MICRO FOCUS

Administrator's Guide

Databridge Client

Version 6.6 Service Pack 1

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About This Guide

This guide contains instructions for configuring and using the Micro Focus Databridge Client. This preface includes information to help you use this guide.

While this guide can be used with the either command-line or service-controlled Client, **we wrote it primarily for command-line Client operations.** For information specific to the service-controlled Client, see the following topics in this chapter or go to the **Help** menu in the Databridge Client Console:

- "Using the Client Console and the Service" on page 15
- Chapter 9, "Automating Client Operations with the Service," on page 193

To install, configure, and run Databridge, you should be a system administrator familiar with the following:

- Standard Unisys® operations for MCP-hosted mainframes such as the CS7xxx series, Libra series, ClearPath® NX/LX or A Series
- DMSII databases and Data And Structure Definition Language (DASDL)
- File layouts and the description of those layouts for the files you will be replicating

Conventions

The following conventions and terms may be used in this guide.

This convention	Is used to indicate this
menu > sub menu 1 > sub menu 2 ... > menu item (item)	This font style/color shows mouse-clicks in the order required to access a specific function, window, dialog box, etc. The greater than symbol > indicates the next item to click in the series. The parentheses ( ) indicate the setting, option, or parameter being discussed. Note the font style reverts back to normal.
`this type style`	text that you type, filenames and directory names, onscreen messages
italic	variables, emphasis, document titles
square brackets ([ ])	optional items in a command. For example, [true | false]. (Do not type the brackets.) Buttons. For example, [OK], [Start], [Cancel]
pipe (|)	a choice between items in a command or parameter. When enclosed in braces ({ }), the choice is mandatory.

This convention	Is used to indicate this
UPPERCASE	DMSII data set and data item names, buttons to click. For example, CANCEL, OK, APPLY.

This term	Is used to indicate this
MCP server host mainframe	Unisys ClearPath NX, LX or A Series mainframe
DBEngine	Databridge Engine on the mainframe
DBEnterprise	Databridge Enterprise Server
DBServer	Databridge Server on the mainframe
Service	For UNIX Clients, consider this term synonymous with "daemon"

Abbreviations

The following abbreviations are used throughout this guide and are provided here for quick reference.

Abbreviation	Name
AA	Absolute Address
ABSN	Audit Block Serial Number
AFN	Audit File Number
API	Application Programming Interface
DASDL	Data and Structure Definition Language
DMSII	Data Management System II
IDX	Index
IPC	Inter-Process Communications
MCP	Master Control Program
RPC	Remote Procedure Call
RSN	Record Serial Number
SEG	Segment
WFL	Work Flow Language

Related Documentation

When using Databridge, you may need to consult the following resources.

Databridge product documentation	On the Databridge installation image, the DOCS folder contains guides for installation, error codes, and administrator's guides for each Databridge product. These documents require Adobe Reader for viewing, which you can download from the Adobe website (http://get.adobe.com/reader/). This documentation, and current technical notes, is also available on the Micro Focus Databridge support site (http://support.attachmate.com/manuals/databridge.html). Documentation for Databridge Enterprise Server and the Databridge Client Console is also available from the **Help** menu. A modern browser is required for viewing this documentation.
Unisys MCP server documentation	If you are not completely familiar with DMSII configuration, refer to your Unisys documentation.

1 Introducing Databridge Client

Micro Focus Databridge is a combination of host and (optional) client software that provides automated replication of DMSII databases and flat files. All replications occur while the DMSII database is active. After the initial clone, Databridge updates the secondary database, copying only the DMSII data changes from the audit trail.

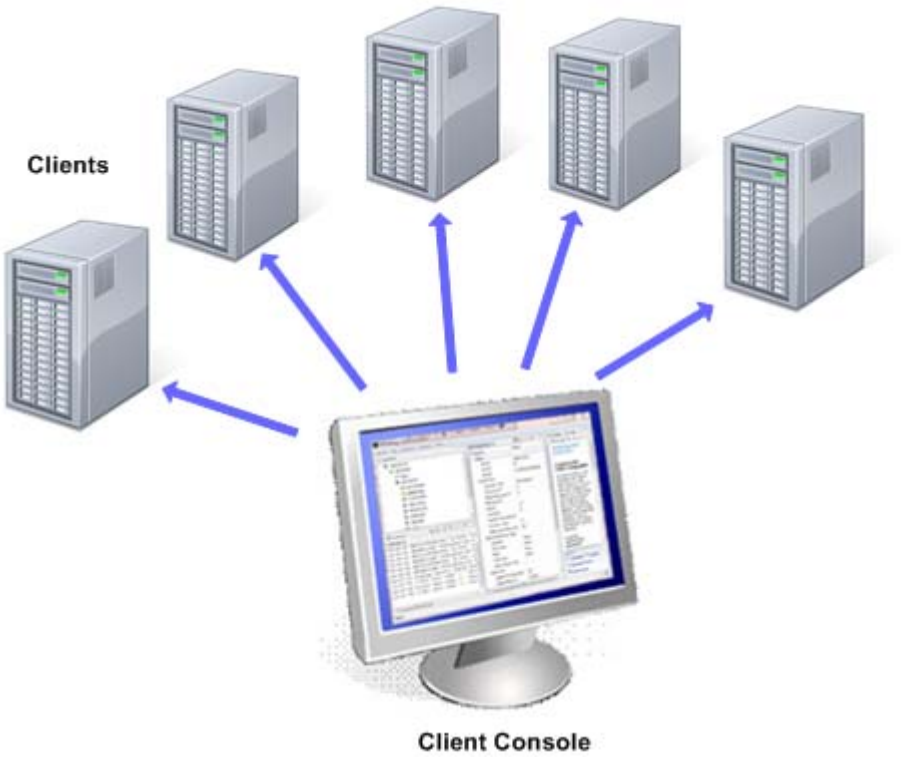
Choosing the Client Manager Service vs. the Command-Line Client

The Databridge Client provides two modes of operation. One mode lets you configure and run the Client from the Client Console, where the Client Manager service launches the client and automates much of the replication process. The other mode uses a command prompt session (or terminal session in the case of UNIX) to run the dbutility program. For a comparison of these modes of operation, see "Comparing the Databridge Client Manager Service to Command-Line Operations" on page 21.

While this guide can be used with either the command-line or service-controlled Client, **it is intended primarily for command-line Client operations.** For information specific to the service-controlled Client, see the following topics or refer to the **Help** in the Databridge Client Console:

Using the Client Console and the Service

The Client Console is an easy-to-use graphical interface that lets you access clients on different platforms. You can view multiple data sources (defined by Databridge Server or Enterprise Server) and monitor all Client activity via onscreen messages and status updates.



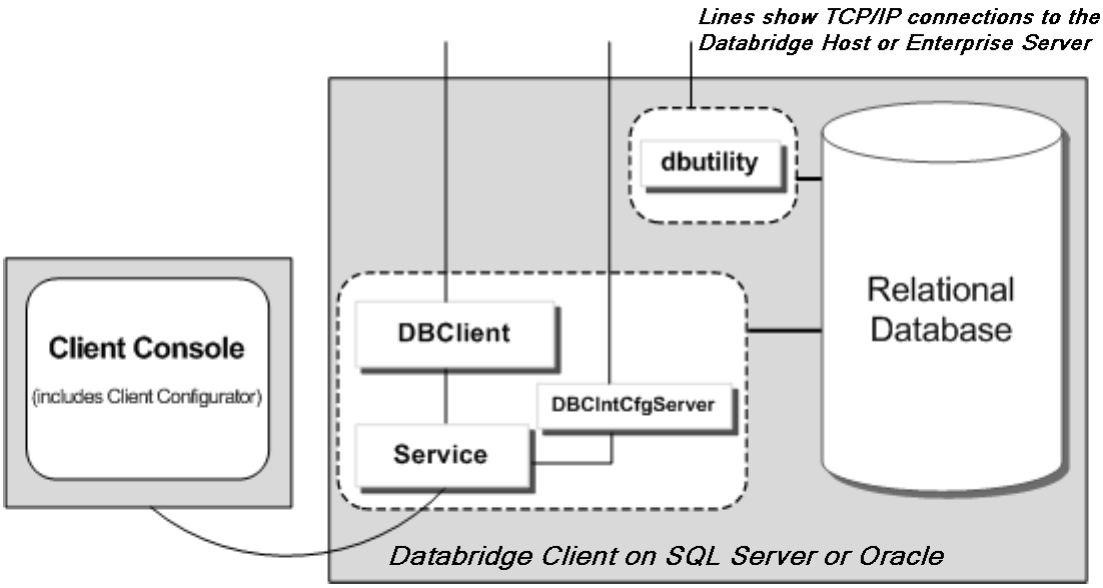
The Client Console communicates directly with the Client Manager service, which starts Client runs in the background and completely automates client operations. You decide when and how often Client runs are initiated by using the service scheduling settings in the Client Console. You can also use scripts to interact with the service and automate processes. For more information, see Chapter 8, Automate Operations with the Service (page 193).

Enhanced Security

Because the service always starts the Client in the background, the Client Console is the only interface to service-initiated Client runs. Neither the service nor the background runs interact with the desktop or require that a user be signed on to the server. This makes service-initiated client operations more secure than command-line operations and prevents the Client runs from being terminated, whether accidentally or maliciously. The service starts at system startup (by default), which ensures that replication can continue in the event of system failure without outside intervention.

In addition to launching Client runs, the service routes all log and informational messages to the Client Console and facilitates operator tasks using the DBClient and DBClntCfgServer programs. The first program, DBClient, performs DMSII processing and cloning tasks. The second program, DBClntCfgServer, handles Client Console requests that require access to the relational database (such as `define`, `generate` and `reorganize` commands). The activity and output of these programs is displayed in the Client Console window.

The following diagram shows the Client architecture for the two types of clients: the command-line client (dbutility) and the service-controlled client (DBClient and other components).



The Client Configurator (accessed from within the Client Console by clicking **Data Source > Customize Data Source**) lets you easily customize your data sources without any knowledge of SQL or how your Client control tables work. Instead of hand-coding SQL user scripts, you can select options in the Client Configurator to configure your data sources and map DMSII data to your relational database tables. To use the Client Configurator with existing Client configurations that employ user scripts, you must first upgrade your Client control tables using the dbscriptfixup utility. (See the *Databridge Installation Guide*.)

NOTE: To customize a specific data source, you must first select the data source by placing your mouse over the data source name in the explorer view and clicking on it. Then you can access the **Data Source** menu on the menu bar for that specific data source. Alternatively, you can right-click on the data source and get an equivalent pop-up menu.

How Replication Works

The Databridge Client controls the replication (page 352) process of DMSII databases and flat files. It initiates connections to Databridge Server on the host and maintains the state information (page 352) necessary for resuming replication in case operations are interrupted. At the heart of the host-based Databridge system is the Databridge Engine—a system library that retrieves structural information and data from the DMSII database and passes it to Databridge Server. When you opt to use Enterprise Server with the Databridge Client instead, Enterprise Server takes over much of the functionality of the Databridge Engine and Databridge Server.

The Databridge Support Library, also installed on the host, provides filtering, formatting, and reformatting services for the Databridge Server. See "Client vs. Host Filtering" on page 18.

After the Databridge Server receives data from the Databridge Engine, it calls the Support Library to determine if the data should be replicated, and if so, it passes the data to the Support Library for formatting.

Replication involves three discrete phases, as described below. These three phases are tracked for each data set in the ds_mode column of the DATASETS control table as values 0, 1, and 2.

Data extraction

This phase (identified by a mode of 0) applies only to data sets that have not yet been cloned. During this phase, the Databridge Engine sequentially reads all of the records from the data sets being cloned and passes them to the Databridge Client. Using the appropriate bulk loader utility, the Client populates the relational database tables and creates indexes for the tables.

Fixup

During this phase (identified by a mode of 1), the Databridge Engine processes audit files and passes all of the DMSII updates that occurred while data extraction was taking place to the Client, which updates the relational database. This phase is fully restartable.

The only difference between the Fixup Phase and the Update (or Tracking) Phase is that the Client has to deal with conditions caused by the fact that the tables from which records are extracted are changing as the extraction is taking place. Until the audit file processing gets past the point in the audit trail where the data extraction ends, the Client behaves somewhat differently in order to handle such issues as updates to records that are not in the tables, deletions of records that are not in the tables, and inserts of records that are already in the tables.

Update

During this phase (identified by a mode of 2), the Client processes audit files and then passes all of the DMSII database updates to the Client, which updates the relational database. This phase is also referred to as the *change tracking phase.*

Databridge uses quiet points (page 352) to synchronize the replicated database (page 352) with the DMSII database and ensure accuracy of the data. Quiet points mark the start of a group of updates, which is referred to as a *transaction*. When the Databridge Engine reaches the end of the last DMSII audit file (or encounters a program that did a rollback), it usually rolls back the transaction and instructs the Client to roll back updates. The Client stores quiet point information with other state information in a set of control tables, referred to as the Client control tables, and uses it to restart the replication process.

If near real-time replication is required, set the parameter use_dbwait (page 299) to true. This causes the Engine to enter a wait-and-retry loop for a configurable amount of time, instead of returning an audit file unavailable status, which normally occurs when no more Audit Files (page 349) are available.

Client vs. Host Filtering

Use the following guidelines to determine when to use the host instead of the Databridge Client to perform filtering.

Filtering Columns

On the host side, you can filter columns by creating a filtering routine with the DBGenFormat utility. On the Databridge Client side, you can filter columns the same way you can filter data sets, which is to set the active column to 0 for the corresponding entry in the DMS_ITEMS.

The advantage of performing the filtering on the Databridge Client side is that you save on host resources. However, there are a few cases where you should consider filtering on the host side, as follows:

- If you plan to filter *many* columns, consider filtering on the host side to reduce TCP/IP traffic. The best way to determine this is to try the filtering both ways and see which gives you the best throughput.
- If you plan to filter columns with confidential or sensitive information, it is best to perform the filtering on the host.

Filtering Data Sets

You can filter data sets on the host side by using a logical database or by creating a filtering routine with the DBGenFormat program. On the Databridge Client side, you can filter data sets by setting the active column to 0 for the corresponding entry in the DATASETS Client control table.

If you want to filter data sets that contain confidential or sensitive information, consider using a logical database or a filtering routine in the DBGenFormat utility. In this case, the Databridge Client will have no record that these data sets exist.

Filtering Rows

Row filtering limits data to certain ranges; you can accomplish this via the WHERE clause of filtering routines created with the DBGenFormat program on the host. For more information, see Chapter 4 in the *Databridge Host Administrator's Guide*.

Filtering OCCURS Tables

OCCURS tables are secondary tables generated by the Databridge Client when OCCURS clauses for items (or GROUPs) are not flattened. Frequently, not all rows in such tables contain meaningful data, for this reason it is desirable to filter such rows to reduce the storage requirements and improve performance. Starting with version 6.5, the Databridge Client implements row filtering for OCCURS tables. For more information, refer to Chapter 7, "Chapter 7: OCCURS Table Row Filtering," on page 145.

Databridge Components

The following table lists all of the Databridge products and components that can have a role when replicating data with the Databridge Client.

Databridge Host (installed on the mainframe)

Component	Description
Databridge Engine (DBEngine)	The main component of the Databridge software, DBEngine is a host library program that retrieves structural information, layout information, and data from the DMSII database and passes the information to the Databridge Server. Additionally, it retrieves updates by reading the audit files on the host and sends the changes to the Client.
Databridge Server (DBServer)	An accessory that provides communications between DBEngine and the Databridge Client, and also between DBEngine and Databridge Enterprise Server. DBServer responds to Databridge Client requests for DMSII data or DMSII layout information.

Component	Description
Support Library (DBSupport)	A library that provides formatting and filtering to the DBServer and other accessories. After DBServer receives data from the DBEngine, it calls the Support Library to determine if the data should be replicated, and if so, passes the data to the Support Library for formatting.
DBGenFormat	A host utility that creates filter and format routines. The GenFormat utility interprets the GenFormat parameter file to generate ALGOL source code patches, which are included in the tailored Support Library.

Databridge Enterprise Server

A Windows-based product that provides the same functionality as the Databridge Engine (DBEngine) and Databridge Server (DBServer) on the host. Enterprise Server offloads much of the replication workload from the Unisys mainframe to a Windows computer, reducing mainframe resource utilization and initial load time.

Databridge Clients can connect directly to Enterprise Server, which in turn connects to DBServer on the mainframe. If MCP disks are directly accessible from the Windows server, Enterprise Server extracts the DMSII data directly. Enterprise Server reads the audit trail on the host to retrieve updates that occurred during the extraction and sends the changed information from the audit file to the Client. If MCP disks are not directly accessible, Enterprise Server uses DBServer to retrieve blocks of data from DMSII data sets or the audit files. Enterprise Server provides high-speed file transfer between the host and the Windows environment and audit file mirroring.

Component	Description
DBEnterprise	The executable file for Enterprise Server, frequently used interchangeably with Enterprise Server.
Databridge Director (DBDirector)	A Windows Service that listens for Client connection requests and starts DBEnterprise whenever a connect request is received.

NOTE: We use terms "Databridge Server" and "Databridge Engine" throughout the rest of this manual as generic terms that apply to either "DBServer" and "DBEngine" on the mainframe or to the equivalent component in "Databridge Enterprise Server".

Databridge Client

The Client initiates a connection with the Databridge Server and then specifies the DMSII data sets to be replicated from a DMSII database.

Component	Description
Client Manager (DBClntControl)	The service (Windows) or daemon (UNIX) that automates most Client operations. It handles operator requests from the Client Console and routes all log and informational messages to the consoles.
DBClient	A Client program that is launched by the service. DBClient handles the processing of DMSII data and updates the same as dbutility, except that it runs as a background run and uses the Client Console to display its output and interact with the operator.

DBClntCfgServer	A program that handles all requests from the Client Console specific to a data source. These requests include updating the client configuration file, providing access to the Client control tables, and handling the Client Configurator. Like DBClient, this program is run by the service as a background run.
dbutility	A program that runs the Databridge Client from a command line.
Batch Console (bconsole)	A program that allows Windows command files (UNIX shell scripts) to issue Client Console requests to the Databridge Client Manager. The Batch Console interprets (and runs) scripts that are written in a language that vaguely resembles Visual Basic. For more information, see Appendix G: Batch Console.
Client Console	A graphical user interface from which you can connect to the Databridge Client Manager. From the Client Console you can start the **Client Configurator**, which lets you customize the layout of the relational database and update the Client configuration file.

Databridge FileXtract

An application that allows you to clone and update flat files (page 351) that reside on Unisys ClearPath NX, LX, or A Series mainframes. You can also use FileXtract with the Databridge Client to replicate this data. From the Client perspective, FileXtract data sources look like DMSII data sources.

FileXtract is bundled with Databridge Host software and includes several Reader libraries and other associated files.

Databridge Flat File Client

The Flat File Client (also known as PCSPAN) is a Windows implementation of the DBSPAN accessory on the MCP. As is the case with DBSPAN, rather than update the secondary database, the Flat File Client creates data files that contain the data records for the updates. This approach is useful when a Databridge Client does not exist for a particular database or platform or when the data has to be transformed before being loaded into a secondary database.

The Flat Client has a very similar architecture to the relational database clients, such as the SQL Server and the Oracle Clients.

Comparing the Databridge Client Manager Service to Command-Line Operations

The Databridge Client Manager service performs the same operations as the command-line client, dbutility. We refer to these operations using the term “service” whether the Client Manager service is running on Windows platforms (service) or UNIX/Linux platforms (daemon). Each machine has its own service (Windows) or daemon (UNIX/Linux). The primary advantage to using the service is its ease of use and the ability to automate most of your Client processes. Additionally, client runs initiated by the service can't be interrupted or tampered with as they occur as background runs.

The following table can give you a better idea of how the two modes of operations compare when performing Client-specific tasks.

To do this	With this dbutility command	With the Databridge Client Manager (via Client Console)
Create Client control tables	`configure`	The Client control tables are automatically created if they don't already exist when you run a `define` or `redefine` command or you start the Client Configurator.
Clone the data sets specified on the command line	`clone`	To clone selected data sets, click **Data Source > Advanced > Clone Data Sets**. The resulting dialog allows you to select the data set to clone, and it also allows you to add command line options.
Populate the Client control tables with information about the DMSII data set layouts and the corresponding relational database table layouts	`define`	Click **Data Source > Advanced > Define/ Redefine**. DBClntCfgServer executes the appropriate command (`define` or `redefine`).
Apply changes from the primary database to the relational database structure while preserving existing information	`redefine`	Click **Data Source > Advanced > Define/ Redefine**. DBClntCfgServer executes the appropriate command (`define` or `redefine`). To run a `redefine` command with the `-R` option (i.e. redefine all data sets) from the Console, click **Data Source > Advanced > Redefine (with options)** and check the "Redefine All Data Sets" checkbox.
To show Client control table entries for data sets	`display`	To show the control tables in a Console view, click **Data Source > Advanced > Display Control Tables**. To write control tables to the log file, click **Data Source > Advanced > Log Control Tables**.
To create script files	`generate` **NOTE:** Use the –u option to create and place all of the script files in the dbscripts subdirectory.	Click **Data Source > Generate Scripts**. This is the equivalent of running the `generate` command with no command-line options. To force all script files to be recreated in the dbscripts subdirectory, click **Data Source > Advanced > Generate All Scripts**.

To do this	With this dbutility command	With the Databridge Client Manager (via Client Console)
To perform the initial clone or process DMSII database updates	`process`	Click **Data Source > Process**. The service, which controls scheduling for all process commands, starts DBClient at the scheduled time (if specified) and terminates DBClient when the process command finishes. You can run this command anytime. To add command line options to `process` commands for runs initiated from the Console, click **Data Source > Process (with options)** then choose the options you need from the provided set of checkboxes.
To recreate the stored procedures for tables associated with a given data set in the specified data source (for example, after a DMSII reorganization)	`refresh`	Click **Data Source > Advanced > Refresh Data Set**. You can either refresh a specific data set or all data sets.
To alter the relational database using the scripts created by the `redefine` command. The command automatically refreshes the scripts and stored procedures associated with the tables whose layouts have changed.	`reorg`	Click **Data Source > Reorganize**.
To run user scripts or Databridge Client scripts	`runscript`	Click **Data Source > Advanced > Run Script**. This command runs the script in the user script directory (`user_script_dir`), the name and location of which is defined in the client configuration file. If you start the filename with a backslash for a Windows client or a slash for a UNIX client, this command uses the `-n` option, which overrides the directory specification.
To close an audit file on the host	`switchaudit`	Not supported.
To back up the Client control tables	`unload`	Click **Data Source > Advanced > Unload Data Source**.
To restore the Client control tables using the backup file	`reload`	Click **Data Source > Advanced > Reload Data Source**.
To export the binary configuration file to an editable text file	`export`	Click **Data Source > Advanced > Export Client Configuration**. You can only execute the export command with the default command-line options from the Client Console.
To import a text configuration file (and convert it to a binary file) for use with the Client	`import`	Not available. The configuration file is updated directly from the Client Console and/or the Client Configurator.

To do this	With this dbutility command	With the Databridge Client Manager (via Client Console)
To create user scripts to back up customizations made by the Client Configurator	`createscripts`	Click **Data Source > Advanced > Create User Scripts**.

For more information about dbutility commands, see "dbutility Commands" on page 227. For more information about the Client Console, see Using the Console and Service (page 15) and the **Help** included in the Client Console.

Switching from Command-Line to Service Operations

Use this procedure if you currently run the Databridge Client from a command line and want the Client Manager to run it, or if you need to add existing data sources to the Client Manager.

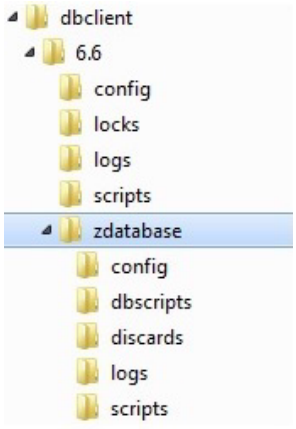
To operate the Client Manager on the Client machine, you'll need a specific directory structure, referred to as the *service's working directory*. You can use the **Migrate** program to create this directory.

IMPORTANT: If you're in the process of upgrading your Databridge software, use the instructions in the *Databridge Installation Guide* for upgrading the Client.

To switch to the service based client (Windows)

1. Set up the service's working directory. If you use the Client on Windows, you can run the **Migrate** program to do this. For more information, see "The Working Directory" in the *Databridge Installation Guide*.
2. Install the Client Console that matches the version of Databridge Client software you use. For instructions, see the *Databridge Installation Guide*.
3. Do one of the following:
   - If you use a text Client configuration file, proceed to step 4.
   - If you use a binary Client configuration file (that is, you have not exported your configuration file to a text file to edit it), skip to step 6.
4. From the data source directory, locate the `config` folder, and copy the text configuration file `dbridge.cfg` to a file named `dbridge.ini`.

   The following image shows an example of a working directory for a data source named "zdatabase".



5 From a command prompt, go to the working directory for your data source and run the dbutility `import` command. This creates a binary configuration file required by the service.

6 To make sure that the Client Manager service is running, from the **Start** menu, click **Control Panel > Administrative Tools > Services**, double-click **Databridge Client Manager 6.6**, then click [Start].

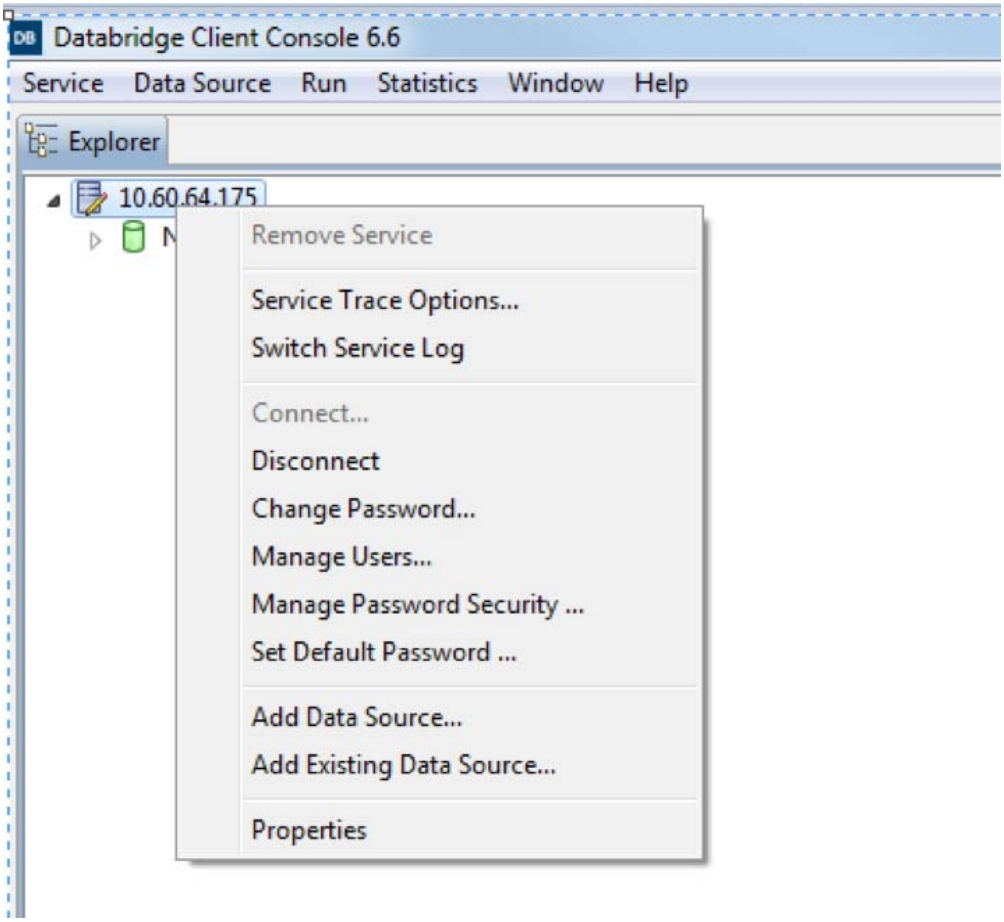
7 Start the Client Console.

8 Add a service, if you haven't already done so. For instructions, see the Client Console Help (**Help > Help Contents**).

9 With the service selected in the explorer view, click **Data Source > Advanced > Add Existing Data Source**, type the data source name (for example, `zdatabase`), and then click [OK].

   You can also do this by right-clicking on the service node and clicking **Add Existing Data Source** from the pop-up menu that appears.

Figure 1-1



To switch to the daemon based client (UNIX/Linux)

1. Log on as the userid specified in the USERID parameter of the file `globalprofile.ini`. This is the same userid you currently use to run the command-line client.
2. Set the current directory to the home or other directory to which you have write access and copy the script `dbdaemon` from the install directory to it. This allows you to make changes to the script.
3. In an editor, open the script `dbdaemon`.
4. Make sure that the environment variables (such as INSTALLDIR, WORKING_DIR, ORACLE_HOME) are correct for your system and edit them as needed.
5. Save and close the script.
6. Start the daemon by typing the following:

   ```
   dbdaemon start
   ```

7. To verify that the daemon is running use the `ps` command, which should produce output similar to the following:

```
databridge@VMOPENSUS114-64:~> ps -ef | grep DBC
databridge   1110     1  0 12:00 ?        00:00:00
/opt/dbridge66/DBClntControl
```

8 If the daemon doesn't start, in the script `dbdaemon`, make sure that the WORKING_DIR and INSTALLDIR environment variables are correct. Also, check the Client Manager's working directory to determine if a file `dbdaemon.log` was created and if it contains any clues.

9 Start the Client Console.

10 Add a service, if you haven't already done so. For instructions, see the Client Console **Help** (**Help > Help Contents**).

11 With the service selected, from the **DataSource** menu, click **Advanced > Add Existing Data Source**, type the data source name (for example, `zdatabase`), and then click [OK].

You can also do this by right-clicking on the service node and clicking **Add Existing Data Source** from the pop-up menu that appears.

12 Type `su` to switch to the root user and then copy the script `dbdaemon` from the location you specified in step 5 to the following location:

- (Linux/Solaris) `/etc/init.d`
- (AIX) `/etc/rc.d/init.d`
- (HP-UX only) `/sbin/init.d`

13 To make the operating system automatically start the daemon whenever the system starts, consult the documentation for your operating system.

Command-Line Client Operations

This section describes the tasks required to clone a DMSII database and track changes using the Databridge Client from a command line. This sequence assumes that the relational database is properly configured and the required Databridge software is installed and running.

1	*Update the configuration file*	Because the Client reads the Client configuration file before writing the script files and the log file, you may need to modify this file. To edit the configuration file, you must export it to an editable format and then import it after you make your changes. For more information, see "Export or Import a Configuration File" on page 242.
2	*Run the dbutility* `configure` *command*	In a first-time installation, you must run the dbutility `configure` command. This creates the Databridge Client control tables that will hold the layout information for the DMSII database and corresponding relational database tables.
3	*Run the dbutility* `define` *command*	This command creates an entry in the DATASOURCES Client control table that contains the data source name, the host name and the port number on which Databridge Server listens. It also populates the Client control tables with the DMSII layout and creates the corresponding table layout for the relational database. `dbutility define` *`datasourcename hostname portnumber`*

4	*Create user scripts*	To customize the Client control tables, you must create user scripts. Or, you can use the default mapping that the Databridge Client produces. Creating user scripts is an iterative process that involves writing scripts to select and map data sets and customizing data tables, and then testing and updating the scripts until the resulting data table layout meets your specifications. When you are satisfied with the results of your user scripts, re-run the `define` command with the -u option.
5	*Run the* `generate` *command*	This command creates scripts that the Databridge Client uses to create and populate the data tables from the data sets that you selected for cloning. You can modify the configuration of your data tables by adding optional parameters to the end of the create table and create index statements. Do not directly modify scripts created by the `generate` command; your changes will be lost the next time your run this command. `dbutility generate` *`datasourcename`*
6	*Review the bulk loader options*	Review the sections on the bulk loader utilities and their related options, making changes to the bulk loader parameters in the configuration file as needed. If you make changes to the Client configuration file, you will need repeat step 5 with the `-u` option added, as the scripts will otherwise not reflect these changes.
7	*Clone the database*	To clone the DMSII database, run the `process` command. If you want to clone only a few data sets, use the `clone` command. This step populates the Databridge data tables in the relational database with actual DMSII data. `dbutility process` *`datasourcename`*
8	*Update the database*	To update the relational database with changes made to the DMSII database, run the `process` command. Or, to make the Databridge Engine wait for updates when it reaches the end of the audit trail, set the configuration parameter `use_dbwait` to true or use the command-line switch `/w`.

Before You Run the Command-Line Client

Before you use dbutility, do the following:

- Set up the relational database.
- Install the Databridge software on the host and set up and start Databridge Server (see the *Databridge Host Administrator's Guide*). If Databridge Server requires signon parameters, include these in the dbutility configuration file. If necessary, you can also provide these parameters in the environment variables or in dbutility command-line options.

- Install or upgrade the Databridge Client (see the *Databridge Installation Guide*) and create a separate working directory for each DMSII database to be cloned. In most cases, you'll add the relational database logon parameters to the data source configuration file. You can do this by supplying the signon parameters to the `import` command using command line switches (such as `/U /P /O /W`) when you create a new data source. Passwords are automatically encoded.

  IMPORTANT: When you execute dbutility commands for different data sources, make sure that you have set the current directory to be the directory created for that data source. This ensures that the `process` or `clone` command can locate the configuration files and the scripts created by the `generate` command.

Controlling and Monitoring dbutility

The Databridge Client includes a command-line console to help control and monitor dbutility. Commands are entered in the same command prompt session as the dbutility commands. When dbutility is running, make sure that the focus is on the command prompt window and then use the keyboard to enter the command. You need to type only enough of the command to make it unique.

The configuration file parameter `inhibit_console` allows you to disable the console, and the command-line option -C toggles this parameter. The available commands are as follows:

This Command	Allows You To
`co[mmit] a[bsn] <number>`	Dynamically change the value of the parameter commit_absn_inc. The change only takes effect at the next commit. The allowable range of values is the same as that of the parameter "commit_absn_inc" on page 280.
`co[mmit] ti[me] <number>`	Dynamically change the value of the parameter commit_time_inc. The change only takes effect at the next commit. The allowable range of values is the same as that of the parameter "commit_time_inc" on page 281.
`co[mmit] tr[ans] <number>`	Dynamically change the value of the parameter commit_txn_inc. The change only takes effect at the next commit. The allowable range of values is the same as that of the parameter"commit_txn_inc" on page 281.
`co[mmit] s[tats]`	Displays the commit statistics.
`co[mmit] u[pdate] <number>`	Dynamically change the value of the parameter commit_update_inc. The change only takes effect at the next commit. The allowable range of values is the same as that of the parameter commit_update_inc (page 282).
`h[elp]`	Displays a list of available commands.
`l[ogswitch]`	Close the current log file and start a new one.
`p[stats]`	Display the performance statistics. These statistics are the same as those shown after an audit file switch when the show_perf_stats configuration file parameter is set to True.
`q[uit] [at` *`hh:mm`* `| after` *`afn`*`]`	Terminate the program at the next quiet point. Issuing this command during data extraction has no effect until the fixup phase starts. Optionally, you can specify either to terminate the program at a particular time or to terminate it after a particular audit file is processed.

This Command	Allows You To
`q[uit] now`	Terminate the program immediately by first closing the TCP/IP connection to the server. This command is particularly useful when using DBWAIT and there are no updates available. This command will not take effect immediately if the client is waiting for an SQL operation to complete.
`sc[hed] {on | off}`	Disable or enable update scheduling. For instructions on scheduling updates, see Scheduling dbutility Updates (page 102).
`ss[tats]`	Display statistics for Databridge Server at the next quiet point.
`st[atus]`	Display a variety of status information, such as the current stateinfo during audit file processing, the trace status, and the program status (for example, waiting for TCP for 100 ms).
`tr[ace] trace_mask`	Dynamically alter the trace mask; for more information, see "Enabling a Trace" on page 211.
`ts[witch]`	Close the current trace file and starts a new one.
`v[erbose] {on | off}`	Alter the setting of the verbose flag; see -v in "dbutility Command-Line Options" on page 234.

dbutility Exit Status Values

After each command, the Databridge Client command-line program, dbutility, returns an exit status value.

exit_status Value	Description
0	dbutility completed successfully.
1	This value identifies generic Databridge Client errors.
2	dbutility `process` or dbutility `clone` exited because of a DMSII reorganization. **NOTE:** An exit_status of 2 can occur *only* with the `process` and `clone` commands.
0*nnn*	dbutility exited because of a Databridge Engine error. The error is listed in Appendix A of the *Databridge Host Administrator's Guide.*
10*nn*	dbutility exited because of a DBServer error. The error is listed in Appendix A of the *Databridge Host Administrator's Guide.*
11*nn*	dbutility exited because of a DBEnterprise error. The error is listed in Appendix A in the Databridge Enterprise Server **Help**.
20*nn*	dbutility exited because of a recognized Databridge Client error.

For detailed information about Client exit codes, see "Appendix E: Client Exit Codes" on page 329.

Testing for Exit Status

The following examples show how you can test for the exit status (`exit_status`).

Windows Example

This example tests for the `exit_status` in a Windows .cmd file:

```
dbutility process datasource
if errorlevel 2 if not errorlevel 3 goto reorg
exit
:reorg
echo DMSII reorganization has occurred
sendmail "message"
```

where *sendmail* is a hypothetical user application that sends a notification to you.

UNIX Example

The following example, written for the UNIX Korn shell (ksh), determines whether or not the value of the exit status (that appears after you run the dbutility program) indicates that a DMSII reorganization was detected. If a reorganization was detected, it echoes a message and runs the sendmail program:

```
dbutility process datasource
if [$? -eq 2]
then
echo "DMSII reorganization has occurred"
sendmail "message"
fi
```

where *sendmail* is a hypothetical user application that sends a notification to you.

2 Chapter 2: Getting Started

Use the topics in this section to prepare to clone a DMSII database.

Before you clone a DMSII data source, you must create Client control tables. Once they're created, you can populate them with DMSII information sent by the Databridge Engine and create the actual data tables that will store your cloned data. The resulting data tables are based on information from the Client control tables and any additional customizations you make.

To customize how DMSII data sets get mapped to their corresponding relational database tables, you can use the Client Configurator or you can write user scripts in SQL. The Client Configurator is compatible with command-line operations and can help make reorganizations easier to handle. For more information on the Client Configurator, see the Help in the Client Console. Writing and testing user scripts is typically time-consuming and requires a bit of trial and err or. For instructions, see "Customizing with User Scripts" on page 42, in this chapter.

In this Chapter

Creating Client Control Tables

Use this procedure to create a set of control tables in a new installation when using the command line client. If you are using the Client Console, the Client control tables are created automatically when you define a new data source, unless the tables already exist.

When you upgrade your Databridge Client software, the **dbfixup** program updates your control tables to the current version. It first alters the control tables and performs any updates to them. Then, it unloads the Client control tables to a file, recreates them using a `configure` command, and then restores them from the unload file. If a problem occurs and you need to revert to the older version of the Client, the unload file will let you reload the Client control tables using the older version.

Client control tables contain information about the data sets in a DMSII database and information about the corresponding tables and their layout in the relational database. These tables are stored and maintained in the relational database.

To run a `configure` command

1. Make sure that the database software and the appropriate Windows services or UNIX processes are running. For more information, see your relational database documentation.
2. Make sure that the current directory is the working directory for the data source (DMSII database) that you are cloning. For details about the working directory, see the *Databridge Installation Guide*.
3. From a Windows Command Prompt or UNIX terminal session, enter the following:

   `dbutility [`*`signon_options misc_options`*`] configure`

Where	Is

`signon_options`	For each Databridge Client type, the following command-line options specify the relational database signon parameters:
	Oracle:
	`[-U` *`userid`*`] [-P` *`password`*`] [-D` *`database`*`]`
	SQL Server:
	`[-U` *`userid`*`] [-P` *`password`*`] [-W] [-O` *`ODBCdatasource`* `]`

`misc_options`	Any of the following miscellaneous command-line options: `-T` forces the client to use a new trace file for this run, if tracing is enabled. `-f` *`filename`* lets you specify a configuration file other than the default dbridge.cfg file in the `config` subdirectory of the client's working directory. `-L` forces the client to use a new log file for this run. `-u`, if you want to override conditions that dbutility would otherwise interpret as a possible user error. For example, you may want to create a second set of control tables within one relational database (these must be owned by a different user), or you might want to drop and re-create the control tables, removing all of the state information associated with the user tables. In most cases you do not need the `-u` option.

   You only need to run dbutility `configure` once, unless you drop your tables via the dbutility `dropall` command and have to start over.
4. (Optional) To display the tables created by dbutility `configure`, use a utility appropriate for your relational database. For example, for Microsoft SQL Server you can use the Query window of SQL Server Management Studio to enter the following:

   ```
   select name from sysobjects where type = "U" order by name
   ```

   For Oracle, you can use the SQL*Plus utility and enter the following:

   ```
   select table_name from user_tables order by table_name
   ```

Creating a Second Set of Tables

Occasionally, sites create a test environment that includes a second set of Client control tables. Even though the second set of tables may coexist with the production environment, this type of test environment can negatively impact the performance of your production database and is not recommended.

Creating a second set of Client control tables in the same relational database requires a separate database user ID. You must keep the working directories for the two user IDs separate. Because table name duplications are allowed when using different user IDs, this can lead to script files with the same names. If you create a set of Client control tables by running a `configure` command under the user ID "usera", those tables will be owned by usera (for example, USERA.DATASOURCES). If you later use the user ID "userb" to run a `configure` command.

Databridge Client creates a new set of Client control tables owned by userb (for example, USERB.DATASOURCES). Usera and userb tables are treated independently of each other.

Dropping and Re-Creating Client Control Tables

If you drop and create the Client control tables, you must reclone everything. All Databridge tables that contain DMSII data will remain in the relational database. However, all of the information required from the Client control tables to request updates from the Databridge Engine will be lost.

Under normal circumstances, use the `dropall` command before running another `configure` command. This ensures the following:

- Tables and stored procedures created by the Databridge Client are dropped from the relational database
- All scripts created by the Databridge Client are deleted from the `dbscripts` subdirectory of the working directory

In some rare cases where the `dropall` command cannot drop all the tables, you may want to drop and create the Client control tables directly by running dbutility `configure` as follows:

```
dbutility -u configure
```

When you attempt to execute a dbutility `configure` command after the Client control tables have been populated, the following message appears:

```
ERROR: Databridge control tables are not empty, use dropall command first
- To bypass this test use the 'u' option for the configure command
```

This message is provided as a safeguard so that you do not inadvertently drop and create the Client control tables.

Updating Client Control Tables

You can update some values in the Client control tables. For best results, use the Client Configurator to customize the table layout for the relational database instead of using user scripts. Avoid using tools like SQL Server Management Studio or SQL*Plus to directly update the control tables.

NOTE: If you previously used user scripts to update control tables and want to switch to the Client Configurator, you'll need to update your Client control tables first. For instructions, see the *Next Steps* section in the *Databridge Installation Guide*.

Update these values	To do this
Values in the active column of all tables	Set cloning on or off for data sets or DMS items.
Values in the dms_subtype column of the DMS_ITEMS tables	Specify the format of a field that is to be cloned as a date.
The set_name column in the DATASETS table and the item_key columns in the DMS_ITEMS table	Create a composite key.
The columns ds_options in the DATASETS table, di_options in DMS_ITEMS, dt_options in DATATABLES and da_options in DATAITEMS	Set a value. Make sure that you do not clear any existing bits. You should use the logical OR and AND operator (| and & for SQL Server; BITOR and BITAND for Oracle). The BITOR function is automatically created by the Oracle client, while the BITAND function is native to Oracle. See NOTE below for more information.
The sql_type, sql_length and sql_scale columns in the DATAITEMS table	Force the `define` command to remap values.
The dms_concat_num column in the DMS_ITEMS table	Set the value of the dms_item_number you want concatenated to this item.
The table_name and index_name columns in the DATATABLES table	Rename.
The item_name column in the DATAITEMS table	Rename.

NOTE: BITOR and BITAND are functions needed to set and clear bits in user scripts used by the Oracle Client in the various xx_options columns of the Client control tables. When you run a `define` or `redefine` command, the Client creates the BITOR function, while the BITAND function is part of SQL language of Oracle. BITAND (a,b) returns the bitwise AND of a and b while BITOR (a,b) returns the bitwise OR of a and b. This means that you can use the BITOR function as if it was part of the Oracle SQL functions.

The following example shows BITOR setting a bit:

```
update DATASETS set ds_options=BITOR(ds_options, 4096) where
dataset_name='CUSTOMER'
```

The SQL Server SQL language uses & and | to perform these functions. In the case of SQL Server the above example would look like:

```
update DATASETS set ds_options=ds_options | 4096 where
dataset_name='CUSTOMER'
```

All scripts generated by the Oracle Client using the `createscripts` command will usually use the BITOR function. BITAND is used mostly for clearing bits.

Primary and Secondary Data Tables

The Databridge data tables hold the cloned DMSII data. You will see two types of Databridge data tables:

- Primary data tables, which are the relational database equivalent of the DMSII data sets. Primary table names are derived from the corresponding DMSII data set name by converting it to lowercase and replacing hyphens (-) with underscores (_).
- Secondary data tables, which are additional tables that need to be generated to represent a DMSII structure that does not have a relational database equivalent (for example, items with OCCURS clauses that are not flattened). Secondary table names are constructed using the primary table name with an appropriate suffix.

Defining a Data Source

A data source is the DMSII database or FileXtract file that you want the Client to replicate. The DBServer control file (on the host) identifies each data source by name in the section that uses the key word SOURCE. A SOURCE has a FORMAT, FILTER and SUPPORT specification.

If you use Enterprise Server, each data source will be associated with a SOURCE in the Enterprise Server configuration file. This SOURCE is based on a base data source that matches a SOURCE in DBServer. If you use the base source without any additional filtering applied by Enterprise Server, the DBServer and Enterprise Server sources are identical and completely interchangeable.

Each data source has an entry in the DATASOURCES Client control table. The hostname column identifies the Databridge server by the domain name or IP address. The hostport column identifies the port on which the server listens for incoming connections. You can switch the server from DBServer to Enterprise Server simply by changing the values of these two columns.

NOTE: You may use Databridge FileXtract sources for Client operations. These sources are made to look like data sources for DMSII databases.

Using the Define Command

Follow these steps to define a data source and populate the Client control tables. You can also perform this action from the Client Console by selecting the data source and then clicking **Data Source > Advanced > Define/Redefine**. If you use the Client Configurator, it will allow you to change the configuration parameters while you are defining the data source.

To define a data source

NOTE: This procedure assumes that Databridge Server is running and the signon parameters are configured appropriately.

---

1 Because the following dbridge.cfg parameters are difficult to change later without redefining and recloning, make sure that they're set appropriately before you run the `define` command:

```
allow_nulls
clr_dup_extr_recs
default_user_columns
dflt_history_columns
enable_dms_links
external_column
flatten_all_occurs
force_aa_only
maximum_columns
min_varchar
minimize_col_updates
optimize_updates
read_null_records
sec_tab_column_mask
split_varfmt_dataset
use_bigint (SQL Server only)
use_binary_aa
use_clob (Oracle only)
use_clustered_index (SQL Server only)
use_column_prefixes
use_decimal_aa
use_date (SQL Server only)
use_datetime2 (SQL Server only)
use_nullable_dates (Miser databases only)
use_primary_key
use_stored_procs
use_time (SQL Server only)
use_varchar
```

For information on setting these parameters, see Appendix C: Client Configuration (page 241).

2 Enter the following command:

`dbutility [`*`signon_opts misc_opts`*`] define `*`datasource hostname portnum`*

Where	Is

signon_opts	For each Databridge Client type, the following command-line options specify the relational database signon parameters:
	Oracle:
	`[-U `*`userid`*`] [-P `*`password`*`] [-D `*`database`*`]`
	SQL Server:
	`[-U `*`userid`*`] [-P `*`password`*`] [-W] [-O `*`ODBCdatasource`*`]`

Where	Is
misc_opts	Any of the following miscellaneous command-line options: `-L` forces the client to use a new log file for this run. `-T` forces the client to use a new trace file for this run, if tracing is enabled. `-f` *filename* to specify a configuration file other than the default dbridge.cfg file in the working directory. `-u` allows the command to delete Client control table entries for a data source that already exists.
datasource	**For DBServer:** The name that matches the entry for SOURCE in the DBServer control file. You can enter the data source name in uppercase or lowercase. **For DBEnterprise:** The name of a source (base or filtered) defined in Enterprise Server.
hostname	The domain name or IP address of the Databridge server.
portnum	The TCP/IP port number on which the appropriate Databridge server listens for incoming calls.

For DMSII databases that have a large number of data sets and data items, the process of retrieving the layout information may take several minutes.

3 Read the following section, "Results of the Define Command" on page 40, and then specify which data sets and data items you do not want to be cloned or updated, as explained in "Customizing with User Scripts" on page 42.

Example

Assuming the DBServer control file contains SOURCE ORDDB and PORT=5001 on the host "OURHOST.CIN.AAA.COM", you would enter the following:

```
dbutility define ORDDB OURHOST.CIN.AAA.COM 5001
```

The Databridge Client makes remote procedure calls to DBServer to get DMSII database layout information. DBServer returns the DMSII layout information to the Client. The Client populates the control tables with the DMSII layout information and creates the corresponding relational database table layout.

The empty control tables (that were built during the dbutility `configure` command) are now populated.

For example, this SQL statement

```
select data_source, hostname, hostport from DATASOURCES
```

would yield a table similar to the following. Only the selected columns are shown.

```
data_source   hostname              hostport
------------  --------------------  ------
ORDDB         OURHOST.CIN.AAA.COM   5001
```

Results of the Define Command

The `define` command automatically does the following with table names and column names:

- (Typically) converts data set, data item, and set names to lowercase for their equivalent relational database table, column, and index names. For more details on how this actually occurs, see "Relational Database Table and Column Names" on page 142.
- Constructs secondary table names by appending an underscore followed by the lowercase data item name (for which the table is constructed) to the primary table name. For example, if a DMSII data item named SALES, which has an OCCURS clause, appears in a data set named CUSTOMERS, the relational database table generated for the OCCURS item is named customers_sales. For more details, see "Handling DMSII OCCURS" on page 132.
- Appends the suffix _x to all object names that are relational database reserved words. For example, if a DMSII data set is named ORDER, which is a relational database reserved word, the table generated for the ORDER data set is named order_x. Likewise, for a DMSII data item named COUNT, which is also a relational database reserved word, the corresponding column would be named count_x.
- In the case of the Databridge Client, adds two-character prefixes to table names (i_, u_, and d_) when constructing the names of the stored procedures it uses to insert, update, and delete records from these tables. The result is that table names are limited to 28 characters, even though some relational databases limit table and index names to 30 characters.
- In the case of the Databridge Client, checks table and index names to see if they duplicate existing table and index names that Databridge previously created. Databridge recognizes only those relational database objects that it has created. When the Databridge Client finds a duplicate name, it makes the name unique in one of the following ways:
  - Appending a numeric suffix. For a data set named ITEM that must be split into three tables, the resulting table names would be as follows: item, item1, item2.
  - If the name is too long to add a suffix, overwriting as many of the last characters as necessary with numeric characters to make the name unique.

Cloning from Multiple Data Sources

If you are cloning multiple data sources to the same relational database and you have duplicate data set names, Databridge modifies the table name for those duplicates to avoid creating multiple tables with the same name.

For example, if you have two data sources (DSA and DSB), both of which include a data set named PRODUCTS, Databridge clones the data set from DSA into a table named "products". When Databridge clones DSB, it clones DSB's data set PRODUCTS into a table named "products1".

IMPORTANT: To avoid potential errors, rename any tables that have duplicate names. For example, rename the "products" table to "products_a" for data source DSA and to "products_b" for data source DSB. You can rename tables during the relational database customization phase of the `define` command using the `script.user_define.`*`primary_tablename`*. For a sample script, see "Renaming a Table" on page 325.

The Databridge Client renames duplicate table names across data sources as a precaution against accidentally removing a table that contains good data. If you do not drop either of the data sources, rerunning the `define` command for either data source does not cause any problems.

For example, if you execute another `define` command for DSA because DMSII database A was reorganized, the `define` command looks for the table name "products" in the DATATABLES Client control table that belongs to data sources other than DSA. Because the name "products" belongs to DSA only, the `define` command does not find "products" as a table name under any other data source. Thus the table corresponding to the data set PRODUCTS will be named "products", as was the case earlier.

Similarly, if you execute a `define` command for DSB, the `define` command looks for the name "products" in the DATATABLES Client control table that belongs to data sources other than DSB. Because the name "products" belongs to DSA, the `define` command will find "products" as a table name used by another data source and it will resolve the conflict by renaming the table. Thus the table corresponding to the data set PRODUCTS will be named "products1" as was the case before the `define` command was run.

If you drop either of the data sources, however, the results may be different because the table name is no longer a duplicate. For example, if you drop DSA and then execute a `define` command for data source DSB, the table will be named "products", not "products1", because it is no longer a duplicate.

Similarly, if you do a `dropall` command and then execute a `define` command for data source DSB first, the tables will be named "products" for data source DSB and "products1" for data source DSA.

Add a Prefix to Duplicate Data Set Names

If you replicate two or more databases, which have many data set names in common, you can make the program add a prefix to all the table names for a data source. You must define the prefixes, which can be 1–8 characters long, before you create the relational database layout. To do this, assign a value, such as X1, to the tab_name_prefix column of the corresponding entry in the DATASOURCES Client control table using the script `script.user_datasets.`*`datasource`*. Using different prefixes for each data source makes the table names unique and eliminates the need to rename tables.

If you are using multiple data sources that have data sets or indexes that have the same name, we strongly recommend that you write user scripts to resolve this issue by forcing such a table to use a different name for one (or more if the name occurs in more than two data sources). This will ensure that you have a consistent naming convention. Without this, you could run into problems if you reorganize these data sets.

Example script

```
script.user_define.customer:
  update DATATABLES set table_name='customer_demodb'
  where data_source='DEMODB' and dataset_name='CUSTOMER'
/***/
  update DATAITEMS set table_name='customer_demodb'
  where data_source='DEMODB' and table_name='customer'
```

This example script forces the table ‘customer’ in data source DEMODB to always be renamed. If another data source also has a data set named CUSTOMER, it will then be able to always use the name 'customer' for the corresponding table. It also makes sure that all the items in the renamed table point to the renamed table. The line `/***/`, which separates the two SQL statements in the script, tells the Client to execute the first SQL statement before moving on to the second one.

Customizing with User Scripts

User scripts are files that contain SQL statements for modifying the Client control tables. They provide a convenient way of automating the customization changes that are applied to the control tables. The Databridge Client looks for user scripts in the directory specified by the configuration file parameter `user_script_dir`. If you do not set the `user_script_dir` parameter in the configuration file, the Databridge Client uses the `scripts` directory. It automatically executes user scripts when certain commands are run, provided they exist.

The main purpose of user scripts is to preserve changes to the control tables by having the program run these scripts to restore the changes whenever necessary. To view sample data set layout and data table customization scripts, see Appendix D: Customization Scripts. (page 315)

NOTE: You can customize the Client control tables easily by using the Client Configurator instead of writing user scripts.

Customizing a DMS item is very simple. Right-click on the item in the DMSII view of the Client Configurator and select the appropriate option from the pop-up menu that appears. You may also need to change the properties of the item in some cases where the `dms_subtype` needs to be set.

You can find a complete description of the additional requirements for user scripts that are compatible with the Client Configurator in "Appendix D: Customization Scripts" on page 315. For information about using the Client Configurator to customize your data source, see the Databridge Client Console Help.

Types of User Scripts

The Databridge Client supports the following types of user scripts:

Script/Filename	Description
Session initialization script	`script.user.session` This script allows you to change session parameters without changing the database settings. Use this script to alter session parameters whose default values are not suitable for client operations. For example, when the NLS_LANGUAGE for Oracle is a European language, ALTER the NLS_LANGUAGE parameter to set the language to AMERICAN and the NLS_TERRITORY to AMERICA. The Databridge Client executes these scripts when running any command that connects to the relational database. **NOTE:** The Oracle Client will automatically execute the SQL to ALTER the SESSION when the language is not AMERICAN or when the character set of the database is UTF8. However, it will only do this if there is no session script present in the user scripts directory. This allows you to override the actions taken by the Client by providing a session script to use instead.

Script/Filename	Description
Data set global mapping customization script	`script.user_datasets.`*`datasource`* where *datasource* is the name of the data source (in lowercase) as defined in the DATASOURCES Client control table. Use this script to disable mapping for unwanted data sets or to enable mapping for data sets that are not mapped by default. Create only one of these scripts for each data source. The Client processes the user script `script.user_datasets.`*`datasource`* before the DMSII mapping phase of both the `define` and `redefine` commands. This script can contain global script commands that allow you to make changes to multiple columns in the DATASETS and DMS_ITEMS layouts with a single SQL statement. For instance, if a DMSII database has a time value item called TS in almost every data set, you can use a single SQL statement to update the dms_subtype value for every occurrence of TS. For an example script, see "Sample Data Set Global Mapping Customization Script" on page 319.
Data set mapping customization script	`script.user_layout.`*`primary_tablename`* where *primary_tablename* is the name of the primary table mapped from the data set. These scripts make changes to the DATASETS and DMS_ITEMS Client control tables for such things as selecting and deselecting DMSII items for cloning, flattening OCCURS clauses, specifying that certain DMSII items should be mapped to relational database dates, creating composite keys, and so on. Such changes are made *before* Databridge performs the actual mapping from DMSII to the relational database. Create one of these scripts for each data set whose mapping needs to be customized. The Databridge Client runs these scripts for all data sets—selected or not—after the DMSII layout has been received from the Databridge Engine during a `define` or `define` command. See also "Using Scripts to Disable Data Sets" on page 48.
Data table global customization script	`script.user_datatables.`*`datasource`* where datasource is the name of the data source (in lowercase) as defined in the DATASOURCES Client control table. This script is run after the relational database layout has been created during a `define` or `redefine` command. It allows you to make global changes to DATATABLES and DATAITEMS. You can use this script to insert common scripts into a single file rather than having to duplicate the SQL in each of the `define` scripts for the individual data sets. For an example, see "Sample Data Table Global Customization Script" on page 325.

Script/Filename	Description
Data table customization script	`script.user_define.`*`primary_tablename`* where *primary_tablename* is the name of the primary table mapped from the data set. These scripts make changes to the DATATABLES and DATAITEMS tables for changing table or column names, changing SQL data types, and so on. Create one of these scripts for each data set that has one or more tables which need to be customized. When you change the name of the table within the script, you must use the original primary table name in the script filename. All changes related to tables mapped from a data set are contained in the data table customization script for the primary table specified by *tablename*. The Databridge Client runs these scripts after the relational database layout has been created by the `define` and `redefine` commands.
Data table creation user script	`script.user_create.`*`tablename`* where *tablename* is the name of the relational database table. Use this script for the following: ◆ To define default values for non DMSII columns ◆ To alter the table and add a column that the Databridge client does not need to be aware of, add a "ALTER TABLE *xxx* ADD COLUMN *yyy*" SQL statement to these scripts instead of adding SQL statements to the table creation scripts These scripts are executed immediately after the related Databridge Client `script.create.`*`tablename`* scripts during the `process` or `clone` command. If you set the `check_user_scripts` parameter, the Databridge Client returns a warning if it cannot find the script. **CAUTION:** Do not use this script to create columns for specific types of data generated by the Client. This script creates a type of user column that the Client is unaware of. To create user columns that the Client is aware of, see "Adding a Non DMSII Column" on page 65.
Index creation user script	`script.user_index.`*`tablename`* where *tablename* is the name of the relational database table. Use this script to add SQL statements to the index creation scripts (`script.index.`*`tablename`*) created by the dbutility `generate` command. Do not modify the scripts created by the `generate` command, as your changes will be lost the next time a `generate` command is run. These scripts are executed immediately after the related Databridge Client script named `script.index.`*`tablename`* during the `process` or `clone` command. If you set the `check_user_scripts` parameter, the Databridge Client returns a warning if it cannot find the script.

Script/Filename	Description
Data table cleanup user script	`script.user_cleanup.`*`tablename`* where *tablename* is the name of the relational database table Use these scripts to undo any actions, such as creating a secondary index, that are done in the `script.user_index.table` user script. These scripts are run during the `process` or `clone` command, prior to executing the cleanup scripts created by the `generate` command. The scripts are only used in cases where the relational database tables are not dropped when a data set is recloned, such as when deleted records are to be preserved.
Stored procedure creation user script	`script.user_create_sp.`*`tablename`* where *tablename* is the name of the relational database table. This new type of script allows the user to split updates to stored procedures from other actions taken when a table is created by the Client. Unlike the user scripts `script.user_create.`*`tablename`*, this script is also run when the table is refreshed during a `refresh` or `reorg` command. This allows the user to alter the stored procedures without requiring any manual intervention.

User Script Syntax

Use the syntax you would typically use for SQL statements; however, separate each statement with the following separator:

```
/***/
```

In addition, be aware of the following:

- You must begin the separator line with the characters `/***/` and no leading spaces. Trailing blanks or carriage returns are ignored.
- Do not end the script with the `/***/` separator.
- Do not use a semicolon or GO as you would if you were using a relational database query tool.
- You can add comments to the end of any line (including a blank line) by using "`//`" to start a comment. This causes the Client to ignore the rest of the line, including these two characters. If you add a comment to a separator line, the separator must be followed by at least one space.

Writing and Testing User Scripts

Following is a recommended method for creating user scripts. Typically, you would start writing your user scripts after you have run `configure` and `define` for the first time. This procedure does *not* cover the data table creation user script or the index creation user script.

CAUTION: If you have already used the Databridge Client to clone a database, we highly recommend that you test your scripts using a *test version* of the Client control tables, *not* your production version of the Client control tables.

Follow these guidelines as you develop your user scripts:

- Store your user scripts in the directory pointed to by the `user_script_dir` parameter of the Client configuration file (by default, the `scripts` subdirectory of the data source's working directory). Storing them in the global working directory ensures that they are protected by file security, if enabled.
- Use the `runscript` command to test each script. This command executes the scripts as a transaction. If an error occurs in a script, the Databridge Client rolls back all changes. You then have the opportunity to fix the error and rerun the script.
- If you make a mistake and change the Client control tables in a way you did not intend to, remove or rename the offending script and then run dbutility `define` again. This creates a fresh set of Client control tables.

To write and test user scripts

1. Do one of the following:
   - If you are already using Client control tables in production, run `configure` to create a test version of the Client control tables or `unload` to create a backup copy of the tables.
   - If you haven't created Client control tables yet, run `configure`.
2. Run `define` to populate the Client control tables.
3. Run `display` to create a report of your Client control tables. This report gives you a record of table names, column names, and so on, that you can use as a reference as you write your user scripts.
4. Create your data set mapping customization scripts, as follows:
   - Create the data set selection script for selecting/deselecting data sets. See "Sample Data Set Selection Script" on page 320.
   - Create a data set mapping customization script for each data set that requires that its mapping be customized. These user scripts can contain several SQL statements that perform different types of mapping customizations (for example, flatten OCCURS clauses, specify that items should be cloned as dates, and disable the cloning of some DMSII items). See Tips for More Efficient Cloning (page 97).
5. Test each script as follows:

   `dbutility [-n] runscript scriptfilename`

   where *scriptfilename* is the name of the script you're testing and *-n* is a command line option that overrides your entry for `user_script_dir` by allowing you to specify a complete path for the script.

   NOTE: The `runscript` command runs the script in transaction mode. If an error occurs during script execution, the Databridge Client rolls back all changes. This allows you to safely rerun the script after correcting it.

   ---

6. Fix any errors uncovered by running the scripts, and rerun the script until it is correct.

   If the script gets corrupted beyond repair, rerun the `define` command as described in step 2. You must add the `-u` command line option to force the program to allow you to rerun the `define` command.
7. When you are satisfied with the script, repeat the `define` command.

You can also set bit 8 of the status_bits column of the DATASETS Client control table to inform dbutility that the data set needs to be redefined. To set this value, run the following within a relational database query tool:

```
update DATASETS set status_bits = 8
where dataset_name = 'DSNAME' and data_source = 'SOURCE'
```

Then execute a `define` command to refresh the mapping.

8. Repeat step 3 at this point to view the effect of your data set mapping customization.
9. Create a data table customization script for each data set whose tables need to be customized.

   These user scripts can contain several SQL statements that perform different types of customizations for any of the tables mapped from the data set (for example, renaming a table, renaming a column, changing the sql type of column, inserting a non DMSII item into a tables). See "Sample Data Table Customization Scripts" on page 325.
10. Test each script as described in step 6.

CAUTION: Include all changes that affect the tables derived from a data set in that data set's script. For example, after a reorganization, the Databridge Client runs your data table customization user scripts after the relational database layout has been created by a `define` command. If some scripts are missing, or if a data table customization script does not include all the changes for its tables, the Databridge Client creates tables that have different layouts than the original ones.

---

11. Fix any errors uncovered by running the scripts, and rerun the script until it is correct.

    If the script gets corrupted beyond repair, rerun the `define` command as described in step 2. You must add the `-u` command line option to force the program to allow you to rerun the `define` command.
12. Run dbutility `define` again, using the `-u` option. If you don't use the `-u` option, the `define` command will tell you the data source already exists. Enter the following:

    `dbutility -t0x801 -u` *`datasource hostname portnumber`*

    The Databridge Client automatically runs your user scripts and updates the Client control tables accordingly. The -t 0x801 option produces a trace of all SQL commands that execute as part of user scripts. These are followed by row counts for update or insert statements. If you do not enable tracing, you will only see the row counts in the log file.

    The next phase of the `define` command executes the mapping of the DMSII data sets to relational database tables for data sets whose active column is set to 1. Finally, the Databridge Client runs the data table customization scripts for all the data sets whose active column is set to 1. The `-t 0x801` options also produce a trace of all SQL commands in these scripts.

    The Databridge Client runs the data set selection scripts and all the data set mapping customization scripts as well as the data table customization scripts in a single transaction group. If there is an error, the Databridge Client does not commit any of the changes; instead, it rolls back all changes and the command terminates.

NOTE: If you created table creation or index creation user scripts, the Databridge Client runs those immediately after running its own table creation or index creation scripts.

---

13. If you decide to clone a data set or data item that you did not previously clone or if a DMSII reorganization occurs, you will need to update your scripts.

Using Scripts to Disable Data Sets

To disable cloning by writing user scripts, do the following:

- Disable data set cloning via `script.user_datasets.datasource`
- Disable DMSII item cloning via `script.user_layout.primary_tablename`
- Once you are familiar with the concepts in this section, see "Customizing with User Scripts" on page 42.

When using the Client Console or Client Configurator you can simply uncheck the checkbox for the active column of the data sets you want to disable. The Client will remember the changes unless you drop the data source and start from scratch.

Decoding DMSII Dates, Times, and Date/Times

This section explains the following:

- How to decode DMSII dates, times, and date/time formats into appropriate relational database types by modifying the DMS_ITEMS Client control table via the `script.user_layout.primary_tablename` user script
- How to change the SQL data type of the resulting relational database column

---

NOTE: You can make the same types of customizations to the Client control tables using the Client Configurator as you can by writing user scripts. You can find a complete description of the additional requirements for user scripts that are compatible with the Client Configurator in "Appendix D: Customization Scripts" on page 315. For information about using the Client Configurator to customize your data source, see the Databridge Client Console Help.

After you are familiar with the concepts in this section, see "Appendix D: Customization Scripts" on page 315.

DMSII Dates

Even though DMSII did not have a date data type until the advent of DMSII 57.1, most DMSII sites use several common methods to store dates. This section includes ways to decode these types of date representations into a relational database date data type. A DMSII 57.1 date is stored as a REAL in DMSII and represents the number of days since 12/31/1600. The Client automatically converts DMSII 57.1 dates to relational database dates making it unnecessary to do any customization

The Databridge Client supports the following DMSII date encoding methods:

For	That represents dates as	See
DMSII GROUPS	Three numbers for year, month, and day	"DMSII Dates Represented as a GROUP of Numbers - approach #1" on page 50 and DMSII Dates Represented as a GROUP of Numbers - approach #2 (page 51)

For	That represents dates as	See
DMSII NUMBER values	Any of the following: ◆ MISER database dates, usually NUMBER(5) ◆ LINC database dates ◆ Month, day, and year combined into a six-digit (031005) or eight-digit (03102005) number ◆ Julian dates represented as a five-digit number (06905) or seven-digit number (0692005)	Decoding DMSII Dates Represented as ALPHA or NUMBER (page 52)
DMSII ALPHA values	Any of the following: ◆ LINC database dates ◆ Month, day, and year represented by a 6- or 8-character alpha string containing only digits ◆ Delimited dates such as (03/10/10) ◆ Dates with three-character month names (MAR102005)	Decoding DMSII Dates Represented as ALPHA or NUMBER (page 52)
DMSII Times		"DMSII Times Represented as ALPHA, NUMBER, or REAL" on page 56
DMSII Date/Times		"Decoding DMSII Date/Time Represented as ALPHA or NUMBER" on page 57
Unique DMSII dates	Any of the following: ◆ Month/year without day or other unique variations ◆ Non-Standard dates ◆ Month/year without day or other unique variations	"Unique DMSII Date/Time Represented as ALPHA or NUMBER" on page 59

Choosing the SQL Data Type of the Relational Database Column

Regardless of the original DMSII date structure, the resulting relational database column has a default sql_type of 12 (smalldatetime) in the case of SQL Server and a sql_type of 10 (date) in the case of Oracle.

To make the Client map a DMS item to a column that is a date data type, you must set the bit DIOPT_Clone_as_Date (2) in the di_options column of the corresponding DMS_ITEMS entry using the user script `script.user_layout.`*`dataset`*.

SQL Server supports multiple date data types. You can make the Client generate different types of dates by using the `script.user_layout.dataset` user script to set the following bits in the di_options column of the corresponding DMS_ITEMS table entry:

- DIOPT_UseLongDate (128) causes the Client to a use a data type of 10 (datetime) instead of smalldatetime.
- DIOPT_UseLongDate2 (65536) causes the Client to use the datetime2 data type. If both this bit and the DIOPT_UseLongDate bit are set, datetime2 is used.
- DIOPT_Clone_as_DateOnly (32768) causes the Client to use the date data type which is 3-bytes long and contains no time.

Relational Database Date Data Type	Value for sql_type Column
Microsoft SQL Server: datetime (8 bytes)	10
Microsoft SQL Server: smalldatetime (4 bytes)	12
Oracle: date (7 bytes)	10
Microsoft SQL Server: int Oracle: number(10) **NOTE:** The date is formatted according to the numeric_date_format configuration parameter, whose default value is 23 (*mmddyyyy*).	13
Microsoft SQL Server: datetime2 (8 bytes)	19
Microsoft SQL Server: date (3 bytes)	20

For an example script, see "Changing SQL Data Types" on page 327.

DMSII Dates Represented as a GROUP of Numbers - approach #1

The DMSII GROUP must always contain a year and a month; the day can be omitted, in which case it defaults to 1.

To clone a DMSII date (represented as a group of numbers) as a relational database date

Write a user script (`script.user_layout.primary_tablename`) that does the following:

1 Sets the DIOPT_Clone_as_Date (2) bit in the di_options column for the GROUP

2 Sets the dms_subtype column of the group members in DMS_ITEMS to indicate which part of the date they represent, as follows:

Part of Date in GROUP	Value for dms_subtype Column
Year (assumes a 1900 base)	1
Month	2
Day	3
Year By default, yy values < 50 are 21st century years (20yy) and yy values > 50 are 20th century years (19yy).*	4
Absolute year This is a 4-digit year specification (for example, 2010).	5

*The following SQL statements cause the Databridge Client to clone the DMSII group INV_DATE as a relational database date type.

Filename: `script.user_layout.inv`

```
update DMS_ITEMS
   set di_options=2
where dataset_name='INV' and dms_item_name='INV_DATE'
/***/
update DMS_ITEMS
   set dms_subtype=1
where dataset_name='INV' and dms_item_name='INV_DATE_YEAR'
/***/
update DMS_ITEMS
   set dms_subtype=2
where dataset_name='INV' and dms_item_name='INV_DATE_MONTH'
/***/
update DMS_ITEMS
   set dms_subtype=3
where dataset_name='INV' and dms_item_name='INV_DATE_DAY'
```

The Client Configurator does not support this method of handling GROUP dates. However, it does support the equivalent method described in the next section. When converting old scripts to a format compatible with the Client Configurator, the dbscriptfixup utility converts the changes made by this type of script to the format described below.

DMSII Dates Represented as a GROUP of Numbers - approach #2

This version of Databridge Client now supports a method of handling DMSII dates represented as a GROUP. The Client redefines a group of like items that can either be unsigned numbers or alpha items as a single item having the common type and encompassing the entire GROUP. This operation is referred to as collapsing a GROUP. By collapsing a GROUP of numbers that represent a date, we effectively make the operation of cloning it as a relational database date equivalent to that of cloning a number that represents a date.

For example, this technique can collapse the year, month, and day in the following DMSII GROUP in the data set named EMPLOYEE into a single item that acts as a NUMBER(8) :

```
EMP-HIRE-DATE-YMD GROUP
(
   EMP-HIRE-YEAR NUMBER(4);
   EMP-HIRE-MONTH NUMBER(2);
   EMP-HIRE_DAY NUMBER(2);
)
```

The method described in the next section can then customize this column as needed. This technique also applies to date/time quantities represented as a group of like items.

To clone a DMSII date (represented as a group of numbers) as a relational database date

Write a user script (`script.user_layout.`*`primary_tablename`*) that does the following:

1. Sets the DIOPT_CollapseGroup (67,108,864) and the DIOPT_Clone_as_Date (2) bits in the di_options column.
2. Sets the dms_subtype column of the GROUP item in DMS_ITEMS to indicate the format in which the resulting date is encoded. See the section below for a list of date formats (the above date group is represented by a dms_subtype of 21).

The script to perform this action is:

Filename: `script.user_layout.employee`

```
update DMS_ITEMS
   set di_options=67108866,
   dms_subtype=21
where dataset_name='EMPLOYEE' and dms_item_name='EMP-HIRE-DATE-YMD'
```

Decoding DMSII Dates Represented as ALPHA or NUMBER

Use the following procedure to decode DMSII dates represented as NUMBER or ALPHA items to relational database data types.

To decode dates represented as NUMBER or ALPHA items

1. Write a script (`script.user_layout.`*`primary_tablename`*) that does the following:
2. Sets the DIOPT_Clone_as_Date (2) bit in di_options.
3. Sets the dms_subtype column in DMS_ITEMS to indicate the type of date encoding method used on the host, as follows:

Date Encoding Scheme	Value for dms_subtype Column
NUMBER(*n*) for MISER dates—days since 12/31/1899	1
NUMBER(*n*) for LINC dates—days since 1/1/*baseyear* (default 1957)	3

Date Encoding Scheme	Value for dms_subtype Column
ALPHA(6) or NUMBER(6) with two-digit year *yy* (1900–1999) *yymmdd* *yyddmm* *mmddyy* *mmyydd* *ddmmyy* *ddyymm*	11 12 13 14 15 16
ALPHA(5) or NUMBER(5) with two-digit year *yy* (1900–1999) and with days *DDD* where *DDD* is a number between 1–366 for Julian dates **DDDyy** *yyDDD*	17 18
ALPHA(8) or NUMBER(8) with four-digit year *yyyy* *yyyymmdd* *yyyyddmm* *mmddyyyy* *mmyyyydd* *ddmmyyyy* *ddyyyymm*	21 22 23 24 25 26
ALPHA(7) or NUMBER(7) with four-digit year *yyyy* and with days *DDD* where *DDD* is a number between 1–366 for Julian dates **DDDyyyy** *yyyyDDD*	27 28
ALPHA(6) or NUMBER(6) with two-digit year *yy* (1950–2049) where *yy* values < 50 are 21st century years (20*yy*) and *yy* values > 50 are 20th century years (19*yy*) *yymmdd*_2000 *yyddmm*_2000 *mmddyy*_2000 *mmyydd*_2000 *ddmmyy*_2000 *ddyymm*_2000	31 32 33 34 35 36
ALPHA(5) or NUMBER(5) with two-digit year *yy* (1950–2049) where *yy* values < 50 are 21st century years (20*yy*) and *yy* values > 50 are 20th century years (19*yy*) and with days *DDD* where *DDD* is a number between 1–366 for Julian dates.* ***DDDyy*_2000** *yyDDD*_2000	37 38

Date Encoding Scheme	Value for dms_subtype Column
ALPHA(8) with two-digit year *yy* (1900–1999) and with delimiter characters where / represents forward slash (/), hyphen (-), or period (.).	41 42 43
yy/mm/dd	44
yy/dd/mm	45
mm/dd/yy	46
mm/yy/dd	
dd/mm/yy	
dd/yy/mm	
ALPHA(10) with four-digit year *yyyy* and with delimiter characters where / represents forward slash (/), hyphen (-), or period (.).	51 52
yyyy/mm/dd	53
yyyy/dd/mm	54
mm/dd/yyyy	55
mm/yyyy/dd	56
dd/mm/yyyy	
dd/yyyy/mm	
ALPHA(8) with two-digit year *yy* (1950–2049) where *yy* values < 50 are 21st century years (20*yy*) and *yy* values > 50 are 20th century years (19*yy*) and with delimiter characters where / represents forward slash (/), hyphen (-), or period (.).*	61 62 63 64
*yy/mm/dd*_2000	65
*yy/dd/mm*_2000	66
*mm/dd/yy*_2000	
*mm/yy/dd*_2000	
*dd/mm/yy*_2000	
*dd/yy/mm*_2000	
ALPHA(7) with two-digit year *yy (*1900–1999) and three-character month abbreviation (*mon*). Month abbreviations are JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, and DEC unless specified otherwise by the months parameter in the Databridge Client configuration file.	71 72 73 74 75 76
yymondd	
yyddmon	
monddyy	
monyydd	
ddmmyy	
ddyymon	

Date Encoding Scheme	Value for dms_subtype Column
ALPHA(9) with four-digit year (*yyyy*) and three-character month abbreviation (*mon*). Month abbreviations are JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, and DEC unless specified otherwise by the months parameter in the Databridge Client configuration file. *yyyymondd* *yyyyddmon* *monddyyyy* *monyyyydd* *ddmonyyyy* *ddyyyymon*	81 82 83 84 85 86
ALPHA(7) with two-digit year *yy* (1950–2049) where *yy* values < 50 are 21st century years (20*yy*) and *yy* values > 50 are 20th century years (19*yy*) and with three-character month abbreviations (*mon*). Month abbreviations are JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, and DEC unless specified otherwise by the months parameter in the Databridge Client configuration file.* *yymondd*_2000 *yyddmon*_2000 *monddyy*_2000 *monyydd*_2000 *ddmonyy*_2000 *ddyymon*_2000	91 92 93 94 95 96

*The configuration parameter century_break allows you to adjust the range for the year. The default value for century_break is 50. A value of -1 causes the Client to automatically set the century break based on the year in the audit timestamp.

For example scripts, see "Cloning a Numeric Field as a Date" on page 321 and "Cloning an Alpha Field as a Date" on page 321.

NOTE: If your DMSII date format includes *mmyy* or *yymm* without a position for days, see "Unique DMSII Date/Time Represented as ALPHA or NUMBER" on page 59.

DMSII Times

The Databridge Client supports several DMSII ALPHA, NUMBER, or TIME encoding methods for time of day and elapsed time.

Choosing the SQL Data Type of the Relational Database Column

The relational database column—regardless of the original DMSII time structure—has a default sql_type of 17, which is a Microsoft SQL Server int or Oracle number(6), except for TIME(12) and TIME(14), which are stored as a number (10). TIME(12) and TIME(14) are formatted as *ddddhhmnss*, where *dddd* is the number of days.

All other TIME types are formatted as *hhmnss*. To make the client map a DMS item to a column that is a numeric time, you need to set the bit DIOPT_Clone_as_Time (256) in the di_options column of the corresponding DMS_ITEMS entry using the user script `script.user_layout.dataset`.

In the case of SQL Server, which has a time data type, the client can store these values using the time data type. You can do this by setting the di_options bit DIOPT_Use_Time (131072) in the corresponding entry in the DMSII_ITEMS table using the `script.user_layout.dataset` user script. If you set both the DIOPT_Clone_as_Time bit and the DIOPT_Use_Time bit, the latter takes precedence.

DMSII Times Represented as ALPHA, NUMBER, or REAL

You can decode DMSII times represented as ALPHA, NUMBER, or REAL items to relational database data types using the Databridge host or the Databridge Client. To do this on the host (versus the Databridge Client), you must redefine the DMSII item using an ALTER REDEFINE. For more information, see Chapter 5 of the *Databridge Programmer's Reference*.

To decode those data types using the Databridge Client

Write a script (`script.user_layout.primary_tablename`) that does the following:

- Sets the DIOPT_Clone_as_Time (256) bit in di_options.
- Sets the dms_subtype column in DMS_ITEMS to indicate the type of time encoding method used on the host, as follows:

Time Encoding Scheme	Value for dms_subtype Column
ALPHA(6) or NUMBER(6) time of day in *hhmnss* format	1
REAL containing a TIME(1) value, which represents the time of day in 1/60th of a second	2
REAL containing a TIME(11) value, which represents the time of day in ticks (2.4 microseconds)	3
REAL containing a TIME(12) or TIME(14) value, which represents the elapsed time in ticks	4
REAL containing a DMSII 57.1 TIME, which represents the number of 100'th of seconds since midnight. These are automatically converted to TIME data types if the database supports it. Otherwise, they are stored as integer values of the form "hhmmss".	5
NUMBER(12) containing the time of day in hhmnssmmmmmm format where mmmmmm represents fractions of seconds.	6

For an example script, see "Cloning an Alpha or Number Field as a Time" on page 321.

Decoding DMSII Date/Times

The Databridge Client implements a set of dms_subtype values to decode DMSII items that include the date and time in a single item. Specifically, the Databridge Client contains values for DMSII ALPHA or NUMBER values that represent the date/time in a variety of ways, such as:

- Month, day, year, and time of day combined into a twelve-digit (031005112501) or fourteen-digit (03102005112501) number
- Julian dates and time of day represented as an eleven-digit number (06905112501) or a thirteen-digit number (0692005112501)
- DMSII item of type REAL that are 48-bits long and represent TIME(6), TIME(7), or TIME(60) type data which encode a date and a time. A new data type in DMSII 57.1, named TIMESTAMP, represents TIME(6) values. The Databridge Client automatically converts these items to the appropriate relational database date/time data type, thus eliminating the need to do any special customization.

To decode these types of date/time representations into a relational database date/time data type, see "Decoding DMSII Date/Time Represented as ALPHA or NUMBER" on page 57. When using these with SQL Server, you should set the `di_options` bit DIOPT_Use_LongDate to force the client to use a data type of datetime rather than smalldatetime. When a data type of smalldatetime is used, the client sets the values of seconds to zero (0), as SQL Server rounds the value to increments of .000, .003, or .007 seconds.

Decoding DMSII Date/Time Represented as ALPHA or NUMBER

You can decode DMSII date/time formats represented as NUMBER or ALPHA items to relational database date/time data types using the Databridge host or the Databridge Client. To do this on the host, you must redefine the DMSII item using an ALTER REDEFINE. For more information, see Chapter 5, "Alter Data Sets" in the *Databridge Programmer's Reference*.

To decode DMSII date/time formats represented as NUMBER or ALPHA items, write a script (`script.user_layout.`*`primary_tablename`*) that does the following:

- Sets the DIOPT_Use_Long_Date (128) bit in di_options.
- Sets the dms_subtype column in DMS_ITEMS to indicate the type of date/time encoding method used on the host, as follows:

NOTE: If your DMSII date/time encoding scheme is not listed in the following table, see the next section.

Date/Time Encoding Scheme	Value for dms_subtype Column
ALPHA(14) or NUMBER(14) with four-digit year followed by a six-digit time	121
	122
yyyymmddhhmnss	123
yyyyddmmhhmnss	124
mmddyyyyhhmnss	125
mmyyyyddhhmnss	126
ddmmyyyyhhmnss	
ddyyyymmhhmnss	

Date/Time Encoding Scheme	Value for dms_subtype Column
ALPHA(13) or NUMBER(13) with four-digit year *yyyy* and with days *DDD* where *DDD* is a number between 1–366 for Julian dates followed by a six-digit time	127 128
DDDyyyyhhmnss	
yyyyDDDhhmnss	
ALPHA(12) or NUMBER(12) with two-digit year representing dates in both the 20th and 21st centuries followed by a six-digit time	131 132 133
yymmddhhmnss *yyddmmhhmnss* *mmddyyhhmnss* *mmyyddhhmnss* *ddmmyyhhmnss* *ddyymmhhmnss* *hhmnssm*	134 135 136
ALPHA(11) or NUMBER(11) with two-digit year representing dates in both the 20th and 21st centuries where days *DDD* is a number between 1–366 for Julian dates followed by a six-digit time*	137 138
DDDyyhhmnss	
yyDDDhhmnss	
ALPHA(12) or NUMBER(12) with two-digit year *yy* (1900–1999) preceded by a six-digit time	211 212
hhmnssyymmdd *hhmnssyyddmm* *hhmnssmmddyy* *hhmnssmmyydd* *hhmnssddmmyy* *hhmnssddyymm*	213 214 215 216
ALPHA(11) or NUMBER(11) with two-digit year *yy* (1900–1999) and with days *DDD* where *DDD* is a number between 1–366 for Julian dates preceded by a six-digit time	217 218
hhmnssDDDyy *hhmnssyyDDD*	
ALPHA(14) or NUMBER(14) with four-digit year preceded by a six-digit time	221 222
hhmnssyyyymmdd *hhmnssyyyyddmm* *hhmnssmmddyyyy* *hhmnssmmyyyydd* *hhmnssddmmyyyy* *hhmnssddyyyymm*	223 224 225 226

Date/Time Encoding Scheme	Value for dms_subtype Column
ALPHA(13) or NUMBER(13) with four-digit year *yyyy* and with days *DDD* where *DDD* is a number between 1–366 for Julian dates preceded by a six-digit time *hhmnssDDDyyyy* *hhmnssyyyyDDD*	227 228
ALPHA(12) or NUMBER(12) with two-digit year representing dates in both the 20th and 21st centuries preceded by a six-digit time *hhmnssyymmdd* *hhmnssyyddmm* *hhmnssmmddyy* *hhmnssmmyydd* *hhmnssddmmyy* *hhmnssddyymm*	231 232 233 234 235 236
ALPHA(11) or NUMBER(11) with two-digit year representing dates in both the 20th and 21st centuries where days *DDD* is a number between 1–366 for Julian dates preceded by a six-digit time* **hhmnssDDDyy** *hhmnssyyDDD*	237 238

*The configuration parameter century_break allows you to adjust the range for the year.

For example scripts, see “Cloning an Alpha or Number Field as a Date/Time” on page 321.

Unique DMSII Date/Time Represented as ALPHA or NUMBER

You may be able to decode DMSII date/time formats represented as NUMBER or ALPHA items, and convert them to relational database date/time format even if you could not find the correct encoding scheme in the previous sections. For instance, if the DMSII date item has no day (*mmyy* or *yymm*), dms_subtype of 0x32 or 0x23 converts this to relational database date/time with a day as "1" and the time as all zeros. For this to work, the DMSII item cannot include any ALPHA data (such as slashes, dashes, or month names). Therefore, 01-FEB-14 would not convert, but 0214 would.

To decode these unique date or date/time layouts using the Databridge Client, write a script (`script.user_layout.`*`primary_tablename`*) that does the following:

1. Sets the DIOPT_Clone_as_Date (2) and the DIOPT_VarFormat_Date (2048) bits in di_options.
2. Sets the dms_subtype column in DMS_ITEMS to indicate the hexadecimal string, in the same order as the host item layout, as follows:

Date/Time Encoding Scheme	Description	Hexadecimal Value for dms_subtype Column
yyyy	Four-digit year	1

Date/Time Encoding Scheme	Description	Hexadecimal Value for dms_subtype Column
yy	Two-digit year within 1950-2049 To adjust this range, use the century_break configuration parameter. See “century_break” on page 279.	2
mm	Two-digit month	3
dd	Two-digit day	4
hh	Two-digit hours	5
mn	Two-digit minutes	6
ss	Two-digit seconds Note: The Databridge SQL Server Client stores all host values for seconds (ss) as zero unless you add the DIOPT_Use_LongDate (128) bit to di_options in step one of the layout script. See "di_options" in DMS_ITEMS (page 175).	7

As stated previously, the format can be as short as *yymm* (dms_subtype 0x23 or 35 decimal). Formats like *mmhhyy* are supported (dms_subtype of 0x253 or 850 decimal) as well as longer ones. For example, a mainframe date/time layout of *mmsshhmnddyy* uses the dms_subtype value of 0x375642 or 3626562 decimal.

Numeric Date and Time in Non-Contiguous Columns

When a DMSII date and time are in contiguous column, you can easily make the Client handle the combined columns as a single date/time quantity by merging the two columns. You can do this by setting the bit 16777216 in di_options of the first item to make the `define` command merge the two items when it maps them to the relational database table. You can then mark the item to be cloned as a date and select the appropriate value for its dms_subtype column.

For example, if you have an item that is a NUMBER(8) representing a date which is immediately followed by an item that is NUMBER(6) representing a time, you can make the Client treat the first item as if it were a NUMBER(14) ignore the second one. This can also be done by using DBGenFormat.

When the two columns are not contiguous, use the dms_concat_num column to append the time part of the combined item to the date part. This column must be set to the item number of the item containing the time value. The Client will effectively treat these two items as if the second one were concatenated to the first one. You must also set the di_options bit 524288 (0x80000) to make the Client include the second item in DATAITEMS with its active column set to 0. This is a lot more efficient than using DBGenFormat to perform this operation.

See a sample script and its explanation here, “Concatenating Two Items and Cloning the Result as a Date/Time” on page 323

Creating Indexes for Tables

This section explains how the Databridge Client creates indexes for tables mapped from a DMSII data set.

Ideally, the Databridge Client uses the optimum SET among the various sets defined for the data set in the DASDL. Only SETs that have the NO DUPLICATES ALLOWED attribute (SETs with unique keys) qualify for this selection.

Keys Derived from the DMSII Database

First, the Databridge Engine decides whether any SETs meet this requirement. If more than one SET does, the Databridge Engine uses the SET with the least number of keys. In case of a tie, it uses the SET with the smallest-sized keys.

In addition, the DBGenFormat utility allows you to declare a primary key without modifying the DASDL. The Databridge Engine is responsible for passing information about DBGenFormat primary keys to the Databridge Client. The Databridge Client sometimes uses these keys for VIRTUAL data sets or any other types of data sets that do not have a SET that meets the requirements mentioned above. If you have both a qualified SET and a PRIMARY KEY defined in the GenFormat file, the Client uses the PRIMARY KEY.

NOTE: If a DMSII SET with the NO DUPLICATES ALLOWED attribute exists, we recommend that you use it as the source of the index rather than declaring a DBGenFormat primary key.

When the Databridge Engine uses a DMSII SET as the index for tables derived from the data set, the name of the DMSII SET is stored in the set_name column of the DATASETS Client control table. Alternatively, when the Databridge Engine uses a DBGenFormat primary key as the index for tables derived from the data set, the name "pk_set" is stored in the set_name column.

Using Sets with the KEYCHANGEOK Attribute

Some DMSII SETs have the KEYCHANGEOK attribute, which indicates that it is legal for the value of items that are members of the SET (that is, keys) to change. When the SET being used as the index has the KEYCHANGEOK attribute, this is reflected by bit 4096 (0x1000) in the ds_options columns of the corresponding row in the DATASETS control table. This causes the Client to register the keys it is using with the Databridge Engine, which then compares the keys in the before and after images of an update to determine if the update should be sent to the client as a MODIFY when the keys are unchanged or as a MODIFY BI/AI pair. This allows the client perform the update by deleting the old record and inserting the new one when a key change occurs.

If the Client used a MODIFY when a key change occurred, the update statement would fail and the Client would then recover by doing an insert instead. This would result in the old record and the new record both being present in the database resulting in an incorrect replication.

RSNs and AA Values as Keys

If the Databridge Engine does not find a suitable index, the Client tries to use the RSN (record sequence number) or the AA Value (absolute address) of the records as the key. Both of these items are A-Series words (48-bit quantities). They are passed to the Client as part of the record header.

Both use the same entry in the header, and the Databridge Engine informs the client about what this item represents, as explained below. If the Client decides to use one of these quantities as the key, the set_name column is set to `aa_set` in the DATASETS Client control table. Otherwise, this column is left blank, indicating that there is no set usable as an index.

The Databridge Client can represent AA Values (or RSNs) the following ways:

- CHAR(12), where each character is the hexadecimal representation of the correspond digit (half-byte) in the A-Series word. This is the default.
- BINARY(6), a binary quantity that uses 48-bits where each byte in the A-Series word is represented by a byte in the relational database. See "use_binary_aa" on page 274.
- Using numeric fields to hold the AA Values (or RSNs). In this case the Databridge Client uses an appropriate numeric data type to hold the AA Values (or RSN), mainly, BIGINT for SQL Server and NUMBER(15) for Oracle. See "use_decimal_aa" on page 276.

NOTE: If a DMSII SET with the NO DUPLICATES ALLOWED attribute exists or the data set has an RSN, we recommend that you use one of these keys rather than declaring a DBGenFormat primary key.

RSNs are unique serial numbers that get assigned to records when they get created and remain associated with the record for the life of the record. You must have DMSII XE to be able to use RSNs. Furthermore, you must explicitly enable RSNs in the DASDL by adding the EXTENDED attribute to the data set. If you explicitly add a column to a data set whose value is the RSN, the Databridge Client will allow you to use this column as an RSN rather than a REAL. In such cases, the Databridge Engine automatically sets the di_options bit DIOPT_Clone_as_RSN in the corresponding DMS_ITEMS table entry to make the client treat this item (which will be a REAL) as an RSN. See DMS_ITEMS (page 175).

AA Values are the absolute address (that is, the file address — offset within the file — of the records in the data set). They do not remain constant over time; however, in the following cases, AA_values are required to implement foreign keys to link records in related data sets:

- Any data set that contains one or more embedded data sets must always use AA Values as the key. Embedded data sets use Parent_AA Values to implement the link to their parent structures.
- When an active data set has links to another data set, the latter must use AA Values as the key.

In both of these cases, the Databridge Engine will use AA Values for the data set in question regardless of whether there is a SET that qualifies for being used as an index, or whether an RSN exists.

Not all data sets have valid AA Values; for example, ORDERED and COMPACT data sets do not have valid AA Values. When AA Values are used as the key, the set_name column of the DATASETS Client control table is set to the name "aa_set". The name "aa_set" causes the RSN or the AA Value to be used as part of the index using a column named my_rsn or my_aa depending on whether this is an RSN or an AA Value.

To find out if a data set has an RSN or a valid AA Value, you need to look at the misc_flags column of the entry for the data set in the DATASETS Client control table. The bit DSFLG_Static_AA (bit mask 64) is used to indicate whether the client is using an RSN or an AA Value (1 indicates RSN and 0 indicates AA Value). The bit DSFLG_Valid_AA (bit mask 128) is used to indicate whether or not the data set has a valid AA Value (1 indicates a valid AA Value). The client has no control over the selection of RSNs versus AA Values. This decision is made by the Databridge Engine.

The advantage of using the AA Value to generate a unique key is that it makes updates possible for data sets that could not otherwise be updated; however, this value is not an absolute constant. Any DMSII reorganization (record conversion, file format, or garbage collection) changes these values. You must reclone a data set that uses AA Values as keys whenever the AA Values change. Therefore, we recommend that you consider creating a unique composite key rather than using AA Values.

The Databridge Client recognizes the names "aa_set", "user_set", and "pk_set" as special names (the use of the underscore is not allowed in DMSII names).

Forcing the Client to Use RSN or AA Values as Keys

You can force the Client to use the RSN or AA Value as the key by using the DATASETS ds_options bit, DS0PT_Use_AA_0nly (bit mask 16384).

NOTE: You can also do this from the Client Configurator by using the checkbox "Use AA Values (or RSNs) As Keys" in the "Options" section of properties of the data set.

To perform this action globally, use the parameter `force_aa_value_only` with one of the following values. (For more details about this parameter, see "force_aa_value_only" on page 270.)

Value	Description
0	Globally disables the parameter
1	Globally enables the parameter
2	Only applies to (that is, sets the bit of) individual data sets that have an RSN; using a SET as the source for the index is always preferable to using AA Values that are volatile.

User Defined Keys in GenFormat

You can create a user-defined SET for a data set by using the PRIMARY KEY construct in GenFormat. When a PRIMARY KEY exists, it is used instead of a SET that would otherwise qualify as the source for the index on the table. To properly identify the source of such an index, the Databridge Client sets the set_name to `pk_set` when it originates from a PRIMARY KEY construct. The Databridge Client recognizes `pk_set` as a special name, the same as `aa_set` and `user_set`. The only difference between `user_set` and `pk_set` is their origin.

Composite Keys

Composite keys use several columns in a relational data table to form a unique index. The entries you make (via a user script) in the item_key column of the DMS_ITEMS Client control table determine the order in which the columns are used in the key.

NOTE: If you specify a member of a DMSII GROUP as part of a composite key, you must also set the corresponding item_key column for the GROUP to a value of 1 so that the `define` (or `redefine`) command picks it up.

To avoid this step, define the composite key in the DBGenFormat parameter file on the host.

When to Use Composite Keys

We recommend that you create a composite key for data sets that do not have a unique key. Creating a composite key is required for the following data sets:

- Data sets that do not have valid RSNs or AA Values, such as COMPACT, ORDERED, and VIRTUAL data sets
- Data sets that use AA Values and for which garbage collection reorganizations are frequently performed.

CAUTION: If the composite key that you create is not unique, the following can occur:

- If a duplicate record is encountered after you clone the data set, the index creation for the resulting table fails. The SQL query we use to eliminate duplicate records will get rid of all copies of the duplicate record.
- If a duplicate record is encountered while attempting to insert a record during an update, the original record is deleted and replaced with the new copy of the record.

When you create a composite key, make sure that you enter the value "user_set" into the set_name column. If you do not, one of two things happens, as follows:

- If the set_name value is "aa_set", a column named my_aa, which contains the AA Value of the record is automatically included in the table.
- If the set_name value is blank, the program does not create an index, regardless of the values of the item_key column of the various DMS_ITEMS Client control table entries.

Once you are familiar with the concepts in this section, and you determine which data sets require composite keys, you must include the SQL statements in the data set mapping customization script for the data set (`script.user_layout.`*`primary_tablename`*).

Composite Keys Defined by the User

If the Databridge Engine does not find a suitable SET or DBGenFormat primary key, the Databridge Client allows you to create a composite key. You can also create a composite key when the Databridge Client decides to use AA Values as the primary key.

NOTE

- If the added column is named "my_rsn," this indicates that it is an RSN, which makes an excellent key. Do not use composite keys when this is the case.
- You must not create a composite key for a data set that contains embedded data sets or for a data set that has other active data sets linking to it when the handling of DMSII links is enabled.

If a data set does not have a DBGenFormat primary key or a DMSII set that qualifies for use as an index, and the AA Values are not valid, the set_name column in the DATASETS Client control table is left blank. In this case, you can clone the data set, but you cannot track updates.

When the DMSII data set does not have a key, we recommend that you create a composite key using the data set mapping customization script (`script.user_layout.`*`primary_tablename`*). See "When to Use Composite Keys" on page 64 for more details about when to use a composite key.

Creating a Composite Key

Use this procedure when you need to create a composite key:

1. Modify `script.user_layout.`*`primary_tablename`* to do the following:
   - If you don't use the Client Configurator, set the set_name column of the DATASETS Client control table entry for the data set in question to "user_set". If you use the Client Configurator, this is done automatically.
   - Specify which items should be part of the composite key by assigning the appropriate values to the corresponding entries for the item_key column of the DMS_ITEMS Client control table. Such entries are identified by the values of the dms_item_name and the dataset_name columns.
2. After you create the composite key, do one of the following:
   - If you have not cloned any tables, run the `define` command again.
   - If you have cloned tables, set the status_bits column for the corresponding entry in the DATASETS Client control table to 8, and run a `redefine` command.
3. If you ran a `define` command (or if the `redefine` command prompts you to run a `generate` command) run the `generate` command from the working directory that for the data source. Otherwise, you'll be prompted to run the `reorg` command, which fixes the index for the table.
4. From the data source's working directory, run a `process` command. This clones or reclones the data set, if needed, and resumes tracking.

Adding a Non DMSII Column

Most sites do not add a non DMSII column. Non DMSII columns (also called user columns) are generally used to store the audit file timestamp so that you can keep track of when the data was last updated. You can add non DMSII columns to your relational tables in any of the following ways:

- To add a non DMSII column to *every* data set, set the corresponding bit in the configuration file parameter `default_user_columns`; this parameter then assigns the appropriate value to the external_columns column of the DATASETS Client control table. The bits in this column determine which non DMSII columns are added to your data table.
- To prevent the Client from adding some of the non DMSII columns to secondary tables (for example, DMSII items that have an occurs clause), set the corresponding bit in the configuration file parameter `sec_tab_column_mask`. This parameter is used in conjunction with the external_columns column in the DATASETS table entry.
- To add a non DMSII column to most, but not all, of your data sets, use the script `script.user_layout.`*`primary_tablename`* to set the external_columns column of the DATASETS Client control table back to 0 for the data sets that you want to keep unchanged.
- To add a non DMSII column to only a few data sets, do not set the `default_user_columns` parameter. Instead, use the script `script.user_layout.`*`primary_tablename`* to modify the external_columns column of the DATASETS Client control table for the data sets you want to change.

Types of Non DMSII Columns

The Databridge Client offers several default non DMSII columns (user columns). You can add user columns to the relational database tables either by using user scripts, as described in this section, or by using the Client Configurator. For more information about the Client Configurator, see the Databridge Client Console Help.

NOTE: The value for the Bit column in this table is equal to the value in the dms_subtype column of the DATAITEMS Client control table. The exception is bit 14, which results in a dms_subtype of 0. Bits are numbered from right to left; the right-most bit is 1.

Bit	Value	User Column Name	Description
1	1	update_type	Database update type, as follows: 0 for extract 1 for create 2 for delete (bit 10 must also be enabled) 3 for modify **NOTE:** This value cannot be used at the same time as bit 11.
2	2	update_time	Time the update was applied to the relational database (PC time)
3	4	update_ts	(SQL Server clients only) SQL Server timestamp data type. (The timestamp is a data type that exposes automatically-generated unique binary numbers within a database. It is not a true timestamp that contains a date and time value.)
4	8	audit_ts	DMSII audit file timestamp. This column is set to NULL during the initial clone. **NOTE:** This bit cannot be used at the same time as bit 13.
5	16	audit_filenum	Audit file number **NOTE:** If you use a decimal number, its precision must be at least 4. Otherwise, the value may be too large and result in a SQL error.
6	32	audit_block	Audit block serial number (ABSN) **NOTE:** If you use a decimal number, its precision must be at least 10. Do not use a data type of int, as the ABSN is a 32-bit unsigned number. Otherwise, the value may be too large and result in an overflow, which will result in a SQL error.
7	64	source_name	Data source name
8	128	source_id	Data source identifier as defined in the DATASOURCES Client control table

Bit	Value	User Column Name	Description
9	256	my_id	SQL SERVER IDENTITY column. Updates have no effect on this number. **NOTE:** For Windows Clients only: This column won't appear on clients other than SQL Server, even if requested. The Oracle database provides the equivalent functionality with the ROWID pseudo-column, which is always present.
10	512	deleted_record	Delete indicator (key item). A nonzero value indicates that the record is deleted. This is actually the value of the client machine's clock at the time of the deletion. Making this column part of the index allows multiple instances of a deleted record to coexist without being considered duplicate records. ◆ This bit cannot be used at the same time as bit 11. These types are compared in "Preserving Deleted Records" on page 70. ◆ The granularity of this column is in seconds. If you have applications that perform many delete/insert operations, you may want to add a delete_seqno column to prevent the Client from getting duplicate deleted records. The Client recovers from this by waiting one second and retrying the operation, which can significantly slow the Client's performance.
11	1024	update_type	Expanded database update type as follows: 0 for extract 1 for create 2 for delete 3 for modify ◆ If the key for this record is reused, the key is removed when the new, duplicate record is inserted. ◆ This value cannot be used at the same time as bit 1 or bit 10. Bits 10 and 11 are compared in "Preserving Deleted Records" on page 70. ◆ This bit and bit 1 work in the same way, except that this bit preserves the deleted image.
12	2048	source_id	Data source identifier as defined in the DATASOURCES Client control table (key item)
13	4096	audit_ts	Expanded audit file time. This column contains the DMSII audit file timestamp during updates and the starting time of the data extraction during extraction. **NOTE:** This bit cannot be used at the same time as bit 4.
14	8192	user_column1	Generic user column whose entry is left as NULL
15	16384	sequence_no	A sequence number used in history tables to determine the order of updates when they have the same update_time values

Bit	Value	User Column Name	Description
16	32768	delete_seqno	Augments the deleted_record column with a sequence number to provide higher granularity and avoid creating duplicate deleted records.
17	65536	create_time	Time when the record was created in the relational database (PC time).
18	131072	user_column2	Generic user column whose entry is left as NULL.
19	262144	user_column3	Generic user column whose entry is left as NULL.
20	524288	user_column4	Generic user column whose entry is left as NULL.

Values for Non DMSII Columns

The bit numbers, decimal values, and hexadecimal values for the user column names are shown in the following table.

Default Name	Bit Number	Decimal Value	Hex Value
update_type	1	1	0x00000001
update_time	2	2	0x00000002
update_ts	3	4	0x00000004
audit_ts	4	8	0x00000008
audit_filenum	5	16	0x00000010
audit_block	6	32	0x00000020
source_name	7	64	0x00000040
source_id	8	128	0x00000080
my_id	9	256	0x00000100
deleted_record	10	512	0x00000200
update_type	11	1024	0x00000400
source_id_key	12	2048	0x00000800
audit_ts	13	4096	0x00001000
user_column1	14	8192	0x00002000
update_seqno	15	16384	0x00004000
delete_seqno	16	32768	0x00008000
create_time	17	65536	0x00010000
delete_seqno	18	131072	0x00020000
delete_seqno	19	262144	0x00040000

Default Name	Bit Number	Decimal Value	Hex Value
delete_seqno	20	524288	0x00080000

Setting Up History Tables

The primary data tables use the CREATE, MODIFY, and DELETE records from the mainframe to build an exact duplicate of DMSII data sets.

A history table, on the other hand, treats these records as new records to insert, even though a history table is structured similarly to a primary data table. In effect, the history table becomes a log or record of mainframe changes. History tables are usually enabled as a device to feed data warehouse applications. History tables will continue to grow as Databridge replicates data, so you should purge them regularly after successful updates to the data warehouse.

To enable history tables, set DSOPT_Save_Updates (bit mask 8 of ds_options in the DATASETS Client control table). You must enable history tables before you generate Databridge Client scripts, as explained in the next section. If you want to set this bit for all data sets, you can set the configuration parameter `history_tables` to 1.

Each history table has the same name as the corresponding primary data table with a "_h" suffix.

It is also possible to create only history tables for a data set or for all data sets. To do this for all data sets, simple set the `history_tables` parameter to 2 in the configuration file. This will cause the ds_options bit DSOPT_History_Only (8192) to be set for all data sets. If you only want to do this for a few data sets, then you can use the user script `script.user_layout.`*`dataset`* to do this.

CAUTION: When setting bits in ds_options, beware that some bits may already be set. You should use the "|" operator for SQL Server and the BITOR function for Oracle to set a bit rather than setting the column to that value.

Modifying Non DMSII Column Names

The configuration file parameter `external_column[n]` allows you to tailor attributes, such as the column name, of individual non DMSII columns. For details and a list of allowable sql_type values, see “external_column[n]” on page 267.

Preserving Deleted Records

Both the deleted_record column (bit 10) and the update_type column (bit 11 only) may be used to preserve deleted records, which is useful when trying to recreate updates to the database.

Be aware of the following when using these bits:

- Bit 11 preserves only the *last instance* of the deleted record. For instance, if the key value of the deleted record is reused, the deleted record is replaced when the duplicate (new) record is inserted.
- Bit 10 results in the deleted_record column being included in the index. The value in this column is a time value, which makes the values in the index unique; therefore, you can keep multiple instances of the deleted record. The granularity of this column is in seconds, if you need coarser granularity you should add the delete_seqno column described in "Values for Non DMSII Columns" on page 68.

In addition, you must clean up deleted images when they are no longer needed.

NOTE: If you use the first method (bit 11) to preserve deleted records, the deleted records will only survive during a reclone if you set the `preserve_deletes` parameter to True. If you use the second method (bit 10), the deleted records will always be preserved during a reclone.

Generating Databridge Client Scripts

In this phase, the Databridge Client generates script files that are used to create the Databridge data tables in the relational database and run the database bulk loader utility to populate those tables during the data extraction phase.

The `generate` command creates scripts only for those data sets that have an active column set to 1 in the corresponding entry in the DATASETS Client control table. The Databridge Client keeps track of the data sets that have been generated. These scripts will only be generated again if a `define` command is executed or if a `redefine` command determines that the layout of a table has changed. If you need to force the Databridge Client to generate the scripts for all data sets that have a corresponding active column value of 1 in the DATASETS Client control table, you can specify the `-u` option on the command line for the `generate` command.

To view a list of the scripts that are generated, see "Summary of Script Files" on page 72.

You can also perform this action from the Client Console by clicking "**Data Source > Generate Scripts**". If you use the Client Configurator and have a new data source, you will need to perform this step after you exit from the Client Configurator.

To generate the Databridge Client scripts

1. If you plan to use the dbridge.cfg file for signon parameters, set them before you continue. (See the *Databridge Installation Guide*.)
2. Make sure that the following parameters, which affect the `generate` command, are set correctly in the appropriate section of the Client configuration file:

```
[params]
global_table_suffix
create_table_suffix
```

```
create_index_suffix
[bulk_loader]
bcp_batch_size
bcp_packet_size
bcp_code_page
bcp_copied_message
sqlld_rows
sqlld_bindsize
inhibit_direct_mode
enable_parallel_mode
max_errors
```

NOTE: For your changes to take effect, you must run the `generate` command again and specify the -u option to force the program to regenerate the scripts.

3 Enter the following command:

`dbutility [`*`signon_options misc_options`*`]generate` *`datasource`*

Where	Is

signon_options	For each Databridge Client type, the following command-line options specify the relational database signon parameters:
	
	Oracle:
	
	`[-U` *userid*`] [-P` *password*`] [-D` *database*`]`
	
	SQL Server:
	
	`[-U` *userid*`] [-P` *password*`] [-W] [-O` *ODBCdatasource*`]`

misc_options	Any of the following miscellaneous command-line options: `-T` forces the client to use a new trace file for this run, if tracing is enabled. `-f` *filename* to specify a configuration file other than the default dbridge.cfg file in the working directory. `-L` forces the client to use a new log file for this run. `-u` unconditionally generates scripts for all tables mapped from data sets that have a corresponding active column value of 1 in the DATASETS Client control table. See "dbutility Command-Line Options" on page 234.
datasource	The name that matches the entry in the DATASOURCES Client control table. You can enter the data source name in uppercase or lowercase.

Status messages indicate the progress of the command.

4 To check on the results of the `generate` command, see Summary of Script Files. (page 72) For information on when to run `generate` next, see "When to Run dbutility generate" on page 74.

At this point, you are ready to run a `process` or `clone` command to create and populate the Databridge tables in the relational database with DMSII data. See "Populating the Databridge Data Tables" on page 86.

Example of Script Files

In this example, scripts are generated for the CUSTOMER data set and the PRODUCTS data set, as follows:

Windows Script Files

```
> dir /on dbscripts
bcp.customer.fmt (Microsoft SQL Server only)
bcp.products.fmt (Microsoft SQL Server only)
load.customer.cmd
load.products.cmd
script.clrduprecs.customer
script.clrduprecs.products
script.create.customer
script.create.products
script.drop.customer
script.drop.products
script.index.customer
script.index.products
sqlld.customer.ctl (Oracle only)
sqlld.products.ctl (Oracle only)
```

UNIX Script Files

```
> ls dbscripts
load.customer.sh
load.products.sh
script.clrduprecs.customer
script.clrduprecs.products
script.create.customer
script.create.products
script.drop.customer
script.drop.products
script.index.customer
script.index.product
sqlld.customer.ctl
sqlld.products.ctl
```

The script files are stored in the dbscripts subdirectory of the working directory, which is the directory from which you run the dbutility `generate` command.

Summary of Script Files

The `generate` command produces the following script files:

- SQL script files that create data tables and stored procedures to update them in the target relational database (`script.create.`*`tablename`*)
- SQL script files that remove selected records from a data table in the SQL *Loader (`script.cleanup.`*`tablename`*). See the table that follows for details about the conditions under which these scripts are generated
- SQL script files that remove false duplicate records that can occur during a long clone process of an active DMSII database, if `clr_dup_extr_recs` is set to True (`script.clrduprecs.`*`tablename`*)
- SQL script files that drop data tables from the target relational database (`script.drop.`*`tablename)`*

- SQL script files that create indexes for data tables in the target relational database (`script.index.`*`tablename`*)
- Windows command (or UNIX shell script) files to run the utility (`load.`*`tablename`*`.cmd` or `load.`*`tablename`*`.sh`). The bulk loader is used during the data extraction phase of a cloning operation of a data set.
- SQL*Loader control files for Oracle (`sqlld.`*`tablename`*`.ctl`) and bcp format files for Microsoft SQL Server (`bcp.`*`tablename`*`.fmt`).

The following table summarizes the scripts that are created for each Oracle table. Each DMSII data set that is cloned is mapped to one or more tables. The Databridge Client creates one set of files for each of these tables that have a corresponding active column value of 1 in the DATATABLES Client control table.

File	Description
SQL Server: `bcp.`*`table`*`.fmt`	This is a control file that contains the bcp parameters that describe the format of the data.
Oracle: `sqlld.`*`table`*`.ctl`	This is a control file that contains the SQL *Loader parameters that describe the format of the data.
Windows: `load.`*`table`*`.cmd`	This is a Windows command file used to run the relational database bulk loader (bcp for Microsoft SQL Server and SQL*Loader for Oracle).
UNIX: `load.`*`table`*`.sh`	This is a UNIX shell script used to run SQL*Loader.
`script.create.`*`table`*	This is a script that contains SQL statements to create the relational database table named *table*. It also contains the SQL statements to create the associated stored procedures for updating this table. Before starting the data extraction phase of a `process` or `clone` command, this script is executed to create the table and its associated stored procedures. The following stored procedures are used during the `process` and `clone` commands for updating the table (specified by *table*): i_*table* stored procedure for inserting a record d_*table* stored procedure for deleting a record u_*table* stored procedure for updating a record z_*table* stored procedure for deleting all rows for all occurrences of key in secondary tables using a single SQL statement

File	Description
`script.drop.table`	This is a script that contains SQL statements to drop the relational database table named *table* and to drop the stored procedures associated with this table. `script.drop.table` scripts are used by the `process`, `clone`, `drop`, and `dropall` commands to drop a specified table and its associated stored procedures. If a table to be cloned (ds_mode=0) already exists during a `process` or `clone` command, this script is executed to drop both the table and its stored procedures before recreating them. During a `process` or `clone` command, if the Databridge Client receives a message from the Databridge Engine indicating that a DMSII data set has been purged, this script is executed to drop the table. Immediately after the table is dropped, the script to recreate the table is executed.
`script.cleanup[2].table`	This script contains SQL statements to delete selected records from the relational database table. This script is typically called `script.cleanup.table`, except when both of the conditions below are true. In that case, an additional cleanup script named `script.cleanup2.table` is also created to remove all records except the deleted records from the table. **NOTE:** This script is generated under rare conditions where tables are not fully recloned, as in the following cases: ◆ The data set is set up to preserve deleted records. ◆ The data set is a virtual data set that gets its input from more than one DMSII data set.
`script.index.table`	This is a script that contains SQL statements to create an index for the given table. **NOTE:** This script is created only when the table has an index.
`script.clrduprecs.table`	This script removes records with false duplicate key values when the bit DSOPT_Clrdup_Recs (32768) is set in ds_options column of the DATASETS table entry for the data set.

When to Run dbutility generate

Run dbutility `generate` when you need to create a new set of scripts for a data source. For example, you would run dbutility again in the following circumstances:

- If you accidentally delete one or more script files, repeat the dbutility generate command with the `-u` option. Make sure that the current directory is the working directory for the data source where you want dbutility `generate` to write the script files.
- If you disable cloning (set the active column to 0 in the DATASETS Client control table) for one or more data sets prior to running the dbutility `generate` command, no scripts are created for these data sets. If you later decide that you want one or more of these data sets to be cloned,

set the active column back to 1, run the `redefine` command, and then run the `generate` command. The missing scripts are created and you can then run the `clone` command to clone the data set.

3 Chapter 3: Cloning a DMSII Database

This chapter covers the steps to clone a DMSII database.

In this Chapter

Cloning Issues for All Relational Databases

We recommend that you read this section before you use the `process` or `clone` commands.

Disk Space	You need to consider two types of disk space for the Databridge Client, as follows: ◆ Database storage is required by both the relational database and the DMSII data. ◆ Temporary file storage is required for Windows clients during the cloning process. These temporary disk files hold the data used by the bulk loader utilities. For information on how to handle temporary file storage, see Controlling Temporary File Storage for the Windows Clients (page 78).
Column Order	The columns in the client database are built in a different order than the order in the DMSII database. Specifically, the key items are placed first, followed by the non-key items in DMSII column order.
Databridge Client Log File	Logging and tracing are separate activities in the Databridge Client. Logging cannot be disabled. Log files are written to the logs subdirectory of the working directory. Trace files are only created when the `-t` option is used and they are placed in the working directory. Using `-t1` is not allowed because this would create a second copy of the log file. You must specify at least one more bit in the trace mask for the option to be accepted.

Bulk Loader Parameters

Both dbutility `process` and dbutility `clone` use a bulk loader utility to populate the Databridge tables in the relational database during the data extraction phase (not during change tracking). Using the relational database bulk loader utility greatly increases the speed with which the Databridge data tables are populated.

This section lists the configuration parameters that affect the Databridge Client operations when using the relational database bulk loader utility. You can use these parameters to do the following:

- Control temporary file storage (`max_temp_storage` parameter, Oracle Client or Windows)
- Control the bulk loader utility maximum error count (`max_errors` parameter)

You can set the bulk loader parameters from the Client Console. These and other configuration parameters are available in the **Client Configuration** menu item. For information, see the Databridge Client Console **Help**.

Parameters that are specific to the SQL*Loader and BCP API are discussed in next sections.

Controlling Temporary File Storage for Windows Clients

During cloning on Windows platforms, the Oracle Client and the SQL Server Client when explicitly directed to use bcp (the latter normally uses the BCP API, which does not involve the use of temporary files) writes bulk loader data to multiple temporary text files for each data table being loaded.

These temporary text files are used as holding areas for the bulk loader data. The Windows client uses overlapped operations to write data to one set of text files while the bulk loader is loading another set of files. The configuration file parameter `max_temp_storage` determines the maximum amount of storage to be used by all of the temporary files.

The Databridge Client writes data to as many temporary files as it needs, while keeping track of the amount of storage used. When the amount of used storage exceeds half of the configured value of the configuration file parameter `max_temp_storage`, the Databridge Client closes all the temporary files and queues them on the bulk loader thread's work queue. (The default setting for `max_temp_storage` is 400 MB.) While the bulk loader thread is sequentially launching the loads for these files (which run as separate processes), the Databridge Client starts filling a new set of temporary files for the next group of loads. This mode of operation significantly enhances performance on systems that have more than one CPU.

This version of the software supports up to 4 bcp threads, which may help improve performance on high-end machines with lots of CPUs. If you do not have a very powerful machine, you should use the default value of 1 for the parameter `n_bcp_threads`. For more details, see the `n_bcp_threads` description in "[Bulk_Loader]" on page 259".

You may want to adjust the value of this parameter depending on how fast the files get filled. Higher values reduce the amount of parallelism, and therefore, may have a negative impact on performance. Conversely, smaller values may negatively impact performance by firing too many bulk loader operations.

Bulk Loader Operations for UNIX Clients

UNIX Clients do not use temporary text files; instead, they use pipes (such as lpipe_*nnn*.dat) to communicate data between processes. This introduces a lot more overlap between the client and the bulk loader, resulting in a much smoother flow of data.

Controlling the Bulk Loader Maximum Error Count

The `max_errors` parameter controls the number of data errors allowed before the bulk loader's operations are canceled. The default value for `max_errors` is 10, which means that the bulk loader aborts after encountering 10 bad records. These bad records are written to the discard file and information about the error is written into the bulk loader log file.

When several bulk loader errors occur, increasing the maximum error count allows you to gather all the errors in one run rather than finding 10 errors and then having to start over again. For more details, see the `max_errors` parameter description in "[Bulk_Loader]" on page 259.

Oracle SQL*Loader Bulk Loader

This section lists the configuration file parameters that affect cloning with Oracle.

The `enable_parallel_mode` parameter, which is only meaningful when direct mode is enabled, causes the program to include the PARALLEL option in the SQL*Loader command line. In direct mode, the loader runs faster at the expense of system resources; however, enabling this option has a much more noticeable impact on Windows clients than on UNIX clients.

For non-US sites where the period (.) and comma (,) decimal characters are swapped, the Databridge Client automatically reads the database NLS parameters and makes the necessary adjustments so that the SQL*Loader input records are formatted using the numeric characters that SQL*Loader expects.

The `inhibit_direct_mode` parameter applies when you run dbutility for a remote Oracle database using SQL*Net®.

The following parameters are meaningful only when `inhibit_direct_mode` is enabled.

- The `sqlld_rows` parameter defines the value to be used for the ROWS specification for SQL*Loader operations.
- The `sqlld_bindsize` parameter defines the value to be used for the BINDSIZE parameter for SQL*Loader operations. Increasing this value can speed up SQL*Loader operations when not using DIRECT mode (for example, running remote to a database on a UNIX system).

For more information about the bulk loader parameters mentioned here, see "[Bulk_Loader]" on page 259.

Files Related to SQL*Loader

Each execution of SQL*Loader uses a control file (load_*nnn*.ctl, which is a copy of the file sqlld.*tablename*.ctl created by the generate command) and a data file (lpipe_*nnn*.dat) as input.

As a result of the bulk loading process, SQL*Loader produces a log file (load_*nnn*.log) and, if there are any records that cannot be loaded due to data errors, a discard file (lpipe_*nnn*.bad) for each table. Discard files are placed into the subdirectory named discards.

Windows Log Files

In Windows, to prevent log files and discard files from being overwritten as a result of successive executions of SQL*Loader during segmented bulk load operations, the Databridge Client uses the SQL*Loader log and discard files as temporary files and does the following:

- At the end of the first load segment, the Databridge Client copies the temporary log file to the permanent log file (sqlld.*tablename*.log). If a discard file was produced, the Databridge Client also copies the temporary discard file to the permanent discard file (sqlld.*tablename*.bad).
- At the end of every subsequent load segment, the Databridge Client appends the temporary log files to the end of the permanent log file (sqlld.*tablename*.log). If a temporary discard file was produced, the Databridge Client either copies it or appends it to the permanent discard file (sqlld.*tablename*.bad), depending on whether this file exists or not.
- The Databridge Client deletes the temporary log and discard files as soon as they are appended to Databridge Client permanent log and discard files.

UNIX Log Files

In order to maintain compatibility with the Windows Clients, the UNIX Client renames the log and discard files at the end of a SQL*Loader operation. Therefore, the log file load_*nnn*.log is renamed sqlld_*tablename*.log and the discard file lpipe_*nnn*.bad is renamed sqlld_*tablename*.bad in the SQL*Loader shell scripts.

List of Files Related to SQL*Loader

The table below lists files related to SQL*Loader and Databridge Client operations. In some of the filenames below, *nnn* is the value in the table_number column of the DATATABLES Client control table. It is unique within each data source.

File	Description
sqlld.*tablename*.ctl	The SQL*Loader control file created by the generate command. It describes the format of the data in the data file (lpipe_*nnn*.dat).

File	Description
lpipe_*nnn*.dat	**For Windows:** This is a temporary file that the Databridge Client creates. It contains the data to be loaded into an Oracle table. Since the client uses two copies of this file simultaneously when doing overlapped operations, it appends a suffix to the file name to make it unique every time a new file is created. The suffix of the form "_*nnn*", where nnn is a number that starts at 1 and gets incremented by 1 each time a new file is created for the table in question. Thus the name "lpipe_12.dat" will be changed to "lpipe_12_1.dat" for the second file and so on. This file is automatically deleted after a successful load of a table. If the table is not loaded successfully, the file is not deleted. This gives you the opportunity to manually run SQL*Loader to determine why it is failing. **For UNIX:** This is a UNIX pipe that the SQL*Loader shell script creates and uses to pass data to the SQL*Loader program. This pipe is automatically removed after a successful load of a table. If the Databridge Client or SQL*Loader abends, the pipe is not immediately deleted. If you run the Databridge Client again, you receive a warning message as the pipe is being deleted. You can safely ignore this warning, as this is not a fatal error.
sqlld.*tablename*.log	**For Windows:** This file is a concatenation of all of the load_*nnn*.log files created during the cloning process. **CAUTION:** Do not delete the sqlld.*tablename*.log file until you have looked at it. It can contain valuable information such as error messages about rows that were not loaded.
sqlld.*tablename*.bad	**For Windows:** This file is a concatenation of all of the load_*nnn*.bad files created during the cloning process. It is created in the discards subdirectory only if discard records exist. **CAUTION:** Do not delete the sqlld.*tablename*.bad file until you have looked at it to determine which records were rejected by SQL*Loader. Correct the bad data. Then use SQL*Loader to load these records into the appropriate table.

The following temporary files are created while the bulk loader is being launched, but they are deleted before the run is completed:

- load_*nnn*.ctl
- load_*nnn*.log (renamed in UNIX to sqlld_*tablename*.log)
- lpipe_*nnn*.bad (renamed in UNIX to sqlld.*tablename*.bad)

You see these files only if the bulk loader operation abends.

Microsoft SQL Server BCP API and bcp utility

This section lists the configuration file parameters that affect cloning with BCP API and bcp utility. SQL Server Clients on Windows do not use temporary text files unless they are specifically directed to use bcp. This process utilizes the SQL Server BCP API which allows the program to perform bulk loader operations by making BCP API calls, which operate similar to SQL statements.

This produces more overlap between the client and the load operations, resulting in a much smoother flow of data. It is recommended that you use multi-threaded updates, as this allows multiple tables to be loaded simultaneously by different threads which increases the resource utilization and offers all the advantages of multi-threaded updates when doing data extraction.

NOTE: Bulk loader operations will run efficiently if the database recovery model is set to "Simple" or "Bulk-logged". If you are running a database with a recovery model of "Full", we recommend that you switch to "Bulk Logged" for the duration of the bulk-load and then switch back to "Full" recovery.

The following client configuration file parameters affect the BCP API calls made by the Client or the bcp utility. For more details, see “[EbcdictoAscii]” on page 307.

Parameter	Description
`bcp_batch_size`	The Databridge Client using the BCP API or the bcp utility can load a table in several batches instead of loading the entire table in a single operation. You can control the batch size using this parameter.
`bcp_code_page`	Adds the -C code_page to the bcp command line, which specifies the code page of the data in the file. For example, because the Japanese code page is 932, setting this parameter to 932 adds -C 932 to the bcp command line. This parameter is only applicable when using the bcp utility.
`bcp_packet_size`	Defines the network packet size value for the bcp utility (applies to remote servers only). If you have wide tables, setting this parameter to a packet size larger than the default (4096) can speed up loading the data into the table at the expense of system resources. This parameter is only applicable when using the bcp utility.
`bcp_copied_msg`	Enables the bcp_auditor program to determine whether or not a bcp was successful in cases where the database language is not English. This parameter is only applicable when using the bcp utility.
`bcp_delim`	Defines the delimiter character bcp uses (the TAB character, by default). If you want to preserve TAB characters in your data, set this parameter to a value that allows multiple characters. This parameter is only applicable when using the bcp utility.
`max_errors`	Controls the bulk loader’s tolerance to records that are discarded due to data errors.
`max_temp_storage`	Activates the segmented bulk load feature, which allows you to specify the maximum amount of storage that dbutility should use for temporary files. This parameter is only applicable when using the bcp utility.

bcp_auditor Utility

The bcp command files capture bcp execution output by redirecting the output to a temporary file. These command files then invoke the bcp_auditor utility to examine this file to determine if the bcp operation was successful. The bcp_auditor utility sets the exit code such that the Databridge Client can determine if the table load was successful.

Files Related to BCP

NOTE: The SQL Server client will only use the bcp utility when specifically directed. By default BCP API is utilized; you can force it to use bcp for tables by using the `/l` command line switch. Alternatively, you can make the Client use bcp for tables associated with any specific data sets by setting the DSOPT_Use_bcp (0x1000000) bit in the ds_options column for the corresponding entries in the DATASETS Client control table.

Each execution of bcp uses a format file (bcp.*tablename*.fmt) and a data file (bcppipe.*tablename*) as input.

As a result of the bulk loading process, bcp produces a log file (`load_nnn.log`) for each table. If there are any records that cannot be loaded due to data errors, bcp also produces a discard file (`load_nnn.bad`).

To prevent log files and discard files from being overwritten during segmented bulk load operations, Databridge Client treats bcp log and discard files as temporary files:

- At the end of the first load segment, the Databridge Client copies the temporary log file to the permanent log file (`bcp.`*`tablename`*`.log`). If a discard file was produced, the Databridge Client also copies the temporary discard file to the permanent discard file (`bcp.`*`tablename`*`.bad`).
- At the end of every subsequent load segment, the Databridge Client appends the temporary log files to the end of the permanent log file (`bcp.`*`tablename`*`.log`). If a temporary discard file was produced, the Databridge Client either copies it or appends it to the permanent discard file (`bcp.`*`tablename`*`.bad`), depending on whether this file exists or not.
- The Databridge Client deletes the temporary log and discard files as soon as they are appended to Databridge Client permanent log and discard files.

Files related to bcp and Databridge Client operations are listed in the following table. In some of the filenames below, *nnn* is the value for the table_number column in the DATATABLES Client control table. The table number is unique within each data source.

Table 3-1

File	Description
`bcp.`*`tablename`*`.fmt`	The bcp format file that is created by the `generate` command. It describes the format of the data in the data file (`bcppipe.`*`tablename`*).

File	Description
bcppipe.*tablename*	A temporary file created by the Databridge Client. It contains the data to be loaded into a Microsoft SQL Server table. Since the client uses two copies of this file simultaneously when doing overlapped operations, it appends a suffix to the file name to make it unique every time a new file is created. The suffix is of the form "_*nnn*" where nnn is a number that starts at 1 and gets incremented by 1 each time a new file is created for the table in question. Thus the name "bcppipe.customer" will be changed to "bcppipe.customer_1" for the second file and so on. This file is automatically deleted after a successful load for a table. If the table is not loaded successfully, the file is not deleted. This gives you the opportunity to manually run bcp to determine why it is failing. **NOTE:** Important: The bcppipe.*tablename* files can be quite large. When these files are no longer needed, make sure you delete them to prevent errors from occurring.
bcp.*tablename*.log	A concatenation of bcp screen output created during the cloning process. The files are created in the working directory for the data source. **CAUTION:** Do not delete the bcp.*tablename*.log file until you have looked at it. It can contain valuable information such as error messages about rows that were not loaded.
bcp.*tablename*.bad	A concatenation of all of the load_nnn.bad files created during the cloning process. These files are created in the discards subdirectory. **CAUTION:** Do not delete the bcp.*tablename*.bad file until you have looked at it. It can contain valuable information such as which rows were not loaded. Correct the bad data and use bcp to load these records into the appropriate table.

The following temporary files are created while the bulk loader is being launched, but they are deleted before the run is completed:

- load_nnn.log
- load_nnn.bad

You see these files only if the bulk loader operation abends.

Files related to the BCP API

When using the BCP API all errors are logged to the Client log file. If there are discarded records, they are written to the *tablename*.bad file located in the discards folder, this is similar to discards during the tracking phase.

Configuring Host Parameters

TCP/IP throughput is greatly affected by the BLOCKTIMEOUT parameter on the host. Typically, the default is 100, which is acceptable for character-oriented communications (for example, Telnet VT™ 100 emulation), but not good for record and block-oriented communications, as with Databridge or FTP (file transfer protocol). For Databridge communications, you can increase throughput by reducing the BLOCKTIMEOUT parameter to a value of 2.

If the Databridge Client system is on a different subnet from the mainframe, put it on the same subnet so that Ethernet packets can be larger. If you cannot put the Databridge Client on the same subnet as the mainframe, you can improve throughput by adjusting BLOCKSIZE on the host and TCP/IP Window Size on the Windows Server PC.

Running tcptest

During the initial setup, use the `tcptest` command to determine if the TCP/IP interface is operating properly. Before you run the `tcptest` command, you must define a data source. For more information, see the table in "dbutility Commands" on page 227. An example of the test is shown below:

```
E:\>dbutility tcptest demodb 111.222.33.444 5555 100 1000
11:49:10 Databridge Client version 6.6.0.000 [OCI/Oracle]
11:49:10 (C) Copyright 2019 Micro Focus or one of its affiliates.
11:49:14 Connecting to 111.222.33.444, port 5555
11:49:16 TCP_Test: len=100, count=1000
11:49:17 Bytes Processed 100.00 KB of DMSII data in 1.000 secs, throughput
= 100.00 KB/sec
11:49:17 Bytes Received 112.00 KB in 1.000 secs, total throughput = 112.00
KB/sec
11:49:17 TCP/IP_time = 0.841 secs, (84.10% of total time)
11:49:17 TCP Test completed successfully
11:49:17 Client exit code: 0 - Successful
```

Populating the Databridge Data Tables

Before you populate the Databridge data tables, determine if you need to customize the character translation tables or not. If you do, modify the [EbcdictoAscii] section of the client configuration file before you run either the `process` or `clone` command. For more information on character translation tables and modifying the configuration file, see "[EbcdictoAscii]" on page 307 and "Export or Import a Configuration File" on page 242.

You can populate the Databridge data tables in the relational database using either of the following methods:

- dbutility `process`
- dbutility `clone`

The `process` and `clone` commands use the relational database bulk loader utility to populate the Databridge tables. *We recommend that you read one of the previous sections*, "Oracle SQL*Loader Bulk Loader" on page 79 or "Microsoft SQL Server BCP API and bcp utility" on page 82 *before you use the dbutility* `clone` *or dbutility* `process` *command*.

The `process` command is typically used to populate the data tables. The `clone` command is a special case of the `process` command that allows you to clone a small number of data sets without changing the values of the corresponding entries in the active column of the DATASETS Client control table.

Data Validation and Discard Files

While processing DMSII extract and update records, Databridge validates all numeric and alpha fields. Fields that contain NULL values (data with all high-bits set) usually are recognized as DMSII NULLS. In this section, the following types of data validation and discard files are described:

- Numeric data validation
- Alpha data validation
- Date validation
- Special handling of key items in discard files
- The handling of blank character data for key items in the Databridge Client for Oracle

Numeric Data Validation

Numeric data that contains illegal digits (for example, values other than 0 through 9, excluding the sign field for signed numbers) are flagged as bad. If the da_options column of the corresponding DATAITEMS control table entry has the DAOPT_Allow_Nulls bit (1) set, Databridge treats numeric items that have bad digits as NULL.

The configuration parameter `allow_nulls` defines the default value for this bit, which can be altered by user scripts. If the bit is zero, the NULL or bad numeric data is stored as either all 9s or all 0s based on the value of the configuration parameter, `null_digit_value` (default value is 9). For more information, see "bracket_tabnames" on page 265 and "null_digit_value" on page 294.

Alpha Data Validation

With alpha data, bad characters are usually replaced with a question mark (?) instead of the whole field being set to NULL. The client configuration file parameter `inhibit_ctrl_chars` determines whether or not control characters are to be treated as bad characters (the program treats a few control characters such as NUL, CR and LF as bad regardless of the value of this parameter). The client configuration file parameter `inhibit_8_bit_data` determines whether or not 8-bit characters are to be treated as bad characters. The client configuration parameter `convert_ctrl_char` (which is incompatible with `inhibit_ctrl_chars`) replaces control characters by spaces instead or question marks. For more information, see "[Bulk_Loader]" on page 259.

The client configuration file parameter `alpha_error_cutoff` determines the percentage of bad characters in an ALPHA field that are tolerated before the entire field is declared bad and treated as NULL.

If ALPHA data is stored as binary data, no alpha data validation is performed because no invalid values exist in binary data. See the DIOPT_Clone_as_Binary option in the di_options column of DMS_ITEMS (page 175).

NULL data is treated as NULL if the da_options column of the corresponding DATAITEMS control table entry has the DAOPT_Allow_Nulls bit (1) set. Otherwise, the NULL data is stored as blanks.

Date Validation

Whenever Databridge processes numeric or alpha items that are cloned as relational database date data types, it checks the validity of the data. Invalid dates are usually treated as NULL. The Databridge Client for Microsoft SQL Server stores bad or NULL dates as 1/1/1900, when the DAOPT_Allow_Nulls bit (1) in the da_options column of the corresponding DATAITEMS control table entry has not been set. The Databridge Client for Oracle uses the date 1/1/0001 instead. A numeric date of all 0s or all 9s is treated as NULL rather than an error. Similarly, an ALPHA date that is all blanks is treated as a NULL date.

Special Handling of Key Items in Discard Files

Because the stored procedures used during update processing use equality tests in the *where* clauses, key items (items that are used in the index for a table) can never be NULL. In relational databases, you cannot use equality tests for items that are NULL.

If a key item has a data error or it is NULL, Databridge places the entire record in a discard file named *`tablename`*`.bad` in the discards subdirectory. The syntax for discard file data is the calling sequence that would typically be used for the stored procedure that performs the update. Therefore, discarded records from both the data extraction and update phases are identical. Databridge preserves bad numeric digits and characters to help you better troubleshoot the problem.

Handling Blank Character Data for Key Items (Databridge Client for Oracle)

The Databridge Client strips all trailing blanks when constructing SQL statements using varchar data. When an application reads the records back from the database, the access routines put back the trailing blanks, greatly reducing the storage requirements for the SQL statements and bulk loader data files.

In Oracle, char or varchar items that have a length of 0 are treated as NULL. If any of the key items used in `where` clauses are NULL, the corresponding update or delete SQL statements fail as mentioned above. To prevent the key item from becoming NULL, the Databridge Client for Oracle keeps the last blank of the item.

The Process Command

The `process` command is the main command of the Databridge Client. It populates and updates the tables for all data sets whose active column is 1 in the corresponding entries of the DATASETS Client control table. Since the `define` command initializes the ds_mode column, all the selected data sets are cloned the first time you run a `process` command.

NOTE: If you do not select specific data sets in the data set global mapping customization script, the Databridge Client automatically clones all data sets except for remaps, the restart data set, and the global data set. This operation may take a very long time and require a lot of disk space.

You can schedule the `process` command to update the Databridge data tables. The schedule becomes effective after you run the `process` command for the first time. For more information, see Scheduling dbutility Updates (page 102).

To populate the Databridge data tables in the relational database via the dbutility `process` command, you must first make sure that the current directory is set to the working directory you created for this data source. This must be the same working directory you used when you executed a `generate` command for this data source; otherwise, the Databridge Client cannot locate the scripts to create and populate the Databridge data tables.

Cloning a DMSII Database

Use the following procedure to clone a DMSII database via the `process` command.

To run the `process` command

1. Make sure that Databridge Server is running. If it is not, the Databridge Client will try to connect to the host and eventually time out.
2. Make sure that your signon parameters are configured appropriately.
3. If you plan to use the [EbcdictoAscii] section to customize character translation or any other parameters in the `dbridge.cfg` file, set them before you continue. In particular, make sure you have appropriate settings for the following parameters. (For information on setting these parameters, see “Appendix C: Client Configuration” on page 241.)

   ```
   statistics_increment
   show_perf_statistics
   ```

```
show_statistics
show_table_stats
statistics_increment
max_temp_storage (Windows only)
max_clone_count (-s option only)
controlled_execution (dbutility only)
min_check_time
stop_after_given_afn (dbutility only)
stop_after_fixups
linc_century_base
inhibit_ctrl_chars
inhibit_8_bit_data
convert_ctrl_char
error_display_limits
discard_data_errors
suppress_dup_warnings
display_bad_data
century_break
enable_minimized_col
enable_optimized_sql
use_stored_procs
use_ext_translation
eatran_dll_name
```

4 Enter the following command:

```
dbutility [signon_options misc_options] process datasource
```

Where	Is

signon_options	For each Databridge Client type, the following command-line options specify the relational database signon parameters:
	
	Oracle:
	
	`[-U userid] [-P password] [-D database]`
	
	SQL Server:
	
	`[-U userid] [-P password] [-W] [-O ODBCdatasource]`

misc_options	Any of the following miscellaneous command-line options: `-f` *filename* specifies a configuration file other than the default `dbridge.cfg` file in the working directory. `-l` (SQL Server only) forces the client to use the bcp utility instead of the BCP API. `-s` tells the client not to use the bulk loader. `-w` (toggle for `use_dbwait` in `dbridge.cfg`) `-L` forces the client to use a new log file for this run. `-K` inhibits the audit file removal WFL from being run on the host. `-T` forces the client to use a new trace file for this run, if tracing is enabled.
datasource	The name of the data source specified in the DBServer control file (DATA/SERVER/CONTROL) or via Enterprise Server.

If the Databridge Client connects to DBServer, it selects all the data sets whose corresponding active columns have a value of 1 in the DATASETS table. Next, the Databridge Client requests that DBServer clone all the selected data sets. At the end of the data extraction phase, the Databridge Client issues another request to start sending the fixup records followed by updates. The processing of audit files continues until there are no more audit files available.

If the Databridge Client connects to DBEnterprise, DBEnterprise supplies the data, either by reading the DMSII data set directly or by issuing a request to DBServer to have Databridge Engine read a block of data from a specific region of the disk. DBEnterprise then processes this block of data. Since Databridge Engine is only reading raw data and does not do any processing of this data, this mode of operations is much less expensive in term mainframe resource utilization. In the case of audit file data, DBEnterprise either reads the data from its caches (if configured), or it reads the audit file directly by issuing a request to DBServer to have Databridge Engine read a block of data from a specific region of the disk.

After the cloning of the DMSII database completes, the tables in the relational database will contain the same data as DMSII. At this point you can execute SQL queries to view the data and make sure that all the tables have been populated. When you are ready to update the relational database with changes made to the DMSII database, see "Updating the Databridge Data Tables" on page 101.

Terminate Cloning

Use the following procedures to stop the cloning process before it is complete.

To terminate cloning

- When using the service, from the Client Console, use the `Abort` command.
- When using dbutility, use the `QUIT NOW` command.

To terminate cloning during the fixup phase

- When using the service, from the Client Console, use the `Stop` command. During the data extraction phase, if you issue a `QUIT` command (or you send a SIGTERM signal when using UNIX), the Databridge Client stops only when the fixup phase begins.
- When using dbutility, use the `QUIT` command (or the SIGTERM (15) signal on UNIX).

NOTE: If you issue a `QUIT` command or send a SIGTERM signal to the program during the data extraction phase, the Databridge Client stops only when the fixup phase begins.

When you terminate the Client during the fixup phase or during updates, the `process` command restarts from the last commit point. If you terminate the Client during the data extraction phase, only the data sets that have successfully completed the data extraction phase (ds_mode=1) are recoverable. You can resume the process by running another `process` command.

If all of these commands fail to terminate the client, press Ctrl+C or kill the run.

Tracking the State of Data Sets

The DATASETS Client control table keeps track of the state of data sets. State information consists of the ds_mode value and the DMSII audit file location from which subsequent updates should be processed. The audit file location includes the AFN, the ABSN, the segment and index in the audit files, and the audit file time stamp. These values, which are collectively referred to as the stateinfo,

are stored in the audit_filenum, audit_block, audit_seg, audit_inx, and audit_time6 of the DATASETS Client control table. The column audit_ts contains a date/time value, which corresponds to the audit_time6 data, which is binary and represents a DMSII TIME(6) value. This last column is not part of the stateinfo; it's there because knowing the audit time stamp value can sometimes be very useful.

Each subsequent time you run a `process` command, the Databridge Client passes the stateinfo and the mode of each data set to the Databridge Engine. The Engine uses this information to determine whether data sets should be cloned and the starting location in the audit trail. From that starting location, the Databridge Engine begins processing updates to the DMSII database. Every time a transaction group ends, the Databridge client updates the stateinfo for the data sets in the DATASETS Client control table. At the end of the `process` command, the location of the last quiet point in the audit trail is saved in the DATASETS Client control table. This is the starting point for the next Client run (`process` command).

If the in_sync column of a data set has a value of 1, its stateinfo columns may be out-of-date. You can determine if it is current by checking the Global_Dataset entry. For more information, see "Optimizing State Information Passing" on page 96.

ds_mode values

The following values are defined for the ds_mode column of the DATASETS Client control table:

Value	Name	Description
0	CLONE	Initial state of ds_mode before the data set is cloned.
1	FIXUP	Data extraction completed, fixup processing not completed.
2	NORMAL	Normal update tracking mode.
10	BCP-FAILURE	The bulk loading of the table failed. Further processing is not possible until the problem is resolved.
11	PRE-FIXUP	Data extraction completed, fixup processing cannot be done due to index creation errors or lack of an index.
12	INVALID-AA	AA Values invalidated by a DMSII garbage collection reorganization.
31	NEEDREORG	The data set needs to be reorganized and the `redefine` command has created scripts to make the relational database table match the new layout that resulted from the reorganization of the DMSII data set. You must run the `reorganize` command in order to run the reorganization scripts created by the `redefine` command.
33	REORGFAILED	The data set needs to be reorganized and the scripts created by the `redefine` command for this data set failed when the `reorganize` command was run. In this case, you must manually alter the table or reclone it.

In the case of DMSII reorganizations, the status_bits column in the DATASETS table is used instead. The Databridge Client leaves the ds_mode column unchanged and sets the DS_Needs_Redefining bit (8) of the status_bits column of the DATASETS Client control table.

Following the initialization (purge) of a data set, the client is notified of the purge. The Client drops the tables for the data set and recreates them. The ds_mode of the data set is set to 2 and the index for the empty tables are created. This enables the normal update processing to repopulate the tables. .

The Clone Command

From a command line, use the `clone` command to select the data sets you want to clone. You can use this command for cloning or recloning. To update the resulting Databridge data tables, you must use the `process` command. The `process` command is generally recommended instead the `clone` command, unless you want to deal only with a specific data set without processing updates at the same time. The dbutility `clone` command is basically a `process` command that forces the ds_mode for the listed data sets to be 0 and treats all data sets not specified on the command line as if their active column is 0.

To populate the Databridge data tables in the relational database via the `clone` command, first make sure that the working directory is set to the directory you created for this data source. This must be the same directory as the working directory used when you executed a `generate` command for this data source; otherwise, the Databridge Client *cannot* locate the scripts to load the Databridge data tables.

Cloning Specific Data Sets

To clone specific data sets via the dbutility `clone` command

1. Make sure that the Databridge Server is running. If it is not, the Databridge Client tries to connect to the server and eventually times out.
2. Make sure that your signon parameters are configured appropriately.
3. If you plan to use the [EbcdictoAscii] section to customize character translation or any other parameters in the `dbridge.cfg` file, set them before you continue. In particular, make sure you have appropriate settings for the following parameters. (For information on setting these parameters, see "Appendix C: Client Configuration" on page 241.)

```
show_statistics
statistics_increment
show_perf_statistics
show_table_stats
max_temp_storage (Windows only)
max_clone_count (-s option only)
controlled_execution (dbutility only)
min_check_time
stop_after_given_afn (dbutility only)
defer_fixup_phase
stop_after_fixups
linc_century_base
inhibit_ctrl_chars
inhibit_8_bit_data
convert_ctrl_char
error_display_limits
discard_data_errors
suppress_dup_warnings
display_bad_data
century_break
```

```
enable_minimized_col
enable_optimized_sql
use_stored_procs
use_ext_translation
eatran_dll_name
```

4 Enter the following command:

```
dbutility [signon_options misc_options] clone datasource datasetname1
[... datasetnamen]
```

Where	Is

signon_options	For each Databridge Client type, the following command-line options specify the relational database signon parameters:
	
	Oracle:
	
	`[-U userid] [-P password] [-D database]`
	
	SQL Server:
	
	`[-U userid] [-P password] [-W] [-O ODBCdatasource ]`

misc_options	Any of the following miscellaneous command-line options: `-L` forces the client to use a new log file for this run `-T` forces the client to use a new trace file for this run, if tracing is enabled. `-f filename` to specify a configuration file other than the default `dbridge.cfg` file in the working directory `-c` (toggle for `defer_fixup_phase` in `dbridge.cfg`) `-l` (SQL Server only) forces the client to use the bcp utility instead of the BCP API `-s` tells the client not to use the bulk loader
datasource	The name of the source specified in the DBServer control file or by Enterprise Server.

Where	Is
`datasetname1 [... datasetnamen]`	The names of the data sets you want to clone. You must specify at least one data set name. If you specify more than one data set name, separate the names with spaces. Note the following: ◆ The data set names you enter *must match the names of the data sets as they are defined in the DASDL for the DMSII database*. Databridge Client automatically converts them to uppercase for you. For example, if the data set you want to clone is named ORD-DETAIL, you must type `ORD-DETAIL` or `ord-detail`. You must use a hyphen (-), not an underscore (_). ◆ The exact data set names are listed in the DATASETS Client control table. ◆ If a DMSII data set is a relational database reserved word, enter it normally without quotes or any other delimiter. ◆ If you specify a data set that has variable-format records, all record types are cloned except for those that have a corresponding active column of 0 in the DATASETS Client control table. ◆ The active column of the selected data sets must be set to 1. Otherwise, an error appears when you specify the data set on the command line.

WARNING: If for some reason the `clone` command abends, do not rerun it before you determine whether or not some of the data sets completed the data extraction phase and are recoverable. *Rerunning the* `clone` *command starts the cloning operations from scratch.*

Cloning Command-Line Options

Command-line options related to the `clone` command are as follows:

Option	Description
`-L`	Forces the Databridge Client to use a new log file for this run.
`-T`	Forces the Databridge Client to use a new trace file for this run, if tracing is enabled.
`-x`	Reverses the meaning of the data set list for the `clone` command, as follows: Without the `-x` option, the Databridge Client clones the data sets listed on the command line. With the `-x` option, the Databridge Client clones all active data sets *except* those listed on the command line.
`-c`	Toggles the `defer_fixup_phase` configuration file parameter. When you use this option, the dbutility `clone` does not enter the fixup phase at the end of data extraction. Instead of issuing a request to the Databridge Server to initiate the fixup phase, the Databridge Client terminates. The ds_mode values of all cloned data sets remain set to 1 with all of the necessary stateinfo stored in the Client control tables (for example, audit_filenum, audit_block, and host_info). The next `process` command then picks up where the `clone` command left off.

Configuring for Optimal Performance

Several configuration file parameters have a very visible effect on the performance of the Databridge Client. Databridge Clients operate efficiently with the following *default* configuration file parameters:

- `max_temp_storage` (Windows only)
- `aux_stmts`
- `optimize_updates`

This section discusses these parameters and other factors that can make Databridge Client run more efficiently.

Overlapped Bulk Loader Operations for Windows

The SQL Server Client uses the BCP API by default in this version which eliminates the use of temporary files and allows for overlapped data extraction operations. Combined with optimized client code for data extraction, clone speeds are much faster than before (especially in cases where the bottleneck is the CPU). The benefits of this mode of operation are much more dramatic when using a system with multiple CPUs. The bcp utility is to be used as a fallback option in case you run into problems with the BCP API.

The 6.6 Client extended multi-threaded updates to also include extracts, which greatly improves performance as the load is distributed among the update threads. This leads to better resource utilization, as multiple CPUs are working concurrently on setting up the data for the records that are being bulk loaded and passing them on to the database using bcp_sendrow() calls.

NOTE: Configuration file parameters for increasing bulk loader speed are listed with the related bulk loader utility in the sections "Oracle SQL*Loader Bulk Loader" on page 79 and "Microsoft SQL Server BCP API and bcp utility" on page 82. See a complete list in Appendix C's section on "[Bulk_Loader]" on page 259

Adjust the `max_temp_storage` value to determine what works best for your site. Setting this parameter too high tends to reduce the benefits of using multiple threads to launch bulk loader operations. Conversely, setting this parameter too low tends to increase overhead, particularly when the record sizes are large, by firing off too many bulk loader operations.

CAUTION: Do not set this parameter to 0, or *the program will bulk load tables in one step, use a huge amount of temporary storage, and eliminate all overlapped processing*.

For details about `max_temp_storage` parameter, see "[Bulk_Loader]" on page 259.

Overlapped Index Creation

The Databridge Clients use a separate thread to execute the index creation scripts for tables after the data extraction for the table is completed. This allows lengthy index creation operations to be overlapped with the bulk loading of tables and has a noticeable impact on speeding up the data extraction process when many data sets are involved.

Optimizing State Information Passing

The Databridge Client optimizes the process of updating the stateinfo in the DATASETS Client control table, which is identical for all data sets that are in update tracking mode (ds_mode=2). Instead of updating every data set each time the stateinfo is updated by Databridge Engine prior to a COMMIT, it stores the common information in a dummy data set in the DATASETS table named Global_DataSet. When the Databridge Client is finished processing updates, the stateinfo in the Global_DataSet entry in the DATASETS Client control table is copied to all data sets that need to be updated with the stateinfo. The Global_DataSet row is stored in the DATASETS Client control table along with the in_sync column that keeps track of stateinfo synchronization between updated data sets and the Global_DataSet. This significantly reduces the number of SQL update statements for the DATASETS Client control table when you have a large number of data sets.

To keep the DATASETS table current, particularly when READ ACTIVE AUDIT is set to TRUE in the Databridge Engine Control File, the Databridge Client copies the stateinfo in the Global_DataSet entry to all data sets whose in_sync column is 1 after an audit file switch.

When the Client is restarted after it abends, it detects the fact that the data sets are out of sync. The Client corrects this situation by copying the global stateinfo to all data sets whose in_sync column is 1 and setting all of the in_sync columns to 0.

Multiple Statements and Pre-parsed SQL Statements

The `aux_stmts` parameter applies only to the Databridge Client during update processing (not cloning).

The `aux_stmts` parameter defines the maximum number of ODBC or OCI auxiliary statements that can be assigned to SQL statements. Using auxiliary statements allows SQL statements to be parsed once and executed multiple times, as long as the auxiliary statement is not reassigned to hold another SQL statement.

In general, higher values for `aux_stmts` result in faster update processing times at the expense of more memory usage. If you have the memory to spare, increase this parameter as needed. The optimum setting for this parameter will depend on the nature of your data.

For details, see "aux_stmts" on page 279.

Reducing the Number of Updates to Data Tables

If your most frequently updated data sets have a significant number of items with OCCURS clauses that are not flattened, you may want to set the DSOPT_Use_bi_ai bit in the ds_options column of the corresponding DATASETS entries. The configuration file parameter `optimize_updates` causes the `define` command to set this bit for all data sets that have active items with unflattened OCCURS clauses.

NOTE: You can also set this parameter from the **Client Configurator** by checking the checkbox **Optimize SQL updates** in the **Customizing > Advanced Parameter** page of the **Client Configuration** dialog box.

If the ratio of SQL rows to DMSII records is five or more during update processing, setting this parameter to True will likely improve performance. Note that this increases the TCP/IP and CPU overhead. If the ratio of SQL rows to DMSII records is low, you won't see any significant reduction in SQL overhead, which can hinder performance.

For best results, set the DSOPT_Use_bi_ai bit only for data sets that have a high ratio of SQL rows to DMSII records. For example, a data set that has only one item with an OCCURS 2 TIMES clause is a poor candidate for the DSOPT_Use_bi_ai bit (SQL row/DMSII records = 3). Conversely, a data set that has 3 items with OCCURS 12 TIMES clauses is a good candidate to use the DSOPT_Use_bi_ai bit (SQL row/DMSII records = 37).

For details, see "optimize_updates" on page 272.

Other Considerations

A few other factors that can significantly affect performance include:

- The number of CPUs (at least two are recommended)
- The type of CPU
- The amount of memory on your client machine
- The type of disks you use. Redundant array of independent disks (RAID) or striped disks are recommended. During data extraction, do not use the same physical disks for temporary files and the database files. Ideally, use RAID for the database files and a separate disk for the Databridge Client files (bulk loader temporary files, scripts files, log files, and so on).
- The condition of your database

Tips for Efficient Cloning

When you first run the `define` command to populate the Client control tables, you will notice that most DMSII data sets are set to be cloned. Although you can accept the default data sets and their items for cloning, note the following:

- Cloning an entire DMSII database can take *several hours or more*. Most sites do not clone the entire DMSII database.
- The cloning of the DMSII restart data set is automatically disabled. The restart data set is related to restarting the DMSII database only.
- If you clone virtual data sets, do not disable the cloning of the data sets from which the virtual data set is derived. (Virtual data sets have a value of 17 in the subtype column of the DATASETS table.) Virtual data sets are created on the host and are explained in the *DATABridge Programmer's Reference*.
- Make sure that you have enough disk space on the relational database server for the DMSII data. If there is not enough room, the cloning process stops. In addition to the space required for DMSII data, you must have some additional file space for the temporary files used by the bulk loader utilities (bcp for Microsoft SQL Server; SQL*Loader for Oracle).

NOTE: The bulk loader temporary files should not be on the same disk as the relational database.

- You do not have to clone all of the data sets at one time. One approach is to clone the most essential data sets and then determine how much space is still available.
- If you do not want to clone secondary tables (those tables generated from a data set), you have two choices. In either case, the primary table is still generated, while the resulting secondary tables are not.
  - Set the value of the active column (for that table) in the corresponding DATATABLES Client control table entry to 0 (`script.user_define.`*`primary_tablename`*`)`.
  - Set the value of the active column in the corresponding DMS_ITEMS Client control table entry to 0 for an item with an OCCURS clause (`script.user_layout.`*`primary_tablename`*).
  - Flatten the OCCURS in either the primary or the secondary table.
- If the active columns for all tables related to a data set are 0, DATABridge sets the active column of the corresponding entry in the DATASETS table to 0.
- The cloning of DMSII remaps is automatically disabled because the remaps are just different views of the base data sets; the DATABridge Client assumes that the base data set will be cloned. We recommend, therefore, that you clone the base data set and then set up a view in the relational database to achieve the same result as the REMAP.

  If you do want to clone a remap of a data set instead of the base data set, you can do so by changing the values of the active columns of the data sets in the DATASETS Client control table. You can identify remaps by their base structure number (base_strnum). For example, if structure numbers (strnum) 11, 121, and 227 are remaps of structure number 10, the base structure number for structures 11, 121, and 227 is 10.

  For data sets that are not remaps, the strnum and base_strnum columns are equal. If you do not want to clone anything related to a particular data set, set the value of the active column (for that data set) in the corresponding DATASETS Client control table entry to 0. No tables (primary or secondary) are generated from this data set.

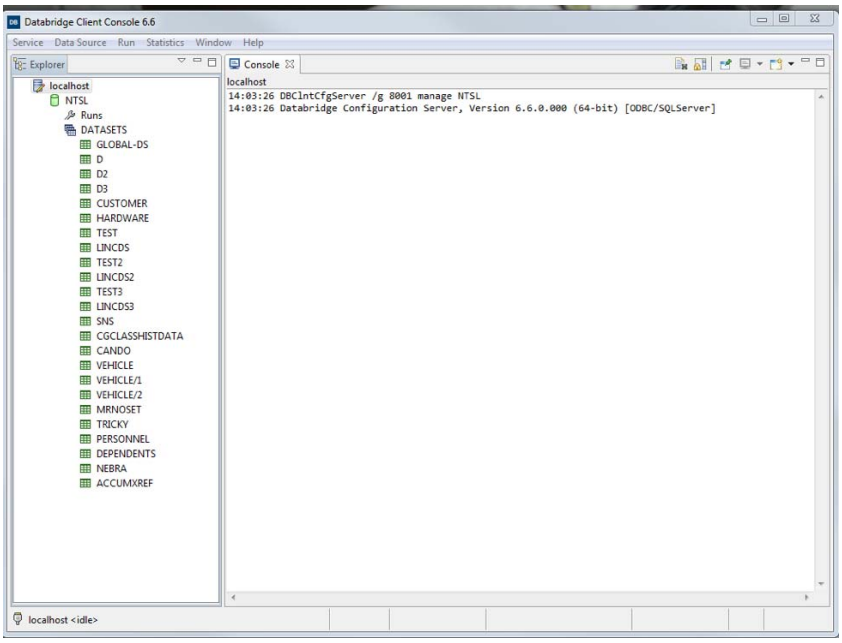
  For more information about REMAPS, see the next section.

REMAPS

If the base structure of a REMAP is not visible to the Client (due to GenFormat filtering) the Client will set the active column of the first REMAP to 1, and clone it in place of the base structure. If the base structure of an embedded data set is not visible to the Client and it has a REMAP, the Client will set the active column of the REMAP to 1 and use it as the parent instead.

NOTE: If you are using the Client Console or Client Configurator and you want to change the active column of a data set that is 0, you should be aware that the tree view has a filter.

The picture below shows this for the Client Console. To access it, click on the triangle right below "Windows" on the **Menu** bar and on the triangle next to **Filters**. To see the data sets that have their active column set to 0, you need to click **Inactive Items**. This causes data sets with active set 0 to be included in the tree view. The items in question will have a light gray icon to indicate that their active columns are 0. You can change the active column by clicking on the checkbox labeled "Active" in the Properties page of the data set.


Databridge Client Console 6.6
Service Data Source Run Statistics Window Help
Explorer
Console
localhost
NTSL
Runs
DATASETS
GLOBAL-DS
D
D2
D3
CUSTOMER
HARDWARE
TEST
LINCDS
TEST2
LINCDS2
TEST3
LINCDS3
SNS
CGCLASSHISTDATA
CANDO
VEHICLE
VEHICLE/1
VEHICLE/2
MRNOSET
TRICKY
PERSONNEL
DEPENDENTS
NEBRA
ACCUMXREF
localhost
14:03:26 DBClntCfgServer /g 8001 manage NTSL
14:03:26 Databridge Configuration Server, Version 6.6.0.000 (64-bit) [ODBC/SQLServer]
localhost <idle>

4 Chapter 4: Updating the Relational Database

This chapter covers updating the Databridge Client data tables in the relational database with changes made to the DMSII database. In addition, it explains DMSII reorganizations and how they update the Databridge Client data tables.

In this Chapter

Updating the Databridge Data Tables

Updating is the process of applying the DMSII database changes to the Databridge data tables in the relational database by sending only the changes, not all of the data, to the Databridge data tables.

You can update the Databridge data tables after they have been cloned as long as they meet the following requirements:

- Each Databridge data table you want to update has a unique index. If a table you want to update does not have a unique index, see "Creating Indexes for Tables" on page 61.
- The DMSII database has not been reorganized. If the DMSII database has been reorganized, see DMSII Reorganizations and Rollbacks (page 107).

You can update the Databridge Client data tables by running a `process` command each time you want the update to occur, or you can schedule a `process` command to run at fixed times or a fixed amount of time after the run finishes. How often you update the Databridge tables depends on the following:

- How current you want the data to be. For time-critical information, you may want to update the Databridge data tables several times a day.

NOTE: If you do *not* update the relational database often, it might be more effective for you to reclone the DMSII data sets rather than update them. For example, if you are interested in weekend information only, and *several* audit files have been closed (and possibly moved to tape) during that time, recloning may be faster than updating.

- How often audit files are available on the host. When an audit file is not available, the Databridge Engine temporarily stops processing until the audit file is available. The Databridge Engine can access the active DMSII audit file when the DBEngine control file parameter READ ACTIVE AUDIT is set to true.
- How often closed audit files are available on the host. In some cases, a closed audit file is not available because it has been copied to tape. In this instance, a host operator must mount the tape before the closed audit file can be made available to Databridge.

Performing Updates Without Using Stored Procedures

This version of the Databridge software introduces a new way of updating tables that does not use stored procedures and is more efficient. This feature can be controlled globally by setting the configuration parameter `use_stored_procs` to false, see "use_stored_procs" on page 277.

This parameter makes the `process` and `clone` commands generate the actual SQL command instead of using a stored procedure call to perform an update. The Client still uses host variables, as was the case with stored procedures calls. Executing the SQL directly eliminates some overhead and makes processing the update faster. You can also control this on a data set by data set basis as described in "use_stored_procs" on page 277.

Scheduling Updates

The `process` command has a built-in scheduling mechanism that allows the run to hibernate and resume at the next scheduled time. When the Databridge Server sends the Client an end-of-audit-reached status, dbutility normally terminates. However, if you enable scheduling, the Databridge Client disconnects from the server and the database and hibernates until the next scheduled `process` command, when it reconnects to the server and the database. This scheduling mechanism only works after you run dbutility for the initial clone of the DMSII database. If the Client crashes or the power fails, scheduling will fail. Service-based scheduling has none of these shortcomings, as the scheduling task is taken over by the Client Manager service. For details about service-based scheduling, see the Databridge Client Console **Help**.

If you use the Client Manager service, it takes over this functionality. When a DBClient run terminates, the service determines when the next `process` command should be run and then starts one when that time arrives. The advantage of service-based scheduling is that it immune to system failures, as the service automatically gets restarted when the system is rebooted.

To schedule updates

1. Uncomment the scheduling parameters in the Databridge Client configuration file. Scheduling parameters are listed under the [Scheduling] header in the configuration file.
2. Select one of the following scheduling methods:
   - Daily scheduling
   - Fixed-delay scheduling
3. Enter appropriate values for the following scheduling parameters, depending on whether you are using daily scheduling or fixed-delay scheduling. Each parameter is explained in "[Scheduling]" on page 305.

```
[Scheduling]
;
;dbutility process command only
;
;daily                  = 08:00, 12:00, 17:00, 24:00
;exit_on_error          = false
;sched_delay_secs       = 600
;sched_minwait_secs     = 3600
;sched_retry_secs       = 3600
;blackout_period        = 00:00, 02:00
```

As long as the process command completes successfully, dbutility becomes inactive (sleep) until the next scheduled time. If the scheduled dbutility process command is successful, the following message appears:

`Next update for DataSource` *`datasourcename`* `will run at` *`hh:mm`* `(delay =` *`nn`* `secs)`

Scheduling of updates will continue until any of the following occurs:

- You reboot the Databridge Client machine or end the Databridge Client session
- You enter a SCHED OFF console command when dbutility is processing updates
- A DMSII reorganization (other than a garbage collection)

NOTE: If you must stop the dbutility program, we recommend that you use the QUIT command to exit at the next quiet point. If the Client is waiting for the server to send it updates when none are available and the use_dbwait configuration file parameter is set to true, you can use the QUIT NOW command, which resets the connection to the server and terminates the client run. If needed, you can also press Ctrl+C to terminate a session while dbutility is processing updates; however, we do not recommend this approach.

Scheduling Examples

Daily Schedule Example

The following example uses the daily scheduling method. In this example, the Databridge Client runs only twice a day—once midway through the business day and once at the end of the business day. If the process command fails, the Databridge Client waits 10 minutes before retrying.

```
[scheduling]
daily = 12:00, 17:00 ;run the process at noon and 5PM
sched_retry_secs = 600 ;retry in 10 minutes after a failure
```

Fixed-Delay Example

The following example uses the fixed-delay scheduling method. In this example, the Databridge Client runs the process command 4 hours (240 minutes) after the run finishes. If the process command fails, the Databridge Client retries every 30 minutes.

```
[scheduling]
sched_delays_secs = 14400
sched_retry_secs = 1800
```

Scheduling Blackout Periods

You can schedule blackout periods during which the Client suspends all processing and updates to allow for routine maintenance or reporting. To use this feature with the service-controlled Client, you can set the **Blackout Period** value from the Client Console by clicking **Data Source > Client Configuration > Processing > Scheduling**.

Unscheduled Updating

Use this procedure when you want to run dbutility `process` independent of scheduling.

To update the Databridge data tables in the relational database

1. Make sure that the Databridge Server is running. If it is not, the Databridge Client will try to connect to the server and eventually time out.
2. Make sure that your signon parameters are set appropriately.
3. If the [EbcdictoAscii] section of the configuration file (to customize character translation) has changed since the initial clone, your data may not be consistent. You might need to reclone.
4. Make sure that the current directory is the one you created for this data source. This ensures that Databridge Client can locate the scripts. (Scripts are only required during an update if there's a purged data set.)
5. Enter the following:

   `dbutility [`*`signon_options misc_options`*`] process `*`datasource`*

Option	Description

`signon_options userid`	For each Databridge Client type, the following command-line options specify the relational database signon parameters:
	Oracle:
	`[-U ] [-P `*`password`*`] [-D `*`database`*`]`
	SQL Server:
	`[-U `*`userid`*`] [-P `*`password`*`] [-W] [-O `*`ODBCdatasource`*`]`

`misc_options`	Any of the following miscellaneous command line options: `-L` forces the client to use a new log file for this run. `-f `*`filename`* to specify a configuration file other than the default `dbridge.cfg` file in the working directory `-w` to toggle the `use_dbwait` parameter `-K` to inhibit running the audit file removal WFL on the host `-T` forces the client to use a new trace file for this run, if tracing is enabled. For information on the command-line options, see "dbutility Command-Line Options" on page 234.

Option	Description
datasource	The name of the data source specified in the DBServer control file or by Enterprise Server.

When you run a process command to update the Databridge tables in the relational database, the following occurs:

- All modified records are overwritten with their new values. If the target record is not found in the table, the Databridge Client adds the record to the table instead.
- All deleted records are deleted.
- All added records are inserted into to the data tables. If the target record is already in the table, the Databridge Client modifies the record in the table instead.

Anomalies That Can Occur In Updates

When the Databridge Client updates the relational database, the following anomalies can occur:

Last quiet point (QPT) in an audit file

When processing an update transaction group since the last quiet point, Databridge Engine does the following when it reaches the end of the last available audit file:

- Aborts the current transaction group so that the updates are rolled back. These are not duplicate updates, but updates that could not be committed. These updates will be reapplied the next time you run a process command.
- Sends the Databridge Client a status indicating that the transaction group was rolled back. Upon receiving this status, the Databridge Client does not display any messages.

Host application rolls back changes

(This is a partial DMSII rollback, not to be confused with a total DMSII rollback (page 113).)

If a host application encounters an error condition while updating the DMSII database, it rolls back all of the changes it made. In this case, Databridge Engine aborts the updates when it finds the aborted transaction indication in the audit file. Databridge Engine handles the situation in one of two ways based on the setting of the DBEngine control file parameter CONVERT REVERSALS TO UPDATES:

1. If CONVERT REVERSALS TO UPDATES is FALSE (the default setting), Databridge Engine sends an abort transaction status to the Databridge Client and then reprocesses the transaction group, excluding any updates by the program(s) that rolled back its updates. In this case, none of the updates in the aborted transaction are applied to the data tables.
2. If CONVERT REVERSALS TO UPDATES is TRUE, Databridge Engine will continue to process the audit file, converting the items marked as reversals to normal updates, in a manner similar to the method employed by DMSII. (DMSII aborts transactions by reversing the updates previously done. Thus a CREATE will be reversed to a DELETE, a DELETE reversed to CREATE, MODIFY to a MODIFY using the Before Image). All updates, including those that were aborted and their reversals, are applied to the data tables.

5 Chapter 5: DMSII Reorganization and Rollbacks

This section lists changes that can occur to the DMSII database, how those changes affect the Databridge Client control and data tables, and how to handle them on the Client database. For instructions on handling a DMSII reorganization on the host, see "Prepare for a DMSII Reorganization" in Chapter 10 of the *Databridge Host Administrator's Guide*.

In this Chapter

Initializations

A DMSII initialization occurs when a DMSII data set is purged of its records. When a data set is initialized, Databridge Engine sends the Databridge Client a stateinfo record with a mode value of 4. The Databridge Client performs the actions described below after displaying the following message:

`DataSet name[/rectype] has been purged`

The Client drops all of the tables belonging to this data set and re-creates them, effectively purging the tables of all records. When Databridge Engine is done sending stateinfo records, it sends a status of DBM_PURGE(21), causing the client to display the following message:

`DataSets purged by Databridge Engine`

The normal update processing will repopulate them.

NOTE: An initialization does not change the data set format level in the DMSII database.

Reorganizations

Although there are basically three types of DMSII database reorganizations (page 352) (record format conversion, file format conversions, and garbage collection reorganizations), the *types* of reorganizations are not as important as whether the reorganization changes record *layouts* or record *locations*, as follows:

- DMSII record format conversions change record *layouts*. When a data set is affected by a record format conversion, parallel changes must be applied to the Client database. See (page 108)"Managing DMSII Changes to Record Layout" on page 108.
- DMSII file format conversions and garbage collection reorganizations change record *locations*. Only certain data sets require recloning in this case. See "DMSII Changes to Record Locations" on page 111.

NOTE: Filler substitutions are handled the same as a record format reorganization. In a filler substitution, there is a change to the item count.

Managing DMSII Changes to Record Layout

Use this procedure if a DMSII reorganization changes the layout of records. DMSII record layouts are changed in the following circumstances:

- Record format conversion (also called structural reorganization in this section)
- Filler substitutions

When Databridge Engine notifies the Databridge Client that the layout of records have changed, the Databridge Client returns a message for each reorganized data set and then prompts you to run a `redefine` command followed by a `reorg` command. It then returns an `exit_status` value of 2 (DMSII reorganization). The `redefine` command can determine whether the layout for the data tables have been affected by the DMSII layout change and if the affected data sets need to be recloned. (For more information about the `redefine` command does, see "About the redefine Command" on page 110.)

To run the redefine command

1. If the DMSII changes are extensive or complex, we recommend that you back up the relational database before proceeding.
2. If you use the Client Configurator to customize the table layouts, skip steps 1 through 3 and run the Client Configurator instead. It will perform the same actions as the `redefine` command, but will also allow you to make customizations for the data sets affected by the reorganization.
3. Modify user scripts as required by the DMSII layout changes.
4. Run the `redefine` command as follows:

   ```
   dbutility redefine datasource
   ```

IMPORTANT: If any changes caused by the reorganization are not supported, the `redefine` command does not create the reorganization scripts. Instead, it sets ds_mode of the corresponding data set to 0, which forces the data set to be recloned. If the changes caused by the reorganization are allowed, the `redefine` command sets ds_mode to 31.

5 If the `redefine` command results in errors because the user scripts were improperly updated, run a `reload` command. This restores the control tables using the unload file that is automatically created by the `redefine` command, as explained in The Unload Command (page 117). Correct the user scripts and rerun the `redefine` command until no errors result.

6 Examine the reorg scripts created by the `redefine` command (or Client Configurator) to make sure they are correct before proceeding any further. These scripts are created in the working directory and have names of the form `script.reorg_`*`nnn.tablename`*, where *nnn* is the old update level of the DMSII database.

7 (This step is effectively executing a `generate` command.) Run the `reorg` command as follows:

```
dbutility reorg datasource
```

The `reorg` command does the following:

- It generates new Client scripts for all data tables whose layouts have changed by running the same code that a `generate` command would.
- For each data set affected by the reorganization, it runs the scripts created by the `redefine` command to reorganize the tables associated with the data set. If these scripts run successfully, it restores ds_mode to its value before the reorganization. Conversely if the script fails, it sets ds_mode to 33 for the data set in question to indicate that the attempt to reorganize the table has failed, and it stops prematurely.

  If the command completes successfully, proceed to step 8. Otherwise, determine why the command failed and decide what to about it.

  Your options include:

  - Give up and reclone the data set that could not be reorganized by setting its ds_mode to 0.
  - Correct the script that failed, set its mode back to 31, and rerun the `reorg` command.
  - If you are proficient in SQL, you can reorganize the table using external means to the client to perform the action that the reorg scripts were attempting to do. If you succeed you can then set ds_mode back to its original value (which will most likely be 2). You also will need to run a `refresh` command for the problem data set to replace the old stored procedures which are out-of-date.

  The `reorg` command is restartable after a failure. The data sets that were already processed successfully will not be affected by rerunning the command, and the data set that caused the command to fail will be skipped unless its mode is set to 31.

8 Run a `process` command to resume change tracking:

```
dbutility process datasource
```

About the redefine Command

You will be prompted to run the `redefine` command when a data set is reorganized or when the Support Library is recompiled. (A Support Library recompile indicates that either the layout has changed, such as changes to ALTER or FILTER, or the SUPPORT option in the SOURCE declaration changed.)

In all of the aforementioned cases, Databridge Engine treats the situation like a reorganization and requires that you run a `redefine` command.

When you run the `redefine` command, it does the following:

- Creates a backup of the Client control tables for the data source by silently performing an `unload` command. The unload file is created in the data source's working directory when the Client first detects the reorganization. The unload file is named *`datasource`*`_reorg_`*`nnn`*`.cct` where *nnn* is the value of update_level prior to running the `redefine` command (and is saved to the old_update_level column of the DATASOURCES entry).
- Re-creates the relational database layout for all data sets that are marked as needing to be redefined.
- Runs user scripts (if you use them) to preserve changes to the Client control tables. If you are using the Client Configurator, all changes are restored from the old controls tables.
- Determines which data sets have tables whose layouts have changed, updates the ds_mode accordingly, and creates reorganization scripts that will alter the relational database tables to match the changes in the reorganized DMSII data sets.

Reorganized Data Sets

When a data set has been reorganized (status_bits = 8), the `redefine` command compares the layouts of tables mapped from the data set in the existing Client control tables with the new layouts and does the following:

- If no changes occur to the layouts of tables mapped from the data set, the `redefine` command sets the data set ds_mode to 2, indicating that the data set is ready to be updated.
- For tables for which the layout has changed, the `redefine` command creates reorganization scripts that will modify the relational database tables to match the changes in the reorganized DMSII data sets.
- If the DMSII reorganization introduces one or more new columns, one of the following occurs.

If suppress_new_columns is	Result
True	The active column is set to 0 for new items in the DATAITEMS Client control table and for new tables in the DATATABLES Client control table. The next `process` command does not reclone the data set.
False	The new columns are added to the tables in the client database. These columns will be set to the appropriate values based on their INITIALVALUE defined in the DASDL. The next `process` command will continue to populate the table including the new column. If new tables appear, the data set will be recloned.

- If the reorganization introduces one or more new data sets, one of the following occurs.

If suppress_new_datasets is	Result
True	Databridge Client sets the active column in the corresponding entry in the DATASETS Client control table to 0, and the data set is not mapped.
False	Databridge Client sets the active column in the corresponding entry in the DATASETS Client control table to 1 (unless the data set is a REMAP), and the layout of the corresponding relational database tables is defined in the DATATABLES and DATAITEMS Client control tables. You must run a `reorg` or `generate` command to create the scripts for these new tables. These data sets are automatically cloned the next time you run a `process` command.

- For any reorganized data set whose active column is 0, the `redefine` command updates the corresponding Client control table entries, leaving the active column to 0. This ensures that if you later decide to clone that data set, you only need to set the active column to 1 and execute a `redefine` and a `generate` command.

Performing Reorganizations Using an Internal Clone

This version of the Databridge software introduces a new way of reorganizing tables that does not use `alter` commands. In some cases, the process of reorganizing a table by using `alter` command can be very expensive. For example, if you try to change a column that is an int to a dec(10) when using SQL Server, the `alter` command will cause every single change to be logged, which can have rather disastrous effects if the table is large. If you run out space for the log, the `alter` command abends, leading to a massive rollback.

The `use_internal_clone` parameter allows you to select the default method of doing reorganizations. See “use_internal_clone” on page 276 for more information. You can then override it (on a data set by data set basis) by using the Client Configurator to change the setting of the ds_options bit DSOPT_Internal_Clone (see DSOPT_Internal_Clone in the section “DATASETS Client Control Table” on page 153 for a description of this bit).

The internal clone is comparable in terms of speed to using the bulk loader to copy the data from the old table to the new table. In the case of SQL Server, to make it run fast you must make sure that database's recovery model is not set to "Full", as was the case of for the bulk loader (temporarily change the database model "Bulk-logged" when you run an internal clone).

DMSII Changes to Record Locations

DMSII record locations are changed in the following circumstances:

- Garbage collections reorganizations
- File format conversions
- Record format conversions

Garbage collection and file format conversion reorganizations only affect data sets that use AA Values as keys. Therefore, unless the data sets using AA Values as keys are small and garbage collection reorganizations at your site are infrequent, we recommend that you use RSNs. (If you're unable to use RSNs, composite keys are a viable alternative to AA Values. However, they are error prone and can result in false duplicate records.)

When a data set is affected by a garbage collection reorganization or a file format conversion, the Databridge Client sets ds_mode to 12 in the DATASETS Client control table and displays the message:

```
WARNING: DMSII reorganization has occurred; AA Values for DataSet name [/
rectype] are no longer valid
```

When a record format conversion affects a data set that uses AA Values, the `redefine` command forces that data set to be recloned, even if the tables derived from the data set are not affected by the reorganization.

Handling New Columns

Use the following procedures to either ignore or add new columns that were added to the DMSII database. When you add a new column, you can make the Client interpret the DMS item as a date by modifying the customization script.

NOTE: You can also use the Client Configurator to add or ignore new columns. See the Databridge Client Console **Help**.

The following two procedures use a new column named "ORDER-DATE" as an example.

To ignore the new column

1. In the Client configuration file, set the file parameter `suppress_new_columns` to True. Don't do this after running the `redefine` command, though, or it will do nothing.)
2. Modify the data set mapping customization script (`script.user_layout.order`) by adding the following lines:

   ```
   update DMS_ITEMS set active=0
   where dms_item_name='ORDER-DATE' and dataset_name='ORDERS'
   ```

   If you do this after running the `redefine` command, it has no effect because the new column will be present in DATAITEMS.

To treat the new column as a date

1. In the Client configuration file, set the file parameter `suppress_new_columns` to False.
2. For the new item ORDER-DATE to be treated as a date in the corresponding relational database table, to the data set mapping customization script (`script.user_layout.order`), add the following lines:

   ```
   update DMS_ITEMS set di_options=2, dms_subtype=23
   where dms_item_name='ORDER-DATE', and dataset_name='ORDER'
   ```

3. If you already ran a `redefine` command, run the `reload` command to reload the Client control tables that were created by the first `redefine` command.
4. Run the `redefine` command to apply your changes.

DMSII Reorganization When Using Merged Tables

The merged tables feature combined with multi-source databases allows a user to store data from multiple separate DMSII databases into a single relational database. The requirement is that all the DMSII databases have the same DASDL and always be kept in sync, as far as reorganizations are concerned. This section documents how to go about handling such reorganizations.

Everything we said about the single data source case still applies here. The first thing you need to do is to let the clients catch up with all the updates until it gets to the point in the audit trail where the reorganization occurred. Make sure that you let all the clients catch up before doing anything else.

Once all the data sources are caught up, you will need to run redefine commands for all of the data sources. Once this is completed you will then need to run a reorg command for one of the data sources. Do not do this for more than one data source, as there is only one set of tables in the relational database and if any of the scripts alter a table running the scripts a second time will usually result in SQL errors, as the ALTER commands will most likely not be valid. For example if the ALTER command adds a column, an attempt to add it again will fail.

We added the -n option to the reorg command to make it work for the second and any subsequent data sources in a multi-source environment. This allows you to get all the data sources ready for processing updates by generating scripts for reorganized data sets and refreshing the stored procedures for the tables associated with such data sets. Finally the command updates the ds_mode column in DATASETS, restoring it to the value it had before the redefine command was run. This command appears near the bottom of the Advanced menu for the data source.

If the reorganization requires that a data set be recloned, you should add the -k option to the first process or clone command you use so the table gets dropped. In the absence of the -k option, the client will run the cleanup script, which removes all the records associated with the current data source. The alternative is to manually drop the table for the first data source. Once the tables to be recloned have been dropped, the remaining data sources can operate normally.

Rollbacks

A DMSII "rollback" restores the DMSII database to an earlier point in time in order to correct a problem. While the DMSII database is being restored, replication stops. The Client must then be restarted for replication to resume.

If the Client has processed updates after the DMSII restore point, this replicated data will be wrong. Upon finding bad information in the stateinfo, the Databridge Engine typically returns a message stating that a rollback has occurred. To resolve this problem, the relational database must also be rolled back (to the DMSII restore point or earlier).

If the Client hasn't processed updates after the DMSII restore point, no action is required. This can often be the case as the Client tends to lag behind the DMSII database by several audit files during the processing of audit files generated by batch jobs.

Recovering from DMSII Rollbacks

You'll need to recover the relational database after a DMSII rollback In situations where the Client database is caught up with the DMSII database (that is, there is no lag time between the two). There are two preferred ways to do this:

Programmatic rollback	Undoes all transactions that occurred after the specified rollback point (typically a time prior to the DMSII restore point). This is only possible if the relational database is audited, which is rarely the case.
Reload the database	Entails reloading the database from a backed-up copy. This requires that all of the audit files—from the point when the relational database was backed up forward—to be available. If the audit files aren't available, recloning is the only option.

Recloning the database is usually very time-consuming and is only recommended as a last resort or in cases where the relational database contains little data or if the required audit files are not available. For information about recloning, see "Recloning" on page 114.

CAUTION: Using shortcuts to recover a relational database after a DMSII rollback, such as updating the tables using scripts or resetting the State Info, is not only ineffective but problematic. These methods leave obsolete updates in the client database and may cause valid updates to be skipped after the Databridge Client resumes tracking.

Recloning

Reasons for recloning include the following:

- DMSII reorganization
- DMSII rollback
- An update is not possible (for example, because a table does not have a unique key)
- One or more of the Databridge data tables in the relational database were removed

You can use either the `process` or `clone` command to reclone data sets. The `clone` command lets you specify individual data sets on the command. The `process` command automatically reclones all data sets whose active column is 1 and whose ds_mode column is 0. Both commands perform fixups, tracking and processing updates as needed (unless the `defer_fixup_phase` or the `stop_after fixups` parameter is set to True). See "Recloning Individual Data Sets" on page 114.

If you're recloning the entire database, the process is more involved. See "Recloning a Database" on page 115.

Recloning Individual Data Sets

Use one of the following procedures to reclone data sets.

To reclone with a `process` command

1. Set the current directory to the one you created for the data source (the directory from which you ran a `generate` command for the data source). Make sure that the directory contains the scripts for this data source.

2. Set the ds_mode column (in the DATASETS Client control table) to 0 for the data sets you want to clone by running a SQL command. If you are recloning all data sets, using the "`-Y reclone_all`" option eliminates the need to do this, as the Client will update the DATASETS table automatically when this option is used.
3. Run the `process` command with the -y option, as follows:

   ```
   dbutility process -y datasource
   ```

   The `-y` option forces any data sets whose ds_mode is set to 11 or 12 to be recloned, in addition to the recloning data sets whose ds_mode is set to 0. After the data extraction process is complete for the data sets being recloned, Databridge data tables whose active columns are set to 1 in their corresponding Client control table (and whose ds_mode is set to 2) are updated.

To reclone with a `clone` command

1. Set the current directory to the one you created for the data source (the directory from which you ran a `generate` command for the data source). Make sure that the directory contains the scripts for this data source.
2. Set the parameter `defer_fixup_phase` to True to suspend audit file processing. If you don't do this, audit files will be processed twice, once for the data set you clone and once for all of the other data sets.
3. Synchronize the tables by running a `process` command. Synchronization occurs when all data sets reach the same point in the audit trail.

For clone command syntax, see “dbutility Commands” on page 227.

Recloning a Database

Recloning the relational database can be an efficient means of recovering it if it doesn't contain a lot of data. Otherwise, it can be time-consuming and costly, as recloning uses host resources. These reasons alone often make recloning a last resort when no backup is available. (These issues are one reason we developed Enterprise Server. It makes processes like this one more efficient.)

We recommend that you use the following procedure instead of setting ds_mode to 0 for all data sets using a SQL query and running a `process` command, because it ensures that you have the latest copy of the DMSII layout.

To reclone the database

1. Make sure that you have the latest copy of the DMSII layout.
2. Run a `drop` command to drop the data source.
3. Run a `define` command.
4. Run a `generate` command.
5. Run a `process` command.

Adding a Data Set

Use this procedure to add a data set after you clone the DMSII database. You don’t need to reclone the entire database.

To add a data set

1. Run a relational database query tool and list the contents of the DATASETS Client control table with the following SQL command:

   ```
   select dataset_name, active, data_source from DATASETS
   ```

2. Set the active column for the data set you want to add to the Databridge data tables to 1 (on), as follows:

   ```
   update DATASETS set active=1 where dataset_name='datasetname'
   ```

3. Run a `redefine` command.
4. Run a `generate datasource` command to create new scripts that populate the resulting table.
5. Run one of the following commands to populate the new tables that correspond to the new data set:

   ```
   dbutility process datasource
   ```

   - –or–

   ```
   dbutility clone datasource datasetname
   ```

   NOTE: If you run the a `process` command, the Databridge data tables whose active columns are set to 1 in their corresponding Client control table are also updated at this time.

After you complete this procedure, update your data set selection script (`script.user_datasets.datasource`) so that you do not lose this change the next time you run a `define` command.

Dropping a Table

Use this procedure when the Client no longer uses a Databridge data table in the relational database.

To drop a table from the Client Console, see the Databridge Client Console **Help**.

To drop a table

1. Update your data set global mapping customization and global data table customization scripts, depending on whether you are dropping a primary or secondary table, to reflect this change. See "Customizing with User Scripts" on page 42.
2. If you are dropping all of the tables derived from a data set, set the active column corresponding to the data set to 0 (in the DATASETS Client control table) and then run the data set selection script (`script.user_datasets.datasource`) using the dbutility `redefine` command.
3. If you are dropping a secondary table, set the active column corresponding to the table to 0 (in the DATATABLES Client control table) and then run the data table customization script (`script.user_define.primary_tablename`) for the primary table using the `redefine` command.

4 From a command line, set the current directory to the working directory for the data source, and then run a script, such as the following (Windows)

```
dbutility -n runscript dbscripts\script.drop.tablename
```

Backing Up and Maintaining Client Control Tables

To help you maintain your Client control tables, Databridge provides three commands that allow you to backup, restore, and recreate copies of your Client control tables. In this section, each of these commands is described.

The Unload Command

The `unload` command creates a text file that contains a record for each of the entries in the various Client control tables. For best results, run an `unload` command before running a `redefine` command.

Format

The format of the `unload` command is as follows:

```
dbutility [options] unload datasource filename
```

Options

The list of options is the same as those for signon_options. Additional options include `-t`, `-T`, and `-f`.

Data Source

If a `datasource` of _ALL is specified, the Databridge Client writes all data sources to the backup file (backupfile). If a specific data source is specified, the Databridge Client writes only the entries for that data source to the backup file.

Sample Run

```
15:05:25 dbutility unload demodb demodb.cct
15:05:25 Databridge Client version 6.6.0.000 [OCI/Oracle]
15:05:25 Copyright (C) 2019 Micro Focus or one of its
affiliates.
15:05:30 Loading control tables for DEMODB
15:05:32 Unloading control tables for DEMODB
15:05:32 Control tables for DataSource DEMODB written to file
"demodb.cct"
15:05:32 Client exit code: 0 – Successful
```

The Reload Command

The `reload` command enables you to restore the Client control tables from a file that was created using the `unload` command.

Format

The format of the `reload` command is as follows:

```
dbutility [signon options]reload datasource filename
[dataset1, dataset2, ...]
```

NOTE: Client control table changes made since the tables were unloaded will be lost. Depending on what has changed, data table record could also be affected, requiring recloning.

Options — The list of options include `-t`, `-T`, `-f`, and `-k`. The `-k` option forces Databridge to keep the stateinfo in the control tables for data sets that are in normal mode (ds_mode = 2) and that have client_fmt_level and item_count columns that remain unchanged (there is no reorganization involved).

Data Source — If a datasource of _ALL is specified, the Databridge Client restores all data sources contained in the backup file. If a specific data source is specified, the Databridge Client restores only the entries for that data source from the file. If this is further qualified by a data set list, the Databridge Client restores only the entries for the data sets specified. Note that all the data sets specified in the list must already exist.

Sample Run

```
d:\dbridge\demodb>dbutility reload demodb demodb.cct
17:16:27 Databridge Client version 6.6.0.000 [OCI/Oracle]
17:16:27 Copyright (C) 2019 Micro Focus or one of its
affiliates.
17:16:35 Reloading Control table entries for DataSource DEMODB
from file "demodb.cct"
17:16:45 Control tables for DataSource DEMODB reloaded from
file "demodb.cct"
17:16:45 Client exit code: 0 – Successful
```

The Refresh Command

The `refresh` command enables you to drop and recreate all of the stored procedures for the tables associated with the given data set in the specified data source. It is a variation of the `runscripts` command that is designed to run portions of the Databridge Client scripts (`script.drop.`*`tablename`* and `script.create.`*`tablename`*). This command is useful when you want to manually handle a data set that would otherwise be recloned after a DMSII reorganization.

NOTE: In case of variable-format data sets, the tables for all the record types that have their active column set to 1 in the DATASETS Client control table, are refreshed.

Format — The format of the `refresh` command is as follows:

```
dbutility [options] refresh datasource dataset
```

Options — The list of options is the same as those for `signon_options`.

If _ALL is specified for *dataset*, Databridge Client refreshes the stored procedures for all active tables that correspond to data sets whose active columns are 1. If a specific data set is specified, the Databridge Client refreshes only the stored procedures for the tables mapped from that data set. All data sets specified must already exist.

Sample run

```
12:39:45 dbutility refresh DEMODB CUSTOMER
12:39:45 Databridge Client, Version 6.6.0.000 (64-bit) [OCI/
Oracle]
12:39:45 Copyright 2019 Micro Focus or one of its affiliates.
12:39:45 Loading control tables for DEMODB
12:39:45 Stored procedures for all tables of DataSet CUSTOMER
successfully refreshed
12:39:45 Client exit code: 0 - Successful
```

In this case, the data set CUSTOMER is mapped to a single table named customer. The `refresh` command executes the following SQL statements.

```
begin drop_proc('i_customer');

begin drop_proc)('i_custmer'); end;

begin drop_proc('u_customer'); end;

create procedure u_customer (...) update customer set ...
where ... ; end;

create procedure i_customer (...) insert into customer
(...) values (...); end;

create procedure d_customer (...) delete from customer
where ... ; end;
```

This effectively replaces all of the stored procedures with a fresh copy, while leaving the tables unchanged. This command is particularly useful when the index of the tables has changed. For example, if the data set CUSTOMER initially uses AA Values as keys, and a DMSII garbage collection occurs, you can avoid recloning this data set if it is mapped to a single table by creating a composite key.

6 Chapter 6: Data Mapping

This chapter shows you how the Databridge Client maps DMSII data structures to relational database structures.

In this Chapter

DMSII and Relational Database Terms

The following table shows the equivalent terms for DMSII structures and relational database structures:

DMSII	Relational
Data set	Table
DMS item (data item)	Column
Record	Row (record)
Set	Index **NOTE:** A relational database index is a set of column names that is used to efficiently access a row (of a table).
Key	Key

DMSII and Relational Database Data Types

The Databridge Engine retrieves the requested DMSII data, and DBServer passes the data to the Databridge Client, where it is assigned to standard relational database data types.

The following table lists equivalent data types for DMSII, Microsoft SQL Server, and Oracle.

DMSII Data Type	SQL Server	Oracle
ALPHA (<= char_limit bytes)	CHAR *	CHAR †
ALPHA (>char_limit bytes)	TEXT	VARCHAR2
ALPHA (>varchar2_limit_bytes)	TEXT	CLOB
BOOLEAN	BIT	NUMBER(1)
FIELD:	SMALLINT	NUMBER(5)
FIELD(*n*) where *n* is < 16	INT	NUMBER(10)
FIELD(*n*) where *n* is < 32	BIGINT ‡	NUMBER(10–15)
FIELD(*n*) where *n* >= 32		
NUMERIC:		
NUMBER(*n*) where *n* is a DMSII declared length <= 2	TINYINT §	NUMBER(*n*)
NUMBER(*n*) where *n* is a DMSII declared length <= 4	SMALLINT	NUMBER(*n*)
NUMBER(*n*) where *n* is a DMSII declared length <= 9	INT	NUMBER(*n*)
NUMBER(*n*) where *n* is a DMSII declared length <= 15	BIGINT ‡	NUMBER(*n*)
NUMBER(*n*) where *n* is a DMSII declared length >15	DEC(*n*)	NUMBER(*n*)
NUMBER(*n,m*) where *n* is a DMSII declared length and *m* is the number of places after the decimal point.	DEC(*n,m*)	NUMBER(*n,m*)
REAL:		
REAL(*n*) where *n* is a DMSII declared length <= 2	TINYINT §	NUMBER(*n*)
REAL(*n*) where *n* is a DMSII declared length <= 4	SMALLINT	NUMBER(*n*)
REAL(*n*) where *n* is a DMSII declared length <= 9	INT	NUMBER(*n*)
REAL(*n*) where *n* is a DMSII declared length > 9	DEC	NUMBER(*n*)
REAL(*n,m*) where *n* is the DMSII declared length and *m* is the number of places after the decimal point.	DEC(*n,m*)	NUMBER(*n,m*)
REAL, with no precision or scale	FLOAT	FLOAT
Date encoding methods (For information, see "Decoding DMSII Dates, Times, and Date/Times" on page 48.	DATETIME SMALLDATETIME DATE (SQL 2008) DATETIME2 (SQL 2008)	DATE

* VARCHAR if the configuration parameter use_varchar is set to True.

† VARCHAR2 if the configuration parameter use_varchar is set to True.

‡ If the configuration parameter use_bigint is set to False, DEC(n) will be used instead.

§ Note that if the number is signed, SMALLINT is used instead. TINYINT is an unsigned quantity in SQL Server.

Databridge Data Types

IMAGE is a Databridge type that allows you to store an ALPHA item as binary by using the REDEFINE clause of the ALTER command in GenFormat on the host.

When the Databridge Client encounters an item of type IMAGE, it automatically sets the ds_options DIOPT_Clone_as_Binary bit in the DMS_ITEMS Client control table.

Supported DMSII Structures

This section lists DMSII structures that are supported by the Databridge Client. If you are the relational database administrator and have no experience with DMSII databases, this section will be more useful to you if you are working with a DMSII database administrator.

In addition to fixed-format data sets and variable-format data sets, the Databridge Client supports the following DMSII structures:

- Embedded data sets (see exceptions in the following section)
- Remaps
- Logical database
- GROUP
- FIELD items for GROUPs of BOOLEANS
- OCCURS
- GROUP OCCURS
- Data sets with more items than the maximum number of columns supported by the relational database
- Data sets that generate relational tables whose record sizes exceed the Microsoft SQL Server maximum record size.
- DMSII links in DIRECT, UNORDERED, and STANDARD data sets. (Links in variable-format data sets are cloned but not tracked.)

Some of these structures may not be supported by your relational database. The DMSII structures that are not supported by relational databases are mapped into a form that the relational database can use. Each of these structures and the way they are mapped in the relational database are explained in the remainder of this chapter.

Unsupported DMSII Structures

When the Databridge host replication software does not support a particular DMSII structure, the Databridge Client may or may not issue a warning message, depending on the DMSII structure. For example, a message is generated when the data set has no keys.

The Databridge Client does not support the following DMSII structures:

- Embedded data sets within an ORDERED or COMPACT data set
- Embedded data sets if the INDEPENDENTTRANS option is reset
- POPULATION items

- COUNT data items
- FILLER data items
- AGGREGATE data items

Embedded Data Sets

An embedded data set is a DMSII representation of a hierarchical relationship or tree structure. When a DMSII data set contains another data set as an item, that data set is called an embedded data set. The data set in which it is declared is called the parent of the embedded structure. You can think of the embedded data set as the "child" of the "parent" data set.

To represent this parent-child relationship in a relational database, the Databridge Client uses a foreign key that points to the parent data set. This foreign key is represented by the value in the parent_aa column in the table that corresponds to the embedded data set. The parent_aa column holds the parent record's key.

DMSII DASDL Showing an Embedded Data Set

The following is an excerpt from a DMSII DASDL that shows how an embedded data set is defined.

```
GENEALOGY DATA SET
(
   PARENT-FAT-NAME          ALPHA (30);
   PARENT-MOT-NAME          ALPHA (30);
   PARENT-MOT-MAIDEN        ALPHA (30);
   PARENT-FAT-BDATE         NUMBER (06);
   PARENT-MOT-BDATE         NUMBER (06);
   FILLER                   SIZE (06);
%
   CHILD                    DATA SET;
      (
      CHILD-NAME            ALPHA (30);
      CHILD-STATUS          ALPHA (11);
      CHILD-BDATE           NUMBER (06);
      CHILD-GENDER          FIELD
         (
         CHILD-MALE         BOOLEAN;
         CHILD-FEMALE       BOOLEAN;
         );
      CHILD-FILLER          FIELD (01);
%
      );
);
```

Resulting Tables

The following examples are for Microsoft SQL Server.

Ignoring any set definition, the resulting relational database tables are as follows:

- Genealogy (the parent data set is cloned to its own primary table)

- Child (the embedded data set is cloned to its own secondary table with a pointer to its parent table)

Parent Table genealogy (table name)

```
(
   my_aa             char(12),
   parent_fat_name   char(30),
   parent_mot_name   char(30),
   parent_mot_maiden char(30),
   parent_fat_bdate  int,
   parent_mot_bdate  int
)
```

where the my_aa column is a unique key for the record derived from the DMSII AA Value of this record.

Child Table child (table name)

```
(
   my_aa             char(12), – child table's key
   parent_aa         char(12), – foreign key of parent table
   child_name        char(30),
   child_status      char(11),
   child_bdate       int,
   child_male        bit,
   child_female      bit,
   child_filler      smallint
)
```

Selecting Embedded Data Sets for Cloning

When you run a clone command, by default, the Databridge Client selects embedded data sets along with the parent structures. If you have altered the values for the active column in the Databridge Client control tables, however, check the values for the embedded data set and its parent data set.

NOTE: Caution: If you want to clone an embedded data set, you must also clone the parent structure. Failure to do this results in the following error message from the Databridge Engine on the host:

```
0043 Parent of embeddeddataset must be selected.
```

Record Serial Numbers

A record serial number (RSN) is a unique number (48-bits long) that is associated with a record in a data set. The RSN is guaranteed to be unique, and it stays with a record for the life of the record. Updates do not affect the RSN; therefore, RSNs are ideal keys for Databridge tables. However, RSNs are available only when using DMSII XE.

DMSII XE adds the RSN to every record of a data set that has the EXTENDED attribute set. As long as the EXTENDED attribute is set, Databridge can access the RSN, unlike application programs that can access the RSN only if it has been explicitly declared in the DASDL source. The Databridge Engine is designed to use RSNs instead of AA Values whenever possible. Regardless of whether RSNs are present, AA Values are used for data sets that contain embedded data sets or DMSII links.

Since RSNs and AA Values are the same length, they are interchangeable, unless the data sets are embedded data sets or contain DMSII links. If the Databridge Engine is not handling either of these types of data sets *and* an RSN is present, Databridge Engine uses the RSN rather than the AA Value. In this case, the resulting column of the DATAITEMS Client control table is named my_rsn instead of my_aa to differentiate it from an AA Value. In both cases, the set_name column of the DATASETS Client control table will have a value of aa_set.

AA Values

AA is a DMSII term that stands for absolute address. An absolute address value is an A Series WORD (48-bits in length). In the Databridge Client, AA is the hexadecimal representation (12 character strings containing the characters 0–9 and A–F) of the AA Value on the host. Databridge Client uses the AA Values to implement unique keys for the parent structures of embedded data set records. It also uses AA Values to reference the records of data sets that do not have DMSII SETS with the NO DUPLICATES ALLOWED attribute.

AA Values are not constant. Any DMSII reorganization (record conversion, file format, or garbage collection) changes these values.

NOTE: Databridge Client supports numeric AA Values that are stored as NUMBER(15) in Oracle and BIGINT in SQL Server. It also supports binary AA Values that are stored as RAW(6) in Oracle and BINARY(6) in SQL Server.

DMSII Links

The Databridge Client implements DMSII link items, such as MEMO items in LINC databases, using an AA Value. You can use the AA Value as a foreign key when you want data from the tables associated with the link item. To enable support for DMSII links, you must do the following:

- Enable DMSII link support in the Databridge Engine control file.
- Set the Client configuration file parameter `enable_dms_links` to True.

Variable-Format Data Sets

DMSII variable-format data sets consist of a collection of dissimilar records containing a fixed part that is common to all records, and a variable part that depends on the record type. The individual records are identified by the record type, which is a special data item that has a value between 0 and 254.

- A record type of 0 indicates that the record does not contain a variable part.
- A record type of 1–254 indicates that the record contains the corresponding variable part in addition to the fixed part that is always present.

The concept of variable-format tables does not exist in relational databases. Therefore, the Databridge host software handles the various types of variable-format records as different structures. Databridge references these structures by a data set name and a record type (all other data set types have a record type value of 0). The Databridge Client uses the notation *datasetname*`/`*rectype* when referring to variable-format data sets in all messages. The Databridge Client handles these structures as if they were logical data sets; thus, each individual record type of a variable-format data set is mapped to a different relational database table. Variable-format data sets are tracked and updated like fixed-format data sets. Links in variable-format data sets, however, are not tracked, but retain their values from the initial clone. The link values for any records created after the clone will be null. (See “track_vfds_nolinks” on page 299.)

Fixed Part Only Records	Even though type 0 records are not explicitly declared in the DMSII DASDL, applications can create such records by simply setting the record type to 0. The Databridge software always defines a data set with a record type of 0 (rectype column in the DATASETS Client control table) for type 0 records of variable-format data sets. This data set is mapped to a table whose name is derived from the data set name (that is, name converted to lowercase and all dashes replaced by underscores). Note that unless the DMSII applications explicitly store type 0 records in the data set, this table may be empty. If you know this is the case, you may want to disable the cloning of the type 0 records for the data set by setting the active column of the corresponding entry in the DATASETS Client control table to 0.
Variable Format Records	All other record types are treated as if they were contained in a separate structure. The primary tables for these structures are named by appending the suffix _type# to the name mapped from the data set name, where # is the decimal value of the record type (that is, a value between 1 and 254). Note that the fixed part of the variable-format records and the record type are also stored in the resulting relational database table.

DMSII DASDL Showing Fixed- and Variable-Length Records

```
MAIN                    DATA SET

(                        RECORD TYPE (3);
   VAR-REC
   CUST-NO
   CPU
   FILLER
  ),
%                             NUMBER (08);
 1:                           ALPHA  (06);
  (                           SIZE   (05);
   SMSA                       ALPHA  (04);
   SALES                      ALPHA  (06);
  )                           ALPHA  (01);
%                             ALPHA  (06);
 2:                           NUMBER (08);
  (                           ALPHA   (07);
   STATUS                     ALPHA   (07);
   RECEIVED                   ALPHA   (02);
   ORDER-DATE
  )
%
 3:
  (
   SITE
   SOURCE
   CLASS
%
  );
%
MAINSET SET OF MAIN
     KEY (CUST-NO)
     NO DUPLICATES;
```

Resulting Tables

The examples in this section assume that the Microsoft SQL Server database is being used and that the Client uses the SET MAINSET as the source for index for the various tables.

The following tables are derived from the variable-format data set MAIN:

- main (type 0 records)
- main_type1 (type 1 records)
- main_type2 (type 2 records)
- main_type3 (type 3 records)

NOTE: All four tables contain the fixed part of the data set. The var_rec column is the record type; all records in the individual tables will have the same value in this field.

Record Type 0 Table

The table named main represents all type 0 records that do not have a variable part. The var_rec column of all records in this table will have a value of 0. Note that this table may be empty if your application does not use type 0 records. The SQL statement to create this table is shown as follows:

```
create table main
(
cust_no          int,
var_rec          smallint,
cpu              char(6)
)
```

Record Type 1 Table

The table named main_type1 represents all type 1 records. The var_rec column of all records in this table will have a value of 1. The SQL statement to create this table is shown as follows:

```
create table main_type1
(
cust_no          int,
var_rec          smallint,
cpu              char(6),
smsa             char(4),
sales            char(6)
)
```

Record Type 2 Table

The table named main_type2 represents all type 2 records. The var_rec column of all records in this table will have a value of 2. The SQL statement to create this table is shown as follows:

```
create table main_type1
(
cust_no          int,
var_rec          smallint,
cpu              char(6),
status           char(1),
received         char(6),
order_date       int
)
```

Record Type 3 Table

The table named main_type3 represents all type 3 records. The var_rec column of all records in this table will have a value of 3. The SQL statement to create this table is shown as follows:

```
create table main_type1
  (
  cust_no          int,
  var_rec          smallint,
  cpu              char(6),
  site             char(7),
  source           char(7),
  class            char(2)
  )
```

Split Variable Format Data Sets Option

When the ds_options bit DSOPT_Split_Varfmt_ds (bit value 65536) is set, variable format data sets are treated slightly differently. The record type 0 tables contains the fixed part of all records regardless of their record types. However, the table has exactly the same layout as above. The tables for all the other records only contain the variable part of the records and the keys from the fixed part.

The table named main_type1 in the above example will now contain the key cust_no and the variable part. The SQL statement to create this table is shown as follows:

```
create table main_type1
  (
  cust_no         int,
  smsa            char(4),
  sales           char(6)
  )
```

Changing the Default Data Type

In most cases, the default data types are sufficient. If you want to change the data type, however, use a relational database query tool to edit the sql_type column in the DATAITEMS Client control table, or put the SQL statements in user scripts as explained in "Customizing with User Scripts" on page 42.

CAUTION: When changing the default data type, make sure that you choose a correct data type or the data may not be correctly stored in the relational database.

Most of these relational database data types can be changed using data table customization user scripts or the Client Configurator.

Value for sql_type	Generic Data Type	Microsoft SQL Server Data Type	Oracle Data Type
0	bit	bit	number(1)
1	char	char	char
2	varchar	varchar	varchar2
3	byte	tinyint	number(3)
4	short int	smallint	number(5)
5	long int	int	number(10)
6	float	float	float
7	text	text	clob
8	binary	binary	raw
9	varbinary	varbinary	raw
10	datetime	datetime	date

Value for sql_type	Generic Data Type	Microsoft SQL Server Data Type	Oracle Data Type
11	packed BCD	dec	number
12	smalldatetime	smalldatetime	date
13	numeric date	int	number(10)
14	unsigned long	binary(4)	raw(4)
15	timestamp	timestamp	N/A
16	serial	{int | bigint | dec(n)} identity	N/A
17	numeric time	int	number(6)
ticks	int	number(6) or number(10)	N/A
18	int64	bigint	NA
19	date	date	NA
20	datetime2	datetime2	NA
21	time	time	NA
22	uniqueidentifier	uniqueidentifier	N/A

Handling DMSII GROUPs

A GROUP is a DMSII construct that allows the data items that belong to the group to be referenced at one time (for example, as one item). The concept of GROUP does not exist in a relational database. Therefore, if the DMSII database you replicate has one or more GROUPs, the Databridge Client ignores the GROUP name and instead treats each item within the GROUP as a regular data item. All items in a DMSII GROUP share the same parent item number, which is the item number of the GROUP item.

Following is an example of the DMSII GROUP item in the data set called ADDRESS. This GROUP item consists of the data item CITY and the data item STATE.

DMSII DASDL Showing GROUP

The following is an excerpt from a DMSII DASDL that shows how a GROUP item is defined. With the GROUP item, you can access both city and state with one reference.

```
ADDRESS             DATA SET
(
  STREET            ALPHA (20);
  APARTMENT         ALPHA (5);
  CITY-STATE        GROUP
 (
    CITY            ALPHA (20);
    STATE           ALPHA (2);
);
  COUNTRY           ALPHA (20);
  ZIPCODE           NUMBER (5);
  POSTFIX           NUMBER (4);
);
```

The next example shows how the same DMSII GROUP item is mapped to a relational database.

Relational Database Table

The following example is for Microsoft SQL Server.

The table name is the lowercase form of the DMSII data set name. The GROUP item CITY-STATE is ignored. The data items in that group are included in the relational database table as if they were ordinary DMSII data items.

```
address (table name)
street       apartment    city       state       country   zipcode  postfi
x

May St.      3            Paris      OH          USA       15010    2146
Elm Ln.                   River      SD          USA       24906    3381
```

If there are duplicate names among members of various groups within a data set, the Databridge Client resolves the conflict by appending a digit to the column name to make it unique.

Handling DMSII OCCURS

An OCCURS clause is a DMSII construct that describes the number of times an item is present or repeats within a data set. Because relational databases do not support the OCCURS construct, these clauses generate additional tables, which can degrade the performance of update processing.

You can control how items with an OCCURS clause are mapped on an item by item basis by flattening OCCURS. See “Flattening OCCURS Clauses” on page 134.

Default OCCURS Handling

If you don't flatten OCCURS, Databridge Client creates a new table for each data item that contains an OCCURS clause. The keys from the data item’s parent data set are used as keys in the new table. In addition, a new key (named index1) is created to establish a unique composite key for each recurring data item.

For example, a DMSII data set has a data item with an OCCURS clause will result in two relational database tables:

- The first table (called the primary table) is named using the lowercase form of the DMSII data set name with all hyphens changed to underscores. It contains the key items as well as all data items that do not have OCCURS clauses.
- The second table (called the secondary table) is named by appending an underscore and the data item name to the primary table name. This table contains all of the OCCURS items; however, each table has a unique key created by index1. (Names that exceed the character limit are truncated. If the truncation results in a duplicate item names, the last characters of the name are changed to digits).

Handling OCCURS items this way can significantly degrade the performance of update processing if the number of occurrences is large. The storage required to hold the keys of the secondary table items can also be substantial. For example, an OCCURS 100 TIMES clause can turn a single DMSII update into 101 relational database updates. See “DMSII DASDL with OCCURS” on page 133 for an example of a DMSII data set that has a data item with an OCCURS clause.

DMSII DASDL with OCCURS

The following excerpt from a DMSII DASDL shows how an OCCURS clause is defined.

```
ORDERS                                  DATA SET
(
     ORDER-ID                           ALPHA (4);
     ORDER-DATE                         ALPHA (5);
     ORDER-ITEM  OCCURS 10 TIMES        NUMBER (8);
);
     BY-ORDER-ID SET OF ORDERS
     KEY IS
    (
     ORDER-ID
    )
     NO DUPLICATES,
     INDEX SEQUENTIAL;
```

The OCCURS clause allows access by subscripting (indexing) within an application program. Because relational databases do not allow subscripting (indexing), the Databridge Client maps the subscript into an additional key. The OCCURS items, then, are available by row.

When this ORDERS data set is cloned into the relational database, it is mapped into the following two tables. These tables show how the DMSII OCCURS clause appears in a relational database.

Table 1 This table is named the same as the ORDERS DMSII data set, and it contains the key item plus all non-OCCURS items. Assuming the ORDERS DMSII data set has 50 records, this table has 50 rows.

`orders` (table name)

order_id	order_date
1201	jan12
.	.
.	.
.	.
1250	feb12

Table 2 This table name combines the DMSII data set name and the name of the data item which has an OCCURS clause. It contains all the occurrences of the OCCURS data item ORDER-NUM.

Continuing with the example from Table 1 with 50 records (rows), this table has 500 total rows. For every order_id key (50 total), there are ten OCCURS items (as declared in the DASDL on the previous page).

`orders_order_item` (table name)

order_id	index1	order_item
1201	1	00007390
1201	2	00001293
1201	3	00007748
1201	4	00009856
1201	5	00003736
1201	6	00002278
1201	7	00004327
1201	8	00009463
1201	9	00008638
1201	10	00008954
1202	1	00001754
1202	.	00005309
1202	.	00004537
1202	10	00005940
1203	1	00005430
1203	.	00005309
1203	.	00004537
1203	10	00006587
.	.	.
.	.	.
.	.	.

You can prevent the additional table from being created if you set the Flatten OCCURS option. Doing so will also help you conserve disk space and improve performance.

Flattening OCCURS Clauses

You can use the Client Configurator or user scripts to control whether items with OCCURS clauses are flattened in the relational database.

The `flatten_all_occurs` parameter makes the `define` and `redefine` commands set the value of the bit DIOPT_Flatten_Occurs (1) in the di_options column in the DMS_ITEMS table for all items that have OCCURS clauses. You can set this parameter from the Client Configurator or by editing the configuration file to specify whether to globally flatten OCCURS clauses for a data source. By using user scripts, you can control this option for individual items.

The Databridge Client provides two options for handling OCCURS clauses.

Flatten OCCURS to the primary table	Each occurrence of the item is mapped into a separate column in the primary table. Use this method if the number of occurrences is not too large and applications access the occurring items by column name (versus numeric index). This is the default method for flattening OCCURS clauses and only requires that the above mentioned di_options bit be set in the DMS_ITEM entry for the item with the OCCURS clause.
Flatten OCCURS to a new secondary table	In the secondary table, all of the occurring items are mapped to a single row that contains the keys and all of the occurrences of the item. Use this method to flatten OCCURS clauses that have a large number of occurrences. To make this happen you need to set the bit DIOPT_FlatSecondary(4096) in the di_options column in the DMS_ITEMS table for any items with an OCCURS clause that you want flattened in this manner. If both this bit and the DIOPT_Flatten_Occurs bit are set, this bit takes precedence.

Flattening OCCURS Clauses to a String

Single items of type NUMBER(n) or ALPHA(n) with an OCCURS clause can be flattened to a character string represented by a CHAR or VARCHAR data type. You can have fixed format strings or CSV format strings, where the delimiter character can be selected via the dms_subtype column in DMS_ITEMS. This feature is controlled by the DIOPT_Flatten2String bit in the di_options and the dms_subtype column. If the dms_subtype is 0, fixed format is used and if the dms_subtype is non-zero it specifies the delimiter character used in the CSV format. NULL data is represented by blanks in fixed format and empty fields in CSV format (i.e. two consecutive delimiters or a delimiter at the end of the data). For example a NUMBER(1) OCCURS 20 TIMES can be flattened to a column that is a CHAR(20) when using fixed format.

Flattening OCCURS Clause for Three-Bit Numeric Flags

MISER systems store certain flags as arrays of single-digit numbers, where each number is used to hold three Boolean values. The Databridge Client can be directed to map these items as a series of Booleans data items (bit in SQL Server). To do this, set the DIOPT_Flatten_Occurs bit (1) and the DIOPT_Clone_as_Tribit bit (16) in the di_options column of the corresponding DMS_ITEMS record.

An example for the item L-LOCK-FLAG in the data set LOAN follows:

Filename: `script.user_layout.loan`

```
  update DMS_ITEMS set di_options=17
  where dataset_name = 'LOAN' and rectype=0 and dms_item_name = '
L-LOCK-FLAG

' and data_source = '

MISDB'
```

In the above example, if the L-LOCK_FLAG has an OCCURS 20 TIMES clause, 60 items of type bit named l_lock_flag_01 to l_lock_flag_60 are created.

These items can also be flattened to a secondary table by setting the bit DIOPT_FlatSecondary(4096) in the di_options column for the corresponding entry in the DMS_ITEMS table.

Flattening OCCURS Clause for Items Cloned as Dates

The following script directs the `define` and `redefine` commands to map an item with an OCCURS clause as a series of columns, whose data type is a relational database date type, in the corresponding table. Furthermore, it specifies that the DMSII item, which is of type NUMBER(8), contains a date in the *mm/dd/yyyy* format.

Filename: `script.user_layout.billing`

```
update DMS_ITEMS set di_options=3, dms_subtype=23
where dms_item_name = 'BILLING-DATES' and dataset_name = 'BILLING'
```

DMSII GROUP OCCURS

The following is an excerpt from a DMSII DASDL that shows a GROUP item that has an OCCURS clause.

```
SALES                    DATA SET
(
 PRODUCT-CODE            ALPHA (10);
 PRODUCT-NAME            ALPHA (20);
 SALES-HISTORY GROUP   OCCURS 5 TIMES %FIVE YEAR HISTORY
    (
    TOTAL-UNITS-SOLD         NUMBER (10);   %FOR THE YEAR
    YEARLY-SALES-AMOUNT      NUMBER (S12,2); %BY MONTH
    );

);
SH-PRODUCT-CODE-SET      SET OF SALES-HISTORY
   KEY IS
   (
   PRODUCT-CODE
   )
NO DUPLICATES,
INDEX SEQUENTIAL;
```

When this SALES data set is cloned into the relational database, it is mapped into the following tables:

Table 1 (primary table)

This table is named the same as the SALES DMSII data set, and it contains the key item and the data items that do not have OCCURS clauses. Because the GROUP item has an OCCURS clause, none of the GROUP items are included in this table. Assuming there are five records in the DMSII data set, there are also five rows in this relational database table.

```
sales  (table name)
product_code     product_name
------------     ------------
BC99992121       Widget
TR55553440       Mixer
HM44447322       Gadget
PP77778299       Twirler
DG22221163       SuperMix
```

Table 2 (secondary table)

This table is named: *datasetname* + GROUP_OCCURS_name

Assuming there are five records in the DMSII data set, there are 25 records in this relational database table. The main difference here is the addition of an index to denote the occurrence number of the item.

```
sales_sales_history (table name)

product_code   index1    total_units_sold   yearly_sales_amount
------------   ------    ----------------   -------------------
BC99992121          1            55543665          123456789.01
BC99992121          2            83746994          234567890.12
BC99992121          3            33847295          345678901.23
BC99992121          4            57483037          456789123.45
BC99992121          5            10947377          567891234.56
TR55553440          1            56722221          678912345.67
TR55553440          2            74838976          789123456.78
TR55553440          3            54793873          891234567.89
TR55553440          4            99048900          912345678.90
TR55553440          5            22308459          123456789.01
HM44447322          1            75032948          234567890.12
HM44447322          2            30750344          345678901.23
HM44447322          3            90570340          456789123.45
HM44447322          4            57948755          567891234.56
HM44447322          5            44874733          678912345.67
     .              .                   .                   .
     .              .                   .                   .
```

DMSII Nested OCCURS

The following is an excerpt from a DMSII DASDL showing a GROUP with an OCCURS clause that contains an item with an OCCURS clause.

This example helps to reinforce the previous examples of how DMSII GROUP and OCCURS are mapped to a relational database.

```
SALES                  DATA SET
 PRODUCT-CODE          ALPHA (10);
 PRODUCT-NAME          ALPHA (20);
 SALES-HISTORY GROUP   OCCURS 5 TIMES %FIVE YEAR HISTORY
   (
   TOTAL-UNITS-SOLD       NUMBER (10); %FOR THE YEAR
   MONTHLY-SALES-AMOUNT   NUMBER (S12,2) OCCURS 12 TIMES;
   );
SH-PRODUCT-CODE-SET     SET OF SALES-HISTORY
   KEY IS
   (
   PRODUCT-CODE
   )
NO DUPLICATES,
INDEX SEQUENTIAL;
```

When this SALES data set is cloned into the relational database, it is mapped into the following three tables:

- `sales`

  `(primary table, table name derived from` *`datasetname`*`)`
- `sales_sales_history`

  `(secondary table, table name derived from` *`datasetname`* `+` *`GROUPOCCURSname`*`)`
- `sales_monthly_sales_amount`

  `(secondary table, table name derived from` *`datasetname`* `+` *`OCCURSitemname`*`)`

Table 1

This table is named the same as the SALES DMSII data set.

It contains the key item and all non-OCCURS data items. Because the GROUP has an OCCURS clause, none of the GROUP items are included in this table. Assuming there are five records in the DMSII data set, there are five rows in the resulting relational database table.

```
sales  (table name)
product_code      product_name
------------      ------------
BC99992121        Widget
TR55553440        Mixer
HM44447322        Gadget
PP77778299        Twirler
DG22221163        SuperMix
```

This table is named the same as the SALES DMSII data set.

It contains the key item and all non-OCCURS data items. Because the GROUP has an OCCURS clause, none of the GROUP items are included in this table. Assuming there are five records in the DMSII data set, there are five rows in the resulting relational database table.

```
sales  (table name)
product_code      product_name
------------      ------------
BC99992121        Widget
TR55553440        Mixer
HM44447322        Gadget
PP77778299        Twirler
DG22221163        SuperMix
```

Table 2

This table is named: *datasetname + GROUP_OCCURS_name*

Assuming there are five records in the DMSII data set, there are 25 rows in this table. Note the addition of index1 to denote the occurrence number of the group.

```
sales_sales_history (table name)

product_code   index1     total_units_sold
------------   ------     ----------------
BC99992121     1          55543665
BC99992121     2          98075300
BC99992121     3          77476478
BC99992121     4          76593939
BC99992121     5          33728282
TR55553440     1          87548974
TR55553440     2          56722221
TR55553440     3          11910078
TR55553440     4          47589474
TR55553440     5          57987999
HM44447322     1          75533785
HM44447322     2          33673391
HM44447322     3          74904532
HM44447322     4          98724498
HM44447322     5          39875992
   .           .             .
   .           .             .
```

Table 3

This table is named: *datasetname + OCCURSitemname*

Assuming there are five records in the DMSII data set, there are 300 rows in this table (12 occurrences of monthly_sales_amount for each of 5 occurrences of sales_history for each product code). In the table below, index1 is the subscript of the GROUP OCCURS (1–5) and index2 is the subscript of the monthly sales amount, with subscripts (1–12).

In this example, the OCCURS level of the items MONTHLY-SALES-AMOUNT is 2, while the OCCURS level of the item SALES-HISTORY is 1.

```
sales_monthly_sales_amount (table name)
product_code   index1   index2   monthly_sales_amount
------------   ------   ------   --------------------
BCS9992121     1        1        1075.36
BCS9992121     1        2        49397.90
BCS9992121     1        3        49375.93
BCS9992121     1        4        22840.97
BCS9992121     1        5        38984.02
BCS9992121     1        6        40039.84
BCS9992121     1        7        33875.93
BCS9992121     1        8        35000.22
BCS9992121     1        9        65876.52
BCS9992121     1        10       20402.55
BCS9992121     1        11       17575.00
BCS9992121     1        12       41938.74
BCS9992121     2        1         .
BCS9992121     2        2          .
BCS9992121     2        3          .
BCS9992121     2        4          .
BCS9992121     2        5          .
BCS9992121     2        6          .
BCS9992121     2        7          .
BCS9992121     2        8          .
BCS9992121     2        9          .
BCS9992121     2        10         .
BCS9992121     2        11         .
BCS9992121     2        12         .
BCS9992121     3        1          .
     .         .        .          .
     .         .        .          .
     .         .        .          .
     .         .        .          .
```

OCCURS DEPENDING ON

DMSII uses the DEPENDING ON clause (usually with COMPACT data sets) to conserve disk space. For COMPACT data sets, the DMSII work area always contains a fully expanded version of the record; however, the record is compacted when it is stored on disk. The exact syntax for OCCURS DEPENDING ON clause is as follows:

item_name OCCURS n TIMES DEPENDING ON *depends_item_name*;

The value (*n*) defines the maximum number of occurrences of the data item (*item_name*), while the value of the depends item (*depends_item_name*) controls the number of occurrences of the item that are stored. This last number cannot exceed *n*. Information on an OCCURS DEPENDING ON clause is relayed to the Databridge Client, enabling the Databridge Client to suppress extraneous columns that do not actually exist. If the DEPENDS data item has a value of 3, and the OCCURS clause is OCCURS 10 TIMES, the last 7 columns are not included.

Handling Unflattened OCCURS DEPENDING ON Clauses

To handle a changing depends item, the Databridge Client uses before-image/after-image (BI/AI) pairs for data sets that have items with OCCURS DEPENDING ON clauses that are not flattened.

First, the Databridge Client checks the old and new values of the DEPENDS data item to determine how to execute the modify. The modify is handled in one of the following ways:

- If the value of the DEPENDS data item is unchanged, the Databridge Client updates the corresponding rows in the secondary tables as usual. (Redundant updates are suppressed if the ds_options bit DSOPT_Use_bi_ai is set.)
- If the value of the DEPENDS data item *increases* from *m* to *n*, the first *m* items are updated normally. The newly added items (*m*+1 through *n*) are inserted into the secondary table.
- If the value of the DEPENDS data item *decreases* from *m* to *n*, the first *n* items are updated normally. Items that are no longer present (*n*+1 through *m*) are deleted from the secondary table.

Relational Database Split Tables

A *split table* occurs when a DMSII data set record requires more than one table in the relational database to hold the data. Split tables occur in the following circumstances:

- When a table mapped from a DMSII data set has more than the maximum number of columns allowed by the relational database. The `maximum_columns` parameter in the configuration file allows you to reduce this value.
- When a relational database table's record size exceeds the Microsoft SQL Server maximum record size (approximately 8K—the actual value depends on the number of columns in the table).

When the Databridge Client software reaches the point where one of the above conditions is satisfied, it stops adding columns to the table (named the same as the DMSII data set). It then starts a new table containing the same keys as in the original record of the primary table, and proceeds to place the remaining data items in this secondary table. The column and record size counters are set to zero before starting to fill the new table. Note that there is always the possibility of having multiple splits for data sets that have a large number of columns. The flattening of OCCURS items can easily lead to split tables.

NOTE: When a DMSII data set is split into more than one relational database table, a WARNING message appears during a `define` or `redefine` command. In addition, each split table duplicates the keys in the original table.

Split Table Names

The new table is named the same as the original (parent) table, but with a unique number appended. All subsequent tables created from the same data set have the original table name with a numeric suffix that is incremented by 1 each time a new split table is created.

Keys for Split Tables

For a data set with keys, the keys of the original data set are duplicated in the split tables because you must access each of these tables individually. The process of splitting the data set into tables continues until there are no more data items left in the data set.

The following examples show the mapping of a data set that has 600 items (5 of which are keys) to a relational database that limits the number of columns in a table to 250. The result is tables that contain a total of 610 columns, where the 5 keys are duplicated across all 3 tables. If the original table is named savings, the remaining two tables are named savings1 and savings2, unless these names are already in use.

tablename	*tablename*1	*tablename*2
250 columns (first 5 are keys)	5 keys and 245 columns	5 keys and 105 columns

The five keys are duplicated in each table. To search these split tables, you must explicitly open each table. The tables are not automatically linked.

Relational Database Table and Column Names

When you clone a DMSII database, the Databridge Client names the relational database tables and columns the same as their equivalent DMSII data sets and data items. However, some differences exist. In this section, the differences between the names are explained.

Uppercase and Lowercase

All DMSII data set, data item, and set names are uppercase. These names are also stored in uppercase in the DATASETS and DMS_ITEMS Client control tables. Their equivalent relational database table, column, and index names are stored in lowercase in the DATATABLES and DATAITEMS Client control tables.

- All DMSII data set names are stored in the DATASETS Client control table in uppercase, just as they appear in the DMSII database. The equivalent relational database table name is converted to lowercase and is stored in the DATATABLES Client control table. Thus, a data set named CREDIT in the DMSII database is named credit in the relational database.
- All DMSII data item names are stored in the DMS_ITEMS Client control table in uppercase, just as they appear in the DMSII database. The equivalent relational database data item name is converted to lowercase and is stored in the DATAITEMS Client control table. Thus, a data item named LIMIT in the DMSII database is named limit in the relational database.

NOTE: You must type these names in the correct case. If you are using the relational database table name as a character string value in a SQL statement (for example, '*tablename*'), you must use lowercase.

Hyphens and Underscores

The hyphen (-) in the DMSII name becomes an underscore (_) in the relational database name. The only exception is a data source name that is allowed to contain hyphens.

Name Length

The limit for a DMSII data set name is 17 characters, and DMSII item name is limited to 128 characters. Relational databases typically limit table names to 30 characters; however, the Databridge Client reserves two characters for the prefix that indicates the stored procedures for a table (i_*tablename*, d_*tablename*, u_*tablename*). Thus, the table names are actually limited to 28 characters. Similarly, the Databridge Client adds a one or two character prefix to the item names to create a unique name for the parameters of the stored procedures. The Databridge Client for Microsoft SQL Server uses a prefix of @ while the Databridge Client for Oracle uses a prefix of p_. To avoid using names that are too long for the relational database, items names are limited to 29 characters for SQL Server or 28 characters for Oracle.

With this limit of 28 characters for a table name, typically all the DMSII names fit into the relational database table name or column name. In cases where data set, data item, or other structure names are concatenated and therefore become too long for a relational database, the Databridge Client truncates the name.

Duplicate Names

If two data sets have the same name in two different DMSII databases (or data sources, from the Client perspective), the Databridge Client appends the number 1 to the duplicate table name the first time it is encountered. If a table already exists with the duplicate name and the number 1, the Databridge Client appends the number 2 and so on until a unique table name is created.

For example, if DMSII database A has a data set named PRODUCTS and DMSII database B also has a data set named PRODUCTS, the resulting Databridge table names would be products and products1.

If you combine this duplicate data set name convention with the convention for naming split tables (when one data set results in more than one table), you can have multiple suffixes for short names.

For example, if you have two data sources with a data set named CUSTOMER, which also generates split tables, the tables are renamed as follows:

- `customers` and `customers1` in the first data source
- `customers11` and `customers12` in the second data source (as the primary table was renamed customers1)

Duplicate item names may result in the following cases:

- When you use the same name for items in two different GROUPs. DMSII allows this, but the Databridge Client ignores GROUPs.
- When you truncate two very long DMSII item names that are almost identical

The Databridge Client handles duplicate item names the same way that it handles duplicate table names.

Reserved Keywords

You cannot use reserved keywords for the relational database object (table, column, index, etc.) names. For example, the word order is an SQL keyword; therefore, you cannot rename a relational database table or column as order.

If an existing DMSII data set is named ORDER, the Databridge Client stores ORDER in the DATASETS Client control table and an equivalent relational database table called "order_x" in the DATATABLES Client control table. This same convention of adding _x to rename a reserved word applies to DMSII data items. For information on which words are reserved by your relational database, see the related database documentation.

7 Chapter 7: OCCURS Table Row Filtering

In This Chapter:

OCCURS tables are secondary tables generated by the Databridge Client when OCCURS clauses for items (or GROUPs) are not flattened. This is the default behavior of the Databridge Client. It involves creating a separate row in these tables for each occurrence of the item (or GROUP) with the keys of the primary table record duplicated and an additional column named **index1**, which contains the occurrence number (starting at 1), added to them. In the case of nested OCCURS clauses you end up with two tables, the first of which could be suppressed when you have nothing but keys in it (i.e. you have a GROUP within an OCCURS clause that contains only a GROUP, which also has an OCCURS clause). In the case of nested OCCURS clauses the second table has two columns named **index1** and **index2** added. These columns hold the occurrence numbers of the corresponding items (or GROUPS) within the OCCURS clauses.

Not all of the rows in such tables contain meaningful data, for this reason it is sometimes desirable to discard the ones with meaningless data. There are several advantages to doing this:

- It saves storage, as these secondary tables are quite expensive, particularly when the item with the OCCURS clause is a single item.
- The users of the database do not have to discard unwanted data when they fetch data from the secondary table.
- The number of updates is significantly reduced, resulting in better performance. This can further be improved by setting the **optimize_updates** parameter to true. This parameter only applies updates to rows that are actually changed. This avoids doing redundant updates, and can thus greatly improve performance. The process of discarding rows that do not contain meaningful data is done by defining a set of filters for such tables that describe the conditions under which the rows should be discarded. This requires having access the before and after images for updates, as a change in the data can affect whether the row is to be filtered or not. Since we already have the before and after images when doing filtering, enabling **optimize_updates** does not add any additional overhead, other than the comparison of the before image and after image data to determine if anything changed, which is a lot quicker than executing a redundant update (that is SQL that does not change anything).

Filter Source File

The implementation of row filtering for secondary tables, derived from items with an OCCURS clause, does not involve changing any configuration file parameters. All you need to do is to create a text file named "`dbfilter.txt`" that specifies the filtering conditions for all such tables that need to be filtered. We refer to this text file as the filter source file. This file must reside in the **config** sub-directory of the data source's working directory in order for the client to automatically compile the filter at the end of a `define` or `redefine` command.

The filter source file, which is formatted in a somewhat similar manner to the row filtering sections of **GenFormat**, defines the filters for the various secondary tables using SQL-like statements. This file is then be compiled using a utility called **makefilter**, which is included in the client files. The **makefilter** utility checks the syntax of the filter source file and validates all the specified table and column names. It then creates a binary file named `"dbfilter.cfg"` in the **config** sub-directory of the client's working directory. This file then gets loaded and bound to the corresponding data tables and data items at the start of a client `process` or `clone` command. The client looks for the file `"dbfilter.cfg"` and loads it when it is present. The binding process replaces column numbers by pointers to the structures that hold the corresponding DATAITEMS control table entries. The client uses a general purpose filtering procedure that interprets the filter pseudo code using the DMSII data buffer for the update and returns a result that indicates whether or not the row should be discarded.

The client can thus determine whether or not to insert (load in the case of data extraction) or update a row in the table. In the case of a delete we do not bother with filtering, we simply delete all rows that have the keys of the parent table record (i.e. for all values of **index1**). To make the client run efficiently, we made it use host variables to do these sort of operations, which we refer to as DELETE_ALL operations (when using stored procedure we use the ***z_tablename*** stored procedure for this purpose). This means that besides INSERT, DELETE and UPDATE statements we also have compound DELETE statements for OCCURS tables (i.e. **"delete from *tabname* where *key1=val1* and … *keyn= valn***"; without specifying a value for **index1**).

The Filter File

The filter source file, which is modeled after the row filtering in **GenFormat**, uses a syntax that defines the conditions when a row is to be discarded, rather than when it is to be selected. The statements are free format and can extend over multiple lines, but they must be terminated by a semicolon. You can add comments using "// …", which makes the scanner stop scanning the image before the slashes.

By using **delete** statements instead of **select** statements we make the **"where"** clause define the conditions under which a row is filtered out rather than selected. The reason for doing this, is that it is easier to follow (no need to use De Morgan's law). An example of a filter file source follows.

Example 7-1
```
delete from customer_hold_information where hold_type = 0 or hold_type = 4;
 delete from customer_account_abbr where account_abbr = " ";
delete from meter_readings where amount_read = NULL;
```

The **makefilter** program converts these filters into a list of tokens that contain all the required information for processing them using the general purpose filtering procedure that acts like a VM that executes the filter pseudo-code.

Any table that is not specified in the filter file will have no filter and will be treated normally. Filtering is limited to secondary tables derived from items with OCCURS clauses (a.k.a. OCCURS tables). We allow the testing for NULL by using "*column_name* = NULL" or "*column_name* != NULL" (or "*column_name* <> NULL"), which is not proper SQL. If the item is ALPHA the fact that NULL is not in quotes is enough to distinguish it from the value 'NULL'. Unlike relational databases, NULL in DMSII is an actual value (typically all high values for numeric items and all low values for ALPHA items). All constants are stored in the data area of the filter using their corresponding DMSII representations. Character constants are automatically space padded. Numeric constants have leading zeroes added.

The 3 types of tokens involved in these expressions are **variables** (i.e. column names), **constants** and **operators**. Constants consist of a data type (that matches the first operand's type, which must be a column name), an offset into the filter's data area (the length is the same as that of the associated column name). We do not need the declared length, as all comparisons work at the character or digit level (we already do this when testing for NULL). Operators also include and end-of-statement indicator which corresponds to the semicolon in the pseudo-SQL statements in the filter source file. All comparisons must start with a column name and the second operand must be a constant or the word "**null**". Comparing two columns as a condition for filtering is not allowed. All object names are case sensitive and must be typed in lower-case, keywords and the word null are not case sensitive.

IMPORTANT: String constants must be enclosed in double quotes (the use of single quotes is not currently supported).

In the case of a DMSII structural reorganization the filters must be recompiled if any of the data sets that have filters for secondary tables are affected by the reorganization. The client automatically takes care of this by initiating a recompile of the filter at the end of `define` and `redefine` commands or a Client Configurator run, when there is filter file present in the **config** directory.

The changes to the client itself are pretty straightforward and involve using the filter routine on the image to determine whether it gets discarded or not. The client handles the situation where an item, that was not stored, needs to be stored after an update (in this case the client does an INSERT). Similarly, it handles the situation where an item, that was being stored, needs to be discarded after an update (in this case the client does a DELETE). The remaining cases are handled normally, if the item was discarded and still needs to be discarded, we do nothing. And if the item was stored and still needs to be stored we update it, unless **optimize_updates** is true, in which case we skip the update if the values of all the columns are unchanged.

The following table summarizes the supported operators and their relative precedence.

Table 7-1

Level	Operators
1	=,>,<,>=,<=,!= (or <>)
2	AND
3	OR

The use of parentheses is allowed, but usually not usually necessary. There is no limit to the number of items that can be specified in the "**where**" clause, other than the actual number of data items that are not keys contained in the table.

The use of DMSII items whose data type is REAL are restricted to tests for NULL and 0 in filters. Items that are not nullable in DMSII cannot be tested for NULL. When using items whose data type is BOOLEAN you must use 0 or 1 in the constants (the use of TRUE and FALSE is currently not supported).

The **makefilter** program has two commands, `import` and `display`. The `import` command compiles the filter source file, which can be specified using the -f option, to create the binary filter file `dbfilter.cfg`. If no filter file is specified the command tries to use the file `dbfilter.txt` in

the config subdirectory of the data source's working directory. The `display` command produces a report that describes the content of the binary filter file. All **makefilter** log output is written to the file ***prefix_flt_yyyymmdd[_hhmmss].log*** keeping it separate from the client log files.

8 Databridge Client Control Tables

This chapter describes the five Client control tables and the properties in each table that can be customized. For best results, use the Console and Client Configurator to customize your Client control tables.

Control tables do not contain replicated DMSII data. To store replicated data, the relational database uses data tables, which are created using information from the control tables. The control tables hold the layout information of the DMSII database (from the DMSII DESCRIPTION file) and the layout of the corresponding relational database tables. Each relational database has one set of Client control tables that includes the following tables: DATASOURCES, DATASETS, DATATABLES, DMS_ITEMS, and DATAITEMS.

The Databridge Client uses several columns of the control tables to determine how DMSII database objects are represented in the relational database layout. While Databridge makes many of these decisions, some properties can be customized by using the Client Configurator or user scripts. For example, you can rename columns, combine like items, and flatten OCCURS.

For instructions on backing up the Client control tables, see "Backing Up and Maintaining Client Control Tables" on page 117.

In this Chapter

Changes in Databridge Client 6.6 Control Tables

Changes to the Client control tables are listed in the following table.

When you run the **dbfixup** utility it automatically updates your existing Client control tables to ensure compatibility with previous releases. For more information, see the *Databridge Installation Guide.*

DATASETS	The bit DSOPT_Clone_First(2,097,152) in the ds_options column is deprecated. The columns extract_priority was added. See "DATASETS Client Control Table" on page 153.

DMS_ITEMS	The di_options column, which ran out of bits,was augmented by the di_options2 column which has the following 4 bits defined: DIOPT_Item_Masked(1), DIOPT_Item_Encrypted(2), DIOPT_Split_Table(4), and DIOPT_End_Split_Table(8). The columns di_options2 and di_user_bmask2 were added to extend the di_options column that had no more usable bits. See "DATAITEMS Client Control Table" on page 185.
DATAITEMS	The bit definitions DAOPT_DoNotTrim (1,048,576) and DAOPT_ITemKey_Modified (4,194,304) were added to the da_options column. The column masking_info was added, see "DATAITEMS Client Control Table" on page 185 for more information.

DATASOURCES Client Control Table

The DATASOURCES Client control table contains the data sources defined for the Databridge Client. Each data source represents both a connection to a host and a DMSII database. You can define more than one data source within the DATASOURCES Client control table as long as each data source name is unique. All of the data sources you define within the DATASOURCES table apply to one relational database.

NOTE: Do not modify Client control tables directly. Instead, use the settings in the Client Console and Client Configurator to add and customize data sources.

The following table contains descriptions of each column, in the order in which it appears in the DATASOURCES table.

Column	Description
data_source	This value is the name you give the data source when you use the Databridge Client `define` command. The name can be a maximum of 30 characters, and it must match one of the following: ◆ The entry for SOURCE in the DBServer control on the host. ◆ A base or filtered source as defined for Enterprise Server.
hostname	This column specifies the host name or IP address of the Databridge Server.
hostport	This column specifies the TCP/IP port number used to connect to the Databridge Server.
hostprot	Reserved

Column	Description
stop_time	This column specifies the start of the Databridge Client blackout period expressed as an integer value representing 24-hour time (*hhmm* format). At a few key points during execution, the Databridge command-line client (dbutility) tests this column to determine whether or not it should continue processing. The configuration file parameter `controlled_execution` enables this feature while the parameter `min_check_time` specifies the minimum delay time (for example, a typical time value may be 5 minutes) between checks of stop_time. The program checks at the start of a `process` or `clone` command and after `commits`, provided enough time has elapsed since the last check. **NOTE:** Service-based operations ignore the value of this column.
end_stop_time	This column specifies the end of the blackout period for the Databridge command-line client (dbutility). It is expressed as an integer value representing 24-hour time (*hhmm* format). For example, if stop_time is 2000 and end_stop_time is 200, the Databridge Client refrains from running between 8:00 p.m. and 2:00 a.m. **NOTE:** Service-based operations ignore the value of this column.
update_level	This column contains the update level of the DMSII database at the time the last `define` or `redefine` command was run.
status_bits	This column contains a set of bits that the Databridge Client sets. Some of these bits contain state information that is useful. Modifying this column can result in problems with the client. The following list is intended to be useful and is not comprehensive.

Bit	Description
1-256	For internal use only.
512	SRC_NotBackedUp - When this bit is set, an unload file is created to ensure that the data source backup is not overwritten; the bit is then cleared. After the Client resumes audit file processing and a transaction group is successfully processed, this bit is set.
1024	SRC_FileXtract - This bit indicates that the data source is a FileXtract file rather than a DMSII database.
2048	SRC_ITRANS - This bit echoes the value of the DMSII database's INDEPENDENTTRANS flag.
4096	Reserved
8192	SRC_DBEnterprise - When this bit is set, it indicates that the data source is an Enterprise Server data source, versus a DBServer data source.
16, 384	Reserved
32, 768	Reserved
65, 536	Reserved

Column	Description
	131, 072 SRC_Upgraded - This bit is set by the **dbfixup** utility, when there are OCCURS clauses that are not flattened, to indicate that we have just done an upgrade to the 6.6 Client software. Upon seeing this bit set the Client automatically executes a `refresh` command to create the *z_tablename* stored procedures that are used to do deletes in OCCURS tables. The Client clears this bit if the `refresh` command is successful. This avoids getting SQL errors when the client tries to use these procedures, which did not previously exist.
	266, 144 SRC_RequiredAware - This bit is set by the 6.6 Client when a `define` command is executed. It indicates that the Client should honor the REQUIRED property in the DASDL and set the corresponding items not to allow nulls (NOT NULL). The purpose of this bit is preserve backward compatibility by preventing data sources created by older clients from having all the REQUIRED items changed to not allow nulls.
tab_name_prefix	This column holds an optional one- to eight-character prefix which is added to all table names in the data source. This prefix, which you must supply, allows you to distinguish between identically named data sets in multiple data sources, without having the `define` and `redefine` commands rename tables to eliminate name conflicts. The configuration file parameter `use_column_prefixes` extends this prefix to all column names.
data_source_id	This column allows you to provide a numeric identifier to distinguish records that belong to a particular data source from other records in a multi-source environment using a user script, or a relational database query tool. In addition, you must set the external_columns column to 128 or 2048 for the data set name.
last_run_status	This column holds the exit code of the last Databridge Client `process` or `clone` command that was run. When the exit status is not available (such as when the Databridge Client is running or abended), the exit_status entry is 9999.
stop_afn	This column specifies the AFN value when the configuration file parameter `stop_after_given_afn` is enabled. **NOTE:** Service-based operations ignore the value of this column.
af_origin	This column specifies the origin of the current audit file being processed. The following values are defined for this column: 0 Audit file processed by Databridge Engine 1 Reserved 2 Audit file processed by DBEnterprise using Databridge Engine to access regions. This is referred to as indirect disk. 3 Audit file processed by DBEnterprise using direct disk I/O. This is referred to as direct disk and is the most economical way to process audit files in term host resource utilization. 4 Cached audit file processed by DBEnterprise.
server_version	This column indicates the version of DBServer last used by the Client.
engine_version	This column indicates the version of Databridge Engine last used by the Client.

Column	Description
support_version	This column indicates the version of the Support Library last used by the Client.
dbe_version	This column indicates the version of Enterprise Server last used by the Databridge Client.
client_version	This column indicates the version of the last dbutility or DBClient that was run for this data source
cfgsrvr_version	This column indicates the version of DBClntCfgServer that was last used by the service to access the data source.
service_version	This column indicates the version of the service that launched a client run for the data source.
old_update_level	This column holds the previous value of update_level when running a `redefine` command. This value is used to name the reorg scripts that contain the DMSII database's update level.
db_timestamp	This column contains the timestamp of the DMSII database, which is the time when the database was created. It is used by the client to verify that the client is using the same database as it originally was. If this column is set to zeroes, then this test is not performed. **CAUTION:** This column contains a DMSII TIME(6) value, which is binary and 6 bytes long. For SQL Server, set db_timestamp=0. For Oracle, set db_timestamp ='000000000000'.
reader_info	This column contains the name and version of the reader used to read audit files (or flat files in the case of a FileXtract data source).
dms_dbase_name	This column contains the name of the DMSII database, which is not always the same as the data source name.
rows_extracted	This column is used by the Client to save the number of DMSII records that were received during the data extraction phase.
client_discards	This column, which is currently only used by the Flat File Client, is used to record the number of records discarded during data extraction phase.

NOTE: The data source CTLTAB_VERSION in the DATASOURCES table is a special entry created by the Databridge Client. It indicates the version of the Client control tables. Do not try to process this data source, and do not remove it from the table.

DATASETS Client Control Table

The DATASETS table contains information about each DMSII data set as permitted by the Databridge host support library filters. The DATASETS table contains state information for each data set visible to the Client, including the current replication phase of the data set. When the data has been successfully extracted, this table includes the location in the audit trail from which the last group of

updates for the data set were read, including the audit file number, the audit block sequence number, the segment number, and the index that identify the physical location of the block in the audit file, and a timestamp.

The active column of the DATASETS table controls the selection of *all* tables mapped from a DMSII data set. (The SQL statements in your user scripts use the active column in this table to specify data sets you do not want to clone.) If you use the DATASETS table to disable cloning for a data set, you disable cloning for all tables related to that data set.

For example, one DMSII data set with a nested OCCURS item can generate multiple tables. If you do not want to clone any of these tables, use the active column in the DATASETS Client control table to turn off cloning. For more information on selectively cloning data sets, Tips for More Efficient Cloning (page 97).

The following table contains descriptions of each column in the DATASETS Client control table. Included is the abbreviated column name that the `display` command writes to the log file.

Column name	Display	Description
data_source		This column contains the name of the data source that identifies the DMSII database from which the data was taken. The data source name is defined when you run a `define` command. It must match the name on the SOURCE statement in the DBServer parameter file on the host.
dataset_name	`ds`	This column contains the name of the DMSII data set.
rectype	`/type`	This column, which is zero for all fixed-format data sets, contains the record type of a DMSII variable-format data set as follows: *Record Type* — *Description* 0 — For a variable-format data set, this represents records that have no variable part. 1–254 — Represents the variable-format record type as defined in the DASDL.
set_name	`set`	This column contains the name of the DMSII set that Databridge Engine uses as an index source for tables mapped from the data set. The names "aa_set", "user_set", and "pk_set" are special set names that the Databridge Client uses when a DMSII set is not available. The name "aa_set" indicates that AA Values (or RSNs) will be used as the source for the index. The name "user_set" indicates that the set is user-defined. The name "pk_set" indicates that the set is defined in GenFormat using the PRIMARY KEY statement.

Column name	Display	Description
active	A	During a `define` or `redefine` command, this column determines whether or not a data set is mapped. During a `process` command, the value of this column determines if the data set is to be selected for cloning or updating. The default, 1, indicates that the data set will be mapped (cloned or updated). A value of 0 indicates that the data set will not be mapped (cloned or updated). The `define` and `redefine` commands change the value in the active column to 0 if the data set contains global database information, if it is the restart data set, or if it is a remap of another data set. **NOTE:** When you change the DATASETS active column value to 0 to disable cloning, *all tables related to the data set are disabled*. For example, if a DMSII data set is represented by three relational database tables, none of the three relational database tables will be cloned.
strnum	ST#	This column contains the DMSII data set structure number.
audit_filenum	AFN	This column contains the current DMSII audit file number. DMSII audit files are created and stored on the host; they contain a record of all updates to the DMSII database and are named as follows: *databasename*/AUDIT*nnnn* where *databasename* is the name of the DMSII database, AUDIT is a literal, and *nnnn* is the AFN (audit file number) whose value is a number between 1 and 9999. Before you run a `process` command to clone a DMSII database, the audit file number (and all the other audit file location information) is zero; subsequent `process` commands fill these records with the ending audit file location.
audit_block	ABSN	This column contains the audit block serial number in the audit file. Because DMSII now uses 32-bit audit block serial numbers, the data type for this column is binary (raw in Oracle). All displays in the log file show this value as a 10-digit unsigned number. If you access this column via a relational database query tool, the hexadecimal value appears instead.
audit_seg	SEG	This column contains the segment number within the audit file.
audit_inx	INX	This column contains the index within the audit file segment.
audit_ts	Time Stamp	This column contains the audit file timestamp represented as a relational database date/time data type.
ds_mode	M	There are a few cases where you may need to change the mode. The ds_mode value provides the following information about the data set: Value Description

Column name	Display	Description	
		0	The data set is ready to be cloned; any existing table with the same name is dropped and a new table with the same name is created.
		1	The data set is in the fixup phase; data extraction is complete and the table is being updated with changes that occurred during the extraction. The integrity of the data in the tables mapped from the data set is not guaranteed to be correct until the fixup phase is complete.
		2	The data set is ready to be updated. This implies that it has already been cloned and the fixup has been completed. This is the most common mode.
		11	An error occurred during index creation *or* the tables mapped from this data set do not have an index defined.
		12	The data set is using AA Values as keys, and the AA Values are no longer valid because the data set has been reorganized.
		31	The data set must be reorganized and the `redefine` command has created scripts to make the relational database table match the DMSII data set. You must run the `reorg` command in order to run the reorganization scripts created by the `redefine` command.
		33	The `reorg` command failed for this data set. In this case, you must manually update the table by trying to fix the failed script. Then, set ds_mode to 31 and repeat the `reorganize` command. If that fails, you must reclone it.
host_fmtlevel		This column contains the format level as seen by the host. The value is the update level received from Databridge Engine in the last STATEINFO record.	
client_fmtlevel	FMT	This column contains the format level as seen by the Databridge Client. The value is determined by the `define` and `redefine` commands. Typically, the host and client format levels are the same until a DMSII reorganization is detected.	
recsz_bytes	RSZ	This column contains the size of the record in bytes.	
parent_strnum	P#	This column contains the parent structure number. This column is used for embedded data set information.	

Column name	Display	Description
num_children	#C	This column contains the number of child structures for the parent structure. This column is used for embedded data set information.
base_strnum	B#	This column contains the base structure number. If the value in this column is not equal to the value in the strnum column, this data set is a remap of the data set whose structure number is base_strnum.
subtype	ST	This column contains the structure subtype of the DMSII data set: Value — Description 0 — Standard data set 1 — Random data set 2 — Ordered data set 3 — Unordered data set 4 — Global data 5 — Direct data set 6 — Compact data set 16 — Restart data set 17 — Virtual data set
in_sync		The in_sync column tracks data sets whose stateinfo is synchronized with the stateinfo stored in the Global_DataSet row for the data source in the DATASETS Client control table. Global_DataSet is a dummy data set that holds the common stateinfo for data sets whose ds_mode is 2. When the Databridge Client is finished updating, the stateinfo in the Global_DataSet is copied to all data sets that need to be updated with the stateinfo. Values in this column indicate the following: Value — Description 0 — The data set stateinfo is current. 1 — The data set stateinfo must be corrected at the end of update processing to reflect the stateinfo as it is stored in the Global_DataSet.
item_count	ICNT	The value in this column indicates the number of items in the DMSII data set and is used by Databridge Engine to detect filler substitutions and changes in DBGenFormat.

Column name	Display	Description
audit_time6		The value in the audit_time6 column is the DMSII timestamp stored as 6 binary characters. The Client uses this value when it sends state information (stateinfo) to Databridge Engine at the beginning of a `process` or `clone` command. The Client does not use the value in the audit_ts column as it is not accurate enough to use in communications with the Databridge Engine. Instead, the original DMSII timestamp is used. It is much more accurate and has a much smaller granularity than relational database date/time values. **CAUTION:** When you enter values for the stateinfo, you must set the audit_time6 column to 0 because the Databridge Engine uses this value to detect DMSII rollbacks. If the value of the timestamp is 0, Databridge Engine bypasses this test. For SQL Server, set audit_time6=0. For Oracle, set audit_time6='000000000000'.
host_info		The information in the host_info column is provided by the Databridge Engine during data extraction. It enables the Databridge Client to recover fixups if the command is aborted. This information is stored as 6 binary characters.
ds_options	0P	The following bits, which can be set through customization user scripts, which control how data sets are mapped

Bit	Description
1	DSOPT_Use_bi_ai - This bit is set by the `define` command for data sets that have OCCURS clauses (that were not flattened) when the configuration file parameter `optimize_stateinfo` was set to True. This bit causes the program to request that the Databridge Engine send all updates for the data set as BI/AI pairs. You can set this bit to 0 via user scripts if you want to disable optimization of updates for this data set.
2	DSOPT_No_Loader - This bit causes the Databridge client not to use the bulkloader during the data extraction phase of this data set. It is effectively a localized form of the /s option, which applies to all data sets.
4	DSOPT_No_StoredProcs – This bit causes the Databridge Client not to use stored procedures when doing updates. Updates still use host variables, but instead of generating a stored procedure call, the Client generates the actual SQL statement to do the update.

Column name	Display	Description	
		8	DSOPT_Save_Updates - This bit causes the Databridge Client to generate history tables for all tables that are mapped from the data set. To determine whether the history tables are populated with clone data only or clone and update data, see history_tables (page 270).
		16	DSOPT_Include_AA - This bit is deprecated and should not be used to force the client to use AA Values (RSNs) as the source for the index. Use the bit DSOPT_Use_AA_Only instead.
		32	DSOPT_Ignore_Dups - When set, this bit has exactly the same effect as the configuration parameter `suppress_dup_warnings`, except that it only applies to the individual data sets for which it is set.
		64	DSOPT_Select_Only - This bit inhibits the creation of tables and stored procedures for the data set. It is used for data sets that provide input to virtual data sets and are not otherwise mapped to any tables.
		128	DSOPT_Keep_Null_Alpha_Keys - This bit indicates that the program should treat NULL alpha keys as blanks instead of discarding such records.
		256	DSOPT_Supp_New_Columns - This bit, which is initially set to reflect the value of the `suppress_new_columns` parameter for the corresponding data set, can be modified via user scripts or the Client Configurator. The `redefine` command uses this bit when determining how to handle new columns.

Column name	Display	Description	
		512	DSOPT_MultiInput - When the `automate_virtuals` and `miser_databse` parameters are enabled, this bit indicates that data for the virtual data set comes from more than one real data set. When this bit is set, the Client tests the res_flag column (identified by a dms_subtype value of 255) before executing the stored procedure i_*tablename*. If the flag is set, the insert is done normally; otherwise, the stored procedure r_*tablename* is called to update the res_flag. If the update fails, an insert is performed instead.
		1024	DSOPT_MultiSource - This bit indicates that the tables generated from the data set get their input from more than one data source and ensures that the Databridge Client doesn't drop the tables. The Databridge Client uses the cleanup scripts, which it generates for such tables, to remove the records that belong to the data source. The most common use of this option is to add DMSII data to a set of tables whose data comes from some other source.
		2048	DSOPT_MergedTables - This bit allows the Databridge Client to replicate multiple DMSII databases, which have the same layout, into a single relational database. Each data source is given a unique ID and a unique prefix (in the data_source_id column of the corresponding DATASOURCES table entries) that the program uses when it constructs the merged tables (though the stored procedures for each data source are separate). This prefix serves as an alias to the actual table. These tables cannot be dropped during a DMSII reorganization. They must be altered in such a way that they can continue to be reused. **NOTE:** This bit must be used with the DSOPT_MultiSource bit.

Column name	Display	Description	
		4096	DSOPT_CheckKeyChanges - This bit represents the value of the KEYCHANGEOK attribute of the DMSII SET used as an index for the tables. It is a copy of the DSFLG_KeyChg_Allowed bit in the misc_flags column of the DATASETS table. This bit is used to determine whether the Client needs to register the keys that are being used as the index with the Databridge Engine. This causes the Databridge Engine to compare the values in the before and after images to determine if any of the keys have changed. If they haven't changed, the Databridge Engine sends the update to the client as a MODIFY record. If they have changed, it sends the update to the client as a BI/AI pair, which enables the client to delete the old record and insert the new one when a key change occurs.
		8192	DSOPT_HistoryOnly - Causes the `define` and `redefine` commands to generate only history tables for the data set in question. This makes it possible to generate history tables for data sets that cannot be tracked because they lack a unique index. This bit implements the parameter history_tables=2 for individual data sets. See history_tables (page 270). **NOTE:** If you set this bit, you must also set bit 8 (DSOPT_Save_Updates).
		16,384	DSOPT_Use_AA_Only - This bit causes the `define` and `redefine` commands to use AA Values or RSN as the index, even if the data set has a SET that qualifies for use as an index. This bit overrides the DSOPT_Include_AA bit, which has been deprecated.
		32,768	DSOPT_Clrdup_Recs - This bit determines whether the Client runs the script `script.clrduprecs.`*`dataset_name`* when the creation of an index fails at the end of the data extraction phase. You can customize this bit.

Column name	Display	Description	
		65,536	DSOPT_Split_Vrfmt_ds - This bit causes the `define` and `redefine` commands to split variable format data set records (of types other than 0) into two parts. The fixed part is placed in the base table, which normally holds type 0 records. The variable part is placed in the secondary table name *<ds_name>*_type*<nn>* after the keys, which must also be included.
		131,072	DSOPT_ExtCols_Set – This bit indicates that the external_columns column has been customized by the Client Configurator or by a user script. You must set this bit whenever you change the value of external_columns for a data set. Otherwise, the Client Configurator won't retain your change.
		262,144	DSOPT_SetNameChange – This bit indicates that the set_name was changed to “user_set”. The Client sets this bit when the user defines a composite key using the Client Configurator. Its only purpose is to ensure that this change will be remembered.
		524,288	DSOPT_Optimize_4_CDC – The initial value of this bit comes from the parameter `minimize_col_updates`. It causes the client to create update statements that only assign values to columns whose values are changed. In place of stored procedures, pure SQL is used without the use of host variables. This significantly slows the client’s update speed, but the amount of replicated data sent to the remote database (SQL Server and Oracle only) is significantly less, which speeds up the overall process.
		1,048,576	DSOPT_Item_Pref_Set – The item_name_prefix column was assigned a value externally. When this column is assigned a value using the Client Configurator, this bit is used to indicate that the prefix should be preserved when redefining the data set or running the Client Configurator

Column name	Display	Description	
		2,097,152	DSOPT_Clone_First – This bit allows the user to mark a series of data sets as to be cloned in pass 1 of a two pass clone. When a `process` (or `clone`) command sees this bit set, it only selects the data sets with the bit set in pass 1, then when pass 1 finishes it selects all the remaining data sets and clones any other data sets that need cloning.
		4,194,304	DSOPT_Internal_Clone - This bit allows the user to customize the use of the configuration parameter `use_internal_clone` on a data set by data set basis. The initial value of the bit is derived from the configuration parameter `use_internal_clone`.
		8,388,608	DSOPT_FilteredTable - This bit is set by the **makefilter** utility to indicate that the data set has secondary tables which have filters. **IMPORTANT:** Do not change this bit, as it will cause the client not to operate correctly.
changes		These bits are used by the `redefine` command.	
		Bit	Description
		1	CHG_new - New entry
		2	CHG_modified - Modified entry
		4	CHG_del_before - One or more entries before this one were removed.
		8	CHG_del_after - One or more entries after this one were removed.
		16	CHG_format_level - The data set's format level changed (that is, a DMSII structural reorganization that affects this data set has occurred).
		32	CHG_item_count - The data set's item count has changed (that is, a filler substitution reorganization has occurred).
		64	CHG_user_change - There were user changes to the DMS_ITEMS or the DATAITEMS tables (that is, the layout has changed as a result of actions by the user rather than a DMSII reorganization.

Column name	Display	Description	
		128	CHG_links_change - DMSII links changed for the data set.
		256	CHG_AA_values_changed - This bit indicates that the data sets AA Values are no longer valid. The bit is set by the `redefine` command but is otherwise not use by the Client.
		1024	CHG_deleted - The item was deleted.
status_bits	SB	The following bits are used by this column:	
		Bit	Description
		1	DS_Needs_Mapping - This bit indicates that the data set has not been mapped. All data sets that have their corresponding active column set to 0 in the data set selection script `script.user_datasets.`*`datasource`* also have this bit set. If you decide to clone such a data set, you must set the active column to 1 and run the `redefine` command to perform the mapping.
		2	DS_Needs_Generating - This bit indicates to the `generate` command that the scripts for the data set need to be generated. Note that the `generate` command only generates scripts for data sets that have this bit set. The `define` and `redefine` commands automatically set this bit.
		4	DS_Needs_Remapping - This bit forces the `redefine` command to refresh the mapping. After you make changes to the data table user_define customization scripts, you may want to set this bit before you execute a `redefine` command.
		8	DS_Needs_Redefining - This bit is automatically set by the `process` and `clone` commands when Databridge Engine detects a structural reorganization or a filler substitution for the data set. You can set this bit to force the `redefine` command to refresh the DMSII layout.
		16	reserved
		32	reserved

Column name	Display	Description
		64 — This bit indicates that the AA Values are invalid. Do not modify this value. 128 — This bit indicates that the index creation failed. Do not modify this value. 256 — This bit indicates that the data set is in fixup mode. Do not modify this value.
misc_flags	MISC	This column contains an integer that holds a series of flags set by Databridge to reflect some characteristics of the individual data sets. **NOTE:** Do not change the value of these bits. Bit — Description 1–8 — Reserved for use by the Databridge Engine 16 — DSFLG_Links - This flag, set by the Databridge Engine in response to a DB_DataSets remote procedure call (RPC), indicates that the data set has DMSII links to other data sets. 32 — DSFLG_Altered - This flag, set by the Databridge Engine in response to a DB_DataSets RPC, indicates that the data set was altered by the support library. 64 — DSFLG_Static_AA - This flag, set by the Databridge Engine in response to a DB_DataSets RPC, indicates that the Databridge Engine is using RSNs (record serial numbers) in place of AA Values. RSNs are only available in a DMSII XE system where each record in a data set is assigned a unique serial number. Using the RSN in place of AA Values eliminates the need to reclone tables after a DMSII garbage collection reorganization. 128 — DSFLG_Valid_AA - This flag, set by the Databridge Engine in response to a DB_DataSets RPC, indicates that the data set has valid AA Values. Not all data sets have valid AA Values. For details, see "Composite Keys" on page 63. **NOTE:** This bit does not apply to RSNs, which are always valid; it applies to the AA Values.

Column name	Display	Description	
		256	DSFLG_Has_Occurs - This flag indicates that the data set contains items with unflattened OCCURS clauses. The program uses this bit in conjunction with the `optimize_updates` parameter to determine whether the DSOPT_Use_bi_ai bit in the ds_options column should be set. The DSOPT_Use_bi_ai bit can be reset by the user to prevent the use of before/after images for data sets where this action offers no significant performance improvements (for example, an OCCURS 2 TIMES clause is probably not worth optimizing).
		512	DSFLG_Uses_AA_values - This flag indicates that the data set uses AA Values as keys. The program uses this flag to avoid having to look at the table columns to determine whether AA Values are used. **NOTE:** This bit is not set when the Databridge Client uses RSNs instead of AA Values.
		1024	DSFLG_Has_Links - This flag indicates that the data set has active DMSII links. This bit can be zero if all the links have their active columns set to 0 in DMS_ITEMS.
		2048	DSFLG_Is_LinkedTo - This flag indicates that one or more data sets have active DMSII links that use AA Values as foreign keys to point to this data set. The program uses this information to force the AA Values to be used as the keys for the tables derived from this data set.
		4096	DSFLG_Occ_Depends - This flag indicates that the data set contains items with unflattened OCCURS DEPENDING ON clauses. The program uses this bit to request that the Databridge Engine send updates to this data set as before/after images, regardless of the value of DSOPT_Use_bi_ai bit in ds_options for this data set.

Column name	Display	Description	
		8192	DSFLG_Uses_Parent_AA - This flag indicates that the data set uses Parent_AA Values as foreign keys. The program uses this to avoid having to look at the table columns to determine if the Parent_AA Values are used.
		16,384	DSFLG_Data_Extracted - This flag indicates that the data set was successfully cloned. The program uses this flag to determine if a table is being recloned. **NOTE:** This information is vital when preserving deleted records.
		32,768	DSFLG_Key_Chg_Allowed - This flag represents the value of the KEYCHANGEOK attribute of the DMSII SET used as an index for the tables. This value is copied to the DSOPT_CheckKeyChanges bit (in the ds_options column of this table). You can modify the DSOPT_CheckKeyChanges bit via user scripts.
		65,536	DSFLG_Data_Dirty - This flag is only meaningful for virtual data sets that get data from more than one DMSII data set. It indicates that phase two of the data extraction process is under way. This flag indicates that the appropriate cleanup script must be invoked when the table is recloned (such tables can be partially recloned). **NOTE:** This information is vital to being able to partially reclone such tables.
		131,072	DSFLG_MiserDateKey - This flag indicates the index used for the data set contains a Miser date that allow nulls.
		262,144	DSFLG_VLinks - This flag indicates that the virtual data set has links
		524,288	DSFLG_HasVisibleRSN - This flag indicates that the data set contains a data item of type REAL that holds the value of the RSN.
		1,048,576	DSFLG_VarFmt_DataSet - This flag indicates that this data set is a variable format data set.

Column name	Display	Description	
		2,097,152	DSFLG_Valid_Parent_AA - This flag indicates that the parent structure of an embedded data set has a valid AA Value.
		4,194,304	DSFLG_Phase1_Done - This flag is used in the data extraction row verification for MISER database tables that get cloned in two phases. It indicates that phase 1 of the data extraction has been completed and instructs the client to get the initial rows count so that the row verification works correctly in the case where the client get aborted before phase of the data extraction for such tables completes.
max_records	MAXRECS	This column contains an integer that holds the maximum row count of the data set as *estimated* by the Databridge Engine. This is the exact number that appears in DBLister reports. The Databridge Engine computes this estimate by dividing the file size by the record size. This value is very inaccurate in the case of variable-format data sets because it is impossible to determine how many records of a given type exist in the data set without doing a full scan of the data set.	
virtual_ds_num	VDS	This column contains an integer value that holds the structure number of the virtual data set to which the DMSII data set is linked. This column is used by the parent data set to point to the associated virtual data set. When more than one virtual data set is derived from a real data set, these data sets are chained together using this column.	
real_ds_num	RDS/type **NOTE:** This display name is combined with the `real_ds_rectype` value.	This column contains an integer that holds the structure number of the primary real data set from which the virtual data set is derived. When more than one virtual data set is derived from a real data set, these data sets all point back to the real data set through their real_ds_num column. These real data sets are chained together, starting with the primary data set, by using the otherwise unused real_ds_num columns of the actual data sets.	
real_ds_rectype		The integer in this column represents the record type of the variable-format data set. This information serves to further identify a variable-format data set when it is cloned as a virtual. In addition, the variable-format data set is linked to the virtual data set through the virtual_ds_num and real_ds_num columns.	
external_columns	EXTC	This column contains an integer value that determines which predefined non-DMSII columns are automatically added to this data set. For a description of these bits, see "Numeric Date and Time in Non-Contiguous Columns" on page 60.	

Column name	Display	Description
ds_user_bmask		This column, which shadows the ds_options column, contains a bit mask that represents the columns in ds_options that were customized. This column is used by the `redefine` command to restore the portion of ds_options that has been customized while leaving the remaining bits intact.
links_sz_bytes		This column contains the size of the link data, in bytes. Link data is no longer stored in the actual record, instead the record is extended by the size of the link data where the link data is placed during data extraction. These areas are not necessarily contiguous in the DMSII record; the DMSII offsets have been adjusted to make them to look contiguous in the Client.
links_offset		This column is used by the Client to determine where the link area for the record starts.
vp_link_offset		Variable format data sets have links in both the fixed part and the variable part, causing the Client to receive two LINK_AI records. This offset value indicates where the second part of the links area starts. By comparing the offset received from the Engine, the Client can tell where the link data should be stored.
item_name_prefix		This column is used by the Client to automatically strip fixed size prefixes from data item names. One frequently finds DMSII databases where the data set names (or a shortened form of these names) is used as a prefix for every item name. The Client has the ability to get rid of these prefixes without requiring any complex actions other than putting the prefix to be stripped in this column, without the trailing dash.
rows_extracted		This column is used by the Client to save the number of DMSII records that were received during the data extraction phase.
client_discards		This column, which is currently only used by the Flat File Client, is used to record the number of records discarded during data extraction phase.
extract_priority		This column is used to affect the order in which data sets are extracted. The data extraction is now ordered by extract_priority (highest value first) and strnum (lowest value first). By setting this column to a positive number you can change the order in which data sets are extracted.

DATATABLES Client Control Table

The DATATABLES Client control table is used primarily to disable cloning for one or more of the secondary tables mapped from one DMSII data set. For example, a DMSII data set with several OCCURS items generates multiple relational database tables. If you do not want to clone particular secondary tables, use the active column in the DATATABLES Client control table to turn off cloning for those secondary tables.

The DATATABLES Client control table contains the entries for each of the relational database tables mapped from the DMSII data sets listed in the DATASETS table. These entries include relational database information rather than DMSII information. For example, the DMSII data set name (in the column named dataset_name) is listed along with the equivalent relational database table name (in the column named table_name). Since a data set can be mapped to several relational database tables (such as when a data set contains OCCURS items), the prim_table column is used to identify the primary table.

The following table contains descriptions of each column in the DATATABLES Client control table. Included is the abbreviated column name that the `display` command writes to the log file.

Column	Display	Description
data_source		This column contains the name of the SOURCE name that identifies the DMSII database from which this data was taken. The data source name is defined when you run a `define` command. It must match the data source name in the DBServer parameter file on the host.
dataset_name	`ds`	This column contains the name of the DMSII data set from which this table was mapped.
table_name	`table name`	This column contains the name of the table as it appears in the relational database. DMSII data sets correspond to relational tables. To change this name, see "Relational Database Table and Column Names" on page 142.
index_name	`index`	This column contains the name of the relational database index that is created for fast access to this table. If the table has no index, this column is blank. This index is created via the Databridge Client script named `script.index.`*`tablename`*. The value in this column is the index name used in the CREATE INDEX SQL statement.
rectype	`/type`	This column, which is zero for all tables mapped from fixed-format data sets, contains the record type of a DMSII variable-format data set. See "Variable-Format Data Sets" on page 127.
occurs_level	`occ`	This column contains the nesting level of OCCURS in the DMSII database. For example, an OCCURS table created from another OCCURS table has an occurs_level of 2. The original OCCURS table has an occurs_level of 1.

Record Type	Description
0	For a variable-format data set, this represents records that have no variable part.
1–254	Represents the variable-format record type as defined in the DASDL.

Column	Display	Description
table_number	T#	This number is used by the SQL*Loader and bcp scripts. The Databridge Client assigns consecutive numbers to the tables it defines for a data source during the `define` command. Each table within a data source has a unique table number, and the numbers begin with 1. The `redefine` command assigns numbers to new tables starting with the highest table number plus 1. Existing tables get their old table numbers restored.
active	A	The value of this column determines whether or not a table is cloned during a `process` or `clone` command. The default is 1, which indicates that the table will be cloned. If you change this value to 0, the table is not cloned. To disable cloning for an entire set of tables related to a DMSII data set, see "DATASETS Client Control Table" on page 153.
create_suffix	`suf`	The create_suffix column enables you to specify a value that identifies the index of the create_suffix string defined in the configuration file. For more information, see "create_table_suffix" in "Generate Command Parameters" on page 300.
index_suffix		The index_suffix column enables you to specify a value that identifies the index of the index_suffix string defined in the configuration file. For more information, see "create_index_ suffix" in "Generate Command Parameters" on page 300.
original_name	`original_name`	The Databridge Client saves the original name of the renamed tables in this column so they can be identified during `redefine` commands.
prim_table	P	This column indicates whether or not this is a primary table.
dt_options		The dt_options column uses the following bits:

Bit	Description
1	DTOPT_Table_Renamed - The table was renamed by the user. This bit is used by the Client configurator to preserve the name change.
2	DTOPT_Index_Renamed - The table's index was renamed by the user. This bit is used by the Client configurator to preserve the name change.
4	DTOPT_User_Table - This table was created by the user. Not supported in Databridge Client 6.6.
8	DTOPT_No_aux_stmts - This option inhibits the use of auxiliary statements for a given table during a `process` or `clone` command when the configuration parameter `aux_stmts` (default 10) is not zero.

Column	Display	Description	
		16	DTOPT_Occ_Depends - This option, automatically set by the Client during a `define` or a `redefine` command, indicates that an OCCURS table (occurs_level > 0) contains an item with an OCCURS DEPENDING ON clause. This bit is used during update processing to properly handle cases where the value of the dms_depends_num item of an OCCURS DEPENDING ON clause changes.
		32	DTOPT_All_Keys - Do not change this value.
		64	DTOPT_No_Unique_Key - Do not change this value.
		128	DTOPT_Preserve_Deletes - Do not change this value.
		256	DTOPT_HistoryTable - This option, which is set by the `define` and `redefine` commands, indicates to the Client that this table is a history table and that all records should be treated as inserts to the history table. **CAUTION:** Clearing this bit can corrupt history tables because it causes the Client to treat records as creates, deletes, and modifies instead of inserts.
		512	DTOPT_UserSP - Indicates that the table uses the stored procedure m_*tablename* to perform customized functions instead of using the procedure i_*tablename* for an insert. This procedure is used to merge records rather than insert them into the table. This bit is most often used for Miser databases.
		1024	DTOPT_Clustered_Index - This option, which only applied to the SQL Server client, tells the Databridge Client to create a clustered index for this table. You can globally set this option via the `use_clustered_index` parameter. See use_clustered_index (page 275).
		2048	DTOPT_Primary_Key - This option tells the Databridge Client to create a primary key (instead of a unique index) for this table. When creating the script to create a primary key constraint, the Microsoft SQL Server client uses the value of the DTOPT_Clustered_Index to determine whether to add the NONCLUSTERED clause to the SQL. If this second option bit is not set, the NONCLUSTERED clause is added. You can set this option globally via the use_primary_key (page 277) parameter.

Column	Display	Description	
		4096	DTOPT_Delete_Seqno - This option is automatically set by the `define` or `redefine` command when the delete_seqno mask is set in the `default_user_columns` parameter value.
		8192	DTOPT_Table_Split - This option is automatically set by the `define` or `redefine` command when the table is part of a split table. Do not modify this value.
		16,384	DTOPT_ConcatItems - This bit is automatically set by the `define` or `redefine` command and indicates that the table contains concatenated items. Do not modify this bit.
		32,768	DTOPT_Clob_in_Table - This bit, which is only used by the Oracle client, indicates that the table contains an item whose data type is CLOB. Do not modify this bit.
		65,536	DTOPT_OrigNameFixed - Internal use only - do not modify. This bit is used to convey whether the original table name was ever changed.
		131,072	DTOPT_ContainsLinks - Do not change this value.
		266,144	DTOPT_LinksOnly - Do not change this value.
		524,288	DTOPT_PreserveAllDel - Do not change this value.
		1,048,576	DTOPT_UseBrackets - This bit, which only applies to the SQL Server client, is set by the `define` and `redefine` commands to indicate that table in question has a name that is a SQL Server reserved word. Such names must be enclosed in square bracket in all SQL statement to avoid getting SQL errors. **IMPORTANT:** Do not change this bit, as it will cause the client not to operate correctly.

Column	Display	Description	
		2,097,152	DTOPT_HasOccurs - This bit is set by the define and redefine commands to indicate that the table is an OCCURS table. The **dbfixup** utility sets it for all such tables during an upgrade, as it was not used in older releases. This bit is critical to proper Client operations when you have items with OCCURS clauses that are not flattened. This was necessary to distinguish such tables from tables that result from flattening an OCCURS clause into a secondary tables (both these tables have a non-zero value in the occurs_level column). **IMPORTANT:** Do not change this bit, as it will cause the client not to operate correctly. **NOTE:** If any of the last 5 bits gets accidentally changed, run a redefine command with the -R option to correct this situation. If using the console **Data Source > Advanced > Redefine (with options)** then click on the check box for the -R option.
		4,194,304	DTOPT_LoadPending - This bit is set by the Client when doing multi-threaded extracts upon receiving a State Info record from the Databridge Engine indicating that the data extraction is complete. This bit says set until the EOF buffer that is queued for the corresponding update thread is processed.
changes		These bits are used by the `redefine` command.	
		1	CHG_new - New entry
		2	CHG_modified - Modified entry
		4	CHG_del_before - One or more entries before this one were removed.
		8	CHG_del_after - One or more entries after this one were removed.
		32	CHG_index_changed - This bit, which is set by the `redefine` command indicates that the table's index changed. The `reorg` command uses this bit as an indication that it must drop the index for the table and recreate it.
		64	CHG_IndexType_changed - The index type changed primary key versus unique index or in the case of SQL Server unique index versus clustered index.

Column	Display	Description	
		128	CHG_IndexName_changed - The index name changed, the client needs to drop the index using the old name and create the new index using the new name. The old name is saved in a temporary file by the `redefine` command. The `reorg` command deletes this file once the new index is successfully created
		256	CHG_new_hist_tab - History tables were added for the data set. The `redefine` command sets this bit when it finds a new history table. The `reorg` command then can create these tables and we can continue processing without re-cloning the data set.
update_count		The update_count column represents the smoothed average number of updates for the table over the specified period of time.	
update_interval		This update_interval column represent the period of time (in milliseconds) that the update_count spans. The multi-threaded update code uses the update_count column to balance the thread load. The update_interval column will start out as 0 and increase until it reaches the value representing one hour, after which it never changes, as the average is smoothed to reflect the number of updates for each table over the last hour. The update_count and update_interval columns were added to hold the table update statistics.	
dt_user_bmask		This column, which shadows the dt_options column, contains a bit mask that represent customized columns in dt_options. This column is used by the `redefine` command to restore the portion of dt_options that has been customized while leaving the remaining bits intact.	

DMS_ITEMS Client Control Table

As with the DATASETS table, the DMS_ITEMS table contains entries for each DMSII item as permitted by the Databridge host support library filters. The DMS_ITEMS table also contains the name of the DMSII data set of which the item is a member, as well as other DMSII layout information.

The following table contains descriptions of each column in the DMS_ITEMS Client control table. Included is the abbreviated column name that the `display` command writes to the log file.

Column	Display	Description
data_source		This column contains the name of the data source that identifies the DMSII database from which this data was taken.
dataset_name	ds	This column contains the name of the data set in the DMSII database to which this DMSII item belongs.

Column	Display	Description
rectype	/type	This column, which is zero for all tables mapped from fixed-format data sets, contains the record type of a DMSII variable-format data set. For more information on variable-format data sets, see "Variable-Format Data Sets" on page 127. Record Type — Description 0 — For a variable-format data set, this represents records that have no variable part. 1-254 — Represents the variable-format record type as defined in the DASDL.
dms_item_name	item_name	This column contains the name of the data item for the listed data set. This column is limited to 128 characters.
active	A	This column specifies whether or not the item will be mapped. A value of 1 (default) indicates that the item will be mapped (if this is possible) to an entry in the DATAITEMS Client control table. A value of 0 indicates that the item will not be mapped. The `define` and `redefine` commands change the value in the active column to 0 if the data set contains global database information.
item_key	K	This column contains a numeric value which specifies the order of the item in the DMSII set (1, 2, 3, and so on). If the item is not a key, this value is 0. **NOTE:** You can edit this column to make a composite key. See "Creating Indexes for Tables" on page 61.
dms_item_number	#	This column contains the item number, which indicates the relative position of the item in the original DMSII record.
dms_parent_item	P#	This column contains the dms_item_number of the parent item for an item that is a member of a GROUP item. For example, if dms_item_number 12 is a DMSII GROUP containing items 13, 14, 15, and 16, the dms_parent_items of the last four items is 12.
dms_item_type	T	Values 27, 29, and 30 through 37 are DMSII data types. This column indicates the type of data item, as follows: Type — Description 10 — DMSII link 14 — Image (alpha data to be stored as binary) 21 — variable-format record type 27 — Field of Booleans 29 — Group 30 — Boolean

Column	Display	Description	
		31	Field
		32	Alpha
		33	Number (*n*)
		34	Number (*n,m*)
		35	Real (*n*)
		36	Real (*n,m*)
		37	Real
dms_decl_length	DL	This column contains the user-declared length of the item in the DMSII DASDL. This length changes according to the data item type selected (alpha, Boolean, field, number, or real).	
dms_scale	S	This column contains the numeric scaling factor, which is the number of digits to the right of the decimal place, if any.	
dms_offset	O	This column contains the item's offset value which indicates where, within the DMSII record, this item begins. This is the location Databridge uses to extract data from DMSII records. For example, in a 400-byte record with an offset of 200, the first 100 bytes are used by other items. This number is in digit size, which is equal to one-half of a byte (four bits).	
dms_length	L	This number is the digit size of the data. Digit size is equal to one-half of a byte (four bits).	
dms_signed	s	This column contains a Boolean value specifying whether the item is signed or unsigned as follows: 0 = unsigned and 1 = signed.	
dms_num_occurs	#O	This column indicates the number of times this data item occurs (is present) within the data set. If the item does not have an OCCURS clause, this value is 0.	
dms_num_dims	#D	This column contains the number of dimensions for the data item, which is the number of subscripts required to access the item.	
dms_depends_num	dep	This column contains the dms_item_number of the item that specifies the number of occurrences in use for an item with an OCCURS DEPENDING ON clause.	

Column	Display	Description
dms_subtype	ST	For items mapped to relational database date types, this column contains the format of the date as it is stored in the DMSII database. These are not actual DMSII data types; rather, they represent the formats of dates that might be stored as a DMSII GROUP, a NUMBER, or an ALPHA item. For non-DMSII columns this column identifies the type of the non-DMSII column. For split data items, this column determines the offset of the split. This column is also used to identify columns in tables that pose unique characteristics. For example, MISER databases use this column to identify special columns in history virtual data sets which indicate if this is a resident history record.
di_options	OPTIONS	The following bits, which can be set through data set mapping customization user scripts, enable you to control how the item is mapped.

Bit	Description
1	DIOPT_Flatten_Occurs - This bit specifies that the OCCURS clause of the item should be flattened; it is ignored if the item does not have an OCCURS clause.
2	DIOPT_Clone_as_Date - This bit specifies that the item should be mapped to a relational database short date (smalldatetime on SQL Server and date on Oracle). The format for the encoded date is specified in the dms_subtype column. If you set this bit at the same time as bit 128, bit 128 takes precedence.
4	DIOPT_Split_Item - This bit indicates that the item should be split into smaller chunks if it cannot be accommodated using a relational database data type (for example, ALPHA(4000) in Oracle). The default is to truncate the item.
8	Reserved
16	DIOPT_Clone_as_Tribit - This bit is used to map DMSII number(1) items to a field of three Booleans.

Column	Display	Description	
		32	DIOPT_Clone_as_Binary - For ALPHA items, this bit indicates that items should be mapped to a relational database binary data type, rather than a character type. Items too large to fit in the corresponding binary type are truncated, unless the DIOPT_Split_Item bit is also set, which then maps the item to multiple binary type columns. For REAL items that contain visible RSNs, this bit indicates that the items should be mapped to a relational database binary data type -- BINARY(6) for SQL Server and RAW(6) for Oracle.
		64	DIOPT_Xlate_Binary - When this bit is set, EBCDIC data is translated to ASCII before being stored as binary. **NOTE:** This bit only affects the program when the DIOPT_Clone_as_Binary bit (32) is also set.
		128	DIOPT_Use_LongDate - This bit, which applies to Microsoft SQL Server only, tells the Client to use a datetime data type instead of smalldatetime for the corresponding column in the relational database. If you are cloning seconds as explained in Unique DMSII Date/Times Represented as ALPHA or NUMBER (page 59), set this bit.
		256	DIOPT_Clone_as_Time - Indicates to the Client that the DMSII items should be interpreted as a time and stored on the relational database as an integer type in the form *hhmnss* except for ticks, which are stored in the form *ddddhhmnss*.
		512	DIOPT_Numeric_Data - This bit, which applies to DMSII ALPHA types only, indicates to the Client that the item contains numeric data and should be mapped to a numeric type on the relational database.
		1024	DIOPT_AlphaNumData - This bit, which applies to DMSII NUMBER types only, indicates to the Client that the item should be mapped to a character type on the relational database.

Column	Display	Description	
		2048	DIOPT_ VarFormat_Date - This bit specifies that the item should be mapped to a relational database short date (smalldatetime on SQL Server and date on Oracle), using a unique encoding scheme. This bit requires that you also set DIOPT_Clone_as_Date (2). The format for the encoded date is specified in the dms_subtype column, using the instructions for Unique DMSII Date/ Time Formats Represented as Alpha or Number Items (page 59). If you use the SQL Server client and are cloning a value for seconds (hexadecimal value 7) from the host, set bit 128.
		4096	DIOPT_FlatSecondary - This bit specifies whether occurring items in the secondary table are flattened into a single row, or placed in multiple rows for each parent record.
		8192	DIOPT_Clone_as_RSN - This bit indicates whether the item should be treated as an RSN. This bit only applies to items of type REAL. When this bit is set, the client treats the A-Series word (represented as a REAL) the same way it treats AA Values and RSNs supplied by the Engine. In this case, REAL items are mapped to a column of type CHAR(12) in the relational database. Note that the configuration file parameter `use_binary_aa` has no effect on such items. Instead, the DIOPT_Clone_as_Binary bit in di_options must be used to cause this RSN to map to a column of type BINARY(6) in the relational database.
		16,384	DIOPT_Clone_as_Number - This bit causes columns containing RSNs to be handled as numeric AA Values.
		32,768	DIOPT_Clone_as_DateOnly - This bit causes the `define` and `redefine` commands to use the data type of date instead of smalldatetime. This bit is ignored if either DIOPT_UseLongDate or DIOPT_UseLongDate2 is set. If you use an earlier version of SQL Server, it is treated as a request to use the data type smalldatetime.

Column	Display	Description	
		65,536	DIOPT_Use_LongDate2 - This bit causes the `define` and `redefine` commands to use the data type datetime2 instead of smalldatetime. If both this bit and DIOPT_UseLongDate are set, this bit takes precedence. If you use an earlier version of SQL Server, it is treated as a request to use the data type datetime.
		131,072	DIOPT_Use_Time - If DIOPT_Clone_as_Time bit is specified, this bit causes the `define` and `redefine` commands to use the data type of time instead of a numeric time type.
		262,144	DIOPT_Subtype_Modified – The Client Configurator uses this bit to mark items whose dms_subtype column was modified. This is necessary as the Engine sets the dms_subtype of some items automatically. This bit allows the Client to preserve these values when the data set is redefined or the Client Configurator is run.
		524,288	DIOPT_ResetActive - This bit is used by the Client Configurator to mark items whose active column is the DATAITEMS table is reset by the Client. This is used for items that need to be included in DATAITEMS but do not have corresponding columns in the relational database table. The second part of a concatenated item is marked with this bit, as it needs to be present to fetch the value to be used in the concatenation but it does not have a corresponding column in the table.
		1,048,576	DIOPT_Split_In_Two – This bit indicates that the Client should split the item into two parts using the value in dms_subtype as the offset of the split. A NUMBER(14) can thus be mapped to a NUMBER(2) item and a NUMBER(12) item by specifying a dms_subtype value of 2.
		2,097,152	DIOPT_NumericData2 - This bit allows the second part of a split item to be stored as a numeric type.
		4,194,304	DIOPT_AlnumData2 - This bit allows the second part of a split item to be stored as an alpha type (i.e. CHAR or VARCHAR).
		8,388,608	DIOPT_CloneasNumDate – This bit indicates that the item should be cloned as a numeric date.

Column	Display	Description	
		16,777,216	DIOPT_MergeNeighbors - This bit indicates that the item should merged with the neighboring item that follows it.
		33,554,432	DIOPT_StripPadChars – This bit allows numeric data that uses high value padding to be interpreted as a valid number by stripping off the trailing pads (i.e. digits with all bits set to high values).
		67,108,864	DIOPT_CollapseGroup - This bit is used to make the Client treat a GROUP of items that are all unsigned NUMBER or ALPHA as a single item. For example the Client would treat a GROUP consisting of 4 NUMBER(2) items as a NUMBER(8) item, which can then be cloned as a date. The Client Configurator uses this method to handle dates that are represented as a GROUP of NUMBER items.
		134,217,728	DIOPT_Clone_as_GUID – This bit is used to make the SQL Server Client store an ALPHA(36) item containing a GUID as a UNIQUEIDENTIFIER data type.
		268,435,456	DIOPT_Value_Required - This bit is set internally to reflect the presence of the REQUIRED option for the item in the DASDL.
		536,870,912	DIOPT_VF_Keep_Item - This bit is used in conjunction with the parameter `split_varfmt_ds` to force a non-key column in the fixed part of the record to be preserved in the variable part tables.

Column	Display	Description	
		1,073,741,824	DIOPT_Flatten2String - This bit is used to indicate that an unsigned NUMBER or an ALPHA item with an OCCURS clause is to be flattened to a CHAR or VARCHAR column. The dms_subtype column determines the format to be used. If the value is 0, fixed format is to be used. In this case the client does not strip leading zeroes from numbers or trailing spaces from alpha data. NULL values are represented by blanks. If the value is non-zero, CSV format is used. In this case the dms_subtype also represents the value of the ASCII character to be used as the delimiter (this is limited to punctuation characters such as a comma or a semicolon). Leading zeroes for numeric data and trailing spaces for alpha data are stripped and NULL values are represented by empty fields (i.e. two consecutive delimiters or a delimiter at the end of the string for the last column).
dms_concat_num		Using this column, the client supports concatenating two non-contiguous columns of the same data type (that is, treat two columns as one). You can concatenate two ALPHA items, or two unsigned NUMBER items. You can also use the client to store a numeric item as ALPHA and then use the item in a concatenation. You can also store an ALPHA item that contains numeric data as an unsigned NUMBER and concatenate it with an unsigned number. Concatenation is also supported for unsigned numeric columns that represent a date and a time. The date can be any of the supported date formats, while the time must be a NUMBER(6) containing the time as HHMISS. The combined NUMBER can then be interpreted by the client as date/time. For an example of the layout scripts, see "Concatenating Two Items and Cloning the Result as a Date/Time" on page 323.	
changes		These bits are used by the Client Configurator (not by the `redefine` command).	
		1	CHG_new - New entry
		2	CHG_modified - Modified entry
		4	CHG_del_before - One or more entries before this one were removed.
		8	CHG_del_after - One or more entries after this one were removed

Column	Display	Description	
		16	CHG_dms_item_key - This bit indicates that value in the item_key column of the entry has changed.
		32	CHG_dms_item_type - This bit indicates that the DMSII data type of the item changed.
		64	CHG_dms_decl_length - This bit indicates that the value in the dms_decl_length column of the entry has changed.
		128	CHG_dms_scale - This bit indicates that the value in the dms_scale column of the entry has changed.
		256	CHG_dms_signed - This bit indicates that the value in the dms_signed column of the entry has changed.
dms_link_ds_num	`lnk`	This column holds the structure number of the data set to which a LINK item points. Thus a nonzero value in this column identifies a DMSII LINK. Links that use AA Values have a dms_item_type value of (10).	
di_user_bmask		This column, which shadows the di_options column, contains a bit mask that represents the bits in di_options that were customized. This column is used by the `redefine` command to restore the portion of di_options that has been customized while leaving the remaining bits intact.	
redef_item_type		This column is used by the Client to redefine a DMSII GROUP, consisting of items that have the same data types (e.g. a GROUP of 4 unsigned NUMBER items), as a single item of the given type.	
redef_decl_len		This column is used by the Client to specify the resulting length when redefining a DMSII GROUP consisting of items that have the same data types.	
di_options2		The following bits, which can be set through data set mapping customization user scripts, enable you to control how the item is mapped.	
		Bit	Description
		1	DIOPT_Item_Masked - This bit specifies that the item in question is masked in DMSII.
		2	DIOPT_Item_Encrypted - This bit specifies that the item in question is encrypted in DMSII.

Column	Display	Description	
		4	DIOPT_Split_Table – This bit forces the define and redefine commands to split the table before mapping this item. This gives the user more control in handling split tables when the splitting of the table in the middle of an OCCUR clause is undesirable.
		8	DIOPT_End_Split_TABLE - This bit is used in conjunction with the the DIOPT_Split_Table bit to make the Client return to the parent table following a force split. It must follow an item with the DIOPT_Split_Table and there can be only one outstanding split (i.e. you cannot have two table splits followed by two end table splits).
da_user_bmask2		This column, which shadows the di_options2 column, contains a bit mask that represents the bits in di_options2 that were customized. This column is used by the redefine command to restore the portion of di_options2 that has been customized while leaving the remaining bits intact.	

DATAITEMS Client Control Table

This table duplicates the DMSII information in the DMS_ITEMS table and contains the layout information for the tables in the relational database. This table is not directly linked to the DATASETS table. Instead, it is linked to the DATATABLES Client control table using the table_name column as a foreign key.

You can use the DATAITEMS Client control table to specify the data items you do not want to clone by setting their corresponding active column to 0. However, we recommend that you accomplish this by setting the active column to 0 in the DMS_ITEMS table. Using the DATAITEMS table can lead to unnecessary table splits. Unused columns cause the column count and record size computations to be too high.

If data set mapping is already complete, this table can be temporarily used to disable a new column after a DMSII reorganization to avoid recloning. (This is done automatically if the configuration file parameter `suppress_new_columns` is set to True.)

If you want to disable cloning for every data item in a data set (every column in a table), disable cloning for the data set instead of disabling cloning for each individual data item. For details, see “DATATABLES Client Control Table” on page 170.

The following table contains descriptions of each column in the DATAITEMS Client control table. Included is the abbreviated column name that the `display` command writes to the log file.

Column	Display	Description
data_source		This column contains the name of the data source that identifies the DMSII database from which the data was taken.

Column	Display	Description
table_name	`table`	This column contains the name of the table in the relational database to which this item belongs.
item_number	#	This column contains an internal number that gives each item within a table a unique number. Numbers are assigned consecutively in increments of 10, starting with 10, making it easier to change the order of items using data table customization user scripts.
item_name	`item_name`	This column contains the name of the item (column) in the relational database table. Typically, this is the same as the lowercase form of the DMSII item name with all dashes changed to underscores. To modify, see Appendix D: Customization Scripts (page 315).
active	A	The value in this column specifies whether or not this data item will be cloned. The default is 1, which indicates that the data item will be cloned. 0 indicates that the data item will not be cloned. The `define` and `redefine` commands change the value in the active column to 0 if the data set contains global database information. **NOTE:** If the active value for the data set to which this item belongs is 0 (off), this item will not be cloned even if its active value is 1 (on).
item_key	iK	This column contains a numeric value specifying the order of the item in the DMSII set (10, 20, 30, and so on). You can edit this column to make it part of a composite key. For details, see "Creating Indexes for Tables" on page 61. If the item is not a key, the value is zero (0).
virtual_key	VK	Do not change this value. This column contains a Boolean value specifying if this item is a virtual key; however, it is created only for mapping DMSII items with unflattened OCCURS clauses. When an item is a virtual key, the corresponding value for item_key is a positive number that is one greater than the item_key value of the last key for the data set. The virtual key is not a DMSII key—its value in the data table is the occurrence number in the occurs clause (starting at 1).
dms_item_number	`I#`	This column contains the item number, which indicates the relative position of the item in the original DMSII record.
dms_parent_item	P#	This column contains the dms_item_number of the parent item for an item that is a member of a GROUP item. For example, if dms_item_number 12 is a DMSII GROUP containing items 13, 14, 15, and 16, the dms_parent_items of the last four items is 12. This column This column contains a copy of the dms_subtype in the DMS_ITEMS table.

Column	Display	Description
dms_item_type	TYP	For a description of this column, see "dms_item_type" in DMS_ITEMS Client Control Table. (page 175) In addition to the types defined in DMS_ITEMS, this column contains the following values: Type — Description 256 — AA Value or RSN, which the Databridge Client generates using the AA Value or RSN of the record in the DMSII database as received from Databridge Engine. You can tell them apart by looking at the item_name column, which is my_aa for AA Values and my_rsn for RSNs. 257 — Parent AA, which the Databridge Client generates using the AA Value of the parent record of an embedded data set in the DMSII database as received from Databridge Engine. 258 — External type, which indicates that the data comes from some place other than the DMSII database.
dms_decl_length	DL	This column contains the user-declared length of the item in the DMSII DASDL. This length changes according to the data item type selected (alpha, Boolean, field, number, or real).
dms_scale	SC	This column contains the numeric scaling factor, which is the number of digits to the right of the decimal place, if any.
dms_offset	OFF	This column contains the item's offset value which indicates where, within the DMSII record, this item begins. This is the location Databridge uses to extract data from DMSII records. For example, in a 400-byte record with an offset of 200, the first 100 bytes are used by other items. This number is in digit size, which is equal to one-half of a byte (four bits).
dms_length	LEN	This number is the digit size of the data. Digit size is equal to one-half of a byte (four bits).
dms_signed	S	This column contains a Boolean value specifying whether the item is signed or unsigned as follows: 0 = unsigned and 1 = signed.
dms_num_occurs	OCC	This column indicates the number of times this data item occurs (is present) within the data set. If the item does not have an OCCURS clause, this value is 0.
sql_type	TY	This column contains the relational database data type that corresponds to the DMSII data types. See "DMSII and Relational Database Data Types" on page 121.

Column	Display	Description
sql_length	LEN	If the data type for the column has a length specification in the relational database, this column specifies the length to be used. For example, in the case of char(5) the sql_length is 5. Conversely, if the data type for the column does not have a length specification in the relational database (for example, "int" in SQL Server or "date" in Oracle) this column has a value of 0.
occurs_level	OLV	This column contains the nesting level of OCCURS in the DMSII database. For example, an OCCURS table created from another OCCURS table has an occurs_level of 2. The original OCCURS table has an occurs_level of 1.
dms_subtype	STY	For items mapped to relational database date types, this column contains the format of the date as it is stored in the DMSII database. These are not actual DMSII data types; rather, they represent the formats of dates that might be stored as a DMSII GROUP, a NUMBER, or an ALPHA item. For non-DMSII columns this column identifies the type of the non-DMSII column.
sql_scale	SC	This column contains a copy of the dms_scale that you can edit. This value is used in the relational database to specify the scale for columns of whose data type is DECIMAL(p,s) on SQL Server or NUMBER(p,s) on Oracle.
dms_depends_num	dep	This column contains the dms_item_number of the item that specifies the number of occurrences in use for an item with an OCCURS DEPENDING ON clause.
da_options	OP	The following bits, which you can set through data table customization user scripts, enable you to specify additional properties of the data items: Bit — Description 1 — DAOPT_Nulls_Allowed - This bit is set by the `define` and `redefine` commands based on the value of the configuration parameter `allow_nulls`. You can later change this value via user scripts. A value of 1 indicates that the item will be created with the attribute of NULL (except in Oracle where this is the default attribute of a column). 2 — DAOPT_Column_Renamed - The column was renamed by the user. This column is only used by the Client Configurator. 4 — DAOPT_Type_Changed - The SQL type of the column was changed by the user. This column is only used by the Client Configurator. 8 — DAOPT_Length_Changed - The SQL length of the column was changed by user. This column is only used by the Client Configurator.

Column	Display	Description	
		16	DAOPT_Scale_Changed - The SQL scale changed by user. This column is only used by the Client Configurator.
		32	Reserved.
		64	Reserved.
		128	DAOPT_Item_Renumbered - The item number (that is, the location of the column) was changed by the user. This column is only used by the Client Configurator.
		256	Reserved.
		512	DAOPT_Store_as_Char - This bit indicates that the item, which is numeric, should be stored in the relational database as a character data type.
		1024	DAOPT_Xlate_Binary - This bit determines whether or not character data gets translated from EBCDIC to ASCII before being stored as binary. This bit is copied from the DIOPT_Xlate_Binary bit in the DMS_ITEMS table as the `process` and `clone` commands do not load the DMS_ITEMS table.
		2048	DAOPT_Store_as_Number - Indicates that the Client is storing the corresponding ALPHA data using the appropriate numeric data type.
		4096	DAOPT_VarFormat_Date - Indicates that the dms_subtype column contains a mask describing the date format.
		8192	DAOPT_FixAlphaChar - This bit applies to data items whose data type is ALPHA, and it indicates that the Client will scan the data for control characters and replace each control character with a space. You can set this bit via a `user_define` script, or you can set it globally via the `convert_ctrl_char` parameter. See "convert_ctrl_char" on page 282. **CAUTION:** Do not set the `convert_ctrl_char` parameter to True unless you are absolutely certain that eliminating control characters will have no adverse effect on the data. For example, eliminating control characters can cause some fields to be misinterpreted.
		16,384	DAOPT_ActiveReset – Internal use only. This bit indicates that the active column of items was set to zero by the client. This happens for concatenated items, which must be present to access the data and are otherwise not processed.

Column	Display	Description	
		32,768	DAOPT_Clone_as_RSN - This bit is set internally to indicate that the item is being cloned as an RSN, which requires special processing. This bit shadows the corresponding bit in DMS_ITEMS.
		65,536	DAOPT_Clone_as_GUID - This bit is set internally by the Client to indicate that an ALPHA item is being cloned as a UNIQUEIDENTIER (SQL Server data type) that is designed to hold GUIDS as a binary quantity. This bit shadows the corresponding bit in DMS_ITEMS.
		262,144	DAOPT_Value_Required - This bit is set internally to indicate that item has the REQUIRED option in the DASDL. It shadows the corresponding bit in DMS_ITEMS.
		524,288	DAOPT_Flatten2String - This bit is a copy of the DIOPT_Flatten2String bit in the di_options column of DMS_ITEMS. It indicates that the column is the result of flattening the corresponding DMS item to a string (the DMS item must have an OCCUR clause when this bit is set). The client also copies the dms_subtype value from DMS_ITEMS to the column with the same name in DATAITEMS during a `define` or `redefine` command, as the client does not use the DMS_ITEMS table during `process` and `clone` commands.
		1,048,576	Reserved
		2,097,152	Reserved
		4,194,304	DTOPT_ItemKey_Modified - This bit allows the client to know that the item_key value of the item in the DATAITEMS table was modified.
changes			
		These bits are used by the `redefine` command.	
		1	CHG_new - New entry
		2	CHG_modified - Modified entry
		4	CHG_del_before - One or more entries before this one were removed.
		8	CHG_del_after - One or more entries after this one were removed

Column	Display	Description
dms_link_ds_num		This column holds the structure number of the data set to which a LINK item points. Thus a nonzero value in this column identifies a DMSII LINK. Links that use AA Values have a dms_item_type value of (10).
dms_concat_num		This column is a copy of the DMS_ITEMS column of the same name and is automatically set by the `define` and `redefine` commands since the DMS_ITEMS table is not loaded during a `process` or `clone` command. Do not modify this column in your user scripts.
da_user_bmask		This column, which shadows the da_options column, contains a bit mask that represents the columns in da_options that were customized. This column is used by the `redefine` command to restore the portion of da_options that has been customized while leaving the remaining bits intact.
masking_info		This column is used by the SQL Server client to do data masking. This integer value contains the masking function type (none, default, email, random, partial) and the index of the corresponding parameter data for masking function that have parameters. The `define` command create entries with default mask for columns that have a datamask specification in DMSII DASDL. You can then change the masking type using the Client Configurator.

9 Automating Client Operations with the Service

This chapter explains how to automate Client operations by using the service and scripts (that is, command files on Windows; shell scripts on UNIX). It also covers the Batch Console and its role in automation.

In this Chapter

Configuring the Service

To configure update scheduling, error recovery, and other features of the service, use the Client Console. Your changes are automatically saved to the service configuration file (`dbcontrol.cfg`), located in the `config` directory of the service's working directory. See "Managing Operations" in the Client Console **Help**, available from within the program. For more information about the service's working directory, see the topic "The Working Directory" in the *Databridge Installation Guide*.

Automation Scripts

The Databridge Client 6.6 service uses scripts (command files in Windows; shell scripts in UNIX) to allow the user to gain control at key points of Client operations. Scripts allow the user to perform pre-processing and post-processing for Client runs (typically `process` commands) and supplement the service's built-in error recovery with additional recovery or error-reporting mechanisms.

Additionally, users can start a script from the mainframe by using the BCNOTIFY program. The BCNOTIFY program is designed to make the service start the script whose name it supplies. By inserting BCNOTIFY at key points in a WFL (Work Flow Language) job, the WFL can trigger a task on the client machine, such as restarting audit file processing. Scripts can interact with the service via the Batch Console, a program which interprets source files that contain programs written in a language similar to Visual Basic. Scripts can also perform arbitrary tasks that may not be directly related to the service (for example, start a run that generates a report).

Automation scripts fall into two basic categories:

- Scripts that are associated with a `process` command. These scripts are associated with a data source and run before or after a Client run. (See "Process-Related Scripts" on page 194.)
- Scripts that are initiated by the BCNOTIFY program on the mainframe. (See "BCNOTIFY Initiated Scripts" on page 195.)

All scripts start with the current directory set to the service's working directory. Additionally, the service sets up the environment variable INSTALLDIR that points to the install directory where the Batch Console program resides. You must use this environment variable as the path when invoking the Batch Console (on Windows, `%INSTALLDIR%\bconsole`; on UNIX, `$INSTALLDIR/bconsole`). You cannot rely on the install directory being in the PATH. For more information about Batch Console, see "Introducing the Batch Console" on page 196.

Process-Related Scripts

This first category of automation scripts includes scripts that are associated with a `process` command. These scripts are referred to as start-of-run and end-of-run scripts. Start-of-run scripts are only applicable to runs started by the service without any outside interference, specifically runs that are started by the service's scheduler. This includes runs that are launched when the service is started in response to the `run_at_startup` parameter for a data source. End-of-run scripts on the other hand are applicable to all runs.

Client runs that are started from DBConsole, Batch Console, and BCNOTIFY do not look for start-of-run scripts.

Both types of scripts follow strict filename conventions, as follows.

Type of script	Naming convention
start-of-run	*source*`_startofrun.`*ext*
end-of-run	*source*`_endofrun.`*ext*
event-notice	`source_eventnotice.`*ext*

where *source* is the data source name in lowercase letters and *ext* is the file extension (.cmd for Windows or .sh for UNIX).

The service searches for these script files in the `scripts` subdirectory in the service's working directory. (For information about the working directory, see "The Working Directory" in the *Databridge Installation Guide*.) Before a scheduled run is started, the service looks for the existence of a start-of-run script. When the service finds a script, it runs it and then starts the `process` command after the script is complete. If the script does not exist, the `process` command is started without issuing any errors or warnings. When the service determines that the process command is complete, it checks for the existence of an end-of-run script and runs it.

When a `process` command terminates with an exit code that initiates auto-recovery, the service checks for the existence of an event-notice script and runs it if found. These type of scripts are designed to give the user the ability to generate event notices, such as e-mails when the service enter auto-recovery. In the absence of these scripts the DBA would be totally unaware that the service restarted the client after a recoverable error.

If a Client run ends because of an error, the end-of-run script will run only after the service's built-in error recovery has been executed. The service has a built-in recovery mechanism for responding to errors and non-zero exit codes. In situations that are temporary or self-resolving, the service will attempt the failed operation only after a brief delay. For example, if a connection to the server or database fails, the service will pause for a specified amount of time before attempting to reconnect, and will do so repeatedly until the server or database becomes available. (The parameter `sched_retry_secs` determines the initial retry interval. For connect failures, this interval doubles

on each subsequent retry until it reaches a maximum value of 5 minutes. You can set this parameter value in the Client Configuration dialog box. To get there, from the Client Console, click **Processing > Error Recovery**.)

Both start-of-run and end-of-run scripts are passed the following set of parameters:

Script Parameter	In the script, referred to as
Data source name	%1
Exit status	%2
Run type (a number that indicates the type of command)	%3
Token used as the password when connecting back to the service using the Batch Console	%4

For start-of-run scripts, *run_type* is always 1, indicating a `process` command. For end-of-run scripts, *run_type* can be 1, 2 (`clone` command), 7 (`redefine` command), 8 (`generate` command) or 4 (Client Configurator run).

BCNOTIFY Initiated Scripts

This second category of automation scripts are initiated by BCNOTIFY, a utility included with Databridge Host software.

BCNOTIFY is a host-based Databridge utility you can use to issue remote procedure calls (RPC) to the service and tell it to launch scripts. BCNOTIFY passes the script name and parameters in the RPC. BCNOTIFY can optionally pass a data source name as an additional parameter. If you do not supply a data source name in the RPC, the data source name must be provided within the script that the service launches. The advantage of including the data source name in the RPC is that the service will only launch the script if the data source is idle (versus always launching it).

Scripts initiated by BCNOTIFY are named as follows:

`start_`*`name`*`.`*`ext`*

where *name* is an arbitrary name, and *ext* is `.cmd` on Windows and `.sh` on UNIX.

When BCNOTIFY launches a script that initiates a process command, the service behaves differently when looking for an end-of-run script to execute. It first looks for a script named `end_`*`name.ext`* in the scripts subdirectory (where *name* is the name used in the original script and *ext* is the OS dependent file extension). If the service finds this script, it uses the script in place of the standard end-of-run script described earlier. Otherwise, the standard end-of-run script is used if it exists. This allows one to associate multiple end-of-run scripts with a data source, depending on which script started the `process` command.

These script files are passed the following set of parameters. The parameters for these scripts can change, depending on whether the data source is an empty string. For example, if no data source name is provided, parameter one is the AFN and parameter 2 is the token.

Parameters

- Data source name (optional)
- Parameters supplied by BCNOTIFY. For example, the current database audit file number (AFN)
- A token used as the password when connecting back to the service via the Batch Console

Introducing the Batch Console

The Batch Console automates routine Client tasks by allowing command files/shell scripts launched by the Databridge Client Manager to interact with the service. It interprets a source file that contains a set of statements written in a language similar to Visual Basic. These statements can initiate a connection, perform rudimentary tests, and issue console requests, to the service. For example, by using the Batch Console in an end-of-run script that runs daily reports, you can restart the Client after the reports are generated.

To use the Batch Console, you must first create a source file for the Batch Console and place it in the `scripts` directory of the service's working directory (also referred to as the Client's global working directory). We recommend that you use a file extension that allows you to easily identify this file as a Batch Console source file (for example, `.bcs`). You can debug this source file by running the Batch Console from the command line, using the source filename (including directory, such as scripts\source_filename) as the first argument of the Batch Console command.

The Batch Console always runs as a background run. Its activity is written to a log file in the current directory. The log filename uses the source filename with the extension `.log` added to it. For example, if your source filename is `sourcefile.bcs` the log file is named `sourcefile.bcs.log`.

Running the Batch Console (bconsole)

The Batch Console program (bconsole) has a command line of the form:

`bconsole [`*`options`*`] `*`filename`*` [argument list]`

where *filename* is the name of a text file that contains commands for the Batch Console to interpret.

NOTE: All scripts start with the current directory set to the service's working directory. Additionally, the service sets up the environment variable INSTALLDIR that points to the install directory where the Batch Console program resides. You must use this environment variable as the path when invoking the Batch Console (on Windows, `%INSTALLDIR%\bconsole`; on UNIX, `$INSTALLDIR/bconsole`). You cannot rely on the install directory being in the PATH. For more information about Batch Console, see "Introducing the Batch Console" on page 196.

You can include additional arguments to pass parameters to the program. This allows you to use generic source files that work with externally-supplied values for the parameters. The command-line parameters in [argument list] are referenced in the script file using the Windows command file conventions (%1 is parameter 1, %2 is parameter 2, and so on). For example, if you invoke bconsole using the statement

```
bconsole /P secret resume.bcs 1234
```

the program substitutes the text "1234" for any occurrence of "%1" in the script file "resume.bcs" the same as Windows command files.

The following command file performs the aforementioned task for a fictional data source named MISDB. MISDB uses the service that runs on a machine named "galactica" using port 8001. (Included with the following command are words, such as "data source", which are ignored by the parser but make the script read more like plain English. These words appear in black text.)

```
connect to galactica port 8001
enable data source MISDB
process MISDB
```

If a command fails, the program returns a non-zero exit status indicating a failure. On successful execution of the script, the program returns an exit status of 0. Each executed script is logged; if something fails, you can look at the log file to determine what went wrong.

The user ID of the user that launches the bconsole run is used to sign on to the service. When the Batch Console program starts from a script that the service launches, the script is passed a handle for use as a temporary password. This eliminates any security problems that having user IDs or passwords in the script files might cause. If the service cannot authenticate the user ID password, it verifies that the user is the same one that is running the service. (This is typically the built-in SYSTEM account). If it is, the service verifies that the handle matches the one assigned to the thread that launched the script. (The handle contains the thread number.)

Signing On to the Service

The userid that starts the Batch Console is also used to sign on to the service. This eliminates the security problems that can result from including userids and passwords in script files. When the service launches a script, it passes a handle for the script to use as the Batch Console password. This password is set using the command-line option /P.

After the service identifies the userid as being the same as the service's userid, it validates the signon once it determines that the password matches the handle passed to the script. Handles are only valid while the script is running and cannot be reused.

Using Batch Console in Scripts Initiated by BCNOTIFY

You can use the Batch Console to make the service start a process command or notify a currently running process command to stop after a specified AFN. This mode of operation replaces dbauditwait working in conjunction with the deprecated NOTIFY program on the mainframe and uses the service-initiated DBClient runs instead of the command-line Client. When invoking the Batch Console in a script launched by the service, you must pass the handle to Batch Console using the /P option.

```
bconsole /P %2 sample_script2.bcs  mikera018684 MISDB 1234
```

The following Batch Console source file sample_script2.bcs uses command-line parameters similar to a Windows command file, except that the parameters are numbered starting with the one that follows the source filename. The program does a textual substitution by replacing %n with the exact text of the corresponding parameter. (This script is located in the scripts directory of the service's working directory.)

```
connect to %1 port 8001
if run active %2 then
    stop run %2 after afn %3
else
    process %2 with option "/F %3"
end if
```

In the above example, the text %1 is replaced by mikera018640, %2 is replaced by MISDB and %3 is replaced by "1234".

Using Batch Console to Get Status Information

You can use the Batch Console in query mode to get status information. This capability is not related to automation, but is provided to let you query the service about the status of your data sources. Query mode connects to the service, gets the status of the specified data sources, and then writes that information to a file.

To use query mode, you must provide the connect parameters and the command using command-line switches. The command line for query mode is as follows:

bconsole /s *service_name* /p port /P *password* /w *filename* /q *command*

where the *service_name*, output *filename*, and *command* can optionally be enclosed in double quotation marks. If the /w *filename* option is omitted, the program will write the output to the file bconsole.log. The syntax for the *command* is:

status [*data_source*]

If *data_source* is omitted (or is specified as _all) the status of all data sources is written to the output file in CSV format. A sample output file is as follows:

```
MISDB,0,0x00000000,0,9999
DEMODB,0,0x00000000,0,9999,,,,disabled
NTSL,0,0x00000000,1,0,2011-03-31@15:26:46,2011-03-31@17:46:52
```

Each line includes (in this order): a) the data source name; b) its state; c) the process-id of the current run (or 0 if there's no active run); d) type (state) of the last run; e) exit code of last run or 9999 if the run is active; f) start time of the active run or the last run (if there's no active run); g) stop time of the last run (0 if there is an active run); h) the next scheduled run (if idle); and i) the flag for the data source. If a Client run crashes, it will have an exit code of 9999 and the data source will be marked as disabled.

Batch Console Commands

The syntax for Batch Console (bconsole) scripts is loosely modeled after Visual Basic. The end-of-line character acts as a statement terminator. This limits you to one statement per line. The following table lists commands in alphabetical order, followed by a list of buzz words that are allowed to improve readability.

Command	Partial Command Syntax
abort	abort [run [for [[data] source]]]...
clone	clone [[data] source]...

Command	Partial Command Syntax
connect	connect [to]...
define	define [[data] source]...
disable	disable [[data] source]...
disconnect	
display	display "text"
drop	drop [[data] source]...
dropall	dropall [[data] source]...
enable	enable [[data] source]...
exit	exit (*value*)
generate	generate [[data] source]...
if expression then ...	
[else	
...]	
end [if]	
launch	[[[data] source]...
process	process [[data] source]
redefine*	redefine [[data] source]...
reorg**	reorg [[data] source]...
reorganize	reorganize [[data] source]...
runscript	runscript "filename"
status	status [[data] source]...
stop	stop [run [for [[data] source]]]...
wait	wait (*value*)

* Synonymous with `define`
** Synonymous with `reorganize`

Statements in Detail

Let's look at the individual statements and syntax of a Batch Console script. All statements are confined to a single line, except for the "if" statement.

This command	Does this
`connect [to] service_name [port] number`	Connects to the given service as a console. If the service name is an IP address or contains non alphanumeric characters, it must be enclosed in double quotation marks.
`enable [[data] source] name`	Enables the specified data source. If the data source doesn't exist, an error occurs. If the data source is not disabled, no command is executed and a warning results. This will not cause the script to terminate prematurely. To eliminate the warning, use an "if" statement; this test whether the data source is disabled before trying to enable it.
`disable [[data] source] name`	Disables the specified data source. If the data source does not exist, an error occurs. If the data source is disabled, no command is executed and a warning results. This will not cause the script to terminate prematurely. To eliminate the warning, use an "if" statement; this test whether the data source is disabled before trying to enable it.
`process [[data] source] name [[with] option[s] "option_list"] [reclone ds_list]`	Initiates a `process` command. The options are specified the same as on the dbutility command line, using either slashes or a hyphen (depending on the operating system) followed by a letter and an argument, if applicable. When specifying options, you must include the keyword option to indicate that a list of options follows the command. Make sure that you separate each option with a space and enclose the entire set of options with double quotation marks. The program will validate the options before passing them to the service. You can force all of the specified data sets to be recloned by adding the keyword `reclone` followed by a list of data sets to the `process` command. This sets the ds_mode to 0 for all the specified data sets in a single command. If you use the name "all", all data sets will be recloned; you don't need to name them individually.
`clone [[data] source] name [[with] option[s] "option_list" ] ds_list`	Initiates a `clone` command. The options are specified like you would in dbutility, using slashes or dashes (depending on the operating system) followed by a letter and an argument when applicable.

This command	Does this
`[re]define [[data] source] name [[with] option[s] "option_list"]]`	Initiates a `redefine` or `define` command, depending on whether the data source exists. This statement causes the service to launch DBClientCfgServer for the data source (unless it is already running) and then execute a `define/ redefine` command.
`reorg[anize] [[data] source] name [[with] option[s] "option_list"]]`	Initiates a `reorganize` command. This statement causes the service to launch DBClientCfgServer for the data source (unless it is already running) and then execute a `reorg` command.
`generate [[data] source] name [[with] option[s] "option_list"]]`	Initiates a `generate` command. The statement causes the service to launch DBClientCfgServer for the data source (unless it is already running) and then execute a generate command.
`stop [run [for [[data] source]]] name [{after [afn] number | at [time] hh:mm}]`	This is equivalent to the DBConsole Stop command. If nothing is specified the run will stop at the next quiet point, otherwise the run will stop at the first quiet point after the specified time (Client machine time) or at the first quiet point after the given AFN.
`abort [run [for [[data] source]]] name`	This is equivalent to the DBConsole Abort command. The Client run is terminated immediately by closing the TCP/IP connection to the server. This will cause the last transaction group to be rolled back by the Client.
`status [[[data] source] name]`	This command writes the status of a data source to the Batch Console (bconsole) log file. If the data source name is omitted, or the name “_all” is used, the status of all data sources is written to the log file.
`display "string"`	This command writes the given string to the log file. It is mainly intended to help debugging.

`if expression then`
`...`
`[else`
`...`
`]`
`end [if]`
	The block of commands following the "if" line, which must end with the keyword "then", are executed if the expression evaluates to true. This block ends with either an "else" or “end [if]” keyword (in the absence of an else clause). The else clause starts a new block of commands that will be executed if the expression in the “if” statement evaluates to false. In all cases “end [if]” ends the block that is started by a "then" or "else".

This command	Does this
`launch [[[data] source]] name cmd_file params`	This command makes the service launch an arbitrary command file. It is only useful in debugging BCNOTIFY scripts, as this is the easiest way to launch them. For *name*, list the data source name. If the run is not associated with a specific data source, use "_none" (quotation marks not required). The *cmd_file* is the filename of the script in the `scripts` subdirectory of the service's working directory that you want the service to launch. *cmd_file* and *params* must be enclosed in double quotation marks if they contain non alphanumeric characters, such as a period (.).
`disconnect`	This command tells the program to disconnect from the given service it is connected to. This command will not normally be needed, as the program will automatically issue it when it reaches the end of the script file.
`wait (integer value)`	This command injects a delay, (measured in seconds) in execution of the script file. It is mainly intended for debugging purposes.
`exit (integer value)`	This command stops the program and returns the specified exit code. The command is only needed to return a non-zero exit code or to stop the flow of execution within an “if” statement.

If Statements

Use the “if” statement to test for the following three conditions for a data source:

1. Whether it is **disabled**
2. Whether a run is **active**
3. Whether a run is **scheduled**

The keywords “disabled”, "active", and “scheduled” are used to indicate the condition being tested. You must follow these keywords with a data source name and the keyword “then”. Optionally, you can precede keywords with the buzzwords “run”, “data source”, or “source”.

To reverse the test, you can place the keyword “not” in front of expressions that follow the keyword “if". The syntax of these expressions is summarized as follows:

```
[not] {[run]  | [[data] source]} active name
[not] {[run]  | [[data] source]} disabled name
[not] {[run]  | [[data] source]} scheduled name
```

Command-Line Options

NOTE: Options are case sensitive. `-p` and `-P` are separate options.

This Switch	Argument	Does this
`-d`		Enables debug output.
`-o`		Overwrites the log file (versus appending to it).
`-p`	port	Specifies the port on the command line.
`-q`		Switches into single query mode (status command only)
`-s`	name	Specifies the domain name or IP address of the service machine on the command line.
`-t`		Enables RPC traffic tracing.
`-w`	filename	Sets the name of the log file.
`-P`	password	Specifies the password to be used when connecting to the service.
`-T`		Specifies that the user is a trusted user*

* When you run the batch console (bconsole) from a command file that is not launched by the service, you need to specify a password using the -P option. Since the password is not encoded, some sites may find this objectionable. In order to solve this problem we implemented the -T option, which requires that the userid being used be registered as the trusted user. The batch console will then read the Windows Registry and determine if the userid is registered as the trusted user (there can only be one in the current implementation). To facilitate the registration process, the program `setbcuserid.exe` was implemented. This program registers the userid you enter as the login userid. You must be an administrator to run this program and the userid you specify must be a valid Windows user.

A Appendix A: Troubleshooting

This appendix provides instructions for troubleshooting problems you may experience with Databridge Client.

In this Appendix

General Troubleshooting Procedures

If you have problems using the Databridge Client, complete the following steps:

1. Check to see that your system meets the minimum hardware and software requirements. For details, see the *Databridge Installation Guide*.
2. Check that you've selected the correct configuration options for connecting to the relational database server:
   - The relational database name
   - Your user ID and password to log in to the relational database server. Does your user ID to the relational database server have the correct privileges?
   - If you use configuration file parameters or environment variables to supply the signon parameters, did you enter them correctly?
   - If you use command-line options, did you enter them in their correct uppercase or lowercase? Did you enter them with each dbutility command? See "dbutility Command-Line Options" on page 234.
   - If you use a UNIX Client, make sure that the ORACLE_HOME, SHLIB_PATH, and LD_LIBRARY_PATH variables point to the correct directory, (for example, ORACLE_HOME = opt/oracle/lib).
3. Check that you've selected the correct configuration options for connecting to the host.
   - Is Databridge Server running on the host?
   - Did you use the data source name as it is defined in the DBServer control file? For more information, refer to the *Databridge Host Administrator's Guide*.
   - Did you enter the correct host name or IP address?

- Did you enter the TCP/IP port number as it is defined in the DBServer control file?
- If there is a password defined in the DBServer parameter file, did you enter the correct password?

4. Make sure that the PATH environment variable contains the Databridge Client's directory and the appropriate relational database bin directory (named bin for Oracle and binn for Microsoft SQL Server).
5. Check your cable connections to make sure that they are securely attached.
6. Determine whether the problem is caused by the host and DMSII (versus Databridge Client) by using Databridge Span on the host to clone a data set from the DMSII database in question.
   - If you cannot clone the data set, the problem is most likely on the host.
   - If you can clone the data, the problem is most likely occurring between the DBServer and Databridge Client.
7. Resolve any errors. If you receive error messages or status messages that you don't understand, see the *Databridge Error and Message Guide*.
8. If you cannot identify and solve the problem without assistance, contact your product distributor or Micro Focus Technical Support (http://support.attachmate.com/contact/) from a location where you have the ability to run dbutility.

Troubleshooting Table

The following table lists some common problems and their solutions.

Problem	Solution
You made changes to the Client control tables, such as changing the active column value, but none of your changes are taking effect.	This problem, which only occurs when using SQL*Plus in an Oracle database, is an indication that your SQL statements did not get "committed." The default mode of operations of SQL*Plus is transaction mode. SQL statements only get committed when you explicitly issue a `commit` or when you exit SQL*Plus. You can make the program automatically issue a `commit` after every SQL statement by typing `set auto[commit] on`.
You changed one or more table names, but the new tables are empty after you do a clone or an update.	Most likely you did not update the table_name columns in the DATAITEMS Client control table.
You have the correct host name, port number, and data source name, but you still cannot connect to the host.	Make sure the domain name server is running. If the domain name server is down, change the host name in the DATASOURCES table to the IP address and try the `dbutility` command again.
You get a "constraint violation" error when you run the `process` command to update the relational database.	Most likely you have placed a constraint on one of the columns in the Databridge data tables. When this occurs, remove the constraint and reclone the data set to get all of the records. **IMPORTANT:** You must *not* place constraints or other restrictions on any Databridge data table. If you do, Databridge will *not* work. Instead, filter rows on the host using the DBGenFormat utility.

Problem	Solution
The Databridge Client becomes unresponsive at the following message: `Begin populating/updating database from AFN=afn, ABSN=absn, INX=inx, SEG=seg, DMSII Time=time_stamp`	Check the host ODT for a waiting entry from Databridge Server, similar to the following: `(usercode) DBSERVER/WORKER-n NO FILE (usercode)`*`databasename`*`-AUDIT`*`nnnn`* In this case, make the audit file available to the Databridge Engine. For example, if the file is on tape, copy it to the usercode indicated for the AUDIT*nnnn* file. Once you make the audit file available, the Databridge Engine automatically begins processing again. If for some reason you cannot make the audit file available, stop running the Databridge Client by typing `QUIT NOW` on the client system.
You are running multiple Databridge Clients, and all of them seem to stop processing.	Most likely, only one of the Databridge Clients has stopped processing because of a problem, and the other Databridge Clients have stopped not because of a processing problem, but because of a resource contention problem on the host or network. To correct this situation, look at the ODT and at the Windows Event Viewer for messages related to the Databridge Client. (The previous two problem descriptions in this table list possible messages.) When you locate and respond to the message for the problem client, the other clients start processing automatically from where they left off.
You are unable to execute the **dbutility** program.	Make sure you have included the Databridge Client program directory in the operating system's PATH environment variable.

Problem	Solution
The Databridge Client gets an index creation error for a table that uses a legitimate DMSII SET as an index.	There is no guarantee that the Databridge Engine will always produce tables without duplicate records at the end of the data extraction phase. Most of the time, duplicate records occur when records are deleted and later reinserted into the data set (this sometimes occurs in environments where the DMSII applications use delete/create pairs or in compact data sets). If a record ends up in a location that is different from the original one, the Databridge Engine sees it twice, resulting in a duplicate record. The Client normally runs the script `script.clrduprecs.`*`tablename`* when an index creation fails. This script removes all occurrences of duplicate records as they will be reinserted during the fixup phase. You can inhibit the running of this script by resetting the bit DSOPT_Clrdup_Recs (32768) in the ds_options column of the DATASETS table entry. This must be done manually if you have disabled this bit. When this problem occurs, use the procedure described in "Using SQL Query to Find Duplicate Records" on page 209 to query for duplicate records and remove them. Alternatively, you can clone the data set when the database is inactive or clone the data set offline (the *Databridge Host Administrator's Guide* provides information about cloning offline).
The Databridge Client stops at the start of the fixup phase with the following error: `Stopping: Errors occurred during data extraction`	The Databridge Client stops at this point if records were discarded. There are two types of discards: ◆ Discards created by the Databridge Client because of data errors in items used as keys. ◆ Discards created by the bulk loader because of internal errors. This type of error typically does not occur. If it does occur, it indicates that the program failed to detect a data error. The Databridge Client stops so that you can review these errors. You can fix the data in the discard files that the Databridge Client creates and load the records using a relational database query tool. Alternatively, you can fix the bad data on the mainframe and let the normal update processing take care of things. If you restart the `process` command, the fixup phase proceeds normally.

Problem	Solution
The Databridge Client stops at the start of the fixup phase with the following error: `Stopping: Errors occurred during index creation`	The Databridge Client stops at this point if one or more index creations fail. You need to determine why the index creation failed and remedy the situation, if possible. For example, if you did not have a large enough TEMP SEGMENT in Oracle, increase its size and execute the index creation scripts using SQL*Plus. Once the indexes are created, you can change the ds_mode of the affected data sets to 1 and resume the `process` command, which proceeds normally. Tables that do not have indexes do not cause the Databridge Client to stop at the beginning of the fixup phase. The Databridge Client deselects such data sets before entering the fixup mode. Any subsequent `process` commands will not select such data sets unless you fix the problem and set their mode to 1. You can reclone such data sets at anytime.
The Databridge Client stops at the start of the fixup phase with the following error: `Stopping: Errors occurred during data extraction and index creation`	This message indicates that both of the last two conditions have occurred.

Using SQL Query to Find Duplicate Records

Use the following SQL query to list the keys and the record counts for duplicate records in a table. Duplicate records result when the given combination of keys is used as the index. This query is also useful when trying to determine if certain key combinations produce a unique key.

```
SELECT key_1, key_2,...key_n, COUNT(*) FROM tablename
GROUP BY key_1, key_2,...key_n
HAVING COUNT(*) >1
```

Where	Is
key_1 key_2 key_n	The list of columns that make up the index for the table.
tablename	The name of the table for which the error occurs.

If no records are duplicated, the output within the relational database query tool will indicate that no rows have been affected. If the SQL query returns a GROUP of duplicates, do the following:

1. Manually delete the extra record or records for each combination of duplicate records.
2. Execute a dbutility `runscript` command for each table that contained duplicate records, specifying the index creation script as follows:

   `dbutility -n runscript dbscripts\script.index.`*`tablename`*

3. Set ds_mode = 1 for each data set that contained duplicate records.
4. Execute a dbutility `process` command.

NOTE: If the query routine returns an unusually high number of duplicates, there may be more serious problems with your keys or the process that creates them. For more information about how Databridge uses keys, see "Creating Indexes for Tables" on page 61.

Log and Trace Files

The Databridge Client produces log files and trace files. This topic describes these files and the differences between them.

Log Files

The log file contains information about errors that the Client encounters and statistics that are useful in tracking performance problems. Additionally the log contains messages that are useful when reporting problems to Micro Focus Technical Support (for example, versions of the various host components). When a command is executed for a data source, one or more messages appear onscreen and are written to the log file for that data source. Log files are created in the logs subdirectory of the data source's working directory. Log files are named

db*yyyymmdd*.log

where db is a user configurable prefix that can be redefined in the configuration file and *yyyymmdd* is the date the log file was created. A time (_hhmnss) is appended to the filename if the filename is already in use. (For details about configuring the log via the file see "Export or Import a Configuration File" on page 242.)

If more than one log file is created for a data source on the same date, the time of day is included after the date to make the filename unique (for example, db*yyyymmdd_hhmnss*.log).

Some messages are written only to the log file. These messages generally include information that may be useful when reporting problems to Micro Focus Technical Support, such as version information for the various host components.

Trace Files

Tracing is a powerful option that provides details on the internal processing of the Databridge Client.

NOTE: Trace files are only required if you experience a problem that requires further diagnostics by Micro Focus Technical Support. Do not enable tracing during routine operations as the trace files tend to be huge. You can delete these files when you no longer need them.

Trace files are named

*trace*yyyymmdd.log

where *trace* is a user configurable prefix and *yyyymmdd* is the date the trace file was created. The file extension is .log. If more than one trace file is created on the same date, the time is added after the date to make the filename unique. Trace files are written to the working directory for the data source.

To create a trace file, you can use the available options in the Client Console or specify the `-t nnn` option from a command line. The parameter *nnn* is a bit mask that enables various trace options. If you select a bit mask that contains 1, log messages are also written to the trace file.

Using Log and Trace Files to Resolve Issues

When an error or problem occurs, use log and trace files to troubleshoot the cause.

- Review the log file, which contains a record of all data errors.
- To prevent problems caused by excessive trace and log file size, use the `max_file_size` parameters to limit file size. On UNIX, the Client will crash if the trace file exceeds the system imposed limit.
- If you are having problems and contact Micro Focus Technical Support, they may request a copy of the log file. We recommend that you use a compression utility before sending the log file.
- If Micro Focus Technical Support requests a trace, make sure that the old trace files are deleted before starting the Client with the `-t nnn` (or `-d`) option. You will need to use a compression utility before sending the trace file (which can be quite large). You can use the splitter utility to break up big trace files into smaller, more manageable files. For help on running the splitter program, type `splitter` with no parameters.

  The splitter program can also split binary files (for example, WinZip® files) that are too large to ship as an e-mail attachment. The original file can be reconstructed from the split files by using the copy /B Windows command. When splitting binary files, you must specify the -B option for the splitter program.

Enabling a Trace

NOTE: We recommend that you enable trace options only when directed to do so by Micro Focus Technical Support. Specifically, avoid full tracing, SQL tracing, protocol tracing, or API tracing. The volume of logging data is so large it can dramatically slow performance of dbutility and fill up your hard disk. Compress files using a compression utility before you send them to Micro Focus Technical Support for analysis. Very large trace files should be broken into manageable pieces with the splitter utility. For help on running the splitter utility, type `splitter` with no parameters.

The trace option controls the volume and type of information written to the trace file.

To enable a trace using dbutility

1. Determine the type of trace you want. Then, add the value for each tracing option (see the table below), and use the result for *nnnn*.
2. Specify the `-t nnnn` option using the following syntax:

   ```
   dbutility -t nnnn command
   ```

   where *nnnn* is a bit mask that specifies the tracing option.

   If you are not sure which tracing masks to use, use the `-d` option. This is the equivalent of `-t 0xB7F`, which enables the most useful trace options.

You can enter other command-line options, such as `-U`, `-P`, and `-D` with the trace option. The order is not important as long as all dash (-) options precede each command line argument. (See "dbutility Command-Line Options" on page 234.)

3. (Optional) To analyze performance, you can use an additional command line option, `-m`. This option includes a five-digit millisecond timer in all output messages. The timer is appended to the timestamp as (*mmmmm*).
4. (Optional) To change the trace option when the Databridge Client is running, use the commands explained in "Controlling and Monitoring dbutility" on page 29.

To enable a trace from the Client Console

1. Do one of the following:
   - If the Client isn't running, in the **Explorer** view, click your data source to activate the **Data Source** menu. Then click **Data Source > Advanced > Trace and Log Options**. (Alternatively, you may right-click the data source and then click **Advanced > Trace and Log Options**.) In the dialog box that opens, select the trace options you want. When you start the Client, the service will supply the appropriate trace options.
   - If the Client is running, right-click the run and select **Trace and Log Options**.Select the tracing options you want and click [OK].
2. To stop tracing, clear your selections in the **Trace and Log Options** dialog box.

If you need to enable tracing for a `process` command only, select the data source in Explorer view, then click **Data Source > Advanced > Process with options**, then specify the `-d` option in the dialog box.

To enable tracing for a `clone` command only, the Clone dialog also allows you to specify the `-d` option. This method of enabling tracing is much simpler because it applies the tracing only to the run, while the **Trace and Log Options** are persistent and you must manually switch them off.

Trace Options

Decimal	Hexadecimal	Description
0	0	Disables tracing.
1	0x1	Writes log messages to the trace file in addition to trace information.
2	0x2	Traces all SQL commands as the Databridge Client passes them to the relational database. Typically, these messages are SELECT or UPDATE SQL statements and stored procedure calls.
4	0x4	Traces all DBServer or DBEnterprise communications and key actions associated with Databridge on the host, including RPC calls such as DB_SELECT and DB_READ and their responses.
8	0x8	Traces information on the Databridge Client control tables as they are loaded from the relational database (that is, load tracing).

Decimal	Hexadecimal	Description
16	0x10	Enables relational database API tracing, which traces calls from the Databridge Client to the ODBC, OCI or CLI APIs.
32	0x20	Traces the records that are written to temporary data files (or UNIX pipes) and used by the bulk loader utility during the data extraction phase of cloning.
64	0x40	Traces information exchanged between the Databridge Server and the Databridge Client. The blocks of data are traced as they are read and written to the TCP interface. The messages are listed in DEBUG format, which is an offset followed by 16 bytes in hexadecimal, followed by the same 16 bytes interpreted as EBCDIC text. The non-printable EBCDIC characters are displayed as periods (.).
128	0x80	Traces all messages that are routed through the Databridge Client Manager (primarily messages from the Client Console and Client Configurator to the client, DBClient).
256	0x100	Traces debugging output that is temporarily added to the Databridge Client (primarily engineering releases).
512	0x200	Displays the configuration file parameters as they are processed.
1024	0x400	Enables exchange of traces information between DBClient (or DBClntCfgServer) and the service. The output looks like a DBServer protocol trace, except for the fact that all the data is ASCII.
2048	0x800	Enables SQL tracing while running user scripts during `define` and `redefine` commands.
4096	0x1000	Prints the Read_CB exit line in the trace file. This option is useful only for determining when the execution of a SQL statement ends because the start of the subsequent wait for TCP input is not traced.
8192	0x2000	Traces DOC records. This option provides the same information you would get by setting trace option bit 4, which traces *all* messages used in server communications. This bit allows you to trace only the DOC records. When used in conjunction with 4 bit, this bit is redundant.
16,384	0x4000	This bit is reserved for internal use only.
32,768	0x8000	This bit is reserved for internal use only.
65,536	0x10000	Enables verbose tracing.
131,072	0x20000	Enables thread tracing.
262,144	0x40000	Enables DMSII buffer management tracing.
524,288	0x80000	Enables row count tracing.
1,048,576	0x100000	Enables SQL buffer size calculations.

Decimal	Hexadecimal	Description
2,097,152	0x200000	Enables load balancing tracing.
4,194,304	0x400000	Enables host variable tracing.

Examples

Following are different ways you can set the logging options.

Log Option Example (Decimal and Hexadecimal)	Result
dbutility -t 7	Traces log data (1), SQL (2) and host events (4)
dbutility -t 0x7	
dbutility -t 2943	Traces the most commonly desirable options.
dbutility -t 0xB7F	**NOTE:** Whenever Micro Focus Technical Support asks you for a trace, use the `-d` option, unless you are told otherwise.
dbutility -d	

Trace Messages

Any of the messages in this section may appear in the trace file, depending on which options you select when you execute dbutility. See "Enabling a Trace" on page 211. Successful executions of dbutility are separated by a line of 132 equal signs (=).

Database API Trace

Database API tracing is available via the `-t 16` or `-t 0x10` command-line option. The API trace messages trace calls to ODBC (Microsoft SQL Server) or OCI (Oracle). The following messages may appear when you use database API tracing:

Message	Description
`Abort_Transaction:`	This message indicates that the Databridge Client is making an API call to rollback the current transaction group.
`Begin_Transaction:`	This message indicates that Databridge Client is starting a transaction group.
`BindColumnPtr, stmt=`*`nnnn`*`:`	This message only appears when the configuration parameter `aux_stmts` has a nonzero value. It indicates that the columns involving a host variable in the SQL statement that was just parsed are being bound to a memory address. This message follows every Parse_SQL message.

Message	Description
`Bind_Record: col=`*`number`*`, name=`*`colname`*`, ofs=`*`number`*`, size=`*`number`*`, type=`*`number`	This message appears when the various data columns referenced explicitly or implicitly in a select statement are bound to fields in a program structure. This messages lists the column number (col=*number*), item name (name=*colname*), offset of the field in the structure expressed as a hexadecimal number (entry ofs=*number*), size of the field (in bytes) expressed as a decimal number (size=*number*), and code for the sql_type of the column (type=*number*).
`Cancel_SQL:`	This message indicates that Databridge Client canceled a SQL statement that failed to complete in the designated time. The timer thread performs this operation when it determines that the threshold specified by the configuration parameter `sql_exec_timeout` has been reached.
`Close_Database:`	This message indicates that a database session has been closed. The Databridge Client typically uses two database sessions at a time.
`Commit_Transaction:`	This message indicates that the Databridge Client is making an API call to commit the current transaction group.
`Execute_PreParsed_ SQL for stmt number, table '`*`name`*`'`	This message is immediately followed by the SQL_DATA message, which displays the actual values of the host variables for the pre-parsed SQL statement that is being executed.
`Execute_SQL:`	This message indicates that the Databridge Client called the Execute_SQL procedure, which executes most SQL statements not involving host variables. This call is preceded by one or more calls on Process SQL, which constructs the SQL statements in a temporary buffer.
`Execute_SQL_Direct:`	This message indicates that the Databridge Client called the Execute_SQL_Direct procedure, which executes SQL statements directly (versus from the buffer that Process_SQL creates).
`Fetch_Results: No more rows`	This message appears when the Databridge Client loads the Client control tables and indicates the no more rows are available in the select statement result.
`Fetch_Results: Row retrieved`	This message appears when the Databridge Client loads the Client control tables and indicates that the Databridge Client successfully read the row when it retrieved the results of a select statement.
`OCIBindByName: col_name= '`*`name`*`', addr=0x`*`hhhhhhhh`*`, len =0x`*`hhhh`*`, ind=`*`nn`	This message, which is limited to the Databridge Client for Oracle, indicates that the given column in the parsed SQL statement was bound to a host variable at the given address and the given length.
`Open_Database: user =`*`userid`*`, pwd=******, {db=`*`database`* `| data source=`*`src`*`}, rslt=` *`dbhandle`*	This message indicates that the Databridge Client established a database session with the given parameters. The value *dbhandle* is the address of the internal structure used to hold the connection parameters and is expressed as a hexadecimal number. The Databridge Client typically uses two database sessions. The database designation (db=*database*) refers to the Oracle Client, while all other clients use `data_source`.

Message	Description
`Open_Stmt: Opened stmt nnnn`	This message indicates that the Client allocates a new stmt structure associated with a SQL statement that uses host variables. The Client allocates a maximum number of auxiliary statements (configuration file parameter `aux_stmts`) before it starts reusing these structures. The client reuses the least recently used (the oldest) stmt in this case.
`Oracle NLS parameter name= value`	This message appears when the Databridge Oracle Client connects to the database. One of the first things it does is to read the NLS parameters to determine the language and decimal character being used. The Client then automatically adjusts the connection so the Client operates properly in the given environment. The `bcp_delim` parameter is automatically set the value that SQL*Loader expects.
`Parse_SQL: SQL[number]=stmt`	This message indicates that the SQL statement involving a host variable is being parsed using the stmt in question. Using host variables improves performance by only parsing statements, binding the host variables to specific columns, and executing the statement multiple time after setting the host variables to the desired values.
`Procedure_Exists(name)`	This message indicates that the Databridge Client called the procedure `Procedure_Exists`, which reads the data dictionary to determine if the given stored procedure exists.
`Process_SQL: SQL=SQLText`	This message, which should not be confused with a similar SQL tracing message, overrides the SQL trace when both SQL and API tracing are enabled. This avoids having duplicate entries in the trace.
`SQLBindParameter: col_no=nn , addr=0xhhhhhhhh, len=0xhhhh, ind_addr=0xhhhhhhhh, ind=nn`	This message, which applies to all ODBC Clients, indicates that the given column in the prepared SQL statement was bound to a host variable at the given address and the given length. The ind column is an indicator that is used to mark columns as being null.
`SQL_DATA[number]= ...|...|...`	This message, which should not be confused with a similar SQL tracing message, overrides the SQL trace when both SQL and API tracing are enabled.
`Table_Exists (name)`	This message indicates that the Databridge Client called the procedure `Table_Exists`, which reads the data dictionary to determine if the given table exists.

Bulk Loader Trace

Bulk loader tracing is available via the `-t 32` or `-t 0x20` command-line option. Bulk loader data tracing results in records of the bulk loader data files (or UNIX pipes) being written to the trace file during the data extraction phase of cloning. Bulk loader data trace messages are in the following form:

Message	Description
`Build_Pipe_Stream: table=name, record=data`	where *data* is the actual ASCII data that is written to the temporary data file (or UNIX pipe) used by the bulk loader utility.

Configuration File Trace

The configuration file trace is available via the `-t 512` or `-t 0x200` command-line option. These messages log configuration file parameters as they are being processed.

For example:

`CONFIG: nnn. Config_file_line`

If a binary configuration file is used, the Client uses the same output procedure as the export command to write the text version of configuration file into the trace file.

DBServer Message Trace

Databridge Server message tracing is available via the `-t 4` or `-t 0x4` command-line option. This trace highlights pertinent information during communications with Databridge Server on the host. These messages are listed in the trace file and may include the following:

Message	Description
`Common_Process: DBDeSelect Table=name, stridx= nnnn, rslt= errorcode`	The DBDeselect RPC call is used to deselect data sets that need to be excluded from change tracking. An example would be a data set whose AA Values are invalidated by a garbage collection reorganization. This message shows the name of the data set and its related structure index. If *errorcode* is nonzero, this message is followed by a Host message.
`Common_Process: DBSelect Table=name, stridx=nnnn, rslt=errorcode`	The DBSelect RPC call is used to select data sets when the Databridge Client starts a `process` or a `clone` command. This message shows the name of the data set and its related structure. If *errorcode* is nonzero, this message is followed by a Host message.
`Datasets_CB: dataset_name [/rectype] (strnum), subtype = dd, ds_options=0xhhhhhhhh, misc_flags = 0xhhhhhhhh`	CB stands for callback. This message shows the receipt of a data set information record from the Databridge Server during the execution of a `define` or `redefine` command.
`Define_Table_Items: table= name, item=name data_type (sql_length)`	This message shows the data type and SQL length of data items as they are inserted in the Client control tables. This occurs during execution of the `define` or `redefine` command.
`Get_Response: Req=req Rslt=rslt Len=len`	where *req* is the request type (RPC name), *rslt* is the returned status (typically OK), and *len* is the number of bytes of data that follow the status in the response packet This message indicates that the Databridge Client received a response to a remote procedure call other than DBREAD or DBWAIT.

Message	Description
`Layout_CB: DataSet = name[/rectype], item (number) = name, data_type = dd, dlen = dd, scaling = dd`	CB stands for callback. This message shows the receipt of a data set item layout information record from the Databridge Server during the execution of a `define` or `redefine` command.
`Read_CB: Type=typename StrIdx=iii, aa= hhhhhhhhhhhh`	This message indicates that the Databridge Client received a response from the Databridge Server in response to a DBREAD or DBWAIT remote procedure call. *typename* is the response name (CREATE, DELETE, MODIFY, STATE, DOC, MODIFY_BI, or MODIFY_AI) *iii* is the structure index assigned to the structure when it is selected via the DBSELECT call *hhhhhhhhhhhh* is the value of the absolute address of the DMSII record (For protocol levels greater than 6, this value is all zeros unless the data set uses the AA Value as a key.)
`Read_CB: Type=DOC[AF_HEADER], Afn=afn, RectoQPT=dd, UpdateLev=ul, TS='ts', DMSRel=nnn, DMSBuild=nnn, AudLev=nnn, AFSize=nnn, AFOrigin=orig,firstABSN= absn1, lastABSN=absn2`	This message is always sent to the Client when the Databridge Engine opens a new audit file. It contains information about the audit file, including the audit file number *afn*, the update level *ul*, and the audit file origin *orig*. This last item is particularly useful when using DBEnterprise as it allows the Client to detect what access method is being used to read the audit file (i.e. direct-disk, indirect-disk or cache).
`Read_CB: Type=DOC [type], . . .`	This message is printed only when the `enable_doc_records` parameter is set to Yes in the configuration file. The Databridge Client uses the DOC record only for debugging purposes. DOC records are documentation records that are optionally sent by the Databridge Engine to document the events that occur while Databridge Engine is reading the audit files. The various types include BEG_TRAN, CLOSE, END_TRAN, OPEN, REORG. The rest of the message varies based on the DOC record type. In the case of BEG_TRAN and END_TRAN, the message includes the transaction count, while OPEN and CLOSE messages give information about the job number, the task number and the task name of the program that accessed the DMSII database. REORG DOC records are sent to Client to notify it that some sort of reorganization has occurred for the specified structure index, which is printed out in the message. The remaining DOC records are only identified by type with no additional information.
`Read_CB: Type=LINK_AI StrIdx= number`	This message indicates that the Databridge Client received a DMSII LINK after image from the Databridge Server in response to a DBREAD or DBWAIT remote procedure call.

Message	Description
`Read_CB: Type=STATE, DataSet=name[/rectype] (idx), mode m, AFN afn, ABSN absn, SEG seg, INX inx, DMSII Time timestamp`	Stateinfo shows a location in the audit file. Mode is the same as ds_mode, which indicates whether or not a data set has been cloned, reorganized, purged, and so forth. When the Engine sends the Client global state information, it uses a structure index (*idx*) of 0 and the data set name is Global_DataSet.

Information Trace

Information tracing occurs via the default `-t 1` or `-t 0x1` command-line option. The information messages include the following messages that are not displayed on the screen, as well as all messages that are displayed on the screen.

Message	Description
command line echo	Everything you type at the command line is echoed in the trace file.
`Current date is: day month year`	This is the date you ran the Client. It is used to identify sections of the trace file as there might be several runs of dbutility logged to the same trace file.
`Negotiated Protocol level = n, Host version n.n`	This is the negotiated protocol level that the Databridge Client and the Databridge Server are using to communicate. For example, a protocol level 7 Databridge Client and a protocol level 6 server use a negotiated protocol level of 6 in all communications.

Load Trace

Load tracing is available via the `-t 8` or `-t 0x8` command-line option. Load tracing messages refer to the Client control tables. To check these tables, use the dbutility `display` command. See "dbutility Commands" on page 227.

The Load External messages are displayed only during a dbutility `define` or `redefine` command. They indicate that the Databridge Client is reading table names defined in other data sources to make sure that any newly-defined tables and indexes do not duplicate table names or index names defined previously in other data sources.

The following messages may appear when you use load tracing:

Message	Description
`Load: DataSet = name[/rectype], strnum = number, AFN = afn, ABSN = absn`	This message appears for every data set loaded from the DATASETS Client control table. The message lists the data set name (and the record type for variable-format data sets) as well as the structure number, the audit file number, and the audit block serial number. For most commands, this message appears for only those data sets whose active column is 1.

Message	Description
`Load: dms_item = name, item_number = number, DataSet = name[/rectype]`	This message appears for every DMS item loaded from the DMS_ITEMS Client control table. The message lists the data set name (and the record type for variable-format data sets) as well as the DMSII item name and the corresponding item number. This message does not appear during the `process` and `clone` commands because all of the information the DMS_ITEMS entries contain is in the DATAITEMS Client control table.
`Load: datatable = name, DataSet = name[/rectype]`	This message appears for every data table loaded from the DATATABLES Client control table. The message lists the data set name (and the record type for variable-format data sets) and the table name.
`Load: dataitem = name, datatable = name`	This message appears for every data table loaded from the DATAITEMS Client control table. The message also displays the table name to which the item belongs.
`Load External: DataSource = name, TableName = name, IndexName = name`	The Load External messages appear during a dbutility `define` or `redefine` command only. They indicate that the Databridge Client is reading table names defined in other data sources to make sure that any newly-defined tables and indexes do not duplicate table names or index names defined previously in other data sources.
`Load: global_dataset = Global_DataSet, AFN = afn, ABSN = absn`	This message appears when the global data set is loaded from the DATASETS Client control table. Under normal circumstances, the AFN and the ABSN is 0 as the Databridge Client sets these entries to 0 after it propagates the global stateinfo for all data sets that have a value of 1 in their in_sync columns before the `process` command terminates.

If an OCCURS table filter is being used the Load Trace also includes a display of the filter data, which can also be generated by using the `display` command of the **makefilter** utility. This immediately follows the log message "Loading binary filter file "config\dbfilter.cfg".

```
Filter:  NumFilters = nnn, NumFilterEntries = nnn, ConstantPoolSize=0xhhhh
Constant Pool:
0000 hh hh hh . . .
Table 'name', filter_start = nnn, num_entries = nnn
    Type = ColumnName: item_name = 'name'
   Type = Constant: associated item,_name = 'name', offset = ddd, length =
lll
    Type = Operator: op
    Type = Operator: END
. . .
```

Each OCCURS table that is being filtered has a starting index and a count that represents the number of tokens associated with the table. Constants are associated with an item, whose properties they share. Constants are put into a global constant pool that is shown in debug format. Individual constants are represented in DMSII native form (i.e. binary data). The offset into the constant pool is used to reference a constant, its length is the same as that of the associated data item. An offset of -1 is used to denote a NULL. The filters are represented in reverse polish form. The various operators are represented by 2 or 3 letter terms such as EQL, NEQ, AND, OR and so on. Every filter ends with an END operator.

Protocol Trace

Protocol tracing is available via the `-t 64` or `-t 0x40` command-line option. Protocol traces display the data that is read from or written to the TCP/IP interface during all communication with the Databridge Server.

Messages	Description
`read: number_of_bytes_read`	Received data. These messages are followed by a hexadecimal dump of data in DEBUG format, with all data interpreted as EBCDIC text. Non-printable characters are displayed as periods (.).
`write: number_of_bytes_read`	Sent data. These messages are followed by a hexadecimal dump of data in DEBUG format, with all data interpreted as EBCDIC text displayed in ASCII. (Non-printable characters are displayed as periods (.).

SQL Trace

SQL tracing is available via the `-t 2` or `-t 0x2` command-line option. The following SQL messages may appear in the log file:

Message	Description
SQL=*sqltext*	Indicates general SQL tracing where *sqltext* is the actual SQL command sent to the relational database.
SQL[*number*]=*sqltext*	Indicates SQL tracing that involves host variables in the Databridge Client for Oracle when the configuration parameter aux_stmts has a nonzero value. *Number* is the stmt number, and *sqltext* is the actual SQL command sent to the relational database.
SQL_DATA[*number*]= `...|...|...`	This message shows the data being passed to the database API when executing updates involving previously parsed SQL statements that use host variables. *Number* is the stmt number.

User Script Trace

User script tracing is available via the `-t 2048` or `-t 0x800` command line options. This causes the SQL statements in user scripts to be traced only during a `define` or `redefine` command. This option provides a subset of the "SQL Trace" on page 221. This option has no effect if SQL tracing is enabled.

Read Callback Exit Trace

Read callback exit tracing is available via the `-t 4096` or `-t 0x1000` command line options. This causes the Client to display the message shown below when it exits the read call back procedure. This indicates that the Client is done processing a data buffer and is ready to read the next one. This is only useful when looking for reasons why the Client is running slow. In such cases we recommend that the command line option `-m` be used, as this will give you a finer granularity timestamp.

```
Read_CB: Exit
```

DOC Record Trace

DOC record tracing is available via the `-t 8192` or `-t 0x2000` command line options. This causes the DOC records received from the Databridge Engine to be traced during a `process` or `clone` command. This option is redundant when the Databridge Server message tracing is enabled, see "DBServer Message Trace" on page 217.

Verbose Trace

Verbose tracing is available via the `-t 65536` or `-t 0x10000` command line options. These messages are described in the Databridge Errors and Messages Guide and identified by using the TR_VERBOSE bit, which is the above-mentioned bit in the trace mask.

Thread Trace

Thread tracing is available via the `-t 131072` or `-t 0x20000` command line options. These messages include the following:

Message	Description
`Bulk_loader thread[`*nn*`] {started | ready | exiting}`	(Windows only) These messages indicate a change in the state of the bulk loader thread(s). ◆ `started` indicates that the thread was started. The thread is only started when there are tables to be bulk loaded. ◆ `ready` indicates that the thread is ready to process requests to run the bulk loader. The bulk loader thread gets the load request from its work queue. If there is none, it blocks until one becomes available. ◆ `exiting` indicates that the thread is no longer needed and is exiting. At this point, the Client is ready to start processing audit files, as soon as the index thread finishes creating indexes for all of the tables that were cloned.
`Bulk loader thread[`*nn*`] starting {sql*loader | bcp} for table '`*name*`'`	(Windows only) This message indicates that the bulk loader thread in question is launching the bulk loader for the specified table.

Message	Description
`Console_Reader thread {starting | ready | exiting }`	These messages indicate a state change in the Console thread. The command line Client uses this thread to read console commands from the keyboard. The service-based client (DBClient) uses this thread to handle console commands that originate in the GUI Console and are passed to the Client as RPCs. The various states indicate the following: ◆ `starting` indicates that the thread was successfully started. ◆ `ready` indicates that the thread is waiting for keyboard input in the case of dbutility and waiting for an RPC in the case of DBClient. ◆ `exiting` means that the thread is about to exit.
`Index_creator thread {started | ready | exiting}`	These messages indicate a state change in the index creator thread. ◆ `started` indicates that the thread was started because there are tables for which indexes must be created. ◆ `ready` indicates that the thread is ready to process requests to create indexes for tables. The index creator thread gets the index creation request from its work queue. If there is none, it blocks until one becomes available. ◆ `exiting` indicates that the thread is no longer needed and is exiting. At this point, the Client is ready to start processing audit files.
`Update Worker thread [`*`nn`*`] empty_work_queue, EOT=`*`n`*`, SDW=`*`n`*`, n_active_threads=`*`nn`*	This message, which is only seen when using multi-threaded updates, indicates that the specified update worker found an empty work queue. This happens when the main-thread gets a COMMIT, in which case EOT will be 1, indicating the end of a transaction. It also happens when the program is shutting down, in which case SDW will be 1, indicating a shutdown worker request. The number of active workers needs to count down to zero before the main-thread gets signalled.
`Update Worker thread [`*`nn`*`] running, DataTable = '`*`name`*`', ws = 0x`*`nnnnnnnn`*`, buf = 0x`*`hhhhhhhh`*`, bi_buf = 0x`*`hhhhhhhh`*	This message, which is only seen when using multi-threaded updates,.indicates that the specified update worker is performing an update for the given table. It shows the address of the work descriptor storage block that is used to queue the request. This information is only useful if you are diagnosing a problem that deals with the management of work descriptor storage blocks.
`Update Worker thread [`*`nn`*`] {started | ready | exiting}`	These messages, which are only seen when using multi-threaded updates, indicate a state change in one of the update worker threads. ◆ `started` indicates that the thread was started. The update threads are started at the start of the process command. ◆ `ready` indicates that the thread is ready to process requests to execute updates. The update worker threads get the update requests from their work queues. If there is no request in the queue, the thread blocks until one becomes available. ◆ `exiting` indicates that the thread is no longer needed and that it is exiting. This only happens when the Client is shutting down.

Message	Description
`Waiting for bulk_loader thread to finish`	(Windows only) This message indicates that the bulk_loader thread is not finished loading tables. The main thread, which is ready to enter the fixup phase, must wait for these operations to complete before updates can be processed. When the bulk loader thread is finished it displays the message "`Bulk_loader thread exiting.`"
`Waiting for index_creator thread to finish`	(Windows only) This message indicates that the index_creator thread is not finished. The main thread, which is ready to enter the fixup phase, must wait for these operations to complete before updates can be processed. When the index creator thread is finished, it displays the message "`Index_creator thread exiting`."

DMS Buffer Trace

Buffer size tracing is available via the `-t 262144` or `-t 0x40000` command line options. This causes the Client to display the following messages when a DMS buffer is gotten from the free buffer list or when it is returned to the list.

Message	Description
`XDR_Get_Buffer: buf=0x`*`hhhhhhhh`*`, buf_cnt=`*`dd`*`, sem_cnt=`*`dd`*	This line is printed every time a DMS buffer is gotten off the free list; `buf` is the address of the buffer, `buf_cnt` is the number of DMS buffer that have been allocated and `sem_cnt` is the number of buffers that are available (note that all of these may not yet have been allocated).
`XDR_Return_Buffer: buf=0x`*`hhhhhhhh`*`, sem_cnt=dd`	This line is printed every time a DMS buffer is returned to the free list; `buf` is the address of the buffer, and `sem_cnt` is the number of buffers that are available (note that all of these may not yet have been allocated).

Row Count Trace

Row count tracing is available via the `-t 524288` or `-t 0x80000` command line options. This causes the Client to display the following message when the Client fetches the row count following the execution of a SQL statement. Note that in the case of user scripts, using the `-v` option causes the exact same output to appear in the log file when a user script executes an update statement.

`Rows updated =` *`dd`*

The value *dd* represents the number of rows updated.

Buffer Size Trace

Buffer size tracing is available via the `-t 1048576` or `-t 0x100000` command line options. This causes the Client to display the following messages at startup when the control tables are being loaded.

Message	Description
`Item name: hv_len=dd, sqlcmd(oh=dd, gr=dd), ins=(dd,dd), upd(dd, dd); total ins=(dd,dd), upd=(dd,dd)`	This line is printed every time a data item is processed. It shows the contributions of the item to the various SQL buffer sizes.
`Computed SQLcmd lengths for table name: [hv_len = dd,], sqlbuf_len = dd, sql_buf2_len = dd, sql_buf_size = dd, [thr_sql_buf_size = dd,] sql_buf2_size = dd`	At the end of the processing of the items in a table this summary line is displayed. In the case of the Flat File Client the sections enclosed in square brackets are not present.
`Buffer sizes are gSQLcmd/ SQLCMDLEN = dd/dd, gSQLcmd2 = dd`	When all the tables have been processed this line is displayed. It shows the sizes for the two SQL buffers used by the main thread. When using multi-threaded updates refer to the previous message to see what the size of the update thread SQL buffers are.

B Appendix B: dbutility Commands and Options

This appendix provides a list of all dbutility commands and command-line options. For a complete reference of command-line options paired with their equivalent environment variables and configuration file parameters, see "Reference Tables" on page 310.

NOTE: The hyphen is used for all command options and is valid for Windows and UNIX. Windows users can substitute the slash (/) for the hyphen.

In this Appendix

dbutility Commands

The following table lists all of the dbutility commands and their related command-line options.

Example

Assume you want to override the environment variable for the relational database name (DBDATABASE) and enter a blank instead (which is the same as the using the default database name). To do this, you could enter either of the following:

```
dbutility -U usera -P secret -D "" configure
dbutility -U usera -D -P secret configure
```

Command	Purpose and Result
`dbutility clone` *`datasource dataset1`* `[`*`dataset2... datasetn`*`]`	Related command-line options: Signon options, `-c, -f, -l, -m, -o, -s, -t, -u, -v, -x, -z, -A, -F, -K, -L, -N, -T` Run this command to clone or reclone (not track changes) a list of data sets. Using the dbutility `clone` command is a convenient way of cloning a few data sets without having to update the DATASETS Client control table. For recloning with dbutility clone, see "Recloning" on page 114.

Command	Purpose and Result
`dbutility configure`	Related command-line options: Signon options, `-f, -m, -t, -u, -L, -T` Run once for each set of Client control tables you want to create. The result is empty Client control tables and their indexes in the relational database. See "Creating Client Control Tables" on page 33. **NOTE:** The only time you would run dbutility `configure` again for the same relational database is if you previously executed a dbutility `dropall` command.
`dbutility define` *`datasource host port`*	Related command-line options: Signon options, `-f, -m, -t, -u, -v, -L, -T` Run once for each data source you want to define except when customizing with user scripts. See "Customizing with User Scripts" on page 42. The result is a data source entry in the DATASOURCES Client control table and all other Client control tables containing the DMSII database layout and corresponding relational database table schema information. See "Defining a Data Source" on page 37.
`dbutility display` *`datasource`*	Related command-line options: Signon options, `-a, -f, -m, -t, -B, -L, -T` Run this command to create a report of the Databridge Client control tables for the specified data source. The report is written to the log file in the logs directory. For more information about log files, see "Log and Trace Files" on page 210. Use this command to check the results of the dbutility `define` command or script customization. **NOTE:** When you use dbutility `display`, the column names for the Client control tables are abbreviated. The actual column names and the abbreviated column names are listed for each Client control table in Chapter 6, *Databridge Client Control Tables*.

Command	Purpose and Result
`dbutility drop datasource`	Related command-line options: Signon options, `-m, -t, -v, -L, -T` Run this command to "undo" the results of a dbutility `define`, `generate`, `process`, and `clone` for a specified data source. dbutility `drop` does the following: ◆ Drops tables and their associated stored procedures ◆ Removes the script files in the current directory ◆ Deletes the DMSII record layout and relational database table schema information (for the specified data source) from the Client control tables **CAUTION:** We recommend that you create a separate directory for each data source. When you must drop a data source, make sure that the current directory is the directory you created for the data source. Then, use the `drop` (not `dropall`) command to drop each individual data source. Failure to do this results in dbutility not being able to locate the required scripts, which causes it to terminate with an error.
`dbutility dropall`	Related command-line options: Signon options,`-m, -t, -u, -L, -T` Run this command to drop all tables that have been created by the Databridge Client, as well as to remove the script files in the current directory. Note that your other non Databridge tables are *not* affected. If you are executing dbutility commands from more than one directory, the dbutility `dropall` command locates scripts in the current directory only. In this case, it drops the scripts that it can find and then refrains from removing the Client control table entries for those data sources that it could not properly delete (that is, the data sources whose scripts are in other directories). Therefore, we recommend that you do either of the following: ◆ Change the directory and repeat the dbutility `dropall` command. ◆ Drop each data source via the `drop` command, then use dbutility `dropall` for the final data source. Typically, you do not need to use this command.
`dbutility options export filename`	Related command-line options: `-E, -u` Exports the binary Client configuration file to an editable text file (`dbridge.ini`, by default) that can then be imported, using the `import` command, for use with the Databridge Client. See "Export or Import a Configuration File" on page 242.

Command	Purpose and Result
`dbutility generate` *`datasource`*	Related command-line options: Signon options, `-f, -m, -t, -u, -v, -L, -T` Generates the Databridge Client script files required to populate the Databridge data tables in the relational database. The result is a set of scripts in the dbscripts subdirectory of the working directory. There are approximately five scripts for each DMSII data set. See "Generating Databridge Client Scripts" on page 70.
`dbutility` *`options`* `import` *`filename`*	Related command-line options: `-E, -f` *`filename`*, `-u` Reads the specified input file and writes it as a binary Client configuration file (`dbridge.cfg`, by default). See Export or Import Configuration Files (page 242).
`dbutility process` *`datasource`*	Related command-line options: Signon options, `-f, -l, -m, -o, -s, -t, -v, -w, -z, -C, -K, -N, -L, -T` Run the first time to populate the Databridge tables in the relational database with the DMSII database data. Run subsequent times to update the relational database with only the changes that have been made to the DMSII database since the last time you ran dbutility `process`. **NOTE:** dbutility `process` can also reclone instead of update if ds_mode=0 when you run dbutility `process`. See "Populating the Databridge Data Tables" on page 86 and "Updating the Databridge Data Tables" on page 101.

Command	Purpose and Result
`dbutility redefine` *`datasource`*	Related command-line options: Signon options, `-f, -m, -t, -u, -v, -r, -R, -L, -T` The `redefine` command compares the old and new layouts of all the tables generated for data sets whose status_bits columns indicate a structural reorganization. The `redefine` command also does the following: ◆ If a new data set appears, the `redefine` command defines it with its corresponding active column set to 0 in the DATASETS Client control table (unless the `suppress_new_datasets` parameter is set to False). When the active column is set to 0, the `redefine` command will not perform any mapping for it unless you set the active column in the DATASETS entry to 1 in the corresponding data set mapping customization user script. ◆ If a data set no longer exists, the `redefine` command deletes all the associated Client control table entries, but does not drop the data tables and their associated stored procedures. You must delete them by running the corresponding scripts (these are not removed either). ◆ The `redefine` command refreshes the data set mapping in three instances. First, the mapping is refreshed when the data set's DS_Needs_Remapping bit is set (value 4). Use this method when you modify the DATASETS and DMS_ITEMS tables. Because the data set mapping customization scripts are not run in this instance, you must execute the `runscript` command prior to executing the `redefine` command. Secondly, mapping is refreshed if a data set's active column is set to 1, and the DS_Needs_Mapping bit is set (value 1) in the status_bits column. Thirdly, mapping is refreshed when you set the DS_Needs_Redefining bit (value 8). In this case, the `redefine` command refreshes the DMSII layout as well. ◆ If a data set has an active column set to 0, and the DS_Needs_Mapping bit is set (value 1) in the status_bits column, the layout information is refreshed, but no mapping is performed. ◆ The `redefine` command sets the active columns of the Client control tables equal to zero for data sets that contain global data. No other data sets are affected by the `redefine` command. You must execute a `generate` command after a `redefine` command to update the scripts.

Command	Purpose and Result
`dbutility [options] refresh datasource dataset`	Related command-line options: Signon options The `refresh` command enables you to drop and recreate all of the stored procedures for the tables associated with the given data set in the specified data source. It is a variation of the `runscript` command that is designed to run portions of the Databridge Client scripts (`script.drop.tablename` and `script.create.tablename`). This command is useful when you want to add a new column to a table after a DMSII reorganization. If _ALL is specified for *dataset*, the program refreshes the stored procedures for all active tables. If a specific data set is specified, only the stored procedures for that data set refreshed. All data sets specified must already exist. **NOTE:** When variable-format data sets are involved, the tables for all the record types that have their active column set to 1 in the DATA SETS Client control table are refreshed.
`dbutility reload datasource backupfile [dataset, dataset2...]`	Related command-line options: Signon options, `-f, -k, -m, -t, -L, -T` Restores the Client control tables from a file that the `unload` command created. If a *datasource* of _ALL is specified, all data sources contained in the backup file are restored. If a specific data source is specified, only the entries for that data source are restored from the file. The reload operation is sensitive to the version of the program that wrote the backup file. As an option, you can provide a list of data sets to be loaded. If such a list does not exist, all data sets for the given data source are reloaded. The `-k` option preserves the stateinfo for data sets whose format levels and item counts remain unchanged.
`dbutility rem . . .`	A dummy command that opens the log file and echoes the command line into it. The purpose of this command is to make it possible for script files or operators to create a log file entry to document the action that was taken. For example: `dbutility rem accidentally killed the Client – JaneDoe`
`dbutility reorg datasource`	Related command-line options: Signon options Generates new scripts for stored procedures and refreshes the relational database stored procedures. The `reorg` command resets ds_mode to 2 (indicating that the data set is in tracking mode). Typically, you would use the reorg command after the `redefine` command when a reorganization has occurred on the DMSII database.

Command	Purpose and Result
`dbutility rowcounts datasource`	Related command-line options: Signon options, `-f, -m, -t, B, -L, -T` Creates a report in the log file with all the row counts for all the active tables associated with the data source.
`dbutility runscript filename`	Related command-line options: Signon options, `-m, -n, -t, -L, -T` Use this command to run user scripts (for example, `script.user_define.primary_tablename`) or Databridge Client scripts (for example, `script.create.tablename`). The Databridge Client expects the user scripts to be located in the directory specified by `user_script_dir` in the Databridge Client configuration file. To override this directory specification, use the `-n` option, as follows: `dbutility -n runscript drive:\directory\scriptfilename` The `runscript` command automatically enables SQL tracing and logging (similar to setting the `-t 3` option). The `runscript` command runs in transaction mode so that if an error occurs, all changes are rolled back. You can then fix your scripts and run them again.
`dbutility switchaudit datasource`	Related command-line options: Signon options, `-f, -k, -m, -t, -v, -L, -T` Run this command to close an audit file on the host. This ensures that you get the most current information possible because the Databridge Engine does not read the currently open audit file. DMSII audit files are explained in detail in the *Databridge Host Administrator's Guide*. **IMPORTANT:** Do not use this command unless you check with the DMSII database administrator first.
`dbutility tcptest datasource [host port] length count`	Related command-line options: Signon options, `-f, -m, -t, -L, -T` Run to test the TCP/IP interface between the Databridge Client and the server. You can use this command as a diagnostic tool to help troubleshoot slow network connections. If the data source is already defined, you do not have to specify the host and the port parameters; the program reads them from the DATASOURCES table entry instead. *Length* is the size of the message to use and *count* is the number of iterations that should be executed. 8000 and 1000 are standard values with these options.

Command	Purpose and Result
`dbutility unload datasource backupfile`	Related command-line options: Signon options, `-f, -k,-m, -t, -L, -O, -T` Creates a file containing a backup of the Client control tables. If a *datasource* of _ALL is specified, all of the data sources that are found in the Client control tables are written to the backup file *backupfile*. If any other data source is specified, only the entries for that data source are written to the file.

dbutility Command-Line Options

This section explains the command-line options you can enter with dbutility commands, with all lowercase options first in alphabetical order and all uppercase options following. Use the following syntax to include the command-line options:

`dbutility [options] command`

where [*options*] begin with the forward slash (/) or hyphen (-) and are followed by a letter and a possible argument, as listed in the following table. If you use a UNIX Client, all options must start with a hyphen (-). Note the following guidelines for using command-line options:

- All options are case-sensitive.
- The options can be used in any order.
- When you enter any of these command-line parameters, do *not* type the [brackets]. The [brackets] indicate that the command-line parameter is optional.
- Following the option letter, you can enter option arguments with or without a space. For example, `-tl` and `-t l` are equivalent.
- If an argument is blank (an empty character string), you can omit it if the next entry on the command line is another option (for example, -D). Otherwise, you must enter the blank argument as `" "` (quotation marks) with both leading and trailing spaces.

Examples

Assume you want to override the environment variable for the relational database name and enter a blank instead (which is the same as the using the default database name). To do this, you could enter either of the following:

```
dbutility -U usera -P secret -D "" configure
dbutility -U usera -D -P secret configure
```

(Both of these examples override the environment variable DBDATABASE.) For a complete reference of command-line options paired with their equivalent environment variables and configuration file parameters, see “Reference Tables” on page 310.

This option	Does this
`-?`	Displays short help, which includes dbutility command syntax and parameters but not options.
`-a`	Toggles the setting of the `display_active_only` parameter.

This option	Does this
`-c`	Toggles the setting of the `defer_fixup_phase` parameter during a `clone` command.
`-d`	When used with any dbutility command, this option enables full tracing. This is the same as entering `-t 8191` (or `-t 0x1FFF`). If you are not sure whether to use the `-d` option or the `-t` option, you may want to use the `-d` option. It is often better to have too much tracing information than not enough.
`-f` *`filename`*	Specifies an input configuration file other than the default filename when used with an import command. If *filename* doesn't start with a backslash (\) on Windows or a forward slash (/) on UNIX, it is assumed to be in the config subdirectory of the working directory. Conversely, if filename starts with the appropriate slash, it is taken to a full file specification.
`-h`	Displays long help, which includes dbutility command options, syntax, and parameters.
`-k`	Used with a `reload` command to preserve the stateinfo for data sets whose format levels and item counts remain unchanged. Used by the `process`, `clone` and `drop` commands in a multi-source environment to force the client drop tables rather than running the cleanup script. This is designed to be used after a reorg that requires a reclone, one would otherwise have to physically drop the affected table(s) to get the clone to recreate the table(s) with the new layout. Now you can use the -k option on the first data source that gets recloned; from thereon the -k option must obviously not be used.
`-l`	(SQL Server only) forces the client to use the bcp utility instead of the BCP API.
`-m`	Includes a 5-digit millisecond timer in all trace messages. The millisecond timer is appended to the timestamp in the trace file. This option does not affect log file output.
`-n`	Used with the `runscript` command to override your entry for `user_script_dir` so that you can run any script that is not located in that directory.
`-o`	Overrides shutdown periods, including those initiated by the stop_time and end_stop_time values in the DATASOURCES Client control table for the data source entry when the `controlled_execution` configuration file parameter is enabled.

This option	Does this
`-r`	Forces the parameter `use_dbconfig` to be treated as False when running a `redefine` command. The `use_dbconfig` parameter is internal and not directly editable. However, this parameter is set to True in the following situations: ◆ When a data source is created using the Client Configurator ◆ When a `define` command creates the data source and no users scripts are encountered ◆ When you run the dbscriptfixup program In all other cases, including after an upgrade using the migrate program, the `use_dbconfig` parameter is set to False. Its purpose is to ensure that the Client Configurator isn't run with improperly setup Client control tables. This would cause all changes that were made via user scripts to be lost.
`-s`	Loads relational database tables that cannot be loaded via the bulk loader utility (SQL*Loader for Oracle and bcp for Microsoft SQL Server). The `-s` option inhibits the use of the bulk loader utility during the data extraction phase of cloning. The Databridge Client loads the table using SQL statements instead. **CAUTION:** Use this option only when certain tables will not load via the bulk loader utility. Do not use it under normal circumstances. The `-s` option slows the cloning process considerably. The -s option is also used by the `createscripts` command to add the data source name in all where clause of the SQL statements that are created.
`-t` *mask*	Enables trace options designated by *mask*. See "Enabling a Trace" on page 211. If you are unsure whether to use the `-d` option or the `-t` option, you may want to use the `-d` option. It is often better to have too much tracing information than not enough.
`-u`	Creates override conditions that dbutility would otherwise interpret as a possible user error. These situations include the following: ◆ Creating a second set of Client control tables within one relational database. In this case, the second set of tables must be owned by a different user ID. ◆ Starting over by dropping and creating the Client control tables, even though this removes all of the state information associated with the user tables. ◆ Attempting to define a data source that already exists. With the dbutility `dropall` command, use this option to drop Databridge Client tables that still contain data.

This option	Does this
`-v`	Causes the Databridge Client to write some additional information to the log file and sometimes to the screen. The most useful one is causing user scripts executed by the client to write the number of rows affected by INSERT, UPDATE and DELETE SQL statements to the log file.
`-w`	Toggles the setting of the `use_dbwait` parameter.
`-x`	Makes the `clone` command clone all active data sets *except* for those specified at the command line.
`-y`	Forces the Client to reclone data sets with a mode of 11 and 12.
`-z`	**CAUTION:** This option is for troubleshooting only in a test environment. **Do not use it in a production environment.** Allows dbutility to simulate a dbutility `process` or `clone` command without actually storing data. For troubleshooting purposes. After the Client control tables are loaded for the specified data source, the program sets a global flag that disables all SQL execution by the ODBC (Microsoft SQL Server) or OCI (Oracle) interface routines. Using this option with statistics enabled (`show_statistics` and `show_perf_stats` both set to True) to determine the rate at which the Databridge Engine and the Databridge Client can process data *without* including any of the additional delays caused by the relational database. If this rate is significantly slower than the rate you get when the `-z` option is set, you can conclude that the slowness is caused by the actual relational database, which might need to be tuned.
`-A`	Prevents the Client from deleting the tables when cloning virtual data sets that have the DSOPT_Ignore_Dups option bit (value 32) set in the ds_options column of the DATASETS Client control table. Instead, it drops their indexes and appends the new records to the tables.
`-B`	Causes the `display` command to report only the second half of the DATASETS Client control table to the trace.log file, then causes the program to quit. (In most cases, the information in the second half of the DATASETS Client control table is the only information you actually need from that table.)
`-C`	Toggles the `inhibit_console` parameter. On UNIX, this doesn't apply if you run `dbutility` as a background run.
`-D` *`databasename`*	(Oracle only) Specifies the relational database you are using.
`-F` *`afn`*	Makes the Client act as if a `QUIT AFTER afn` command had been executed. Applies only to `process` and `clone` commands. The range of values allowed are 1 through 9999.
`-K`	Inhibits audit file removal WFLs from running on the host during a `process` command. This option is also implied during a `clone` command and when used with the `-z` option.
`-L`	Forces the Client to start using a new log file.
`-N`	Toggles the setting of the `enable_optimized_sql` parameter.

This option	Does this
`-O ODBCdatasource`	Specifies an ODBC data source that the Client uses to connects to the Microsoft SQLServer database.
`-P password`	Defines the password for accessing the relational database.
`-R`	Treats every data set as if its DS_Needs_Redefining status bit is set and allows the program to rebuild the control tables when you change a configuration parameter such as `optimize_updates` or `read_null_records`.
`-T`	Forces the Client to start using a new trace file. See Log and Trace Files. (page 210)
`-U userid`	Specifies the user ID defined in the relational database.
`-V`	Used with the `unload` command, this option lets you specify the control table version you want. To create tables that you can use with an older Client version, use the value that corresponds to that version. Values for the Databridge Client are as follows: 31 Version 6.6 30 Version 6.5 SP1 29 Version 6.5 26 Versions 6.2 and 6.3 25 Version 6.1 SP3 24 Version 6.1 23 Version 6.0 22 Version 5.2.0.12 21 Version 5.2.0.3 20 Version 5.2 (base release) 19 Version 5.1
`-W`	**NOTE:** Uses Integrated Windows Authentication to connect to the SQL Server database.
`-X password`	Used to define a host password. The host password is required only when it is configured on the host in the DBServer control file. **CAUTION:** The password is currently not encrypted in communications between the Databridge Client and Databridge Server.

This option	Does this
`-Y reclone_all`	Causes a `process` command to reclone all data sets. The text `reclone_all` is required and prevents you from accidentally recloning everything, when you actually wanted to specify the `-y` option. When using the console, specify this option by selecting a check-box labeled “Reclone all active data sets.” To find this option, click the data source in Client Console **Explorer** view to activate the **Data Source** menu, then click **Data Source > Advanced > Process with options**.
`-Z`	Forces a `process` or `clone` command to drop and create the tables of all recloned data sets, regardless of the use of the deleted_record or expanded update_type columns.

C Appendix C: Client Configuration

This appendix lists the configuration parameters for Databridge Client.

In this Appendix

Client Configuration Files

The Databridge Client 6.1 and later uses binary configuration files. Binary configuration files are compatible with both service-initiated operations and command-line operations. However, if you use the service, you must use binary configuration files. (Command-line operations can use either binary or text configuration files. For information about creating text configuration files, see "Export or Import a Configuration File" on page 242.)

The Databridge Client software uses the following configuration files:

- The service configuration file (`dbcontrol.cfg`). This file contains settings for the service (Windows) or daemon (UNIX) that specify scheduling, passwords, logs, and more. For more information, see Appendix F, "Appendix F: Service Configuration," on page 337.
- Data source configuration files (`dbridge.cfg`) used by the Databridge Client programs (DBClient, DBClntCfgServer and dbutility). Each data source has its own configuration file, which can be updated using the Client Console and Client Configurator. The Client configuration file overrides any equivalent parameter settings on the host.

In a new installation, the service creates the service configuration file in the `config` directory of the service's working directory (also referred to as the global working directory) the first time the service is started. The service also creates the `logs` and `scripts` directories of the service's working directory at that time. When you add a data source in the Client Console, the service creates a binary configuration file (`dbridge.cfg`) for the data source. Data source configuration files are stored in the `config` subdirectory of the *data source's* working directory.

In an upgrade, as long as you are upgrading from version 6.1 SP3 or newer, you should be able to use the same working directory. If this is not possible, rename the old working directory and use the Migrate utility to recreate it using the old name (you must use a different working directory). You will also want to use this utility if you are upgrading from software older than 6.1 or you are switching from command line operations to service based operations. The Migrate utility takes your existing configuration files and creates new data source configuration files from them. It also creates a new service configuration file and adds your preexisting data sources to it.

How Do I Edit the Configuration File?

CAUTION: You should *never* directly modify a binary configuration file. This will corrupt the file.

Each time you change your configuration settings in the Client Console or Client Configurator, you update the binary configuration files. If you need to change a parameter that is not supported by the Client Console or Client Configurator, you can export the binary configuration file to a readable text file. After you edit the text file, you can import the updated file to create a new binary configuration file. The `import` command performs all the necessary checks to ensure that your changes are valid. If you don't like the idea of using binary files for command-line operations, you can force the `export` command to replace the binary file with an equivalent text file.

Because passwords are encoded in the configuration file, there is no way to read them. If a password is wrong, export the configuration file and reenter the password as plain text. Then, import the file and export it again to remove the unencoded password from the text configuration file. Alternatively, you can use the Client Console or the dbpwenc utility to change passwords.

Export or Import a Configuration File

Use the `export` command to create an editable text file from your configuration file. If no configuration file exists, the `export` command creates a text file with the default configuration settings. After you make your changes, the `import` command will convert the text file to binary for use with the Client. Text configuration files can only be used with the command-line Client.

The `export` and `import` commands are typically used from a command line; the Client Console supports only the `export` command (**Export Configuration**). When you export the configuration file, the Databridge Client creates a text file that reflects the current values of the configuration parameters. Any passwords in the file are automatically encoded.

CAUTION: If you overwrite an existing text configuration file with this file, any comments you had in the previously existing file will be lost. To change or encode a password that was manually entered in a text configuration file, use the password encoding utility from a command line. See Change or Encode a Password. (page 244)

To export the configuration file for a data source

- Open a command session and run the following command:

  `dbutility [`*`options`*`]export [`*`filename`*`]`

  where [*filename*] is an optional parameter to name an exported file something other than the default (`dbridge.ini`).

The exported text file is written to the `config` subdirectory of the data source's working directory.

Option	Description
-u	Use this option if you export a text file named `dbridge.cfg`. This allows the Client to overwrite the existing binary configuration file `dbridge.cfg` with a text configuration file of the same name. For example: `dbutility -u export dbridge.cfg`

To import the configuration file for a data source

Use this procedure to create a binary configuration file from a text Client configuration file.

- Open a command session and run the following command:

  `dbutility [`*`options`*`] import [`*`filename`*`]`

  where [*filename*] is an optional parameter to specify a filename other than the default (`dbridge.ini`). When no option or filename is specified, the import command processes the text file `dbridge.ini` in the `config` directory and creates an equivalent binary configuration file, `dbridge.cfg`, in the same directory. If the file `dbridge.ini` does not exist in this location, the import command creates a binary configuration file with the default values. If the text file contains errors, the Client returns an error to help you identify the problem and no binary file is created.

Option	Description
`-f` *`filename`*	Use this option to specify a filename or path other than the default. If this option is omitted, the Client tries to read the file `dbridge.cfg` in the config directory of the data source's working directory. To indicate a different location, type a backslash (Windows) or forward slash (UNIX) followed by the full path, including filename. For example, `/home/user/xyz/foo/myconfig.cfg`
`-u`	This option is required to allow the existing configuration file to be overwritten with a new file with the same name. Otherwise, the Client will try to read (import) the configuration from a file named `dbridge.ini.` For example, the following command: `dbutility -u -f dbridge.cfg import` imports (reads) a file named `dbridge.cfg` and creates the binary configuration file `dbridge.cfg` regardless of whether the imported file is a text or binary file.

To export the service configuration file

- Open a command session and from the Client's global working directory, run the following command:

```
dbctrlconfigure export
```

This command reads the binary configuration file `dbcontrol.cfg` in the `config` directory of the global working directory and creates an editable text configuration file (`dbcontrol.ini`) in the same location.

To import the service configuration file

- Open a command session and run the following command:

  ```
  dbctrlconfigure import
  ```

  This command reads the text configuration file `dbcontrol.ini` in the `config` directory of the global working directory and creates a binary configuration file named `dbcontrol.cfg` in the same location.

Change or Encode a Password

Use this procedure for any of the following situations:

- To change the password for the user ID that you use to sign on to the database in your text or binary configuration file
- When the KEY (host password) on the host has changed and you need to update and encode the `hostpasswd` value in the Client configuration file. The KEY can only be changed by editing the DBServer control file (DATA/SERVER/CONTROL) on the host.

Passwords in the Client configuration file are automatically encoded when you use the export command to export the file (see "Export or Import a Configuration File" on page 242).

To change a password

1. When using a text Client configuration file, make sure that the password and hostpassword entries are uncommented.

   ```
   [signon]
   user          = user1
   password      =
   datasource    = BANKDB_S
   hostpasswd    =
   ```

2. Open a command prompt session and set the directory to the working directory of the appropriate data source.
3. To change or encode the password, enter the following command:

   ```
   dbpwenc -p
   ```

dbpwenc Options	Description
-h	Displays help for the password encoding utility (dbpwenc).
-p	Changes the relational database password and encodes it. You must supply both the new and the old passwords.
-q	Changes the Databridge Server password and encodes it. You must supply both the new and the old passwords.
-f *filename*	*filename* is the name you have given the Databridge Client configuration file. Use this option only when you have changed the configuration file name from its default (dbridge.cfg). If necessary, you can also include the directory path.

4 Make sure that the host password matches the password in the Databridge Server control file (DATA/SERVER/CONTROL) on the host.

The Databridge Client configuration file is updated with the encoded password, similar to the following example:

```
[signon]
user          = user1
password      = 9610ac320e9571e0d35020d15190610412131816
datasourse    = BANKDB_S
hostpasswd    = e617dc2316120d0a371003031c00230067c99551
```

Command-Line Options

The following command-line options have no equivalent configuration parameter:

Option	dbutility Command	Description
?		Short help
`-d`	All	Full tracing
`-f` *`filename`*	All	Specifies the configuration filename.
`-h`		Long help
`-k`	`reload`	Makes the command preserve the stateinfo of data sets that have a ds_mode of 2 and have not been reorganized.
`-m`	All	Includes a 5-digit millisecond timer in all output messages.
`-r`	`redefine`	Toggles the setting of the parameter `use_dbconfig`, which determines whether the command uses user scripts.
`-t` *`mask`*	All	Log file and tracing options

Option	dbutility Command	Description
-u	configure, define, redefine, generate and dropall	Unconditionally performs the requested command, overriding any warnings that would be displayed without this option
-w	clone or process	Toggles the setting of the use_dbwait parameter.
-x	clone	Clones all active data sets except those specified at the command line
-y	process	Instructs the Client to reclone all data sets whose ds_mode has a value of 11 or 12.
-z	clone or process	Instructs dbutility to not update the relational database during a clone or process command. This option is useful in determining how much non-database time is required to extract data for a data set.
-A	clone or process	Prevents the Databridge Client from dropping a table during a clone (the Databridge Client drops only the index).
-B	display	Causes the display command to quit after displaying the DATASETS Client control table records.
-D *database*		Specifies the name that identifies the Oracle instance or the Net8 service that is being accessed.
-F afn	process	Use this option make the Client act as if a QUIT AFTER *afn* command had been executed. It applies to process and clone commands only. The range of values allowed are 1-9999.
-K	process	Prevents the audit file removal WFL from being run on the mainframe after the Engine finishes processing an audit file.
-L	All	Forces the Client to start using a new log file.
-O *ODBCdatasource*	All	Specifies the ODBC data source to connect to (SQL Server Client only).
-P *password*	All	Sets the password associated with the user ID for the relational database. The password is limited to 30 characters.
-R	redefine	Forces all data sets to be redefined.
-T	All	Forces the program to create a new trace file when tracing is enabled.

Option	dbutility Command	Description
`-U userid`	All	Specifies the user ID for the relational database. The user ID must have the appropriate resource privileges for the designated relational database.
`-W`	All	Specifies that the configuration parameter `use_nt_authen` should be set to True.
`-X`	`define, redefine, clone, process`	Specifies the host password.
`-Y`	`process`	Causes all active data sets to be recloned.
`-Z`	`clone` or `process`	Forces the program to drop and create the tables of all recloned data sets, regardless of the use of the delete_record or expanded update_type columns.

Syntax

Follow these conventions in the configuration file:

- For hexadecimal values, use the 0x*nnnn* format.
- A semicolon (;), except within double quoted strings, indicates that the remainder of the current line is a comment.
- Section headers are enclosed in square brackets.
- Section headers and parameter names are not case-sensitive.
- Spaces and tabs between entries are ignored; however, spaces within double quoted values (for example, password values) are read.
- If you are not using a parameter, either comment the parameter out or delete the corresponding line in the configuration file. Do not leave an uncommented parameter without a value after the equal sign (=). Doing so results in syntax error.

You can specify some of these parameters only in the Client configuration file. Other parameters have equivalent command-line options and environment variables. For a complete list of configuration file parameters, their equivalent command-line options, and their related Client command, see “Reference Tables” on page 310.

Sample SQL Server Client Configuration File

You can view the configuration file for SQL Server by using the Export command. See “Export or Import a Configuration File” on page 242.

To use a parameter that is commented out, delete the semi-colon (;) and after the equals sign (=), enter a value that is appropriate for your site. Boolean parameters can be represented by True or False.

In the example below, some of the commented-out parameters have a value of -1. These parameters include the Databridge Engine control file parameters that can be overridden by the Client (commit frequency parameters and engine workers). This value indicates that the corresponding parameter in the Databridge Engine (or Server) control file will not be overridden by the Client. Do not uncomment these lines, unless you want to supply an actual value. Otherwise, the Client will issue an error.

```
;
; Databridge Client version 6.6 SQL Server configuration file -- generated
programmatically
;

[Signon]
;user                   = USERID
;password               = PASSWORD
;datasource             = DATASOURCE
use_nt_authen           = false
;hostpasswd             = HOSTPASSWD

[Log_File]
file_name_prefix        = "db"
;max_file_size          = 0
logsw_on_size           = false
logsw_on_newday         = false
newfile_on_newday       = true
single_line_log_msgs    = false

[Trace_File]
file_name_prefix        = "trace"
;max_file_size          = 0

[Bulk_Loader]
bcp_batch_size          = 100000
;bcp_code_page          = <code page>
;bcp_copied_msg         = "rows copied"
bcp_packet_size         = 0
max_errors              = 10
verify_bulk_load        = 1

[Params]
;
;  (1) define/redefine command parameters
;
allow_nulls             = true
auto_mask_columns       = true
bracket_tabnames        = false
clr_dup_extr_recs       = true
default_user_columns    = 0x00000000
dflt_history_columns    = 0x00000000
enable_dynamic_hist     = false
enable_dms_links        = false
;external_column[n]     = ["name"][,[sql_type][,[sql_length][,"default"]]]
extract_embedded        = false
flatten_all_occurs      = false
force_aa_value_only     = 0
```

```
history_tables          = 0
;maximum_columns        = 0
min_varchar             = 4
minimize_col_updates    = false
miser_database          = false
optimize_updates        = false
read_null_records       = true
reorg_batch_size        = 50000
sec_tab_column_mask     = 0x00000000
split_varfmt_dataset    = false
strip_ds_prefixes       = false
suppress_new_columns    = false
suppress_new_datasets   = true
use_bigint              = false
use_binary_aa           = false
use_clustered_index     = false
use_column_prefixes     = false
use_date                = false
use_datetime2           = false
use_decimal_aa          = false
use_internal_clone      = false
use_nullable_dates      = false
use_primary_key         = false
use_stored_procs        = false
use_time                = false
use_varchar             = true
;
; (2) process/clone command parameters
;
alpha_error_cutoff      = 10
automate_virtuals       = false
aux_stmts               = 100
century_break           = 50
;commit_absn_inc        = -1
;commit_longtrans       = -1
;commit_time_inc        = -1
;commit_txn_inc         = -1
;commit_update_inc      = -1
controlled_execution    = false
convert_ctrl_char       = false
;convert_reversals       = -1
correct_bad_days        = 0
dbe_dflt_origin         = direct
defer_fixup_phase       = false
discard_data_errors     = false
display_bad_data        = false
enable_doc_records      = false
enable_minimized_col    = false
enable_optimized_sql    = true
;engine_workers         = -1
error_display_limits    = 10,100
inhibit_8_bit_data      = false
inhibit_console         = false
inhibit_ctrl_chars      = false
inhibit_drop_history    = false
```

```
linc_century_base       = 1957
max_clone_count         = 10000
max_discards            = 0,100
max_retry_secs          = 20
max_srv_idle_time       = 0
max_wait_secs           = 3600,60
min_check_time          = 600
n_dmsii_buffers         = 0
n_update_threads        = 8
null_digit_value        = 9
numeric_date_format     = 23
preserve_deletes        = false
set_blanks_to_null      = false
set_lincday0_to_null    = false
show_perf_stats         = true
show_statistics         = true
show_table_stats        = true
sql_exec_timeout        = 180,0
statistics_increment    = 100000,10000
stop_after_fixups       = false
stop_after_gc_reorg     = false
stop_after_given_afn    = false
stop_on_dbe_mode_chg    = false
suppress_dup_warnings   = false
track_vfds_nolinks      = true
use_ctrl_tab_sp         = true
use_dbwait              = false
use_latest_si           = false
;
; (3) Server options
;
;shutdown {until | for} hh:mm after stop
;stop {before | after} task "name"
;stop {before | after} time hh:mm[:ss]
;
; (4) generate command parameters
;
;global_table_suffix    = "str"
;create_table_suffix[n] = "str"
;global_index_suffix    = "str"
;create_index_suffix[n] = "str"
;user_column_suffix[n]  = "str"
;
; (5) miscellaneous command parameters
;
display_active_only     = true
;
; (6) user scripts
;
user_script_bu_dir      = ""
user_script_dir         = "scripts"
;
; (7) external data translation parameters
;
use_ext_translation     = false
```

```
eatran_dll_name         = "DBEATRAN.DLL"

[Scheduling]
;
; dbutility process command only
;
;daily                  = 08:00, 12:00, 17:00, 24:00
;exit_on_error          = false
;sched_delay_secs       = 600
;sched_minwait_secs     = 3600
;sched_retry_secs       = 3600
;blackout_period        = 00:00, 02:00

[EbcdicToAscii]
; e1 = a1
; e2 = a2
;  ...
; en = an
;

[DBConfig]
default_date_fmt        = 21
```

Sample Oracle Client Configuration File

```
;
; Databridge Client version 6.6 Oracle configuration file -- generated
programmatically
;

[Signon]
;user                   = USERID
;password               = PASSWORD
;database               = DATABASE
;hostpasswd             = HOSTPASSWD

[Log_File]
file_name_prefix        = "db"
;max_file_size          = 0
logsw_on_size           = false
logsw_on_newday         = false
newfile_on_newday       = true
single_line_log_msgs    = false

[Trace_File]
file_name_prefix        = "trace"
;max_file_size          = 0

[Bulk_Loader]
;bcp_code_page          = <code_page>
;bcp_decimal_char       = -1
enable_parallel_mode    = false
inhibit_direct_mode     = false
max_errors              = 10
```

```
max_temp_storage        = 400M // Windows only
sqlld_bindsize          = 65536
sqlld_rows              = 10000
verify_bulk_load        = 1

[Params]
;
;  (1) define/redefine command parameters
;
allow_nulls             = true
clr_dup_extr_recs       = true
default_user_columns    = 0x00000000
dflt_history_columns    = 0x00000000
enable_dms_links        = false
enable_dynamic_hist     = false
;external_column[n]     = ["name"][,[sql_type][,[sql_length][,"default"]]]
extract_embedded        = false
flatten_all_occurs      = false
force_aa_value_only     = 0
history_tables          = 0
;maximum_columns        = 0
min_varchar             = 4
minimize_col_updates    = false
miser_database          = false
optimize_updates        = false
read_null_records       = true
reorg_batch_size        = 50000
sec_tab_column_mask     = 0x00000000
split_varfmt_dataset    = false
strip_ds_prefixes       = false
suppress_new_columns    = false
suppress_new_datasets   = true
use_binary_aa           = false
use_clob                = false
use_column_prefixes     = false
use_decimal_aa          = false
use_internal_clone      = false
use_nullable_dates      = false
use_primary_key         = false
use_stored_procs        = false
use_varchar             = true
;
; (2) process/clone command parameters
;
alpha_error_cutoff      = 10
automate_virtuals       = false
aux_stmts               = 100
century_break           = 50
;commit_absn_inc        = -1
;commit_longtrans       = -1
;commit_time_inc        = -1
;commit_txn_inc         = -1
;commit_update_inc      = -1
controlled_execution    = false
convert_ctrl_char       = false
```

```
;convert_reversals      = false
correct_bad_days        = 0
dbe_dflt_origin         = direct
defer_fixup_phase       = false
discard_data_errors     = false
display_bad_data        = false
enable_doc_records      = false
enable_minimized_col    = false
enable_optimized_sql    = true
;engine_workers         = -1
error_display_limits    = 10,100
inhibit_8_bit_data      = false
inhibit_console         = false
inhibit_ctrl_chars      = false
inhibit_drop_history    = false
linc_century_base       = 1957
max_clone_count         = 10000
max_discards            = 0,100
max_retry_secs          = 20
max_srv_idle_time       = 0
max_wait_secs           = 3600,60
min_check_time          = 600
n_dmsii_buffers         = 0
n_update_threads        = 8
null_digit_value        = 9
numeric_date_format     = 23
preserve_deletes        = false
;rollback_segment_name  = ""
set_blanks_to_null      = false
set_lincday0_to_null    = false
show_perf_stats         = true
show_statistics         = true
show_table_stats        = true
sql_exec_timeout        = 180,0
statistics_increment    = 100000,10000
stop_after_fixups       = false
stop_after_gc_reorg     = false
stop_after_given_afn    = false
stop_on_dbe_mode_chg    = false
suppress_dup_warnings   = false
track_vfds_nolinks      = true
use_ctrl_tab_sp         = true
use_dbwait              = false
use_latest_si           = false
;
; (3) Server options
;
;shutdown {until | for} hh:mm after stop
;stop {before | after} task "name"
;stop {before | after} time hh:mm[:ss]
;
; (4) generate command parameters
;
;global_table_suffix    = "str"
;create_table_suffix[n] = "str"
```

```
;global_index_suffix    = "str"
;create_index_suffix[n] = "str"
;user_column_suffix[n]  = "str"
;
; (5) miscellaneous command parameters
;
display_active_only     = true
;
; (6) user scripts
;
user_script_bu_dir      = ""
user_script_dir         = "scripts"
;
; (7) external data translation parameters
;
use_ext_translation     = false
eatran_dll_name         = "DBEATRAN.DLL"


[Scheduling]
;
; dbutility process command only
;
;daily                  = 08:00, 12:00, 17:00, 24:00
;exit_on_error          = false
;sched_delay_secs       = 600
;sched_minwait_secs     = 3600
;sched_retry_secs       = 3600
;blackout_period        = 00:00, 02:00

[EbcdicToAscii]
; e1 = a1
; e2 = a2
;  ...
; en = an
;

[DBConfig]
default_date_fmt        = 21
```

Processing Order

Configuration file options override environment variables. Command-line options override both environment variables and configuration file options.

The parameter processing order is as follows:

- The operating system login name (user ID) is used as the lowest level default for the database user ID.
- Environment variables (DBUSERID, DBPASSWD, DBDATABASE, and DBHOSTPW).

- Command-line options `-d` (for full tracing), `-v` (for verbose messages), `-t` (for creating a Databridge Client trace file) and `-T` (for forcing the Client to start a new trace file), and `-f` (for specifying a configuration file other than the default `dbdridge.cfg`). These options are processed in the order in which they appear on the command line.
- Parameters specified in the configuration file. You can specify the configuration file via the `-f` option. If you do not specify a configuration file name via the `-f` option, dbutility tries to open the default configuration file (`dbridge.cfg` in the config subdirectory of the data source's working directory); if the file does not exist, the Databridge Client uses the default values for each configuration file parameter. The absence of a configuration file is not treated as an error only when running the command-line Client. If you use the service or daemon, the absence of a configuration file named `dbridge.cfg` is treated as an error.
- All remaining command-line options. In the final pass, a command-line option with a configuration file equivalent overrides the configuration file entry.

Parameter Descriptions

[signon]

Use the [signon] section of the `dbridge.cfg` file to enter information for signing on to the relational database and Databridge Server on the host.

The configuration file must include the data source (or database, if using Oracle), signon parameters to access the relational database, and a user and a password (unless you use the SQL Server Client with Integrated Windows authentication).

When using the Client Console, you need to supply these parameters at the time you create the data source. To do so, right-click on the service in the tree view and click **Add Data Source** from the pop-up menu to open the dialog and enter these parameters.

Parameter	Description
`database`	Default: None Command-line option: `-D` (Oracle) This parameter is the name that identifies the Oracle instance or the Oracle Net Services node that is being accessed. If the name contains non-alphanumeric characters, you must enclose it in double quotation marks, as follows: `database = "orcl.cin.microfocus.com"`
`datasource`	Default: None Command-line option: `-O` (Microsoft SQL Server) This parameter is the name that identifies the ODBC data source used to access the SQL database. This ODBC data source is configured using the Control Panel during the Client installation procedure.

Parameter	Description

hostpasswd	Default: None
	Range: 17 alphanumeric characters
	Command-line option: -X
	
	Use the host password parameter to specify the password associated with Databridge Server on the host. This parameter must match exactly the KEY parameter defined in the Host Server control file. For example:
	
	`DBServer`
	
	`KEY = "Secret"`
	
	`dbridge.cfg`
	
	`hostpasswd = Secret`

password	Default: None Command-line option: -P Use the password parameter to specify the password associated with the user ID for the relational database. The password must be valid for the user ID or the connection to the relational database server will fail. Passwords are limited to 30 characters. If your password contains non alphanumeric characters other than the underscore, you must enclose the password in double quotes, as follows: `password = "a$bb%"` **NOTE:** Passwords for Oracle 11g release 2 are case-sensitive. The password is always encoded in both text and binary versions of the Client configuration file. For more information, see "Export or Import a Configuration File" on page 242 or in the Databridge Client Console Help, see "Export the Client Configuration to a File." Passwords that are communicated between the Databridge Client and Databridge Server are not encoded.
user	Default: None Command-line option: -U Use the user parameter to specify the user ID for the relational database. The user ID must have the appropriate resource privileges for the designated relational database, as explained in *Setting Up a User ID (Windows)* in the *Databridge Installation Guide*.

Parameter	Description
use_nt_authen	Default: False Range: True or False Command-line option: -W The use_nt_authen parameter applies to Microsoft SQL Server Clients only. Use Windows ODBC Data Source Administrator to set the required ODBC data source authentication method. The SQL Server database must be installed with the proper authentication mode selected; either SQL Server, Integrated Windows, or Mixed Mode (that is, using both methods). When using Integrated Windows authentication, Windows Administrators are automatically included in the SQL Server user list. The SYSTEM account is only included in versions of SQL Server older than 2012. For more information, see the *Databridge Installation Guide*. Use this parameter as follows: ◆ Set it to True when Microsoft SQL Server is set to use Integrated Windows Authentication for access to the SQL Server database. ◆ Set it to False when Microsoft SQL Server is set to use its own SQL Server authentication. The SQL Server verifies the authenticity of the login ID with SQL Server authentication using a Login ID and password entered by the user.

[signon] parameters with equivalent environment variables

[signon] Parameter	Environment Variable	Option	dbutility Command
database	DBDATABASE	-D	All (only applies to Oracle)
datasource		-O	All (does not apply to Oracle)
hostpasswd	DBHOSTPW	-X	define, redefine, process, clone, and switchaudit
password	DBPASSWD	-P	All
user	DBUSERID	-U	All

[Log_File]

Use the [Log_File] section to control the various options for the log file that is created in the logs subdirectory of the working directory for a data source.

When using the service, two sets of Client log files are generated. The DBClient program and the command-line Client dbutility use log files, whose default names are of the form *dbyyyymmdd*.log. The DBClntCfgServer program uses log files, whose names are of the form db_cfg*yyyymmdd*.log. The prefix “db” can be changed by specifying a file_name_prefix in the log section of the Client configuration file.

To supply these parameters:

1 From the Client Console or Client Configurator, right-click on the data source and then select **Client Configuration** from the pop-up menu that appears.

2 The Configuration tool opens. Click **Logging/Tracing** to expand the tree.

3 Click **Client Log** and then set the parameters.

4 Click [OK]

NOTE: You can also access the Configuration tool window from the Client Configurator.

Parameter	Description
`file_name_prefix`	Default: "db" Range: 1 to 20 characters Recommended value: data source name Use this parameter to change the prefix of the log files for this data source. We recommend using the name of the data source as the prefix as this ensures that log files created on the same date but for different data sources have unique names. The log files have names in the form db*yyyymmdd*`.log` or when necessary, db*yyyymmdd_hhmiss*`.log` (This command allows you to replace the prefix "db" by any character string, provided that it results in a legal file name.)
`logsw_on_newday`	Default: False Range: True or False This parameter determines whether or not the Client uses a new log file, when the date changes. You may want to set this parameter to False, if your log files are small and use the `logsw_on_size` parameter to manage the log files.
`logsw_on_size`	Default: False Range: True or False Recommended value: True (when running real/time) Use this parameter to control whether or not the Client should check the log file size to see if it has reached the size defined by the `max_file_size` parameter. If the size of the log file exceeds this parameter the log file is closed and a new one is opened. If the current date is different that the creation date of the old file, which is part of its name, the new log file will be of the form db*yyyymmdd*`.log` otherwise the time component will be added to the file name to ensure that the name is unique.
`max_file_size`	Default: 0 Range: numeric value, optionally followed by K, M, or G Recommended value: 1M Use this parameter to limit the size of log files. The default value of 0 indicates that no limit is imposed on the size of log file. The suffixes of K, M and G allow you to specify the maximum file size in kilobytes, megabytes, or gigabytes. A value on the order of 1 MB is a reasonable value to use. The file size is always checked when you start the Client, regardless of the setting of the `logsw_on_size` parameter. When the `logsw_on_size` parameter is set, the log file size is also checked when the Client starts processing a new audit file.

Parameter	Description
`newfile_on_newday`	Default: True Range: True or False This parameter forces the Client to create a new log file when it starts if the existing log file was created on an earlier date. You may want to set this parameter to False, if your log files are small and use the `logsw_on_size` parameter to manage the log files.
`single_line_log_msgs`	Default: False Range: True or False The `single_line_log_msgs` parameter tells the Client to make all of its log file output messages single-line messages. When this parameter is set to True, the end-of-line character of all multi-line outputs are replaced by a space. This parameter exists to assist some log file analysis programs that fail to parse multi-line output messages.

[Trace_File]

Use the [Trace_File] section to control the various options for the trace file, created in the trace subdirectory of the working directory for a data source.

To supply these parameters:

1. From the Client Console or Client Configurator, right-click on the data source and then select **Client Configuration** from the pop-up menu that appears.
2. The Configuration tool opens. Click**Logging/Tracing** to expand the tree.
3. Click **Trace** and then set the parameters.
4. Click [OK]

Parameter	Description
`file_name_prefix`	Specify a string (up to 20 characters in length) to change the default prefix "trace".
`max_file_size`	Specify the size limit of trace files by entering a number and a suffix of K, M and G to indicate the unit of measure (kilobyte, megabyte, or gigabyte).

[Bulk_Loader]

The bulk loader parameters apply to the bulk loader utility for your relational database—Oracle or the SQL Server BCP API.

When using the Client Console or Client Configurator, supply these parameters in the **Bulk Loader** page of the **Client Configuration** dialog box. Select the data source, then select **Client Configuration** in the pop-up menu. You can also do this in the Client Configurator.

Parameter	Description
bcp_batch_size	Default:100,000 rows per batch Range: 0 or 1000–10000000 rows per batch BCP API and bcp: SQL Server Specifies the batch size used in BCP API calls (after bcp_batch_size rows are loaded the client bcp_batch to commit these rows), which is the number of rows per batch of data copied. This allows the bcp utility to load a table in several batches instead of in a single operation. Permitted values are 0 or 1000-10000000 (rows per batch). A value of zero causes the bcp utility to load the entire group of records in the data file in one batch. Copying all of the rows of a very large table in one batch may require a high number of locks on the Microsoft SQL Server database. When you specify a nonzero value, the Databridge Client adds the -b batch_size option to the bcp command line. A value of 0 omits the -b option.
bcp_code_page	Default: "" Range: “String” Bulk Loader utility: SQL Server and Oracle Adds the line "CHARACTERSET <code_page>" to the SQL*Loader control file. Consult the Oracle documentation for the exact names of the code pages as Oracle uses their own notation. The typical code page for 8-bit character data is "WE8ISO8859P1". You need to specify a bcp_code_page when dealing with a UTF8 database.
bcp_copied_msg	Default: NULL (omitted) Range: Any “quoted string” Bulk Loader utility: SQL Server Enables the bcp_auditor utility to determine whether or not a bulk loader was successful in cases where the database language is not English. For example, in German, this parameter is "Zeilen kopiert", but in English, it is "rows copied". If this parameter is not set correctly, the bcp_utility reports bulk loader failures even though the bulk loader worked correctly. The bcp_auditor program also accepts the bcp_copied_message in binary format expressed as the text "HEX_" followed by a string of hexadecimal values representing the values of each byte. This allows you to circumvent code page related problems, which can sometimes corrupt the bcp_copied_message when it is passed to the bcp_auditor program as a command-line argument. For example, the string "HEX_6C69676E657320636F7069E965732E" can represent the French message "lignes copiées." (The character "é" does not cause any problems when expressed as "E9".)

Parameter	Description
bcp_decimal_char	Default: -1 (This parameter is commented out.) Range: a period (.) or a comma (,) SQL*Loader: Oracle Clients only This parameter is normally auto-detected by the client that gets its value by reading the of Oracle database's NLS_NUMERIC_CHARACTERS parameter. This method will work correctly when the Client and the database reside in the same machine. However, if the Client is run in outside the database machine, there is no guarantee that the Oracle Client software,that the Databridge Client uses, will have the same NLS settings as the target database. For example it is possible to have a US Oracle Client software in the client machine that connects to a Brazilian database. In this rather unusual situation you would have to set the bcp_decimal_character to '.' as it will default to ',' which will lead to SQL*Loader errors in for all records that have numeric data with a decimal point.
bcp_delim	Default: Tab (SQL Server) bcp utility: SQL Server This parameter works as follows with the various clients: **Oracle:** The string "delim" is not configurable, the Client always uses the vertical bar as the delimiter. The client sets the bcp decimal_chararacter by reading the database's NLS parameters. **SQL Server:** The string "delim" can be longer than one character. Useful if the data contains alpha fields with TAB characters that need to be preserved. (A possible delimiter value in this case would be "|" or "||"; see "inhibit_ctrl_chars" on page 287)
bcp_packet_size	Default: 0 (which omits the -a option) Range: 0 or 512–65535 (decimal or hexadecimal) bcp utility: SQL Server (remote servers only) Defines the network packet size value for the bcp utility. Use this parameter when you have wide tables. For wide tables, setting this parameter to a packet size larger than the bcp default (4096) can speed up loading the data into the table. When you specify a nonzero value, the Databridge Client adds the -a pkt_size option to the bcp command line in the .CMD scripts. If you omit this parameter, or if you specify a value of 0, the Databridge Client omits the -a pkt_size option and the bcp utility uses the default network packet size of 4096.

Parameter	Description
enable_parallel_mode	Default: False Range: True or False SQL*Loader: Oracle Related parameters: inhibit_direct mode This parameter, which is only meaningful when DIRECT mode is enabled, causes the generate command to add the specification parallel = true to the SQL*Loader command line. Parallel mode makes the SQL*Loader run faster at the expense of additional system resources.
inhibit_direct_mode	Default: False Range: True or False SQL*Loader: Oracle Related parameters: enable_parallel_mode, sqlld_rows, and sqlld_bindsize Controls whether the generate command adds the specification direct=true to the SQL*Loader command line. If your Oracle database is on the same machine as the Databridge Client, you would let this parameter assume its default value of False, as DIRECT mode is much faster than CONVENTIONAL mode. Conversely, if your Databridge Client accesses a remote Oracle database using SQL*Net between two dissimilar architectures (for example, Windows and UNIX), you must use CONVENTIONAL mode by setting this parameter to True. Setting inhibit_direct_mode to True inhibits the use of the direct=true option when invoking SQL*Loader in the command files. It is provided for your convenience so that you do not to have to remove the string direct=true from every call on SQL*Loader. When you enable inhibit_direct_mode, we recommend that you increase the size of sqlld_bindsize for better performance.
max_errors	Default: 10 Range: 0–1000 Bulk loader utility and BCP API: All Controls the bulk loader's tolerance to records that are discarded due to data errors. Use this parameter when you have many bulk loader errors. Increasing the maximum error count allows you to gather all the errors in one run rather than finding 10 errors and then having to start over again. For example, if you are having problems cloning a table, you may want to increase the count to 1000 or more to get all the errors in one cloning or process session. Knowing the type of errors helps you to solve the problems. The default value for this parameter is 10, which means that the bulk loader aborts after encountering 10 bad records. These bad records are written to the discard file and information about the error is written to the bulk loader log file. For information about these files, see "Files Related to SQL*Loader" on page 80 and "Files Related to BCP" on page 83.

Parameter	Description
max_temp_storage	Default: 400 MB Range: 10 MB–3 GB (or 0) Bulk loader utility: bcp for SQL Server or SQL*Loader for Oracle Applies to: Windows Clients This parameter activates the segmented bulk load feature, which allows you to specify the maximum amount of storage that dbutility should use for temporary files. Because dbutility cannot stop in the middle of a record, you can expect it to use slightly more storage than the value you specify. Therefore, select a value less than the total amount of free space available on the disk. We recommend that you keep this value low as there is no real advantage to attempting to load large tables all at once. If you set the value too high, dbutility can run out of storage while it is writing temporary files. You can specify the max_temp_storage value as an integer with any of the following suffixes: K (or KB) for kilobytes (default) M (or MB) for megabytes G (or GB) for gigabytes The space between the number and the suffix is optional. **NOTE:** The valid range for this parameter is 10 MB to 3 GB (0xC0000000). You must specify values greater than 0x7FFFFFFF without a suffix. The value you enter for max_temp_storage must be a whole number.
sqlld_bindsize	Default: 64K bytes Range: 0x10000–0x400000 (decimal or hexadecimal) SQL*Loader: Oracle Related parameters: inhibit_direct_mode, sqlld_rows Defines the value to be used for the BINDSIZE parameter for SQL*Loader operations. Increasing this value can speed up SQL*Loader operations when using conventional mode (for example, running remote to a database on a UNIX system. Use sqlld_rows and sqlld_bindsize when you are running dbutility for a remote Oracle database running on UNIX or Windows. A larger bind size and row size can increase the speed of the load across Oracle Network Services at the expense of using more memory.
sqlld_rows	Default: 100 Range: 10–100,000 rows SQL*Loader: Oracle Related parameters: inhibit_direct_mode, sqlld_bindsize Defines the value to be used for the ROWS specification for SQL*Loader operations. Use sqlld_rows and sqlld_bindsize when you are running dbutility for a remote Oracle database running on UNIX or Windows. A larger bindsize and row size can increase the speed of the load across Oracle Network Services at the expense of using more memory.

Parameter	Description
verify_bulk_load	Default: 1 Range: 0, 1, or 2 Bulk loader utility: All Determines how you want the Databridge Client to handle the results of the bulk loader operations during data extraction, as follows: Setting — Description 0 — The Databridge Client does not verify the results of bulk loader operations. 1 — The Databridge Client retrieves the number of rows in the table and compares it to the number of rows handled by the bulk loader. If the two counts differ, the Databridge Client displays a warning message. 2 — This setting is the same as the preceding setting 1, except that the Databridge Client terminates so that you can investigate the reason for the mismatch.

[params]

The [params] section of the configuration consists of the following groups of command parameters:

For this group	See this topic
define and redefine	“Define and Redefine Command Parameters” on page 264
process and clone	“Process and Clone Command Parameters” on page 278
Server options	“Server Option Parameters” on page 300
generate	“Generate Command Parameters” on page 300
display	“Display Command Parameter” on page 303
User scripts	“User Scripts Parameters” on page 303
External data translation DLL support	“[Bulk_Loader]” on page 259

Define and Redefine Command Parameters

The following parameters are included in the [params] section of Databridge Client configuration file. The parameters listed in this section affect only the define and redefine commands.

When using the Client Console, you can only supply these parameters when using the Client Configurator.

How To Supply Define and Redefine Command Parameters

1. Select the data source to activate the **Data Source** menu.
2. Click **Data Source > Customize Data Source**, or right-click the data source and click **Customize Data Source** in the pop-up menu, to start the Client Configurator.
3. Wait for the data source to load and refresh
4. Right-click on the data source and click **Client Configuration** from the pop-up menu that appears.

   NOTE: If you open the **Client Configuration** dialog box from the Console, parameters that can only be changed in the Client Configurator will be grayed out.)

   ---

5. Follow the mouse-clicks (designated **with this font**) listed in each description below to locate the parameter you wish to set.

   Items in parentheses represent groups of settings in the dialog box.

allow_nulls

Default: False
Range: True or False
Configurator: **Customizing (General)**

The `allow_nulls` parameter specifies whether or not the `define` and `redefine` commands should set the DAOPT_Nulls_Allowed bit (value 1) in the da_options column of the DATAITEMS Client control table. This means that both DMSII null data and data items that contain bad values (excluding keys) will be stored as relational database NULLs.

You can set this parameter in the Client Configuration dialog box of the Client Console or by using data table customization scripts. To avoid storing NULL data as values that are possibly legitimate (0 or 999), keep this parameter set to True.

bracket_tabnames

Default: False
Range: True or False
Applies to: SQL Server Client only
Configurator: **Customizing (General)**

The parameter `bracket_tabnames` specifies whether the Databridge Client should allow data set names that are TRANSACT_SQL reserved words to be use as table names or they should be renamed. If this parameter is set to true all such table names are enclosed in square brackets in all SQL statements used by the Client. If the parameter is set to false the client renames the by adding "_x" to the data set name.

auto_mask_columns

Default: True
Range: True or False
Configurator: **Customizing (DMSII related parameters)**

The parameter auto_mask_columns specifies whether the Databridge Client should automatically mask columns whose corresponding item in DMSII have DATAMASK specification in the DASDL.

clr_dup_extr_recs

Default: True

Range: True or False

Configurator: Customizing > Advanced Parameters (Global data set options)

This parameter defines the initial value of the DATASETS table ds_options bit DSOPT_Clrdup_Recs. This bit tells the Databridge Client whether to run a script to remove false duplicate records caused by long cloning of an active DMSII database. In addition to indirectly affecting the `process` and `clone` commands, this parameter indirectly affects the `generate` command.

The ds_options bit DSOPT_Clrdup_Recs causes the following actions:

- When set to False, the Databridge Client ignores false duplicate records. If there are false duplicate records, index creation will fail. In this case you must manually remove the false duplicate records and recreate the index before the fixup phase can continue.
- When set to True, the `generate` command creates a script (named `script.clrduprecs.`*`tabname`*) that removes records with duplicate key values. This script will run only if the create index step fails. After the duplicate records are deleted, the index creation and fixup phases continue as normal.

default_user_columns

Default: 0

Range: 0 – 16383 (Some bit combinations are not allowed.)

Configurator: Customizing > User Columns

The `default_user_columns` parameter adds non-DMSII columns (user columns) to all data sets in the client database, except for the history tables. To add more non-DMSII columns to all history tables, see dflt_history_columns (page 266).

dflt_history_columns

Default: 0

Range: 0 – 16383 (Some bit combinations are not allowed.)

Configurator: Customizing > User Columns

The `dflt_history_columns` parameter adds more non-DMSII columns (user columns) to all history tables in the client database. By default, history tables are created with three non-DMSII columns. The `dflt_history_columns` parameter is intended to simplify user scripts at sites where the same non-DMSII columns (user columns) are added to all (or most) history tables. When you use this parameter to add user columns to history tables, the same kind of non-DMSII columns are added to all history tables. If you do not want to add the same columns to all history tables, you must generate the columns using a user script or set active = 0 for the unwanted columns.

For more information about history tables, see history_tables and “ds_options” in DATASETS (page 153).

enable_dynamic_hist

Default: None

Range: True or False

Configurator: **Customizing > History Tables (Options)**

This parameter allows the user to add history tables without having to reclone all the affected data sets. To do this, specify the default history columns (if any) using the `default_history_columns` configuration file parameter. Then, set the DSOPT_SaveUpdates(8) bit for all data sets for which history tables are to be kept, and run a `redefine` command with the `-R` option, forcing all data sets to be remapped. Finally, run a `reorg` command, which creates the history tables and indexes. The new history tables will populate when audit files are processed.

extract_embedded

Default: False

Range: True or False

Configurator: **Customizing (DMSII related parameters)**

Use the `extract_embedded` parameter when the DMSII INDEPENDENTTRANS option is reset. If INDEPENDENTTRANS is set, the *extract_embedded* parameter is not needed because the Databridge Client can clone and update embedded datasets.

When INDEPENDENTTRANS is reset, use this parameter as follows:

- Set `extract_embedded` to True if you want the Databridge Client to extract embedded data sets during cloning when INDEPENDENTTRANS is reset. However, the Databridge Client cannot apply fixups or updates to these extracted embedded data sets.
- Set `extract_embedded` to False if you want the Databridge Client to ignore embedded data sets.

external_column[n]

Default: N/A

Range: N/A

Configurator: **Customizing > User Columns**

This parameter allows you to globally change the column name, sql_type, or sql_length of the non DMSII columns described in "Numeric Date and Time in Non-Contiguous Columns" on page 60. The syntax is as follows:

```
external_column[n] = ["name"[,sql_type[,sql_length]]]
```

Where	Is
n	The corresponding bit number (dms_subtype value) for the non-DMSII column. **NOTE:** The brackets and value are required syntax.
name	Custom column name
sql_type	An integer value that represents the internal code for the SQL type that you want to use. The program only accepts data types that make sense for a particular column. For instance, you cannot set the AFN to a bit or a char, but you can set it to an int or a dec(10). For details, see "DMSII and Relational Database Data Types" on page 121.
sql_length	A value that represents the length of the data type. Specify this value only if the data type requires it. If the data type does not have a length specification, specifying a value may cause an error.

The following table shows allowable *sql_type* values for `external_column`.

DMS Subtype	Mask Value (hex)	Default Column Name	Allowable SQL Types (SQL Server)	Allowable SQL Types (Oracle)
1	0x0001	update_type	tinyint, shortint, int, bigint	number(n)
2	0x0002	update_time	datetime, smalldatetime, datetime2	date
3	0x0004	update_ts	timestamp	N/A
4	0x0008	audit_ts	datetime, smalldatetime, datetime2	date
5	0x0010	audit_filenum	shortint, int, dec(n), bigint	number(n)
6	0x0020	audit_block	int, dec(n), bigint	number(n)
7	0x0040	source_name	varchar(n), char(n)	varchar(n), char(n)
8	0x0080	source_id	tinyint, shortint, int, bigint	number(n) (where n >=3)
9	0x0100	my_id	int, dec(n), bigint	N/A
10	0x0200	deleted_record	int, bigint	number(n) (where n >=9)
11	0x0400	source_name	varchar(n), char(n)	varchar(n), char(n)
12	0x0800	source_id	tinyint, shortint, int, bigint	number(n) (where n >=3)
13	0x1000	audit_ts	datetime, smalldatetime, datatime2	date

DMS Subtype	Mask Value (hex)	Default Column Name	Allowable SQL Types (SQL Server)	Allowable SQL Types (Oracle)
14	0x2000	user_column1	char(n), varchar(n), tinyint, shortint, int, float, datetime, dec(n), smalldatetime, datetime2, date, time	char(n), varchar(n), number(n), float, date
15	0x4000	sequence_no	int, bigint	number(n) (where n >=9)
16	0x8000	delete_sqno	shortint, int, bigint	number(n) (where n >=5)
17	0x10000	create_time	datetime, smalldatetime,datetime2	date
18	0x20000	user_column2	char(n), varchar(n), tinyint,shortint, int, float, datetime,dec(n), malldatetime,datetime2, date, time	char(n), varchar(n),number(n), float, date
19	0x40000	user_column3	char(n), varchar(n), tinyint,shortint, int, float, datetime,dec(n), malldatetime,datetime2, date, time	char(n), varchar(n),number(n), float, date
20	0x80000	user_column4	char(n), varchar(n), tinyint,shortint, int, float, datetime,dec(n), malldatetime,datetime2, date, time	char(n), varchar(n),number(n), float, date

---

NOTE: For Oracle, if you choose the tinyint value for *sql_type* you get number(3), if you choose the smallint value you get number(5) and so on, as the data types in question are not defined for Oracle. Oracle has only one type of date.

For example, the entry below causes the audit_filenum column to be renamed AFN (the double quotation marks are optional since no special characters are involved); the sql_type and sql_length remain unchanged.

```
external_column[5] = "AFN"
default_user_columns  = 0x0010
```

In the example below, the data type of the audit_block column changed to dec(12).

```
external_column[6] = ,11,12
```

flatten_all_occurs

Default: False

Range: True or False

Configurator: Customizing > Advanced Parameters (Table layout)

This parameter simplifies script writing when you want to flatten a lot of OCCURS clauses. Setting this parameter to True causes the program to initialize the DIOPT_Flatten_Occurs bit to 1 in the di_options column of the DMS_ITEMS Client control table so that you do not need to set this bit with user scripts. If you have certain OCCURS clauses that you do not want to flatten, you can set the corresponding bit to 0 for those specific items by using customization (user) scripts or by using the customization settings in the Client Console and Client Configurator (see the Databridge Client Console Help).

force_aa_value_only

Default: 0

Range: 0-2

Configurator: Customizing > Advanced Parameters (Force AA Values ...)

When set to 1, this parameter globally sets the DSOPT_Use_AA_Only bit in the ds_options column for the DATASETS table entries that have valid AA Values or RSNs. When set to 2, this action is only performed for data sets that have RSNs, because AA Values aren't preserved when a garbage collection or structural reorganization occurs.

If you want to exclude certain data sets, you can set the DSOPT_Use_AA_Only bit to 0 using customization (user) scripts or by using the customization settings in the Client Console and Client Configurator (see the Databridge Client Console Help).

history_tables

Default: 0

Range: 0-2

Configurator: Customizing > Advanced Parameters (Data set history tables)

This parameter is designed to simplify script writing. It allows you to make the `define` command globally set the DSOPT_Save_Updates and DSOPT_History_Only bits. This parameter replaces the deprecated parameter `keep_history` only. A value of 0 indicates that neither bit should be set for data sets. A value of 1 indicates that the DSOPT_Save_Updates bit should be set for all data sets. Finally, a value of 2 indicates that the DSOPT_Save_Updates and the DSOPT_History_Only bits should be set for all data sets.

maximum_columns

Default: Dependent on the database

Configurator: Customizing > Advanced Parameters (Table layout)

The `maximum_columns` parameter enables you to reduce the column count when a table split occurs because of the maximum column limitation of the relational database. For example, if you want to add a column containing the value of the audit timestamp file to the first table of a split table, you can set the `maximum_columns` parameter to 1023 instead of 1024. By doing so, you avoid moving an item from a full table to a secondary table to make room for the new column. The table below shows the maximum columns and ranges for different relational databases.

Database	Default	Range
Oracle	1000	1–1000
SQL Server	1024	1–1024

min_varchar

Default: 4

Range: 0 to 255

Configurator: **Customizing > SQL Data Types**

This parameter supplements the `use_varchar` configuration file parameter by adding the condition that the length must be at least equal to the value of this parameter. Setting this parameter value to 4 would force columns whose data types would have been VARCHAR(1), VARCHAR(2), or VARCHAR(3) to instead be CHAR(1), CHAR(2), and CHAR(3) if `use_varchar` is set to True.

NOTE: Setting this parameter to a non-zero value when `use_varchar` is set to False has no effect.

---

minimize_col_updates

Default: False

Range: True or False

Configurator: **Customizing > Advanced Parameters (Global data set options)**

The `minimize_col_updates` parameter specifies whether the `define` or `redefine` command should set the DSOPT_Optimize_4_CDC bit (value 1) in the ds_options column of the DATASETS table. It causes the client to create update statements that only assign values to columns whose values are changed. To do this, stored procedures are abandoned in favor of pure SQL without the use of host variables. This usually slows the update speed of the Client, but the overall process ultimately takes less time because SQL Server or Oracle replication sends significantly less data to the remote database.

CAUTION: Using this parameter will significantly slow update processing by the Client. If you are replicating your relational database, enabling this feature may provide some benefit if replication is very slow.

See also the `enable_minimized_col` parameter, which allows the user to disable this option without running a `redefine` command.

miser_database

Default: False

Range: True or False

Related parameters: `automate_virtuals`, `use_nullable_dates`

Configurator: **Customizing (DMSII related parameters)**

This parameter is for MISER database sites. When set to True, this parameter sets the default date format to a MISER date. It also sets the following parameters (required for MISER sites) to True, if they aren't already set:

- automate_virtuals
- flatten_all_occurs
- use_nullable_dates

optimize_updates

Default: False
Range: True or False
Configurator: **Customizing > Advanced Parameters (Global data set options)**

The `optimize_updates` parameter specifies whether the `define` or `redefine` command should set the DSOPT_Use_bi_ai bit (value 1) (in the ds_options column of the DATASETS table) for data sets that have items with OCCURS clauses that are not flattened. The program uses this bit, which you can modify using user scripts, to determine if it should request the Databridge Engine to send all updates for the data set as BI/AI pairs. The Databridge Client then compares the before and after images to determine if an update has any effect, and suppresses all redundant updates. Depending on the data, this can greatly increase performance when you do not flatten OCCURS clauses. See the parameter "use_internal_clone" on page 276, which allows the user to disable this option without having to run a `redefine` command.

read_null_records

Default: True
Range: True or False
Configurator: **Customizing (DMSII related parameters)**

This parameter determines whether or not the program should request the NULL VALUES for data set records from the Databridge Engine during the `define` and `redefine` commands. The NULL VALUES are then stored in a binary file (*`datasource`*`_NullRec.dat`) from which they are retrieved at the beginning of a `process` or a `clone` command. When this parameter is enabled, the testing for NULL is more accurate; however, this feature generates a small amount of overhead, particularly with a large database where these records use more memory. Note that this parameter does *not* imply that NULLS are allowed in the relational database; this is still specified using the `allow_nulls` parameter.

reorg_batch_size

Default: 50000

Range: 5000 - 100000

Configurator: **Customizing > Advanced Parameters (Table Reorganization ...)**

This parameter determines the size of the transactions that the Client uses during a `reorg` command to set the value of newly-added columns to their initial value, as defined in the DASDL. The `redefine` command creates a reorg script that uses a stored procedure to do the updates in

batches that are executed as transactions. For a large table, this process can take quite long, but it does not run the database out of log space. Consider using the internal clone option instead (see alpha_error_cutoff (page 278)).

sec_tab_column_mask

Default: 0
Range: 0 – 16383
Configurator: **Customizing > User Columns**

The parameter `sec_tab_column_mask` eliminates a set of user-defined external_columns from secondary tables without having to write extensive scripts to set active = 0 for the unwanted columns. To remove those columns, the Client removes the bits you specified in sec_tab_column_mask from the value represented in external_columns and uses the resulting value to determine which user columns to add to secondary tables during `define` and `redefine` commands.

This parameter is intended for adding the audit timestamp, the audit file number, or the audit block to primary tables without adding them to secondary tables. The default value of this parameter is 0, which indicates that no user columns should be removed from secondary tables.

split_varfmt_dataset

Default: False
Range: True or False
Configurator: **Customizing > Advanced Parameters (Global data set options)**

This parameter makes the `define` and `redefine` commands set the bit DSOPT_Split_Varfmt_ds in the ds_options column for the DATASETS table globally.

strip_ds_prefixes

Default: False
Range: True or False
Configurator: **Customizing (General)**

This parameter makes the `define` and `redefine` commands set the `item_name_prefix` column in the DATASETS table to the data set name. This is useful when all DMSII data item names use a common prefix; for example, using the data set name followed by a dash. The `strip_ds_prefixes` parameter provides a quick way of stripping those common prefixes without writing any user scripts or using the Client Configurator (as renaming every column requires a lot of work). If the prefix is an abbreviated form of the data set name (e.g. SVHIST instead of SV-HISTORY), use a user script or the Client Configurator to set the `item_name_prefix` column in the DATASETS table to this value (do not include the trailing dash).

suppress_new_columns

Default: False
Range: True or False
Configurator:**Customizing > Advanced Parameters (Global Data Set Options)**

The suppress_new_columns parameter indicates that the redefine command sets the active columns to 0 in the DATAITEMS and DATATABLES entries resulting from DMSII reorganizations that add DMSII items. The suppress_new_columns parameter is useful when you want to keep your relational database tables intact after a DMSII reorganization, particularly if the added column will cause existing application to fail. If this is the case, set suppress_new_columns to True.

suppress_new_datasets

Default: True

Range: True or False

Configurator: **Customizing (General)**

This parameter indicates whether or not the program maps new data sets created during a DMSII reorganization. If this parameter is set to True when you want to replicate the new data set, you must set the active column=1 in the DATASETS Client control table after running a redefine command. Then, run a second redefine command to get the data sets mapped.

use_bigint

Default: False
Range: True or False
Recommended Value: True
Applies to: SQL Server Client only
Configurator: **Customizing > SQL Data Types**

This parameter is only applicable to the SQL Server Client. It indicates that the Databridge Client should map DMSII numeric data that is too large to fit in the int data type (32-bit integer), to bigint (64-bit integer). If this parameter is set to False, such data items would be mapped to decimal(n). Items that are too large to fit in a bigint are still mapped to decimal(n). The only reason for having this parameter is to maintain backward compatibility.

use_binary_aa

Default: False

Range: True or False

Configurator: **Customizing (AA Values and RSNs)**

This parameter maps AA Values, Parent_AA Values, RSNs (including Visible RSNs) and DMSII Links to binary(6) or raw(6) instead of char(12) to reduce the storage requirement for AA Values (and RSNs) by half.

AA Values (and RSNs), which are 48-bit values, are stored in 6 bytes when using binary data, as opposed to 12 bytes when using character data.

The data types used for these columns depend on the value of the sql_type column in the DATAITEMS Client control table. The purpose of this parameter is to define how these items are to be mapped by default to avoid changing the sql_type of all such columns.

use_clob

Default: False
Range: True or False

Applies to: Oracle Client only
Configurator: Customizing > SQL Data Types

It indicates that DMSII ALPHA data that is too large to fit in a VARCHAR2 column, which is limited to 4000 characters, should be mapped to a data type of clob instead of being truncated or split into two columns.

use_clustered_index

Default: False for index. True for primary key.
Range: True or False
Applies to: SQL Server Client only
Configurator: Customizing > Advanced Parameters (Indexes)

The `use_clustered_index` parameter applies to all data tables. You can override its setting on a table-by-table basis via the DATATABLES control table, dt_options column, DTOPT_Clustered_Index bit.

Use this parameter as follows:

- Set `use_clustered_index` to True if you want a clustered index for all or most tables.
- For all tables, just set this parameter to True.
- For most tables, set this parameter to True and then reset DTOPT_Clustered_Index for those tables for which you do not want a clustered index.
- Set `use_clustered_index` to False if you want no clustered indexes on all tables, or if you want clustered indexes on only a few tables.
- For no clustered index on all tables, just set this parameter to False.
- For clustered indexes on only a few tables, set this parameter to False and then set DTOPT_Clustered_Index for those tables for which you do want a clustered index.

To reset or set DTOPT_Clustered_Index, see "dt_options" in DATATABLES (page 170). Typically you would do this via user scripts.

use_column_prefixes

Default: False
Range: True or False
Configurator: Customizing(General)

This parameter extends the tab_name_prefix specified in the DATASOURCES Client control table to the columns of the user tables. If the tab_name_prefix column of the data source is blank, this parameter has no effect. For more details, see “DATASOURCES Client Control Table” on page 150.

use_date

Default: False
Range: True or False
Related parameters: use_datetime2
Applies to: SQL Server Client
Configurator: Customizing > SQL Data Types

Use this parameter to make the `define` and `redefine` commands interpret the DIOPT_Clone_as_Date bit in the di_options column of the DMS_ITEMS table as a request to use a data type of date instead of smalldatetime. This eliminates the need to set the di_options bit DIOPT_Use_Date for every item that is to be mapped to a data type of date.

use_datetime2

Default: False
Range: True or False
Related parameters: `use_date`
Applies to: SQL Server Client
Configurator: **Customizing > SQL Data Types**

Use this parameter to make the `define` and `redefine` commands interpret the DIOPT_Use_LongDate bit in the di_options column of the DMS_ITEMS table as a request to use a data type of datetime2 instead of datetime. This eliminates the need to set the di_options bit DIOPT_Use_LongDate2 bit for every item that is to be mapped to a data type of datetime2.

use_decimal_aa

Default: False
Range: True or False
Configurator: **Customizing (AA Values and RSNs)**

NOTE: This parameter is mutually exclusive with the `use_binary_aa` parameter.

This parameter maps AA Values, Parent_AA Values, RSNs (including Visible RSNs) and DMSII LINKS to a numeric data type instead of char(12). The data type varies from database to database. In the case of SQL Server, BIGINT is used and in the case of Oracle, NUMBER(15) is used.

use_internal_clone

Default: False
Range: True or False
Configurator: **Customizing > Advanced parameters (Table reorganization …)**

This parameter affects the `redefine` and `reorg` commands. Instead of using ALTER commands to add, delete or modify new columns to tables, the Client uses a combination of scripts and table renaming commands to create new copies of the tables with the new layouts. The Client copies the data using SELECT INTO in the case of SQL Server and CTAS (Create Table As Select) in the case of Oracle. This operation works like the bulk loader and is sometimes faster than using ALTER and UPDATE commands, but more importantly the command is not logged. The only drawback of this method is that it requires sufficient free disk storage to hold a second copy of the table for the duration of the operation.

use_nullable_dates

Default: False

Range: True or False

Configurator: Customizing (General)

This parameter forces all MISER dates, including keys, to have the DAOPT_Nulls_Allowed bit (value 1) in the da_options column of the DATAITEMS Client control table. This parameter should only be set to True if you are using a MISER database. Only one MISER date is allowed as a key. The Client generates custom-stored procedures that handle the cases where the MISER date that is part of the index is NULL.

use_primary_key

Default: False

Range: True or False

Configurator: Customizing > Advanced parameters (Indexes)

This parameter tells the Databridge Client to create a primary key instead of a unique index for all tables. You can override its setting on a table-by-table basis via the DATATABLES control table, dt_options column, DTOPT_Primary_Key bit.

- Set `use_primary_key` to True if you want a primary key for all or most tables.
- For all tables, just set this parameter to True.
- For most tables, set this parameter to True and then reset DTOPT_Primary_Key for those tables for which you do not want a primary key.
- Set `use_primary_key` to False if you want no primary keys on all tables, or if you want primary keys on only a few tables.
- For no primary key on all tables, just set this parameter to False.
- For primary keys on only a few tables, set this parameter to False and then set DTOPT_Primary_Key for those tables for which you do want a primary key.

To reset or set DTOPT_Primary_Key, see "dt_options" in DATATABLES (page 170). Typically you would do this via user scripts.

use_stored_procs

Default: False

Range: True or False

Configurator: Customizing > Advanced parameters (Global Data Set Options)

This parameter makes the `process` and `clone` commands generate the actual SQL command instead of a stored procedure call to perform an update. The Client still uses host variables, as was the case with stored procedures calls. Executing the SQL directly eliminates some overhead and makes processing the update faster. If you change this parameter, you must propagate the change to the ds_options columns of the DATASETS table. The easiest and safest way to do this is to run a `redefine` command using the `-R` option (when using the console, click **Redefine with Options** and then **All Data Sets**). The `redefine` command will ask you to run a `reorg` command, which creates a new set of scripts for creating the tables. It also will refresh the stored procedures for all data sets by dropping them if they exist and are no longer needed, or by recreating them if they are needed.

use_time

Default: False
Range: True or False
Applies to: SQL Server Client
Configurator: **Customizing > SQL Data Types**

Use this parameter to make the `define` and `redefine` commands interpret the DIOPT_Clone_as_Time bit in the di_options column of the DMS_ITEMS table as a request to use a data type of time instead of a numeric time. This eliminates the need to set the di_options bit DIOPT_Use_Time for every item that is to be mapped to a data type of time.

use_varchar

Default: True
Range: True or False
Configurator: **Customizing > SQL Data Types**

Set use_varchar to True to cause the `define` and `redefine` commands to map DMSII ALPHA data to varchar (Microsoft SQL Server) or varchar2 (Oracle) instead of char.

NOTE: The Databridge Client suppresses trailing blanks from all character data constructed from DMSII ALPHA data.

Process and Clone Command Parameters

The following parameters are included in the [params] section of the Databridge Client configuration file. The parameters listed in this section affect only the `process` and `clone` commands.

When using the Client Console, you can supply these parameters using **Client Configuration** in the pop-up menu or the Client Configurator.

To run the Client Configurator

1. Select the data source to active the **Data Source** menu.
2. Click **Data Source > Customize Data Source** to start the Client Configurator (or right-click the data source and click **Customize Data Source** from the pop-up menu.
3. Wait for the data source to load and refresh
4. Right-click on the data source and click **Client Configuration** from the pop-up menu.
5. Follow the mouse-clicks (designated **with this font**) listed in each description below to locate the parameter you wish to set.

   Items in parentheses represent groups of settings in the dialog box.

alpha_error_cutoff

Default: 10
Range: 0 – 100
Related parameters: `discard_data_errors`, `display_bad_data`

Console: **Processing > DMSII Data Error Handling (Character data ...)**

This parameter specifies the percentage of data errors in any given ALPHA item that are tolerated before the field is declared bad and treated as NULL (or simulated NULL if the column does not allow NULLS). The default value for this parameter is 10 (10%); the allowable values are in the range 0 (fail on first error) to 100 (ignore all errors).

automate_virtuals

Default: False

Range: True or False

Console: **Processing > Advanced Parameters (General)**

This parameter enables code that automatically handles virtual data sets that must be linked with their parent data sets using the virtual_ds_num, real_ds_num, and real_ds_rectype columns in the DATASETS Client control table. These links are currently set up via user scripts. When this option is enabled, you simply issue a `process` command. When issuing a `clone` command, the virtual data sets do not have to be explicitly specified on the command line.

aux_stmts

Default: 100

Range: 0 – 200

Console: **Processing (General)**

Use the `aux_stmts` parameter to set the number of database API (that is, ODBC or OCI) STMT structures that can be assigned to individual SQL statements. Using multiple database API STMT (statement) structures allows SQL statements to be parsed once and executed multiple times, provided the STMT structure is not reassigned to hold another SQL statement. Increasing the number of database API statements significantly improves processing time, if your system has enough memory.

A value of zero indicates that the Databridge Client should parse and execute all SQL statements using a single STMT structure.

NOTE: When using the Oracle Client, make sure that the `open_cursors` parameter defined in the database initialization file for the Oracle instance (`init`*`SID`*`.ora`, where *sid* is the name of the instance) is set to a high enough value.

---

century_break

Default: 50

Range: 0 – 99 or -1

Console: **Processing > Date and Time Parameters (Date parameters)**

The dms_subtypes in the 30s, 60s, and 90s have a 2-digit year value (*yy*) which represents dates in the 20th and 21st centuries. Values < 50 are 21st century years (20*yy*); values >= 50 are 20th century years (19*yy*). When the `century_break` value is set to 50, *yy* = 1950–2049. When the

century_break value is set to 11, yy = 1911–2010. When the century_break value is set to -1, the century break value is dynamically calculated based on the current year giving the two digit years a range of current_year - 49 to current_year + 50. In the case of 2012, this range is 1963 to 2062.

You can find DMSII date formats that are affected by the century_break parameter at Decoding DMSII Dates, Times, and Date/Times. (page 48)

commit_absn_inc

Default: –1 (This parameter is commented out.)

Range: 0 – 200,000

Related parameters: commit_update_inc, commit_time_inc, commit_txn_inc

Console: **Processing > Databridge Engine and ... (COMMIT parameters)**

The commit_absn_inc parameter allows the Databridge Client to override the Databridge Engine CHECKPOINT CLIENT EVERY *nnn* AUDIT BLOCKS parameter setting. It does this by causing Databridge Engine to generate a commit at the next quiet point after the *nnn* audit blocks have been processed after the last commit. This parameter determines one of many conditions under which Databridge Engine should generate a commit.

When a value is not specified, as in the case of the default setting, Databridge Client uses an internal value of –1. This value indicates that it won't attempt to override the settings for the corresponding Databridge Engine parameter (whose default value is 100). The value -1 is not a valid setting, per se, and will result in a "value out of range" error.

A value of 0 disables the use of this parameter by Databridge Engine. A value that exceeds the value specified in Databridge Engine control file is ignored.

If commit_absn_inc, commit_update_inc, commit_time_inc, and commit_txn_inc are specified, Databridge Engine commits at the next quiet point after one or more of the conditions are satisfied.

commit_longtrans

Default: –1 (This parameter is commented out.)

Range: True or False

Related parameters: commit_absn_inc, commit_update_inc, commit_time_inc, commit_txn_inc

Console: **Processing > Databridge Engine and ... (COMMIT parameters)**

WARNING: Setting this parameter to True (that is, overriding the Databridge Engine CHECKPOINT LONG TRANSACTIONS parameter) can result in problems and is therefore not recommended. By default, this parameter is commented out.

This parameter determines one of many conditions under which Databridge Engine should generate a commit. When this value is not specified, as in the case of the default setting, Databridge Client uses an internal value of –1. This value indicates that it won't attempt to override the settings for the corresponding Databridge Engine parameter (whose default value is false). The value -1 is not a valid setting, per se, and will result in a "value out of range" error.

A value of 0 disables the use of this parameter by Databridge Engine. A value that exceeds the value specified in the Databridge Engine control file is ignored.

commit_time_inc

Default: –1 (This parameter is commented out.)

Range: 0 – 300 seconds

Related parameters: `commit_absn_inc`, `commit_update_inc`, `commit_txn_inc`

Console: **Processing > Databridge Engine and ... (COMMIT parameters)**

The `commit_time_inc` parameter allows the Databridge Client to override the Databridge Engine CHECKPOINT CLIENT EVERY *n* SECONDS parameter setting by causing Databridge Engine to generate a commit at the next quiet point after *n* seconds have elapsed in the current transaction. This parameter determines one of many conditions under which Databridge Engine should generate a commit.

When this value is not specified, as in the case of the default setting, Databridge Client uses an internal value of –1. This value indicates that it won't attempt to override the settings for the corresponding Databridge Engine parameter (whose default value is 0). The value -1 is not a valid setting, per se, and will result in a "value out of range" error.

A value of 0 disables the use of this parameter by Databridge Engine. A value that exceeds the value specified in the Databridge Engine control file is ignored.

If `commit_absn_inc`, `commit_update_inc`, `commit_time_inc`, and `commit_txn_inc` are specified, Databridge Engine commits at the next quiet point after one or more of these conditions are satisfied.

commit_txn_inc

Default: –1 (This parameter is commented out.)

Range: 0 – 200,000

Related parameters: `commit_absn_inc`, `commit_update_inc`, `commit_time_inc`

Console: **Processing > Databridge Engine and ...(COMMIT parameters)**

The `commit_txn_inc` parameter allows the Databridge Client to override the Databridge Engine CHECKPOINT CLIENT EVERY *n* TRANSACTIONS parameter setting by causing Databridge Engine to generate a commit at the next quiet point after *n* transaction groups have been processed. This parameter determines one of many conditions under which Databridge Engine should generate a commit.

When this value is not specified, as in the case of the default setting, Databridge Client uses an internal value of –1. This value indicates that it won't attempt to override the settings for the corresponding Databridge Engine parameter (whose default value is 0). The value -1 is not a valid setting, per se, and will result in a "value out of range" error.

A value of 0 disables the use of this parameter by Databridge Engine. A value that exceeds the value specified in the Databridge Engine control file is ignored.

If `commit_absn_inc`, `commit_update_inc`, `commit_time_inc`, and `commit_txn_inc` are specified, Databridge Engine commits at the next quiet point after one or more of these conditions are satisfied.

commit_update_inc

Default: -1 (This parameter is commented out.)
Range: 0 – 200,000
Related parameters: `commit_absn_inc`, `commit_time_inc`, `commit_txn_inc`
Console: **Processing > Databridge Engine and ...(COMMIT parameters)**

The `commit_update_inc` parameter allows the Databridge Client to override the Databridge Engine CHECKPOINT CLIENT EVERY *nnn* UPDATE RECORDS parameter setting. It does this by causing Databridge Engine to generate a commit at the next quiet point after the *nnn* updates have been sent to the Databridge Client. This parameter determines one of many conditions under which Databridge Engine should generate a commit.

When this value is not specified, as in the case of the default setting, Databridge Client uses an internal value of –1. This value indicates that it won't attempt to override the settings for the corresponding Databridge Engine parameter (whose default value is 1000). The value -1 is not a valid setting, per se, and will result in a "value out of range" error.

A value of 0 disables the use of this parameter by Databridge Engine. A value that exceeds the value specified in the Databridge Engine control file is ignored.

If `commit_absn_inc`, `commit_update_inc`, `commit_time_inc`, and `commit_txn_inc` are specified, Databridge Engine commits at the next quiet point after one or more of these conditions are satisfied.

controlled_execution

Default: False
Range: True or False
Related command-line option: `-o`
Related parameters: `min_check_time`
Applies to: Command-line Client (dbutility) only
Console: N/A

NOTE: This parameter is only used by the command-line Client dbutility. The blackout_period parameter (page 345) in the scheduling section of the configuration file renders this method obsolete.

The `controlled_execution` parameter forces the program to check the values of the stop_time and end_stop_time columns of the DATASOURCES table. These columns enable an application external to Databridge to specify a block of time during which Databridge Client operations are disallowed. If the Databridge Client determines that this period of time exists, update processing is stopped. Any attempts you make to restart the Databridge Client also fail until the blackout period is over or the stop_time and end_stop_time columns are set to 0.

convert_ctrl_char

Default: False
Range: True or False
Related parameters: `alpha_error_cutoff`, `discard_data_errors`, `display_bad_data`

Console: Processing > DMSII Data Error Handling (Character data ...)

The convert_ctrl_char parameter applies to DMSII data items of type ALPHA.

NOTE

- Do not set the convert_ctrl_char parameter to True unless you are absolutely certain that eliminating control characters will have no adverse effect on the data. For example, eliminating control characters can cause some fields to be misinterpreted.
- This parameter and the parameter inhibit_ctrl_chars are mutually exclusive. If you attempt to set them both to True, the configuration file scanner will generate an error.

Use this parameter as follows:

- Set convert_ctrl_char to True if you want the Databridge Client to replace all control characters in ALPHA data with spaces. Most likely, your host fields are remapped by a COBOL application and the data in the fields is different from the declared data type in DASDL. In this case, you would want to know when data was being misinterpreted.
- Set convert_ctrl_char to False if you want the Databridge Client to not change control characters. Depending on your setting for alpha_error_cutoff, the column that contains control characters may be set to NULL, but at least the problem field will be identified. Then, you can decide whether to set this parameter to True and ignore the bad data.

In summary, before you set this option to True, set alpha_error_cutoff to a low value and set display_bad_data to True to determine whether or not it is safe to ignore the control characters.

convert_reversals

Default: -1 (This parameter is commented out.)

Range: True or False

Console: Processing > DBEngine and DBEnterprise Parameters

The convert_reversals parameter allows the Client to override the Databridge Engine control file parameter CONVERT REVERSALS. Refer the Databridge Host Administrator Guide for more details on this parameter.

When this value is not specified, as in the case of the default setting, Databridge Client uses an internal value of –1. This value indicates that it won't attempt to override the settings for the corresponding Databridge Engine parameter (whose default value is false). The value -1 is not a valid setting, per se, and will result in a "value out of range" error.

correct_bad_days

Default: 0

Range: -1 to 2

Console: Processing > Date and Time Parameters(Date parameters)

The parameter correct_bad_days specifies whether the Databridge Client should treat a DMSII date with a bad day (or month) value as an error or attempt to correct it by setting the value to last day for the given month and year.

This parameter does not apply in the following circumstances:

- Dates whose day values are greater than 31 (unless the parameter is set to 2)
- DMSII Julian dates (dms_subtype values 17, 18, 27, 28, 37, 38)
- MISER dates, LINC dates, DMSII dates and DMSII timestamps

Set this parameter as follows:

- Set `correct_bad_days` to 1 if you want the Databridge Client to set bad DMSII dates to the last day for the given month. In this case, a bad date would be February 29, 2002 because 2002 is not a leap year. The Databridge Client would correct this date to February 28, 2002. Likewise, a date of September 31 would be corrected to September 30, regardless of the year because September always has 30 days. A day value greater than 31 is not corrected in this case. However, a day value of 0 is always silently changed to 1, regardless of the setting of the setting of this parameter.
- Set `correct_bad_days` to 2 if you want the Databridge Client to perform the following corrections in addition to the ones for the case where `correct_bad_days` is set to 1. Day values greater than 31 are set to the last legal day of the month, month values greater than 12 are set to 12 and a month value of 0 is set to 1.
- Set `correct_bad_days` to 0 if you want the Databridge Client to store bad dates as NULL. If the DAOPT_Nulls_Allowed bit in the da_options column of the corresponding DATAITEMS entry is not set, the bad date is stored as 1/1/1900 in SQL Server.
- Set `correct_bad_days` to -1 if you want the Databridge Client to store bad dates (including dates with a day value of 0, which normally gets changed to 1) as NULL. If the DAOPT_Nulls_Allowed bit in the da_options column of the corresponding DATAITEMS entry is not set, the bad date is stored as 1/1/1900 in SQL Server.

dbe_dflt_origin

Default: direct

Range: direct, indirect, cache

Console: **Processing > Databridge Engine and DBEnterprise ...(General)**

The `dbe_dflt_origin` parameter specifies the expected origin for Enterprise Server audit files during normal operations. The program issues a WARNING if Enterprise Server sends a different value to the Client whenever it starts processing a new audit file.

defer_fixup_phase

Default: False

Range: True or False

Console: **Processing > Stop Conditions**

The `defer_fixup_phase` parameter prevents the Databridge Client from entering the fixup phase, which is deferred to the next `process` command. Version 6.1 and later Databridge Clients no longer support parallel clones.

discard_data_errors

Default: False
Range: True or False
Related parameters: `alpha_error_cutoff`, `display_bad_data`
Console: **Processing > DMSII Data Error Handling (General error ...)**

The parameter `discard_data_errors` instructs the Client to write all records with data errors to the discard file *tablename*.bad, located in the discards subdirectory of the working directory. If you set this parameter to False, the Client loads the record into the database with the affected column set to NULL or with the affected characters changed to question marks (?). Setting this parameter to True forces the `alpha_error_cutoff` parameter to 0 so that no errors are tolerated before the Client declares the field bad. For more information, see "alpha_error_cutoff" on page 278.

display_bad_data

Default: False
Range: True or False
Related parameters: `alpha_error_cutoff`, `discard_data_errors`
Console: **Processing > DMSII Data Error Handling (General error ...)**

The `display_bad_data` parameter is a debugging aid for users that encounter many data errors. Enabling this parameter makes the Databridge Client display the raw DMSII data in a field that is found to have a data error. This output, which immediately follows the data error messages, is suppressed whenever the number of errors exceeds the maximum number of errors to be logged (as defined by the `error_display_limits` configuration file parameter).

enable_doc_records

Default: False

Range: True or False

Console: **Processing > Databridge Engine and ...(General)**

This parameter is not supported by the Client Configurator. To set this parameter, you must first use the dbutility export/import commands and then edit the text configuration file. See "Export or Import a Configuration File" on page 242.

The `enable_doc_records` parameter requests DOC records from the Databridge Engine. Enable this parameter only when you are troubleshooting Databridge Engine problems.

NOTE: These records are recorded in the trace file only when full debugging is enabled (`-d`) or if you enable the DOC Record Tracing option as described in the section DOC Record Trace (page 222) .

---

enable_ff_padding

Default: False

Range: True or False

Console: **Processing > DMSII Data Error Handling (Character Data ...)**

This parameter enables an option in the Client Configurator (Enable high value padding) that lets you mark items as padded with high values to achieve left justification. This parameter applies to ALPHA items and unsigned numeric items that are store as ALPHA data. When set to False, this parameter does not appear in the exported configuration file.

enable_minimized_col

Default: True

Range: True or False

Console: **Processing > Advanced Parameters (General)**

When the `minimize_col_updates` parameter is applied during a `define` or `redefine` command, the DSOPT_Optimize_4_CDC bit is set in all data sets. Set this parameter to False to override the DSOPT_Optimize_4_CDC bit during the change tracking phase and avoid having to run the `redefine` command to clear the DSOPT_Optimize_4_CDC bit.

enable_optimized_sql

Default: True

Range: True or False

Console: **Processing > Advanced Parameters (General)**

When the `optimize_updates` parameter is applied during a `define` or `redefine` command, the DSOPT_Use_bi_ai bit is set in all data sets containing secondary OCCURS tables. Setting this parameter to False allows you to override the DSOPT_Use_bi_ai bit during the change tracking phase. Previously, you had to run the `generate` command to alter the optimization operation. The DSOPT_Use_bi_ai bit is documented under "ds_options" in DATASETS (page 153).

engine_workers

Default: -1 (This parameter is commented out.)

Range: 1–10

Console: **Processing > Databridge Engine and ... (General)**

The `engine_workers` parameter allows the Databridge Client to override the Databridge Engine WORKERS = *n* parameter setting to control the number of extract workers Databridge Engine can use during the data extraction phase.

This value can only be lower than Host parameter (DATA/ENGINE/CONTROL), never higher.

The default value of -1 indicates that the Client does not attempt to override the settings for the corresponding Databridge Engine parameter whose default value is 1.

error_display_limits

Default: 10 errors for the display; 100 errors for the log file

Range: 0–1000, 0–10000

Console: **Processing > DMSII Data Error Handling (General error ...)**

The `error_display_limits` parameter enables you to control the number of screen output messages and log file entries for data errors. All data error counts are maintained for individual tables. This parameter prevents Databridge from filling the disk with meaningless errors when a large number of the records in a data set are in error.

inhibit_8_bit_data

Default: False

Range: True or False

Console: **Processing > DMSII Data Error Handling (Character data ...)**

Use the `inhibit_8_bit_data` parameter for data validation. Do not set this parameter if your data contains international characters.

For example, if your valid alpha data consists of 7-bit characters, set inhibit_8_bit_data to True. The Databridge Client then changes all 8-bit characters to a question mark (?) and issues a warning message on the *first* occurrence of the bad data. The message contains the keys of the record with the invalid data, as in the following:

```
WARNING: Item 'cm_addr_line_2' in table 'customers' has 8-bit characters in
alpha data
- Keys: cm_number=00101301
```

NOTE: If an item containing 8-bit characters or control characters happens to be a key, the record is discarded as it attempts to change the bad characters to ? (question marks), potentially resulting in duplicate records. All discarded records are written to the file *`tablename`*`.bad` in the discards subdirectory of the working directory.

---

inhibit_console

Default: False

Range: True or False

Related command-line parameter: `-C` (toggle)

Applies to: Command-line Client (dbutility) only

Console: N/A

When set to True, this parameter disables the console commands for the command-line Clients. The console commands are explained in "Controlling and Monitoring dbutility" on page 29.

inhibit_ctrl_chars

Default: False

Range: True or False

Console: **Processing > DMSII Data Error Handling (Character data ...)**

Since the Databridge Client supports *most* (but not all) control characters, this parameter treats all control characters as errors and converts them to a question mark (?) when set to True. When set to False, the Databridge Client supports all control characters except NUL, CR, LF, and TAB; however the Databridge Client for Oracle accepts TAB, and the Databridge Client for Microsoft SQL Server accepts TAB characters if the bcp delimiter is not TAB.

NOTE: This parameter and the parameter `convert_ctrl_char` are mutually exclusive. If you attempt to set them both to True, the configuration file scanner will generate an error.

inhibit_drop_history

Default: False

Range: True or False

Console: **Customizing > History Tables (Options)**

Use this option to prevent the Databridge Client from inadvertently dropping history tables during a `clone`, `process`, or `drop` command or to prevent the clean-up scripts from running.

This is a safeguard to prevent the user from making an unrecoverable error. If you want the tables dropped and are sure of that, you can change this setting and rerun the Client. However, make sure to set it back to True for the next time.

- If the data source is dropped it cannot be reprocessed because the Databridge Client attempts to drop the history table, and the option prevents this from happening.
- Cleanup scripts deal with tables that are partially recloned. In the case of multiple source tables, they are recloned one data source at a time. In the case of tables that preserve deleted records, the deleted records are preserved during a clone. In the case of MISER data sets that hold history and resident records, the table is recloned without dropping the history records (which is different than Databridge Client history tables).

inhibit_initial_values

Default: False

Range: True or False

Console: **Customizing > Advanced Parameters (Table reorganization options)**

This parameter allows you to disable new columns added after a DMSII reorganization from getting set to their initial values. If there are large tables and the user is okay with the column being NULL, setting this parameter to true will save time.

NOTE: If you ever reclone such tables these columns will no longer be NULL.

keep_undigits

Default: False

Range: True or False

Console: **Processing > DMSII Data Error Handling (Character data ...)**

This parameter allows the user to keep the undigits in numeric fields that are stored as character data. These characters will have a value of ‘A’ through ‘F’ based on the value of the corresponding undigit.

linc_century_base

Default: 1957

Range: 1800 and up

Console: **Processing > Date and Time Parameters (Date parameters)**

This parameter allows you to configure the base year for LINC dates.

masking_parameter[n]

Default: N/A

Range: “string”

Applies to: SQL Server client using SQL Server 2016 or newer

Console: **Relational > Relational Properties > SQL Server Masking**

This array of parameters is used to hold the parameters for masking for the random and partial masking functions. Data masking is defined using the masking_info column of DATAITEMS, which defines the masking function and the index of the corresponding parameter string, which does not include the parentheses. The format of the masking_info column (which is an int) is 0x00nn000m, where m is the masking function code.

The following masking codes are defined: 0 – no masking, 1 – default() masking function, 2 – email() masking function, 3- random() masking function, 4 – partial masking function. The last two masking functions have 2 and 3 parameters respectively. These parameters are represented in the left half of the masking_info by the index into the table of masking parameters (or example 0x00010003 would be a random() masking function with its parameters represented by the masking_parameter[1] entry in the configuration file. This parameter could be “0,100” which would result in the masking function random(1,100) being used in defining the data mask for the column.

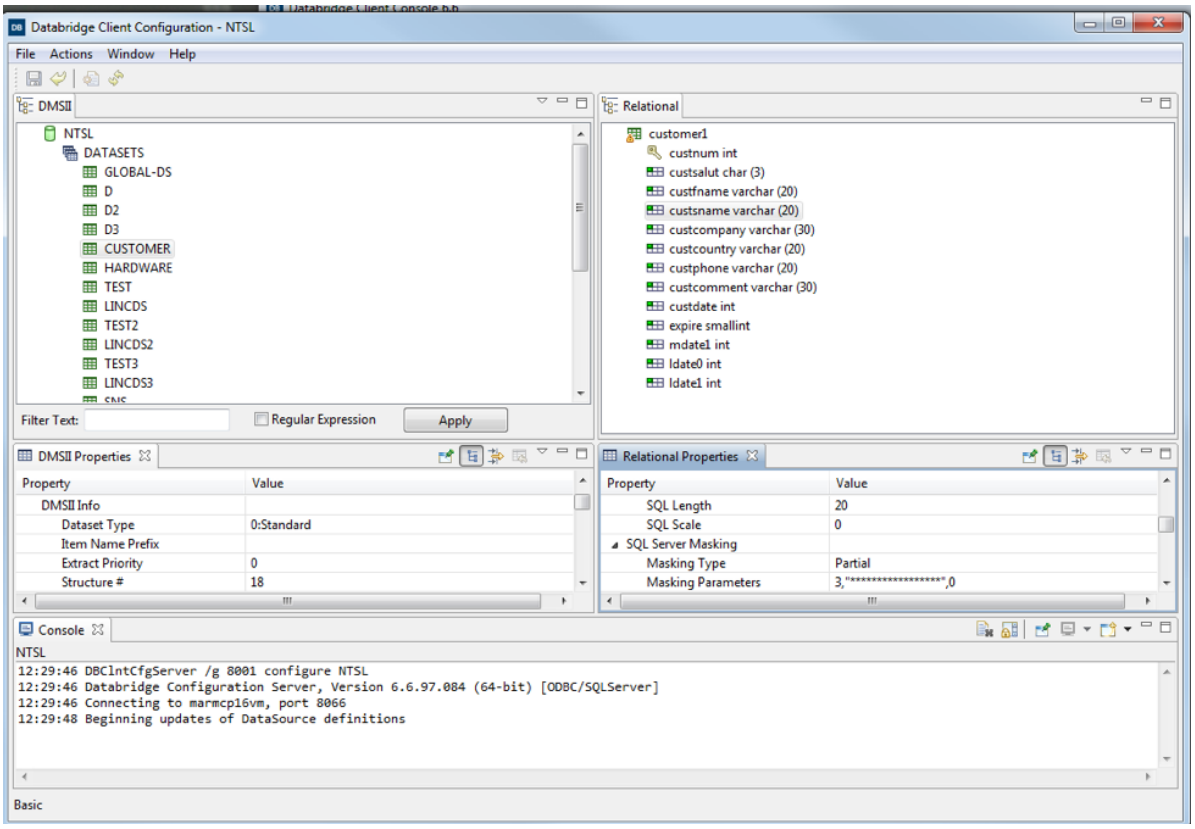
You can reuse masking_parameter entries as many times as needed. The index must be between 1 and 100. If you use the configurator to create the entries, it will add and remove entries from these tables based on the number of references to them. The best way to ensure that a parameter is reused is to use copy and paste when using the Client Configurator, as retyping the entry might result in two different entries, if the two strings do not exactly match.

Refer to the SQL Server documentation for details on how data masking works.

The figure below shows how to set up masking parameters using the Client Configurator. This example results in the custname column with the following attributes:

```
custsname varchar(20) masked with
(function='partial(3,"*****************",0)') NULL,
```

Figure C-1



max_clone_count

Default: 10000

Range: 1000–100000 SQL insert statements before a commit

Related command-line option: -s

Console: N/A

In most cases you do not need to use this parameter. This parameter is used only when you enter the `-s` option at the command line or set the bit DSOPT_No_Loader (2) in the ds_options column of corresponding row in the DATASETS table.

The `max_clone_count` parameter applies to the dbutility `process` and `clone` commands for cloning only, not updates, when the command-line option `-s` is set. It defines the maximum number of rows that the Client can insert into a table before a commit is required.

The value of this parameter has no effect on the commit frequency during the processing of updates, which is controlled by Databridge Engine.

max_discards

Default: 0,100

Range: 0-10000,0-1000

Console: **Processing > DMSII Data Error Handling (Discard ...)**

This is a two-part parameter that controls how the Client handles discarded records. The first number represents the total number of discards the Client will tolerate before abending. The second number represents the maximum number of discards records for a table that are written to the discard file. Discards that exceed this number are ignored.

If either of these values are set to zero, no limits are imposed for the corresponding actions, and the Client will behave the way it did before this parameter was implemented.

The first value must be greater than the second value, unless the second value is zero, indicating that it's unlimited. Otherwise, the Client will always abend before the second value goes into effect.

max_retry_secs

Default: 20

Range: 1 - 36000 seconds

Related parameters: `use_dbwait`, `max_wait_secs`

Console: **Processing (Audit unavailable action)**

The `max_retry_secs` parameter works only when you enable "max_wait_secs" on page 292 so be sure to set both.

The `max_retry_secs` parameter applies when you use the `process` command to track changes. It defines the value for the retry time (in seconds) for the DBWAIT API call for Databridge Engine, which is called when the `use_dbwait` parameter is set to True. This value defines the amount of time to wait before requesting an audit file again.

For example, if you set `max_wait_secs` to 3600 seconds (same as 1 hour) and `max_retry_secs` to 60 seconds, Databridge Engine checks for an audit file once a minute for an hour before giving up and returning an audit file unavailable status.

Note that when you supply a second value for the parameter max_wait_secs, the value of max_retry_secs must be less than that value, as the client expects to get control back within the time specified by the second value of max_wait_secs. Ideally, the second value of max_wait_secs should be an exact multiple of max_retry_secs to ensure that client gets control back after the correct amount of time. For example, if using the default value of 60 for the second value of max_wait_secs, we recommend you set this parameter to 20 or 30 seconds, which ensures that the client gets control back in 60 seconds.

max_srv_idle_time

Default: 0

Range: 15 – 600 minutes

Console: **Processing > Advanced Parameters (Server Inactivity ...)**

This parameter allows the timer thread to time out a server connection after several inactivity warnings. When this parameter is set to a non-zero value, which represents the timeout value in minutes, the Client stops if the length of an inactivity period exceeds this value.

The Client stops with an exit code of 2059. If using the service, this will cause it to restart the Client after a brief delay. This parameter provides an alternative to the TCP keep-alive mechanism to detect situations where we have a dead connection. This situation is most likely to occur if the MCP is HALT LOADED.

max_wait_secs

Default: 3600,60
Range: 0–36000 seconds for the first value, 0 or 60-300 seconds for the second value
Related parameters: `use_dbwait`, `max_retry_secs`
Console: **Processing (Audit unavailable action)**

The `max_wait_secs` parameter works only when you enable "use_dbwait" on page 299. When you set `max_wait_secs`, also set "max_retry_secs" on page 291.

The `max_wait_secs` parameter applies when you use the dbutility `process` command to track changes. It defines the maximum wait time (in seconds) for the DBWAIT API call for Databridge Engine, which is called when the `use_dbwait` parameter is set to True. This is the maximum amount of time that Databridge Engine waits before returning an audit file unavailable status.

The `max_wait_secs` value and the `max_retry_secs` value are the DBWAIT API input parameters. The maximum wait time (`max_wait_secs`) specifies the cutoff point for the retries (`max_retry_secs`). DBWAIT gives up when the total amount of time elapsed since the last successful attempt to read the audit file is greater than or equal to the `max_wait_secs`.

The optional second value for this parameter is used to break up large wait times into smaller increments by making the client repeatedly issue DBWAIT calls using this second value, which must be smaller than the first value (unless the first value is 0).

For example setting `max_wait_secs` to 3600,60 will result in the client issuing a DBWAIT remote procedure call with a `max_wait_secs` value of 60 seconds. Upon getting a **"no more audit available"** return status, the client will issue another DBWAIT call until it has received no data for the amount of time indicated by the first parameter. This way of doing things ensures that an idle line has some traffic on it, which makes it possible to detect situations where the network goes down and neither side knows about it.

Upon receiving data the client resets the timer that keeps track of idle during which no updates are received. A value of 0 for the second parameter makes the Databridge Engine handle the wait-and-retry loop without any involvement by client.

Note that when you supply a second value for the parameter max_wait_secs, the value of max_retry_secs must be less than that value, as the client expects to get control back within the time specified by the second value of max_wait_secs. Ideally the second value of max_wait_secs should be an exact multiple of max_retry_secs to ensure that client gets control back after the correct amount of time. For example, if using the default value of 60 for the second value of max_wait_secs, we recommend you set this parameter to 20 or 30 seconds, which ensures that the client gets control back in 60 seconds.

NOTE: A value of 0 indicates that Databridge Engine continually waits.

---

min_check_time

Default: 600 (expressed in units of seconds)
Range: 10–1200
Related parameters: `controlled_execution`
Applies to: Command-line Client (dbutility) only
Console: N/A

The min_check_time parameter is used in with the controlled_execution parameter to reduce the number of times the program reads the corresponding entry in the DATASOURCES table. After a quiet point, which ends a transaction group of updates, the program only reads the DATASOURCES table if min_check_time has elapsed since the last read. If you set this parameter to 60 seconds, the program reads the DATASOURCES table no more than once a minute, even if quiet points are only a few seconds apart.

months

Default: JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC

Range: A list of exactly 12 three-character entries

Console: N/A

Use the months parameter when you want to use month name abbreviations that are not in English. This parameter applies only when you are using DMSII date encoding methods that use three-character abbreviations for months.

For more information on DMSII date encoding methods, see "Decoding DMSII Dates, Times, and Date/Times" on page 48.

To make an entry for the months parameter, enter your three-character month names in order and separated by commas.

n_dmsii_buffers

Default: 0

Range: 0, 2 – 64

Related parameters: n_update_threads

Console: **Processing > Advanced Parameters (Multithreaded updates)**

Use this parameter to configure the number of RPC buffers to be used by the Client. If you let this parameter default or set it to 0, the Client uses 4 times n_update_threads RPC buffers or 2 buffers when n_update_threads is 0. When you have DMSII links enabled, this parameter is set to the number of extract workers unless the default value is larger. Raising this value might improve performance by ensuring that there are enough buffers queued to keep the update workers busy at all times.

n_update_threads

Default: 8
Range: 0 – 16
Applies to: SQL Server (see note) and Oracle Clients
Console: **Processing > Advanced Parameters (Multithreaded updates)**

Use this parameter to specify the number of update threads to be used. The update threads are responsible for executing SQL to update the user tables and writing bulk loader temporary files. When using the BCP API in the SQL Server Client these threads are also responsible for making the BCP API calls to load the data. If you have multiple processors and disk arrays, setting this parameter to a high value will increase the update processing speed at the expense of additional memory. Avoid setting this parameter to 1, as this will effectively pass off all updates to the single worker thread, when executing them directly would be preferable.

It is recommended to always use multi-threaded updates, as it improves performance considerably.

NOTE: This parameter requires the use of SQL Native Client in ODBC. The SQL Server driver doesn't support MARS, which is required for multithreaded updates. If MARS cannot be enabled, the Client automatically reverts to using single-threaded updates.

---

null_datetime_value

Default: 19010101

Range: 17530101 to 99991231

Applies to: SQL Server Client

Console: **Processing > Date and Time Parameters (Date parameters)**

Use this parameter to change the value used to represent a NULL date in a datetime column that does not allow nulls. For example, you could change the value to 18991231 if the default value of 190001001 is meaningful.

null_datetime2_value

Default: 19010101

Range: 00010101 to 99991231

Applies to: SQL Server Client

Console: **Processing > Date and Time Parameters (Date parameters)**

Use this parameter to change the value used to represent a NULL date in a datetime2 column that does not allow nulls. For example, you could change the value to 00010101 if the default value of 190001001 is meaningful.

null_digit_value

Default: 9

Range: 0 or 9

Related parameters: `allow_nulls`

Console: **Processing (Store NULL DMSII numbers as)**

Use this parameter when your DMSII data contains NULL values that you do not wish to store as NULL. This parameter applies only to items that have the DAOPT_Nulls_Allowed bit reset in the da_options column of the corresponding DATAITEMS table entry.

- If you set `null_digit_value` to 0, all NULL values encountered in DMSII NUMBER data types get stored as zeros.
- If you set `null_digit_value` to 9, all NULL values encountered in DMSII NUMBER data types get stored as high values (999 or 999.999).

numeric_date_format

Default: 23 (format mmddyyy)

Range: Any legal numeric date format value (dms_subtype values 11–16, 21–26, 31–36). See "Decoding DMSII Dates, Times, and Date/Times" on page 48.

Console: **Processing > Date and Time Parameters (Default date formats)**

The `numeric_date_format` parameter enables you to store DMSII dates as relational database numbers written out in the specified, allowable, DMSII numeric date format. To configure the `numeric_date_format`, you need to set the DMS_ITEMS Client control table DIOPT_Clone_as_Date bit and set the sql_type to 13, which represents a numeric date. The date is stored as an int data type in Microsoft SQL Server and a number (10) in Oracle.

This feature is useful in converting a DMSII MISER date or LINC date as a readable, numeric date. Note that the use of relational database date data type is a much better alternative.

preserve_deletes

Default: False

Range: True or False

Console: **Processing > Advanced Parameters (General)**

Setting this parameter to True causes records that contain an extended update_type column (type or bit 11) whose value is 2 (DELETE) to survive a reclone of the data set. Instead of dropping the table, all non-deleted records are removed from the table during the reclone.

To enable this you also need to have a NON-DMSII column enabled that stores the value and is called DELETED_RECORD.

This parameter has no effect on the handling of tables that have a non-DMSII column of type 10 (named deleted_record by default). Deleted records are unconditionally preserved when such tables are recloned.

rollback_segment

Default: NULL string

Range: `rollback_segment_name`

Applies to: Oracle Clients only

Console: **Processing (General)**

This parameter makes the Client use the specified rollback segment by executing the SQL "SET TRANSACTION USE ROLLBACK SEGMENT `Rollback_segment_name`" at the start of every transaction.

set_blanks_to_null

Default: False

Range: True or False

Console: **Customizing (General)**

This parameter causes the Client to store zero-length character data (that is, "") as NULL instead of a single space. This parameter only applies to columns that are not part of the index.

set_lincday0_to_null

Default: False
Range: True or False
Console: Processing > Date and Time Parameters (Date parameters)

This parameter causes the Client to treat a Linc date of 0 as NULL rather than 1/1 of the Linc base year.

show_perf_stats

Default: True
Range: True or False
Console: Processing > Statistics Parameters (Logging options)

The `show_perf_stats` parameter enables you to print the performance statistics at the end of the data extraction phase when the AFN value changes (for example, when the processing of audit files is completed) and when the `process` or `clone` command terminates.

show_statistics

Default: True
Range: True or False
Related command-line option: `-v`
Related parameter: `statistics_increment`
Console: Processing > Statistics Parameters (Logging options)

Use the `show_statistics` parameter to cause the Databridge Client to display record count statistics at the intervals specified by the `statistics_increment` parameter. The statistics lines are useful in monitoring the progress of lengthy operations.

The `show_statistics` parameter applies to both the `process` and `clone` commands. The `-v` option implicitly sets `show_statistics`; however, the `-v` option produces trace output that is typically not needed.

show_table_stats

Default: True
Range: True or False
Console: Processing > Statistics Parameters (Logging options)

This parameter makes the client print the counts of updates for each individual table at the end of the data extraction phase and when the client starts to process a new audit file during change tracking. When processing updates these statistics also include the average update times. Tables that have no updates are omitted from this report.

sql_exec_timeout

Default: 180,0
Range: 15-1200 for the first value, 0 or 30-3600 for the second value

Console: Processing > Advanced Parameters (SQL execution ...)

The `sql_exec_timeout` parameter applies to update processing only. The first value allows the user to override the default setting of 180 seconds (3 minutes), which is used to determine when the time thread should issue a WARNING about the query taking too long to complete.

The optional second parameter, which defaults to 0 when omitted, allows the user to set the secondary timeout value for a long query after which time the query is aborted. A value of 0 disables this timeout. The value of the second parameter must be greater than that of the first parameter, except if it is 0.

statistics_increment

Default: 100000,10000

Range: 1–10000000 (10 million) for the first value, 1–1000000 (1 million) for the second value

Related command-line option: `-v`

Related parameter: `show_statistics`

Console: Processing > Statistics Parameters (Record count ...)

The `statistics_increment` parameter applies when `show_statistics` is set to True *or* when the `-v` option is in effect. The `statistics_increment` parameter lets you set the display interval for record counts that occur during cloning and updating. For example, a setting of 1 indicates that the Databridge Client will display when *every* record is processed. A setting of 1000000 indicates that the Databridge Client will display a line after one million records have been processed.

Setting the `statistics_increment` parameter to a low number slows processing time, especially during cloning.

Enter a value using the following syntax:

```
statistics_increment = ccc[,uuu]
```

Where	Is
ccc	The record count before displaying the record statistics. This record count is used during cloning.
uuu	The record count before displaying the record statistics. This record count is used during updating.

stop_after_fixups

Default: False

Range: True or False

Console: Processing > Stop Conditions

Setting this parameter to True causes the program to stop as soon as all the tables are synchronized. This is a useful stopping point in a data warehousing environment, as the warehouse can be loaded at this point. It is also helpful if you want to validate data before declaring things to be in working order.

stop_after_gc_reorg

Default: False

Range: True or False

Console: Processing > Stop Conditions

Setting this parameter to True causes the program to stop at the first quiet point after a garbage collection reorganization occurs. The program acts as if the operator issued a console QUIT command (or a SIGTERM signal in the case of UNIX) at the point when the garbage collection reorganization was detected. The program exit status is 2034 if garbage collection or a file format reorganization is encountered in the audit trail.

stop_after_given_afn

Default: False

Range: True or False

Applies to: Command-line Client (dbutility) only

Console: N/A

NOTE: This parameter is specific to replication and applies only to the command-line Client. The command-line `-F` option, which allows you to specify the AFN after which to stop, overrides this parameter.

The `stop_after_given_afn` parameter enables you to stop processing after an externally specified audit file has been processed. Note that you must store the value of the audit file number in the stop_afn column of the DATASOURCES entry using data source tools external to dbutility. The `stop_after_given_afn` parameter forces the program to check the values of the stop_afn column of the DATASOURCES table. If a non-zero value is found in this column, the Client sets the stop AFN value and stops reading the DATASOURCES table.

To automate this functionality using a script launched by the service, see Automate Client Operations with the Service (page 193).

stop_on_dbe_mode_chg

Default: False

Range: True or False

Console: Processing > Stop Conditions

Setting this parameter to True causes the program to stop as soon as it detects that the Databridge Enterprise Server access mode changes from the value specified in the parameter `dbe_dflt_origin`. If this parameter is set to “direct” and DBEnterprise switches to “indirect”, this will result in the Client stopping at the next quiet point.

suppress_dup_warnings

Default: False

Range: True or False

Console: Processing > DMSII Data Error Handling (General error ...)

The parameter suppress_dup_warnings controls whether or not duplicate insert and failed update warnings are displayed during update processing. The bit DSOPT_Ignore_Dups (32) in the ds_options column of the DATASETS table can be used instead when you want to apply this only for certain data sets.

track_vfds_nolinks

Default: True

Range: True or False

Console: **Customizing (DMSII related parameters)**

Tracks variable-format data sets that contain links; however, the links themselves are not tracked. When a record is created in a variable-format data set, links are set to null. If the application assigns the links to point to other records, the client database will not contain these new link values until the variable-format data set is recloned. This parameter is selected, by default.

When this parameter is unselected, variable-format data sets are set to mode 11 after initial cloning and not updated.

use_dbwait

Default: False
Range: True or False
Related parameters: max_wait_secs, max_retry_secs
Console: **Processing (Audit unavailable action)**

Use this parameter to select the Databridge RPC to use during update processing, as follows:

- Set to False to use the DBREAD RPC. The DBREAD RPC returns an audit file unavailable status when all available audit files have been processed.
- Set to True to use the DBWAIT RPC. The DBWAIT RPC waits for an audit file to become available. *This is the required setting if the reading of the active audit file is enabled (READ ACTIVE AUDIT parameter in the Engine control file).*

The difference between the DBWAIT RPC and the DBREAD RPC is that DBWAIT waits for updates to become available rather than returning an audit file unavailable status.

This parameter applies only to the process command for updates. The Databridge Client ignores it for a clone command, which always uses the DBREAD RPC.

NOTE: You can temporarily toggle this parameter by using the -w command-line option.

---

use_latest_si

Default: False

Range: True or False

Console: **Processing > Databridge Engine and DBEnterprise ...(General)**

If the use_latest_si parameter is set to True, the Client will request that the server include the latest StateInfo in all the data records sent during audit file processing. The overhead of doing this is 24 bytes per record. This parameter is mainly intended as a debugging tool when chasing audit file processing problems. In addition to making the Client print up-to-date audit locations instead of the

audit location of the last quiet point that was used as a COMMIT, this option may be useful when you use the audit timestamp as an external column for data tables. Enabling this parameter will make the values used in such columns much more accurate. Not all DMSII audit file records have an associated timestamp, so the time stamp will still not be 100% accurate.

Server Option Parameters

The following parameters are included in the [params] section of the Databridge Client configuration file. The parameters listed in this section affect how the Databridge Client processed updates.

shutdown

Console: N/A

This parameter applies only to the command-line Client. This parameter inhibits update processing for a given period of time after a LIMIT_NAME or LIMIT_TIME condition (normally initiated by a STOP parameter) is encountered. The format of the shutdown parameter is as follows:

```
shutdown {until | for} hh:mm after stop
```

The first form specifies the time of day at which the shutdown period ends, while the second form specifies the length of the shutdown period. The command-line option `-o` can override this parameter.

stop

Console: **Processing > Stop Conditions (Dynamic stop conditions)**

This parameter allows you to specify a condition for the Databridge Engine to stop processing updates as follows:

```
stop {before | after} {task "name" | time hh:mm[:ss]}
```

For example, you would enter the following:

```
stop before task "name"
- or-
stop after time 12:30:15
```

Generally, you should include only one stop specification in the configuration, but using two stop specifications is legal. When more than one task or one time is specified in the configuration file, the program honors only the last one. However, when a task specification is coupled with a time specification, the program honors the task specification only if it occurs on the date specified in the time specification.

Generate Command Parameters

The `generate` command parameters include `decimal_aa_length` (Oracle Clients only) and a number of SQL statement suffixes (Oracle and SQL Server Clients).

Parameter	Description
`decimal_aa_length`	Default: 15 Range: 15 – 38 Applies to: Oracle Client Use this parameter to control the size of the data type that represents a decimal AA Value—by default, this is NUMBER(15). If you set this parameter to 16, the Client will use NUMBER(16) for all decimal AA Values.

SQL Statement Suffixes

The following parameters determine which extra clauses are added to the create table and create index SQL statements in the scripts generated by the Databridge Client.

Suffixes must be entered on a single line and be enclosed in double quotation marks. Suffixes can be up to 256 characters in length.

To supply these parameters:

1. From the Client Console or Client Configurator, right-click on the data source and then select **Client Configuration** from the pop-up menu that appears.
2. The Configuration tool opens. Click **Customizing > SQL Suffixes** and type the Suffix in the appropriate edit box.
3. Click [OK] when done.

Parameter	Description

`create_index_suffix`	**Default**: None
	Range: "*suffix*"
	Applies to: Oracle and SQL Server Clients
	
	The `create_index_suffix` parameter enables you to define extra attributes (a suffix) for `create index` SQL statements that the program generates for any given table. Each attribute list is defined with a number or index *n* so you can reference it. Up to 100 different suffixes can be defined. Individual indexes can select one of the suffixes by specifying this value in the index_suffix column of the corresponding DATATABLES Client control table entry. The index suffix is then concatenated to all create index SQL statements for this table.
	
	Here's an example suffix for a SQL Server database which specifies file groups for create index statements:
	
	`create_index_suffix [1]="ON filegroup"`
	
	Here's an example *suffix* for an Oracle database:
	
	`create_index_suffix [1]="TABLESPACE name STORAGE MINEXTENTS 1 NEXT 10 MAXEXTENTS UNLIMITED"`

Parameter	Description

`create_table_suffix`	**Default**: None
	Range: "*suffix"*
	The `create_table_suffix` parameter enables you to define a suffix for `create table` SQL statements that the program generates for any given table and to assign a number to this suffix so you can reference it. The index *n* allows for up to 100 different suffixes to be defined. Individual tables can select one of the suffixes by specifying this value in the create_suffix column of the corresponding DATATABLES Client control table entry. The table suffix is then concatenated to all create table SQL statements that specify the given suffix number.
	Here's an example suffix for an SQL Server database which specifies filegroups for create table statements:
	`create_table_suffix [1]="ON filegroup"`
	Here's an example suffix for an Oracle database:
	`create_table_suffix [1]="TABLESPACE tablename"`

`global_index_suffix`	**Default**: None **Range**: "*suffix"* **Applies to**: Oracle and SQL Server Clients The `global_index_suffix` parameter enables you to add a filegroup (SQL Server) or a tablespace (Oracle) or any other SQL command specification to all create index SQL statements that the program generates except those that have a suffix associated with the `create_index_suffix` parameter.
`global_table_suffix`	**Default**: None **Range**: "*suffix"* The `global_table_suffix` parameter allows you to add a filegroup (SQL Server) or a tablespace (Oracle) or any other SQL command specification to all the create table SQL statements that the Client generates, except for statements whose suffix is associated with the `create_table_suffix` parameter.
`user_column_suffix`	**Default**: None **Range**: "*suffix"* The `user_column_suffix` parameter allows you to add a suffix to the column definition created by the generate command for external columns of type user_column1 through user_column4. This is particularly useful for adding default clauses.

In the case of index suffixes (both global and specific) for the Oracle client, you can use the string $(INDEX_NAME) as an environment variable that the client replaces by the actual index name for the table when using the suffix. You can also insert new line characters into the suffix by using "\n"; this is sometimes necessary when the suffix contains a SQL statement that must be executed separately after the index creation completes. An example for this is enabling parallel mode for index creations, which speeds up the index creation significantly. You can use the following index suffix to do this:

```
"parallel (degree 8)\n/***/\nalter index $(INDEX_NAME) parallel 1"
```

Once the index is created, the alter index statement sets the parallel degree back to 1, it needs the index name to be able to do this, using the $(INDEX_NAME) environment variable makes this possible without having to write separate scripts for each table. The /***/ is inserted into the SQL suffix to force the client to execute the create index statement before executing the alter index statement. Using a semicolon causes an OCI error. Inserting "\n/***/\n" makes the client break up the line into two separately executed SQL statements.

Display Command Parameter

The following parameter is included in the [params] section of the Databridge Client configuration file. It affects the `display` command only.

When using the Client Configurator, this parameter can be found in the **Processing** page of the Client Configuration property pages.

`display_active_only`

Default: True
Range: True or False
Related command-line option: `-a`
Console: **Processing (General)**

Use the `display_active_only` parameter to affect the display command, as follows:

- Set `display_active_only` to True to show only the Client control table entries for data sets whose active column is 1. This is particularly useful if your site clones a small number of data sets.
- Set `display_active_only` to False to show all Client control table entries, regardless of the data set active column setting.

You can temporarily override this parameter by using the `–a` command-line option.

User Scripts Parameters

The following parameters are included in the [params] section of the Databridge Client configuration file. The parameters listed in this section affect what the Databridge Client does with user scripts.

When using the Client Configurator these parameters can be found in the **Customizing** page of the Client Configuration property pages

---

NOTE: We highly recommend that you set these parameters. As long as you have made sure that each user script includes all of the changes for the specified data set, the user scripts ensure that the Databridge Client can handle DMSII reorganization changes.

`check_user_scripts`

Default: False
Range: True or False

Set this parameter to True to let the Databridge Client inform you if a user script for a table is missing. In this case, the Databridge Client returns the following message:

```
ERROR: Unable to open script file filename
```

This parameter is especially useful if you have created data table creation user scripts and index creation user scripts for every table in your relational database. The Databridge Client runs these scripts immediately after it completes its own scripts for creating tables and table indexes.

NOTE: This parameter does not apply to data set selection user scripts and data table customization scripts.

`user_script_dir`

Default: "scripts"
Range: Any valid directory (except the service's working directory)
Related command-line option: `-n`

Use this parameter to tell the Databridge Client where your user scripts are located. You can place them in any valid directory; however, it is highly recommended that you place them in the scripts subdirectory in the data source's working directory. When you upgrade from an earlier version to 6.1 or later, the migrate utility copies your scripts to the scripts directory. Similarly, when you add a data source using the service, the service creates a scripts subdirectory and sets this parameter to point to that directory.

You must use the double quotation marks. Also use two consecutive back slashes (\\) to represent one back slash. For the directory C:\DBRIDGE\CUSTDB\SCRIPTS, you would enter the following:

```
user_script_dir = "C:\\DBRIDGE\\CUSTDB\\SCRIPTS"
```

Store the following user scripts in this directory:

`script.user.`*`session`*

`script.user_datasets.`*`datasource`*

`script.user_datatables.`*`datasource`*

`script.user_layout.`*`primary_table_name`*

`script.user_define.`*`primary_table_name`*

`script.user_create.`*`tablename`*

`script.user_index.`*`tablename`*

`script.user_cleanup.`*`tablename`*

NOTE: You can temporarily override this parameter via the `-n` option when you run the dbutility `runscript` command.

`user_script_bu_dir`	**Default:** “” (The default backup directory is located within the user script directory.) The `createscript` command copies all of the user script files that apply to the `define` and `redefine` command from the user script directory to a new sub-directory created under this directory. If you create many backups, it's important to manage these directories to prevent scripts from accumulating.

[Scheduling]

The Scheduling parameters section only applies to the dbutility `process` command. You must run the `process` command once before the scheduling takes effect. For more information, see Scheduling dbutility Updates (page 102).

To schedule Client runs that are initiated from the Client Console, click **Processing > Scheduling** to open the **Client Configuration** property pages and set these parameters. For more information, see the Databridge Client Console **Help**.

Parameter	Description
`blackout_period`	**Default:** 00:00, 00:00 **Range:** 00:00 to 24:00 (The two time values cannot be equal.) Use this parameter to specify a fixed block of time during which the Client cannot run. This parameter is useful for operations, such as database backups, that can only take place when the Client is inactive. For example, if you want to back up the database daily between 1:00 a.m, and 2:30 a.m. daily, define a blackout period from 0:55 to 2:30. The extra 5 minutes ensures that the Client finishes any long transactions before the database backup begins. If the Client is running when the blackout period starts, the Client automatically stops. If the Client is waiting for an idle host to send it updates when the blackout period starts, the Client resets the TCP/IP connection and aborts the run if it hasn't received any updates after 15 seconds. If you try to run the Client during a blackout period, nothing happens. During a blackout period the service will not start the Client. If the scheduler tries to schedule a DBClient run at a time that falls within a blackout period, the start of the run will be delayed until the blackout period ends. When this parameter is updated using the Client Console or Client Configurator, it is set to the same value in both the service and Client configuration files.

Parameter	Description
daily	**Default:** daily = 08:00, 12:00, 17:00, 24:00 **Range:** 12 entries in ascending order from 00:00 to 24:00 **NOTE:** The daily parameter is mutually exclusive with the sched_delay_secs parameter. If you specify both daily and sched_delay_secs in the [scheduling] section of the configuration file, sched_delay_secs *overrides daily regardless of the order in which they are specified*. Enter the times you want the dbutility process command to wake up and gather updates from the DMSII database. You must specify 24-hour time (for example, 5:00 for 5:00 a.m. and 17:00 for 5:00 p.m.). The range for minutes is 00–59. You can specify up to 12 times for the daily parameter. However, you must specify the times in *ascending* order. Note the following: ◆ The values 00:00 and 24:00 are equivalent for midnight. ◆ 24:00 is allowed only so that you can put it at the end of the list of times in ascending order. ◆ 24:01 is not allowed; instead, specify, 00:01.
exit_on_error	**Default:** True **Range:** True or False The exit_on_error parameter indicates that the scheduling should be terminated if an error occurs. If this parameter is set to false, the process command is retried at the next scheduled time.
sched_delay_secs	**Default:** 0 **Range:** 0–86,400 seconds (24 hours) **NOTE:** The sched_delay_secs parameter is mutually exclusive with the daily parameter. If you specify both daily and fixed_delay in the [scheduling] section of the configuration file, fixed_delay *overrides daily regardless of the order in which they are specified*. Use the sched_delay_secs parameter to specify a time delay between successive executions of the process command. The sched_delay_secs parameter does use the retry_time parameter. To disable the sched_delay_secs parameter, comment it out or set its value to 0. Replaces the fixed_delay parameter in version 6.0 and earlier.
sched_minwait_secs	**Default:** 0 **Range:** 0–86,400 seconds (24 hours) This parameter ensures that next scheduled process command is delayed by the specified interval and doesn't occur too soon after the current scheduled time. Replaces the min_wait parameter in version 6.0 and earlier.

Parameter	Description
sched_retry_secs	**Default:** 3600 seconds (1 hour) **Range:** 0–86,400 seconds (24 hours) The sched_retry_time parameter only applies after a failed process command. A value of 0 means that dbutility schedules the next run at the next regularly scheduled time without any retries. For example, if the mainframe is down when dbutility attempts a process command using the scheduling option, dbutility will retry the operation after the specified amount of time has elapsed. If the retry time value is larger than the next scheduled time, dbutility retries at the next scheduled time. Replaces the retry_time parameter in version 6.0 and earlier.

[EbcdictoAscii]

Use the [EbcdictoAscii] section of the configuration file to customize character translation tables.

When using the Client Configurator, you can customize the translation table by clicking **Customizing > Translations** to open this section of the Client Configuration property pages.

NOTE: If you plan to customize character translation tables, you must modify the configuration file before you run dbutility process or dbutility clone to populate the Databridge data tables in the relational database. In addition, if you customize the character translation tables when you populate the data tables the first time, you must use them on all subsequent updates. If you don't, the data will be invalid.

Translation Table

The Databridge Client uses the ISO standard translation tables to translate EBCDIC data received from the host to ASCII data. You can adjust the translation tables to work with national character sets, which typically redefine characters such as { } [ ] | \ to represent national characters.

[DBConfig]

This section contains parameters that are related to the Client Configurator.

default_date_fmt

Default: 21

Range: 1-296

Console: **Processing > Date and Time Parameters (Default date formats)**

This parameter specifies the default format for numeric columns that are clones as dates. For a MISER database this should be set to 1.

Redefining a Character

To redefine a character, alter the EBCDIC to ASCII translation table by entering the pair of numeric values representing the EBCDIC character code and the corresponding ASCII character code in the [EbcdictoAscii] section of the configuration file. You can use decimal or hexadecimal (for example, 124 for decimal or 0x7C for hexadecimal) to represent the EBCDIC and ASCII character codes.

The Databridge Client does not allow you to change the values of characters that are constant across national characters, including the space, hyphen (-), single quote ('), digits 0–9, and the letters of the alphabet (A–Z and a–z). Changing any of these characters causes an error unless you set the `restrict_translation` parameter appropriately.

Example

The following example shows EBCDIC to ASCII translation using hexadecimal characters. Note that this file is for example only; it does not represent any national character set.

```
;hexadecimal format
[EbcdictoAscii]
0x7C = 0x7E     ; remapping of @ to ~
0xE0 = 0x7C     ; remapping of \ to |
0xC0 = 0x5B     ; remapping of { to [
0xD0 = 0x5D     ; remapping of } to ]
```

External Data Translation DLL Support

The following parameters are included in the [params] section of the Databridge Client configuration file.

When using the Client Configurator, you can change the translation DLL name by clicking **Customizing > Translations** to open this section of the Client Configuration property pages.

Parameter	Description
`eatran_dll_name`	**Default:** "DBEATRAN.DLL" **Range:** "*dllname*" **NOTE:** You must include quotation marks around the filename. The parameter `eatran_dll_name` allows you to rename the external translation file `DBEATRAN.DLL`.
`use_ext_translation`	**Default:** False **Range:** True or False The `use_ext_translation` parameter enables you to translate 16-bit character sets from EBCDIC to ASCII. When this parameter is enabled, the Databridge Client accesses an alternate data translation routine that uses an external DLL, named `DBEATRAN.DLL` (`dbeatran.so` for UNIX), instead of the standard translation procedure (for example [EbcdictoAscii] Section). The `DBEATRAN.DLL` contains the EBCDIC_to_ASCII entry point. This DLL is dynamically loaded when you enable the `use_ext_translation` option.

Setting up the Oracle Client for an UTF8 Database

The Databridge Client is designed to work with 8-bit character sets, therefore picking an intermediate 8-bit ASCII character set, such as ISO 8859-1, for the character data in the Client is needed. Modify the translation table, as you would for a given EBCDIC code page on the MCP. This will allow the OCI driver and SQL*Loader to correctly handle the translation from the client code page to UTF8.

The NLS_LENGTH_SEMANTICS parameter for the session is automatically set to CHAR by the Client when it detects that the database's character set is UTF8. This indicates that the lengths of CHAR and VARCHAR2 data are in characters, which can be 1 to 4 bytes long, as opposed to bytes.

For an MCP using the EBCDIC Latin 1 code page the translation table entries in the client configuration file looks like the sample seen below:

Table C-1

EBCDIC_to_ASCII	
0x45 = 0xE1	; small a acute (á)
0x49 = 0xF1	; small n tilde (ñ)
0x51 = 0xE9	; small e acute (é)
0x55 = 0xED	; small i acute (í)
0x65 = 0xC1	; capital A acute (Á)
0x69 = 0xD1	; capital N tilde (Ñ)
0x71 = 0xC9	; capital E acute (É)
0x75 = 0xCD	; capital I acute (Í)
0xCE = 0xF3	; small o acute (ó)
0xDC = 0xFC	; small u dieresis or umlaut (ü)
0xDE = 0xFA	; small u acute (ú)
0xEE = 0xD3	; capital O acute (Ó)
0xFC = 0xDC	; capital U dieresis or umlaut (Ü)
0xFE = 0xDE	; capital U acute (Ú)

For the SQL*Loader, set the bcp_code_page parameter in the bulk_loader section to the appropriate name. This tells the loader that the data is in the given character set. If the parameter is not set, SQL*Loader assumes that the data is in the machine's character set. The name for character set in Oracle can be found in the Oracle documentation, in the case of the above mentioned code page the exact name is WE8ISO8859P1.

For updates set the NLS_LANG environment variable to reflect the above mentioned intermediate 8-bit character set. The NLS_LANG environment variable has the format **language_teritory.characterset.**

For example for Mexico this would be NLS_LANG=SPANISH_MEXICO.WE8ISO8859P1.

Reference Tables

The following reference tables show all of the configuration file parameters, and *as applicable*, their associated environment variables, command-line options, and dbutility commands. Additionally, the tables show relationships between configuration file parameters that work together.

Because these tables do not explain each configuration file parameter, environment variable, and command-line option in detail, we recommend that you use it for reference only.

Bulk Loader Parameters

The following parameters from the "[Bulk_Loader]" on page 259 section of the Databridge Client configuration file apply only to the dbutility `clone` and `process` commands and have no associated command-line options.

[Bulk_Loader] Parameter	Bulk Loader Utility
bcp_batch_size	SQL Server
bcp_code_page	Oracle and SQL Server (bcp only)
bcp_copied_msg	SQL Server (bcp only)
bcp_delim	SQL Server (bcp only)
bcp_packet_size	SQL Server (bcp only)
enable_parallel_mode	Oracle
inhibit_direct_mode	Oracle
max_bcp_failures	SQL Server and Oracle
max_temp_storage	SQL Server (bcp only) and Oracle (Windows only)
sqlld_bindsize	Oracle
sqlld_rows	Oracle
verify_bulk_load	All

Scheduling Parameters

The following [Scheduling] parameters from the Databridge Client configuration file have no associated command-line parameter, and they apply to the `process` command only when using the command-line Client (dbutility):

- daily
- exit_on_error
- sched_delay_secs (replaces fixed_delay)
- sched_retry_secs (replaces retry_time)

EBCDIC to ASCII Parameters

EBCDIC to ASCII translation applies only to the `clone` and `process` commands and has no associated command-line options.

Params Parameters

The following parameters are from the [params] section of the Databridge Client configuration file:

[params] Parameter	Option	dbutility Command	Notes
allow_nulls		define and redefine	
alpha_error_cutoff		clone and process	
auto_mask_encryption		clone and process	SQL Server 2016 and newer
automate_virtuals		clone and process	
aux_stmts		clone and process	This parameter applies to Oracle and SQL Server ODBC Clients only.
bracket_tabnames		clone and process	
century_break		clone and process	
check_user_scripts		clone and process	
clr_dup_extr_recs		generate	
commit_absn_inc		clone and process	
commit_longtrans		clone and process	
commit_time_inc		clone and process	
commit_txn_inc		clone and process	
commit_update_inc		clone and process	
controlled_execution	-o	clone and process	
convert_ctrl_char		clone and process	
correct_bad_days		clone and process	
create_index_suffix [n]		generate	
create_table_suffix [n]		generate	
dbe_dflt_origin		clone and process	
default_user_columns		define and redefine	
defer_fixup_phase	-c	clone	Toggle
dflt_history_columns		define and redefine	

[params] Parameter	Option	dbutility Command	Notes
discard_data_errors		clone and process	
display_active_only	-a	display	Override
display_bad_data		clone and process	
eatran_dll_name		clone and process	
enable_dms_links		define, redefine, process and clone	
enable_doc_records		clone and process	
enable_dynamic_hist		redefine	
enable_minimized_col		clone and process	
enable_optimized_sql	-N	clone and process	Toggle
engine_workers		clone and process	
error_display_limits		clone and process	
external_column [n]		define and redefine	
extract_embedded		define, redefine, process and clone	
flatten_all_occurs		define and redefine	
force_aa_only		define and redefine	
global_index_suffix		generate	
global_table_suffix		generate	
history_tables			
inhibit_8_bit_data		clone and process	
inhibit_console	-C	clone and process	Toggle
inhibit_ctrl_chars		clone and process	
inhibit_drop_history		clone and process	
auto__mask_columns		define, generate, process, redefine and clone	SQL Server Client only
linc_century_base		clone and process	
masking_parameters[n]		generate	
max_clone_count	-s	clone and process	
max_discards		clone and process	
max_retry_secs		process	Requires use_dbwait and works with max_wait_secs
max_srv_idle_time		clone and process	

[params] Parameter	Option	dbutility Command	Notes
max_wait_secs		process	Requires use_dbwait and works with max_retry_secs
maximum_columns		define and redefine	
min_check_time		clone and process	
min_varchar		define and redefine	
minimize_col_updates		define and redefine	
miser_database		define, redefine, process and clone	
months		clone and process	
null_datetime_value		clone and process	
null_datetime2_value		clone and process	
null_digit_value		clone and process	
numeric_date_format		clone and process	
n_dmsii_buffers		clone and process	
n_update_threads		clone and process	
optimize_updates		define and redefine	
preserve_deletes		clone and process	
read_null_records		define and redefine	
rollback_segment		All	Oracle only
sec_tab_column_mask		define and redefine	Requires default_user_columns
set_blanks_to_null		clone and process	
set_lincday0_to_null		clone and process	
show_perf_stats		clone and process	
show_statistics	-v	clone and process	Works with statistics_increment
show_table_stats		clone and process	
shutdown	-o		Override
split_varfmt_dataset		define and redefine	
sql_exec_timeout		clone and process	
statistics_increment	-v	clone and process	Works with show_statistics
stop			

[params] Parameter	Option	dbutility Command	Notes
stop_after_fixups		clone and process	
stop_after_gc_reorg		clone and process	
stop_after_given_afn		clone and process	
suppress_dup_warnings		clone and process	
suppress_new_columns		redefine	
suppress_new_datasets		redefine	
use_bigint		define and redefine	SQL Server only
use_binary_AA		define and redefine	
use_clob		define and redefine	Oracle only
use_clustered_index		define and redefine	This parameter applies to SQL Server. See “use_decimal_aa” on page 276.
use_column_prefixes		define and redefine	The tab_name_prefix column of the DATASOURCES Client control table must contain an entry.
use_date		define and redefine	
use_datetime2		define and redefine	
use_dbwait	-w	process	Toggle Works with max_wait_secs and max_retry_secs
use_decimal_aa		define	
use_ext_translation		clone and process	This parameter applies to Windows.
use_internal_clone		redefine and reorg	
use_latest_si		clone and process	
use_nullable_dates		define and redefine	This parameter applies only to MISER databases.
use_primary_key		define	
use_stored_procs		define, redefine, process and clone	
use_varchar		define and redefine	
user_script_dir	-n	define, redefine, clone and process	Override
user_column_suffix[n]		generate	

D Appendix D: Customization Scripts

This appendix is intended as a quick reference for writing user scripts. For more information about user scripts, see "Customizing with User Scripts" on page 42.

The user scripts described in this Appendix differ significantly from program-generated user scripts (that is, user scripts created by the `Create Scripts` command in the Client Console or the dbutility `createscripts` command). Program-generated user scripts set additional bits in the control tables. These bits allow the `redefine` command and the Client Configurator—whose support code is compatible with the `redefine` command—to restore changes to the Client control tables.

If you use the Client Configurator and want the ability to restore the Client control tables, you'll need to set some additional fields whenever you make a change.

In this Appendix

Customization Rules for Client Configurator

All of the Client control tables except DATASOURCES have a column named *xx*_user_bmask (where *xx* is "ds", "di", "dt" or "da", depending on the table where it resides). This column, which parallels *xx*_options, is used to indicate whether the bits were changed by the user script or by the Client Configurator. Additionally, some of the bits in the *xx*_options columns are set by the Client or are set by changing an item to a special C lient data type, such as a date.

The `redefine` command, when run in Client Configurator mode (use_dbconfig = true), will restore the bits in *xx*_options that are referenced by *xx*_user_bmask, while leaving the remaining bits unchanged. Several bits in *xx*_options that were previously unused are now used to indicate that a specific field in the record was modified by a user script or the Client Configurator.

Parameters that affect ds_options

The global parameters that affect ds_options settings are as follows:

`history_tables = { 0 | 1 | 2}`	0 - No history tables will be created. 1 - Creates history tables for all data sets. The bit DSOPT_Save_Updates (8) is automatically set for all data set table entries. (If you used a data set user script to do this, remove it and set `history_tables` to 1 in the Client configuration file using either the Client Configurator or the editor. If you use binary configuration files, you must export the file before editing the file. See "Export or Import a Configuration File" on page 242. 2 - The same as a value of 1, except that it also sets the bit DSOPT_History_Only (0x2000 or decimal 8192).
`clr_dup_extr_recs = {true | false}`	Defines the initial value of the new ds_options bit DSOPT_Clrdup_Recs (0x8000 or decimal 32768). This parameter is no longer checked by the `process` and `clone` commands, which only look at the ds_option bit.
`split_varfmt_dataset = {true | false}`	Defines the initial value of the new ds_options bit DSOPT_Split_Vfmt_ds (0x10000 or decimal 65536). It makes the Client treat variable format data sets in a slightly different manner by putting all the fixed parts of records in the table normally used for type 0 records. The fixed parts of records in all other tables are not included, except for the items that are keys.
`force_aa_value_only = {0 | 1 | 2}`	Defines the initial value of the ds_options bit DSOPT_Use_AA_Only, which forces the data set to use AA Values or RSNs as keys if the data set has a valid AA Value or RSN. RSNs always take precedence over AA Values unless an embedded data set or a DMSII link is involved. A value of zero sets the bit to 0 for all data sets. A value of 1 sets the bit to 1 for all data sets that have a valid AA Value or an RSN. A value of 2 sets the bit 1 for data sets that have an RSN.

NOTE: Any time you explicitly change the value of a bit in ds_options, you must set the corresponding bit in ds_user_bmask. If you set a bit that had a default value of 1 to 0, you must set the corresponding bit in ds_user_bmask to 1 to indicate that the value of this bit should be preserved by the `redefine` command.

Be aware that some bits in ds_options may already be set. For SQL Server, use the "|" operator. For Oracle, use the BITOR function with the BITAND function to perform logical OR and logical And functions. For best results, avoid directly setting ds_options or using the + operator. The following example uses the BITOR function when updating the ds_options column of DATASETS to set the bit DSOPT_Select_Only (64) while leaving the rest of the bits intact:

```
ds_options=BITOR(ds_options,64)
```

When using the Client Configurator, if you change the value of `external_columns` for a single data set, you must also set the new bit DSOPT_ExtCols_Set (0x2000 or decimal 131072) in both ds_options and ds_user_bmask. This ensures that the Client Configurator retains the change.

Sample script for setting a ds_options bit in DATASETS

This script sets the ds_options bit DSOPT_Ignore_Dups (32) for the data set SVHIST without changing any of the other bits in the column. We provide both a SQL Server version and Oracle version of this script.

Filename: `script.user_layout..svhist`:

SQL Server version:

```
update DATASETS set ds_options = ds_options | 32
where dataset_name = 'SVHIST'
```

Oracle version:

```
update DATASETS set ds_options = BITOR(ds_options, 32)
where dataset_name = 'SVHIST'
```

Changes By Table

DATAITEMS Control Table Changes

Besides the addition of the column da_user_bmask, several da_options bits are used to indicate that a specific field in the record was changed by the Client Configurator or a user script. These new da_options bits are described in the following table.

NOTE: Any time you explicitly change the value of a bit in da_options, you must set the corresponding bit in da_user_bmask. If you set a bit that had a default value of 1 to 0, you must set the corresponding bit in da_user_bmask to 1 to indicate that the value of this bit should be preserved by the `redefine` command.

DAOPT_Column_Renamed (2)	This bit indicates that the column was renamed by changing the item_name column of the item. The `redefine` command uses this bit to determine if the item_name value should be preserved.
DAOPT_Type_Changed (4)	This bit indicates that the column's data type was changed by changing the value in the sql_type column. The `redefine` command uses this bit to determine if the sql_type value should be preserved.
DAOPT_Length_Changed (8)	This bit indicates that the column's data type length specification was changed by changing the value in the sql_length column. The `redefine` command uses this bit to determine if the sql_length value should be preserved.
DAOPT_Scale_Changed (16)	This bit indicates that the column's data type scale was changed by changing the value in the sql_scale column. The `redefine` command uses this bit to determine if the sql_scalevalue should be preserved.

DAOPT_User_Column (32)	This bit indicates that the column was added by the user. The `redefine` command uses this bit to determine if the column should be preserved.
DAOPT_Item_Renumbered (128)	This bit indicates that the column was renumbered by the user. The `redefine` command uses this bit to determine if the item_number should be preserved. **CAUTION:** This will not always work because item numbers may change as a result of a DMSII reorganization. If you do this, you'll need to use the Client Configurator to get the column into the proper place.

DATASETS Control Table Changes

Besides the addition of the column ds_user_bmask, some ds_options bits are used to indicate that a specific field in the record was changed by the Client Configurator or a user script. These new ds_options bits are described in the following table.

NOTE: If you explicitly change the value of a bit in ds_options, you must set the corresponding bit in ds_user_bmask. If you set a bit that has a default value of 1 to 0, you must set the corresponding bit in ds_user_bmask to 1 to indicate that the value of this bit should be preserved by the `redefine` command.

DSOPT_SetNameChange (262144)	This bit must be set for any data set whose set_name column is modified by the Client Configurator or a user script. The `redefine` command uses this bit to determine if the value of the set_name should be preserved.

DATATABLES Control Table Changes

Besides the addition of the column dt_user_bmask, several dt_options bits are used to indicate that a specific field in the record was changed by Client Configurator or a user script. These new `dt_options` bits are described in the following table.

NOTE: If you explicitly change the value of a bit in dt_options, you must set the corresponding bit in dt_user_bmask. If you set a bit that had a default value of 1 to 0, you must set the corresponding bit in dt_user_bmask to 1 to indicate that the value of this bit should be preserved by the `redefine` command.

DTOPT_Table_Renamed (1)	This bit indicates that the table was renamed by changing the table_name column of the item_namecolumns and all the DATAITEMS that belong to the table. The `redefine` command uses this bit to determine if the table_name value should be preserved.
DTOPT_Index_Renamed (2)	This bit indicates that the index was renamed by changing the index_name column of the table. The `redefine` command uses this bit to determine if the index_name value should be preserved.
DTOPT_User_Table (4)	This bit indicates that the table was created by the user. The `redefine` command uses this bit to determine if the index_name value should be preserved. (This bit is not fully implemented in version 6.1.)

DMS_ITEMS Control Table Changes

Besides the addition of the column di_user_bmask, several di_options bits are used to indicate that a specific field in the record was changed by Client Configurator or a user script. These new di_options bits are described in the following table.

NOTE: If you explicitly change the value of a bit in di_options, you must also set the corresponding bit in di_user_bmask. If you set a bit that has a default value of 1 to 0, you must set the corresponding bit in di_user_bmask to 1 to indicate that the value of this bit should be preserved by the redefine command.

DIOPT_Item_Key_Modified (8)	This bit must be set for any item whose item_key column is modified by the Client Configurator or a user script. The `redefine` command uses this bit to determine if the dms_item_key value should be preserved.
DIOPT_Subtype_Modified (0x40000 or decimal 262144)	This bit indicates that the dms_subtype column was set by the Client Configurator or a user script. The `redefine` command uses this bit to determine if the dms_subtype value should be preserved.

Sample Scripts for Customizing Data Set Mapping

This section is intended as a quick reference for writing data set mapping customization user scripts. Therefore, it lists sample scripts without background explanation. If you are unfamiliar with the Databridge Client, refer to the indicated sections for more information.

Sample Data Set Global Mapping Customization Script

The following example updates the dms_subtype value for every occurrence of the time value TS in the DMSII database whose data source name is CMDB. Create only one of these scripts for each data source.

File name: `script.user_datasets.cmdb`

```
update DMS_ITEMS set dms_subtype = 6
where dms_item_name = 'TS'
```

For more information about the dms_subtype column of the DMS_ITEMS Client control table, see "DMS_ITEMS Client Control Table" on page 175

Sample Data Set Selection Script

This script selects the data sets that we want to clone. Following is a sample user script for a DMSII customer database whose data source name is CMDB. This script turns cloning off (by setting the active column value to 0) for two data sets. We used the data set global customization script rather than the scripts for individual data sets in this example.

File name: `script.user_datasets.cmdb`

```
update DATASETS set active = 0
where data_source = 'CMDB'
/***/
update DATASETS set active = 0
where dataset_name = 'EMPLOYEE' and data_source='CMDB'
/***/
update DATASETS set active = 0
where dataset_name = 'CUSTOMER' and data_source='CMDB'
/***/
update DATASETS set active = 0
where dataset_name = 'INVENTORY' and data_source='CMDB'
***/
update DATASETS set active = 0
where dataset_name = 'BILLING' and data_source='CMDB'
```

For a complete explanation of specifying data sets for cloning, see Tips for Efficient Cloning (page 97).

Selecting DMSII Items

The following script disables the cloning of two DMSII items in the data set named ORDER by setting the value of the active column to 0 in the corresponding DMS_ITEMS table entries.

File name: `script.user_layout.order`

```
update DMS_ITEMS set active=0
where dms_item_name = 'SPECIAL-ORDER-DATE' or
      dms_item_name = 'SPECIAL-ORDER-AMOUNT'
      and dataset_name = 'ORDER'
```

Multiple data sets can contain items with the same name. Adding the data set name to the WHERE clause ensures that you update only the items in question.

For more information, see Tips for Efficient Cloning (page 97).

Cloning a Numeric Field as a Date

The following script causes the `define` command to map a DMSII item of type NUMBER(8) to a relational database date data type where the number contains a date in the *mmddyyyy* format.

File name: `script.user_layout.payments`

```
update DMS_ITEMS set dms_subtype=23,di_options=2
where dms_item_name = 'PAYMENT-DATE' and dataset_name='PAYMENTS'
```

Cloning an Alpha Field as a Date

The following script causes the `define` command to map three DMSII items of type ALPHA(10) to a relational database date data type, where those items contain a date in the *mm/dd/yyyy* format.

File name: `script.user_layout.order`

```
update DMS_ITEMS set dms_subtype=53,di_options=2
where dms_item_name = 'ORDER-DATE' or
      dms_item_name = 'DUE-DATE' or
      dms_item_name = 'DATE-SENT'
      and dataset_name = 'ORDER'
```

Cloning an Alpha or Number Field as a Time

The following script causes the `define` command to map a DMSII ALPHA or NUMBER time item as a relational database time item.

File name: `script.user_layout.payment`

```
update DMS_ITEMS set di_options=256, dms_subtype=3
where dms_item_name='TIME11' and dataset_name = 'BILLING'
```

Cloning an Alpha or Number Field as a Date/Time

The following script causes the `define` command to map a DMSII ALPHA or NUMBER date/time item as a relational database date/time item.

File name: `script.user_layout.payment`

```
update DMS_ITEMS set di_options=128, dms_subtype=121
where dms_item_name='PAY_REC_TIME' and dataset_name = 'PAYMENTS'
```

Flattening OCCURS Clause

The following script causes the `define` command to map an item with an OCCURS clause as a series of columns in the corresponding relational database table instead of mapping each occurrence of the items to a separate column in an OCCURS (secondary) table.

File name: `script.user_layout.billing`

```
update DMS_ITEMS set di_options=1
where dms_item_name = 'MONTHLY-BILLS' and dataset_name='BILLING'
```

For details see “Flattening OCCURS Clauses” on page 134.

Flattening OCCURS Clause for Item Cloned as Dates

The following script directs the `define` command to map an item with an OCCURS clause as a series of columns, whose data type is a relational database date type, in the corresponding primary table. Furthermore, it specifies that the DMSII item, which is of type NUMBER(8), contains a date in the *mmddyyyy* format.

File name: `script.user_layout.billing`

```
update DMS_ITEMS set di_options=3, dms_subtype=23
where dms_item_name = 'BILLING-DATES' and dataset_name = 'BILLING'
```

Flattening OCCURS Clause for Three Bit Numeric Flags

MISER systems store certain flags as arrays of single-digit numbers, where each number is used to hold three Boolean values. The Databridge Client can be directed to map these items as a series of Booleans data items (bit in SQL Server). This requires the setting of the DIOPT_Flatten_Occurs bit (1) and the DIOPT_Clone_as_Tribit bit (16) in the di_options column of the corresponding DMS_ITEMS record.

Following is an example for the item L-LOCK-FLAG in the data set LOAN.

File name: `script.user_layout.loan`

```
update DMS_ITEMS set active=1, di_options=17, dms_subtype=0
where dataset_name = 'LOAN' and rectype=0 and dms_item_name = 'L-LOCK-FLAG'
```

In this example, if the L-LOCK_FLAG has an OCCURS 20 TIMES clause, 60 items of type bit named l_lock_flag_01 to l_lock_flag_60 are created.

Splitting an Unsigned Number Item into Two Items

If you have NUMBER(12) items whose first two digits represent an account type and the remaining ten digits represent the account number, you might want to split this item into two columns. You can then rename the two columns as described in “Renaming Columns” on page 326.

In the following scripts, the NUMBER(12) item is named L_APPL_ACCT and is part of the data set LOAN. This item is mapped into two columns, the first of which contains 2 digits while the second one contains 10 digits. When the Client splits an item it appends “_x1” and “_x2” to the column names it creates to avoid having to deal with duplicate names.

File name: `script.user_layout.loan`

```
update DMS_ITEMS set di_options = 1048576, dms_subtype = 2
where dms_item_name = 'L-APPL-ACCT' and dataset_name = 'LOAN'
```

For SQL Server, this results in `columns l_appl_acct_x1` (data type tinyint) and `l_appl_acct_x2` (data type bigint).

You can also make the Client convert the first column to CHAR by setting bit 1024 in di_options to force the data to be stored using a data type of CHAR(2) in the relational database.

File name: `script.user_layout.loan`

```
update DMS_ITEMS set di_options = 1049600, dms_subtype = 2
where dms_item_name = 'L-APPL-ACCT' and dataset_name = 'LOAN'
```

Merging Two Neighboring Items

The following example merges the items SHIPPING-DATE and the item SHIPPING-TIME (which immediately follows it) in the data set SHIPMENTS.

File name: `script.user_layout.shipments`

```
update DMS_ITEMS set di_options = 0x1000000
where dms_item_name = 'SHIPPING-DATE' and dataset_name = 'SHIPMENTS'
```

The Client automatically skips the second item after it performs the merge, so you do not need to set its active column to 0.

NOTE: This example is only valid for SQL Server. If you are using Oracle, you have to use decimal values.

Merging a Date and Time to Form a Date/Time

We extend the previous example to map the result to a relational database date/time data type. Assuming that these items have data types of NUMBER(8) and NUMBER(6) respectively in DMSII, we then treat the resulting value as a date/time of the form "*yyyymmddhhmiss*" (a date format value of 121).

File name: `script.user_layout.shipments`

```
update DMS_ITEMS set di_options = 0x1000080, dms_subtype = 121
where dms_item_name = 'SHIPPING-DATE' and dataset_name = 'SHIPMENTS'
```

The Client automatically skips the second item after it performs the merge, so you do not need to set its active column to 0.

NOTE: This example is only valid for SQL Server. If you are using Oracle you have to use decimal values.

Concatenating Two Items and Cloning the Result as a Date/Time

This script allows you to combine numeric date and time data in non-contiguous columns. When the two columns are not contiguous, use the dms_concat_num column to append the time part of the combined item to the date part. This column must be set to the item number of the item containing the time value. The Client will effectively treat these two items as if the second one were concatenated to the first one. You must also set the di_options bit 524288 (0x80000) to make the Client include the second item in DATAITEMS with its active column set to 0. This is a lot more efficient than using DBGenFormat to perform this operation.

Filename: `script.user_layout.dttest`:

```
update DMS_ITEMS
   set dms_concat_num =(select dms_item_number from DMS_ITEMS
                          where dms_item_name='SALE-TIME' and
dataset_name='DTTEST'),
      di_options = 0x82,
      dms_subtype = 111
where dms_item_name='SALE-DATE' and dataset_name ='DTTEST'
/***/
update DMS_ITEMS set di_options = 0x80000
where dms_item_name='SALE-TIME' and dataset_name='DTTEST'
```

This script combines the columns SALE-DATE and SALE-TIME into a column that effectively replaces SALE-TIME and is to be cloned as a long date with a date format of 111. The column sales_time needs to be present in the DATAITEMS control table, as the Client needs to access the DMSII data for the corresponding DMS item when performing the concatenation.

The second SQL statement in the script sets an option bit that tells the client to map this item to DATAITEMS with its active column set to 0.

Adding a Composite Key to Tables Mapped from a Data Set

The following example inserts a composite key named user_set_shipping_detail into the data set SHIPPING-DETAIL, which does not have a SET defined in DMSII.

File name: `script.user_layout.shipping_detail`

```
update DATASETS set set_name='user_set'
where dataset_name = 'SHIPPING-DETAIL'
/***/
update DMS_ITEMS set item_key=1
where dms_item_name = 'SD-PO-NUMBER' and dataset_name = 'SHIPPING-DETAIL'
/***/
update DMS_ITEMS set item_key=2
where dms_item_name = 'SD-LINE-ITEM' and dataset_name = 'SHIPPING-DETAIL'
```

NOTE: If the set_name is either aa_set or user_set, the Databridge Client appends the table_name to the set_name. The above script takes advantage of this feature.

Specifying How to Handle Alpha Items That Are Too Long

The following script splits the item NOTES in the data set EMPLOYEE into multiple columns rather than truncating it at 4000 characters. The item is declared as ALPHA(4095) in DMSII. This script applies to Oracle.

File name: `script.user_layout.employee`

```
update DMS_ITEMS set di_options=4
where dms_item_name = 'NOTES' and dataset_name = 'EMPLOYEE'
```

Sample Data Table Customization Scripts

This section is intended as a quick reference for writing data table customization user scripts. Therefore, it lists sample scripts without any background explanation. If you are unfamiliar with the Databridge Client, make sure that you refer to the indicated sections for more information.

Sample Data Table Global Customization Script

The following example shows how to use one statement to rename all occurrences of the column name ts to time_stamp in the item_name column of the DATAITEMS Client control table for the DMSII database whose data source name is CMDB. Create only one of these scripts for each data source.

File name: `script.user_datatables.cmdb`

```
update DATAITEMS set item_name = 'time_stamp' where item_name = 'ts'
```

Disabling the Cloning of Secondary Tables

The following script disables the cloning of the secondary table, order_amounts for the data set named ORDER, by setting the active column value to 0 in the corresponding DATATABLES entry. In the case of an OCCURS table, the same result can be achieved by disabling the DMSII item instead. This is much more efficient because it does not create numerous unnecessary entries in DATATABLES and DATAITEMS.

File name: `script.user_define.order`

```
update DATATABLES set active=0 where table_name='order_amounts'
```

For more information, see Tips for Efficient Cloning (page 97).

Renaming a Table

Use the DATATABLES Client control table to rename tables in the relational database. The dataset_name column shows the DMSII data set name and the table_name column shows the name of the table as it appears in the relational database. For an explanation of how the DMSII data set and data items are mapped to the relational database, see “Relational Database Table and Column Names” on page 142.

You can change one or more relational database table names before you clone DMSII data sets. If you use the `clone` command, keep in mind that you must specify the DMSII data set name with the `clone` command, not the relational database table name. This means that if a DMSII data set is named ORD-YEAR-TOTAL and you rename the equivalent relational database table to total, you must still reference the DMSII data set by its name ORD-YEAR-TOTAL.

When you rename a table, make sure to do the following:

- The new table name must not be used by any other table. After the relational database has been created by the `define` or `redefine` command, the Databridge Client *does not* verify that renamed tables have unique names.
- The table name is no longer than 28 characters. Using table names longer than 28 characters causes SQL syntax errors when the Databridge Client executes the corresponding stored procedures.

Example

The following script changes the name of the table derived from the data set named EMPLOYEE to be full_time_employees. Both the DATATABLES and DATAITEMS Client control tables must be updated as all data items have a column that points back to the table to which they belong.

File name: `script.user_define.employee`

```
update DATATABLES set table_name='full_time_employees'
where table_name='employee'
/***/
update DATAITEMS set table_name='full_time_employees'
where table_name='employee'
```

Renaming Columns

Use the DATAITEMS Client control table to rename the columns that appear in the relational database. The data_item column shows the DMSII data item (column) name and the item_name column shows the name of the column as it will appear in the relational database. For an explanation of how the DMSII data set and data items are mapped to the relational database, see "Relational Database Table and Column Names" on page 142.

You can change one or more column names before or after cloning, as follows:

- If you change the relational database column name immediately after you run a `define` command, continue with the remaining commands. Keep in mind, however, that the DMSII data item retains its original name in the DMSII database. We recommend that you make this change via user scripts during the `define` and `redefine` command to ensure that your changes are not lost.
- If you change the column name after you have already cloned a DMSII database, you must mark the table to be recloned and then rerun the `generate` command to create new scripts that contain the new column name.

NOTE: Column names in Oracle are limited to 28 characters. Using a column name longer than 28 characters results in a SQL syntax error when the Databridge Client executes the corresponding stored procedures.

Example

The following script changes the names of two columns in the table derived from the data set named ORDERS.

File name: `script.user_define.orders`

```
update DATAITEMS set item_name='order_amount'
where item_name='order_amt' and table_name='orders'
/***/
update DATAITEMS set item_name='order_date'
where item_name='order_dt' and table_name='orders'
```

Changing SQL Data Types

The following user script changes the sql_type for a packed decimal (sql_type of 11) data item named order_amount to be a floating point number (sql_type of 6).

File name: `script.user_define.transaction`

```
update DATAITEMS set sql_type=6
where item_name='order_amount' and table_name='orders'
```

Cloning a Number as a Character Type

This operation requires that you set the DAOPT_Store_as_Char bit (512) in the da_options column of the corresponding DATAITEMS record. Additionally, you must change the value of the sql_type column to the appropriate character type (such as 1 for char, 2 for varchar, and so on). Finally, in the case of SQL Server, you must also change the value of the sql_length column, as this column has a value of zero for the int and smallint data types. An example for the item l_appl_code in the table loan follows.

File name: `script.user_define.loan`

```
update DATAITEMS set sql_type=1, sql_length=2, sql_scale=0, da_options=512
where item_name='l_appl_code' and table_name='loan'
```

Adding a Non DMSII Column

The following script demonstrates how to add a non DMSII column to a relational database table.

This script adds three non DMSII columns (update_type, audit_ts, and delete_record) to the ORDERS data set and preserves all deletes, including multiple deletes with the same key value, since bit column 10 becomes a new key item with a unique value.

File name: `script.user_layout.orders`

```
update DATASETS set external_columns = 521 where dataset_name ='orders'
```

E Appendix E: Client Exit Codes

If the Databridge Client terminates with an error, an exit code appears in the last_run_status column of the DATASOURCES Client control table. The value 9999 indicates that the last run status is no longer available (typically when dbutility is running). These status messages apply only to the `process` and `clone` commands.

The Client exit codes are as follows:

NOTE: On UNIX, exit statuses are restricted to 8 bits (a range of 0 to 255). The Client uses the exit status specified in the 8-bit Exit code column instead of the actual code, which is longer than 8 bits. This only affects shell scripts that test the exit status.

Exit Code	8-bit Exit Code	Description
2001	150	**Indicates an error in the command line when invoking the Client**
2002	151	**The control table check failed** This means one of two things—either the Client control tables do not exist, or they are not the right version. In the latter case, the Client issues a control table version mismatch error and suggests that you run the dbfixup program.
2003	152	**The data source is locked, indicating that a Client is currently running** If you try to run a `process` or `clone` command while there is a DBClient process command running, the run will return this exit code. The `-u` option will not work in this situation; you must wait for the run to finish. If the run hangs, you can release the data source lock by terminating the run.
2004	153	**An error occurred while loading the control tables**
2005	154	**The data source specified on the command line does not exist in the DATASOURCES table**
2006	155	**The process or `clone` command failed because the DS_Needs_Redefining(8) bit in the status_bits column was set for an active data set** This status indicates that normal operations can only be resumed after a `redefine` command is executed.
2007	156	**The Client could not connect to the Databridge Server or to Databridge Enterprise Server either during initialization or data transmission**

Exit Code	8-bit Exit Code	Description
2008	157	**The `clone` command failed because one of the data set names specified on the command line is invalid**
2009	158	**A data set has an invalid value in the ds_mode column of DATASETS** Any other value causes the Client to abend with this exit code.
2010	159	**An error occurred while creating or cleaning up a data table at the start of the data extraction phase of a `process` or `clone` command**
2011	160	**An error occurred while dropping the index of a data table at the start of the data extraction phase of a `process` or `clone` command**
2012	161	**A bad structure index was received**
2013	162	**A system error occurred while attempting to allocate memory**
2014	163	**No active structures were found at the start of a `process` or `clone` command**
2015	164	**No active structures remain after a structure was deselected during a `process` or `clone` command**
2016	165	**The Client is stopping at the start of the fixup phase because errors occurred during data extraction**
2017	166	**The Client is stopping at the start of the fixup phase because errors occurred during data extraction and index creation**
2018	167	**The Client is stopping at the start of the fixup phase because errors occurred during index creation**
2019	168	**The Client is stopping at the start of the fixup phase because of the `defer_fixup_phase` parameter setting (or `-c` option)**
2020	169	**Client operations are being inhibited by the `stop_time` settings** You can override this situation by specifying the `-o` option on the command line. The applies only to the command line Client (dbutility).
2021	170	**The console operator issued a `QUIT` command, which stops the Client at the next quiet point** If you stop the Client using a DBServer AX `QUIT` command for the worker or an Enterprise Server `Quit` command, a different exit code results (1015 for DBServer) and (1135 for Enterprise Server).
2022	171	**The Client encountered a SQL error while updating the control tables** **NOTE:** Some SQL errors generate an exit code of 2099.
2023	172	**An error occurred while executing a COMMIT TRANSACTION for the relational database**

Exit Code	8-bit Exit Code	Description
2024	173	**An error occurred while executing a ROLLBACK TRANSACTION for the relational database**
2025	174	**The Client is stopping because it finished processing the audit file specified in the `stop_afn` column of the DATASOURCES tables** You can do one of the following: ◆ Specify the stop AFN using the "`-F <afn>`" command line option. ◆ Use the `Stop After` AFN command from the command line or the Client Console.
2026	175	**An error occurred in the EBCDIC to ASCII translation**
2027	176	**The command terminated because the Client encountered improperly linked virtual data sets while loading the control tables** This status applies only when the configuration file parameter `automate_virtuals` is set to True.
2028	177	**The `clone` command terminated because the operator tried to reclone a data set that is the primary source for the virtual data set without recloning the data set that is the secondary source for the virtual data set** This status only applies when the configuration file parameter `automate_virtuals` is set to True. For example, if the data sets SV-HISTORY (primary source) and SAVINGS (secondary source) provide input to the virtual data set SV-HISTORY-REMAP, you must reclone SAVINGS when you reclone SV-HISTORY.
2029	178	**The Client discarded records during audit processing** Any other fatal error or reorganization indication overrides this exit code.
2030	179	**The Client was unable to sign on to the relational database** To find the cause, locate the corresponding OCI Error in the log file or the log output.
2031	180	**The `process` or `clone` command failed because some records were not loaded during the data extraction phase** When the `verify_bulk_load` parameter is set to 2, the Client compares the number of records loaded to the actual count of records in the table. If these do not match, the program fails with this exit code. If the `verify_bulk_load` parameter is set to 1, the program doesn't fail and errors are reflected in the final exit code, unless a more serious error occurs and overrides this exit code.

Exit Code	8-bit Exit Code	Description
2032	181	**The `process` or `clone` command failed because the DS_Needs_Generating(4) bit in the status_bits column was set for an active data set** This status indicates that normal operations can only be resumed after a generate command is executed. You can also get this exit code from a `redefine` command when a `generate` command is required to create scripts for tables in the relational database that were affected by a DMSII reorganization.
2033	182	**You need to run a `reorg` command before resuming normal processing** You will get this exit code from a `redefine` command when a `reorg` command is needed to alter tables in the relational database affected by a DMSII reorganization. Note that a `reorg` command implicitly does a `generate` command.
2034	183	**The Client stopped because a DMSII garbage collection reorganization that affects one or more datasets was encountered during audit file processing and the configuration parameter `stop_after_gc_reorg` was set to True.**
2035	184	**A clone was aborted by Enterprise Server and the operation was never restarted.** This is a special case of a failed clone.
2036	185	**Client stopped** This exit status indicates that the operator issued a dbutility `QUIT NOW` command or an `abort` command from the Client Console, which stopped the Client by closing the TCP connection to the server.
2037	186	**A relational database deadlock was detected** This error causes the Client to exit. When using dbutility, the program tries to restart the `process` command 3 times before exiting. When using DBClient, the service automatically retries the `process` command, as specified by the Error Recovery parameters set for the data source in the service configuration file.
2038	187	**The Client is stopping at the end of the fixup phase because of the `stop_after_fixup` parameter setting** You can resume processing by issuing another `process` command when you are ready.
2039	188	**The Client is unable to continue because the global working directory specified in the Windows registry or in the UNIX file `/etc/Attachmate/DATABridge/globalprofile.ini` cannot be found** Even if you do not use the service, before you can run the Client, the working directory (which includes the locks subdirectory) must be created.

Exit Code	8-bit Exit Code	Description
2040	189	**Client encountered an error when trying to open the lock file for the data source** Look at the log file or the log output to determine the nature of the error, which might be security related. You must always run the Client using the same user. Failure to do so can result in this error.
2041	190	**Databridge Client for Microsoft SQL Server is unable to continue because the install directory specified in the Windows registry cannot be found** Reinstall the Client using the installer so that the Client can access this directory (and the `bcp_auditor` program) without having to use the full path. Copying the files from the DVD will result in this exit code.
2042	191	**The Client command failed because the DS_Needs_Mapping(1) or the DS_Needs_Remapping(4) bit in the status_bits column was set for an active data set** This exit code indicates that normal operations can only be resumed after a `redefine` command is executed. You would typically get this status if you try to run a `process` or `generate` command after an error occurs when using the Client Configurator. You need to rerun the Client Configurator to fix the problem.
2043	192	**File IO error caused the Client to terminate**
2044	193	**DMSII link improperly set up in the control tables**
2045	194	**`Reorg` command script in error**
2046	195	**Attempt to refresh stored procedure failed**
2047	196	**The Client abended because of one or more bulk loader errors.**
2048	197	**Client did not find a binary configuration file** The DBClient and DBClntCfgServer programs get this exit status when the configuration file is not binary.
2049	198	**An I/O error occurred while reading the configuration file** For details, see error messages in the log.
2050	199	**Computed checksum does not match the value in the binary configuration file** This error occurs if you try to patch the file using a hex editor. Use the `export` command, edit the exported configuration file, and then import it.
2051	200	**Errors found while processing a text configuration file** See the log file for details.

Exit Code	8-bit Exit Code	Description
2052	201	**User_scripts directory not contained within the Client's working directory when security is enabled** Databridge security prevents users scripts from residing outside the Working Directory, as we have no control over such a directory and could therefore be vulnerable to unauthorized users modifying user scripts, which could have rather dire consequences.
2053	202	**Client encountered an I/O error while trying to write to a discard file** This exit status indicates that either the discard file is too large or the machine is running out of disk space. You should periodically clean up the working directory for the Client along with the discards and logs folders.
2054	203	**Total discards threshold has been reached** See the `max_discards` parameter in Appendix C for details.
2055	204	**Client encountered an error while trying to update a user table** This exit status indicates that the audit file original for Databridge Enterprise has changed. Setting the configuration parameter `stop_on_dbe_mode_chg` to true causes the client to stop when the audit file origin changes.
2056	205	**DBEnterprise audit file origin changed** This exit status indicates that the audit file original for Databridge Enterprise has changed. Setting the configuration parameter `stop_on_dbe_mode_chg` to true will cause the client to stop when the audit file origin changes.
2057	206	**Client control table version mismatch** This exit status indicates that the Client control tables need to be upgraded before you can resume client operations. When using the service this happens automatically. However, if you are using the command line client `dbutility`, you have to manually run `dbfixup` for a data source in each relational database.
2058	207	**SQL update took longer than the maximum allowable time specified by the `sql_exec_timeout` parameter** See Appendix C for details.
2059	208	**Errors found while processing a text configuration file** See the log file for details. The most likely cause of this error is that the table is locked by another application. The Databridge Client cannot operate if you prevent it from doing its job by locking tables.

Exit Code	8-bit Exit Code	Description
2060	209	**Effective CHECKPOINT FREQUENCY parameters for the Databridge Engine are all 0** The most likely cause for this is COMMIT parameters set to 0 in the Client configuration file. Rather than attempting to process audit with this rather ridiculous setting, the Client stops and gives you a chance to rectify the situation.
2061	210	**Error in loading a DLL or finding its entry points**
2062	211	**Error in updating control table**
2063	212	**Error creating control table**
2064	213	**Error dropping control table**
2065	214	**Malformed unload file** This exit status indicates that the reload command encountered a malformed unload file and could not complete the operation.
2066	215	**Error dropping user table**
2067	216	**Control tables are incompatible with DBConfig** You need to run dbscriptfixup to fix this situation.
2068	217	**Unable to create directory**
2069	218	**Unable to allocate a STMT** Try reducing the value of aux_stmts
2070	219	**Client got an error while attempting to create a file**
2071	220	**User script in error**
2072	221	**Bad DMSII database timestamp** This exit status indicates that the DMSII database timestamp does not match the one the Client is using. This is taken to mean that the Client is not using the same DMSII database as it was earlier.
2073	222	**History table error**
2074	223	**Data source already defined** This exit status indicates that the Client is attempting to define a data source that is already defined.
2075	224	**Index for user table has too many columns**
2076	225	**Mismatched AFNs in control tables** The redefine command requires that all active data sets point to the same audit file.
2077	226	**Protocol Error**
2078	227	**File does not exist**

Exit Code	8-bit Exit Code	Description
2079	228	**IO error reading filter file**
2080	229	**Malformed binary filter file**
2081	230	**Bad checksum in binary filter file**
2082	231	**Syntax error in filter source file**
2083	232	**Filter generation failed**
2084	233	**Unsupported table encountered in filter source file**
2085	234	**Data source already exists in relational database**
2086-2088		**Not currently used**
2089	238	**Client lost connection to database** This usually means that the database was taken down without stopping the Client first. The service/daemon recognizes this error and enters its error recovery, which keeps trying to connect every so often, until the database comes back up again.
2090	238	**Reserved**
2091	240	**Client lost connection to Client Manager service** This usually means that the service crashed.
2092	241	**Connection to the Databridge Server closed by the host or Enterprise Server system** The Client is forced to exit. This indicates that the server closed the connection because of an operator command. This exit code indicates that the connection was closed in an orderly manner.
2093	242	**Connection to the Databridge Server reset by the host or Enterprise Server system** The Client is forced to exit. This exit code indicates that the server was forcibly terminated or that it crashed.
2099	248	**Internal error** This code is used for all errors that cause the dbread and dbwait callback routine to terminate prematurely.

NOTE: For more detailed information on how exit codes are used in custom programs to automate control of Databridge operations, see "dbutility Exit Status Values" on page 30.

F Appendix F: Service Configuration

This appendix lists the parameters for the Client Manager service that automate most Client operations. In most cases, you'll use the Client Console to configure scheduling and other features of the service. See “Configuring the Service” on page 193.

In this Appendix

Sample Client Manager Service Configuration File

For information about Databridge Client configuration files, see “Client Configuration Files” on page 241.

```
;
; Databridge control program version 6.6 configuration file -- generated
programmatically
;
[control_program]
ipc_port                = 8001
userid                  = "dbridge", "", administrator
startup_delay           = 1
sess_start_timeout      = 2
n_scr_threads           = 1
pw_security_opts        = 63
min_passwd_len          = 4
max_pw_retries          = 5
user_lockout_time       = 15
default_passwd          = "2f0700040d13294e"
enable_status_file      = false
data_sources            = BANKDB, DEMODB

[Log_File]
file_name_prefix        = "cp"
;max_file_size          = 0
logsw_on_size           = false
logsw_on_newday         = false
newfile_on_newday       = true

[BANKDB]
working_dir             = "d:\\dbridge_work\\bankdb"
client_dir              = "E:\\Program Files\\Micro Focus\\DATABridge\\
6.6\\SQLServer"
;sched_delay_secs       = 0
```

```
;daily                  = 10:00, 14:00, 18:00
sched_retry_secs        = 60
max_retries             = 3
blackout_period = 00:00, 00:00
;disable_on_exitcode = 93, 94
run_at_startup          = false
auto_redefine           = false
auto_generate           = false
disabled                = false

[DEMODB]
working_dir             = "d:\\dbridge_work\\demodb"
client_dir              = "E:\\Program Files\\Micro Focus\\DATABridge\\
6.6\\SQLServer"
;sched_delay_secs       = 0
;daily                  = 10:00, 14:00, 18:00
sched_retry_secs        = 60
max_retries             = 3
sched_minwait_secs      = 18000
run_at_startup          = false
auto_redefine           = false
auto_generate           = false
disabled                = false
```

[Control_Program]

This section, which must always be present in the configuration file, is used to define various service parameters. It also contains a list of all the data sources that are configured for the service.

In this Section

data_sources

Default: <empty list>
Range: Comma separated list of no more than 32 data sources (maximum of 256 characters)
Console: N/A (Handled Automatically)

Use the migrate utility to create the configuration during an upgrade or use the **Add Data Source** and **Remove Data Source** commands in the Client Console to manage this list rather than manually adding data sources to the configuration file.

If the line of data sources is long and must wrap, the export command inserts a slash (\) after a comma to indicate that the list continues on a second line.

enable_status_file

Default: True
Range: True or False
Console: Property sheet for the service
Applies to: Clustered Windows systems

When set to True, this parameter causes the service to maintain a status file containing information about the state of the various data sources it controls. This file is named "`dbstatus.cfg`" and resides in the config sub-directory. It is used to restart runs that were active before the service was restarted. The difference between using this method and setting the configuration parameter `run_at_startup` to True for a data source is that latter causes the run to always be started, even if the data source was not active when the service was taken down.

NOTE: If you are not on a Clustered Windows system or you have not installed the Cluster option package, this parameter has no effect as the service ignores it. The Cluster option is separately licensed form the Client software.

---

ipc_port

Default: 8001

Range: 16-bit unsigned integer

Console: Property sheet for the service

This parameter specifies the TCP/IP port number on which the service listens for connection requests from the Client Console or client runs. If the default port is used by some other application on the client machine, you can change the port.

When the service creates a new configuration file, it sets the value for this parameter using the port number specified at the time of installation, which is then saved to the Windows Registry (or the `globalprofile.ini file` in UNIX). After the `ipc_port` value is set, the service refers only to the `ipc_port` parameter in the service configuration file for this value (not the Windows Registry (or the `globalprofile.ini file` in UNIX).

n_scr_threads

Default: 1

Range: 1 - 4

Console: Property sheet for the service

This parameter specifies the size of the pool of threads the service uses to start externally launched scripts and end-of-run scripts. If all of the threads are busy, the execution of a script might be delayed until a thread become available. To update this parameter from the Client Console, go to the **Explorer** view, right-click the service node, click **Properties**, and then modify the value.

sess_start_timeout

Default: 2 (seconds)

Range: 2-10

Console: Property sheet for the service

This parameter specifies the length of time that the service waits for input from a new connection before forcing a disconnect. The reason for doing this is to protect against a flood of rogue connection requests that would otherwise cripple the service. In some cases, the default value of 2 seconds might be too low. This parameter allows you to adjust the value to best suit your environment.

startup_delay

Default: 1

Range: 0-15 (seconds)

Console: Property sheet for the service

This parameter ensures that process commands for all data sources do not launch simultaneously, which can result in the mainframe failing to start all workers and lead to failed runs. In most cases, the default value of 1 second is adequate.

pw_security_opts

Default: 0

Console: **Service (pop-up menu) > Manage Password Security**

This parameter is a bit vector that defines the console password security options that are enabled. The following bits are currently defined:

ENFORCE_MIN_LEN(1) - Indicates that the console passwords have a minimum length, whose value is defined by the `min_passwd_len` parameter described below.

REQUIRE_NUMBERIC(2) - Indicates that a legal pasword must contain at least one numeric character.

REQUIRE_ALPHA(4) - Indicates that a legal password must contain at least one alphabetic character.

REQUIRE_BOTHCASES(8) - Indicates that a legal password must contain at least one uppercase and one lowercase character.

REQUIRE_NONALNUM(16) - Indicates that a legal password must contain at least one non-alphanumeric character.

CHANGE_ON_FIRST_USE(32) - Indicates that users must change their console password the first time they sign on to the service. New users are assigned the default password, which can be changed from the console.

max_pw_tries

Default: 0

Range: 0 - 10

Console: **Service (pop-up menu) > Manage Password Security**

This parameter defines the maximum number of consecutive times a user is allowed to attempt to sign on to the Client Manager service before the system locks out his or her userid. A value of zero means never lock out a userid.

user_lockout_time

Default: 15

Range: 10 – 1440 (minutes)

Console: **Service (pop-up menu) > Manage Password Security**

This parameter defines the length of time a userid remains locked out before the user may attempt to signon again. You can unlock the userid from the Client Console, or you can reset the password from the Client Console if the user has forgotten his password. When you reset the password, it reverts to being the default password.

default_passwd

Console: **Service (pop-up menu) > Manage Password Security**

This parameter defines the current default password, which console operator can change and is only meaningful for new users or users whose password was reset.

min_passwd_len

Default: 0

Range: 0-15 (seconds)

Console: **Service (pop-up menu) > Manage Password Security**

This parameter defines the minimum length of a legal password when the ENFORCE_MIN_LEN bit is set in the `pw_security_options`.

userid = <userid>, <passwd>,<role>

Default: dbridge, "", administrator

Range: character string

Console: **Service (pop-up menu) > Manage Users**

When the Client Console connects to the service, it provides a userid and a password. The userid is not encoded, but the password is. You can have up 10 userids and each can When the two columns are not contiguous, use the dms_concat_num column to append the time part of the combined item to the date part. This column must be set to the item number of the item containing the time value. The Client will effectively treat these two items as if the second one were concatenated to the first one. You must also set the di_options bit 524288 (0x80000) to make the Client include the second item in DATAITEMS with its active column set to 0. This is a lot more efficient than using DBGenFormat to perform this operation.be assigned one of the following roles:

Role	Alternate Spelling	Access Privileges
administrator	admin	Full privileges to use the Client Console.
operator	oper	Can perform only tasks related to daily operations, such as starting or stopping a run.
user		Can monitor runs and perform status command.

When the Client Console connects to the service, it provides a userid and a password. You can change the userid and the password from the Client Console. (For instructions, see the Databridge Client Console Help.) When you change the password, the service updates the configuration file to include userid and password. Because the password is encoded in the configuration file, you can not edit the password except to specify a blank password. In this case, the encoded value is equal to the unencoded value.

After the password is encoded you can only specify an empty password in the configuration file. If you need to reset a password set it to “”, then sign on as the user in question with an empty password and set the new password.

[Log_File]

Use the [Log_File] section to control the various options for the log file, which is created in the logs subdirectory of the working directory.

When using the service, right-click the data source to activate the **Client Configuration** menu. Then click **Client Configuration > Logging/Tracing > Service Log**. If you don’t select a data source first, the menu item will be grayed out.

In this Section

file_name_prefix

Default: "cp"
Range: 1 to 20 characters

Use this parameter to change the prefix of the log files. The log files have names in the form cp*yyyymmdd*.log, or, when necessary, cp*yyyymmdd_hhmiss*.log. This command allows you to replace the prefix "cp" with any character string, provided that it results in a legal filename.

logsw_on_newday

Default: False

Range: True or False

This parameter determines whether the program uses a new log file when the date changes. You may want to set this parameter to False if your log files are small and use the `logsw_on_size` parameter to manage the log files.

logsw_on_size

Default: False

Range: True or False

Recommended value: True

Use this parameter to control whether the program should check the log file size to see if it has reached the size defined by the `max_file_size` parameter. If the size of the log file exceeds this parameter, the log file is closed and a new one is opened. If the current date is different from the creation date of the old file (which is part of its name), the new log file will be of the form db*yyyymmdd*`.log`; otherwise the time component will be added to the filename to ensure that the name is unique.

max_file_size

Default: 0

Range: numeric value optionally followed by K, M

Recommended value: 1M

Use this parameter to limit the size of log files. The default value of 0 indicates that no limit is imposed on the size of log file. The suffixes of K, M and G allow you specify the maximum file size in kilobytes, megabytes, or gigabytes. A value on the order of 1 MB is a reasonable value to use. The file size is always checked when you start the program regardless of the setting of the `logsw_on_size` parameter.

newfile_on_newday

Default: True

Range: True or False

This parameter forces the program to use a new log file, when it starts up and the log file was created on an earlier date. You may want to set this parameter to False, if your log files are small and use the `logsw_on_size` parameter to manage the log files.

[<data_source_name>]

To modify the parameters for each data source, open the Databridge Client Manager service and right-click the data source you wish to modify. This will activate the **Client Configuration** menu. Each parameter's listing below lists the clicks from here to reach its section of the dialog box. If you don't select a data source first, the menu item will be grayed out.

Each data source that is defined in the `data_sources` parameter of the [Control_Program] section has its own section in the configuration file by that name. The data source section name must follow the first two sections. Do not move these sections before the [Control_Program]; this will result in an error and cause the service program to exit immediately. When an error occurs, you can examine the log file to determine the cause of the problem.

In this Section

auto_generate

Default: False
Range: True or False
Console: **Client Configuration > Processing > Scheduling**

This parameter causes the service to automatically launch a `generate` command if a (service-initiated) `process` or `redefine` command gets a return status indicating that a `generate` command is required. This parameter is designed to be combined with the `auto_redefine` parameter to allow operations to continue when a DMSII reorganization is detected.

auto_redefine

Default: False
Range: True or False
Console: **Client Configuration > Processing > Scheduling**

This parameter causes the service to automatically launch a `redefine` command after a DMSII reorganization is detected (that is, when a service-launched process gets a return status).

When combined with the `auto_generate` parameter, this parameter allows operations to continue after a DMSII reorganization. If the `redefine` command finds nothing to do, the service launches a `process` command and operations resume. If the return status indicates that a `generate` command is required, the service will launch a `generate` command and upon successful completion of this command, will launch a `process` command. If the exit status of the `redefine` command indicates that a `reorganize` command is required, no action is taken. Manual intervention is required to examine the new scripts before they're executed to make sure that they don't corrupt the relational database.

If, after an automatic `redefine` command, tables in the relational database need to be altered, you can customize the data source and resume processing. The `redefine` command is fully compatible with customization features in the Client Console.

blackout_period

Default: 00:00, 00:00

Range: 00:00 to 24:00 (The two time values cannot be equal.)

Console: **Client Configuration > Processing > Scheduling**

Use this parameter to specify a fixed block of time during which the client cannot run. This parameter is useful for operations, such as database backups, that can only take place when the Client is inactive. For example, if you want to back up the database daily between 1:00 a.m, and 2:30 a.m. daily, define a blackout period from 0:55 to 2:30. The extra 5 minutes ensures that the Client finishes any long transactions before the database backup begins.

If the Client is running when the blackout period starts, the Client automatically stops. If the Client is waiting for an idle host to send it updates when the blackout period starts, the Client resets the TCP/IP connection and aborts the run if it hasn't received any updates after 15 seconds. If you try to run the Client during a blackout period, nothing happens.

During a blackout period the service will not start the client. If the scheduler tries to schedule a DBClient run at a time that falls within a blackout period, the start of the run will be delayed until the blackout period ends.

When this parameter is updated using the Client Console or Client Configurator, it is set to the same value in both the service and client configuration files.

client_dir

Default: none (this line must be present)

Range: Double-Quoted string

Console: N/A (Handled automatically)

This parameter contains the full filename of the client directory. In the case of Windows, all double slashes must be represented using two double slashes. In the case of UNIX, which uses forward slashes, this is not the case as the forward slash character has no special meaning for the configuration file scanner.

The client directory is the database-specific subdirectory of the install directory.

In the case of Windows, the registry key INSTALLDIR is the Databridge entry point to this directory. The database specific sub-directories are SQLServer, or Oracle.

daily

Default: daily = 08:00, 12:00, 17:00, 24:00

Range: 12 entries in ascending order from 00:00 to 24:00

Console: **Client Configuration > Processing > Scheduling**

NOTE: The daily parameter is mutually exclusive with the `fixed_delay` parameter. If you specify both `daily` and `fixed_delay` in a data source section of the configuration file, `fixed_delay` overrides `daily` regardless of the order in which they are specified. The service notifies you of this situation by writing a message to the log file.

Enter the times you want the service to launch a `process` command for the data source. You must specify 24-hour time (for example, 5:00 for 5:00 A.M. and 17:00 for 5:00 P.M.). The range for minutes is 00-59. You can specify up to 12 times for the daily parameter. However, you must specify the times in ascending order.

- The values 00:00 and 24:00 are equivalent for midnight.
- 24:00 is allowed only so that you can put it at the end of the list of times in ascending order.
- 24:01 is not allowed; instead, specify, 00:01.

disable_on_exitcode

Default: empty list

Range: a list of up to 3 exit codes

Console: **Client Configuration > Processing > Error Recovery (Disable …)**

Specify exit codes that cause the service to disable the data source. Allowable values include: 93 (stop before or after task); 94 (stop before or after time); and 2025 (stop after audit file number).

max_retries

Default: 3

Range: 0-20

Console: **Client Configuration > Processing > Error Recovery (Options)**

The `max_retries` parameter is intended to specify the maximum number of times the service launches a Client `process` command after a failed `process` command. Not all exit conditions are recoverable. After it unsuccessfully tries to relaunch the Client the specified maximum number of times, the service disables the data source. You must enable the data source using the Client Console before you can launch another `process` command.

The `max_retries` parameter is ignored for a few exit codes, where the condition that causes the problem is expected to self-correct or change over time. (Retrying forever eliminates the need for manual intervention, which would be required if the data source were to be disabled.) Such situations include connect problems to the server or the database, which are often symptomatic of the host, the server, or the database being down.

run_at_startup

Default: False

Range: True or False

Console: Client Configuration > Processing > Scheduling

This command is only meaningful during startup. It indicates whether the service should launch a Client `process` command for the data source when the service starts. If the process returns with a "`database not up`" error, the service retries the launch until the database is up.

sched_delay_secs

Default: 0 (indicating that this parameter is disabled)

Range: 1–86,400 seconds (24 hours)

Console: Client Configuration > Processing > Scheduling

NOTE: The `sched_delay_secs` parameter is mutually exclusive with the `daily` parameter. If you specify both `daily` and `sched_delay_secs` in a data source section of the configuration file, `sched_delay_secs` overrides `daily` regardless of the order in which they are specified.

Use the `sched_delay_secs` parameter to specify a fixed delay between the time a launched client, running a `process` command for the data source, terminates and the launching of the next `process` command for the data source. To disable the `sched_delay_secs` parameter, comment it out or set its value to 0.

sched_minwait_secs

Default: 0

Range: 0-86,400 (24 hours)

Console: Client Configuration > Processing > Error Recovery (Options)

This parameter ensures that a next scheduled `process` command is delayed by the given interval, when a `process` commands finishes right around the next scheduled time and would otherwise start too soon. This parameter delays the start of the next run for the specified amount of time.

working_dir

Default: none (this line must be present)

Range: A string of any length enclosed with quotation marks

Console: N/A (Handled automatically)

This parameter contains the full file name of the working directory. In the case of Windows, all double slashes must be represented using two double slashes. In the case of UNIX, which uses forward slashes, this is not the case as the forward slash character has no special meaning for the configuration file scanner.

Glossary of Terms

absolute address (AA) value. AA is a DMSII term that stands for absolute address. An absolute address value is an A Series WORD (48-bits in length). In the Databridge Client, AA is the hexadecimal representation (12 character strings containing the characters 0–9 and A–F) of the AA Value on the host. Databridge Client uses the AA Values to implement unique keys for the parent structures of embedded data set records. It also uses AA Values to reference the records of data sets that do not have DMSII SETS with the NO DUPLICATES ALLOWED attribute.

AA Values are not constant. Any DMSII reorganization (record conversion, file format, or garbage collection) changes these values.

Databridge Client supports numeric AA Values that are stored as NUMBER(15) in Oracle and BIGINT in SQL Server. It also supports binary AA Values that are stored as RAW(6) in Oracle and BINARY(6) in SQL Server.

Audit Files. An audit file is created by DMSII and contains the raw format of changes made to the DMSII database by update programs. Audit file records contain the deletes, adds, and modifies that were made to the various structures. It can contain, for example, hours', days', or weeks' worth of information.

Databridge uses the audit file for the raw data of each database change to exactly replicate the primary database. Databridge records the audit location (AFN, ABSN, SEG, IDX) between runs, so it can restart without losing any records.

If you set the Databridge Engine Read Active Audit option, Databridge can access the current audit file. If you do not set Read Active Audit = true in the Databridge Engine parameter file, Databridge can access audit information up to and including the current audit file minus one. The audit file contains the update level at the time the audit file was created. The update level in the audit file and the update level in the DESCRIPTION file used by Databridge must match before Databridge will update a replicated database.

When an audit file is closed, DMSII creates the next one in the series. Audit files are closed for several reasons, including the following:

- An operator closes the audit file with the mixnumber SM AUDIT CLOSE command.
- The audit file reaches the file size set in its DASDL.
- There is an I/O error on the audit file.
- There is not enough disk space for this audit file.
- The database update level changes due to database definition changes
- A Databridge accessory closed the file in preparation for the fixup phase after extracting records from a DMSII database.
- The current audit file could not be found.
- A file reorganization was executed to modify the DMSII structure.

audit trail. The audit trail contains all of the audit files generated for a database. The Databridge Engine reads the audit files to extract updates. It then passes the updates to the Client to be applied to the relational database. After the updates have been successfully extracted, the Client saves the state information, which includes the location in the audit trail from which the last group of updates for the data set were read.

Batch Console. The Batch Console automates routine Client tasks by allowing command files/shell scripts launched by the Databridge Client Manager to interact with the service.

caching. A process that filters files before they're requested by the Databridge Client. Caching allows Databridge Enterprise Server to send Client data requests quickly and without placing an additional resource burden on the mainframe.

client. The client is the computer system that will receive DMSII records from the primary database. The client could be a Windows computer, a UNIX computer, or an MCP server. The client can have a relational or a DMSII database.

cloning. Cloning is the one-time process of generating a complete snapshot of a data set to another file. Cloning creates a static picture of a dynamic database. Databridge uses the DMSII data sets and the audit trail to ensure that the cloned data represents a synchronized snapshot of the data sets at a quiet point, even though other programs may be updating the database concurrently. Databridge clones only those data sets you specify.

Cloning is one phase of the database replication process. The other phase is tracking (or updating), which is the integration of database changes since the cloning.

DASDL. Data and Structure Definition Language (DASDL) is the language that defines DMSII databases. The DASDL must be compiled to create a DESCRIPTION file.

data set. A data set is a file structure in DMSII in which records are stored. It is similar to a table in a relational database. You can select the data sets you want to store in your replicated database.

Databridge Director. Databridge Director (also referred to as DBDirector) is a Windows Service installed with Enterprise Server that starts Enterprise Server whenever a connection request is received.

When you start your computer, DBDirector starts and reads the ListenPort registry value to determine which TCP/IP port communicates with Databridge Clients.

Databridge Engine. Databridge Engine is a generic term that can refer to either DBEngine or the engine component of Databridge Enterprise Server. The two are interchangeable as far as the Databridge Client is concerned.

Databridge Server. Databridge Server is a generic term that can refer to either DBServer or Databridge Enterprise Server. The two are interchangeable as far as the Databridge Client is concerned.

DBClient. A Client program that is launched by the Client Manager service. DBClient handles the processing of DMSII data and updates the same as dbutility, except that it runs as a background run and uses the Client Console to display its output and interact with the operator.

DBClntCfgServer. A program that handles all requests from the Client Console specific to a data source. These requests include updating the Client configuration file, providing access to the Client control tables, and handling the Client Configurator. Like DBClient, this program is run by the Client Manager service as a background run.

DBClntCfgServer. A program that handles all requests from the Client Console specific to a data source. These requests include updating the Client configuration file, providing access to the Client control tables, and handling the Client Configurator. Like DBClient, this program is run by the Client Manager service as a background run.

DBServer. DBServer is a Databridge Host accessory that responds to Databridge Client requests for DMSII data or DMSII layout information and provides communications between the following components:

- Databridge Engine and Databridge Enterprise Server
- Databridge Engine and the Databridge Client

NOTE: When Enterprise Server is used with the Databridge Client, Enterprise Server takes over much of the functionality of DBServer and Databridge Engine.

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direct disk. A replication method that allows Databridge Enterprise Server to clone and track DMSII data sets without using any significant mainframe resources. Direct disk replication requires a SAN (Storage Area Network) or Logical Disks configured to make MCP disks visible in Windows.

entry point. A procedure in a library object.

extraction. Extraction is the process of reading through a data set sequentially and writing those records to a file (either a secondary database or flat file).

file format conversion. A type of DMSII reorganization affects file size values (for example, AREASIZE, BLOCKSIZE, or TABLESIZE), but it does not change the layout of the records in a DMSII database.

flat files. A flat file is a plain text or mixed text and binary file which usually contains one record per line. Within the record, individual fields may be separated by delimiters, such as commas, or have a fixed length and be separated by padding. An example of a flat file is an address list that contains fields for *Name* and *Address*.

garbage collection reorganization. A garbage collection reorganization moves records around, but it doesn't change the layout of the DMSII database. Its primary function is to improve disk and/or I/O efficiency by eliminating the space occupied by deleted records. Optionally, a garbage collection reorganization reorders the remaining records in the same sequence as one of the sets.

lag time. The lag time is defined as the elapsed time between the time a record in the DMSII database is updated and the time where this update appears in the relational database. This value accounts for any difference between the clock on the mainframe and that on the client machine.

mutex. A mutex is an operating system resource that is used to implement a critical section and prevent multiple processes from updating the same variables at the same time.

null record. A record for a data set where every data item is null.

null value. The value defined in the DASDL to be NULL for a data item. If the DASDL does not explicitly specify a NULL value for a data item, the NULL value is all bits turned on.

primary database. This is the original DMSII database that resides on the host. Databridge replicates from the primary database to one or more client databases. The client databases can be another DMSII database or one of several relational databases. Compare this to the replicated (or secondary) database.

quiet point (QPT). A quiet point is a point in the audit trail when the DMSII database is quiet and no program is in transaction state. This can occur naturally, or it can be forced by a DMSII sync point.

record format conversion. A type of DMSII reorganization that occurs when a data set or set (group of keys) is reordered or reformatted. It indicates that changes were made to a data set format, or to data items, such as changing the length of an item, for example, BANK-ID NUMBER (10) to BANK-ID NUMBER (15).

record serial number (RSN). Record sequence numbers (RSN) are 48-bit quantities used by the Databridge Engine, in the case of DMSII XE, to uniquely identify a record. RSNs will always be used instead of AA Values when available except for data sets having embedded data sets. RSNs are always static; they will not change after a garbage collection reorganization.

reorganization. Structural or formatting changes to records in the DMSII database, which may require parallel changes to (or re-cloning of) records in the secondary, or relational, database. See also “file format conversion” on page 351 and “record format conversion” on page 352.

replicated database. The replicated database is the database that usually resides on the client machine and contains records cloned from the DMSII database. The replicated database is updated periodically with changes made to the primary (original) DMSII database. The periodic update (or tracking process) is explained later in this section. Compare this to the primary database.

replication. Replication is the ongoing process of cloning and tracking changes to a DMSII database.

rollback. A systematic restoration of the primary or secondary database to a previous state in which the problem or bad data is no longer found.

secondary database. The replicated database. The replicated database is the database that usually resides on the client machine and contains records cloned from the DMSII database. The replicated database is updated periodically with changes made to the primary (original) DMSII database. The periodic update (or tracking process) is explained later in this section. Compare this to the primary database.

semaphores. Operating system resources that are mainly used to implement thread synchronization and signaling.

service. The service (Windows) or daemon (UNIX) that automates most Client operations. It handles operator requests from the Client Console and routes all log and informational messages to the consoles.

set. An index into a data set. A set has an entry (key + pointer) for every record in the data set.

state information. Data that reflects information about the cloned data, such as the audit location and format level.

structure. A data set, set, subset, access, or remap. Each structure has a unique number called the structure number.

table. A data structure in the client database corresponding to a data set or remap in the host DMSII database.

tracking. Tracking is an ongoing process for propagating changes made to records in the DMSII primary database to the replicated database after the initial clone. The Databridge Engine performs extraction as well as tracking.

visible RSN. An RSN (record serial number) that is declared in the DASDL. These appear as an item in the data set and are therefore visible to the database user.