IBM WebSphere Transformation Extender

DB2 (z/OS) Adapter

Version 8.1

Note
Before using this information, be sure to read the general information in "Notices" on page 17.

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Chapter 1. DB2 (z/OS) Adapter overview

Use the DB2 (z/OS) Adapter to access and manipulate data contained in databases that are DB2 data sources in the CICS and IMS environment. For all other z/OS environments, use the DB2 (z/OS ODBC) adapter. For more information about the DB2 (z/OS ODBC) adapter, see the DB2 (z/OS ODBC) documentation. You can install adapters on additional systems for remote database connectivity.

You can use the DB2 (z/OS) Adapter with a Command Server, the Software Development Kit, or with a map in a map rule.

If you plan to only use **mtsmaker** without an .mdq file to create each type tree, you do not need to use the Database Interface Designer. However, you will still need to use the Database Interface Designer to create maps on the workstation. For information about using **mtsmaker**, see the Resource Adapters documentation.

System requirements

Before installing and running the DB2 (z/OS) Adapter:

- Verify that you have installed the Language Environment (LE) run-time library. The DB2 (z/OS) Adapter is compatible with all supported releases of LE.

For more information, see the Command Server documentation.

Binding the application plan

Ensure that the application plan for the adapter you intend to use has been bound. For DB2 (z/OS ODBC), these plans are supplied by IBM. If you want to use the native DB2 adapter, the DBUTILE plan must be bound as described in the IBM WebSphere Transformation Extender for z/OS Release Notes on the product Web site (www.ibm.com/software/integration/wtx).

Chapter 2. Database columns and types

The Database Interface Designer and **mtsmaker** with the Type Tree Maker generate type trees for queries, tables, and views in a DB2-compliant Database Management System (DBMS). Item types are created in a type tree that represents the data types of the columns of a query, table, or view.

The Database Interface Designer and **mtsmaker** get information about columns by calling DB2 to describe the columns associated with a query, table, or view. DB2 returns the data type, length, and other information to the Database Interface Designer and **mtsmaker**. The Database Interface Designer and **mtsmaker** then map the DB2 data types to types in a type tree.

Item type properties

The following table lists the DB2 data types and the values of the item type properties to which they correspond when the type tree is generated. If using ODBC to access your DB2 data, see the ODBC Adapter documentation.

DB2 Data Type	Interpret as	Item Subclass Presentation	Length
INTEGER	Character	Number, Integer	*
SMALLINT	Character	Number, Integer	*
FLOAT	Binary	Number, Float	8
REAL	Binary	Number, Float	4
DOUBLE PRECISION	Binary	Number, Float	8
DECIMAL	Binary	Number, Packed	*
NUMERIC	Character	Number, Zoned	*
CHAR	Character	Text	*
VARCHAR	Character	Text	*
DATE	Character	Text	10
TIME	Character	Text	8
TIMESTAMP	Character	Text	26
GRAPHIC	Binary	Byte stream	*
VARGRAPHIC	Binary	Byte stream	*

*The DBMS dictates the length of this type.

Date and time formats

When using columns defined as date, time, or timestamp, use the following formats for both input and output.

Date:

```
ccyy-mm-dd
```

Time:

```
hh:mm:ss
```

Timestamp:

```
ccyy-mm-dd hh:mm:ss:ffffff
```

Format element descriptions:

cc two-digit century

yy two-digit year

mm two-digit month

dd two-digit day

hh two-digit hour

mi two-digit minute

ss two-digit second

.fff... optional fractional seconds

ffffff six-digit fraction of a second

hh24 two-digit hour using a 24-hour day

In the Generate Type Tree from dialog, use the **Represent date/time columns as text items** check box to define whether to automatically format this information as Date & Time (which is with this check box disabled, the result of which is shown in the **Item Subclass, Presentation** column) as a text string. When generated as a text string, it might be necessary to use either the TEXTTODATE or TEXTTOTIME function in a map rule to convert the text string to the date and time format required by the database. If you are generating new type trees, it is recommended that you disable this check box.

This **Represent date/time columns as text items** check box is modal. After it has been disabled, it will remain disabled for all subsequent type tree generations, regardless of source. Therefore, you must be careful in determining this setting.

Chapter 3. Database Interface Designer settings

When you define a DB2 (z/OS) database in the Database Interface Designer, in addition to the common settings available for all of the database-specific adapters in the Database Definition dialog, you need to enter information specific to DB2 (z/OS).

DB2 (z/OS) Adapter-specific settings include:

- **DB2 → Plan name**

  This is the name used to bind the plan when the DataStage TX products were installed.
- **DB2 → Subsystem name**

  This is the name used to specify the DB2 subsystem.
- **Have access to DB2 through ODBC**

  This check box determines whether you will access your DB2 database through ODBC and Client Access for Windows.

  If you do have ODBC access, the remaining fields must be assigned values.
- **ODBC Definition → Data source**

  This is the data source you defined in your development computer that is used by the Database Interface Designer to access the database information for design-time purposes.
- **Security → User ID**

  This is the user ID to connect to the DB2 subsystem.

  This field is used by the Database Interface Designer only. It is ignored when the map is run on z/OS.
- **Security → Password**

  This is the authorization password to connect to the DB2 subsystem.

  This field is used by the Database Interface Designer only. It is ignored when the map is run on z/OS.

Chapter 4. DB2 (z/OS) Adapter commands

Use the adapter commands when specifying data sources and targets. The applicability of many of the commands depends upon whether you are specifying a source or target, whether a database/query file (.mdq) is used, and the situations in which the usage of the command applies.

Adapter commands can be used in **GET → Source → Command** or **PUT → Target → Command** settings in the Map Designer and Integration Flow Designer, using GET, PUT, DBLOOKUP, or DBQUERY function calls, or overriding a data source or target using execution commands in a RUN function or on the command line.

DB2 (z/OS) Adapter-specific commands

The following section lists and describes those adapter commands that are DB2-specific database parameters. For a complete listing of all database-specific adapter commands, see the Resource Adapters documentation.

- ″Database Adapter Type (-DBTYPE)″
- ″Database/Query File (-MDQ)″

Database adapter type adapter command for DB2 (z/OS)

Use the Database Adapter Type adapter command (`-DBTYPE`) to specify the database adapter type.

```
-DBTYPE {DB2MVS|ODBC}
```

Option Description

DB2MVS
The database adapter type is z/OS and you must specify an .**mdq** file.

This must be specified if the original card is not a database and no database is specified using the Database/Query adapter command (`-MDQ`) and the Database Name adapter command (`-DBNAME`).

ODBC
The database adapter type is ODBC. In order to use the ODBC database adapter type, your systems programmer (DBA) must bind the ODBC default package and plans. For more information, see the topic regarding default plans and packages in the *IBM ODBC* documentation.

Database/query file adapter command for DB2 (z/OS)

Use the `-MDQ` command to specify the DDNAME that identifies the .mdq file.

```
-MDQ DDNAME
```

Option Description

DDNAME
Specify the DDNAME that identifies the .mdq file.

DB2 (z/OS) Adapter source commands

This summary shows the syntax of the adapter commands that can be used when defining a data source using an .mdq file or without using one, including both the required and optional adapter commands in the following situations:

- Using the **GET → Source → Command** setting in the Map Designer and Integration Flow Designer.
- Overriding a data source using the Input Source Override - Database execution command (-ID) using a RUN function or on the command line.
- Using a DBLOOKUP, DBQUERY, or GET function in map or component rules.

GET > source > command for DB2 (z/OS) Adapter

Use the Map Designer or Integration Flow Designer to specify **Database** as the value for the **GET → Source** setting and enter the database-specific adapter commands as desired for the **Command** setting.

Database command options when there is a database/query file:

```
'' '[-DBTYPE DB2MVS]
[-SOURCE datasource]
[-STMT SQL_statement]
[-VAR name=value...]
[-CSTMT [number]]
[{-TRACE [file|ERROR]}]' ''
```

Database command options when there is no database/query file:

```
'' '-DBTYPE ODBC
-STMT SQL_statement
[-SOURCE datasource]
[-VAR name=value...]
[-CSTMT [number]]
[{-TRACE [file|ERROR]}]' ''
```

DB2 (z/OS) Adapter database execution command (input source override)

Use the Input Source Override - Database execution command (-ID) to designate a database as the source or you can override one or more of the adapter command settings or database definitions in a RUN function or on the command line.

About syntax for quotation marks

The adapter commands are shown using a single quotation mark, which is the Windows syntax. For non-Windows platforms, use two single quotation marks followed by one single quotation mark and end with one single quotation mark followed by two single quotation marks.

Scenario: compiled map source is a database

Database/query file (.mdq)

```
'[-MDQ DDNAME
-DBNAME database_name]
[-QUERY query_name|-STMT SQL_stmt]
[-VAR name=value...]
[-CCARD|-CSTMT [number]]
[{-TRACE [file|ERROR]}]'
```

No database/query file (.mdq)

```
'-DBTYPE ODBC
-STMT SQL_statement
[-SOURCE datasource]
[-VAR name=value...]
[-CCARD|-CSTMT [number]]
[{-TRACE [file|ERROR]}]'
```

Scenario: compiled map source is not a database

Database/query file (.mdq)

```
'-MDQ DDNAME
-DBNAME database_name]
-QUERY query_name|-STMT SQL_stmt]
[-VAR name=value...]
[-CCARD|-CSTMT [number]]
[{-TRACE [file|ERROR]}]'
```

No database/query file (.mdq)

```
'-DBTYPE ODBC
-STMT SQL_statement
[-SOURCE datasource]
[-CCARD|-CSTMT [number]]
[{-TRACE [file|ERROR]}]'
```

DBLOOKUP or DBQUERY functions

The DBLOOKUP and DBQUERY functions can be used in component rules in the Type Designer and map rules in the Map Designer when creating a map that can be used without specifying a database/query file name (.mdq) or a database name.

Using DBLOOKUP with a database/query file:

```
DBLOOKUP
(''SQL_statement'',
''-MDQ DDNAME
-DBNAME database_name
[-CCARD|-CSTMT [number]]
[{-TRACE [file|ERROR]}]'')
```

Using DBQUERY without a database/query file:

```
DBQUERY
(''SQL_statement'',
''-DBTYPE ODBC
[-SOURCE datasource]
[-CCARD|-CSTMT [number]]
[{-TRACE [file|ERROR]}]'')
```

GET function

The GET function returns the data from the source adapter.

Using GET with a database/query file:

```
GET (''DB'', ''
-MDQ DDNAME
-DBNAME database_name
-QUERY query_name|-STMT SQL_stmt
[-VAR name=value...]
[-CCARD|-CSTMT [number]
[{-TRACE [file|ERROR]}]'')
```

Using GET without a database/query file:

```
GET ''DB'', ''
-DBTYPE ODBC
-STMT SQL_stmt
[-SOURCE datasource]
[-CCARD|-CSTMT [number]]
[{-TRACE [file|ERROR]}]'')
```

DB2 (z/OS) Adapter commands for a target

This summary shows the syntax of the adapter commands that can be used when defining a data target using an .mdq file or without using one, including both the required and optional adapter commands in the following situations:

- Using the **PUT** → **Target** → **Command** setting in the Map Designer and Integration Flow Designer.
- Overriding a data source using the Output Source Override - Database execution command (-OD) using a RUN function or on the command line
- Using the PUT function in map or component rules.

PUT > target > command for DB2 (z/OS) Adapter

Use the Map Designer or Integration Flow Designer to specify **Database** as the value for the **PUT** → **Target** setting and enter the adapter commands as desired for the **Command** setting.

About syntax for quotation marks

The adapter commands are shown using a single quotation mark, which is the Windows syntax. For non-Windows platforms, use two single quotation marks followed by one single quotation mark and end with one single quotation mark followed by two single quotation marks.

Database command options when there is a database/query file

```
'' '[-DBTYPE DB2MVS]
[-SOURCE datasource]
[-TABLE table_name]
[-CSTMT [number]]
[-DELETE]
[-UPDATE [OFF|ONLY]]
[{-TRACE [file|ERROR]}]' ''
```

Database command options when there is no database/query file

```
'' '-DBTYPE ODBC
-TABLE table_name
[-SOURCE datasource]
[-CSTMT [number]]
[-DELETE]
[{-TRACE [file|ERROR]}]' ''
```

DB2 (z/OS) Adapter database execution command (output source override)

Use the Output Source Override - Database execution command (-OD) to designate a database as a target or you can override one or more of the adapter command settings or database definitions in a RUN function or on the command line.

About syntax for quotation marks

The adapter commands are shown using a single quotation mark, which is the Windows syntax. For non-Windows platforms, use two single quotation marks followed by one single quotation mark and end with one single quotation mark followed by two single quotation marks.

Scenario: compiled map target is a database

Database/query file (.mdq)

```
'[-MDQ DDNAME -DBNAME database_name]
[-TABLE table_name]
[-CCARD|-CSTMT [number]]
[-DELETE]
[-UPDATE [OFF|ONLY]]
[{-TRACE [file|ERROR]}]'
```

No database/query file (.mdq)

```
'-DBTYPE ODBC
-TABLE table_name
[-SOURCE datasource]
[-CCARD|-CSTMT [number]]
[-DELETE]
[-UPDATE [OFF|ONLY]]
[{-TRACE [file|ERROR]}]'
```

Scenario: compiled map target is not a database

Database/query file (.mdq)

```
'-MDQ DDNAME
-DBNAME database_name
-TABLE table_name
[-CCARD|-CSTMT [number]]
[-DELETE]
[-UPDATE [OFF|ONLY]]
[{-TRACE [file|ERROR]}]'
```

No database/query file (.mdq)

```
'-DBTYPE ODBC
-TABLE table_name
[-SOURCE datasource]
[-CCARD|-CSTMT [number]]
[-DELETE]
[-UPDATE [OFF|ONLY]]
[{-TRACE [file|ERROR]}]'
```

PUT function

Use the PUT function to pass data to the target adapter.

Using PUT with a database/query file

```
PUT (''DB'',  ''-MDQ DDNAME
-DBNAME database_name
-TABLE table_name
[-CCARD|-CSTMT[number]]
[-DELETE]
[-UPDATE [OFF|ONLY]]
[{-TRACE [file|ERROR]}]'')
```

Using PUT without a database/query file

```
PUT (''DB'',  ''-DBTYPE ODBC
-TABLE table_name
[-SOURCE datasource]
[-CCARD|-CSTMT [number]]
[-DELETE]
[{-TRACE[file|ERROR]}]'')
```

Chapter 5. DB2 (z/OS) Adapter limitations

The Database Interface Designer and adapters offer options and functions for accessing and manipulating data contained within a database. However, there are some restrictions and limitations of certain functions:

- **Stored Procedures**

  Using stored procedures to access adapter commands and return values from stored functions is not supported.
- **Bind Facility**

  Using bind values in database functions is not supported.
- **Database Triggers**

  Using a data source as an input event trigger for the Launcher is not supported.

Chapter 6. Return codes and error messages

Return codes and messages are returned when the particular activity completes. Return codes and messages can also be recorded as specified in the audit logs, trace files, execution summary files, and so forth.

For information about error codes and messages returned by database-specific adapters, refer to the Resource Adapters documentation.

Various troubleshooting tools are available in case you encounter problems while using the database adapters. For example, if you attempt to run a map that uses the adapter and encounter problems or do not receive the expected results, use the following adapter troubleshooting tools:

- adapter audit log (.log)
- adapter trace file (.mtr)

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