information, see Performance Counters (http://go.microsoft.com/fwlink/?LinkID=119211).

Security and Protection

The following sections provide help for securing and protecting deployments of Data Provider.

In This Section

- Security
- Protection

Security

The Microsoft OLE DB Provider for DB2 (Data Provider) connects Microsoft SQL Server database applications to remote IBM DB2 relational database management servers, for on-line transaction processing, analysis and reporting. The Data Provider functions as a DB2 application requester client supporting the standard distributed relational database architecture (DRDA)

protocols and formats that are compatible with IBM DB2 server products functioning as DB2 application servers.

The Data Provider enables interoperability between DB2 client applications and DB2 server databases by issuing structured query language statements. These include data definition language statements for administration and data manipulation management statements for read and write operations. The Data Provider connects the DB2 client applications to the DB2 server databases across a transmission control protocol over internet protocol (TCP/IP) network that uses the optional security features described in this topic.

Protection

This topic describes supported standards for DB2 protection.

Encryption standards for DB2

The following table describes supported encryption standards for DB2.

Encryption	Authentication	Data	DB2 for z/OS	DB2 for i5/OS	DB2 for LUW
Kerberos	Yes	No	V8	V5R3	V8
SSL V3	Yes	Yes	V9	V5R4	V9.1
TLS V1	Yes	Yes	V9	V5R4	V9.1
AES	Yes	No	V8 (APAR PK56287)	V5R4	V9.5 (Fix Pack 3)

Configuring for Protection

The Data Provider grants execute on DB2 package to the DB2 public group

When creating DB2 packages, the Data Access Tool and the DB2 data providers set the execute permissions on DB2 packages to PUBLIC, which includes all DB2 users. To increase security on your DB2 server, we recommend that you revoke execute permissions to PUBLIC on these packages and grant execute permissions only to selected DB2 users or groups. Permissions granted to PUBLIC are granted to all DB2 users, which could leave your DB2 server vulnerable to attack.

The Data Provider stores the user name in plain text in the Universal Data Link (UDL) or connection string file

By default, when you use the Data Source Wizard or Data Links, the Data Provider stores the user name in plain text in the Universal Data Link (UDL) or connection file. We recommend that you configure the Data Provider to use Enterprise Single Sign-On, which integrates Windows Active Directory accounts with IBM host system and DB2 credentials. Administrators map host and DB2 credentials to AD accounts, storing these in an encrypted SQL Server database. The Data Provider retrieves these mappings at runtime to securely authenticate users to remote IBM DB2 database servers. For more information about Enterprise Single Sign-On, see the Host Integration Server 2010 [Security User's Guide](http://go.microsoft.com/fwlink/?LinkID=180767) (http://go.microsoft.com/fwlink/?LinkID=180767).

The Data Provider supports weak encryption based on DES and Diffie-Hellman

Optionally, the Data Provider supports authentication and data encryption using weak 56-bit Data Encryption Standard (DES) technologies. We recommend that you configure the Data Provider to use data encryption by using Secure Sockets Layer (SSL) V3.0 or Transport Layer Security (TLS) V1.0. For encrypting authentication only, you can utilize the Advanced Encryption Standard (AES) to support 256-bit encryption.

The Data Provider connects using unencrypted, plain text, user name and password

By default, the Data Provider connects to remote DB2 server computers over a TCP/IP network using basic authentication, where the user name and password are not encrypted and are submitted in plain text. We recommend that you configure The Data Provider to use authentication encryption by using Kerberos, Secure Sockets Layer (SSL) V3.0 or Transport Layer Security (TLS) V1.0, or authentication encryption using AES.

The Data Provider sends and receives unencrypted data

By default, the Data Provider sends and receives unencrypted data. We recommend that you configure the Data Provider to use data encryption by using Secure Sockets Layer (SSL) V3.0 or Transport Layer Security (TLS) V1.0.

The Data Provider send additional network flow to support Defer Prepare

Optionally, you can specify TRUE to instruct the Data Provider to optimize the processing of parameterized database commands. The default value is FALSE. For the INSERT, UPDATE, and DELETE commands, the Data Provider can combine PREPARE, EXECUTE, and COMMIT commands into one network flow to the remote database. For the SELECT command, the Data Provider combines PREPARE and EXECUTE commands into one network flow. This optimization minimizes network traffic and can improve overall performance.

Troubleshooting

The following sections provide help for troubleshooting deployments of Data Provider.

In This Section

- [Data Consumer Issues](#)
- [Data Provider Error Codes](#)
- [Tracing](#)

Data Consumer Issues

This topic provides information to troubleshoot data consumer issues.

SQL Server Integration Services

Enterprise Single Sign-On

When using Enterprise Single Sign-On with SQL Server Integration Services, you may need to enter a placeholder value of "MS$SAME" for user name and password. Using Data Links, you can configure ESSO for use with SSIS.

1. In the **Connection** dialog, click **Single sign-on** for the **Security method**.
2. Select an **Affiliate application** from the drop-down list box.
3. In the **All** dialog, click **Password** and then click Edit Value. In the **Edit Property Value** dialog, enter **MS$SAME** for the **Property Value**, and click **OK**.
4. In the **All** dialog, click **User ID** and then click **Edit Value**. In the **Edit Property Value** dialog, enter MS$**SAME** for the **Property Value**, and click **OK**.
5. In the **Connection** dialog, click **Test**. You can view the results in the Microsoft Data Links dialog.
6. Click **OK** to save the configuration information.

Data Type Mapping

When using the SQL Server Integration Services Import and Export Wizards, from the Microsoft SQL Server Management Studio or Business Intelligence Design Studio, you can customize the default data conversions by editing XML mapping files. The Import and Export Wizard XML mapping files are located in the following folder.

C:\Program Files\Microsoft SQL Server\100\DTS\MappingFiles

C:\Program Files (x86)\Microsoft SQL Server\100\DTS\MappingFiles

To correctly map IBM DB2 for i5/OS character and decimal data types to SQL Server data types, the data mapping files should be extended to include the DB2 data type long form synonym. For example, add the following data type mapping between DB2 INTEGER source and SQL Server. This mapping is compatible with SQLOLEDB, SQLNCL, SQLNCLI10, and System.Data.SqlClient.SqlConnection. It replaces the short form SourceDataType value INT with the long form INTEGER.

The following mapping for DB2 INT is compatible with a DB2 for z/OS V9 source.

```
<!-- INT -->
  <dtm:DataTypeMapping>
   <dtm:SourceDataType>
      <dtm:DataTypeName>INT</dtm:DataTypeName>
   </dtm:SourceDataType>
   <dtm:DestinationDataType>
      <dtm:SimpleType>
        <dtm:DataTypeName>INT</dtm:DataTypeName>
      </dtm:SimpleType>
   </dtm:DestinationDataType>
  </dtm:DataTypeMapping>
```

The following data type mapping for DB2 INTEGER is compatible with a DB2 for i5/OS V6R1 source.

```
<!-- INTEGER -->
  <dtm:DataTypeMapping>
    <dtm:SourceDataType>
      <dtm:DataTypeName>INTEGER</dtm:DataTypeName>
    </dtm:SourceDataType>
    <dtm:DestinationDataType>
      <dtm:SimpleType>
        <dtm:DataTypeName>INT</dtm:DataTypeName>
      </dtm:SimpleType>
    </dtm:DestinationDataType>
  </dtm:DataTypeMapping>
```

Data Type Mapping Files

The following table describes the three mapping files that you can edit when you use the Data Provider.

DB2 Data Type Name	DB2ToMSSql	DB2ToMSSql10	DB2ToSSIS10
TIME	DATETIME	time	DT_DBTIME
TIMESTAMP	datetime	datetime2	DT_DBTIMESTAMP2

DATE	DATETIME	DATE	DT_DBDATE
CHAR	CHAR	CHAR	DT_STR
CHAR () FOR BIT DATA	BINARY	BINARY	DT_BYTES
CHAR () FOR MIXED DATA	NCHAR	NCHAR	DT_WSTR
CHAR () FOR SBCS DATA	CHAR	CHAR	DT_STR
CHARACTER	CHAR	CHAR	DT_STR
CHARACTER () FOR BIT DATA	BINARY	BINARY	DT_BYTES
CHARACTER () FOR MIXED DATA	NCHAR	NCHAR	DT_WSTR
CHARACTER () FOR SBCS DATA	CHAR	CHAR	DT_STR
NATIONAL CHARACTER	NCHAR	NCHAR	DT_WSTR
VARCHAR	VARCHAR	VARCHAR	DT_STR
VARCHAR () FOR BIT DATA	VARBINARY	VARBINARY	DT_BYTES
VARCHAR () FOR MIXED DATA	NVARCHAR	NVARCHAR	DT_WSTR
VARCHAR () FOR SBCS DATA	VARCHAR	VARCHAR	DT_STR
CHARACTER VARYING	VARCHAR	VARCHAR	DT_STR
CHARACTER VARYING () FOR BIT DATA	VARBINARY	VARBINARY	DT_BYTES
CHARACTER VARYING () FOR MIXED DATA	NVARCHAR	NVARCHAR	DT_WSTR
CHARACTER VARYING () FOR	VARCHAR	VARCHAR	DT_STR

SBCS DATA			
NATIONAL CHARACTER VARYING	NVARCHAR	NVARCHAR	DT_WSTR
LONG VARCHAR FOR BIT DATA	image	image	DT_IMAGE
LONG VARCHAR	text	text	DT_TEXT
GRAPHIC	NCHAR	NCHAR	DT_WSTR
VARGRAPHIC	NVARCHAR	NVARCHAR	DT_WSTR
GRAPHIC VARYING	NVARCHAR	NVARCHAR	DT_WSTR
SMALLINT	SMALLINT	SMALLINT	DT_I2
INT	INT	INT	DT_14
INTEGER	INT	INT	DT_14
BIGINT	BIGINT	BIGINT	DT_18
DECIMAL	NUMERIC	NUMERIC	DT_NUMERIC
NUMERIC	NUMERIC	NUMERIC	DT_NUMERIC
REAL	REAL	REAL	DT_R4
FLOAT	FLOAT	FLOAT	DT_R8
DOUBLE	FLOAT	FLOAT	DT_R8
DOUBLE PRECISION	FLOAT	FLOAT	DT_R8
BLOB	image	image	DT_BYTES
BINARY LARGE OBJECT	image	image	DT_BYTES
CLOB	text	text	DT_TEXT
CLOB () FOR MIXED DATA	ntext	ntext	DT_NTEXT
CLOB () FOR SBCS DATA	text	text	DT_TEXT
CHAR LARGE OBJECT	text	text	DT_TEXT
CHAR LARGE	ntext	ntext	DT_NTEXT

OBJECT () FOR MIXED DATA			
CHAR LARGE OBJECT () FOR SBCS DATA	text	text	DT_TEXT
CHARACTER LARGE OBJECT	text	text	DT_TEXT
CHARACTER LARGE OBJECT () FOR MIXED DATA	ntext	ntext	DT_NTEXT
CHARACTER LARGE OBJECT () FOR SBCS DATA	text	text	DT_TEXT
130	ntext	ntext	DT_NTEXT

After you edit a mapping file, you must close and reopen the SQL Server Import and Export Wizard or the Business Intelligence Development Studio, depending on the environment in which you are working.

For more information about configuring SQL Server 2008 Integration Services, see the Importing and Exporting Data by Using the SQL Server Import and Export Wizard) topic in SQL Server Books Online (http://go.microsoft.com/fwlink/?LinkId=193204).

Customizing Data Flow Components

You can use SQL Server Integration Services Data Flow Components to perform default and customized transformations. The customized transformations are based on developer-provided custom code.

The SQL Server Integration Services mapping files in XML format are for use with the Import and Export Wizard. These files are not for use with the Data Flow. SQL Server Integration Services offers a Pipeline Buffer class to allow enterprise developers to customize data mapping within the Data Flow. For more information about customizing data flow components using SQL Server 2008 Integration Services, see the Working with Data Types in the Data Flow topic in SQL Server Books Online (http://go.microsoft.com/fwlink/?LinkId=241523).

SQL Server Replication

Derive Parameters

SQL Server Replication requires that Derive Parameter is set to FALSE.

Data Type Mapping

SQL Server Replication may convert data incorrectly, based on the default mappings from SQL Server to DB2 data types. We recommend that you review and revise the Replication data type mappings using the following SQL Server system stored procedures.

sp_helpdatatypemap

sp_getdefaultdatatypemapping

sp_setdefaultdatatypemapping

For more information, see the System Stored Procedures (Transact-SQL) topic in SQL Server Books Online (http://go.microsoft.com/fwlink/?LinkId=241524).

Problem with mapping SQL Server DATETIME2 to DBTYPE_TIMESTAMP

SQL Server 2008 Replication to DB2 for z/OS may fail with SQLCODE -188 (the string representation of a datetime value is not a valid datetime value). This occurs when Replication is configured to map DATETIME2 to DB2 VARCHAR(27) and uses subscription article commands with string literal data values.

Solution to problem with Step-by-Step Instructions

Re-configure SQL Server 2008 Replication to map DATETIME2 to DB2 TIMESTAMP and subscription article commands with parameters. This enables the Data Provider to format the DATETIME2 as a DB2 TIMESTAMP structure that is supported by the IBM DB2 database server.

1. Identify the data type mapping to modify. Use MASTER for all steps.

   select * from

```
sys.fn_helpdatatypemap
(
    'MSSQLSERVER',
    '%',
    '%',
    '%',
    '%',
    '%',
    0
)
```

Where destination_dbms = 'DB2' and source_type = 'datetime2'The results should indicate the mapping_id to modify. The following table shows the results pane for this example where the mapping_id is 189.

mapping_id	source_dbms	source_type	destination_dbms	destination_type	destination_length

189	MSSQLSERVER	datetime2	DB2	VARCHAR	27

2. Drop the data type mapping.

exec sp_dropdatatypemapping 189

3. Add the data type mapping.

```
exec  sp_adddatatypemapping

    @source_dbms = 'MSSQLSERVER',

    @source_type = 'datetime2',

    @destination_dbms = 'DB2',

    @destination_type = 'TIMESTAMP',

    @destination_nullable = 1,

    @destination_createparams = 0,

    @dataloss = 0,

    @is_default = 1
```

4. Run the query again to verify the new data type mapping.

select * from

```
select * from sys.fn_helpdatatypemap

    (

    'MSSQLSERVER',

    '%',

    '%',
```

```
      '%',

      '%',

      '%',

      0
  )
```

Where destination_dbms = 'DB2' and source_type = 'datetime2'

The results should indicate the mapping_id to modify. The following table shows the results pane for this example where the mapping_id is 189.

mapping_id	source_dbms	source_type	destination_dbms	destination_type	destination_length
494	MSSQLSERVER	datetime2	DB2	TIMESTAMP	NULL

5. Identify the replication subscription article to re-configure. Use the Transact-SQL USE statement to switch from the master database to the database from which you are replicating.

   USE [Test]

   ```
   select name, status from sysarticles
   ```

6. The results should display the name of the article to modify. In this example, the following table shows the results where the name is DB2TS01.

name	status
DB2TS01	25

If the status value is 1 or 9, then the article is configured for string literal formatting.

If the status value is 17 or 25, then the article is configured for parameterized formatting.

7. Configure the replication subscription article for parameterized commands.

   USE [Test]

   ```
   DECLARE @publication AS sysname;

   DECLARE @article AS sysname;

   SET @publication = N'DB2TS_PUB01';
   ```

```
SET @article = N'DB2TS01';


EXEC sp_changearticle @publication, @article, 'status',
'parameters', 0, 0;
```

For more information, see [Replication System Stored Procedures Concepts](http://go.microsoft.com/fwlink/?LinkId=241525) (http://go.microsoft.com/fwlink/?LinkId=241525) in SQL Server Books Online.

SQL Server Analysis Services

When you design cubes for use with SQL Server Analysis Services, the tools generate SQL commands that contain long alias names that may exceed the maximum length supported by the DB2 server. Depending on the DB2 platform and version that you use, you may not be able to use queries with alias names exceeding 18 characters. For example, many objects deployed in DB2 for z/OS use names of 18 characters. Refer to the DB2 SQL Reference for your DB2 platform and version and check with your DB2 database administrator. We recommend that the administrator or developer update the two SQL Server Analysis Service configuration cartridge files that contain the data type mapping support for DB2 by changing the identifier-length (limit-table-identifier-length) from 29 to 18. The following are the names and location of the two cartridge files that must be updated.

- C:\Program Files\Microsoft SQL Server\100\Tools\Binn\VSShell\Common7\IDE\DataWarehouseDesigner\UIRdmsCartridge\db2v0801.xs
- C:\Program Files\Microsoft SQL Server\100\Tools\Binn\VSShell\Common7\IDE\DataWarehouseDesigner\UIRdmsCartridge\db2v0801.xs

SQL Server Analysis Services uses the updated configuration files to correctly name objects in SQL commands.

Data Provider Error Codes

The Data Provider returns errors in the form of SQLSTATE, SQLCODE, Reason Code, and Error Text, formatted as part of the OLE DB IErrorInfo interface. The Data Provider connects to the DB2 database server using the Distributed Relational Database Architecture (DRDA) protocol and formats. The Data Provider returns DRDA protocol issues in SQLSTATE HY000 or 08S01, with associated SQLCODE errors and text. The following table list DRDA errors. For additional information on DRDA protocol issues, you can refer to the DRDA protocol documentation published by The Open Group (http://www.opengroup.org). You can download DRDA V5 Vol. 3: Distributed Data Management Architecture, publication number C114, from the [Open Group bookstore](http://go.microsoft.com/fwlink/?LinkID=219127&clcid=0x409) (http://go.microsoft.com/fwlink/?LinkID=219127&clcid=0x409).

DRDA Protocol Errors

The following table lists DRDA protocol error constants, values, SqlState, SqlCode and a description of the error. An asterisk (*) indicates not in use.

SQLSTATE	SQLCODE	Description
08S01	-256	Message: Abnormal unit of work. Reason: The abnormal unit of work reply message indicates that the server encountered an issue on the server, causing the server to end the unit of work abnormally. Action: Determine whether a deadlock, operator intervention, or other issue caused the server to roll back the unit of work. Review a client network trace to determine if the server returned a SQL communications area reply data (SQLCARD) with an optional reason code or other optional diagnostic information.
08S01	-260	Message: Access RDB command is processed. Reason: The access relational database reply message indicates that the server could not complete a database connection request. Action: Verify the connection parameters and re-attempt the connection request. Review a client network trace to determine if the server returned a SQL communications area reply data (SQLCARD) with an optional reason code or other optional diagnostic information.
08S01	-261	Message: A permanent error

		condition has been detected on the target system. Contact your server administrator.
		Reason: The permanent agent error reply message indicates that the server encountered an issue on the server, causing the server to not complete the requested command.
		Action: Review a client network trace to determine if the server returned an optional reason code or other optional diagnostic information.
08S01	-263	Message: Package binding process could not be initiated.
		Reason: The begin bind error reply message indicates that the server encountered an issue on the server, preventing the server from initiating the requested package binding process.
		Action: Verify the package bind options and re-attempt the package bind process request. Review a client network trace to determine if the server returned a SQL communications area reply data (SQLCARD) with an optional reason code or other optional diagnostic information.
08S01	-269	Message: The user is not authorized to perform the requested command on the target system.
		Reason: The server cannot authenticate the user with the credentials presented at connection.
		Action: Verify connection information to ensure the User

		Name (User Identifier), Password and Security Method specified (Interactive sign-on security, Single sign-on, or Kerberos) match the server requirements defined for the current user. For more information, see topics on User Name, Password and Security Method.
08S01	-270	Message: An internal network library error has occurred. The requested command encountered an implementation-specific error condition on the target system.
		Reason: The command check reply message indicates that the server received a command from the client that the server determined to be un-architected within Distributed Data Management or Distributed Relational Database Architecture.
		Action: Review a client network trace to determine if the server returned additional optional error messages that might indicate the cause of the problem and actions to resolve the problem.
08S01	-272	Message: An internal network library error has occurred. The requested command is not recognized or is not supported by the target system.
		Reason: The command not supported reply message indicates that the server received a command from the client that the server does not

		recognize or that the server does not support.
		Action: Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
08S01	-273	Message: Command violated processing capability of the conversation.
		Reason: The command violation reply message indicates that the server received a command from the client that the server determined to be in violation of the processing scope of the current conversation.
		Action: Verify the connection parameters (e.g. Distributed Unit of Work) and re-attempt the connection and command request. Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
08S01	-274	Message: Commitment request.
		Reason: The commitment request reply message indicates that the server received a commit or rollback request from the client that the server determined to be invalid in the current context.
		Action: Verify the connection parameters (e.g. Distributed Unit of Work) and re-attempt the connection and command request. Review a client network trace to determine if the server returned an optional severity

		code or other optional diagnostic information.
08S01	-290	Message: Invalid description.
		Reason: The invalid description reply message indicates that the server could not read one or more data values, causing the command to fail, when the client sent an invalid DRDA Formatted Data Object Content Architecture (FD:OCA) descriptor of the data.
		Action: Verify the data parameter values and data types, and then re-attempt the command request. Review a client network trace to determine if the server returned an optional severity code, the invalid parameter number, or other optional diagnostic information.
08S01	-291	Message: Host cannot insert, modify or retrieve a record due to data mapping error.
		Reason: The data mapping error reply message indicates that the server could not map one or more data values from source to destination, causing the command to fail, when the client sent invalid data.
		Action: Verify the data parameter values and data types, and then re-attempt the command request. Review a client network trace to determine if the server returned an optional severity code, the invalid parameter number, or other optional diagnostic information.
08S01	-303	Message: End of query.

		Reason: The end of query reply message indicates the server could not continue process the query result, due to a problem on the server, the network, or the client.
		Action: Verify the status of the server and the network, and then re-attempt the connection and command request. Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
08S01	-304	Message: End of unit-of-work.
		Reason: The end unit of work condition reply message indicates that the server has ended the unit of work, based on the last command that it received from the client.
		Action: Verify the connection parameters (e.g. Auto Commit, Distributed Unit of Work, Connection Timeout, Command Timeout, FastLoad Optimize, and Static SQL Package Bind Options) and re-attempt the connection and command request. Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
08S01	-331	Message: An internal network library error has occurred. A request has been made that requires an internal manager dependency that was not met.
		Reason: The manager

		dependency error reply message indicates that the server received a command from the client that the server does not support in the context of the request, based on the server-specified manager levels. Action: Verify the connection parameters and re-attempt the connection and command request. Review a client network trace to determine if the server returned an optional reason code or other optional diagnostic information.
08S01	-332	Message: Manager level conflict. Reason: The manager level conflict reply message indicates that the server could not complete a database connection request. Action: Verify the connection parameters and re-attempt the connection request. Review a client network trace to determine if the server returned a SQL communications area reply data (SQLCARD) with an optional reason code or other optional diagnostic information.
08S01	-335	Message: An internal network library error has occurred. The requested command sent a data object that is not recognized or is not supported by the target system. Reason: The object not supported reply message indicates that the server received an object from the

		client that the server does not recognize or that the server does not support. Action: Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
08S01	-339	Message: Open query failed. Reason: The open query failure reply message indicates that the server could not process the client request to open cursor. Action: Verify the connection parameters (e.g. Auto Commit, Distributed Unit of Work, Connection Timeout, Command Timeout, FastLoad Optimize, and Static SQL Package Bind Options) and re-attempt the connection and command request. Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
08S01	-340	Message: Open query reply message. Reason: The open query complete reply message indicates that the server could not complete an open query or SQL set statement normally. Action: Verify the connection parameters (e.g. Auto Commit, Distributed Unit of Work, Connection Timeout, Command Timeout, FastLoad Optimize, Static SQL Package Bind Options, or Default Qualifier) and re-attempt the connection

		and command request. Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
08S01	-341	Message: Package binding process is not active for the specified package. Reason: The relational database package binding not active reply message indicates that the server could not process a bind SQL statement or end bind request, when a preceding begin bind request was not completed. Action: Verify the connection parameters (e.g. Package Collection or Static SQL Package Bind Options) and re-attempt the command request. Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
08S01	-342	Message: The command cannot be processed when the RDB package binding process is active. Reason: The relational database package binding process active reply message indicates that the server could not process a bind SQL statement, when a preceding end bind request was not completed. Action: Verify the connection parameters (e.g. Package Collection or Static SQL Package Bind Options) and re-

		attempt the command request. Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
HY000	-343	Message: An internal network library error has occurred. A network level conversational protocol error has occurred. Reason: The conversation protocol error code string reply message indicates that the server received a protocol command that is out of sequence in the current context. Action: Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
08S01	-344	Message: An internal network library error has occurred. The requested command included a parameter that is not recognized or is not supported by the target system. Reason: The parameter not supported reply message indicates that the server cannot complete the requested command, when the server does not recognize or support the specified command. Action: Verify the connection and command parameters, and then re-attempt the connection and command request. Review a client network trace to determine if the server returned an optional severity code or

		other optional diagnostic information.
08S01	-345	Message: Query is not opened. Reason: The query not open reply message indicates that the server could not process a continue query or close query command, when a query is not open. Action: Verify the status of the server, the network, and the connection parameters (e.g. Auto Commit, Distributed Unit of Work, Connection Timeout, Command Timeout, FastLoad Optimize, and Static SQL Package Bind Options), and then re-attempt the connection and command request. Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
08S01	-346	Message: Query was previously opened. Reason: The query previously opened reply message indicates that the server cannot process an open query request, for a query that is already open. Action: Verify the connection parameters (e.g. Auto Commit, Distributed Unit of Work, Connection Timeout, Command Timeout, FastLoad Optimize, and Static SQL Package Bind Options), and then re-attempt the connection and command request. Review a client network trace to determine if the server

		returned an optional severity code or other optional diagnostic information.
08S01	-356	Message: The user already has access to the host resource. Reason: The relational database currently accessed reply message indicates the server cannot complete an access relational database command, when the client is already connected to a relational database. Action: Verify the connection parameters (e.g. Initial Catalog, Connection Pooling, Connection Timeout), and then re-attempt the connection and command request. Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
08S01	-357	Message: The request for the host resource failed. Reason: The relational database access failed reply message indicates that the server cannot complete a connection request. Action: Verify the status of the server, the network, and the connection parameters (e.g. Initial Catalog, Network Address, Network Port and Connection Timeout), and then re-attempt the connection request. Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.

08S01	-358	Message: The user does not have the authority to access the host resource. Check your authentication credentials or contact your system administrator.
		Reason: The not authorized to relational database reply message indicates that the server cannot authenticate the user with the credentials presented at connection time.
		Action: Verify connection information to ensure the User Name (User Identifier), Password and Security Method specified (Interactive sign-on security, Single sign-on, or Kerberos) match the server requirements defined for the current user, and then re-attempt the connection request. Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information. For more information, see topics on User Name, Password and Security Method.
08S01	-359	Message: Access RDB command must be issued prior to any command that requests RDB services.
		Reason: The relational database not accessed reply message indicates that the server could not complete the command, when the preceding connection request was not completed.
		Action: Verify connection information and then re-attempt

		the connection and command request. Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
HY000	-360	Message: The host resource could not be found. Check that the Initial Catalog value matches the host resource name. Reason: The relational database not found reply message indicates that the server could not connect the client to the requested relational database. Action: Verify connection information to ensure the Initial Catalog value matches DB2 for z/OS location name, DB2 for i5/OS relational database directory entry (RDBDIRE), or DB2 for Windows database name. Verify the values for Network Address and Network Port, and then re-attempt the connection request. Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information. For more information, see topic on Initial Catalog.
08S01	-361	Message: RDB update reply message. Reason: The relational database update reply message indicates that the server could not complete a command to update a local or remote relational database. Action: Verify the connection

		parameters (e.g. Auto Commit, Distributed Unit of Work, Connection Timeout, Command Timeout, FastLoad Optimize, and Static SQL Package Bind Options), and then re-attempt the connection and command request. Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
08S01	-370	Message: There are insufficient resources on the target system to complete the command. Contact your server administrator. Reason: The resource limits reached reply message indicates that the server could not be completed due to insufficient server resources (e.g. memory, lock, buffer). Action: Verify the connection and command parameters, and then re-attempt the connection and command request. Review a client network trace to determine if the server returned a SQL communications area reply data (SQLCARD) with an optional reason code or other optional diagnostic information.
08S01	-372	Message: SQL error occurred. Reason: The SQL error condition reply message indicates that the server encountered an error, for which it returned a SQL error. Action: Verify the connection and command parameters, and

		then re-attempt the connection and command request (e.g. any SQL statement, and any bind SQL statement to static SQL package section process request). Review a client network trace to determine if the server returned a SQL communications area reply data (SQLCARD) with an optional reason code or other optional diagnostic information.
HY000	-379	Message: An internal network library error has occurred. A network level syntax error has occurred. Reason: The data stream syntax error reply message indicates that the server could not process a protocol command that the server determined did not conform to the requirements of the Distributed Data Management architecture. Action: Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
08S01	-381	Message: An internal network library error has occurred. The requested command sent a data object extension that is not recognized or is not supported by the target system. Reason: The target not supported reply message indicates that the server received a parameter on an object from the client that the server does not recognize or

		that the server does not support.
		Action: Review a client network trace to determine if the server returned an optional severity code or other optional diagnostic information.
08S01	-385	Message: An internal network library error has occurred. The requested command included a parameter value that is not recognized or is not supported by the target system.
		Reason: The parameter value not supported reply message indicates that the server received a parameter value (e.g. invalid Host CCSID) on an object from the client that the server does not recognize or that the server does not support. The client specified an incorrect user-specified value when connecting or when executing a command.
		Action: Review a client network trace to view the parameter whose value is not recognized or not supported, and to determine if the server returned an optional severity code or other optional diagnostic information.
HY000	-1500	Message: The maximum number of statements (128) has been reached for the current connection.
		Reason: The client relies on pre-defined SQL statements in sections within DB2 Static SQL packages to support execution of concurrent SQL SELECT

		statements. By default, the client defines 128 package sections, allowing the client to execute 128 concurrent SQL SELECT statements per client connection. When the maximum number of outstanding concurrent SQL SELECT statements exceeds the number of pre-defined sections, then the client cannot execute a new SQL SELECT statement.
		Action: Verify connection information to ensure the Package Collection value matches DB2 collection in which HIS 2010 packages are defined for execution by current user ID or PUBLIC. For more information, see topic on Package Collection.
HY000	-1501	Message: User has no authority to create (execute) package.
		Reason: The server cannot execute a SQL SELECT or CALL statement that requires a CURSOR statement stored in a static SQL package to which the current user is not authorized. The client relies on pre-defined SQL statements in sections within DB2 Static SQL packages to support execution of SQL SELECT statements. By default, the client defines a package automatically, if the runtime user has package BIND, EXECUTE, and GRANT authority over the DB2 collection specified in the Package Collection connection property.
		Action: Verify connection

		information to ensure the Package Collection value matches DB2 collection in which HIS 2010 packages are defined for execution by current user identifier or PUBLIC. Manually create HIS 2010 packages for execution by current user ID or PUBLIC, using Data Access Tool, Data Source Wizard, Data Links, or Data Access Library. Connect to DB2 using an authorization ID that is privileged to automatically create HIS 2010 packages (CREATE, BIND and EXECUTE privileges). For more information, see topic on Package Collection.
HY000	-7049	Message: Failed to get connection from pool. Application reaches the limit of connections from connection pooling. Max number defined in "MAX POOL SIZE" property.
		Reason: Client cannot connect to server when the available connections in the client connection pool have been exhausted.
		Action: Configure a larger max pool size and set a timeout on the pooled connections. For more information, see topic on Max Pool Size.

TCPIP Network Errors

The following table lists TCPIP Network Client error constants, values, SqlState, SqlCode and a description of the error.

SQLSTATE	SQLCODE	Description

08S01	-602	Message: Could not resolve the specified host name. Reason: The client could not connect to the DB2 server with an incorrect user-specified Network Address or Network Port value. Action: Verify connection information to ensure the Network Address and Network Port specified matches the server. For more information, see topics on Network Address and Network Port.
08S01	-603	Message: Could not connect to specified host. Reason: The client could not connect to the DB2 server with an incorrect user-specified Network Address or Network Port value, or the server is unavailable. Action: Verify connection information to ensure the Network Address and Network Port specified matches the server. Contact the network administrator or server administrator. For more information, see topics on Network Address and Network Port.
08S01	-604	Message: Socket allocation failed. Reason: The client failed to connect to the DB2 server via a TCP/IP network, when all of the local client socket resources were in use. Action: Close unused client connections. Utilize client connection pooling. For more information, see topic on Connection Pooling.
08S01	-605	Message: The network connection was terminated because the host failed to send any data. Reason: The client could not connect to the DB2 server due to an unforeseen problem with the client or server. Action: Contact the client administrator,

		network administrator, or server administrator.
08S01	-606	Message: Enterprise single sign-on failure: Could not contact the SSO server <server-name>. Check that SSO is configured and that the SSO service is running on hat server.
		Reason: The Enterprise Single Sign-On server is not configured or running.
		Action: Verify connection information to ensure the ESSO Affiliate Application name matches the value for the server and current user defined by the Enterprise Single Sign-On administrator. Check with your Enterprise Single Sign-On Administrator. Configure an alternative authentication method. For more information, see topic on Security Method.
08S01	10014	Message: A TCPIP socket error has occurred (10014): The sockaddr structure pointed to by the name contains incorrect address format for the associated address family or the namelen parameter is too small. This error is also returned if the sockaddr structure pointed to by the name parameter with a length specified in the namelen parameter is not in a valid part of the user address space.
		Reason: The client is attempting to connect to the DB2 server using an improperly-formatted IPv6 Network Address.
		Action: Verify connection information to ensure the Network Address specified matches the server and requirements for either an IPv4 or IPv6 network. For more information, see topic on Network Address.

| 08S01 | 10022 | Message: A TCPIP socket error has occurred (10022): An invalid argument was supplied.

Reason: The client is attempting to connect to the DB2 server using an improperly-formatted IPv4 or IPv6 Network Address.

Action: Verify connection information to ensure the Network Address specified matches the server and requirements for either an IPv4 or IPv6 network. For more information, see topic on Network Address. |
|---|---|---|
| 08S01 | 10024 | Message: A TCPIP socket error has occurred (10024): No more socket descriptors are available.

Reason: The client failed to connect to the DB2 server via a TCP/IP network, when all of the local client socket connections were in use.

Action: Close unused client connections. Utilize client connection pooling. For more information, see topic on Connection Pooling. |
| 08S01 | 10040 | Message: A TCPIP socket error has occurred (10040): The message was too large to fit into the specified buffer and was truncated.

Reason: The client failed to execute a command as requested by the program.

Action: Verify that the command syntax and parameter data values are within the limits supported by the DB2 server platform and version. For more information on command and data type limits, see topic on Data Type Mappings. |
| 08S01 | 10043 | Message: A TCPIP socket error has occurred (10043): The specified |

		protocol is not supported. Reason: The client is attempting to connect to the DB2 server using an access method that is not supported by the DB2 server, such as Secure Sockets Layer or Transport Layer Security. Action: Verify connection information to ensure the DB2 server support SSL or TLS. Configure a TCP/IP network without specifying SSL or TLS. Contact the network administrator or server administrator. For more information on TCP/IP Network Connection, see topic on TCP/IP Network Connection.
08S01	10047	Message: A TCPIP socket error has occurred (10047): Addresses in the specified family cannot be used with this socket. Reason: The client is attempting to connect to the DB2 server using an improperly-formatted IPv4 or IPv6 Network Address. Action: Verify connection information to ensure the Network Address specified matches the server and requirements for either an IPv4 or IPv6 network. For more information, see topic on Network Address.
08S01	10049	Message: A TCPIP socket error has occurred (10049): The remote address is not a valid address (such as INADDR_ANY or in6addr_any). Reason: The client is attempting to connect to the DB2 server using an improperly-formatted IPv6 Network Address. Action: Verify connection information to ensure the Network Address specified matches the server and requirements for either an IPv4 or IPv6 network. For

		more information, see topic on Network Address.
08S01	10050	Message: A TCPIP socket error has occurred (10050): A socket operation encountered a dead network. This could indicate a serious failure of the network system (that is, the protocol stack that the Windows Sockets DLL runs over), the network interface, or the local network itself. Reason: The client could not connect to the DB2 server with an incorrect user-specified Network Address or Network Port value, or the server is unavailable. Action: Verify connection information to ensure the Network Address and Network Port specified matches the server. Contact the server administrator. For more information, see topics on Network Address and Network Port.
08S01	10051	Message: A TCPIP socket error has occurred (10053): The network cannot be reached from this host at this time. Reason: The client could not connect to the DB2 server with an incorrect user-specified Network Address or Network Port value, or the server is unavailable. Action: Verify connection information to ensure the Network Address and Network Port specified matches the server. Contact the server administrator. For more information, see topics on Network Address and Network Port.
08S01	10052	Message: A TCPIP socket error has occurred (10053): For a connection-oriented socket, this error indicates that the connection has been broken due to keep-alive activity detecting a failure while the operation was in progress.

		For a datagram socket, this error indicates that the time to live has expired.
		Reason: The server closed the client connection.
		Action: Contact the network administrator or server administrator.
08S01	10052	Message: A TCPIP socket error has occurred (10052): The connection has been broken due to the keep-alive activity detecting a failure while the operation was in progress.
		Reason: The server closed the client connection.
		Action: Contact the network administrator or server administrator.
08S01	10053	Message: A TCPIP socket error has occurred (10053): An established connection was aborted by the software in your host machine.
		Reason: The server closed the client connection.
		Action: Contact the network administrator or server administrator.
08S01	10054	Message: A TCPIP socket error has occurred (10054): The virtual circuit was reset by the remote side executing a hard or abortive close. The application should close the socket as it is no longer usable. On a UPD-datagram socket this error would indicate that a previous send operation resulted in an ICMP "Port Unreachable" message.
		Reason: The server closed the client connection.
		Action: Contact the network administrator or server administrator.
08S01	10055	Message: A TCPIP socket error has

		occurred (10055): No buffer space is available.
		Reason: The client failed to connect to the DB2 server via a TCP/IP network, when all of the local client socket resources were in use.
		Action: Close unused client connections. Utilize client connection pooling. For more information, see topic on Connection Pooling.
08S01	10057	Message: A TCPIP socket error has occurred (10057): A request to send or receive data was disallowed because the socket is not connected and (when sending on a datagram socket using a sendto call) no address was supplied.
		Reason: The client could not connect to the DB2 server with an incorrect user-specified Network Address or Network Port value.
		Action: Verify connection information to ensure the Network Address and Network Port specified matches the server. For more information, see topics on Network Address and Network Port.
08S01	10060	Message: A TCPIP socket error has occurred (10060): The connection has been dropped because of a network failure or because the peer system failed to respond.
		Reason: The server closed the client connection.
		Action: Contact the network administrator or server administrator.
08S01	10061	Message: A TCPIP socket error has occurred (10061): The attempt to connect was forcefully rejected.
		Reason: The client could not connect to the DB2 server with an incorrect user-specified Network Address or Network

		Port value.
		Action: Verify connection information to ensure the Network Address and Network Port specified matches the server. For more information, see topics on Network Address and Network Port.
08S01	10065	Message: A TCPIP socket error has occurred (10065): A socket operation was attempted to an unreachable host.
		Reason: The client could not connect to the DB2 server with an incorrect user-specified Network Address or Network Port value, or the server is unavailable.
		Action: Verify connection information to ensure the Network Address and Network Port specified matches the server. Contact the server administrator. For more information, see topics on Network Address and Network Port.
08S01	10093	Message: A TCPIP socket error has occurred (10093): A successful WSAStartup call must occur before using this function. For more information, see http://msdn.microsoft.com/en-us/library/ms742213(VS.85).aspx.
		Reason: The client failed to connect to the DB2 server via a TCP/IP network, when all of the local client socket connections were in use.
		Action: Close unused client connections. Utilize client connection pooling. For more information, see topic on Connection Pooling.

Common Errors

The following table describes DB2 server errors that may occur along with the actions you must take to correct them.

SQLSTATE	SQLCODE	Message	Description
42601	-104	Illegal symbol. Token was not valid Unexpected token. An unexpected token <token> was found following <text>. Expected tokens may include: <token-list>.	Reason: The server cannot execute a SQL statement that contains illegal, invalid, or unexpected symbols or tokens. Action: Verify the SQL syntax using the IBM DB2 SQL Reference for the specific IBM DB2 platform and version. Check if data consumer application is using unsupported delimited object identifiers (e.g. square brackets ([<object-name>]) as opposed to using supported delimiters (double quotes).
42602	-113	INVALID CHARACTER FOUND IN: <string>, REASON CODE <reason-code>. A character that is invalid in a name has been detected. <identifier> contains a character that is not allowed or does not contain any characters.	Reason: The server cannot process a SQL SET CURRENT SQLID statement, when the client connects to the DB2 server. Action: Verify connection information to ensure the Default Qualifier value matches the DB2 collection in which object is cataloged. For more information, see topic on Default Qualifier.
42802	-117	THE NUMBER OF VALUES ASSIGNED IS NOT THE SAME AS THE NUMBER OF SPECIFIED OR IMPLIED COLUMNS. Statement contains wrong number of values. The number of values assigned is not the same as the number of specified or implied columns or variables.	Reason: The server cannot execute a SQL INSERT statement when the number of values specified is not the same as the number of columns in the table(s). Action: Verify that the number of columns match the objects in the SQL statement, by querying the system catalog (e.g. SYSIBM.SYSCOLUMNS) or executing a client schema query (e.g. OLE DB IDBSchemaRowsets::GetSchemas(DBSCHEMA_COLUMNS) or ADO.NET MsDb2Connection.GetSchema(Columns).
22007	-181	THE STRING REPRESENTATION OF A DATETIME VALUE IS NOT A VALID	Reason: The server cannot execute the SQL statement where a DATETIME value is incorrectly formatted or out-of-range. Action: Verify the DATETIME values are within

		DATETIME VALUE Value in date, time, or timestamp string not valid. The string representation of a datetime value is out of range.	the supported range for year of 0001-9999, month of 1-12, day of 28/29/30/31 (depending on month and leap year), hour of 0-24 (12 for USA), minutes of 0-59, seconds of 0-59, and microseconds of 0-999999. Check connection information to ensure the DateTime As Date option is specified True to instruct the client to delete the time portion of Windows DateTime data values mapped to DB2 Timestamp data values, allowing the DB2 database to read these values as DB2 Date data values. For more information, see topic on DateTime As Date.
42704	-204	<schema>.<object> is an unidentified name. An undefined object or constraint name was detected. <name> is an undefined name.	Reason: The server cannot execute a SQL statement that references an invalid <schema>.<object> name. Action: Verify the object name specified in the SQL statement. Check connection information to ensure the Default Qualifier value matches the DB2 collection in which object is cataloged. For more information, see topic on Default Qualifier.
42703	-206	<name> IS NOT VALID IN THE CONTEXT WHERE IT IS USED Column <name> not in specified tables. <name> is not valid in the context where it is used.	Reason: The server cannot execute a SQL statement where a specified column name is not a column of the source or target table or view referenced I the statement. Action: Verify the column references match the objects in the SQL statement, by querying the system catalog (e.g. SYSIBM.SYSCOLUMNS) or executing a client schema query (e.g. OLE DB IDBSchemaRowsets::GetSchemas(DBSCHEMA _COLUMNS) or ADO.NET MsDb2Connection.GetSchema(Columns).
08S01	-360	The host resource could not be found. Check that the Initial Catalog value matches the host resource name.	Reason: The server could not connect the client to the requested DRDA RDBNAM (Relational Database Name). Action: Verify the connection information to ensure the Initial Catalog value matches DB2 for z/OS location name, DB2 for i5/OS relational database directory entry (RDBDIRE), or DB2 for Windows database name. For more information, see topic on Initial Catalog.

42884	-440	NO <routine-type> BY THE NAME <routine-name> HAVING COMPATIBLE ARGUMENTS WAS FOUND IN THE CURRENT PATH No routine was found with the specified name and compatible arguments. No authorized routine named <routine-name> of type <routine-type> having compatible arguments was found.	Reason: The server cannot execute a SQL CALL statement that contains the wrong number of arguments, or invalid parameter data types, or references an invalid <schema>.<object> name. Action: Verify the number of arguments. Check the parameter data types. Verify the object name specified in the SQL statement. Check the connection information to ensure the Default Qualifier value matches the DB2 collection in which object is cataloged. For more information, see topic on Default Qualifier.
24501	-501	THE CURSOR IDENTIFIED IN A FETCH OR CLOSE STATEMENT IS NOT OPEN. Cursor <cursor name> not open. The cursor specified in a FETCH statement or CLOSE statement is not open or a cursor variable in a cursor scalar function reference is not open.	Reason: The server cannot execute a SQL SELECT or CALL statement that requires a FETCH or CLOSE against a CURSOR that is not in an open state. Action: Verify the application to see if it issuing a COMMIT or ROLLBACK, which might close the cursor. Check for previously-received return message that might indicate the server automatically closed the cursor based on a system event (e.g. SQLCODE -404, -652, -679, -802, -901, -904, -909, -910, -911, -913, or -952). Verify connection information to ensure the AutoCommit option is specified True when working with some generic consumers, including SQL Server Integration Services and Distributed Query Processor, when using remote unit of work transactions. For more information, see topic on AutoCommit.
42501	-551	Not authorized to object. Not authorized to object <object-name> in <resource-name> type <resource-type>. <authorization-ID> does not have the required	Reason: The server cannot execute a SQL SELECT or CALL statement that requires a CURSOR statement stored in a static SQL package to which the current user is not authorized. The client relies on pre-defined SQL statements in sections within DB2 Static SQL packages to support execution of SQL SELECT

			statements. By default, the client defines a package automatically, if the runtime user has package BIND, EXECUTE, and GRANT authority over the DB2 collection specified in the Package Collection connection property.
	authorization or privilege to perform operation <operation> on object <object-name>.		Action: Verify connection information to ensure the Package Collection value matches DB2 collection in which HIS 2010 packages are defined for execution by current user identifier or PUBLIC. Manually create HIS 2010 packages for execution by current user ID or PUBLIC, using Data Access Tool, Data Source Wizard, Data Links, or Data Access Library. Connect to DB2 using an authorization ID that is privileged to automatically create HIS 2010 packages (CREATE, BIND and EXECUTE privileges). For more information, see topic on Package Collection.
42501 42602	-567 -567	<bind-type> AUTHORIZATION ERROR USING <auth-id> AUTHORITY PACKAGE = <package-name> PRIVILEGE = <privilege>. Authorization name &1 is not allowed. <authorization-ID> is not a valid authorization ID.	Reason: The server cannot execute a SQL SELECT statement when the user account does not have permission to create or execute the required DB2 packages. Action: Verify connection information to ensure the Package Collection value matches DB2 collection in which HIS 2010 packages are defined for execution by current user identifier or PUBLIC. Manually create HIS 2010 packages for execution by current user ID or PUBLIC, using Data Access Tool, Data Source Wizard, Data Links, or Data Access Library. Connect to DB2 using an authorization ID that is privileged to automatically create HIS 2010 packages (CREATE, BIND and EXECUTE privileges). For more information, see topic on Package Collection.
42710	-601	THE NAME (VERSION OR VOLUME SERIAL NUMBER) OF THE OBJECTTO BE DEFINED OR THE TARGET OF A RENAME STATEMENT	Reason: The server cannot name an object when that name is already in use for another object of the same type. Action: Name the object uniquely compared to existing database objects.

		IS IDENTICAL TO THE EXISTING NAME (VERSION OR VOLUME SERIAL NUMBER) <object-name> OF THE OBJECT TYPE <object-type>. <name> in <schema> type <type> already exists. The name of the object to be created is identical to the existing name <name> of type <type>.	
42721	-725	THE SPECIAL REGISTER <register> AT LOCATION <location> WAS SUPPLIED AN INVALID VALUE	Reason: The server cannot process SET CURRENT SQLID statement when it contains an invalid value for user identifier or collection name. Action: Verify connection information to ensure the Default Qualifier value matches the DB2 collection in which object is cataloged. For more information, see topic on Default Qualifier.
23505	-803	AN INSERTED OR UPDATED VALUE IS INVALID BECAUSE THE INDEX IN INDEX SPACE <indexspace-name> CONSTRAINS COLUMNS OF THE TABLE SO NO TWO ROWS CAN CONTAIN DUPLICATE VALUES IN THOSE COLUMNS. RID OF EXISTING ROW IS X <row identifier> Duplicate key value specified. One or more values in the INSERT statement,	Reason: The server cannot execute an INSERT or UPDATE statement against a table that is constrained by a UNIQUE INDEX where the statement would result in duplicate values. Action: Verify the data values do not violate a constraint, by querying the system catalog (e.g. SYSIBM.SYSINDEXES) or executing a client schema query (e.g. OLE DB IDBSchemaRowsets::GetSchemas(DBSCHEMA_INDEXES) or ADO.NET MsDb2Connection.GetSchema(Indexes).

		UPDATE statement, or foreign key update caused by a DELETE statement are not valid because the primary key, unique constraint or unique index identified by <index-id> constrains table <table-name> from having duplicate values for the index key.	
51002	-805	DBRM OR PACKAGE NAME <location-name>.<collection-id>.<dbrmname>.<consistency-token> NOT FOUND IN PLAN <plan-name>. REASON <reason>. SQL package <package-name> in <collection-name> not found at DRDA Server. Package <package-name> was not found.	Reason: The server could not find the DB2 static SQL package required by the DB2 client to execute a dynamic SQL SELECT statement. Action: Verify connection information to ensure the Package Collection value matches DB2 collection in which HIS 2010 packages are defined for execution by current user ID or PUBLIC. For more information, see topic on Package Collection.
58004	-901	UNSUCCESSFUL EXECUTION CAUSED BY A SYSTEM ERROR THAT DOES NOT PRECLUDE THE SUCCESSFUL EXECUTION OF SUBSEQUENT SQL STATEMENTS. SQL system error. The SQL statement failed because of a non-severe system error. Subsequent SQL statements can be processed. (Reason	Reason: The server failed to execute the current SQL statement, but subsequent SQL statements may succeed. This error may be caused by a transaction commit fails within a Distributed Unit of Work, or an update fails due to a constraint, or the SQL statement contains an invalid length (0 or beyond maximum length). Action: The user should check the reason code where available to determine if further user or administrator action is required, as well as to determine how to avoid the error by modifying the application, transaction, or command.

		<reason>.)	
57011	-904	UNSUCCESSFUL EXECUTION CAUSED BY AN UNAVAILABLE RESOURCE. REASON <reason-code>, TYPE OF RESOURCE <resource-type>, AND RESOURCE NAME <resource-name>. Resource limit exceeded. Unsuccessful execution caused by an unavailable resource. Reason code: <reason-code>, type of resource: <resource-type>, and resource name: <resource-name>.	Reason: The server cannot execute the SQL statement because the object of the statement is unavailable. Action: Verify that the object and database are available and not in a deadlock, offline, or other unavailable state.
57033	-913	UNSUCCESSFUL EXECUTION CAUSED BY DEADLOCK OR TIMEOUT. REASON CODE <reason-code>, TYPE OF RESOURCE <resource-type>, AND RESOURCE NAME <resource-name>. Row or object <object-name> in <resource-name> type <resource-type> in use. Unsuccessful execution caused by deadlock or timeout. Reason code <reason-code>.	Reason: The server cannot execute the SQL statement because the object of the statement is unavailable. Action: Verify that the object and database are available and not in a deadlock, offline, or other unavailable state. Commit or rollback previous operation, and then disconnect from the database. Check the server reason code for more information on the state of the object (e.g. DB2 for z/OS reason code 00C90088 indicates a deadlock, whereas 00C9008E indicates a timeout.

Tracing

There are multiple options for tracing, which can help to capture problems in the data consumer application, OLE DB service components, Data Provider, DB2 network client, and DB2 database server.

SQL consumer tracing using SQL Server Profiler

SQL Server Profiler is a graphical user interface to SQL Trace for monitoring an instance of the Database Engine or Analysis Services. You can capture and save data about each event to a file or table to analyze later. For more information, see Introducing SQL Server Profiler (http://go.microsoft.com/fwlink/?LinkID=241520).

DB2 provider tracing using Provider Trace Utility

The Provider Trace Utility captures and saves information from the Microsoft client for DB2 network connections, OLE DB interfaces and data messages. For more information, see the Host Integration Server 2010 Trace Utility Help (http://go.microsoft.com/fwlink/?LinkID=180447) and SNA Trace Utility (http://go.microsoft.com/fwlink/?LinkID=180449).

Network tracing using Network Monitor

The Network Monitor captures network traffic for display and analysis. It enables you to perform tasks such as analyzing previously captured data in user-defined methods, extracting data from defined protocol parsers. It includes a Distributed Data Management (DDM) parser for use with the Data Provider. Contact Microsoft Customer Support Services for a copy of the DDM parser. For more information, see Network Monitor (http://go.microsoft.com/fwlink/?LinkID=180448).

DB2 server tracing using IBM tools

For more information, see the IBM DB2 Administration Guide for the applicable DB2 platform and version.

Windows Server events using Event Viewer

The Event Viewer is a Microsoft Management Console (MMC) snap-in that enables you to browse and manage event logs. For more information, see Event Viewer (http://go.microsoft.com/fwlink/?LinkID=131274).