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SAS® Data Quality Accelerator 2.6 for Teradata

User's Guide

SAS® Documentation

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What's New in SAS Data Quality Accelerator 2.6 for Teradata

Overview

SAS Data Quality Accelerator 2.6 for Teradata includes internal enhancements that provide improved memory management and streamline the software infrastructure.

Chapter 1

Introduction to SAS Data Quality Accelerator for Teradata

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Introduction to the SAS Data Quality Accelerator for Teradata

SAS applications are often built to work with large volumes of data in environments that demand rigorous IT security and management. When the data is stored in an external database, such as a Teradata database, the transfer of large data sets to the computers that run the SAS System can cause a performance bottleneck. There are also possible unwanted security and resource management consequences for local data storage. SAS Data Quality Accelerator for Teradata addresses these challenges by moving computational tasks closer to the data and by improving the integration between the SAS System and the database management system (DBMS).

SAS Data Quality Accelerator for Teradata provides in-database data quality operations. The data quality operations are provided as Teradata stored procedures. A stored procedure is a subroutine that is stored in the database and is available to applications that access a relational database.

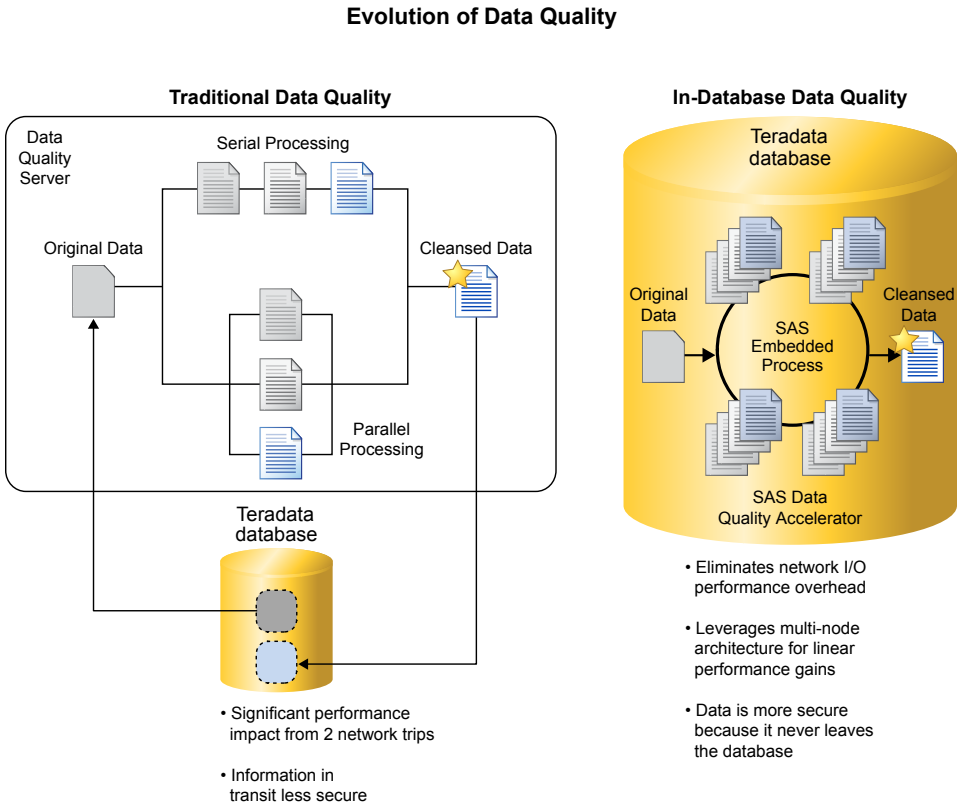
The stored procedures perform the following data quality operations:

- upper-casing, lower-casing, and proper-casing
- attribute extraction
- gender analysis
- identification analysis
- matchcode generation
- parsing
- pattern analysis

- standardization

Benefits of In-Database Processing

The following diagram illustrates the difference between in-database and outside-of-database data quality operations.



Executing data quality operations inside of the database rather than as a separate utility outside of the database provides the following benefits:

- eliminates network I/O performance
- leverages multi-node architectures for linear performance gains
- makes information more secure because it never leaves the database

Benefits of Teradata Stored Procedure Technology

The availability of the in-database data quality operations as Teradata stored procedures offers the following benefits:

- Because they are self-contained, the data quality stored procedures provide a good way to enforce standards for commonly used processes and avoid same-code proliferation.

- Programmatically, the data quality stored procedures can be nested in the definition of other stored procedures.
- The data quality stored procedures can be run anywhere a Teradata stored procedure can be run. They can be executed interactively by a user with a command-line interface such as the Teradata BTEQ utility. Or they can be executed in a client program by any language that supports a Teradata connection or a generic ODBC connection. Examples include the Base SAS SQL procedure; the Teradata Tools and Utilities (TTTU); scripting languages, such as Perl or Python; and third-party ETL tools.

Comparison to SAS Data Quality Server Functions

The data quality stored procedures provide similar data quality operations to those available with the following SAS Data Quality Server functions.

Table 1.1 *Data Quality Stored Procedures and Comparable SAS Data Quality Server Functions*

Stored Procedure Name	Function Name	Description
DQ_EXTRACT()	DQEXTRACT()	Extracts specific entities or attributes from a text string.
DQ_GENDER()	DQGENDER()	Determines the gender of a person from their name or other information. The input value is a text string.
DQ_GENDER_PARSED()	DQGENDERPARSED()	Determines the gender of a person from their name or other information. The input consists of one or more parsed character values.
DQ_IDENTIFY()	DQIDENTIFY()	Determines the type of data that is represented by a text string.
DQ_LOWERCASE()	DQCASE()	Lowercases text.
DQ_MATCH()	DQMATCH()	Generates a matchcode for a text string.
DQ_MATCH_PARSED()	DQMATCHPARSED	Generates a matchcode for one or more parsed character values.
DQ_PARSE()	DQPARSE() DQPARSETOKENGET()	Segments a string into semantically atomic tokens.
DQ_PATTERN()	DQPATTERN()	Returns a simple representation of a text string's character pattern.

Stored Procedure Name	Function Name	Description
DQ_PROPERCASE()	DQCASE()	Applies uppercase and lowercase lettering using context-sensitive rules.
DQ_STANDARDIZE()	DQSTANDARDIZE()	Generates a preferred standard representation of a string.
DQ_STANDARDIZE_PARSED()	Not applicable	Generates a preferred standard representation from one or more parsed values.
DQ_UPPERCASE()	DQCASE()	Uppercases text.
DQ_SET_LOCALE()	Not applicable (the locale is set by other means)	Sets the locale for data quality operations in the SQL session.
DQ_LIST_LOCALES()	DQLOCALEINFOGET (lists the locales that are currently available in memory)	Lists all of the locales in the current SAS Quality Knowledge Base.
DQ_LIST_DEFNS()	DQLOCALEINFOLIST( )	Lists the SAS Quality Knowledge Base definitions that are available for the specified operation and locale.
DQ_LIST_TOKENS()	Not applicable	Lists the input tokens that are available for a specified operation, Quality Knowledge Base definition, and locale.

The data quality stored procedures and SAS Data Quality Server functions differ in the following ways:

- SAS Data Quality Server functions operate outside of the database.
- SAS Data Quality Server functions operate on one data line at a time. The data quality stored procedures operate on the contents of an entire column of an input table.
- SAS Data Quality Server functions are applied dynamically. The data quality stored procedures can return output in a physical table or dynamically, as a *cursor*, which is a control structure that enables traversal over the records in a result set.
- A SAS language is required to use the SAS Data Quality Server functions. The data quality stored procedures can be run by any language that supports the Teradata SQL dialect.

Components of the Accelerator

SAS Data Quality Accelerator for Teradata consists of the following components:

1. SAS Embedded Process for Teradata. The SAS Embedded Process is a SAS server process that runs within Teradata to read and write data. Currently, the SAS Embedded Process for Teradata can be installed only on a Teradata Linux server.
2. SAS Quality Knowledge Base (QKB), a collection of data quality rules provided as part of the SAS Data Quality software offering. The QKB comes equipped with a standard collection of data quality rules, which you can modify for your needs in DataFlux Data Management Studio. The QKB can originate from a Windows or UNIX system.
3. Tools for packaging and deploying the QKB and SAS Embedded Process on the Teradata nodes.
4. Tools for creating and administering the data quality stored procedures in the Teradata database.
5. The data quality stored procedures.

Each component has separate installation and maintenance steps. For more information, see Chapter 2, "Post-Installation Configuration and Administration," on page 7.

About This Document

This document describes how to install the data quality stored procedures in the Teradata database. It also describes how to use the data quality stored procedures to improve data quality at your site.

Audience

The audience for this product is IT organizations that want to improve data quality so that their programs run on clean data.

Chapter 2

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Prerequisites

The following products need to be installed along with SAS Data Quality Accelerator for Teradata:

- SAS Foundation
- SAS/ACCESS Interface to Teradata
- SAS Data Quality Standard software offering

SAS/ACCESS Interface to Teradata contains the SAS Embedded Process for Teradata.

The SAS Data Quality Standard software offering represents the minimum level of data quality functionality that must be available to use the SAS Data Quality Accelerator for Teradata. More advanced data quality offerings can be used, but they are not required. The SAS Data Quality Standard software offering includes SAS Quality Knowledge Base (QKB) and DataFlux Data Management Studio software. The QKB is required by the accelerator. DataFlux Data Management Studio software enables you to customize the definitions in the SAS Quality Knowledge Base.

A Teradata database version of 13.10.02.01 or later is required. Each Teradata node needs approximately 200MB of disk space in the **/opt** file system for the SAS Embedded Process and approximately 8 GB for the QKB.

Post-Installation Steps

After the required products are installed, the SAS Data Quality Accelerator for Teradata requires the following additional setup before it can be used:

1. Customize the SAS Quality Knowledge Base (optional).
2. Package the QKB for deployment (required).
3. Install the SAS Embedded Process for Teradata package, SAS Embedded Process support functions, and QKB package on the Teradata nodes.
4. Run accelerator shell scripts to create the stored procedures in the Teradata database and grant users permissions to the stored procedures.

Multi-Node Deployments

The SAS Embedded Process and QKB packages must be deployed on all Teradata nodes. These instructions use the Teradata Parallel Upgrade Tool to deploy the package files. This tool deploys the software on all nodes simultaneously.

Shell scripts that create (or remove) the stored procedures are run once, in the Teradata database, using SQL statements.

Overview of SAS Data Quality Accelerator for Teradata Scripts

The SAS Data Quality Accelerator for Teradata comes with four scripts:

- a QKB packaging script named qkb_pack
- stored procedure installation and uninstallation scripts, named dq_install.sh and dq_uninstall.sh, respectively
- a user authorization script named dq_grant.sh

The scripts are created in the ***<SAS-installation-directory>*/SASTKInDatabaseServer/9.4/TeradataonLinux/misc/deployment** directory of the SAS/ACCESS installation.

All of the shell scripts except qkb_pack need to be run from a system with a UNIX shell and BTEQ available. This system does not necessarily have to be any of the database systems themselves. BTEQ can be configured to access the Teradata database over the network from a non-database system.

The dq_install.sh, dq_uninstall.sh, and dq_grant.sh shell scripts must be run by the Teradata systems administrator.

Choosing a QKB

You can deploy the QKB that was provided with your SAS Data Quality Accelerator for Teradata order into your Teradata database, or you can deploy a QKB that you are already using with other SAS software in your enterprise. After your initial deployment, you might want to periodically update the QKB in your Teradata database to make sure that you are using the latest QKB updates provided by SAS. See "Updating and Customizing the QKB" on page 9 for more information.

Updating and Customizing the QKB

SAS provides regular updates to the QKB. It is recommended that you update your QKB each time a new one is released. For a listing of the latest enhancements to the QKB, refer to "What's New in SAS Quality Knowledge Base." The What's New document is available on the SAS Quality Knowledge Base (QKB) product documentation page at support.sas.com. To find this page, either search on the name "SAS Quality Knowledge Base" or locate the name in the product index and click the Documentation tab. Check the What's New for each QKB to determine which definitions have been added, modified, or deprecated, and to learn about new locales that might be supported. Contact your SAS software representative to order updated QKBs and locales. To deploy a new QKB, follow the steps in "Packaging the QKB for Deployment" on page 9 and "Installing the SAS Embedded Process and Support Functions" on page 10. The accelerator supports one QKB in the Teradata database.

The standard definitions in the SAS Quality Knowledge Base are sufficient for performing most data quality operations. However, you can use the Customize feature of DataFlux Data Management Studio to modify the QKB definitions to meet specific needs.

If you wish to customize your QKB, then as a best practice, we recommend that you customize your QKB on a local workstation before copying it to the Teradata database for deployment. Then, when updates to the QKB are required, you can merge your customizations into the updated QKB locally and deploy a copy of the updated, customized QKB to the Teradata database. Refer to the online help provided with your SAS Quality Knowledge Base for information about how to merge any customizations that you have made into an updated QKB.

Packaging the QKB for Deployment

The qkb_pack script is provided to package the QKB for deployment on the Teradata nodes. The qkb_pack script is run on an existing QKB to create an .rpm file. An .rpm file is a file that is suitable for installation on Linux systems by Linux package management software. Windows and UNIX versions of qkb_pack are available.

Here is the syntax for executing qkb_pack:

Windows:

```
qkb_pack.cmd qkb-dir out-dir
```

UNIX:

```
./qkb_pack.sh qkb-dir out-dir
```

qkb-dir
specifies the path to the QKB. Use the name of the QKB's root directory. Typically, the root directory is found at the following locations:

Windows XP:	C:\Documents and Settings\All Users\Application Data\SAS\QKB. Specify the full pathname to the root directory (for example: C:\Documents and Settings\All Users\Application Data\SAS\QKB*product**version*).
Vista, Windows 7:	C:\ProgramData\SAS\QKB (example of full pathname: C:\ProgramData\SAS\QKB*product**version*).
UNIX:	/opt/sas/qkb/share

out-dir
specifies the directory where the package file is created. This argument is required.

The output package file has a name in the following form:

```
sasqkb_product-version-timestamp.noarch.rpm
```

product
is a two-character product code for the QKB, such as CI (for Contact Information) or PD (for Product Data).

version
is the version number of the QKB.

timestamp
is a UNIX datetime value that indicates when qkb_pack was invoked. A UNIX datetime value is stored as the number of seconds since January 1, 1970.

noarch
indicates the package file is an XML file, which is platform-independent.

Here is an example of an output filename, representing the QKB for Contact Information 22:

```
sasqkb_ci-22.0-1367606747659.noarch.rpm
```

Put the sasqkb package file on your Teradata database server in a location where it is both Read and Write accessible. The package file must be readable by the Teradata Parallel Upgrade Tool. You need to move this package file to the server machine in accordance with procedures used at your site.

After the package is on the Teradata database server, install the sasqkb package at the same time that you install the SAS Embedded Process package. For more information, see "Installing the SAS Embedded Process and Support Functions" on page 10.

Installing the SAS Embedded Process and Support Functions

The in-database deployment package for Teradata includes two deployment package files: a SAS Formats Library package and a SAS Embedded Process package. Only the SAS Embedded Process package, tkindbsrv, is required to be deployed for SAS Data

Quality Accelerator for Teradata. The accelerator requires tkindbsrv-9.41-1.x86_64.rpm or later.

In addition to tkindbsrv, you must install the SAS Embedded Process support function package. The support function package is provided by Teradata.

The steps for installing the SAS Embedded Process in the Teradata database differ depending on whether an earlier version of the embedded process already exists in the database.

Run this command on the Teradata nodes to check for the current installed version of the SAS Embedded Process.

```
psh "rpm -q -a" | grep tkindbsrv
```

If a previous version is installed, a result similar to this is displayed. The version number might be different.

```
tkindbsrv-9.41-1
```

If the SAS Embedded Process is not installed on the Teradata nodes, no output is displayed.

Instructions for installing the SAS Embedded Process and SAS Embedded Process support functions are provided in the Teradata section of the *SAS In-Database Products: Administrator's Guide*. See “Upgrading from or Reinstalling a Previous Version” or “Installing the SAS Formats Library and the SAS Embedded Process,” as appropriate.

When you get to the topic, “Installing the SAS Formats Library and the SAS Embedded Process with the Teradata Parallel Upgrade Tool” in the *SAS In-Database Products: Administrator's Guide*, follow the steps provided to install the tkindbsrv package and the sasqkb package. The SAS Embedded Process should be installed in the **`/opt`** file system of the Teradata nodes. The QKB will automatically be installed in the **`/opt/qkb/default`** directory. Then see “Installing the SAS Embedded Process Support Functions” in *SAS In-Database Products: Administrator's Guide* for information about how to install the support functions.

Note: It is not necessary to stop and restart the Teradata database when you install the SAS Embedded Process and QKB. However, if the SAS Embedded Process already exists and is running, you must stop it. It is also necessary to stop and restart the SAS Embedded Process for QKB updates. See “Controlling the SAS Embedded Process” in *SAS In-Database Products: Administrator's Guide* for more information.

You can manually verify that the tkindbsrv and sasqkb installations were successful by running these commands from the shell prompt:

```
psh "rpm -q -a" | grep tkindbsrv
psh "rpm -q -a" | grep sasqkb
```

If the installation was successful, tkindbsrv-9.41-**`n`** and sasqkb_ci-22.0-**`ttttttttttttt`** are displayed. **`n`** is a number that indicates the latest version of the tkindbsrv package file. If this is the initial installation, **`n`** has a value of 1. Each time you reinstall or upgrade, **`n`** is incremented by 1. **`ttttttttttttt`** is the timestamp assigned to the sasqkb package file by the qkb_pack script.

The SAS Data Quality Accelerator for Teradata binaries are installed as part of the tkindbsrv installation process. You do not need to take any further steps to install them.

Creating the Data Quality Stored Procedures

The data quality stored procedures are created in the Teradata database by running the dq_install.sh script. The dq_install.sh script needs to be run from a system with a UNIX shell and the Teradata BTEQ utility available.

The dq_install.sh script requires modification before it can be run. The Teradata administrator must edit the shell script to specify the site-specific Teradata server name and DBC user logon credentials for the DBC_PASS=, DBC_SRVR=, and DBC_USER= variables. Running dq_install.sh puts the data quality stored procedures into the SAS_SYSFNLIB database and enables the accelerator functionality.

Here is the syntax for executing dq_install.sh:

```
./dq_install.sh <-l log-path>
```

log-path
specifies an alternative name and location for the dq_install.sh log. When this parameter is omitted, the script creates a file named dq_install.log in the current directory.

Granting Users Authorization to the Data Quality Stored Procedures

The dq_grant.sh shell script is provided to enable the Teradata system administrator to grant users authorization to the data quality stored procedures. Before running the dq_grant.sh script, the Teradata administrator must edit it to specify the site-specific Teradata server name and DBC user logon credentials for the DBC_SRVR=, DBC_USER=, and DBC_PASS= variables. The user name specified in DBC_USER= and DBC_PASS= must have grant authority in the database.

Here is the syntax for executing dq_grant.sh:

```
./dq_grant.sh <-l log-path> user-name
```

log-path
specifies an alternative name and location for the dq_grant.sh log. When this parameter is omitted, the script creates a file named dq_grant.log in the current directory.

user-name
is the user name to which permission is being granted. The target user account must already exist in the Teradata database.

The authorizations granted by dq_grant.sh augment existing authorizations that the target user account already has in the Teradata database.

After you have installed the tkindsrv and sasqkb package files and run the dq_install.sh and dq_grant.sh scripts, the installation of the SAS Data Quality Accelerator for Teradata is complete.

Verifying the Accelerator Installation

Here is a simple BTEQ program that can be used to verify that the SAS Data Quality Accelerator for Teradata is operational.

The code first lists the locales that are installed in the QKB. Then it creates a table and executes the DQ_GENDER() stored procedure on the table. Before running the example, substitute a real value for the *output_table_1*, *output_table_2*, and *locale* variables throughout the program. This example assumes that the SAS Data Quality Accelerator for Teradata is using the QKB for Contact Information.

The CREATE VOLATILE TABLE statement is used to create a temporary input table named Dqacceltest that lasts for the duration of the SQL session. The example also sets the SAS Data Quality Accelerator DQ_OVERWRITE_TABLE option to create temporary output tables in the SAS Data Quality Accelerator session. If you run the example again in the same SAS Data Quality Accelerator session, the new output tables will overwrite any existing output tables and the output tables are automatically discarded at the end of the session.

```
call sas_sysfnlib.dq_list_locales('mydb.output_table_1');
select * from mydb.output_table_1;

call sas_sysfnlib.dq_set_option('DQ_OVERWRITE_TABLE', '1');

create volatile table mydb.dqacceltest (id integer, name varchar(64))
    unique primary index(id)
    on commit preserve rows;

insert into mydb.dqacceltest (id, name) values (1, 'John Smith');
insert into mydb.dqacceltest (id, name) values (2, 'Mary Jones');

call sas_sysfnlib.dq_gender('Name', 'mydb.dqacceltest', 'name', 'id',
'mydb.output_table_2', 'locale');

select gender from mydb.output_table_2;
```

If the request was successful, the SELECT statement produces an output table that contains this:

```
Gender
------
M
F
```

Troubleshooting the Accelerator Installation

Q. I ran the sample code and the output tables were not created in my user schema. What now?

A. The stored procedures can fail if one or more of the following are true:

- The request specifies an output location to which the user does not have Write permission. Verify that you have access to the database that is specified in the *output_table* parameters.
- The data quality stored procedures are not installed correctly. Verify that the stored procedures are in the SAS_SYSFNLIB database by executing the following command in BTEQ:

  ```
  select TableName from dbc.tables where databasename='SAS_SYSFNLIB'
  and tablename like 'dq_%';
  ```

  The command should return a list similar to the following:

  ```
  TableName
  ------------------------------
  dq_standardize_loc
  dq_format
  dq_set_qkb
  dqi_invoke_table
  dq_standardize
  dqi_replace_tags
  dq_identify
  dq_extract
  dq_debug
  dq_gender_loc
  dqi_tbl_basename
  dq_parse_loc
  ```

  If the procedures are absent, run the dq_install.sh script again, making sure you are logged in as Teradata system administrator.
- Permission to the data quality stored procedures is not granted correctly. Verify that the target user name submitted to the dq_grant.sh script is a valid user account in the Teradata database. Verify that the database server and granter information in the dq_grant.sh shell script is correct.
- The QKB is not in the correct location. Look for subdirectories similar to the following in the **`/opt/qkb/default`** directory on the Teradata nodes: **`chopinfo`**, **`grammar`**, **`locale`**, **`phonetx`**, **`regexlib`**, **`scheme`**, and **`vocab`**.
- The database connection does not specify MODE=TERADATA. When you submit the data quality stored procedures in SAS PROC SQL using explicit pass-through, the database connection is made in ANSI mode by default. You must specify the MODE= option to switch to Teradata mode. See "Using Data Quality Stored Procedures in Base SAS" on page 48 for information about how this option is specified. Consult appropriate documentation for how to set Teradata mode in other client programs.

Removing the Procedures from the Database

The accelerator provides the dq_uninstall.sh shell script for removing the data quality stored procedures from the Teradata database.

The dq_uninstall.sh shell script requires modification before it can be run. The Teradata administrator must edit the shell script to specify the site-specific Teradata server name and DBC user logon credentials for the DBC_PASS=, DBC_SRVR=, and DBC_USER= variables.

Here is the syntax for executing dq_uninstall.sh:

```
./dq_uninstall.sh <-l log-path>
```

log-path
specifies an alternative name and location for the dq_uninstall.sh log. When this parameter is omitted, the script creates a file named dq_uninstall.log in the current directory.

Running dq_uninstall.sh disables the SAS Data Quality Accelerator for Teradata functionality and removes the data quality stored procedures from the database. The dq_uninstall.sh script does not remove the QKB or the SAS Embedded Process from the Teradata nodes. Follow whatever procedure is appropriate at your site for removing the QKB. See *SAS In-Database Products: Administrator's Guide* for information about how to stop the SAS Embedded Process and remove SAS in-database components from the Teradata database. The dq_grant.sh script also does not remove permissions that were granted by dq_grant.sh. You need to remove the permissions in accordance with the procedures used at your site.

Chapter 3

Overview of Data Quality Operations

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Overview

This section illustrates the data quality operations that can be performed with the data quality stored procedures.

Casing

Casing applies context-sensitive case rules to text. It operates on character content, such as names, organizations, and addresses. Casing is applied with the DQ_LOWERCASE(), DQ_PROPERCASE(), and DQ_UPPERCASE() stored procedures.

Table 3.1 *Examples of Case Stored Procedure Inputs and Outputs*

Input	Procedure	Output
SAS INSTITUTE	DQ_LOWERCASE	sas institute
	DQ_UPPERCASE	SAS INSTITUTE
	DQ_PROPERCASE	SAS Institute

Extraction

Extraction returns one or more extracted text values, or tokens, as output. Extraction is performed with the DQ_EXTRACT() stored procedure.

Table 3.2 *Example of Extraction*

Input	Output	
Blue men's long-sleeved button-down collar denim shirt	Color:	Blue
	Material:	Denim
	Item:	Shirt

Gender Analysis

Gender analysis evaluates the name or other information about an individual to determine the gender of that individual. If the evaluation finds substantial clues that indicate gender, the function returns a value that indicates that the gender is female or male. If the evaluation is inconclusive, the stored procedure returns a value that indicates that the gender is unknown. The exact return value is determined by the specified gender analysis definition and locale.

Two stored procedures are provided to perform gender analysis. The DQ_GENDER() stored procedure parses and analyzes an input text string in order to return a gender value.

Table 3.3 *Example of Gender Analysis of a Text String*

Input	Output
Jane Smith	F
Sam Adams	M
P. Jones	U

The DQ_GENDER_PARSED() stored procedure analyzes pre-parsed values and returns a gender value based on the concatenated values.

Table 3.4 Example of Gender Analysis on Pre-parsed Values

Input Value 1	Input Value 2	Output
Jane	Smith	F
Sam	Adams	M
P.	Jones	U

Identification Analysis

Identification analysis returns a value that indicates the category of the content in an input character string. The available categories and return values depend on your choice of identification definition and locale. Identification analysis is performed with the DQ_IDENTIFY() stored procedure.

Table 3.5 Example of Identification Analysis

Input	Output
John Smith	NAME
SAS Institute	ORGANIZATION

Matching

Matching analyzes the input data and generates a matchcode for the data. The matchcode represents a condensed version of the character value. Similar strings get identical matchcodes. You can specify a sensitivity value that indicates the degree of similarity that should be applied to consider something a match. For higher sensitivities, two values must be very similar to produce the same matchcode. At lower sensitivities, two values might produce the same matchcode despite considerable dissimilarities. Records can be clustered by sorting by matchcodes. Fuzzy lookups can be performed via matchcode searches.

Two stored procedures are provided to perform matching. The DQ_MATCH() stored procedure parses and analyzes an input text string and generates a matchcode for the string.

Table 3.6 Example of Matching Text Strings

Input	Output
Gidley, Scott A	XYZ$$$

Input	Output
Scotty Gidleigh	XYZ$$$
Mr Scott Gidlee Jr.	XYZ$$$
Mr Robert J Brauer	ABC$$$
Bob Brauer	ABC$$$

The DQ_MATCH_PARSED() stored procedure analyzes pre-parsed values and generates a matchcode based on the concatenated values.

Table 3.7 *Example of Matching Pre-Parsed Values*

Prefix	Given Name	Middle Name	Family Name	Suffix	Output
	Scott	A.	Gidley		XYZ$$$
	Scotty		Gidleigh		XYZ$$$
Mr.	Scott		Gidlee	Jr.	XYZ$$$
Mr.	Robert	J	Brauer		ABC$$$
	Bob		Brauer		ABC$$$

Data quality stored procedures currently do not perform clustering. You need to retrieve matchcodes and matchcode index keys from the DBMS and use a product such as SAS Data Quality Server to cluster data to determine possible matches and to determine which record from each cluster is the survivor. After the survivors have been determined, issue SQL statements to select the cleansed data of index keys of relevant survivors and write them to the DBMS.

Parsing

Parsing segments a string into semantically atomic tokens. Parsing is performed with the DQ_PARSE() stored procedure.

Table 3.8 *Example of Parsing*

Input	Output	
Mr. Roy G. Biv Jr	Prefix:	Mr.
	Given Name:	Roy
	Middle Name:	G.
	Family Name:	Biv
	Suffix:	Jr

Pattern Analysis

Pattern analysis returns a simple representation of a text string's character pattern, which can be used for pattern frequency analysis in profiling jobs. Pattern analysis identifies words or characters in the input data column as numeric, alphabetic, non-alphanumeric, or mixed. The choice of pattern analysis definition determines the nature of the analysis. Pattern analysis is performed with the DQ_PATTERN() stored procedure.

Table 3.9 *Example of Pattern Analysis*

Input	Output
919-677-8000	999-999-999
NC	AA

Standardization

Standardization generates a preferred standard representation of data values. Standardization definitions are provided for character content such as dates, names, and postal codes. The available standardization definitions vary from one locale to the next. The return values are provided in the appropriate case, and insignificant blank spaces and punctuation are removed. The order of the elements in the return values might differ from the order of the elements in the input character values.

Two stored procedures are provided for performing standardization. The DQ_STANDARDIZE() stored procedure generates a preferred standard representation of a text string.

Table 3.10 *Example of Standardization of Different Text Strings*

Input	Output
N car	NC
919.6778000	(919) 677–8000
Smith, Mister James	Mr. James Smith

The DQ_STANDARDIZE_PARSED() stored procedure evaluates and generates a preferred standard representation of pre-parsed values. It reads a set of input tokens created in advance by using the DQ_LIST_TOKENS() and DQ_BIND_TOKEN() stored procedures and then creates a single standardized output string

Table 3.11 *Example of Standardization of Pre-Parsed Values*

Input			Output
Prefix	**Given Name**	**Family Name**	**Standardized**
Mister	James	Smith	Mr. James Smith

Chapter 4

Understanding the Stored Procedures

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Overview of Using the SAS Data Quality Accelerator for Teradata

The SAS Data Quality Accelerator for Teradata includes four categories of stored procedures: data quality, informational, session management, and pre-parsed support. The stored procedures in the informational, session management, and pre-parsed support categories provide supporting functionality for the data quality stored procedures. For a listing of the stored procedures, see "Categorized List of Stored Procedures" on page 29.

Invoking the Stored Procedures

All of the stored procedures are invoked with the CALL keyword from any product that supports the Teradata SQL dialect. For example, they might be run from within the Teradata command-line interface, BTEQ, or they might be provided to the database via an ODBC connection in any language that supports the Teradata SQL dialect.

How the Data Quality Stored Procedures Work

Overview

The data quality stored procedures use data quality rules from the SAS Quality Knowledge Base in order to cleanse data. The rules, referred to as *QKB definitions*, are operation- and locale-specific. That is, the definition that you specify in a stored procedure must be appropriate for both the locale and the data quality stored procedure. For more information, see "Selecting a QKB Definition" on page 24.

In order to execute any data quality stored procedure, you must set a locale. There are two ways to set a locale for a data quality operation. For more information, see "Setting a Locale" on page 25.

The majority of data quality stored procedures operate on the content of a single table column. For gender, match, and standardize operations, which must parse input data in order to evaluate it, the SAS Data Quality Accelerator provides parsing and pre-parsed variants. When the data to be examined is stored as a text string, use the DQ_GENDER, DQ_MATCH, and DQ_STANDARDIZE stored procedures. These stored procedures parse the input data internally before evaluating it. Use DQ_GENDER_PARSED, DQ_MATCH_PARSED, and DQ_STANDARDIZE_PARSED to evaluate pre-parsed data.

The stored procedures can return output in an output table or in a dynamic result set via a cursor. For more information, see "Controlling Stored Procedure Output" on page 25.

The stored procedures give you the option to include a primary key in the output. Including the primary key in the output enables you to join data quality stored procedure output tables.

Selecting a QKB Definition

You can list the QKB definitions that are available to your SAS Data Quality Accelerator session as follows:

1. Execute the DQ_LIST_LOCALES() stored procedure to list the installed locales.
2. Execute the DQ_LIST_DEFNS() stored procedure to list the definitions that are available for a specified locale and operation type.

DQ_LIST_DEFNS() returns a list of definition names. For more information about the definitions, see the QKB Help in DataFlux Data Management Studio. You can open the QKB Help in the original QKB installation on Windows or UNIX. The Help is typically installed at C:\Program Files\DataFlux\QKB\CI*release-number*\doc\html. Or you can use the DataFlux Data Management Studio Customize program to view the Help.

When selecting a definition, be careful to choose a definition that is appropriate for the stored procedure. For example, do not use a case definition that includes the string LOWER in its name in the DQ_PROPERCASE() stored procedure.

For more information, see "DQ_LIST_LOCALES()" on page 42 and "DQ_LIST_DEFNS()" on page 41.

Locating Token Names

In order to use the DQ_*OPERATION*_PARSED stored procedures, you must know the token names that are supported by the QKB definition that you want to use. The tokens supported for a definition depend on the operation and the locale. Execute the DQ_LIST_TOKENS() stored procedure to obtain a list of valid token names for the specified operation type and definition name. For more information, see "DQ_LIST_TOKENS()" on page 42.

Setting a Locale

There are two ways to set a locale for a data quality operation:

- Specify a locale value in the *locale* parameter of the data quality stored procedure.
- Execute the DQ_SET_LOCALE() stored procedure at the start of the SAS Data Quality Accelerator session, and specify NULL in the stored procedure's *locale* parameter.

Valid locale values can be obtained by executing the DQ_LIST_LOCALES() stored procedure.

Controlling Stored Procedure Output

The stored procedures can return output in an output table or in a dynamic result set via a cursor. A *cursor* is a control structure that enables traversal over the records in a result set. It facilitates subsequent processing (such as retrieval, addition, and removal of database records) by enabling the rows in the result set to be processed sequentially.

The output that is returned by a data quality stored procedure is controlled with the *out-table* parameter. The stored procedures create an output table when you specify a table name in the *out-table* parameter. They return a cursor when NULL is specified as the output table name. Not all languages that support SAS Data Quality Accelerator for Teradata support cursors. The SAS SQL procedure is one language that does not support returned cursors.

For best results when creating an output table, execute the DQ_SET_OPTION() stored procedure at the start of the session to set the DQ_OVERWRITE_TABLE option, or specify the name of a non-existent table in *out-table*. By default, all of the stored procedures append data if the output table exists. In the case of append, the existing table must have the exact same schema as the output table, or an error is returned. The Append operation also fails if the same _PK_ value is specified. Executing the DQ_SET_OPTION() stored procedure with the DQ_OVERWRITE_TABLE option changes the default session behavior to overwrite existing tables. The setting lasts for the duration of the session or until you change it by executing DQ_SET_OPTION('DQ_OVERWRITE_TABLE', '0').

Parsing versus Pre-Parsed Stored Procedure Variants

The difference between the parsing and pre-parsed variants of the gender, match, and standardize stored procedures is that the DQ_*OPERATION*_PARSED() stored procedures use token-to-column mappings to identify the data to be operated on by the stored procedure instead of a column name. The use of token-to-column mappings enables multiple columns to be submitted as input to the stored procedures while providing flexibility in the number of columns that can be submitted.

You identify the tokens that need mapping by executing the DQ_LIST_TOKENS() stored procedure. You create the token-to-column mappings by executing the DQ_BIND_TOKEN() stored procedure. The DQ_BIND_TOKEN() stored procedure maps one token to one column and must be run at least once on the input table before a DQ_*OPERATION*_PARSED stored procedure is run. Ideally, DQ_BIND_TOKEN() is executed for each input token supported for the QKB definition that will be used to cleanse the data. Unmapped tokens are treated as empty strings by the stored procedures.

DQ_BIND_TOKEN() is a session-based stored procedure. The mappings that it creates remain in session memory until you remove them, or until you log off. You can check for mappings in a session by executing the DQ_LIST_BINDINGS() stored procedure. You can remove them by executing the DQ_CLEAR_BINDINGS() stored procedure.

For best results, execute DQ_CLEAR_BINDINGS() to clear any previously used token-to-column mappings before creating new mappings.

Executing the Stored Procedures

All of the data quality stored procedures have the same general syntax, except for DQ_MATCH, which has an additional, operation-specific parameter. The DQ_*OPERATION*_PARSED stored procedures take one fewer parameter than their parsing counterparts. They do not have a *data-column* parameter.

For more information about stored procedure syntax, see "DQ_OPERATION Syntax" on page 31 and "DQ_OPERATION_PARSED Syntax" on page 34.

Content of the Stored Procedure Output Tables

An output table is created when the SAS Data Quality Accelerator stored procedures run without error.

Data Quality Stored Procedures

The output tables returned by the DQ_*OPERATION*() stored procedures have the following columns:

- Column _INPUT_ shows what the data in the column specified in the *data_column* parameter of the stored procedure call looked like before the data quality stored procedure was run.
- Column _ERR_ contains a blank value or an error message. A blank value indicates that the stored procedure ran successfully. Error messages are returned for memory errors and errors caused by internal processes.
- Column *Result* holds the result of applying the data quality operation to each input found in the column specified in the *data_column* parameter of the stored procedure call. This column is named after the operation (for example, **`Gender`**, **`Identified`**, **`Matchcode`**, **`Lowercase`**, **`Pattern`**, **`Propercase`**, **`Standardized`**, and **`Uppercase`**).

  The DQ_EXTRACT() and DQ_PARSE() stored procedures return a result column for each token present in the QKB definition named in the *definition* parameter of the stored procedure call. The columns are named after the tokens.
- Column _PK_ contains the values from the data column that was specified in the *pk_column* parameter of the stored procedure call. If the value of the *pk_column* parameter is NULL in the stored procedure call, then column _PK_ is not created in

the output table. When column _PK_ is created, it is created with the PRIMARY KEY constraint, permitting joins with the source table.

The output tables created by the DQ_*OPERATION*_PARSED stored procedures include _ERR_, *Result*, and can include_PK_. The *Result* column contains a string of the concatenated, cleansed input column values.

All of the columns in the output tables except column _PK_ and the result column for DQ_GENDER() have data type VARCHAR(1024). Column _PK_ has the same data type as the column that was specified in the *pk-column* parameter in the stored procedure call. The data type for the Gender column is VARCHAR(1).

Informational Stored Procedures

The DQ_LIST_LOCALES() and DQ_LIST_DEFNS() stored procedures return output tables consisting of two columns each. One column is specific to the stored procedure. The other column is_ERR_.

- The name of the column created by DQ_LIST_LOCALES() is **`Locale Name`**.
- The name of the column created by DQ_LIST_DEFNS() is **`Definition Name`**.

The DQ_LIST_TOKENS() stored procedure returns an output table consisting of two columns. The columns are named **`Order`** and **`Token Name`**. **`Order`** specifies a number that indicates the order in which the definition uses the token. The **`Order`** column is omitted when output is written to a cursor.

The DQ_LIST_BINDINGS() stored procedure returns an output table consisting of two columns. These columns are named **`Token Name`** and **`Column Name`**.

Pre-Parsed Stored Procedures

The DQ_BIND_TOKEN() and DQ_CLEAR_BINDINGS() stored procedures do not return an output table. DQ_BIND_TOKEN() creates token-to-column mappings in the SAS Data Quality Accelerator session that can be listed with DQ_LIST_BINDINGS().

Chapter 5

Stored Procedure: Reference

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Categorized List of Stored Procedures

The stored procedures, by category, are as follows:

Table 5.1 *Categorized List of SAS Data Quality Accelerator for Teradata Stored Procedures*

Category	Name	Description
Data Quality Operations	DQ_EXTRACT()	Extracts specific entities or attributes from a text string.
	DQ_GENDER()	Determines the gender of a person from their name or other information. The input value is a text string.
	DQ_GENDER_PARSED()	Determines the gender of a person from their name or other information. The input consists of one or more parsed character values.
	DQ_IDENTIFY()	Determines the type of data that is represented by a text string.
	DQ_LOWERCASE()	Lowercases text.

Category	Name	Description
	DQ_MATCH()	Generates a matchcode for a text string.
	DQ_MATCH_PARSED()	Generates a matchcode for one or more parsed character values.
	DQ_PARSE()	Segments a string into semantically atomic tokens.
	DQ_PATTERN()	Returns a simple representation of a text string's character pattern.
	DQ_PROPERCASE()	Applies uppercase and lowercase lettering using context-sensitive rules.
	DQ_STANDARDIZE()	Generates a preferred standard representation of a string.
	DQ_STANDARDIZE_PARSED()	Generates a preferred standard representation from one or more parsed values.
	DQ_UPPERCASE()	Uppercases text.
Informational	DQ_LIST_DEFNS()	Lists the QKB definitions that are available for the specified locale and definition type.
	DQ_LIST_LOCALES()	Lists the names of the locales that are installed in the QKB.
Session Management	DQ_SET_LOCALE()	Sets the locale for SAS Data Quality Accelerator stored procedures as a session value.
	DQ_SET_OPTION()	Sets options for the SAS Data Quality Accelerator session as key, value pairs.
Pre-Parsed Support	DQ_BIND_TOKEN()	Creates a token-to-column mapping in the SAS Data Quality Accelerator session.
	DQ_CLEAR_BINDINGS()	Clears token-to-column mappings from the SAS Data Quality Accelerator session.
	DQ_LIST_BINDINGS()	Generates an output table containing the current list of token-to-column mappings in the SAS Data Quality Accelerator session.
	DQ_LIST_TOKENS()	Lists the input tokens that are available for the specified operation, QKB definition, and locale.

All of the data quality stored procedures have the same general syntax, except for DQ_MATCH, which has an additional, operation-specific parameter. The DQ_*OPERATION*_PARSED() stored procedures take one fewer parameter (the _PARSED procedures do not have a *data-column* parameter). For more information about stored procedure syntax, see "DQ_OPERATION Syntax" on page 31 and "DQ_OPERATION_PARSED Syntax" on page 34.

For information about the other stored procedures, see the stored procedure.

DQ_*OPERATION* Syntax

Executes the specified data quality operation on the specified data column, internally parsing the input string if necessary.

Interaction

Applies to the DQ_EXTRACT(), DQ_GENDER(), DQ_IDENTIFY(), DQ_LOWERCASE(), DQ_MATCH(), DQ_PARSE(), DQ_PATTERN(), DQ_PROPERCASE(), and DQ_STANDARDIZE() stored procedures.

Syntax

DQ_*OPERATION* ('*definition*', <'*sensitivity*',> '*in-table*', '*data-column*', '*pk-column*', '*out-table*', '*locale*');

Parameters

OPERATION
specifies the name of the data quality operation. Valid values are EXTRACT, GENDER, IDENTIFY, LOWERCASE, MATCH, PARSE, PATTERN, PROPERCASE, or STANDARDIZE. Preface the completed stored procedure name with the name of the database in which it is located. For example, SAS_SYSFNLIB.DQ_OPERATION(). SAS_SYSFNLIB is the required database name.

'*definition*'
specifies the name of a SAS Quality Knowledge Base definition. The definition must be valid for the locale. Use "DQ_LIST_DEFNS()" on page 41 to identify the definitions that are available for the specified operation and locale.

'*sensitivity*'
specifies an integer that represents the degree of similarity that should be applied to consider something a match. The *sensitivity* parameter is used by the DQ_MATCH operation only, for which it is required. Valid values range from 50 to 95. The recommended sensitivity setting is 85. A higher sensitivity value requires greater similarity between input values for a match to be obtained. In general, higher sensitivity leads to fewer matches than lower sensitivity.

'*in-table*'
specifies the name of an existing database table containing data to be processed. Preface the table name with the database name.

'*data-column*'
specifies the name of the column in *in-table* that contains the data to be processed. This column must be a VARCHAR type.

Note: Any column name that is a reserved word in Teradata needs to be quoted when passed into a data quality stored procedure. For example:

```
call sas_sysfnlib.dq_parse('Date (MDY)', 'mydb.mytable', '"date"',
'_PK_', 'mydb.parsed', 'null')
```

'*pk-column*'
specifies the name of the column in *in-table* that contains the primary key or a null value. When this parameter is passed as NULL, then no primary key is transferred to the output table.

'*out-table*'
specifies the name of the database table where the result rows are written or a null value. Preface the table name with the database name. If the table does not exist, it is created.

For the best results, specify a non-existent table name, or use the DQ_SET_OPTION() stored procedure to set the DQ_OVERWRITE_TABLE option at the start of the session. By default, SAS Data Quality Accelerator stored procedures append results if a table with the name of the specified output table already exists. The DQ_OVERWRITE_TABLE option changes the default behavior to overwrite any existing tables. For more information, see "DQ_SET_OPTION()" on page 45.

When the *out-table* parameter is passed as NULL, the result set is dynamic and is returned as a cursor rather than being written to a specific table. For more information, see "Controlling Stored Procedure Output" on page 25.

'*locale*'
specifies an uppercase string specifying the five-letter ISO code name of the QKB locale to use for the session (for example, ENUSA) or a null value. When the *locale* parameter is passed as NULL, the locale value set by DQ_SET_LOCALE() stored procedure is used. You can use the DQ_LIST_LOCALES() stored procedure to identify the available locales. For more information, see "DQ_LIST_LOCALES()" on page 42.

Details

The strings passed to the data quality stored procedures need to be encoded in the ISO-8859-1 (Latin-1) encoding or some compatible encoding. This means that any table names or column names containing non-Western European characters are not supported. This restriction does not apply to the actual data in the columns. Unicode is supported within the columns, just not in the table metadata.

All parameters, except *sensitivity*, accept a string of up to 256 characters.

Example 1: DQ_GENDER()

This example uses the DQ_GENDER() stored procedure to return a gender value based on the text in the Name column of a table named People. The stored procedure uses a QKB definition named Name. The output is stored in a table named People_Gend.

```
call sas_sysfnlib.dq_gender(
      'Name',
      'mydb.People',
      'Name',
      'Id',
      'mydb.People_Gend',
      'ENUSA');

select * from mydb.People_Gend;
```

This is the content of the source table, People.

Display 5.1 *People Table*

Id	Name
1	JAMES K WRIGHT
2	Mr. Willie White

This is the content of the table that is returned by the DQ_GENDER() stored procedure. The gender value is in the Gender column.

Display 5.2 *Results of the DQ_GENDER() Stored Procedure*

INPUT	_ERR_	Gender	_PK_
JAMES K WRIGHT		M	1
Mr. Willie White		M	2

Example 2: DQ_STANDARDIZE()

This example uses the DQ_STANDARDIZE() stored procedure to standardize the values in the Name column of the People table. The stored procedure also uses a QKB definition named Name. The output is stored in a table named People_Std.

```
call sas_sysfnlib.dq_standardize(
      'Name',
      'mydb.People',
      'Name',
      'Id',
      'mydb.People_Std',
      'ENUSA');

select * from mydb.People_Std;
```

This is the content of table returned by the DQ_STANDARDIZE stored procedure.

Display 5.3 *Results of the DQ_STANDARDIZE() Stored Procedure*

ERR	Standardized	_PK_
	James K Wright	1
	Mr Willie White	2

DQ_*OPERATION*_PARSED Syntax

Executes the specified data quality operation on pre-parsed input tables. This syntax is available only for gender, match, and standardize operations.

Interaction

Applies to the DQ_GENDER_PARSED(), DQ_MATCH_PARSED(), and DQ_STANDARDIZE_PARSED() stored procedures.

Requirements

You must create token-to-column mappings with the DQ_LIST_TOKENS() and DQ_BIND_TOKEN() stored procedures before executing a DQ_*OPERATION*_PARSED() stored procedure.

Syntax

DQ_*OPERATION*_PARSED ('*definition*', <'*sensitivity*',> '*in-table*', '*pk-column*', '*out-table*', '*locale*');

Parameters

OPERATION
specifies the name of the data quality operation. Valid values are GENDER, MATCH, or STANDARDIZE. Preface the completed stored procedure name with the name of the database in which it is located. For example, SAS_SYSFNLIB.DQ_GENDER_PARSED(). SAS_SYSFNLIB is the required database name.

'*definition*'
specifies the name of a SAS Quality Knowledge Base definition. The definition must be valid in the current locale. Use "DQ_LIST_DEFNS()" on page 41 to identify the definitions that are available for the specified operation and locale.

'*sensitivity*'
specifies an integer that represents the degree of similarity that should be applied to consider something a match. The *sensitivity* parameter is used by the DQ_MATCH_PARSED operation only, for which it is required. Valid values range from 50 to 95. The recommended sensitivity setting is 85. A higher sensitivity value requires greater similarity between input values for a match to be obtained. In general, higher sensitivity leads to fewer matches than lower sensitivity.

'*in-table*'
specifies the name of an existing database table containing data to be processed. Preface the table name with the database name.

'*pk-column*'
specifies the name of the column in *in-table* that contains the primary key or a null value. When this parameter is passed as NULL, then no primary key is transferred to the output table.

'*out-table*'
specifies the name of the database table where the result rows are written or a null value. Preface the table name with the database name. If the table does not exist, it is created.

For the best results, specify a non-existent table name, or use the DQ_SET_OPTION() stored procedure to set the DQ_OVERWRITE_TABLE option at the start of the session. By default, SAS Data Quality Accelerator stored procedures append results if a table with the name of the specified output table already exists. The DQ_OVERWRITE_TABLE option changes the default behavior to overwrite existing tables. For more information, see "DQ_SET_OPTION()" on page 45.

When the *out-table* parameter is passed as NULL, the result set is dynamic and is returned as a cursor rather than being written to a specific table. For more information, see "Controlling Stored Procedure Output" on page 25.

'*locale*'
specifies an uppercase string specifying the five-letter ISO code name of the QKB locale to use for the session (for example, ENUSA) or a null value. When the *locale* parameter is passed as NULL, the locale value set by the DQ_SET_LOCALE() stored procedure is used. You can use the DQ_LIST_LOCALES() stored procedure to identify the available locales. For more information, see "DQ_LIST_LOCALES()" on page 42.

Details

The strings passed to the data quality stored procedures need to be encoded in the ISO-8859-1 (Latin-1) encoding or some compatible encoding. This means that any table names or column names containing non-Western European characters are not supported. This restriction does not apply to the actual data in the columns. Unicode is supported within the columns, just not in the table metadata.

All parameters except for *sensitivity* accept a string of up to 256 characters.

Example 1: DQ_GENDER_PARSED()

This example uses the DQ_GENDER_PARSED() stored procedure to return a gender value based on the values in the columns Honorific, First Name, and Middle Name from a table named PeopleParsed. The stored procedure uses a QKB definition called Name, which has Pre-Parsed support enabled in the QKB. The stored procedure reads a set of tokens that are created in advance by using the DQ_LIST_TOKENS() and DQ_BIND_TOKEN() stored procedures and then creates a single standardized output string based on those tokens. The output of the DQ_GENDER_PARSED() operation is stored in a table named PeopleParsed_Gend.

```
/* Execute DQ_LIST_TOKENS(), DQ_BIND_TOKEN() and DQ_LIST_BINDINGS() first */
call sas_sysfnlib.dq_gender_parsed(
     'Name',
     'mydb.PeopleParsed',
     'Id',
     'mydb.PeopleParsed_Gend',
     'ENUSA');

select * from mydb.PeopleParsed_Gend;
```

This is the content of the source table, PeopleParsed. Note that the name values are split across four columns.

Display 5.4 *PeopleParsed Table*

Id	Honorific	First_name	Middle_name	Last_name
1		JAMES	K	WRIGHT
2	Mr.	Willie		White

These are the input tokens returned by DQ_LIST_TOKENS() for a gender operation in the ENUSA locale. See "DQ_LIST_TOKENS()" on page 42 for an example of the code that was used to obtain the input tokens.

Display 5.5 *Tokens Supported for a Gender Operation in the ENUSA Locale*

Order	Token Name
1	Suffix
3	Middle Name
0	Prefix
2	Given Name

These are the column mappings. See "DQ_BIND_TOKEN()" on page 38 for the code to create the token-to-column maps. See "DQ_LIST_BINDINGS()" on page 40for the code to display the token-to-column mappings.

Display 5.6 *Column Mappings Defined for the PeopleParsed Gender Operation*

Token Name	Column Name
Middle Name	Middle_name
Prefix	Honorific
Given Name	First_name

These are the results of the DQ_GENDER_PARSED() stored procedure.

Display 5.7 *DQ_GENDER_PARSED() Output Table*

ERR	Gender	_PK_
	M	1
	M	2

Example 2: DQ_STANDARDIZE_PARSED()

This example uses the DQ_STANDARDIZE_PARSED() stored procedure to standardize the values in the Honorific, Middle_name, Given_name, and Family_name columns of the PeopleParsed table. The stored procedure uses a QKB definition called Name, which has Pre-Parsed support enabled in the QKB. The stored procedure reads a set of tokens that are created in advance by using the DQ_LIST_TOKENS() and DQ_BIND_TOKEN() stored procedures and then creates a single standardized output string based on those tokens. The output is stored in a table named PeopleParsed_Std.

```
/* Execute DB_LIST_TOKENS, DB_BIND_TOKEN() and DQ_LIST_BINDINGS() first */
call sas_sysfnlib.dq_standardize_parsed(
     'Name',
     'mydb.PeopleParsed',
     'Id',
     'mydb.PeopleParsed_Std',
     'ENUSA');

select * from mydb.PeopleParsed_Std;
```

These are the input tokens returned by the DQ_LIST_TOKENS() stored procedure for the standardization operation in the ENUSA locale. See “DQ_LIST_TOKENS()” on page 42 for the code to obtain the tokens.

Display 5.8 *Tokens Supported for Standardizing Names in the ENUSA Locale*

Order	Token Name
5	Title/Additional Info
4	Suffix
3	Family Name
0	Prefix
1	Given Name
2	Middle Name

The Name definition provided for standardization operations supports several more input tokens than the Name definition for gender operations. It is not necessary to create a column mapping for every token. See “DQ_BIND_TOKEN()” on page 38 for the code to create the column mappings and “DQ_LIST_BINDINGS()” on page 40 for the code to display them.

These are the column mappings.

Display 5.9 *Column Mappings Defined for the PeopleParsed Standardization Operation*

Token Name	Column Name
Middle Name	Middle_name
Prefix	Honorific
Given Name	First_name
Family Name	Last_name

These are the results of the DQ_STANDARDIZE_PARSED() stored procedure:

Display 5.10 *DQ_STANDARDIZE_PARSED() Output Table*

ERR	Standardized	_PK_
	James K Wright	1
	Mr Willie White	2

Dictionary

DQ_BIND_TOKEN()

Creates a token-to-column mapping in the SAS Data Quality Accelerator session.

Category: Pre-Parsed Support

Requirements: The DQ_BIND_TOKEN() stored procedure must be executed at least once before executing a DQ_*OPERATION*_PARSED() stored procedure.

DQ_BIND_TOKEN() does not have visible output. Use DQ_LIST_BINDINGS() to display available token-to-column mappings.

Syntax

DQ_BIND_TOKEN('*token-name*', '*data-column*')

Parameters

token-name
specifies the name of an input token. Use the DQ_LIST_TOKENS() stored procedure to obtain a list of valid token names. For more information, see "DQ_LIST_TOKENS()" on page 42.

data-column
specifies the name of the data column to which to bind the token. The data column must exist in the table that is specified in the *in-table* parameter of the DQ_*OPERATION*_PARSED() stored procedure that follows. This column must be a VARCHAR type.

Details

This stored procedure creates one token-to-column map. Execute the stored procedure for each valid input token that you want to include in the evaluation of the specified QKB definition and operation.

DQ_BIND_TOKEN() is a session-based stored procedure. The token-to-column mappings created with DQ_BIND_TOKEN() remain in the SAS Data Quality Accelerator session until the session ends, or until you remove them with the DQ_CLEAR_BINDINGS() stored procedure. It is a good idea to check for and clear token-to-column mappings from any previous DQ_*OPERATION*_PARSED() operations before creating token-to-column mappings for another operation. Otherwise, any irrelevant token-to-column mappings that remain in the session will have a column in the next DQ_*OPERATION*_PARSED() stored procedure's output table. For more information, see "DQ_LIST_BINDINGS()" on page 40 and "DQ_CLEAR_BINDINGS()" on page 39.

Unmapped tokens are treated as empty strings by the DQ_*OPERATION*_PARSED stored procedures.

Examples

Example 1

The following code created the token-to-column mappings depicted in Display 5.6 on page 36.

```
call sas_sysfnlib.dq_bind_token('Prefix', 'Honorific')
call sas_sysfnlib.dq_bind_token('Given Name', 'First_name')
call sas_sysfnlib.dq_bind_token('Middle Name', 'Middle_name')
```

Example 2

The following code created the token-to-column mappings in Display 5.9 on page 38.

```
call sas_sysfnlib.dq_bind_token('Prefix', 'Honorific')
call sas_sysfnlib.dq_bind_token('Given Name', 'First_name')
call sas_sysfnlib.dq_bind_token('Middle Name', 'Middle_name')
call sas_sysfnlib.dq_bind_token('Family Name', 'Last_name')
```

DQ_CLEAR_BINDINGS()

Removes token-to-column mappings from the SAS Data Quality Accelerator session.

Category: Pre-Parsed Support

Syntax

DQ_CLEAR_BINDINGS()

Parameters

This stored procedure takes no parameters. It removes all token-to-column mappings in the SAS Data Quality Accelerator session.

Example

```
call sas_sysfnlib.dq_clear_bindings()
```

DQ_LIST_BINDINGS()

Lists the token-to-column mappings in the SAS Data Quality Accelerator session.

Category: Pre-Parsed Support

Interaction: Use DQ_LIST_BINDINGS() to list the token-to-column mappings that were created with DQ_BIND_TOKEN().

Syntax

DQ_LIST_BINDINGS('*out-table*')

Parameters

'*out-table*'

(optional) specifies the name of the database table where the result rows are written. Preface the table name with the database name. If the table does not exist, it is created.

For the best results, specify a non-existent table name, or use the DQ_SET_OPTION() stored procedure to set the DQ_OVERWRITE_TABLE option at the start of the session. By default, SAS Data Quality Accelerator stored procedures append results if a table with the name of the specified output table already exists. The DQ_OVERWRITE_TABLE option changes the default behavior to overwrite any existing tables. For more information, see "DQ_SET_OPTION()" on page 45.

When the *out-table* parameter is passed as NULL, the result set is dynamic and is returned as a cursor rather than being written to a specific table. For more information, see "Controlling Stored Procedure Output" on page 25.

Details

The token-to-column mappings remain in the SAS Data Quality Accelerator session until it ends, or until you use the DQ_CLEAR_BINDINGS() stored procedure to remove the column mappings from the session.

Examples

Example 1

The following code was used to display the token-to-column mappings in Display 5.6 on page 36.

```
call sas_sysfnlib.dq_list_bindings('mydb.gendermaps')
```

Example 2

The following code was used to display the token-to-column mappings in Display 5.9 on page 38.

```
call sas_sysfnlib.dq_list_bindings('mydb.standaridzemaps')
```

DQ_LIST_DEFNS()

Lists the QKB definitions available for the specified data quality operation type and locale.

Category: Informational

Syntax

DQ_LIST_DEFNS('*locale*', '*operation-type*', '*out-table*')

Parameters

'*locale*'

specifies an uppercase string specifying the five-letter ISO code name of the QKB locale to use for the session (for example, the ENUSA code name represents the "English, United States" locale). When the locale parameter is passed as NULL, the locale value set by DQ_SET_LOCALE() stored procedure is used. Use the DQ_LIST_LOCALES() stored procedure to identify the available locales. For more information, see "DQ_LIST_LOCALES()" on page 42.

'*operation-type*'

specifies a string that identifies the data quality operation for which to return definitions. Valid values are as follows:

- CASE
- EXTRACTION
- GENDER
- IDENTIFICATION
- MATCH
- PARSE
- PATTERN
- STANDARDIZATION

'*out-table*'

(optional) specifies the name of the database table where the result rows are written. Preface the table name with the database name. If the table does not exist, it is created.

For the best results, specify a non-existent table name, or use the DQ_SET_OPTION() stored procedure to set the DQ_OVERWRITE_TABLE option at the start of the session. By default, SAS Data Quality Accelerator stored procedures append results if a table with the name of the specified output table already exists. The DQ_OVERWRITE_TABLE option changes the default behavior to overwrite any existing tables. For more information, see "DQ_SET_OPTION()" on page 45.

When the *out-table* parameter is passed as NULL, the result set is dynamic and is returned as a cursor rather than being written to a specific table. For more information, see "Controlling Stored Procedure Output" on page 25.

Example

See "Using Data Quality Stored Procedures in Base SAS" on page 48 for more DQ_LIST_DEFNS() examples, and screen captures of the output tables.

```
call sas_sysfnlib.dq_list_defns('ENUSA', 'parse', 'mydb.parsedefs')
```

DQ_LIST_LOCALES()

Lists the locales available to SAS Data Quality Accelerator session.

Category: Informational

Syntax

DQ_LIST_LOCALES('*out-table*')

Parameters

'*out-table*'

(optional) specifies the name of the database table where the result rows are written. Preface the table name with the database name. If the table does not exist, it is created.

For the best results, specify a non-existent table name, or use the DQ_SET_OPTION() stored procedure to set the DQ_OVERWRITE_TABLE option at the start of the session. By default, SAS Data Quality Accelerator stored procedures append results if a table with the name of the specified output table already exists. The DQ_OVERWRITE_TABLE option changes the default behavior to overwrite any existing tables. For more information, see "DQ_SET_OPTION()" on page 45.

When the *out-table* parameter is passed as NULL, the result set is dynamic and is returned as a cursor rather than being written to a specific table. For more information, see "Controlling Stored Procedure Output" on page 25.

Example

See "Using Data Quality Stored Procedures in Base SAS" on page 48 for an example of a DQ_LIST_LOCALES() output table.

```
call sas_sysfnlib.dq_list_locales('mydb.loclist')
```

DQ_LIST_TOKENS()

Lists the input tokens that are available for a specified operation, Quality Knowledge Base definition, and locale.

Category: Pre-Parsed Support

Interaction: DQ_LIST_TOKENS() returns information needed by DQ_BIND_TOKEN().

Syntax

DQ_LIST_TOKENS('*locale*', '*operation-type*', '*definition*', '*out-table*')

Parameters

'*locale*'
is an uppercase string specifying the five-letter ISO code name of the QKB locale to use for the session (for example, ENUSA). Use the DQ_LIST_LOCALES() stored procedure to list the available locales. For more information, see "DQ_LIST_LOCALES()" on page 42.

'*operation-type*'
specifies a string that identifies the data quality operation for which the tokens are used. Valid values are as follows:

- GENDER
- MATCH
- PARSE
- STANDARDIZATION

'*definition*'
specifies the name of a SAS Quality Knowledge Base definition. The definition must be valid in the current locale. Use the DQ_LIST_DEFNS() stored procedure to identify the definitions that are available for the specified operation and locale. For more information, see "DQ_LIST_DEFNS()" on page 41.

'*out-table*'
(optional) specifies the name of the database table where the result rows are written. Preface the table name with the database name. If the table does not exist, it is created.

For the best results, specify a non-existent table name, or use the DQ_SET_OPTION() stored procedure to set the DQ_OVERWRITE_TABLE option at the start of the session. By default, SAS Data Quality Accelerator stored procedures append results if a table with the name of the specified output table already exists. The DQ_OVERWRITE_TABLE option changes the default behavior to overwrite any existing tables. For more information, see "DQ_SET_OPTION()" on page 45.

When the *out-table* parameter is passed as NULL, the result set is dynamic and is returned as a cursor rather than being written to a specific table. For more information, see "Controlling Stored Procedure Output" on page 25.

Details

DQ_LIST_TOKENS() identifies the input tokens that a QKB definition needs to make an evaluation for a specified operation and locale. You use this stored procedure to obtain the token names to specify in the DQ_BIND_TOKEN() stored procedure.

Not all tokens that are returned by DQ_LIST_TOKEN() must have a column mapped to them. However, at least one valid token-to-column mapping must exist in the SAS Data Quality Accelerator session for the DQ_*OPERATION*_PARSED() stored procedure to execute successfully.

Examples

Example 1

The following code created the token listing depicted in Display 5.5 on page 36.

```
call sas_sysfnlib.dq_list_tokens(
     'ENUSA',
     'gender',
     'name',
     'mydb.Name_tokens');

select * from mydb.Name_tokens;
```

Example 2

The following code created the token listing depicted in Display 5.8 on page 37.

```
call sas_sysfnlib.dq_list_tokens(
     'ENUSA',
     'standardization',
     'name',
     'mydb.Standardize_tokens');

select * from mydb.Standardize_tokens;
```

DQ_SET_LOCALE()

Establishes the locale for an in-database data quality stored procedure session.

Category: Session Management

Syntax

DQ_SET_LOCALE('*locale*')

Parameters

'*locale*'
is an uppercase string specifying the five-letter ISO code name of the QKB locale to use for the session (for example, ENUSA). You can obtain a listing of the valid locale values by using the DQ_LIST_LOCALES() stored procedures. For more information, see "DQ_LIST_LOCALES()" on page 42.

Details

DQ_SET_LOCALE is a session-based stored procedure that establishes the locale for the SAS Data Quality Accelerator session. The locale value set with this stored procedure is used when NULL is specified in the *locale* parameter of a SAS Data Quality Accelerator stored procedure.

Example

```
call sas_sysfnlib.dq_set_locale('ENUSA')
```

DQ_SET_OPTION()

Invokes optional behavior in the SAS Data Quality Accelerator session.

Category: Session Management

Syntax

DQ_SET_OPTION('*keyword*', '*value*')

Parameters

'*keyword*'
specifies the optional behavior to invoke. Currently one option is supported:

'DQ_OVERWRITE_TABLE'
specifies to overwrite existing stored procedure output tables instead of appending data to them.

'*value*'
specifies a Boolean value that controls the optional behavior. Specify 1 to turn on the optional behavior. Specify 0 (the default value) to turn it off. The option is session-based. If the default value is overridden, the session is reset to the default value when you log off.

Example

```
call sas_sysfnlib.dq_set_option('dq_overwrite_table', '1');
```

Chapter 6

Examples: Using the Stored Procedures in PROC SQL and BTEQ

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Usage Overview

The traditional data quality process involves the following steps:

1. Extract uncleansed source data from the DBMS to the SAS Data Quality Server.
2. Standardize the data.
3. Publish the cleansed data to the DBMS.

With SAS Data Quality Accelerator for Teradata, the extraction step is removed, and the process consists only of connecting to the DBMS and calling stored procedures to standardize the uncleansed source data.

Overview of Examples

This section shows two ways that you can connect to a Teradata database and execute SAS Data Quality Accelerator for Teradata stored procedures. The first example uses the Base SAS SQL procedure to execute the stored procedures. The second example uses the Teradata BTEQ utility to execute the stored procedures.

The sample code creates a small source table named MyDB.Employees, which contains raw data. Then, it executes SAS Data Quality Accelerator stored procedures to cleanse the data and create a report with the cleansed data. In the examples:

- The DQ_LIST_LOCALES() store procedure identifies the locales that are available to the session.
- The DQ_LIST_DEFNS() stored procedure lists the gender, parse, and standardize definitions for the ENUSA locale.
- The DQ_SET_OPTION() stored procedure specifies to overwrite any existing stored procedure output tables.

- The DQ_GENDER() stored procedure determines the gender of the employees in the source table.
- The DQ_PARSE() stored procedure splits the employee's first, middle, and last names.
- The DQ_STANDARDIZE() stored procedure standardizes the employees' addresses.
- SQL code joins the cleansed data.

The examples use the "English, United States" locale.

The Base SAS sample program contains extra code to print the stored procedure output tables.

Using Data Quality Stored Procedures in Base SAS

In a Base SAS session, you must use the SQL procedure to execute the data quality stored procedures. The stored procedures are executed through the SQL pass-through facility.

```
proc sql;
  /* Establish the connection to Teradata. */
  connect to teradata
    (server=teraserver
     user=myid
     password=mypwd
     database=mydb
     mode=teradata); 1

/* Set option to overwrite output tables */ 2
execute (
  call sas_sysfnlib.dq_set_option('DQ_OVERWRITE_TABLE', '1')
  ) by teradata;

/* List the available locales */ 3
  execute (
    call sas_sysfnlib.dq_list_locales('mydb.loclist')
  ) by teradata;
title 'Available Locales';
select * from connection to teradata (select * from mydb.loclist);

/* List the available gender, parse, and standardize */ 4
/* definitions for the ENUSA locale */

  execute (
    call sas_sysfnlib.dq_list_defns('ENUSA', 'gender','mydb.gendefs')
  ) by teradata;
title 'Listing of ENUSA Gender Definitions';
select * from connection to teradata (select * from mydb.gendefs);

  execute (
    call sas_sysfnlib.dq_list_defns('ENUSA', 'parse','mydb.parsdefs')
  ) by teradata;
title 'Partial Listing of ENUSA Parse Definitions';
```

```
select * from connection to teradata (select * from mydb.parsdefs);

  execute (
    call sas_sysfnlib.dq_list_defns('ENUSA', 'standardization','mydb.standdefs')
  ) by teradata;
title 'Partial Listing of ENUSA Standardization Definitions';
select * from connection to teradata (select * from mydb.standdefs);

  /* Create an example source table. */
  execute (
    create table mydb.employees
      (empid      integer primary key not null,
       name       varchar(50),
       address    varchar(100),
       start_date varchar(9),
       birth_date varchar(9))
  ) by teradata;

  /* Populate the source table with some data. */
  execute (
    insert into mydb.employees values
        (203,
         'Ken Patrick Burke',
         '445 main street',
         '27JAN1994',
         '14JAN1950')
  ) by teradata;

  execute (
    insert into mydb.employees values
        (485,
         'Stella Mae Santorini',
         '160-a NORTH 6TH ST # 3',
         '18DEC2005',
         '17JUL1980')
  ) by teradata;

  execute (
    insert into mydb.employees values
        (1003,
         'Dale Michael Hayes',
         '1575 Jordon St, Suite 3 2nd floor',
         '01AUG2009',
         '09OCT1985')
  ) by teradata;

  execute (
    insert into mydb.employees values
        (460,
         'Angela Sarah Koehlepp',
         'Number 704 Martin Luther King Blvd',
         '14FEB2005',
         '12MAY1978')
  ) by teradata;

  execute (
```

```
    insert into mydb.employees values
        (255,
         'Ross Maxwell Petersen',
         'POBOX 4 SMITH STREET',
         '23NOV1996',
         '12MAR1968')
  ) by teradata;

/* print the example table */
title 'Content of Employees Table';
select * from connection to teradata (select * from mydb.employees);

  /* Determine the gender of employees in the source table. */ 5
  execute (
    call sas_sysfnlib.dq_gender(
      'Name',
      'mydb.employees',
      'name',
      'empid',
      'mydb.employees_gend',
      'ENUSA')
  ) by teradata;

/* print the output table */
title 'Content of Employees_gend Table';
select * from connection to teradata (select * from mydb.employees_gend);

  /* Run DQ_PARSE() to split the first, middle, and last name. */ 6
  execute (
    call sas_sysfnlib.dq_parse(
      'Name',
      'mydb.employees',
      'name',
      'empid',
      'mydb.employees_pars',
      'ENUSA')
  ) by teradata;

/* print the output table */
title 'Content of Employees_pars Table';
select * from connection to teradata (select * from mydb.employees_pars);

  /* Standardize the employees' addresses. */ 7
  execute (
    call sas_sysfnlib.dq_standardize(
      'Address',
      'mydb.employees',
      'address',
      'empid',
      'mydb.employees_std',
      'ENUSA')
  ) by teradata;

/* print the output table */
title 'Content of Employees_std Table';
select * from connection to teradata (select * from mydb.employees_std);
```

```
  /* Aggregate the processed data into a report. */ 8
title 'Cleansed Employees Table';
  select * from connection to teradata (
    select
     e.empid,
     p."Given Name",
     p."Middle Name",
     p."Family Name",
     e.birth_date,
     e.start_date,
     g.Gender,
     s.Standardized
  from
     mydb.employees e,
     mydb.employees_gend g,
     mydb.employees_pars p,
     mydb.employees_std s
  where
    e.empid=g._PK_ and
    e.empid=p._PK_ and
    e.empid=s._PK_
  );
  /* Clean up. */
  execute (drop table mydb.employees) by teradata;
  execute (drop table mydb.employees_gend) by teradata;
  execute (drop table mydb.employees_pars) by teradata;
  execute (drop table mydb.employees_std) by teradata;
quit;
```

1 Note the use of the LIBNAME option MODE=TERADATA in the database connection statement. The data quality stored procedures require client programs to connect to the Teradata database with a database connection of session-mode Teradata. If this option is not specified, PROC SQL will connect in ANSI mode.

2 The DQ_SET_OPTIONS() stored procedure is executed to set the DQ_OVERWRITE_OPTION in the session. All output tables created with SAS Data Quality Accelerator stored procedures will be overwritten with new tables should any of the stored procedures be run again in the session.

3 The DQ_LIST_LOCALES() stored procedure is executed to identify the available locales.

4 The DQ_LIST_DEFNS() stored procedure is executed to list the gender, parse, and standardize definitions that are available for the ENUSA locale.

5 The DQ_GENDER stored procedure call specifies to apply the QKB definition "Name" to data column Name. It specifies data column EmpID as the primary key. Stored procedure output is written to a table named MyDB.Employees_Gend.

6 The DQ_PARSE stored procedure call specifies to apply the QKB definition "Name" to data column Name as well. Although this definition has the same name as the definition specified in DQ_GENDER, the content of the definitions is not the same. The definitions contain different instructions. The stored procedure call specifies data column EmpID as the primary key. Stored procedure output is written to a table named MyDB.Employees_Pars.

7 The DQ_STANDARDIZE stored procedure specifies to apply the QKB definition "Address" to data column Address. It specifies data column EmpID as the primary key. Stored procedure output is written to a table named MyDB.Employees_Stdz.

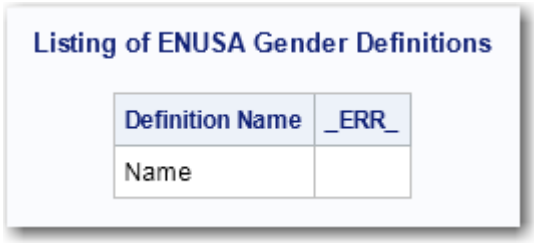
8 In the final step, a pass-through query is submitted to the Teradata database that specifies which columns from the source and stored procedure output tables to display and performs an equijoin on the primary key EmpID.

The following display shows the MyDB.Loclist table created by the DQ_LIST_LOCALES() stored procedure.

Available Locales

Locale Name	_ERR_
ENUSA	

The following display shows the MyDB.Gendefs table created by the DQ_LIST_DEFNS() stored procedure.



Listing of ENUSA Gender Definitions

Definition Name	_ERR_
Name	

The following display shows a portion of the MyDB.Parsdefs table created by the DQ_LIST_DEFNS() stored procedure.

Partial Listing of ENUSA Parse Definitions

Definition Name	_ERR_
Name (Multiple Name)	
Name	
Address (v22)	
Phone (Global)	
City - State/Province - Postal Code	
IBAN	
Address	
Address (Global)	
Address (Full)	
Date (YMD)	
Organization (Multiple)	
Date/Time (DMY)	
Name (Address Update)	
Name (Global)	
Phone	
Postal Code	
Date/Time (MDY)	

The following display shows a portion of the MyDB.Standdefs table created by the DQ_LIST_DEFNS() stored procedure.

Partial Listing of ENUSA Standardization Definitions

Definition Name	_ERR_
Country (Sub-Region)	
Name	
Address (v22)	
URL	
IBAN (Printed)	
Country (Region)	
Address	
Phone (with Country Code)	
City	
Multiple Space Collapse	
Date (DMY)	
Country (ISO 2 Char)	
Country (FIPS)	
Non-Number Removal	
Hyphen/Dash Removal	
Hyphen/Dash Space Replacement	

The following display shows contents of the MyDB.Employees table, before data cleansing:

Content of Employees Table

empid	name	address	start_date	birth_date
460	Angela Sarah Koehlepp	Number 704 Martin Luther King Blvd	14FEB2005	12MAY1978
203	Ken Patrick Burke	445 main street	27JAN1994	14JAN1950
255	Ross Maxwell Petersen	POBOX 4 SMITH STREET	23NOV1996	12MAR1968
485	Stella Mae Santorini	160-a NORTH 6TH ST # 3	18DEC2005	17JUL1980
1003	Dale Michael Hayes	1575 Jordon St, Suite 3 2nd floor	01AUG2009	09OCT1985

The following display shows the MyDB.Employees_Gend table:

Content of Employees_gend Table

INPUT	_ERR_	Gender	_PK_
Angela Sarah Koehlepp		F	460
Ken Patrick Burke		M	203
Ross Maxwell Petersen		M	255
Stella Mae Santorini		F	485
Dale Michael Hayes		M	1003

The following display shows the MyDB.Employees_Pars table:

Content of Employees_pars Table

ERR	_INPUT_	_PK_	Prefix	Given Name	Middle Name	Family Name	Suffix	Title/Additional Info
	Angela Sarah Koehlepp	460		Angela	Sarah	Koehlepp		
	Ken Patrick Burke	203		Ken	Patrick	Burke		
	Ross Maxwell Petersen	255		Ross	Maxwell	Petersen		
	Stella Mae Santorini	485		Stella	Mae	Santorini		
	Dale Michael Hayes	1003		Dale	Michael	Hayes		

The following display shows the MyDB.Employees_Stdz table:

Content of Employees_std Table

INPUT	_ERR_	Standardized	_PK_
Number 704 Martin Luther King Blvd		Martin Luther King Blvd Num 704	460
445 main street		445 Main St	203
POBOX 4 SMITH STREET		Smith St PO Box 4	255
160-a NORTH 6TH ST # 3		160-A N 6th St # 3	485
1575 Jordon St, Suite 3 2nd floor		1575 Jordon St Suite 3 Fl 2nd	1003

The following display shows the content of the report after the data was cleaned with the data quality stored procedures:

Cleansed Employees Table

empid	Given Name	Middle Name	Family Name	birth_date	start_date	Gender	Standardized
460	Angela	Sarah	Koehlepp	12MAY1978	14FEB2005	F	Martin Luther King Blvd Num 704
1003	Dale	Michael	Hayes	09OCT1985	01AUG2009	M	1575 Jordon St Suite 3 Fl 2nd
255	Ross	Maxwell	Petersen	12MAR1968	23NOV1996	M	Smith St PO Box 4
203	Ken	Patrick	Burke	14JAN1950	27JAN1994	M	445 Main St
485	Stella	Mae	Santorini	17JUL1980	18DEC2005	F	160-A N 6th St # 3

Using Data Quality Stored Procedures in BTEQ

The following is BTEQ code that can be used to create and clean the content of the MyDB.Employees source table and create a report. BTEQ is a utility from the Teradata Utility Pack that allows users on a workstation to submit SQL statements to the Teradata database. This utility allows users to query, import, and export data from one or more Teradata RDBMS, and to produce reports. BTEQ stands for Basic Teradata Query. BTEQ connects to the Teradata database in Teradata mode by default.

```
.logon teraserver/myid,mypwd
.width 160

/* Set the option to overwrite output tables */
  call sas_sysfnlib.dq_set_option('DQ_OVERWRITE_TABLE', '1')

/* List the available locales. */
call sas_sysfnlib.dq_list_locales('mydb.loclist')

/* List the gender, parse, and standardization */
/* definitions available for the ENUSA locale. */
call sas_sysfnlib.dq_list_defns('ENUSA', 'gender','mydb.gendefs')
call sas_sysfnlib.dq_list_defns('ENUSA', 'parse','mydb.parsdefs')
call sas_sysfnlib.dq_list_defns('ENUSA', 'standardization','mydb.standdefs')

/* Create an example source table. */
create table mydb.employees
  (empid      integer primary key not null,
   name       varchar(50),
   address    varchar(100),
   start_date varchar(9),
   birth_date varchar(9));

/* Populate the source table with some data. */
insert into mydb.employees values
  (203,
   'Ken Patrick Burke',
   '445 main street',
   '27JAN1994',
```

```
   '14JAN1950');

insert into mydb.employees values
  (485,
   'Stella Mae Santorini',
   '160-a NORTH 6TH ST # 3',
   '18DEC2005',
   '17JUL1980');

insert into mydb.employees values
  (1003,
   'Dale Michael Hayes',
   '1575 Jordon St, Suite 3 2nd floor',
   '01AUG2009',
   '09OCT1985');

insert into mydb.employees values
  (460,
   'Angela Sarah Koehlepp',
   'Number 704 Martin Luther King Blvd',
   '14FEB2005',
   '12MAY1978');

insert into mydb.employees values
  (255,
   'Ross Maxwell Petersen',
   'POBOX 4 SMITH STREET',
   '23NOV1996',
   '12MAR1968');

/* Determine gender of employees in the source table. */
call sas_sysfnlib.dq_gender_loc(
  'Name',
  'mydb.employees',
  'name',
  'empid',
  'mydb.employees_gend',
  'ENUSA');

/* Run parse to split the first, middle, and last name. */
call sas_sysfnlib.dq_parse_loc(
  'Name',
  'mydb.employees',
  'name',
  'empid',
  'mydb.employees_pars',
  'ENUSA');

/* Standardize the employees' addresses. */
call sas_sysfnlib.dq_standardize_loc(
  'Address',
  'mydb.employees',
  'address',
  'empid',
  'mydb.employees_std',
  'ENUSA');
```

```
/* Aggregate the processed data into a report. */
select e.empid                                as "Employee ID",
       cast (p."Given Name"  as varchar(15)) as "Given Name",
       cast (p."Middle Name" as varchar(15)) as "Middle Name",
       cast (p."Family Name" as varchar(15)) as "Family Name",
       e.birth_date                           as "Birth Date",
       e.start_date                           as "Start Date",
       g.Gender                               as "Gender",
       cast (s.Standardized as varchar(30))  as "Address"
  from mydb.employees      e,
       mydb.employees_gend g,
       mydb.employees_pars p,
       mydb.employees_std s
where e.empid=g._PK_ and
       e.empid=p._PK_ and
       e.empid=s._PK_;

/* Clean up. */
drop table mydb.employees;
drop table mydb.employees_gend;
drop table mydb.employees_pars;
drop table mydb.employees_std;

.logoff
.quit
```

Recommended Reading

Here is the recommended reading list for this title:

- *SAS In-Database Products: Administrator's Guide*
- *SAS In-Database Products: User's Guide*
- *SAS Data Quality Server: Reference*
- *SAS/ACCESS for Relational Databases: Reference*
- *DataFlux Data Management Studio: User's Guide*
- SAS Quality Knowledge Base documentation that is available from SAS Documentation:
  - What's New in SAS Quality Knowledge Base
  - SAS Quality Knowledge Base Online Help

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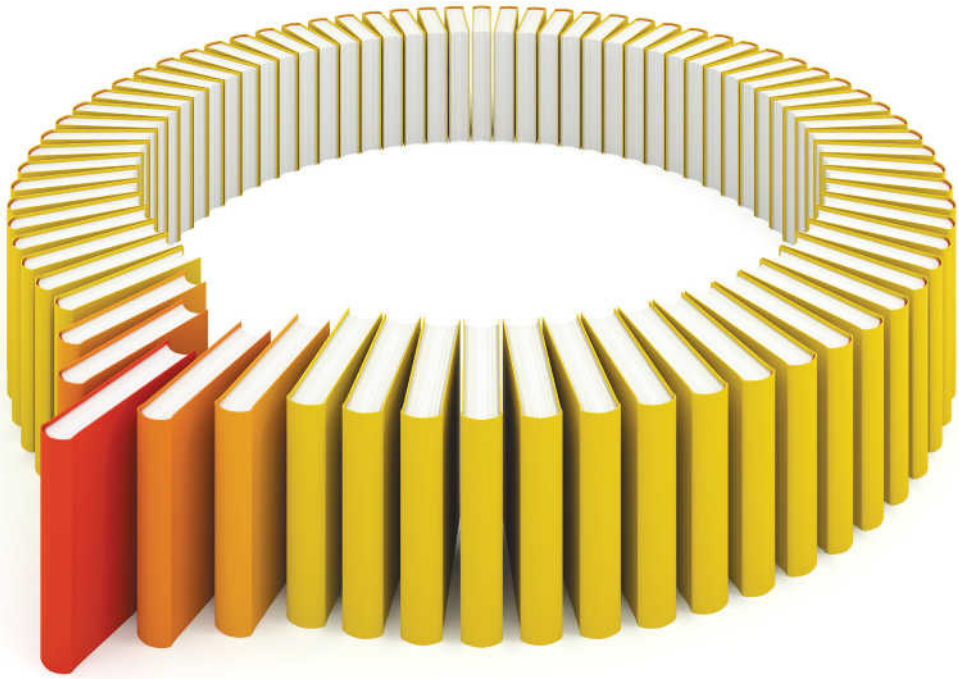

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