

*IBM SPSS Modeler 17.1 Scoring
Adapter Installation*

IBM

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IBM SPSS Modeler Scoring Adapter Installation

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For some databases it is possible to enable SQL pushback of the majority of the SPSS® Modeler model nuggets. In this way, model scoring can be performed within the database, avoiding the need to extract the data before scoring. This pushback can either use the native SQL within SPSS Modeler or, where available, use additional SQL scoring adapters that are tailored for different databases.

The scoring adapters support scoring of most model nuggets in a stream, with the following exceptions:

- Association Rules (with list data), TimeSeries, Sequence, PCA, STP, and TCM are not supported.
- Association models do not support transactional format.
- Text Analytics (TA) - Field mode is supported in DB2 LUW but not the other databases; TA is not supported with DB2 for z/OS. When using the TA scoring adapter in field mode, the returned row length may contain many scoring output columns, which can result in some database limits being exceeded. For example, you might see the error message TOO MANY ITEMS RETURNED IN SELECT OR INSERT LIST. Sometimes these limits can be changed in the database but, if that is not possible, the recommended approach is to use record mode to score the model.

The use of scoring adapters that enable data to be scored by the generated models within the database to avoid data transfer. SPSS Modeler enables integration with IBM and non-IBM databases, and enable models to be deployed faster and with greater efficiency. The DB2 for z/OS user defined functions (UDFs) can also be used in real time against transactional data such as high volume sales, credit card payment, and customer service and claims transactions.

Where scoring adapters are installed into the relevant databases the SQL generation option generates scoring adapter SQL by default, unless you specifically choose to override this. The databases for which scoring adapters are available are:

- Netezza
- Teradata
- DB2 LUW
- DB2 for z/OS

A model nugget can also be published for use in real time deployment against DB2 for z/OS. The steps to publish to a scoring adapter are:

1. Establish a connection to the database
2. When the connection is setup, publish the nugget to the scoring adapter. To do this, select the **Publish for server scoring adapter** option on the **File** menu of the model nugget.
3. When the nugget information is published to the scoring adapter it generates a sample SQL statement. This SQL statement uses UDFs to invoke the model nugget and generates a predictive score. When the sample SQL contains multiple SQL statements they should be executed in the order in which they were generated.

About scoring

In IBM® SPSS Modeler, scoring data is defined as deploying a predictive model on new data with an unknown outcome. This predictive model processes incoming data and gives a predictive score about the likelihood or probability of an event. For example, when an online payment transaction takes place, a predictive model processes the input data and provides a predictive score which gives the probability of a transaction being either genuine or a fraud.

The normal process within SPSS Modeler is that when a predictive model receives incoming data it evaluates the input using historical data from a database and creates an output of a predicted score. This score gives a probability about an event for which a predictive analysis model is built.

The predictive model process using a scoring adapter differs from this in that the scoring adapter enables the evaluation of each record and for producing a score, or prediction, in the database without the need to export the data from database, run it through the model, and import it back again thereby making the whole process quicker.

Installing IBM SPSS Modeler Server Scoring Adapter for Netezza

If you have a previous version of the scoring adapter for Netezza installed, first you must uninstall it as follows:

1. Locate the executable file named Uninstall IBM SPSS Modeler Server Scoring Adapter for Netezza in the Netezza scoring adapter's installation directory. It's in a folder named Uninstall IBM SPSS Modeler Server Scoring Adapter for Netezza.
2. Run the executable file either from the console or by using the graphical user interface (GUI). Follow the instructions in the uninstaller to uninstall the scoring adapter.
3. If you receive a message that some items could not be removed, go to the root directory where the adapter had been (the `cfscoring` directory, for example) and run the command `rm -rf` on the listed directories that were not removed. This will remove them.
4. Proceed with the following steps to install the new version of the scoring adapter.

Depending on the configuration of your database you can install either from the console or by using a graphical user interface (GUI); however, the first step is the same for both methods:

- Run the `install.bin` install script. Ensure that `install.bin` can be executed by `nz user` and run it as that user.

Console Installation

1. Introduction details are displayed. Press Enter to continue.
2. Licensing information is displayed. Read the license, type Y to accept it, and press Enter to continue.
3. You are prompted to type the installation location. The default installation location is shown; however, if your installation is different, type the revised location and press Enter.

Note: The installation must be under the `/nz/export/` path.

4. You are prompted to enter the database name, database user name, and database password.

Note: The database user must have database access permissions to initialize the database and register the udf modules.

5. A pre-installation summary is displayed to confirm your entries so far. Press Enter to continue.
6. A message is displayed to say the installation routine is ready to run. Press Enter to continue.
7. A progress bar is displayed whilst the installation routine runs. When the installation is complete, press Enter to exit from the installer.

GUI Installation

1. Introduction details are displayed. Click **Next** to continue.
2. Licensing information is displayed. Read the license, select the option to accept it, and click **Next** to continue.
3. You are prompted to select the installation location. The default installation location is shown; however, if your installation of is different, click **Choose** to browse for the revised location. When the correct location is shown, click **Next**.
4. You are prompted to enter the database name, database user name, and database password.

Note: The database user must have database access permissions to initialize the database and register the UDF modules.

5. A pre-installation summary is displayed to confirm your entries so far. Click **Install** to continue.
6. A progress bar is displayed whilst the installation routine runs. When the installation is complete, click **Done** to exit from the installer.

When you have completed these steps the scoring adapter is ready to receive work.

Note: The Netezza UDF has a 64 field limit that can be processed by the scoring adapter. If that field limit is exceeded, the validation error message: SQL Validation Error: HY000[46] ERROR: Cannot pass more than 64 arguments to a function is displayed and model scoring continues without using the scoring adapter.

Installing IBM SPSS Modeler Server Scoring Adapter for Teradata

If you have a previous version of the scoring adapter for Teradata installed, first you must uninstall it as follows:

1. Locate the executable file named Uninstall IBM SPSS Modeler Server Scoring Adapter for Teradata in the Teradata scoring adapter's installation directory. It's in a folder named Uninstall IBM SPSS Modeler Server Scoring Adapter for Teradata.
2. Run the executable file either from the console or by using the graphical user interface (GUI). Follow the instructions in the uninstaller to uninstall the scoring adapter.
3. If you receive a message that some items could not be removed, go to the root directory where the adapter had been (the `cfscoring` directory, for example) and run the command `rm -rf` on the listed directories that were not removed. This will remove them.
4. Proceed with the following steps to install the new version of the scoring adapter.

Depending on the configuration of your database you can install either from the console or by using a graphical user interface (GUI); however, the first step is the same for both methods:

- Log in as either *root* or *DBA user* and run the *install.bin* install script. You must have access permissions for the installation folder to do this. The installing user must also have CREATE FUNCTION permissions.

Console Installation

1. Introduction details are displayed. Press Enter to continue.
2. Licensing information is displayed. Read the license, type Y to accept it, and press Enter to continue.
3. You are prompted to type the installation location. The default installation location is shown; however, if your installation is different, type the revised location and press Enter.
4. Enter the database TDPID. Press Enter to continue.
5. Enter the user name. Press Enter to continue.
6. Enter the password. Press Enter to continue.
7. A pre-installation summary is displayed to confirm your entries so far. Press Enter to continue.
8. A message is displayed to say the installation routine is ready to run. Press Enter to continue.
9. A progress bar is displayed whilst the installation routine runs. When the installation is complete, press Enter to exit from the installer.
10. If the *Components* table exists in your database a confirmation message is displayed. Either enter Y to continue creating tables and functions in your database, or enter N to skip this step. *Note:* If you skip this step you must manually create tables and functions later using `initdb.sh`, which is stored in the `<installation path>\setup` folder.

GUI Installation

1. Introduction details are displayed. Click **Next** to continue.

2. Licensing information is displayed. Read the license, select the option to accept it, and click **Next** to continue.
3. You are prompted to select the installation location. The default installation location is shown; however, if your installation of is different, click **Choose** to browse for the revised location. When the correct location is shown, click **Next**.
4. Enter the database TDPID, name, and password and click **Next** to continue.
5. A pre-installation summary is displayed to confirm your entries so far. Click **Install** to continue.
6. A progress bar is displayed whilst the installation routine runs. When the installation is complete, click **Done** to exit from the installer.
7. If the *Components* table exists in your database a confirmation message is displayed. Either click **Yes** to continue creating tables and functions in your database, or click **No** to skip this step. *Note:* If you skip this step you must manually create tables and functions later using `initdb.sh`, which is stored in the `<installation path>\setup` folder.

When you have completed these steps the scoring adapter is ready to receive work.

Note: The UDFs and COMPONENTS table are installed into the default database of the user who installs the scoring adapter.

Sharing the scoring adapter

To share the scoring adapter for use by other Teradata users:

1. Grant the following privileges to the user:
 - SELECT and EXECUTE FUNCTION on the database where the scoring adapter is installed.
 - INSERT on the COMPONENTS table on the database where the scoring adapter is installed.
2. When a database connection is made to Teradata with the scoring adapter installed, open the Database Preset dialog box, enable **Use Server Scoring Adapter Schema** and select the schema from the **Server Scoring Adapter Schema** drop down list.

Note: The Database Preset dialog box varies for different databases and is not supported by scripting; therefore, this step can only be done in SPSS Modeler Client.

Preventing SQL errors for date or time entries

If the ODBC driver for the Date or Time format is set to Integer, and your input table contains fields that are coded as Date, Time, or Timestamp; Teradata displays a SQL error message and is unable to process those fields.

To prevent this error from happening follow these steps:

1. Open the ODBC Data Source Administrator.
2. Open the DSN that uses the Teradata driver.
3. Click on **Options >>** to open the Teradata ODBC Driver Options dialog box.
4. On the top right side of the dialog box, set the **Date Time Format** to AAA.
5. Save your changes.
6. In IBM SPSS Modeler Server, remove the connection and then reconnect to the DSN that uses the Teradata driver.

Note: On Unix/Linux, the option is called: **DateTimeFormat**.

Installing IBM SPSS Modeler Server Scoring Adapter for DB2 LUW

Note: The DB2 LUW scoring adapter is only available on DB2 running on LINUX or AIX.

Note: The IBM SPSS Modeler Server Scoring Adapter may conflict with the DB2 LUW ANALYZE_TABLE embedded process for SAS because they share the same DB2 built in support.

If you have a previous version of the scoring adapter for Netezza installed, first you must uninstall it as follows:

1. Locate the executable file named Uninstall IBM SPSS Modeler Server Scoring Adapter for DB2 in the DB2 scoring adapter's installation directory. It's in a folder named Uninstall IBM SPSS Modeler Server Scoring Adapter for DB2.
2. Run the executable file either from the console or by using the graphical user interface (GUI). Follow the instructions in the uninstaller to uninstall the scoring adapter.
3. If you receive a message that some items could not be removed, go to the root directory where the adapter had been (the `cfscoring` directory, for example) and run the command `rm -rf` on the listed directories that were not removed. This will remove them.
4. Proceed with the following steps to install the new version of the scoring adapter.

Before installation, you need to shut down the DB2 LUW ANALYZE_TABLE embedded process using the `db2ida_epsps.sh` script provided in the IBM SPSS Modeler Server scoring adapter installation folder. To do this, use the DB2 command: `db2ida_epsps.sh stop`.

After installation, the DB2 LUW ANALYZE_TABLE embedded process should start automatically using `db2start`. However, if you install the adapter while a DB2 instance is active, you can start the DB2 LUW ANALYZE_TABLE embedded process manually by using the command: `db2ida_epsps.sh start`.

Note: The DB2 LUW ANALYZE_TABLE doesn't support the WITH table-expression clause if it contains UNION ALL. This may cause an error if you attempt to use this expression in a IBM SPSS Modeler node which generates UNION or UNION ALL SQL, such as the Append node.

Depending on the configuration of your database you can install either from the console or by using a graphical user interface (GUI); however, the first step is the same for both methods:

- Run the `install.bin` install script. Ensure that `install.bin` can be executed by `db2 user` and run it as that user.

Console Installation

1. Introduction details are displayed. Press Enter to continue.
2. Licensing information is displayed. Read the license, type 1 to accept it and press Enter.
3. You are prompted to type the installation location. The default installation location is shown; however, if your installation is different, type the revised location and press Enter.
4. You are prompted to enter the database name, database user name, and database password.
5. A pre-installation summary is displayed to confirm your entries so far. Press Enter to continue.
6. A message is displayed to say the installation routine is ready to run. Press Enter to continue.
7. A progress bar is displayed whilst the installation routine runs. When the installation is complete, press Enter to exit from the installer.

GUI Installation

1. Introduction details are displayed. Click **Next** to continue.
2. Licensing information is displayed. Read the license, select the option to accept it, and click **Next** to continue.
3. You are prompted to select the installation location. The default installation location is shown; however, if your installation is different, click **Choose** to browse for the revised location. When the correct location is shown, click **Next**.
4. You are prompted to enter the database name, database user name, and database password.
5. A pre-installation summary is displayed to confirm your entries so far. Click **Install** to continue.

6. A progress bar is displayed whilst the installation routine runs. When the installation is complete, click **Done** to exit from the installer.

When you have completed these steps the scoring adapter is ready to receive work.

Note: If you have problems scoring large Text Mining models via the Database Scoring Adapters for DB2 LUW, you may need to modify the database table column size parameter. If you encounter errors related to failing to insert the model into the components table, use a DB2 command such as the following to increase the column size parameter as appropriate:

```
ALTER TABLE COMPONENTS ALTER COLUMN MODELDS2 SET DATA TYPE BLOB(48M);
```

Installing IBM SPSS Modeler Server Scoring Adapter for DB2 for z/OS

IBM SPSS Modeler Server, together with IBM SPSS Modeler Server Scoring Adapter for DB2 for z/OS, provides the ability to add predictive analytics to On Line Transaction Processing (OLTP) applications running on z/OS. SPSS Modeler Server is used to create and train the models that are to be used and publishes those models into DB2 z/OS.

The scoring adapter for DB2 for z/OS provides a scoring engine that runs in the DB2 for z/OS User Defined Function (UDF) runtime. The adapter defines a UDF that applications can invoke using SQL to run the scoring models synchronously, in-line within their transactions, using live transaction data as the input for scoring to maximize the effectiveness of scoring results. Because the adapter runs embedded in DB2 z/OS, it provides the same scalability and performance as DB2 for z/OS itself enabling you to handle large loads and meet stringent response time Service Level Agreements (SLAs).

The scoring adapter runs as a USS (Unix System Services) application within a WLM (Work Load Manager) application environment for DB2 defined for exclusive use by the adapter. Do not attempt to share this WLM application environment with any other DB2 stored procedure or UDF.

The scoring adapter for DB2 for z/OS is only available as part of Program Number 5655-SP7 "IBM SPSS Modeler with Scoring Adapter for zEnterprise" as FMID (Function Modification Identifier) HHUMH00.

To install the scoring adapter, the z/OS system administrator must:

1. Order PID 5655-SP7 FMID HHUMH00.
2. Follow the installation instructions in the program directory to install the scoring adapter using SMP/E.

The following table lists the resulting SMP/E installed datasets and their contents:

Table 1. Dataset contents.

Dataset name	Contents
SHUMSAMP	The following configuration samples: HUMBIND - DB2 Bind the scoring adapter packages and plan HUMRACF - Set the required RACF privileges HUMSCFDB - Create the scoring adapter metadata database and tables HUMUDFS - Define scoring adapter UDFs HUMWLMP - PROC for Work Load Manager (WLM) Analytics application environment HUMWLMA - Define Work Load Manager (WLM) Analytics application environment
SHUMLOAD	Shared libraries (DLLs) and UDF executable.

Table 1. Dataset contents (continued).

Dataset name	Contents
SHUMHFS	<p>Default Mount at path: /usr/lpp/spss/cfscoring_<n.n>.. Where <n.n> is the version number of SPSS Modeler Server.</p> <p>All dynamically loaded and long named DLLs are externally linked from HFS to the HUMLOAD short name member during SMP/E installation.</p>
SHUMDBRM	DB2 package.

To configure the scoring adapter, you must modify the configuration jobs provided in SHUMSAMP. To tailor it for your particular installation of the scoring adapter you need to make the changes specified in the job itself; to do this, follow these steps:

1. Use HUMSCFDB to create the database and tables needed by the scoring adapter and to grant their use.
2. Use HUMWLMP to setup the WLM PROC that the scoring adapter will use.

Note: Ensure that the scoring adapter SHUMLOAD dataset is APF authorized.

3. Use HUMWLMA to define and activate the WLM application environment for the scoring adapter.

Note: Do not share this WLM application environment with any other application.

Note: Do not use a general WLMA application environment.

Note: Ensure you start the WLM Application Environment and the scoring UDF, if not started automatically or if they are stopped for any reason. Sample commands to do that are:

```
VARY WLM,APPLENV=DB1DWLM_ANALYTICS,RESUME
-START FUNCTION SPECIFIC(HUMSPSS.HUMSCORESPE)
```

4. Use HUMUDFS to create the scoring adapter UDFs.
5. Use HUMBIND to bind the scoring adapter packages and plan and to grant its use.

Note: The scoring adapter depends on PACK/UNPACK SQL provided by DB2 z/OS v10 in Authorized Program Analysis Reports (APARs) PM55928 and PM56631. In addition, DB2 APAR PM74654 provides a change critical for high performance. Ensure you have them applied to your DB2 subsystem before attempting to use the scoring adapter.

6. Define a very aggressive Work Load Manager Service class for use by the scoring adapter. It is recommended to start with a WLM goal of 95% completion within 70 microseconds and adjust as necessary.

Note: The scoring adapter is designed for performance, high concurrence, and scalability. To achieve that, ensure that the limit for these two z/OS system resources is set high enough to handle the required levels of concurrency. It is recommended you set them at these levels and adjust as necessary after peak workloads. Use DISPLAY OMVS,L to check the limits that are set:

```
SETOMVS IPCSEMIDS=680
SETOMVS MAXPROCSYS=32767
```

When you have completed these steps the scoring adapter is ready to receive work; use IBM SPSS Modeler to create the models and publish them into DB2 z/OS for the scoring adapter. To do this, from the model nugget menu, choose **File > Publish to Server Scoring Adapter**, complete the details, and click **OK**.

The following table lists the potential error codes and their meaning:

Table 2. Error codes

Code	Name	Message
38700	EXFirst	
38701	EXScoreHomeNotDefined	Home directory for Scoring UDF is not defined
38702	EXTempDirNotDefined	Temp directory for Scoring UDF is not defined
38704	EXCFInitError	Failed to restore container. Check following cases: 1) Modeler and UDF version are compatible 2) In USS, public write access is granted at /tmp/cfscoring_!version_number! 3) In USS, /usr/lpp/spss/cfscoring_!version_number!/ext/lib/pasw.scoring/module.xml is ascii format
38705	EXCFFieldCountMismatch	Field count mismatch
38706	EXCFFieldStorageTypeMismatch	Field types do not match
38707	EXCFReportedError	
38708	EXPackedDecimalOutOfRange	Value (%d) not in range to write to a packed decimal byte

Table 2. Error codes (continued)

Code	Name	Message
38709	EXBufferTooSmall	<p>Binary data not large enough</p> <p>Binary data is too small to contain all of the type information</p> <p>Binary data is too small to contain the 8 byte integer for column %d</p> <p>Binary data is too small to contain the 4 byte integer for column %d</p> <p>Binary data is too small to contain the 2 byte integer for column %d</p> <p>Binary data is too small to contain the precision/scale bytes for column %d</p> <p>Binary data is too small to contain the packed bytes (%d bytes) for column %d</p> <p>Binary data is too small to contain the 8 byte double for column %d</p> <p>Binary data is too small to contain the 4 byte date for column %d</p> <p>Binary data is too small to contain the 3 byte date for column %d</p> <p>Binary data is too small to contain the 9+ byte timestamp for column %d</p> <p>Binary data is too small to contain the precision bytes and timezone bytes for the timestamp in column %d</p> <p>Binary data is too small to contain the precision bytes for the timestamp in column %d</p> <p>Binary data is too small to contain the fixed length part of the string for column %d</p> <p>Binary data is too small to contain the string data for column %d</p> <p>Output buffer is not large enough to store the type information</p> <p>Binary data is too small to contain the integer data for column %d</p> <p>Binary data is too small to contain the real data for column %d</p> <p>Binary data is too small to contain the date data for column %d</p> <p>Binary data is too small to contain the time data for column %d</p> <p>Binary data is too small to contain all of the type information</p>

Table 2. Error codes (continued)

Code	Name	Message
38710	EXFailedToReadFromIterator	Failed to read value for column %d
38711	EXInvalidDecimalDigit	Non decimal digit found in the packed decimal
38712	EXBinaryDataVersion	Binary data is newer than the currently supported version
38713	EXBinaryDataColumnCount	Binary data contains the wrong number of columns. Expected %d, got %d Expected at least one column
38714	EXIntegerTypeUnexpected	Unexpected column type for column %d. Expected a column of type %s but got an Integer
38715	EXRealTypeUnexpected	Unexpected column type for column %d. Expected a column of type %s but got a packed decimal Unexpected column type for column %d. Expected a column of type %s but got a Real
38716	EXDateTypeUnexpected	Unexpected column type for column %d. Expected a column of type %s but got a Date
38717	EXTimeTypeUnexpected	Unexpected column type for column %d. Expected a column of type %s but got a Time
38718	EXTimestampTypeUnexpected	Unexpected column type for column %d. Expected a column of type %s but got a Timestamp
38719	EXStringTypeUnexpected	Unexpected column type for column %d. Expected a column of type %s but got a String
38720	EXICUFailedForCCSID	Failed to open ICU for ccsid (%d) with ICU error: %s
38721	EXICUConversionToUTF16Failed	Failed to convert string from ccsid (%d) to UTF16 with ICU error: %s
38722	EXICUConversionToUTF8Failed	Failed to convert string from UTF16 to UTF8 with ICU error: %s
38723	EXUnknownDataTypeCode	Unknown datatype code of %d for column %d
38724	EXUnsupportedCodePage	The string for column %d contains an unsupported codepage (%d)
38725	EXIteratorColumnOutOfRange	Index of %d is outside the array size of %d
38726	EXNullMetaData	Input metadata is NULL
38727	EXFailedToGetMetadata	Failed to get output metadata
38728	EXFailedToRunJob	Failed to run job
38729	EXFailedToFindComponet	Component not found. Reason code = %d Published component not found. Reason code = %d
38730	EXFailedToCreateContainer	
38731	ExFailedToWriteContainer	
38732	ExUnknownParameter	Unknown value %s for parameter mode. Container file does not exist
38733	EXSchedulerCacheLRUNotFound	LRU item not found in map
38734	EXStringConversionError	
38735	EXFailedToCreateToken	Failed to create token using IEANTCR. Return code = %d
38736	EXFailedToGetToken	Failed to get token using IEANTRT. Return code = %d

Table 2. Error codes (continued)

Code	Name	Message
38737	EXCacheTokenNotInitialized	Cache token not initialized
38738	EXSemaphoreInvalid,	Invalid semaphore
38739	EXSemaphoreFailedToWait	Failed to wait for semaphore with errno=%d
38740	EXSemaphoreFailedToRelease	Failed to release semaphore with errno=%d
38741	EXLast	
38999	EXUnexpected	[IBM SPSS CF Scoring] Unexpected error



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