Oracle® GoldenGate

Windows and UNIX Troubleshooting and Tuning Guide

11*g* Release 2 (11.2.1.0.0)

E27276-01

February 2012

Oracle GoldenGate Windows and UNIX Troubleshooting and Tuning Guide 11g Release 2 (11.2.1.0.0)

E27276-01

Copyright © 2012, Oracle and / or its affiliates. All rights reserved.

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, the following notice is applicable:

U.S. GOVERNMENT RIGHTS Programs, software, databases, and related documentation and technical data delivered to U.S. Government customers are "commercial computer software" or "commercial technical data" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, the use, duplication, disclosure, modification, and adaptation shall be subject to the restrictions and license terms set forth in the applicable Government contract, and, to the extent applicable by the terms of the Government contract, the additional rights set forth in FAR 52.227-19, Commercial Computer Software License (December 2007). Oracle America, Inc., 500 Oracle Parkway, Redwood City, CA 94065.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle and Java are registered trademarks of Oracle and / or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information on content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services.

Contents

Preface **About the Oracle GoldenGate Guides** 6

Typographic conventions used in this manual. 7

Getting more help with Oracle GoldenGate 7

Getting help with the Oracle GoldenGate interface 7

Getting help with questions and problems 8

Chapter 1 **Oracle GoldenGate performance and troubleshooting tools** 9

Overview of the Oracle GoldenGate performance tools. 9

Using the information commands in GGSCI 9

Positioning processes using GGSCI commands. 10

Using the process report 11

Scheduling runtime statistics in the process report 12

Viewing record counts in the process report 12

Managing process reports 12

Using the error log 13

Using the discard file 14

Using Oracle GoldenGate Monitor 15

Using the system logs 15

Using SHOWSYNTAX to view Replicat SQL statements 16

Using tracing parameters. 16

Using DUMPDDL to view DDL statements. 16

Using Oracle GoldenGate error documentation 17

Finding help with Oracle GoldenGate in My Oracle Support 17

Using the Logdump utility. 18

Chapter 2 **Tuning the Performance of Oracle GoldenGate** 19

Overview of performance tuning 19

Timing process startup 19

Balancing the load across parallel process groups 20

Considerations for using parallel process groups. 20

Using parallel Replicat groups on a target system 22

Using parallel Extract groups with parallel Replicat groups 24
Splitting large tables into row ranges across process groups 26
Tuning a data pump for pass-through efficiency 27
Configuring Oracle GoldenGate to use the network efficiently 27
Eliminating disk I/O bottlenecks 29
Optimizing data filtering and conversion 30
Applying similar SQL statements in arrays 31
Preventing full table scans in the absence of keys 31
Splitting large transactions 32
Tuning Replicat transactions 32

Chapter 3 Troubleshooting Oracle GoldenGate 33

Overview of Oracle GoldenGate troubleshooting 33
Troubleshooting example 33
Troubleshooting process startup failures 34
Configuration problems that cause startup failure 34
Operating system issues that cause startup failure 36
Database errors that cause statup failure 37
Troubleshooting slow startup 38
Troubleshooting Extract problems 38
Extract stalls or abends during recovery 38
Extract is too slow 39
Extract stalls or pauses 40
Extract abends 41
Troubleshooting Replicat problems 44
Replicat is too slow 44
Replicat abends 45
Cannot delete a Replicat group 49
Troubleshooting data-synchronization problems 49
Testing for out-of-sync rows 49
Causes of out-of-sync data 50
Discrepancies caused by DML on the target 50
Discrepancies caused by tables without keys 50
Discrepancies caused by character sets 50
Discrepancies caused by non-matching structures or keys 51
Resynchronizing an out-of-sync table 51
Troubleshooting data-mapping 53
Table and column names 53
Definitions 53

Column-missing error 54
Fetch failures on Oracle source 54
Replicat errors on Sybase targets 55
Escaped characters not converting correctly 55
Troubleshooting SQLEXEC 55
Troubleshooting missed transactions 57
Troubleshooting problems with Oracle DDL replication 58
Extract abends with "OCI Error executing fetch ..." 59
No DDL is captured by Extract 59
Specific DDL is not captured or excluded 62
Data on new, altered, and renamed tables not captured 62
RENAMEs converted to ALTER TABLE RENAME 63
RENAME operations are failing 64
Comments are in the wrong place 64
Derived object names are not being converted correctly 64
String substitution not working 64
DDL processing steps not in the process report 65
Replicat abends on ggs_ table 65
The database returns ORA-04021 65
The DDL objects tablespace filled up 66
Troubleshooting problems with Teradata DDL replication 66
No DDL is captured by Extract 66
Specific DDL is not captured or excluded 67
String substitution not working 67
Derived object names are not being converted correctly 67
DDL is being applied with the wrong owner on the target 67
Troubleshooting trail and file-maintenance problems 68
Process report not generated 68
Discard file not created 68
Discard file too big 68
Trail file is not emptying 68
Trail not rolling over 69
Trail sequence number is at 000000 69
Trail files not being purged 69
Trail files purge too soon 70
Report file too big 70
Troubleshooting other problems 70
Too many open cursors 70

Time differences 71
Oracle ADD TRANDATA problems 71
Other Oracle-specific problems 71
Sybase missing server messages 72
DB2 z/OS-specific problems 72
SQL Server-specific problems 74
Teradata module not found 75

Chapter 4 Using the Logdump Utility 76

Getting started with Logdump 76
Viewing the first record 76
Executing basic Logdump tasks 78
Evaluating transaction size 81
Maintaining command history 82
Logdump command reference guide 82
Logdump command summary 82
ASCIIDATA | EBCDICDATA 85
ASCIIDUMP | EBCDICDUMP 85
ASCIIHEADER | EBCDICHEADER 85
CD 86
COMPUTETIMESTAMP 86
COUNT 86
CTIME 89
DEBUG 89
DECRYPT 90
DETAIL 90
DUMP 91
ENCRYPT 91
ENV 92
EXIT 92
FC 92
Using the editor 93
FILEHEADER 94
FILES 103
FILTER 103
Comparison operators 104
GHDR 110
HEADERTOKEN 110
HELP 111

HISTORY . . . 111
INTERPRETINTERVAL . . . 112
INTERPRETTIMESTAMP . . . 112
LOG . . . 113
NEXT . . . 113
NEXTTRAIL . . . 113
NOTIFY . . . 114
OBEY . . . 114
OPEN . . . 115
POSITION . . . 115
RECLEN . . . 115
SAVE . . . 116
SCANFORENDTRANSACTION . . . 117
SCANFORHEADER . . . 117
SCANFORRBA . . . 118
SCANFORTIME . . . 118
SCANFORTYPE . . . 118
SCANSCROLLING . . . 119
SHOW . . . 119
SKIP . . . 121
TIME . . . 121
TIMEOFFSET . . . 121
TRAILFORMAT . . . 122
TRANSBYTELIMIT . . . 122
TRANSHIST . . . 122
TRANSRECLIMIT . . . 123
USERTOKEN . . . 123
WRITELOG . . . 124
X . . . 124

Glossary . . . 126

Index . . . 139

PREFACE

About the Oracle GoldenGate Guides

The complete Oracle GoldenGate documentation set contains the following components:

HP NonStop platforms

- *Oracle GoldenGate HP NonStop Administrator's Guide:* Explains how to plan for, configure, and implement the Oracle GoldenGate replication solution on the NonStop platform.
- *Oracle GoldenGate HP NonStop Reference Guide:* Contains detailed information about Oracle GoldenGate parameters, commands, and functions for the NonStop platform.

Windows, UNIX, Linux platforms

- *Installation and Setup guides*: There is one such guide for each database that is supported by Oracle GoldenGate. It contains system requirements, pre-installation and post-installation procedures, installation instructions, and other system-specific information for installing the Oracle GoldenGate replication solution.
- *Oracle GoldenGate Windows and UNIX Administrator's Guide*: Explains how to plan for, configure, and implement the Oracle GoldenGate replication solution on the Windows and UNIX platforms.
- *Oracle GoldenGate Windows and UNIX Reference Guide*: Contains detailed information about Oracle GoldenGate parameters, commands, and functions for the Windows and UNIX platforms.
- *Oracle GoldenGate Windows and UNIX Troubleshooting and Tuning Guide:* Contains suggestions for improving the performance of the Oracle GoldenGate replication solution and provides solutions to common problems.

Other Oracle GoldenGate products

- *Oracle GoldenGate Director Administrator's Guide*: Expains how to install, run, and administer Oracle GoldenGate Director for configuring, managing, monitoring, and reporting on the Oracle GoldenGate replication components.
- *Oracle GoldenGate Veridata Administrator's Guide*: Explains how to install, run, and administer the Oracle GoldenGate Veridata data comparison solution.
- *Oracle GoldenGate for Java Administrator's Guide*: Explains how to install, configure, and run Oracle GoldenGate for Java to capture JMS messages to Oracle GoldenGate trails or deliver captured data to messaging systems or custom APIs.
- *Oracle GoldenGate for Flat File Administrator's Guide*: Explains how to install, configure, and run Oracle GoldenGate for Flat File to format data captured by Oracle GoldenGate as batch input to ETL, proprietary or legacy applications.

Typographic conventions used in this manual

This manual uses the following style conventions.

- Parameter and command arguments are shown in upper case, for example:
  `CHECKPARAMS`
- File names, table names, and other names are shown in lower case unless they are case-sensitive to the operating system or software application they are associated with, for example:
  `account_tab`
  `GLOBALS`
- Variables are shown within `< >` characters, for example:
  `<group name>`
- When one of multiple mutually-exclusive arguments must be selected, the selection is enclosed within braces and separated with pipe characters, for example:
  `VIEW PARAMS {MGR | <group> | <file name>}`
- Optional arguments are enclosed within brackets, for example:
  `CLEANUP EXTRACT <group name> [, SAVE <count>]`
- When there are numerous multiple optional arguments, a placeholder such as `[<option>]` may be used, and the options are listed and described separately, for example:
  `TRANLOGOPTIONS [<option>]`
- When an argument is accepted more than once, an ellipsis character (...) is used, for example:
  `PARAMS ([<requirement rule>] <param spec> [, <param spec>] [, ...])`
- The ampersand (&) is used as a continuation character in Oracle GoldenGate parameter files. It is required to be placed at the end of each line of a parameter statement that spans multiple lines. Most examples in this documentation show the ampersand in its proper place; however, some examples of multi-line statements may omit it to allow for space constraints of the publication format.

Getting more help with Oracle GoldenGate

In addition to the Oracle GoldenGate documentation, you can get help for Oracle GoldenGate in the following ways.

Getting help with the Oracle GoldenGate interface

Both GGSCI and the Oracle GoldenGate Director applications provide online help.

GGSCI commands

To get help for an Oracle GoldenGate command, use the HELP command in GGSCI. To get a summary of command categories, issue the HELP command without options. To get help

for a specific command, issue the HELP command with the command name as input.

```
HELP <command name>
```

Example:

```
HELP ADD EXTRACT
```

The help file displays the syntax and description of the command.

Oracle GoldenGate Director and Oracle GoldenGate Monitor

To get help for the Oracle GoldenGate graphical client interfaces, use the **Help** menu within the application.

Getting help with questions and problems

For troubleshooting assistance, see *Oracle GoldenGate Windows and UNIX Troubleshooting and Tuning Guide*. Additional information can be obtained from the Knowledge Base on http://support.oracle.com. If you cannot find an answer, you can open a service request from the support site.

CHAPTER 1

Oracle GoldenGate performance and troubleshooting tools

Overview of the Oracle GoldenGate performance tools

Oracle GoldenGate provides a variety of tools and resources that help you:

- Monitor processing activity
- Tune performance
- Solve problems

This information is obtained through:

- GGSCI commands
- Oracle GoldenGate tracing parameters
- Oracle GoldenGate reports and logs
- Oracle GoldenGate Director graphical user interface
- System logs
- Oracle GoldenGate Logdump utility
- Oracle GoldenGate error documentation
- Oracle GoldenGate Knowledge Base

Using the information commands in GGSCI

The primary way to view processing information is through GGSCI. For more information about these commands, see the *Oracle GoldenGate Windows and UNIX Reference Guide.*

Table 1 Commands to view process information

Command	What it shows
INFO {EXTRACT | REPLICAT} <group> [DETAIL]	Run status, checkpoints, approximate lag, and environmental information
INFO MANAGER	Run status and port number
INFO ALL	INFO output for all Oracle GoldenGate processes on the system

Table 1 Commands to view process information

Command	What it shows
STATS {EXTRACT | REPLICAT} <group>	Statistics for operations processed
STATUS {EXTRACT | REPLICAT} <group>	Run status (starting, running, stopped, abended)
STATUS MANAGER	Run status
LAG {EXTRACT | REPLICAT} <group>	Latency between last record processed and timestamp in the data source
INFO {EXTTRAIL | RMTTRAIL} <path name>	Name of associated process, position of last data processed, maximum file size
SEND MANAGER	Run status, information about child processes, port information, trail purge settings
SEND {EXTRACT | REPLICAT}	Depending on the process, returns information about memory pool, lag, TCP statistics, long-running transactions, process status, recovery progress, and more.
VIEW REPORT <group>	Contents of the process report
VIEW GGSEVT	Contents of the Oracle GoldenGate error log

<command> ER <wildcard>	Information dependent on the <command> type:
	INFO
	LAG
	SEND
	STATS
	STATUS
	
	<wildcard> is a wildcard specification for the process groups to be affected, for example:
	`INFO ER ext*`
	`STATS ER *`

Positioning processes using GGSCI commands

In the course of resolving a problem, you might need to position an Extract process in the transaction log or in an extract trail, or to position Replicat in the trail, such as to skip data. The following commands have reposition options:

- ADD EXTRACT and ALTER EXTRACT for a primary Extract or a data pump have options to start at a given timestamp or physical location in the data source. In addition, ALTER EXTRACT enables you to start a new file within a trail. (SEND EXTRACT also provides this capability.)

- SEND EXTRACT provides the option to skip the oldest transaction, allowing the management of long-running transactions.
- ADD REPLICAT and ALTER REPLICAT have options to start at a given timestamp or at a physical location in the trail.
- START REPLICAT has options to skip the first transaction from its restart position in the trail, or to start processing at, or after, a transaction indicator that contains a given commit sequence number (CSN).

For full details and syntax, see the Oracle GoldenGate *Windows and UNIX Reference Guide*.

Using the process report

Use the process report to view (depending on the process):

- parameters in use
- table and column mapping
- database information
- runtime messages and errors
- runtime statistics for the number of operations processed

Every Extract, Replicat, and Manager process generates a report file at the end of each run. The report can help you diagnose problems that occurred during the run, such as invalid mapping syntax, SQL errors, and connection errors.

To view a process report

Use any of the following:

- standard shell command for viewing a text file
- Oracle GoldenGate Director
- VIEW REPORT command in GGSCI

Syntax

```
VIEW REPORT {<group> | <file name> | MGR}
```

Where:

- <group> shows an Extract or Replicat report that has the default name, which is the name of the associated group.
- <file name> shows any Extract or Replicat report file that matches a given path name. Must be used if a non-default report name was assigned with the REPORT option of the ADD EXTRACT or ADD REPLICAT command when the group was created.
- MGR shows the Manager process report.

Report names are in upper case if the operating system is case-sensitive. By default, reports have a file extension of .rpt, for example EXTORA.rpt. The default location is the dirrpt sub-directory of the Oracle GoldenGate directory.

To determine the name and location of a process report

Use the INFO command in GGSCI.

Syntax

```
INFO <group>, DETAIL
```

To view information if a process abends without a report

Run the process from the command shell of the operating system (not GGSCI) to send the information to the terminal.

Syntax

```
<process> paramfile <path name>.prm
```

Where:

- <process> is either Extract or Replicat.
- paramfile <path name>.prm is the fully qualified name of the parameter file.

Example

```
replicat paramfile /ggs/dirdat/repora.prm
```

Scheduling runtime statistics in the process report

By default, runtime statistics are written to the report once, at the end of each run. For long or continuous runs, you can use optional parameters to view these statistics on a regular basis, without waiting for the end of the run.

To set a schedule for reporting runtime statistics

Use the REPORT parameter in the Extract or Replicat parameter file to specify a day and time to generate runtime statistics in the report.

To send runtime statistics to the report on demand

Use the SEND EXTRACT or SEND REPLICAT command with the REPORT option to view current runtime statistics when needed.

Viewing record counts in the process report

Use the REPORTCOUNT parameter to report a count of transaction records that Extract or Replicat processed since startup. Each transaction record represents a logical database operation that was performed within a transaction that was captured by Oracle GoldenGate. The record count is printed to the report file and to the screen.

Managing process reports

Once created, a report file must remain in its original location for Oracle GoldenGate to operate properly after processing has started.

Whenever a process starts, Oracle GoldenGate creates a new report file and ages the previous one by appending a sequence number to the name. The numbers increment from 0 (the previous one) to 9 (the oldest).

No process ever has more than ten aged reports and one active report. After the tenth aged report, the oldest is deleted when a new report is created. Set up an archiving schedule for aged report files in case they are needed to resolve a service request.

Figure 1 Current Extract and Manager reports plus aged reports

```
-rw-rw-rw-     1 ggs ggs     1193 Oct 11 14:59     MGR.rpt
-rw-rw-rw-     1 ggs ggs     3996 Oct 5  14:02     MGR0.rpt
-rw-rw-rw-     1 ggs ggs     4384 Oct 5  14:02     TCUST.rpt
-rw-rw-rw-     1 ggs ggs     1011 Sep 27 14:10     TCUST0.rpt
-rw-rw-rw-     1 ggs ggs     3184 Sep 27 14:10     TCUST1.rpt
-rw-rw-rw-     1 ggs ggs     2655 Sep 27 14:06     TCUST2.rpt
-rw-rw-rw-     1 ggs ggs     2655 Sep 27 14:04     TCUST3.rpt
-rw-rw-rw-     1 ggs ggs     2744 Sep 27 13:56     TCUST4.rpt
-rw-rw-rw-     1 ggs ggs     3571 Aug 29 14:27     TCUST5.rpt
```

To prevent an Extract or Replicat report file from becoming too large

Use the REPORTROLLOVER parameter to force report files to age on a regular schedule, instead of when a process starts. For long or continuous runs, setting an aging schedule controls the size of the active report file and provides a more predictable set of archives that can be included in your archiving routine.

To prevent SQL errors from filling up the Replicat report

Use the WARNRATE parameter to set a threshold for the number of SQL errors that can be tolerated on any target table before being reported to the process report and to the error log. The errors are reported as a warning. If your environment can tolerate a large number of these errors, increasing WARNRATE helps to minimize the size of those files.

Using the error log

Use the Oracle GoldenGate error log to view:

- a history of GGSCI commands
- Oracle GoldenGate processes that started and stopped
- processing that was performed
- errors that occurred
- informational and warning messages

Because the error log shows events as they occurred in sequence, it is a good tool for detecting the cause (or causes) of an error. For example, you might discover that:

- someone stopped a process
- a process failed to make a TCP/IP or database connection
- a process could not open a file

To view the error log

Use any of the following:

- Standard shell command to view the ggserr.log file within the root Oracle GoldenGate directory
- Oracle GoldenGate Director
- VIEW GGSEVT command in GGSCI

Syntax `VIEW GGSEVT`

To filter the error log

The error log can become very large, but you can filter it based on a keyword. For example, this filter show only errors:

```
$ more ggserr.log | grep ERROR
```

Because the error log will continue to grow as you use Oracle GoldenGate, consider archiving and deleting the oldest entries in the file.

NOTE The Collector process might stop reporting to the log on UNIX systems after the log has been cleaned up. To get reporting started again, restart the Collector process after the cleanup.

Using the discard file

Use a discard file to capture information about Oracle GoldenGate operations that failed. This information can help you to resolve data errors, such as those that involve invalid column mapping.

The discard file reports such information as:

- The database error message
- The sequence number of the data source or trail file
- The relative byte address of the record in the data source or trail file
- The details of the discarded operation, such as column values of a DML statement or the text of a DDL statement.

A discard file can be used for Extract or Replicat, but it is most useful for Replicat to log operations that could not be reconstructed or applied.

To use a discard file

Include the DISCARDFILE parameter in the Extract or Replicat parameter file. You must supply a name for the file. The parameter has options that control the maximum file size, after which the process abends, and whether new content overwrites or appends to existing content.

Syntax `DISCARDFILE <file name> [, APPEND | PURGE] [, MAXBYTES <n> | MEGABYTES <n>]`

NOTE To prevent the need to perform manual maintenance of discard files, use either the PURGE or APPEND option. Otherwise, you must specify a different discard file name before starting each process run, because Oracle GoldenGate will not write to an existing discard file.

To view a discard file

Use either of the following:

- Standard shell command to view the file by name
- VIEW REPORT command in GGSCI, with the discard file name as input

Syntax

```
VIEW REPORT <file name>
```

To manage discard files

Use the DISCARDROLLOVER parameter to set a schedule for aging discard files. For long or continuous runs, setting an aging schedule prevents the discard file from filling up and causing the process to abend, and it provides a predictable set of archives that can be included in your archiving routine.

Syntax

```
DISCARDROLLOVER {AT <hh:mi> | ON <day of week> | AT <hh:mi> ON <day of week>}
```

Using Oracle GoldenGate Monitor

Most of the information that can be viewed with GGSCI commands can also be viewed through the graphical user interface of Oracle GoldenGate Monitor. For more information, see the online help for that software.

Using the system logs

Oracle GoldenGate writes errors that are generated at the level of the operating system to the Event Viewer on Windows or to the syslog on UNIX and Linux. Oracle GoldenGate events are basically the same format in the UNIX, Linux, and Windows system logs. Oracle GoldenGate errors that appear in the system logs also appear in the Oracle GoldenGate error log.

On UNIX and Linux, Oracle GoldenGate messaging to the syslog is enabled by default. On Windows, Oracle GoldenGate messaging to the Event Viewer must be installed by registering the Oracle GoldenGate message DLL.

To register Oracle GoldenGate messaging on Windows

1. Run the install program with the addevents option. This enables generic messages to be logged.
2. (Optional) To get more specific Windows messages, copy the category.dll and ggsmsg.dll libraries from the Oracle GoldenGate directory to the SYSTEM32 directory, either before or after running install. The detailed messages contain the Oracle GoldenGate user name and process, the name of the parameter file, and the error text.

   NOTE Windows event messaging might have been installed when Oracle GoldenGate was installed. For more information on running install, see the Oracle GoldenGate installation guide for your database.

To filter Oracle GoldenGate messaging on Windows and UNIX

Use the SYSLOG parameter to control the types of messages that Oracle GoldenGate sends to the system logs on a Windows or UNIX system. You can:

- include all Oracle GoldenGate messages
- suppress all Oracle GoldenGate messages
- filter to include information, warning, or error messages, or any combination of those types

You can use SYSLOG as a GLOBALS or Manager parameter, or both. When present in the GLOBALS parameter file, it controls message filtering for all of the Oracle GoldenGate processes on the system. When present in the Manager parameter file, it controls message filtering only for the Manager process. If used in both the GLOBALS and Manager parameter files, the Manager setting overrides the GLOBALS setting for the Manager process. This enables you to use separate settings for Manager and all of the other Oracle GoldenGate processes.

Using SHOWSYNTAX to view Replicat SQL statements

Use the SHOWSYNTAX parameter to start an interactive session where you can view each Replicat SQL statement before it is applied. By viewing the syntax of SQL statements that failed, you might be able to diagnose the cause of the problem. For example, you could find out that the WHERE clause is using a non-indexed column.

Using tracing parameters

Use the tracing parameters only as directed by an Oracle support analyst when trying to resolve a support case. Tracing captures processing activity that otherwise is not included in the Oracle GoldenGate output files. It adds a large amount of overhead to a system, and the output requires expert interpretation.

NOTE Tracing for Teradata installations *must* involve a support analyst, no matter what the circumstances, because it requires a special trace file and debug version of Extract and Replicat.

To trace Extract and Replicat processing

Use the TRACE and TRACE2 parameters to capture Extract or Replicat processing information to help reveal processing bottlenecks.

- TRACE provides step-by-step processing information.
- TRACE2 identifies the code segments on which Extract or Replicat is spending the most time.

Both support the tracing of DML and DDL.

Using DUMPDDL to view DDL statements

Use the DUMPDDL command to view the data in the Oracle GoldenGate DDL history table.

This information is the same information that is used by the Extract process. It is stored in proprietary format, but can be exported in human-readable form to the screen or to a series of SQL tables that can be queried by using regular SQL.

Using Oracle GoldenGate error documentation

Use the Oracle GoldenGate Error Messages Guide to view descriptions, causes, and solutions for the error and informational messages that Oracle GoldenGate processes write to the error log.

Finding help with Oracle GoldenGate in My Oracle Support

Use My Oracle Support to find knowledge solutions, workarounds, and other information that is reported by customers, partners, and Oracle employees. My Oracle Support also enables you to open a Service Request. If a patch is required to resolve a service request, you will receive instructions on how to download it from My Oracle Support.

To view the Oracle GoldenGate Knowledge Base

1. Go to http://support.oracle.com.
2. Select your language and then log in with your email and Oracle password.
3. Click the **Knowledge** tab.
4. You can:
   - Browse the Oracle GoldenGate knowledge base by typing “Oracle GoldenGate” in **Browse Any Product** or by selecting **Middleware>Business Intelligence>GoldenGate** under **Browse Knowledge**.
   - Type a search word or phrase in **Search Knowledge Base** to search for a specific topic. If needed, use the **Product Category** option under **Refine Search** to narrow the scope of the results to just Oracle GoldenGate tickets (**Middleware>Business Intelligence>GoldenGate**). Use other options as needed.

     NOTE **Refine Search** contracts and expands with every search refinement that you make, and then refreshes the refinement options and results each time for further action, if needed.

If you need help with My Oracle Support, click **Help** at the top of the application window.

To open a service request

NOTE If you purchased Oracle GoldenGate and support through a distributor, contact your distributor instead of attempting to create a service request through My Oracle Support.

1. Click the **Service Requests** tab.
2. Click **Create SR**.
3. Complete the form, referring to the **Help** at the top of the application window if necessaary.

Using the Logdump utility

Use the Logdump utility to search for, filter, view, and save data that is stored in an Oracle GoldenGate trail or extract file. Using Logdump is not necessary to solve most problems, but it is useful when you need to view data in an Oracle GoldenGate record. For more information about using Logdump, see Chapter 4.

CHAPTER 2

Tuning the Performance of Oracle GoldenGate

Overview of performance tuning

One of the challenges of performance tuning is in deciding which component of your Oracle GoldenGate environment needs tuning:

- the system or network?
- the database or applications?
- the Oracle GoldenGate configuration?

To address these questions, you can tune the performance of the following components in an Oracle GoldenGate environment:

- Manager
- Primary Extract process
- Data pump Extract process
- Network
- Replicat

NOTE Performance tuning and troubleshooting often are done at the same time. See “Troubleshooting Oracle GoldenGate” on page 33 if you need additional help.

Timing process startup

You can tune the Manager process to start local Extract and Replicat processes automatically and to control the timing of the startup,

To start processes automatically when Manager starts

Use the AUTOSTART parameter to start one or more Extract and Replicat processes automatically when Manager starts. AUTOSTART ensures that no process groups are overlooked and that synchronization activities start immediately.

To restart processes automatically after recovery

Use the AUTORESTART parameter to start one or more Extract and Replicat processes automatically after they fail. AUTORESTART provides fault tolerance when something temporary interferes with a process, such as intermittent network outages or programs that interrupt access to transaction logs.

To delay Manager activities

Use the BOOTDELAYMINUTES parameter on a Windows system to delay the activities that Manager performs when it starts, such as executing parameters. For example, BOOTDELAYMINUTES can be used to delay AUTOSTART parameters until database services are started.

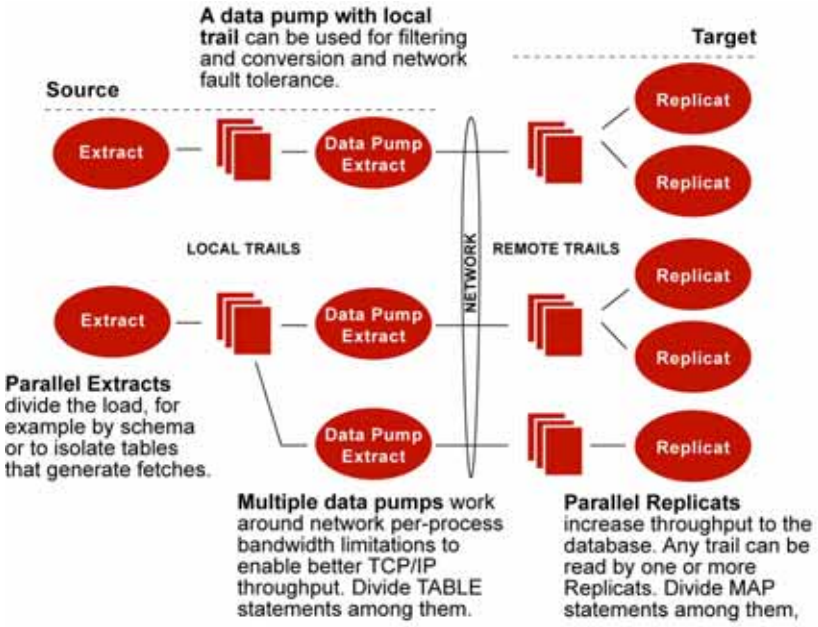
Balancing the load across parallel process groups

The most basic thing you can do to improve the performance of Oracle GoldenGate is to divide a large number of tables among parallel processes and trails. For example, you can divide the load by schema.

Because each Oracle GoldenGate component — Extract, data pump, trail, Replicat — is an independent module, you can combine them in ways that suit your needs. You can use multiple trails and parallel Extract and Replicat processes (with or without data pumps) to improve performance and to isolate the processing of specific data. This configuration helps to minimize target latency when the transaction volume is high or when operations on certain tables cause bottlenecks.

Figure 2 shows some of the ways that you can configure Oracle GoldenGate to improve throughput speed and overcome network bandwidth issues.

Figure 2 Load-balancing configurations that improve performance



Considerations for using parallel process groups

Number of groups

The number of concurrent Extract and Replicat process groups that can run on a system depends on how much system memory is available. Each Extract and Replicat process

needs approximately 25-55 MB of memory, or more depending on the size of the transactions and the number of concurrent transactions.

The Oracle GoldenGate GGSCI command interface fully supports up to 5,000 concurrent Extract and Replicat groups per instance of Oracle GoldenGate Manager. At the supported level, all groups can be controlled and viewed in full with GGSCI commands such as the INFO and STATUS commands. Beyond the supported level, group information is not displayed and errors can occur. Oracle GoldenGate recommends keeping the number of Extract and Replicat groups (combined) at the default level of 300 or below in order to manage your environment effectively. The number of groups is controlled by the MAXGROUPS parameter.

NOTE When creating the groups, keep tables that have relational constraints to each other in the same group.

Memory

The system must have sufficient swap space for each Oracle GoldenGate Extract and Replicat process that will be running. To determine the required swap space:

1. Start up one Extract or Replicat.
2. Run GGSCI.
3. View the report file and find the line PROCESS VM AVAIL FROM OS (min).
4. Round up the value to the next full gigabyte if needed. For example, round up 1.76GB to 2 GB.
5. Multiply that value by the number of Extract and Replicat processes that will be running. The result is the maximum amount of swap space that could be required

See the CACHEMGR parameter in the Oracle GoldenGate *Windows and UNIX Reference Guide* for more information about how memory is managed.

Maintaining data integrity

When using parallel Extract and/or Replicat processes, keep related DDL and DML together in the same process stream to ensure data integrity. Configure the processes so that:

- all DDL and DML for any given object are processed by the same Extract group and by the same Replicat group.
- all objects that are relational to one another are processed by the same process group.

For example, if ReplicatA processes DML for Table1, then it should also process the DDL for Table1. If Table2 has a foreign key to Table1, then its DML and DDL operations also should be processed by ReplicatA.

If an Extract group writes to multiple trails that are read by different Replicat groups, Extract sends all of the DDL to all of the trails. Use each Replicat group to filter the DDL by using the filter options of the DDL parameter in the Replicat parameter file.

Isolating processing-intensive tables

Use dedicated process groups for certain kinds of tables that tend to interfere with normal processing and cause latency to build on the target. For example:

- Extract fetches data for large-object types, for columns that are not logged to the transaction log, and for data that must be fetched because of parameter specifications or SQL procedures. When data must be fetched from the database, it affects the performance of Extract because the data must be fetched using native calls. You can get fetch statistics from the STATS EXTRACT command if you include the STATOPTIONS REPORTFETCH parameter in the Extract parameter file.
- The Replicat process is most often a source of performance bottlenecks because, in its normal mode of operation, it is a single-threaded process that applies operations one at a time by using regular SQL. Replicat takes longer to process tables that have large or long-running transactions, heavy volume, a very large number of columns that change, and LOB data.

  NOTE You can use the Logdump TRANSHIST command to view the size of the transactions that are contained in a trail file. See Chapter 4.

  NOTE Depending on the types of transactions your applications generate, you gain processing efficiencies by using BATCHSQL instead of the normal Replicat mode. See the Oracle GoldenGate *Windows and UNIX Reference Guide*.

Using parallel Replicat groups on a target system

In most cases, only a single instance of Extract is required to extract and transmit data to the target system, even for very large data loads. Typically, extracting and moving data to the target occurs near real-time, with backlogs typically occurring during the apply process on the target. Because Replicat must reproduce the source operations by constructing SQL, its I/O activity tends to be random access, as opposed to Extract I/O, which is serial, blocked, and buffered. To reduce this inherent latency, you can use multiple Replicat processes.

Although it is possible for multiple Replicat processes to read a single trail (no more than three of them to avoid disk contention) it is recommended that you pair each Replicat with its own trail and corresponding Extract process.

When using parallel Replicats, configure each one to process a different portion of the overall data. To ensure data integrity, tables with referential integrity to one another must be processed through the same trail and associated Replicat group. For example, process table1 and table2 — and any child tables — through one trail-group pair, and process table3 and table4 and their child tables through another.

- Refer to the Oracle GoldenGate *Windows and UNIX Reference Guide* for complete command and parameter syntax.
- For detailed instructions on configuring change synchronization, see the Oracle GoldenGate *Windows and UNIX Administrator's Guide.*

To create the Extract group

NOTE If needed, one or more Extract data-pumps can be added to this configuration.

1. On the source, use the ADD EXTRACT command to create an Extract group, specifying TRANLOG as the data source.

```
ADD EXTRACT <group>, TRANLOG, BEGIN <time> [, THREADS <n>]
```

2. On the source, use the ADD RMTTRAIL command to specify the relative or full path name of a trail to be created by Oracle GoldenGate on the target system.

```
ADD RMTTRAIL <trail_1>, EXTRACT <group>
```

- Repeat this step to create a trail for each Replicat group that you will be using. For the EXTRACT argument of the command, specify the same Extract group.

  ```
  ADD RMTTRAIL <trail_2>, EXTRACT <group>
  ```

3. On the source, use the EDIT PARAMS command to create an Extract parameter file that contains the following required parameters plus any others that are appropriate for your database environment.

   ```
   EXTRACT <group>
   [SOURCEDB <dsn>,][USERID <user>[, PASSWORD <pw> [<encryption options>]]]
   RMTHOST <hostname>, MGRPORT <portnumber>
   RMTTRAIL <trail_1>
   TABLE <owner>.<table_group_1>;
   RMTTRAIL <trail_2>
   TABLE <owner>.<table_group_2>;
   ```

   - Divide the source tables among different TABLE parameters, as many as you need. This example shows two.
   - Link each TABLE statement to a different trail that is specified with the Extract parameter RMTTRAIL.
   - If needed, you link multiple TABLE statements to any given trail.

To create the Replicat groups

4. On the target, create a Replicat checkpoint table. For instructions, see the Oracle GoldenGate *Windows and UNIX Administrator's Guide*. All Replicat groups can use the same checkpoint table.
5. On the target, use the ADD REPLICAT command to create a Replicat group for each trail that you created. Use the EXTTRAIL argument of that command to link the group to a trail.

   ```
   ADD REPLICAT <group_1>, EXTTRAIL <trail_1>
   ADD REPLICAT <group_2>, EXTTRAIL <trail_2>
   ```

6. On the target, use the EDIT PARAMS command to create a Replicat parameter file for each Replicat group. In each file, use the following required parameters plus any others that are appropriatge for your database environment.

   Replicat group 1

   ```
   REPLICAT <group_1>
   {SOURCEDEFS <full_pathname>} | ASSUMETARGETDEFS
   [TARGETDB <dsn>,] [USERID <user id>[, PASSWORD <pw> &
      [<encryption options>]]]
   MAP <owner>.<table_group_1>, TARGET <owner>.<table_group_1>;
   ```

   Replicat group 2

   ```
   REPLICAT <group_2>
   {SOURCEDEFS <full_pathname>} | ASSUMETARGETDEFS
   [TARGETDB <dsn>,] [USERID <user id>, PASSWORD <pw> &
      [<encryption options>]]]
   MAP <owner>.<table_group_2>, TARGET <owner>.<table_group_2>;
   ```

- You can use any number of MAP statements for any given Replicat group. All MAP statements for a given Replicat group must specify the same objects that are contained in the trail that is linked to the group.

7. In the Manager parameter file on the target system, use the PURGEOLDEXTRACTS parameter to control the purging of files from the trails.

NOTE You can take this configuration a step further by dividing the rows of an individual table among multiple Replicat processes. This might be necessary, for example, when table1 receives one million inserts and updates per day, while the rest of the tables receive 100,000 or less. See “Splitting large tables into row ranges across process groups” on page 26.

Using parallel Extract groups with parallel Replicat groups

To ensure good performance on the source, you might need to use two or more parallel Extract processes in conjunction with parallel Replicat processes on the target. For example, candidates for a dedicated Extract are tables that generate fetches (generally those containing LOBs and columns that are not logged to the transaction log) and tables that generate long transactions or that trigger SQL procedures or user exits.

Multiple Extract groups extract and transmit in parallel to their own trails. Each trail is read by a dedicated Replicat group. Configure each Extract-Replicat pair to process a different portion of the overall data by assigning different tables to each one. To ensure data integrity, tables with referential integrity to one another must be processed through the same Extract-Replicat pair. For example, process table1 and table2 — and any child tables — through one pair, and process table3 and table4 and their child tables through another.

- Refer to the Oracle GoldenGate *Windows and UNIX Reference Guide* for complete command and parameter syntax.
- For detailed instructions on configuring change synchronization, see Oracle GoldenGate *Windows and UNIX Administrator's Guide.*

To create the Extract groups

NOTE If needed, an Extract data-pump can be added to each Extract-Replicat pair.

1. On the source, use the ADD EXTRACT command to create the Extract groups, specifying TRANLOG as the data source.

```
ADD EXTRACT <group_1>, TRANLOG, BEGIN <time> [, THREADS <n>]
ADD EXTRACT <group_2>, TRANLOG, BEGIN <time> [, THREADS <n>]
```

2. On the source, use the ADD RMTTRAIL command to create a trail for each Extract group.

```
ADD RMTTRAIL <remote_trail_1>, EXTRACT <group_1>
ADD RMTTRAIL <remote_trail_2>, EXTRACT <group_2>
```

3. On the source, use the EDIT PARAMS command to create an Extract parameter file for each Extract group. Use the following required parameters plus any others that are appropriate for your database environment.

Extract group 1

```
EXTRACT <group_1>
[SOURCEDB <dsn>,][USERID <user>[, PASSWORD <pw> &
   [<encryption options>]]]
RMTHOST <hostname>, MGRPORT <portnumber>
RMTTRAIL <remote_trail_1>
TABLE <owner>.<table_group_1>;
```

Extract group 2

```
EXTRACT <group_2>
[SOURCEDB <dsn>,][USERID <user>[, PASSWORD <pw> &
   [<encryption options>]]]
RMTHOST <hostname>, MGRPORT <portnumber>
RMTTRAIL <remote_trail_2>
TABLE <owner>.<table_group_2>;
```

- Divide the source tables among the Extract groups by using the TABLE parameter in each parameter file. This example shows two Extract parameter files.
- You can use any number of TABLE statements for any given Extract group.
- Use the Extract parameter RMTTRAIL to link each Extract group to a different trail.

To create the Replicat groups

4. On the target, create a Replicat checkpoint table. For instructions, see the Oracle GoldenGate *Windows and UNIX Administrator's Guide*. All Replicat groups can use the same checkpoint table.
5. On the target, use the ADD REPLICAT command to create a Replicat group for each trail. Use the EXTTRAIL argument of that command to link the group to the trail.

```
ADD REPLICAT <group_1>, EXTTRAIL <remote_trail_1>, BEGIN <time>
ADD REPLICAT <group_2>, EXTTRAIL <remote_trail_2>, BEGIN <time>
```

6. On the target, use the EDIT PARAMS command to create a Replicat parameter file for each Replicat group. In each file, use the following required parameters plus any others that are appropriatge for your database environment.

Replicat group 1

```
REPLICAT <group_1>
{SOURCEDEFS <full_pathname>} | ASSUMETARGETDEFS
[TARGETDB <dsn>,][USERID <user>[, PASSWORD <pw> &
   [<encryption options>]]]
MAP <owner>.<table_group_1>, TARGET <owner>.<table_group_1>;
```

Replicat group 2

```
REPLICAT <group_2>
{SOURCEDEFS <full_pathname>} | ASSUMETARGETDEFS
[TARGETDB <dsn>,][USERID <user>[, PASSWORD <pw> &
   [<encryption options>]]]
MAP <owner>.<table_group_2>, TARGET <owner>.<table_group_2>;
```

- You can use any number of MAP statements for any given Replicat group. All MAP statements for a given Replicat group must specify the same objects that are contained in the trail that is linked to the group.

7. In the Manager parameter files on the source system and the target system, use the PURGEOLDEXTRACTS parameter to control the purging of files from the trails.

NOTE You can take this configuration a step further by dividing the rows of an individual table among multiple Extract or Replicat processes. This might be necessary, for example, when table1 receives one million inserts and updates per day, while the rest of the tables receive 100,000 or less. See "Splitting large tables into row ranges across process groups".

Splitting large tables into row ranges across process groups

Use the @RANGE function to divide the rows of any table across two or more Oracle GoldenGate processes. It can be used to increase the throughput of large and heavily accessed tables and also can be used to divide data into sets for distribution to different destinations. Specify each range in a FILTER clause in a TABLE or MAP statement.

@RANGE is safe and scalable. It preserves data integrity by guaranteeing that the same row will always be processed by the same process group.

It might be more efficient to use Extract to calculate the ranges than to use Replicat. To calculate ranges, Replicat must filter through the entire trail to find data that meets the range specification. However, your business case should determine where this filtering is performed.

Figure 3 Dividing rows of a table between two Extract groups

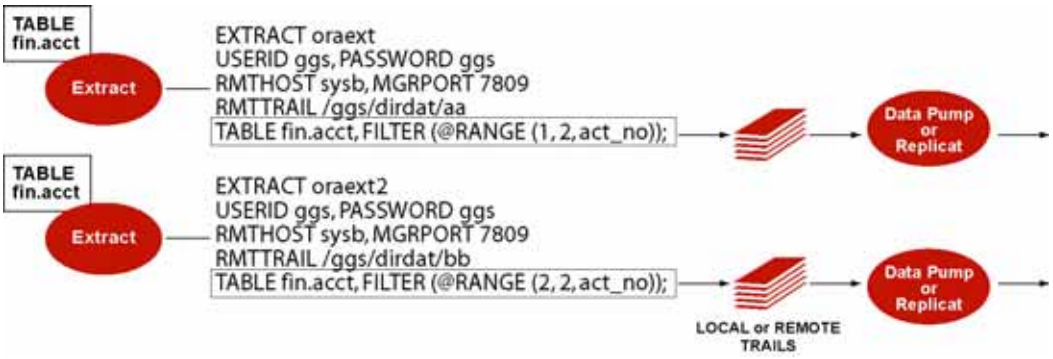
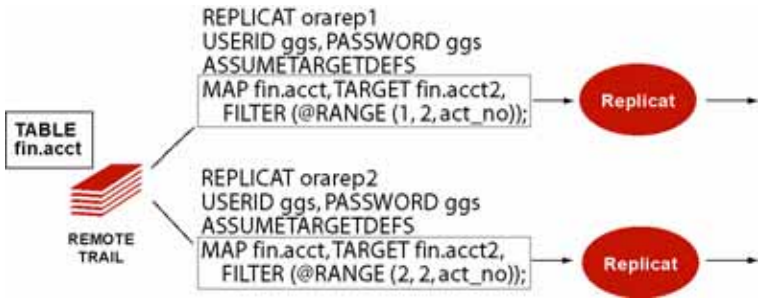


Figure 4 Dividing rows of a table between two Replicat groups



See the Oracle GoldenGate *Windows and UNIX Administrator's Guide* for more information about using parallel processing groups. Also see the Oracle GoldenGate installation guide for your database to see if there are any limitations that apply to how Oracle GoldenGate can be configured in your environment. For example, verify that the database can support multiple Oracle GoldenGate processes.

Tuning a data pump for pass-through efficiency

If a data pump is only being used to pass data from one process to another, without performing filtering, mapping, or conversion, configure it to run in pass-through mode. In this mode, the Extract process bypasses its normal queries for table definitions from the database or a definitions file and can even be used on a system that does not contain a database. To use pass-through mode, include the PASSTHRU parameter in the parameter file of the data pump.

Configuring Oracle GoldenGate to use the network efficiently

Inefficiencies in the transfer of data across the network can cause lag in the Extract process and latency on the target. If not corrected, it can eventually cause process failures.

When you first start a new Oracle GoldenGate configuration:

1. Establish benchmarks for what you consider to be acceptable lag and throughput volume for Extract and for Replicat. Keep in mind that Extract will normally be faster than Replicat because of the kind of tasks that each one performs. Over time you will know whether the difference is normal or one that requires tuning or troubleshooting.
2. Set a regular schedule to monitor those processes for lag and volume, as compared to the benchmarks. Look for lag that remains constant or is growing, as opposed to occasional spikes. Continuous, excess lag indicates a bottleneck somewhere in the Oracle GoldenGate configuration. It is a critical first indicator that Oracle GoldenGate needs tuning or that there is an error condition.

To view volume statistics

Syntax

```
STATS {EXTRACT | REPLICAT | ER} {<group | wildcard>}
[TABLE {<name | wildcard>}]
```

To view lag statistics

Use either the LAG or SEND command in GGSCI.

Syntax

```
LAG {EXTRACT | REPLICAT | ER} {<group | wildcard>}
```

Or...

Syntax

```
SEND {EXTRACT | REPLICAT} {<group | wildcard>}, GETLAG
```

To detect a network bottleneck

1. Issue the following command to view the ten most recent Extract checkpoints. If you are using a data-pump Extract on the source system, issue the command for the primary Extract and also for the data pump.

   ```
   INFO EXTRACT <group>, SHOWCH 10
   ```

2. Look for the Write Checkpoint statistic. This is the place where Extract is writing to the trail.

   ```
   Write Checkpoint #1

      GGS Log Trail

      Current Checkpoint (current write position):

         Sequence #: 2
         RBA: 2142224
         Timestamp: 2011-01-09 14:16:50.567638
         Extract Trail: ./dirdat/eh
   ```

3. For both the primary Extract and data pump:
   - Determine whether there are more than one or two checkpoints. There can be up to ten.
   - Find the Write Checkpoint <n> heading that has the highest increment number (for example, Write Checkpoint #8) and make a note of the Sequence, RBA, and Timestamp values. This is the most recent checkpoint.

4. Refer to the information that you noted, and make this validation:
   - Is the primary Extract generating a series of checkpoints, or just the initial checkpoint?
   - If a data pump is in use, is it generating a series of checkpoints, or just one?

5. Issue INFO EXTRACT for the primary and data pump Extract processes again.
   - Has the most recent write checkpoint increased? Look at the most recent Sequence, RBA, and Timestamp values to see if their values incremented forward since the previous INFO EXTRACT command.

6. Issue the following command to view the status of the Replicat process.

   ```
   SEND REPLICAT <group>, STATUS
   ```

- The status indicates whether Replicat is delaying (waiting for data to process), processing data, or at the end of the trail (EOF).

7. There is a network bottleneck if:

   You are only using a primary Extract and its write checkpoint is not increasing or is increasing too slowly. Because this Extract process is responsible for sending data across the network, it will eventually run out of memory to contain the backlog of extracted data and abend.

   Or...

   You are using a data pump, and its write checkpoint is not increasing, but the write checkpoint of the primary Extract is increasing. In this case, the primary Extract can write to its local trail, but the data pump cannot write to the remote trail. The data pump will abend when it runs out of memory to contain the backlog of extracted data. The primary Extract will run until it reaches the last file in the trail sequence and will abend because it cannot make a checkpoint.

   And...

   The status of Replicat is either in delay mode or at the end of the trail file. Even when there is a network outage, Replicat will process in a normal manner until it applies all of the remaining data from the trail to the target. Eventually, it will report that it reached the end of the trail file.

To get more network bandwidth

Use parallel data pumps to overcome any per-process bandwidth limitations of your network. Data pumps also remove TCP/IP responsibilities from the primary Extract, and their local trails provide fault tolerance. For more information, see the Oracle GoldenGate *Windows and UNIX Administrator's Guide*.

To reduce bandwidth requirements

Use the compression options of the RMTHOST parameter to compress data before it is sent across the network. Weigh the benefits of compression against the CPU resources that are required to perform the compression.

To increase the TCP/IP packet size

Use the TCPBUFSIZE option of the RMTHOST parameter to increase the size of the TCP socket buffer that Extract maintains. By increasing the size of the buffer, you can send larger packets to the target system.

Eliminating disk I/O bottlenecks

I/O activity can cause throughput bottlenecks for both Extract and Replicat.

- A regular Extract generates disk writes to a trail and disk reads from a data source.
- A data pump and Replicat generate disk reads from a local trail.
- Each process writes a recovery checkpoint to its checkpoint file on a regular schedule.

To improve I/O within the system configuration

Look for I/O waits on the disk subsystems that contain the trail files. Put the trails on the fastest disk controller possible.

Check the RAID configuration. Because Oracle GoldenGate writes data sequentially, RAID 0+1 (striping and mirroring) is a better choice than RAID 5, which uses checksums that slow down I/O and are not necessary for these types of files.

To improve I/O within the Oracle GoldenGate configuration

Try increasing the values of the following parameters:

Use the CHECKPOINTSECS parameter to control how often Extract and Replicat make their routine checkpoints.

Use the GROUPTRANSOPS parameter to control the number of SQL operations that are contained in a Replicat transaction when operating in its normal mode. Increasing the number of operations in a Replicat transaction improves the performance of Oracle GoldenGate by:

- Reducing the number of transactions executed by Replicat.
- Reducing I/O activity to the checkpoint file and the checkpoint table, if used. Replicat issues a checkpoint whenever it applies a transaction to the target, in addition to its scheduled checkpoints.

Use the EOFDELAY or EOFDELAYCSECS parameter to control how often Extract, a data pump, or Replicat checks for new data after it has reached the end of the current data in its data source. You can reduce the system I/O overhead of these reads by increasing the value of this parameter.

NOTE Increasing the values of these parameters will improve performance, but it also increases the amount of data that must be reprocessed if the process fails. This has an effect on overall latency between source and target. Some testing will help you determine the optimal balance between recovery and performance.

Optimizing data filtering and conversion

Data filtering and data conversion both add overhead, and these activities are sometimes prone to configuration errors. The following are suggestions for minimizing the impact of this overhead on the other processes on the system.

- Avoid using the primary Extract to filter and convert data. Keep it dedicated to data capture. It will perform better and is less vulnerable to any process failures that result from those activities.
- Use Replicat or a data-pump to perform filtering and conversion. Consider any of the following configurations:
  - Use a data pump on the source if the system can tolerate the overhead. This configuration works well when there is a high volume of data to be filtered, because it uses less network bandwidth. Only filtered data gets sent to the target, which also can help with security considerations.

    - Use a data pump on an intermediate system. This configuration keeps the source and target systems free of the overhead, but uses more network bandwidth because unfiltered data is sent from the source.
    - Use a data pump or Replicat on the target if the system can tolerate the overhead, and if there is adequate network bandwidth for sending large amounts of unfiltered data.
- Consider using parallel data pumps or parallel Replicat processes to balance the load of filtering and conversion. Parallel processes work well when sending data to different target systems, because you can dedicate one or more pumps to each target. Keep tables that have relational constraints to each other in the same process group.
- If you have limited system resources, a least-best option is to divide the filtering and conversion work between Extract and Replicat.

For more information about configuring processes, see the Oracle GoldenGate *Windows and UNIX Administrator's Guide.*

Applying similar SQL statements in arrays

Use the BATCHSQL parameter to increase the performance of Replicat. BATCHSQL causes Replicat to organize similar SQL statements into arrays and apply them at an accelerated rate. In its normal mode, Replicat applies one SQL statement at a time.

When Replicat is in BATCHSQL mode, smaller row changes will show a higher gain in performance than larger row changes. At 100 bytes of data per row change, BATCHSQL has been known to improve the performance of Replicat by up to 300 percent, but actual performance benefits will vary, depending on the mix of operations. At around 5,000 bytes of data per row change, the benefits of using BATCHSQL diminish.

Preventing full table scans in the absence of keys

If a target table does not have a primary key, a unique key, or a unique index, Replicat uses all of the columns to build its WHERE clause. This is, essentially, a full table scan. Use a KEYCOLS clause in the TABLE and MAP statements to specify one or more columns for Replicat to use as a key. The columns must contain unique values. On the target system, create an index on those columns.

```
TABLE <source_table>, KEYCOLS (<column> [, <column>, <column>, ...]);
```

and...

```
MAP <source_table>, TARGET <target_table>, KEYCOLS (<column>
[, <column>, <column>, ...]);
```

Example

```
TABLE hr.emp, KEYCOLS (FIRST_NAME, LAST_NAME, DOB, ID_NO);
MAP hr.emp, TARGET hr.emp2, KEYCOLS (FIRST_NAME, LAST_NAME, DOB, ID_NO);
```

Splitting large transactions

If the target database cannot handle large transactions from the source database, you can split them into a series of smaller ones by using the Replicat parameter MAXTRANSOPS.

Tuning Replicat transactions

Replicat uses regular SQL, so its performance to some degree depends on the performance of the target database and the type of SQL that is being applied (inserts, versus updates or deletes). However, you can take the following steps to maximize Replicat efficiency.

Adjust open cursors

The Replicat process maintains cursors for cached SQL statements and for SQLEXEC operations. Without enough cursors, Replicat must age more statements. By default, Replicat maintains as many cursors as allowed by the MAXSQLSTATEMENTS parameter. You might find that the value of this parameter needs to be increased. If so, you might also need to adjust the maximum number of open cursors that are permitted by the database.

Improve update speed

Excessive block fragmentation causes Replicat to apply SQL statements at a slower than normal speed. Reorganize heavily fragmented tables, and then stop and start Replicat to register the new object ID.

Ensure effective execution plans

Stale database statistics can reduce the performance of Replicat as it adds rows to tables. Generate new statistics to ensure the use of appropriate execution plans.

Set a Replicat transaction timeout

Use the TRANSACTIONTIMEOUT parameter to prevent an uncommitted Replicat target transaction from holding locks on the target database and consuming its resources unnecessarily. You can change the value of this parameter so that Replicat can work within existing application timeouts and other database requirements on the target.

TRANSACTIONTIMEOUT limits the amount of time that Replicat will hold a target transaction open if it has not received the end-of-transaction record for the last source transaction in that transaction. By default, Replicat groups multiple source transactions into one target transaction to improve performance, but it will not commit a partial source transaction and will wait indefinitely for that last record. The Replicat parameter GROUPTRANSOPS controls the minimum size of a grouped target transaction.

The following events could last long enough to trigger TRANSACTIONTIMEOUT:

- Network problems prevent trail data from being delivered to the target system.
- Running out of disk space on any system, preventing trail data from being written.
- Collector abends (a rare event).
- Extract abends or is terminated in the middle of writing records for a transaction.
- An Extract data pump abends or is terminated.
- There is a source system failure, such as a power outage or system crash.

CHAPTER 3

Troubleshooting Oracle GoldenGate

Overview of Oracle GoldenGate troubleshooting

One of the challenges of solving problems in a replication environment is in deciding which component of the environment is at the root of the problem:

- the system or network?
- the database or applications?
- the Oracle GoldenGate installation?
- a specific Oracle GoldenGate process?
- the way that Oracle GoldenGate is configured?
- SQL or procedures?

The Oracle GoldenGate troubleshooting documentation provides help with many common issues that can arise during Oracle GoldenGate startup and the processing of data. You can find help for other known issues and frequently asked questions by going to My Oracle Support at http://support.oracle.com and viewing the Knowledge Base. For more information, see “Finding help with Oracle GoldenGate in My Oracle Support” on page 17. Troubleshooting tools described in this chapter are documented in Chapter 1.

Important: The more invasive of the troubleshooting solutions, such as those affecting data records and processing continuity, should be performed by individuals who have authority to resolve problems and who understand the Oracle GoldenGate components, configuration structure, and processing methodology. Less experienced users should undertake such solutions in conjunction with help from support staff or a more experienced user.

Troubleshooting example

Here is a simple example of how you can use GGSCI commands and the error log to determine why a process (in this case Extract group ggext) failed.

1. The STATUS EXTRACT command returns the following:

```
GGSCI (sysa) 20> status extract ggext
EXTRACT GGEXT: ABENDED
```

2. Viewing the error log with VIEW GGSEVT shows the following:

```
GGSCI (sysa) 22> view ggsevt
2011-01-20 16:38:14  GGS INFO    399  GoldenGate Command Interpreter for
Oracle:  GGSCI command (admin): start extract ggext.
2011-01-20 16:38:15  GGS INFO     301  GoldenGate Manager for Oracle,
mgr.prm:  Command received from GGSCI on host 100.000.000.000 (START
EXTRACT GGEXT).
2011-01-20 16:38:15  GGS INFO     310  GoldenGate Capture for Oracle,
ggext.prm:  EXTRACT GGEXT starting.
2011-01-20 16:38:17  GGS ERROR    501  GoldenGate Capture for Oracle,
ggext.prm:  Extract read, error 13 (Permission denied) opening redo log
/newrdbms/oracle/ora920/arch/0001_0000000758.arc for sequence 758.
2011-01-20 16:38:17  GGS ERROR    190  GoldenGate Capture for Oracle,
ggext.prm:  PROCESS ABENDING.
```

   The error message 501 indicates the Extract user does not have permission to read the redo logs.

Solution: Contact the system administrator to grant the user running the extract program read permission on those files. Then do the following:

1. Stop Manager.
2. Exit GGSCI.
3. Exit the terminal session.
4. Start the processes again from a new session.

Troubleshooting process startup failures

When a process fails, view the process report and the error log. Check for the following conditions.

Configuration problems that cause startup failure

✔ Was the correct Oracle GoldenGate build installed?

- Oracle GoldenGate provides a unique build of the software for each type and version of the operating systems and databases that it supports. The build name contains the operating system version, database version, Oracle GoldenGate release number, and Oracle GoldenGate build number, as shown in the following example:

  ```
  Oracle GoldenGate V11.2.1.x for Oracle 11g on RedHat 3.0 IA64
  ```

- To find out the Oracle GoldenGate build and version that is installed, go to the Oracle GoldenGate home directory and issue the following command from the operating system:

  ```
  ggsci -v
  ```

- ✔ Did you use the CHECKPARAMS parameter and forget to remove it?
  - This parameter causes the process to stop after it verifies parameter syntax.
  - View the process report for syntax errors, fix them, and then remove CHECKPARAMS.
- ✔ Is the database running? Is Manager running?
  - Both must be running before starting process groups.
- ✔ Does the process group that you are trying to start exist?
  - Use INFO ALL to view all processes and groups on the system. Maybe there was a spelling error when the group was created or when the START command was issued.
- ✔ Does a trail or extract file exist?
  - If not, Extract cannot write its initial checkpoint, and Replicat has no data source to read.
  - Use INFO EXTRACT <group> or INFO REPLICAT <group> with the DETAIL option to see if a trail or file exists.
- ✔ Are parameter files in the correct place?
  - Check for the GLOBALS file (if being used) in the root Oracle GoldenGate installation directory. It should not have a file extension.
  - Check for the Manager parameter file and any other parameter files in the Oracle GoldenGate dirprm sub-directory. The Manager file must be named MGR.prm, and all other parameter files should have the name of the associated process group.
  - If a parameter file is not there, did you store it elsewhere? Use the INFO EXTRACT <group>, DETAIL command to see where else it might be. To store a parameter file elsewhere (not recommended), use the PARAMS argument with ADD EXTRACT or ALTER EXTRACT.
- ✔ Is the parameter file accessible?
  - Check the permissions for the system user assigned to the process. Grant read permission, if needed.
- ✔ Are all required parameters present?
  - Requirements vary by database and configuration. Review the requirements for your database in the Oracle GoldenGate *Windows and UNIX Administrator's Guide* and in the Oracle GoldenGate installation guide that is specific to the database type.
- ✔ Is parameter syntax correct?
  - Oracle GoldenGate reports syntax problems in the process report, usually as a “bad parameter” error.
  - Use the CHECKPARAMS parameter to verify syntax. It verifies syntax when the process starts, writes results to the report file, and then stops the process. After using CHECKPARAMS, remove it or comment it out; otherwise the process will stop again.

- Common syntax errors:
  - TABLE or MAP not terminated with a semi-colon.
  - Comma not followed by a space.
  - Missing commas, quotes, or parentheses in nested clauses, such as a COLMAP.
- See the Oracle GoldenGate *Windows and UNIX Reference Guide* for complete parameter syntax information.

✔ Are parameters listed in logical order?

- Parameters are processed in the order listed; some must precede others.
- Parameter ordering examples:

  RMTHOST must precede RMTTRAIL: A host name must be qualified before a file name can be qualified.

  SOURCEDB or TARGETDB and USERID must precede TABLE: Oracle GoldenGate must log into the database before it can process table information.

  TABLE or MAP must be listed after global and specific parameters that apply to it.

Operating system issues that cause startup failure

✔ Do the Oracle GoldenGate interfaces show that Manager is not running after a START MANAGER command?

- This can occur on systems that have slow process startup times or that have heavy loads. It is a function of the way in which GGSCI determines whether Manager is running or not. GGSCI starts Manager and then immediately checks for a file lock on the Manager process file to determine whether the process started. If Manager was not able to complete enough of its initialization to lock the process file, GGSCI reports the process as not running.
- Issue the INFO MANAGER command in GGSCI a few times until it shows the "Running" status. Alternatively, you can get the actual process status by using the ps command (UNIX/Linux), tasklist (Windows), or similar commands that are available through the local operating system.

✔ Did Oracle GoldenGate return message OGG-01761 when Manager was restarted?

- OGG-01761 occurs on operating systems that use System V semaphores. It usually indicates that the semaphore allocated by Manager was deleted manually from the command line of the operating system. The message occurs when attempting to restart Manager.
- Stop all Extract and Replicat processes, and then start Manager.

✔ Does the error report a missing UNIX library?

- Issue the env command and make sure LD_LIBRARY_PATH and PATH are correct.
- Set the paths correctly in the .profile startup file in the Oracle GoldenGate home directory.

- ✔ Does the error request the function stack to be increased?
    - The memory that stores arguments supplied to and from Oracle GoldenGate functions has been exceeded.
    - To increase the memory allocated, use the FUNCTIONSTACKSIZE parameter. This parameter can adversely affect the performance of Oracle GoldenGate.
- ✔ Are there file-access errors?
    - Extract and Replicat users require the following permissions:
        - read and write for files in the Oracle GoldenGate directory.
        - read for the transaction and archive logs.
- ✔ Is the error "Bad parameter: Group name invalid"?
    - The process cannot open the checkpoint file.
    - Issue INFO * in GGSCI to view the group name, then issue VIEW PARAMS <group>. Make sure the group name from INFO * matches the one in the EXTRACT or REPLICAT parameter.
    - Check the file permissions.
    - On NonStop systems, look for access problems related to Safeguard and Enform reports.

Database errors that cause statup failure

- ✔ Is the database running?
- ✔ Was a database user created for the process and does it have the correct permissions?
    - For many database types, Extract and Replicat require a database user with certain permissions. See the Oracle GoldenGate installation guide that is specific for your database type.
- ✔ If a data source name is required as part of the login, is it specified with SOURCEDB or TARGETDB?
- ✔ If database authentication is required, are the correct database user and password specified with the USERID and PASSWORD parameters?
    - Connect to the database through its native interface by using the same user and password that is contained in the parameter file of the failed process. The login that a process uses is specified with the USERID and PASSWORD parameters. Connecting from outside Oracle GoldenGate helps to identify whether the authentication itself is valid.
    - If you cannot connect from outside Oracle GoldenGate, check the database configuration to make certain the user and password are still valid. Perhaps a change was made to the user or password.
    - After you identify the correct login, update the USERID and PASSWORD parameters in the parameter file.

WARNING Do not use the VIEW PARAMS or EDIT PARAMS command to view or edit a parameter file that was created in a character set other than that of the local operating system (such as one where the CHARSET option was used to specify a different character set). View the file from outside GGSCI; otherwise, the contents may become corrupted..

- Stop and start the process.
- (Oracle) If database passwords change frequently, you can specify operating-system authentication with the / option of the USERID parameter.

✔ (Oracle) Are the ORACLE_SID and ORACLE_HOME system variables set to the correct instance name in the Oracle GoldenGate user profile?

- To check Oracle environment variables, use:

  ```
  env | grep ORA
  ```

  This filters out all the other information that would be shown if you were to use the basic env command.

Troubleshooting slow startup

✔ Are wildcards being used for table names?

- Make certain that the WILDCARDRESOLVE parameter is set to the default of DYNAMIC, so that tables satisfying wildcard definitions are resolved whenever the wildcard rule is satisfied, instead of all at once at startup.

✔ Is Extract operating in archived log only (ALO) mode?

- Did you create the group with the BEGIN NOW option of the ADD EXTRACT command? If an Extract is created that way and also configured for ALO mode, the Extract might not capture data immediately upon startup. The start time of "NOW" corresponds to the time of the current *online* redo log, but an ALO Extract cannot read the online logs, so it waits for that log to be archived when Oracle switches logs. The timing of the switch depends on the size of the redo logs and the volume of database activity. This can happen in both regular and RAC database configurations.
- On RAC systems this effect is compounded by the fact that Extract needs to read data from all RAC instances before it can proceed. Extract will wait for Oracle to archive all of the online logs that correspond to the NOW time.
- To force capture to begin sooner, you can switch the logs manually with the following command:

  ```
  ALTER SYSTEM SWITCH LOGFILE
  ```

Troubleshooting Extract problems

Extract stalls or abends during recovery

(All databases except Oracle)

After Extract abends, it might appear to be stalled when it is restarted, or it might abend again. This is probably caused by a long-running transaction that was open at the time of

the failure.

Extract does not write open transactions to the trail until the applications commit them. Until the commits are received, Extract keeps track of these transactions in memory, including the data, and maintains a checkpoint in the log that contains the start point of the oldest transaction. If Extract abends, it reads that checkpoint when it starts again, and then it searches for the log that contains the start of the oldest open transaction (at the time of failure). The following can cause Extract to be slow or abend during recovery:

- If the log cannot be found, Extract waits and eventually abends with an error. This situation is likely to occur in a high-volume setting, where the logs age quickly and must be removed from the system frequently to conserve disk space.
- If Extract finds the log, and if the oldest open transaction (at the time of failure) goes a long way back in time, Extract must read through a large volume of log records from that point in time to restore the lost data. This work causes Extract to appear frozen.

To find out whether a prolonged recovery is the cause of an Extract slowdown, use the SEND EXTRACT command with the STATUS option. If one of the following messages is displayed on the Current status line, this indicates that recovery is in progress (or being completed) and that Extract is operating normally:

- In recovery[1] – Extract is recovering to its input checkpoint.
- In recovery[2] – Extract is recovering to its output checkpoint.
- Recovery complete – The recovery is finished, and normal processing will resume.

Oracle databases

For Oracle source databases, Extract starts quickly after a failure. The data for any long-running transactions that existed at the time of failure can be retrieved from persistence files on disk as needed. The following parameters are available to control long-running transactions, if needed.

Use the WARNLONGTRANS parameter to specify a length of time that a transaction can be open before Extract generates a warning message that the transaction is long-running. Also use WARNLONGTRANS to control the frequency with which Oracle GoldenGate checks for long-running transactions.

Use the SHOWTRANS, SKIPTRANS, and FORCETRANS options of the SEND EXTRACT command to view open transactions, to remove any transaction from the Extract memory structure, or to force any transaction to be written to the trail as a committed transaction.

Extract is too slow

This section covers possible acute causes of slow extraction processing. For other things that affect the speed of extraction, and their solutions, see “Tuning the Performance of Oracle GoldenGate” on page 19.

✔ Is tracing enabled?

- Check the parameter file for TLTRACE (now deprecated, but may still exist from a previous version) and TRACE. Tracing slows down Extract.
- Disable those parameters unless required by a support case.

- ✔ Is there is a problem with the transfer of data across the network?
    - See "To detect a network bottleneck" on page 28 for instructions that help you detect whether a network problem is affecting Oracle GoldenGate.
    - Work with your network administrator to resolve network problems as soon as possible. If Extract lags too far behind the speed at which transaction logs are created, latency on the target will increase to an intolerable level, and Extract could eventually lose access to data that it still needs if the archives are moved off the system. Major network delays can also cause eventual process failure.
    - If the network is functional, check to see if the per-process bandwidth has been used up for the Extract process. You might need to split the data load among some data pumps to gain more bandwidth. The use of data pumps also reduces the chance of process failures and data loss if the network fails intermittently. To configure data pumps, see the Oracle GoldenGate *Windows and UNIX Administrator's Guide.*
- ✔ Are there numerous columns in the tables?
    - The more columns that are changed in a table, the longer it takes for Extract to process them. This is normal and cannot be avoided. You can isolate tables like this that cause slowdowns by using parallel processes. See page 20 for more information.
- ✔ Is Extract waiting for a transaction log?
    - (This applies to all databases except Oracle) Extract waits if it cannot find the transaction log that it needs, which means it probably was archived off the system or was moved to a location that is unknown to Oracle GoldenGate. This can happen if there is high Extract lag and the archives are moved off the system.

      NOTE This could take hours or days of searching, and Extract will eventually abend if it cannot locate the log.

    - To determine which log is needed, use the VIEW REPORT <group> command. Restore that log to the directory where it was before, and also restore subsequent ones until Extract is finished with them.
    - (Oracle) If Oracle archives are not stored in Oracle's default location, use the Extract parameter ALTARCHIVELOGDEST <path name> to specify the alternate location.
    - If the transaction logs that Oracle GoldenGate requires are no longer available, resynchronize the source and target data. See "Resynchronizing an out-of-sync table" on page 51.
- ✔ See also "Extract stalls or pauses".

Extract stalls or pauses

- ✔ Is this an Oracle RAC system, and does Extract pause across all RAC nodes?
    - On RAC, if an Extract thread reaches the end of a node's last archived log, and the next log is not immediately available, the entire Extract process will stop, even though other Extract threads have archive logs available. This is to maintain transactional integrity. ALO mode does not provide enough information for Extract to determine if

there is other, older transaction data somewhere that must be processed before it processes the data captured by the other threads.

✔ Is this an Oracle RAC system, and did one of the instances fail?

- If one or more of the RAC instances fails, archive log generation will stop for those instances. In this situation, an Extract operating in ALO mode will stop. To allow Extract to continue, set the THREADOPTIONS paramter with the PROCESSTHREADS {SELECT | EXCEPT} option to skip processing on the failed nodes. This is an undocumented parameter. Please contact Oracle Support before using this parameter. For more information, go to http://support.oracle.com.

Extract abends

✔ Is Extract unable to open the transaction logs?

- Check to see if the disk is full.
- Verify that the Extract user has read permissions on the log files.

  If you have to grant permissions, do the following afterward:

  1. Stop Manager.
  2. Exit GGSCI.
  3. Close the terminal session.
  4. Start processes again from a new session.

✔ Is an archived transaction log missing?

- Extract reads the archived logs when an online log is not available. If you started Extract after it was stopped for a long time, the records it needs to process might already be archived away.
- Restore the archive log that is specified in the error message in the report file, and also restore all subsequent logs.

  NOTE Extract should not be stopped for a long time. If you must stop Extract, make certain that archives are available all the way back to the time that you stopped Extract. If Extract remains stopped for an exceptionally long time, it might be more practical to resynchronize the table(s) rather than wait for Extract to go through the archives and catch up.

✔ Does the message state that an Oracle redo log has missing trailing blocks?

```
Online log /rdbms2/oracle/ora1012i/64/oradata/ora1012a/redo02.log on
sequence# 2887 has missing trailing blocks.
```

- This message means that Extract has detected missing trailing blocks from the online log and is trying to switch to the archived log. If the archived log cannot be found, Extract will abend. Restore the archived log that is shown in the error message, plus any other archived logs that were generated after that one, and then restart Extract.

  NOTE You might see this message even though Extract did not abend. This means that the switch was successful.

- ✔ Can the source system communicate with the target?
  - To check, use the ping shell command:

    ```
    ping <host name>
    ```

    The following shell command displays the network routing table:

    ```
    netstat -r
    ```

- ✔ Does Extract return “connection-refused” errors?
  - A typical TCP/IP error is “4127 connection refused.” It indicates that the target Manager or Collector process is not running, or that Extract is pointing to the wrong TCP/IP address or Manager port number.
  - On the target, use INFO MGR in GGSCI to view the port number that is specified for the target Manager.
  - On the source, check the Extract parameter RMTHOST for the following:
  - Verify that MGRPORT is the same as the port shown by INFO MGR.
  - If a host name was given for RMTHOST, make sure the domain name server (DNS) can resolve it. If an IP address was used, verify that it is correct. To verify an IP address, use the following commands from the OS command shell:

    UNIX:

    ```
    ifconfig
    ```

    Windows:

    ```
    ipconfig
    ```

  - Connection errors can indicate Collector security violations, a full file system, or errors relating to the system or to the Oracle GoldenGate configuration. Use VIEW GGSEVT to check for those errors.

- ✔ Does Extract return the error “No Dynamic ports available”?
  - The target Collector was unable to obtain a port on which to communicate with the source Manager. Collector looks for a port in the list specified with the DYNAMICPORTLIST parameter in the Manager parameter file or, if that parameter is not in use, the next available port higher than the one Manager is running on, as specified with the PORT parameter.
  - If you are using DYNAMICPORTLIST, it is possible that there are not enough numbers to use, or that the numbers are being used by an active or orphan process. Try adding some port numbers to the list. Or, contact your systems administrator to find out which ports can be used.
  - If you are using Oracle GoldenGate Director to connect to the target server, you might need to increase the number of ports in your dynamic port list, because Director uses ports from the dynamic port list.

- ✔ Are you trying to use a data pump in pass-through mode?
  - If you are using the PASSTHRU parameter for the data pump, but are trying to use data filtering, conversion, or other manipulation, this configuration will not work. In pass-

through mode, the source and target table names and structures must be identical, and no filtering or manipulation can be done to the data.

- Does the parameter file that includes PASSTHRU also include USERID or SOURCEDB parameters? If the system does not have a database, these parameters should not be used.
- Are you trying to combine pass-through for some tables with normal processing for other tables? For the tables being processed normally, the system must have a database. The database login parameters of SOURCEDB and USERID must be used, and a source definitions file must be used if filtering is to be performed. A target definitions file must be used if column mapping or conversion is to be done.

✔ Is the error for a Sybase source that states “Failed to reserve LTM context”?

- Check to see what other processes are using the LTM. Extract uses the LTM to read the transaction log, and only one process at a time can reserve a context. Therefore, no other Extract or RepServer processes can be run against the same database. Errors similar to the following in the error log indicate that some other process is running.

```
2011-01-18 22:54:01  GGS INFO     631  SYBLTM - Server message:.
2011-01-18 22:54:01  GGS INFO    631  number(9121) severity(16) state(2)
line(1).
2011-01-18 22:54:01  GGS INFO     631   Server name: SysA.
2011-01-18 22:54:01  GGS INFO    631   The log transfer context for the
current database is already reserved by SQL Server process 16.  The log
transfer context for the current database is not reserved.
2011-01-18 22:54:01  GGS ERROR    630  Failed to reserve LTM context
during log reader initialization.
2011-01-18 22:54:01  GGS ERROR    190  PROCESS ABENDING.
```

✔ Is the database DB2 For LUW?

- Is the database configured to retain the logs? Either USEREXIT or LOGRETAIN must be enabled.
- Is the DB2 parameter OVERFLOWLOGPATH set to the archive log directory? This enables Oracle GoldenGate to get archived data stored in a non-default location.
- Are you using wildcards to specify tables? Check to see if DATA CAPTURE CHANGES was specified for all of the tables that satisfy the wildcard conditions. If not, use the TRANLOGOPTIONS parameter with the IGNOREDATACAPTURECHANGES option. This configuration directs Extract to ignore tables for which change capture is not enabled. A warning will be issued to the error log that those tables were skipped.
- Have columns been added with the ALTER command to a table that is already in the DB2 LUW configuration? And, have any of those columns been defined as key columns? If so, check to see if there were updates on those columns. A primary key update requires a before image for Oracle GoldenGate to compare to the after image, but the DB2 API used by Oracle GoldenGate does not provide the before image for the added columns. This will cause Extract to abend. Columns added to existing tables cannot be part of a key in the data definitions or as part of a KEYCOLS clause in the Oracle GoldenGate parameters TABLE or MAP.

- Is the error similar to the following example? If so, Extract does not have the correct permissions to read the catalog tables and log files.

  ```
  [SC=-1224:SQL1224N A database agent could not be started to service a
  request, or was terminated as a result of a database system shutdown or
  a force command. SQL STATE 55032: The CONNECT statement is invalid,
  because the database manager was stopped after this application was
  started].
  ```

✔ Is the database DB2 For z/OS?

- Are the correct permissions set? The API (which is named IFI IFCID 306) requires Extract to call the API in Supervisor State with Storage Key 0 and allocate a return area in Extended Common Storage Area (ECSA) memory subpool 241 with Storage Key 7. For more information about required privileges, see the installation guide for the DB2 for z/OS database.

✔ Does Extract return an error on LOB length when extracting from a SQL Server 2005 source?

```
Msg 7139, Level 16, State 1, Line 1
Length of LOB data (<n_bytes>) to be replicated exceeds configured
maximum 65536.
The statement has been terminated.
```

- This means that the data for LOB or VARCHAR (MAX) columns exceeds the SQL Server default size.
- To resolve this issue, extend the maximum data size with the 'max text repl size' parameter by using sp_configure. For example:

  ```
  'max text repl size', '2147483647'
  ```

  Use sp_configure to find the current default value of 'max text repl size'.

Troubleshooting Replicat problems

Replicat is too slow

✔ Is there consistent latency in the target data?

- Is the DEFERAPPLYINTERVAL being used in the Replicat parameter file? To find out, you can examine the parameter file or use the following GGSCI command and look for a status of "Waiting on deferred apply."

  ```
  SEND REPLICAT <group> STATUS
  ```

- This parameter causes an intentional, specific delay in the timing of Replicat's transactions. Replicat will always wait for the specified amount of time after reading data from the trail, before applying that data to the target table.

- If your target applications do not require this delay, you can remove DEFERAPPLYINTERVAL. You must stop Replicat and then start it again for the change to take effect.

✔ Does Replicat appear stalled?

- Issue the following command in GGSCI a few times to see whether or not the checkpoint is moving.

  ```
  INFO REPLICAT <group>, SHOWCH
  ```

- Look for the Read checkpoint. If the number of Read checkpoints is not increasing, Replicat is stalled.

  Do the following:

  1. Note the trail name that Replicat is reading from, as shown with INFO REPLICAT.
  2. Issue INFO EXTRACT <group>. Note the trail name that Extract is writing to.
  3. Make certain that Replicat is reading the same trail that Extract is writing to. If not, issue ALTER REPLICAT <group>, EXTTRAIL <trail> to specify the correct trail.
  4. Issue INFO RMTTRAIL * (or INFO EXTTRAIL * if local) and make sure the trail was created. Create the trail, if necessary, with the following command:

     ```
     ADD {EXTTRAIL | RMTTRAIL} <trail>, EXTRACT <group>.
     ```

  5. Make certain that the RMTTRAIL or EXTTRAIL Extract parameter is also set to the correct trail name.

  ○ If the checkpoint is moving, Replicat is processing data, and other issues are causing the slowdown. See “Tuning the Performance of Oracle GoldenGate” on page 19 for conditions that might be affecting Replicat's performance.

✔ Is Replicat holding locks on target objects?

- Problems with the network, loss of disk space, process failures, and system failures all can interrupt the transfer of source operations to the trail. If Replicat cannot commit its current transaction because it is waiting for the rest of the last source transaction in the transaction group to arrive, the lock will be held indefinitely.
- If you continue to see that Replicat is holding locks, and you cannot resolve the reasons that are delaying source transactions, consider using the Replicat TRANSACTIONTIMEOUT parameter to allow Replicat to handle the condition.

Replicat abends

✔ Are there checkpoint table errors?

- Depending on the problem, these errors can appear as the following:

  ```
  GGS ERROR 516 Extract read, No data found selecting position from
  checkpoint table HR.REPCHECK for group REPORA, key 1181389907
  (0x4669453).
  ```

  Or...

```
2011-01-25 13:22:16 GGS ERROR 516 Extract read, Checkpoint table
HR.REPCHECK does not exist.  Please create the table or recreate the
REPORA group using the correct table.
```

- The checkpoint table may be corrupted, deleted, or missing a row. Do the following:

  1. Issue INFO REPLICAT <group> to verify that the checkpoint file on disk is intact. If the command fails, the file is missing or corrupt. If the file is intact, continue with these steps.
  2. If the table was deleted, recreate it with same schema and name as before. If the table is corrupt or missing a row, truncate it.
  3. Start Replicat.
  4. SELECT from the checkpoint table to verify that checkpoints are being added again.
  5. If this procedure fails, contact Oracle Support for assistance.

✔ Is Replicat unable to locate a trail?

- Do the following:

  1. Issue the following command, and record the trail name to which Extract is writing.
     ```
     INFO EXTRACT <group>
     ```
  2. Issue the following command to see if the trail was created.
     ```
     INFO {RMTTRAIL | EXTTRAIL} *
     ```
  3. Create the trail, if necessary, with the following command.
     ```
     ADD {EXTTRAIL | RMTTRAIL} <trail>, EXTRACT <group>
     ```
  4. Issue the following command to link that trail to the Replicat process.
     ```
     ALTER REPLICAT <group>, EXTTRAIL <trail>
     ```
  5. Make certain that the RMTTRAIL or EXTTRAIL Extract parameter is also set to the correct trail name.

✔ Is Replicat unable to open a trail file?

- Verify that the Replicat user has read and write permissions on trail files.

✔ Are you using trail encryption?

- If you specified ENCRYPTTRAIL for Extract, make certain that DECRYPTTRAIL is specified for Replicat. Otherwise, Replicat will return error 160. The encrypted data will be interpreted as a bad record.

✔ Are Replicat's transactions large?

- If the target cannot handle large transactions, Replicat will abend with a memory error.
- Try using the MAXTRANSOPS parameter to split Replicat's transactions into smaller ones.

- ✔ Have source definitions changed?
  - For example, were columns added to a source table?
  - If so, did you create a new source-definitions file for that table? Use DEFGEN and then transfer the new file to the target.
- ✔ Are you replicating LOBS to a Sybase target?
  - Are you moving a LOB to a Sybase CHAR, VARCHAR, BINARY, or VARBINARY column? If so, the size of the LOB must be smaller than, or equal to, the size of the target column. You can set Replicat to truncate the LOB and post it without error by using the DBOPTIONS parameter with the ALLOWLOBDATATRUNCATE option in the Replicat parameter file.
  - Are you replicating empty source LOB columns to a Sybase target? Replicat converts empty LOB columns to NULL, but Sybase does not permit null LOB columns. Use the DBOPTIONS parameter with the EMPTYLOBSTRING option to substitute a string value in place of NULL so that the operation is accepted.
- ✔ Did Replicat return an "incompatible record" error (error 509)?
  - Does the error read like this?

    ```
    "2011-01-27 15:45:22 GGS ERROR 509 GoldenGate Delivery for Oracle,
    ORAREP.prm: Extract read, Incompatible record in
    C:\GOLDENGATE802\DIRDAT\JD000000, rba 5287 (getting header)."
    ```

  - Either the data is corrupted or written in a format other than the Oracle GoldenGate internal canonical format. The following are the recommended steps to take.

    First step

    Did you recently run an initial load? See if FORMATASCII was used for Extract during the load. Other Extract parameters to look for are FORMATSQL and FORMATXML. All of these parameters write data in a format that is incompatible with Replicat.

    Next step

    Is Extract configured to write over a trail that was used by an old process? Or, are two Extract processes configured to write to the same trail? Possible causes of these problems are:

    - A previously active group was dropped and recreated to link to the same trail name as before. This causes the new Extract to start writing to the beginning of the first file in the trail again, overwriting data that was written by the old group.
    - The parameter file for one Extract group was copied as the basis for the second group, but trail names (and possibly other names) were not changed for the second group. One group is writing over the other's data in the same file.

    What happens to cause the Replicat error is this: A complete record is followed by an incomplete record that was overlayed by a different write. Instead of the incomplete record starting with the beginning of a header, as Replicat expects, it starts somewhere in the middle.

To use Logdump to analyze an error 509 condition

1. Issue OPEN <path name> to open the sequence number shown in the error, for example OPEN C:\GOLDENGATE802\DIRDAT\JD000000.
2. Referring to the RBA in the error, use the POS command to look at the timestamps of records before and after that position. If later records have earlier timestamps, those records overwrote existing ones in the trail.

   The best solution is to start over, because data was probably lost or corrupted.

To start replication over again

1. Move the old trail files out to a temporary location, in case you need them later, or in case an Oracle support engineer needs to see them.
2. Drop and re-create the Extract groups.
3. Create a new trail for each Extract group, and give each a unique name.
4. Create new Replicat groups.
5. Resynchronize the data. If the source data must remain active while you are resynchronizing the data, refer to the instructions for performing an initial load in the Oracle GoldenGate *Windows and UNIX Administrator's Guide*.

   NOTE When a trail is corrupted this way, a debug509.txt file is created in the Oracle GoldenGate installation directory. Save this file. You will need to send the file to a support analyst. To open a support case, go to http://support.oracle.com.

✔ Is Replicat abending on one or more errors that cannot be avoided?

- If there are errors that continue to disrupt Replicat processing, but which you cannot immediately resolve, you can use the REPERROR parameter to handle them in one of a number of ways that prevent the process from abending.
- You can use REPERROR at the root level of the Replicat parameter file, as well as within a MAP statement. You can specify a default response, as well as error-specific responses.
- For more information, see REPERROR in the Oracle GoldenGate *Windows and UNIX Reference Guide*.

✔ Are you using deferred constraint checking (Oracle only)?

- Check the Replicat parameter file for the DBOPTIONS parameter with the DEFERREFCONST option. This parameter causes Replicat to set its transaction so that the target database defers constraint checking until the transaction is committed. By default, when there is an error on any operation in the transaction, including the commit, Replicat abends.
- You can configure Replicat to continue processing on transaction-level errors, including commit errors, by using the REPERROR parameter with either the TRANSDISCARD or TRANSEXCEPTION option.
  - TRANSDISCARD discards the entire replicated source transaction to the discard file if any operation within that transaction, including the commit operation, causes a Replicat error that is listed in the error specification.

- TRANSEXCEPTION performs exceptions mapping for every record in the replicated source transaction according to its corresponding exceptions-mapping specification, as defined by a MAPEXCEPTION or EXCEPTIONSONLY clause in an exceptions MAP statement.

These parameters can work within a REPERROR statement in a MAP statement, as well as within a root-level REPERROR statement. To handle commit errors, however, it is only appropriate to use them at the root level, because REPERROR within a MAP statement only allows for record-level error handling. A commit error does not have a particular record associated with it. For more information about how to use these parameters, see REPERROR in the Oracle GoldenGate *Windows and UNIX Reference Guide*.

NOTE Note: These REPERROR options are also useful in cases where the transaction must be "all or nothing" in that all operations from the source transaction must be applied successfully to the target, and it is not permissible to discard or ignore individual operations.

Cannot delete a Replicat group

✔ Are you trying to delete a Replicat group but the DELETE REPLICAT command fails?

- Does the error state "checkpoint table does not exist"?
- Either the group was created without the NODBCHECKPOINT argument, or the checkpoint table was deleted.
- In either case, use the ! argument with DELETE REPLICAT. The ! tells Oracle GoldenGate to ignore the checkpoint table. Oracle GoldenGate will generate a warning that the database checkpoint could not be deleted, but the group will be removed successfully. The syntax is:

```
DELETE REPLICAT <group> !
```

Troubleshooting data-synchronization problems

By default, Oracle GoldenGate does not verify that the before images of source and target data are identical before it applies a change to the target. Oracle GoldenGate qualifies target rows only by matching the source and target keys, unique-key columns, or substitute key columns defined with the KEYCOLS option of TABLE and MAP. You should test for out-of-sync data on a regular basis.

NOTE Before-image validation can be done by using an external function such as a conflict resolution routine.

Testing for out-of-sync rows

To compare source and target data, you can use Oracle GoldenGate Veridata. It can be used on active source tables while replication (native or third-party) is active. For more information about Oracle GoldenGate Veridata, go to http://www.oracle.com.

Causes of out-of-sync data

Some causes beyond your control:

- user input errors
- application bugs
- system failures
- disk corruption

Some factors within your control:

- DML on target tables (other than replication)
- tables without keys
- character sets
- differences between source and target structure or primary keys

Discrepancies caused by DML on the target

✔ Are transactional applications running on the target?

- Changes to target tables, except by Replicat, cause data discrepancies or errors.

✔ Are there triggers on target tables?

- Triggered operations are replicated from the source. If target triggers reproduce those same operations, they cause errors.
- Disable triggers, alter them to ignore the Replicat user, or use SQLEXEC to disable them on demand by issuing the appropriate database command. Triggers affecting tables outside the Oracle GoldenGate replication environment are permissible.

  NOTE For Oracle 10.2.0.5 and later patches, and for Oracle 11.2.0.2 and later, you can use the Replicat parameter DBOPTIONS with the SUPPRESSTRIGGERS option to cause Replicat to disable the triggers and cascade constraints during its session.

Discrepancies caused by tables without keys

✔ Are there target tables that lack a primary key or unique constraints?

- Without a primary key or unique constraints, Oracle GoldenGate uses all of the columns as a key. Multiple rows could be updated if they contain identical data.
- Use the KEYCOLS option of TABLE and MAP, or use DBOPTIONS with the LIMITROWS option to prevent multiple rows from being updated (supported databases only).

Discrepancies caused by character sets

✔ Are source and target character sets different?

- If so, extended ASCII will not synchronize correctly.

- (Oracle) Check the NLS_LANG environment variable on the source and target databases. The NLS_LANG of the target must be set to match the NLS_LANG of the source.

Discrepancies caused by non-matching structures or keys

✔ Was the structure of the source table changed?

- If a source structure changes, including changes in a key definition, you must run DEFGEN to create a new source-definitions file for the affected table. Otherwise, the same structure changes must be applied to the target. For more information about DEFGEN, see the Oracle GoldenGate *Windows and UNIX Administrator's Guide.*
- If source and target key columns are different, use the KEYCOLS option of TABLE and MAP to define other columns as keys.

Resynchronizing an out-of-sync table

In this procedure, there are two Replicat groups:

- The original group, known as groupA
- A new group that you will create, known as groupB

To resynchronize a table

1. Comment out the out-of-sync table in the original Replicat parameter file.

   WARNING Do not use the VIEW PARAMS or EDIT PARAMS command to view or edit a parameter file that was created in a character set other than that of the local operating system (such as one where the CHARSET option was used to specify a different character set). View the file from outside GGSCI; otherwise, the contents may become corrupted..

2. Stop the original Replicat and start it again so it continues processing the tables that are not out-of-sync.

   ```
   STOP REPLICAT <groupA>
   START REPLICAT <groupA>
   ```

3. Write down the timestamp on the source system.
4. Try to resolve any long-running transactions on the source out-of-sync table. You will be copying the source data to the target, and if transactions are open while the copy is being made, they will not be captured.
5. Start a copy of the source data.
6. Import the copy to the target table.
7. Create a new Replicat group for the out-of-sync table, using BEGIN to start at the source timestamp that you recorded step 3, and using the existing trail for EXTTRAIL.

   ```
   ADD REPLICAT <groupB>, EXTTRAIL <existing trail>,
   BEGIN <yyyy-mm-dd hh:mm:ss>
   ```

8. Create a parameter file for the new group and include HANDLECOLLISIONS.

```
EDIT PARAMS <groupB>
```

9. Start the new Replicat group.

```
START REPLICAT <groupB>
```

10. View the lag of the new group until it shows "`At EOF, no more records to process.`"

```
SEND REPLICAT <groupB>, GETLAG
```

11. Stop the new Replicat group.

```
STOP REPLICAT <groupB>
```

12. Edit the parameter file of the new group to comment out or remove HANDLECOLLISIONS.

WARNING Do not use the VIEW PARAMS or EDIT PARAMS command to view or edit a parameter file that was created in a character set other than that of the local operating system (such as one where the CHARSET option was used to specify a different character set). View the file from outside GGSCI; otherwise, the contents may become corrupted..

13. Start the new Replicat group.

```
START REPLICAT <groupB>
```

The next steps merge the table back with the others so that only one Replicat group is needed again.

14. Stop Extract.

```
STOP EXTRACT <extract_group>
```

15. View the lag of each Replicat group until it shows "`At EOF, no more records to process.`"

```
SEND REPLICAT <groupA>, GETLAG
SEND REPLICAT <groupB>, GETLAG
```

16. Stop both Replicat groups.

```
STOP REPLICAT <groupA>
STOP REPLICAT <groupB>
```

17. Uncomment the newly synchronized table in the original Replicat parameter file.

WARNING Do not use the VIEW PARAMS or EDIT PARAMS command to view or edit a parameter file that was created in a character set other than that of the local operating system (such as one where the CHARSET option was used to specify a different character set). View the file from outside GGSCI; otherwise, the contents may become corrupted..

18. Start Extract.

```
START EXTRACT <extract_group>
```

19. Start the original Replicat.

```
START REPLICAT <groupA>
```

20. Delete the new Replicat that you created.

```
DELETE REPLICAT <groupB>
```

Troubleshooting data-mapping

Because table and column mapping can be complex, it is a common cause of processing errors or unexpected results.

- The process report shows where a data-mapping error occurred.
- Issue VIEW REPORT <group> or use Oracle GoldenGate Director to view the report.

Table and column names

- ✔ Do the source and target tables exist in the databases?
- ✔ Are they specified correctly in the TABLE or MAP statement?
  - If the database supports case sensitivity, check spelling and case of the names.
  - Make sure names are fully qualified with owner and object name.
- ✔ Do table and column names contain only supported characters?
- ✔ Are any column names within quotes? (They will be interpreted as literals).
- ✔ Are wildcards being used properly? For example, you cannot use a partially wildcarded name for target objects in a MAP statement.
  - See the TABLE and MAP documentation in the Oracle GoldenGate *Windows and UNIX Reference Guide* for more details about requirements for table and column names.

Definitions

- ✔ Was a source definitions file created and placed on the target system (and intermediary systems, if applicable)? Is data manipulation being performed on the source? In that case, you need to create a target-definitions file for the source system.
- ✔ Is the file referenced correctly with the Replicat parameter SOURCEDEFS or TARGETDEFS, as applicable?
- ✔ Are source columns mapped to target columns of a similar data type?
  - If types differ, use a column-conversion function in the mapping statement to prevent “mismatched data type” errors.

- ✔ Are source and target columns different sizes?
    - Oracle GoldenGate truncates or rounds target data if the target column is smaller than the source column.
- ✔ Are comparisons configured realistically?
    - For example, comparing a numeric column to a numeric value.

Column-missing error

- ✔ Are you using KEYCOLS?
    - (Oracle and SQL Server only) Are the specified columns being logged to the transaction log? Enable logging of the columns. For an Oracle table, you can use ADD TRANDATA with the COLS option. For SQL Server, use the ADD TRANDATA command to enable the additional log information that Oracle GoldenGate needs to reconstruct update operations.
- ✔ Are you using KEYCOLS for both the source and target tables?
    - Corresponding source and target key columns must match.
- ✔ Did the error occur on a filter or function?
    - This indicates that data is missing from the transaction record. Try one of the following:
        - Filter on key columns.
        - Enable logging of required columns, if the database does not log all column values in its transaction operations.
        - Use FETCHCOLS or FETCHCOLSEXCEPT in the TABLE statement.
- ✔ Are you using valid filter or comparison elements?
    - For example, FILTER takes a numeric value, and WHERE takes a string but not arithmetic operators or floating-point numbers.

Fetch failures on Oracle source

- ✔ Was the source row that contained the data deleted?
- ✔ Has the undo retention expired?
    - If so, then the read-consistent image that Extract needs is gone, and a snapshot-too-old message will be returned.
    - Add the FETCHOPTIONS parameter with the NOUSESNAPSHOT option to Extract. This parameter tells Extract to fetch from the table, not the undo segments. Once Oracle GoldenGate is past the affected record, remove the parameter so that Extract resumes fetching from the undo segments.

- If possible, increase the amount of time that Oracle keeps information in the undo segments.

  NOTE Certain DDL operations that alter the structure of a table, such as a table truncate, can cause fetch errors too.

✔ Are you using NOUSELATESTVERSION for FETCHOPTIONS?

- If so, Oracle GoldenGate cannot default to fetching from the table if the undo record is not available. Unless error handling options are set with that parameter, Extract abends.
- If fetched data is available but cannot be merged with the redo data, then Extract abends.

Replicat errors on Sybase targets

✔ Are you attempting to map TIMESTAMP columns?

- TIMESTAMP columns must be excluded from Oracle GoldenGate extraction. These data types are populated automatically by the database, which generates errors if Replicat attempts to post a timestamp value that was replicated from the source record. To exclude timestamp columns from being captured by Oracle GoldenGate, use the COLSEXCEPT option of the TABLE parameter. Note: Because the system generates these data types, the source and target values will be different.

Escaped characters not converting correctly

✔ Are you using an octal or hexadecimal escape sequence to represent native encoding or Unicode characters in a parameter file?

- An octal sequence must contain exactly three digits. A hexadecimal sequence must contain exactly two digits. Any more than the expected number of digits causes the sequence to be interpreted as multiple characters.
- For more information about using escape sequences, see TABLE or MAP in the Oracle GoldenGate *Windows and UNIX Reference Guide.*

Troubleshooting SQLEXEC

✔ Does the Extract or Replicat user have permissions to call and execute database procedures and commands?

✔ Are you trying to use input or output parameters for a SQLEXEC statement at the root of a parameter file?

- Parameters can only be used in SQLEXEC statements within a TABLE or MAP statement.

✔ Does parameter resolution result in a column-missing error?

- (Oracle and SQL Server) Is the referenced column being logged to the transaction log? Enable logging with the ADD TRANDATA command. For an Oracle table, you also can use ADD TRANDATA with the COLS option.
- Is the stored procedure supposed to execute more than once, for example to specify the same stored procedure for two different column maps? In that case, use the ID <logical name> option of SQLEXEC to specify a logical name for each execution, similar to that shown in bold face in the following:

```
TABLE sales.srctab, TARGET sales.targtab,
SQLEXEC (SPNAME lookup, ID lookup1, PARAMS (param1 = srccol)),
COLMAP (targcol1 = lookup1.param2),
SQLEXEC (SPNAME lookup, ID lookup2, PARAMS (param1 = srccol)),
COLMAP, (targcol2 = lookup2.param2);
```

- Is the stored procedure supposed to synchronize a source row with multiple target rows? Set the EXEC option of SQLEXEC to SOURCEROW so that it executes for each source-row operation.
- To prevent a process from abending on SQLEXEC errors, specify error handling with the ERROR option.

To trace SQLEXEC problems

Use the TRACE option of SQLEXEC. This option has two modes:

- ALL writes all input and output parameters to the discard file. This is the default.
- ERROR writes the input and output parameters to the discard file only after a SQL error occurs.

The discard file shows the parameters that are being passed, and the report file shows the number of attempts that were made to pass them.

Sample parameter file that includes tracing:

```
MAP MASTER.INTERACTION_ATTR_VALUES , &
TARGET MASTER.INTERACTION_ATTR_VALUES, &
SQLEXEC ( SPNAME ggs_conflict_rule, ID ggs_interaction_attr_values, &
    PARAMS ( LMS_TABLE = "INTERACTION_ATTR_VALUES", &
    KEY1 = interaction_attribute_value_id, &
    KEY2 = attribute_value_seq), &
    ERROR RAISE ,TRACE ALL ) ;
```

Sample discard file with SQLEXEC tracing enabled:

```
Input parameter values...

LMS_TABLE: INTERACTION_ATTR_VALUES
  KEY1: 2818249
  KEY2: 1
Report File:

From Table MASTER.INTERACTION_ATTR_VALUES to
MASTER.INTERACTION_ATTR_VALUES:
       #  inserts:      0
       #  updates:      0
       #  deletes:      0
       #  discards:     1
```

```
Stored procedure GGS_INTERACTION_ATTR_VALUES:
     attempts:        2
     successful:      0
```

Troubleshooting missed transactions

✔ Are the tables that are to be processed by Extract and Replicat properly specified?

- Verify that the tables are included in TABLE and MAP statements.
- Check syntax: If fully qualified names (owner.table) are used for TABLE, then fully qualified names must be used for MAP. The name in TABLE, an Extract parameter, is written to the trail record header, and Replicat expects an exact match in the source portion of the Replicat MAP statement. Otherwise, nothing is replicated.

  NOTE Qualifying a table name by including the owner is recommended for Oracle GoldenGate versions 8.0 and later, and is required for Oracle tables regardless of the Oracle GoldenGate version.

✔ Did you recently run an initial load and use the same parameter file for your load and online groups?

- Check the parameters. After a load, some parameters from the load configuration must be altered to suit the online configuration. A common mistake: Using RMTFILE for the load, but forgetting to change it to RMTTRAIL for the online group.

To resolve the problem

1. Stop Extract.
2. Edit the parameter file to fix or add parameters.
3. Add the remote trail with ADD RMTTRAIL in GGSCI, if you have not done so already.
4. Start Extract.

✔ Is the database Sybase, and is the secondary truncation point disabled?

- By default, Extract manages the secondary truncation point. If Extract is stopped for an extended period of time, the secondary truncation point does not move, which prevents transaction data from being purged. Ultimately, the log fills up, and the database halts.
- Solution: The only thing that you can do if the log fills up is to disable the secondary truncation point and finish purging the log. The purge will remove entries that were not yet read by Extract, so you must resynchronize the source and target data. Afterward, initialize the secondary truncation point by issuing the following database command before starting Extract.

  ```
  dbcc settrunc( 'ltm', 'valid')
  ```

✔ Was transaction data configured for replication?

- (Applies to most supported databases) Was ADD TRANDATA issued for each table? This GGSCI command makes modifications to database settings so that Oracle GoldenGate can obtain the information it needs from the transaction logs.

  An example of an Oracle error reflecting lack of ADD TRANDATA is:

  ```
  Missing one or more key fields in update
  Missing one or more key fields in update
  Aborting transaction beginning at seqno 0 rba 10008
                           error at seqno 0 rba 10008
  Problem replicating GGS.TCUSTMER to GGS.TCUSTMER_T
  Mapping problem with compressed update record (target format)...
  *
  CUST_CODE = NULL
  NAME = mike
  ```

  For more information about ADD TRANDATA, see the Oracle GoldenGate installation guide for your database and the Oracle GoldenGate *Windows and UNIX Reference Guide*.

To include missed transactions in the target

To update the target with missed operations after running ADD TRANDATA or setting data capture changes, you need to resynchronize the affected tables.

To skip missed transactions

To skip the transactions that were missed before running ADD TRANDATA, follow this procedure. The target will not reflect accurate data in this case.

1. Stop Replicat.

   ```
   STOP REPLICAT <group>
   ```

2. Close the current trail file and open a new one.

   ```
   SEND EXTRACT <group> ROLLOVER
   ```

3. Point Replicat to the new file.

   ```
   ALTER REPLICAT <GROUP NAME>, EXTSEQNO <n>, EXTRBA 0
   ```

   Where: <n> is the sequence number of the new file.

4. Start Replicat to start processing from the new file.

   ```
   START REPLICAT <group>
   ```

Troubleshooting problems with Oracle DDL replication

These solutions apply to Oracle DDL replication. For solutions that apply to Teradata DDL replication, see page 66.

Extract abends with "OCI Error executing fetch ..."

✔ Does the error report an invalid identifier, similar to the following?

```
OCI Error executing fetch for <table_name>: 904-ORA-00904: <column name>:
invalid identifier …
```

- This error happens if key columns are changed before Oracle GoldenGate can process updates or deletes that were issued on the old column structure. In this context, the *key columns* are whichever columns are being used by Oracle GoldenGate as the key. This could be a primary key, a unique key or index, a substitute key defined with a KEYCOLS clause, or all of the columns in the absence of those other identifiers.

No DDL is captured by Extract

✔ Is there a valid DDL parameter in the Extract parameter file?

- If so, continue with the next diagnostic step.

✔ Does the value of the GGSCHEMA parameter in the GLOBALS file match the name of the schema that was used to install the Oracle GoldenGate DDL objects?

✔ Are you still unable to determine why DDL is not being captured? Use the following procedure to verify that the DDL objects are installed and are operating correctly.

To diagnose failure to capture DDL

1. In the root Oracle GoldenGate directory, open the GLOBALS file.
2. Make a note of the Oracle GoldenGate DDL user name and, if applicable, any non-default names specified with the DDLTABLE and MARKERTABLE parameters.
3. Connect to the source database as SYSDBA.
4. Run the marker_status.sql script. This script verifies that the Oracle GoldenGate marker table is installed. It should show the following results.

```
Please enter the name of a schema for the GoldenGate database objects:
ggsuser
Setting schema name to GGSUSER

MARKER TABLE
-------------------------------
OK

MARKER SEQUENCE
-------------------------------
OK
```

5. Run the ddl_status.sql script. This script verifies that the Oracle GoldenGate DDL objects are installed.

6. In the script output, look for the location of the DDL trace file, as shown in the following example, and make a note of it.

```
LOCATION OF DDL TRACE FILE
---------------------------
C:\ORACLE\ADMIN\TEST11g2\UDUMP/ggs_ddl_trace.log
```

7. At the end of the output, verify that the following shows successful installation of the DDL objects.

```
SUCCESSFUL installation of DDL Replication software components
```

8. Run GGSCI.

9. In GGSCI, stop Extract.

```
STOP EXTRACT <group>
```

10. Edit the ddl_tracelevel.sql script that resides in the root Oracle GoldenGate directory, and set the trace level to 1.

11. Start Extract again.

```
START EXTRACT <group>
```

12. On the source, issue a DDL statement as a test.

13. Open the trace file in a text editor.

14. At the bottom of the trace file, search for a line that contains the date, time and DDL text, for example:

```
... 08-10 11:08:16 : DDL : DDL operation [create table qatest1.testTable
(<n> Number) ], sequence [17047] ...
```

    If this line exists, it means that the DDL trigger captured the DDL.

15. Make a note of the sequence number.

16. Proceed to the next step to confirm that the record exists in the DDL history table.

17. Connect to the database as SYS.

18. Issue the following query in SQL*Plus, using the sequence number you recorded in place of the one shown here.

```
select metadata_text from <ggsuser>.<ggs_ddl_hist> where seqno=17047;
```

    Where:

    - <ggsuser> is the Oracle GoldenGate DDL user name that is listed in the GLOBALS file that resides in the Oracle GoldenGate root directory.
    - <ggs_ddl_hist> is either the name listed with DDLTABLE in the GLOBALS file or else the default DDL history table name of ggs_ddl_hist.

19. In the output, look for a record that contains the DDL statement that you issued.

20. If the record exists, keep the query output open, and then proceed to the next step to determine the marker sequence number.

21. Starting from the line you read in the previous step, search for the first occurrence of MD_TAB_MARKERSEQNO. You should see something like the following, which shows the marker sequence number.

    ```
    ... MD_TAB_MARKERSEQNO(key1 = [] key2 = []) = [16549] ....
    ```

22. If the line exists, do the following:

    - Record the marker sequence number.
    - Copy the query statement and paste it into a text file for future use.
    - Proceed to the next step to verify that the marker record exists in the marker table.

23. In SQL*Plus, issue the following query, using the sequence number you recorded in the previous step.

    ```
    select metadata_text from <ggsuser>.<ggs_marker> where seqno=16549;
    ```

    Where:

    - <ggsuser> is the Oracle GoldenGate DDL user name that is listed in the GLOBALS file that resides in the Oracle GoldenGate root directory.
    - <ggs_marker> is either the name listed with MARKERTABLE in the GLOBALS file or the default DDL marker table name of ggs_marker.

24. In the output, look for the DDL statement that you issued. If the statement is there, a marker was written to the redo logs as expected. Do the following:

    - Copy the query statement and paste it into the text file with the other query.
    - Proceed to the next step to verify that Extract can read the marker.

25. In SQL*Plus connect to the database as the Oracle GoldenGate DDL user, the one listed in the GLOBALS file.

26. Issue the following queries, which are the two that you copied and pasted to the text file.

    ```
    select metadata_text from <ggsuser>.<ggs_ddl_hist> where seqno=17047;
    select metadata_text from <ggsuser>.<ggs_marker> where seqno=16549;
    ```

27. Verify that these queries returned the same results as the ones you issued as the SYS user. Do one of the following:

    - If you do not get output, but instead get a database error, this indicates that the ddl_rolesetup.sql script was not executed properly to grant the Oracle GoldenGate DDL user the correct privileges. Run the role_setup script as SYSDBA and then grant the role that you just created to all Oracle GoldenGate users under which the following Oracle GoldenGate processes run: Extract, Replicat, GGSCI, and Manager.
    - If you receive valid results from the query, proceed to the next step.

28. In GGSCI, start Extract. Start the existing group, not a new or recreated one. Otherwise, the test DDL statement will not be captured.

    ```
    START EXTRACT <group>
    ```

29. Look for a statement similar to the following.

```
TABLE resolved (entry GGSUSER.GGS_MARKER):
  TABLE GGSUSER.GGS_MARKER;
```

30. If you do not see this statement, or if you get an error, contact Oracle Support. For more information, go to http://support.oracle.com. Or, reinstall the DDL environment, understanding that you will lose any DDL operations that have not been captured.

Specific DDL is not captured or excluded

- ✔ Are ALTER DATABASE and ALTER SYSTEM being excluded?
  - This is normal. These operations are not considered to be DDL by the database and are ignored.
- ✔ Are other specific operations that are supported by Oracle GoldenGate not being captured?
  - Check the structure of the DDL parameter statement.
    - First, make certain that the operation is listed in an INCLUDE OPTYPE statement or else is *not* listed in an EXCLUDE OPTYPE statement, and verify that the missing operation does not apply to an object whose name was in an EXCLUDE OBJNAME statement.
    - Perhaps you have the same operation type or object name in both an EXCLUDE and INCLUDE statement. If so, the EXCLUDE takes priority over the INCLUDEs, and this might be why some operations are not being captured or applied to the target.
    - Or, perhaps you are only replicating objects that are MAPPED in scope, and the missing DDL was for objects that are UNMAPPED in scope.
- ✔ Are you using a DDL EXCLUDE INSTR or a DDL INCLUDE INSTR?
  - The filter criteria may not be inclusive or exclusive enough. For example, if you filter on INSTR 'supplemental log', it will filter both ADD SUPPLEMENTAL LOG and DROP SUPPLEMENTAL LOG statements.
  - Check for spaces in the source DDL. If the source includes spaces, then you must include those spaces in your filter specification.

Data on new, altered, and renamed tables not captured

- ✔ Did you forget to use the DDLOPTIONS ADDTRANDATA parameter statement or issue the ADD TRANDATA command in GGSCI for the new source table name?
  - The ADD TRANDATA functionality of Oracle GoldenGate creates a supplemental log group for a new table that is to be part of the Oracle GoldenGate configuration. The supplemental logging provides information that Oracle GoldenGate needs to capture transactional data from the logs.

- Unless you either enable supplemental logging for a new table through the database interface, or else use one of the ADD TRANDATA options described here, the data is not captured by the Extract process.
- When DDL support is enabled, it is recommended that you use either the ADD SCHEMATRANDATA command or the DDLOPTIONS ADDTRANDATA statement, instead of the ADD TRANDATA command in GGSCI. By using those features, you can ensure that supplemental logging is created or updated automatically for all CREATE, ALTER, and RENAME operations that affect tables in the DDL configuration. It also deletes the old supplemental log groups when a table is renamed, preventing the need for a manual procedure.

✔ Did you use a DDLOPTIONS ADDTRANDATA statement and data still is not captured?

- There might have been a lag between when the table was created or altered, and when the ADD TRANDATA took effect. If there was DML issued during this interval, it was not captured because the supplemental logging was not yet added or updated.

✔ Are you using TABLEEXCLUDE with the NORENAME option or DDLOPTIONS with the NOCROSSRENAME option?

- If so, were the table names previously of UNMAPPED scope, but the new names are of MAPPED scope? You might see one of the following messages in the Extract report:

  ```
  Object [FIN.ACCT] was renamed even though it's marked excluded with
  NORENAME….
  ```

  or

  ```
  Object that is not replicated [FIN.ACCT] was renamed into object that is
  [FIN.SALES].
  ```

- Those renames will succeed, but data in those tables might not be replicated to the target.

RENAMEs converted to ALTER TABLE RENAME

✔ Is the message similar to the one below?

```
DDL RENAME found, old object [JCAN.OLDT], new object [JCAN.NEWT], RENAME
converted to ALTER TABLE, new operation [ALTER TABLE JCAN.OLDT RENAME TO
NEWT]
```

- This is normal. Oracle GoldenGate converts RENAME TABLE to ALTER TABLE RENAME to work around permissions problems that can occur if the source and target Oracle GoldenGate database user names are different from each other.

RENAME operations are failing

- ✔ Are the old or new table names longer than 16 characters?
    - Oracle only allows 16 characters plus the double quote marks (18 total) for RENAME and ALTER TABLE RENAME, because of the ANSI limit for identifiers.

Comments are in the wrong place

- ✔ Were the comments in the middle of the name of the source object in the source DDL statement?
    - If so, it is expected behavior for Oracle GoldenGate to move them to the end of the object name on the target. This does not affect the integrity of the DDL replication.

Derived object names are not being converted correctly

- ✔ Is the DDLOPTIONS parameter being used with the NOMAPDERIVED option?
    - If so, then regardless of whether you explicitly or implicitly mapped the derived object, NOMAPDERIVED overrides the mapping and prevents the conversion.
- ✔ Is the operation a rename?
    - Check your mappings. For RENAME and ALTER TABLE RENAME, the new table name is considered the base object name, and the old name is the derived object name.

String substitution not working

- ✔ Does your DDL INCLUDE statement include the object for which you want to use string substitution? Or, is that object excluded somehow in an EXCLUDE statement?
    - The DDL statement always executes first, regardless of the ordering of the DDL and DDLSUBST parameters. Did you perhaps create a DDLSUBST statement that affects a non-included object, thinking it would execute independently of the INCLUDE or EXCLUDE in the DDL parameter?
- ✔ Is there a DDLOPTIONS REMOVECOMMENTS BEFORE in use?
    - This parameter removes comments before the point in processing where string substitution occurs. Use DDLOPTIONS REMOVECOMMENTS AFTER if you want comments removed on the target after string substitution occurs. To prevent the removal of comments, do not use a REMOVECOMMENTS option.
- ✔ Are there spaces in the source DDL statement?
    - The DDLSUBST specification should also include those spaces.

DDL processing steps not in the process report

✔ Is reporting enabled?

- By default, DDL runtime information is not included in the report because it expands the size of the file.
- To enable DDL runtime reporting, use a DDLOPTIONS REPORT statement in the parameter file of the process for which you want the reporting to be generated (Extract, Replicat, or both).

Replicat abends on ggs_ table

✔ Is the error similar to the following?

```
GGS ERROR 118 Target table not resolved for source [GGS.GGS_SETUP].
```

- This indicates that one or more Oracle GoldenGate DDL objects are included in the replication configuration. These objects are:
  - GGS_MARKER
  - GGS_DDL_HIST
  - GGS_SETUP
  - GGS_DDL_OBJECTS
  - GGS_DDL_COLUMNS
  - GGS_DDL_LOG_GROUPS
  - GGS_DDL_PARTITIONS
  - GGS_DDL_PRIMARY_KEYS
- Do not include the Oracle GoldenGate DDL objects in any DDL, TABLE or MAP parameter statements, and make certain that wildcard specifications in those parameters do not include them. These objects must be excluded from the Oracle GoldenGate replication configuration.

The database returns ORA-04021

✔ Is the error text like the following?

```
"timeout occurred while waiting to lock object SYS.DATABASE"
```

- This error can occur if any changes were made to the Oracle GoldenGate DDL objects while sessions that performed DDL operations were still open.
- Close all sessions in the database that performed DDL. If that does not help, close all database sessions. Then reinstall the Oracle GoldenGate DDL trigger, using the NORMAL option.
- If this procedure does not help, you need to reinstall the DDL objects.
- Refer to the Oracle GoldenGate *Windows and UNIX Administrator's Guide* for procedures.

The DDL objects tablespace filled up

✔ Is the error text like the following?

```
ERROR at line 1:
ORA-00604: error occurred at recursive SQL level 1
ORA-01653: unable to extend table JSUN.GGS_MARKER by 128 in tablespace USERS
ORA-06512: at line 647
ORA-01653: unable to extend table JSUN.GGS_MARKER by 128 in tablespace USERS
```

- The tablespace that contains the Oracle GoldenGate DDL objects is full. When the tablespace is full, users cannot perform DDL across the whole database system, even for DDL that is executed in other tablespaces.

To resolve this problem

1. Stop all DDL.
2. Disable the Oracle GoldenGate DDL trigger.
3. Add more storage to the tablespace.
4. Enable the DDL trigger.
5. Start the Oracle GoldenGate process.

For more information about how to enable and disable the DDL trigger, see the DDL chapter in the Oracle GoldenGate *Windows and UNIX Administrator's Guide*. This chapter also contains information on how to purge the history and marker tables to control their size.

Troubleshooting problems with Teradata DDL replication

No DDL is captured by Extract

✔ Is there a valid DDL parameter in the Extract parameter file that specifies the DDL that you want Extract to capture?

✔ Did you create a replication group that includes the table for which you want DDL to be captured?

✔ Did you create a replication ruleset? You must create a replication ruleset statement for the replication group that includes the table for which you want DDL to be replicated. A ruleset statement creates a set of one or more DDL-capture rules and associates them with the specified replication group. DDL operations on tables that are members of a replication group are automatically captured.

NOTE The Teradata RSG also must be properly configured. For more information, see the Teradata Replication Solutions documentation.

Specific DDL is not captured or excluded

- ✔ Are other specific operations that are supported by Oracle GoldenGate not being captured?
  - Check the structure of the DDL parameter statement.
    - First, make certain that the operation is listed in an INCLUDE OPTYPE statement or else is *not* listed in an EXCLUDE OPTYPE statement, and verify that the missing operation does not apply to an object whose name was in an EXCLUDE OBJNAME statement.
    - Perhaps you have the same operation type or object name in both an EXCLUDE and INCLUDE statement. If so, the EXCLUDE takes priority over the INCLUDEs, and this might be why some operations are not being captured or applied to the target.
    - Or, perhaps you are only replicating objects that are MAPPED in scope, and the missing DDL was for objects that are UNMAPPED in scope.

String substitution not working

- ✔ Does your DDL INCLUDE statement include the object for which you want to use string substitution? Or, is that object excluded somehow in an EXCLUDE statement?
  - The DDL statement always executes first, regardless of the ordering of the DDL and DDLSUBST parameters. Did you perhaps create a DDLSUBST statement that affects a non-included object, thinking it would execute independently of the INCLUDE or EXCLUDE in the DDL parameter?

Derived object names are not being converted correctly

- ✔ Is the DDLOPTIONS parameter being used with the NOMAPDERIVED option?
  - If so, then regardless of whether you explicitly or implicitly mapped the derived object, NOMAPDERIVED overrides the mapping and prevents the conversion.

DDL is being applied with the wrong owner on the target

Did you explicitly map the source and target object names? If Teradata DDL is of UNMAPPED scope in the Replicat configuration, it is applied to the target in one of these ways:

- If the required Replicat connection parameter TARGETDB contains just a DSN (as in tdtarg), but not a database name, it is applied to the target object with the same owner (database name) and object name as in the source DDL.
- If a specific database name is used in TARGETDB (as in db@tdtarg), all of the DDL operations are applied to the target with the owner from TARGETDB.

Troubleshooting trail and file-maintenance problems

Process report not generated

- ✔ Did an Oracle GoldenGate process abend without generating a report?
    - This happens occasionally. See “Using the process report” on page 11 for more information and a resolution.

Discard file not created

- ✔ Did you specify a location for the file with the DISCARDFILE parameter?
    - Oracle GoldenGate does not create a discard file by default.
- ✔ Are you looking in the correct directory?
    - See the DISCARDFILE parameter for the location.
- ✔ Could there be a security violation?
    - Perhaps the user that wrote the last discard file has a security level that won't let the new one be created.

Discard file too big

- ✔ First, try to resolve whatever problem is causing discarded records to accumulate in the file. The records themselves can provide information that helps you diagnose it.
- ✔ If you can tolerate the errors, you can control the size of the file with the following parameters:
    - DISCARDROLLOVER: specifies parameters for aging the file
    - MAXDISCARDRECS: limits the number of errors written to the file
    - DISCARDFILE with the PURGE option: purges the file before writing new content
    - DISCARDFILE with the MEGABYTES option: sets a different maximum file size.

Trail file is not emptying

- ✔ Is it a local trail?
    - If a local trail is not emptying, check for TCP/IP issues that delay transfer of data across the network.
- ✔ Is it a remote trail?
    - If a remote trail is not emptying, find out if Replicat is running and processing data.
    - If yes, Replicat might be processing a large transaction.

- You can see which tables have large transactions by using the TRANSHIST command in Logdump. See Chapter 4.
- Consider partitioning tables that have large transactions into multiple trails and Extract or Replicat groups, or use data pumps. Use the FILTER option in the TABLE or MAP statements, and use the @RANGE function to divide the rows among the different groups. For more information about using multiple groups and row ranges, see page 20.

Trail not rolling over

✔ What is the maximum file size for the trail?

- To check the maximum file size, use the INFO EXTTRAIL * or INFO RMTTRAIL * command and view the File Size field. Maybe the file size has not reached that value yet.
- To change the file size, use ALTER EXTTRAIL or ALTER RMTTRAIL with the MEGABYTES option.

Trail sequence number is at 000000

✔ Was the trail sequence number a very high digit, but now is 000000, or another very low number?

- The trail sequence numbers probably reached 999999. The expected behavior after reaching sequence number 999999 is to start at 000000 again.
- This does not require any action on your part.

Trail files not being purged

✔ Are you using PURGEOLDEXTRACTS to manage the trail?

- If not, add PURGEOLDEXTRACTS to the Manager parameter file to prevent old files from accumulating.
- If you are using PURGEOLDEXTRACTS, make certain that the Manager user has the authority to purge trail files, and make certain that the PURGEOLDEXTRACTS options are used correctly. See the Oracle GoldenGate *Windows and UNIX Reference Guide*.

✔ Is there an obsolete Replicat group that is linked to the trail?

- A trail file will not be purged if another process has a checkpoint in it. Delete the obsolete group with the DELETE REPLICAT command, so that the checkpoint records are deleted.
- If a checkpoint table is being used for the group, log into the database with the DBLOGIN command first, so that the checkpoint will be removed from the table.

```
[TARGETDB <dsn>,][USERID <user>[, PASSWORD <pw> &
   [<encryption options>]]]
DELETE REPLICAT <group>
```

NOTE Note: In the DBLOGIN command, TARGETDB or USERID might be required, or both will, depending on the database type and what kind of authentication is required.

Trail files purge too soon

- ✔ Are multiple Replicat groups linked to the same trail? Or are a Replicat and a data pump linked to the same trail?
    - Are you using PURGEOLDEXTRACTS?
    - If so, how are you using it? When more than one process reads a trail, PURGEOLDEXTRACTS should only be used as a Manager parameter, not as an Extract or Replicat parameter. When you use PURGEOLDEXTRACTS as a Manager parameter, there are better options to defer purging until all processes are done with a file.

Report file too big

- ✔ Are you using macros?
    - If so, are you using CMDTRACE?
    - This parameter causes inclusion of macro expansion steps in the report. The DETAIL option writes even more data.
    - If your reporting requirements do not include macro tracing, disable CMDTRACE to reduce the report size.
- ✔ Are you using LIST?
    - This parameter lists the macros of a library in the report. If your reporting requirements do not include macro lists, remove LIST to reduce report size. Otherwise, you can control report size by setting an aging schedule with the REPORTROLLOVER parameter.
- ✔ Are you using DDLOPTIONS REPORT?
    - If DDL information is included in a process report, it increases the size of the file. If you do not need to see step-by-step processing history of DDL operations in the report file, remove the DDLOPTIONS REPORT parameter. The default is DDLOPTIONS NOREPORT.

Troubleshooting other problems

Too many open cursors

- ✔ Is the maximum for open cursors reached?
    - The Extract process maintains cursors for queries that fetch data. The Replicat process maintains cursors for caching SQL statements. These processes also might use other cursors, such as those needed for SQLEXEC operations.
    - If the database will support additional cursors, you can increase the Oracle GoldenGate allocation with the Extract parameter MAXFETCHSTATEMENTS or the Replicat parameter MAXSQLSTATEMENTS. If the database will not support an increase, use those

parameters to reduce the number of cursors. This will affect performance because Oracle GoldenGate will need to age more statements.

Time differences

- ✔ Is the lag report inaccurate?
  - Lag is always accurate in absolute terms, but may seem inaccurate because of differences in system time on source and target machines.
  - Use the TCPSOURCETIMER parameter to reflect a more accurate lag result. This is the default behavior, so check the parameter file to see if NOTCPSOURCETIMER is being used.
- ✔ Do timestamps seem inaccurate?
  - Oracle GoldenGate records are extracted in GMT (Greenwich Mean Time) format. However, source and target timestamps could differ for the same set of data if an application uses the timestamp recorded by Oracle GoldenGate as a column in the target record. Discrepancy occurs if:
    - the timestamp is converted to Local Civil Time (LCT) before being included in the database record, and that data is replicated to a location in another time zone.
    - timestamps are derived locally and used in a key, which can create sequence differences if a table contains records created in two different time zones.
  - Solution: If using timestamps written by Oracle GoldenGate in application data, maintain all timestamps as GMT offsets. GMT is reliable in any time zone and through Daylight Saving time changes without sequence problems. If that is not possible, then use Oracle GoldenGate conversion functions to change the format back and forth as needed.

Oracle ADD TRANDATA problems

- ✔ Are you getting errors with ADD TRANDATA?
  - Is the error " No tables matched specification"?
    - Did you type the table name correctly?
    - Does it exist in the database?
    - Did you use a fully qualified table name? When a schema name is not specified, Oracle GoldenGate uses the current user as the schema.

Other Oracle-specific problems

- ✔ Did Extract abend after you enabled database-level supplemental logging?
  - Did you add the Extract group before you enabled the supplemental logging?
  - If so, use the ALTER EXTRACT command with one of the following options: the BEGIN option set either to NOW (to start capturing from the time that ADD EXTRACT is issued) or with a BEGIN timestamp, or with the EXTSEQNO <seqno>, EXTRBA <relative byte address> option to specify a particular start point in the log.

- ✔ Are there excessive operations being processed by an Oracle Extract?
  - Did you change storage for a SECUREFILE LOB?
  - When changing a SECUREFILE LOB from one storage to another (such as from ENCRYPT to DECRYPT), Oracle updates the whole table, and Extract captures those updates from the log. Therefore, it will appear as though Oracle updated all of the data blocks that are associated with the table.

    NOTE This also can happen when an ALTER TABLE command sets a DEFAULT value to a column that has null values.

- ✔ Are you replicating sequences with Oracle GoldenGate, but the target sequences are not in the expected range of values?
  - By default, Replicat checks to see if the target sequences are either higher or lower than those of the source, depending on the direction of the incrementation method that is in use. If there is a discrepancy, Replicat corrects it automatically unless NOCHECKSEQUENCEVALUE is used in the parameter file.
  - If NOCHECKSEQUENCEVALUE is not in use, and you cannot find a possible cause outside the Oracle GoldenGate configuration, contact Oracle Support. For more information, go to http://support.oracle.com.
- ✔ Does GGSCI return an error similar to the following when you try to register, unregister, add, or delete an Extract group immediately after issuing a DBLOGIN command?

```
2011-01-09 15:32:43  ERROR   OGG-01755  Cannot register or unregister EXTRACT
FETCH_S because of the following SQL error: OCI Error ORA-26668: STREAMS
process OGG$_FETCH_SB8846FDD exists.
```

  - This is a known issue for Oracle version 10.2.0.1 running on AIX.
  - The workaround is to exit GGSCI, and then issue DBLOGIN in a new GGSCI session.
  - This problem has not been observed in Oracle versions 10.2.0.3 and later.

Sybase missing server messages

- ✔ Are Sybase server messages missing from the error log?
  - By default, certain information messages and messages with a severity level greater than 10 are not logged by Oracle GoldenGate to the error log.
  - To show these messages in the log, use the Extract parameter DBOPTIONS with the SHOWINFOMESSAGES and SHOWWARNINGS options.

DB2 z/OS-specific problems

- ✔ Is the number of operations that were executed on the database different from the number that Oracle GoldenGate shows were extracted?
  - These statistics will vary because of the way that messages are updated in the DB2 logs. DB2 does not log update statements if they do not physically change a row.

- ✔ Is Oracle GoldenGate issuing commit locks?

  - This can happen if the DB2 parameter mvsattachtype is set to CAF (call attachment facility, the default). CAF does not support multiple connections, so Oracle GoldenGate issues commit locks on the system catalog tablespace until it receives the commit for its open connection. To avoid commit locks, set the attachment type to RRSAF (Resource Recovery Services Attachment Facility), if possible.

- ✔ Is there an authorization failure 00D31024?

  - If the error is similar to the one following, it means that the location name of the local DB2 subsystem needs to be inserted into the DB2 remote server locations table, SYSIBM.LOCATIONS.

    ```
    2011-01-09 15:48:45 GGS WARNING 228 ODBC operation failed: Couldn't
    connect to cdnxdb2q.
    2011-01-09 15:48:45 GGS WARNING 228 {DB2 FOR OS/390}{ODBC DRIVER}
    DSNT408I SQLCODE = -922, ERROR: AUTHORIZATION FAILURE: 00D31024 ERROR.
    REASON CONNECT DSNT418I SQLSTATE = 42505 SQLSTATE RETURN CODE DSNT415I
    SQLERRP = DSNLVINF SQL PROCEDURE DETECTING ERROR
    DSNT416I SQLERRD = 0 0 0 -1 0 0 SQL DIAGNOSTIC INFORMATION
    DSNT416I SQLERRD = X'00000000' X'00000000' X'00000000' X'FFFFFFFF'
    X'00000000' X'00000000' SQL DIAGNOSTIC INFORMATION ERRLOC=1:13:2.
    2011-01-09 15:48:45 GGS ERROR 118 ODBC error 42505, native database error
    -922.
    2011-01-09 15:48:45 GGS ERROR 190 PROCESS ABENDING.
    ```

  - A statement similar to the following adds the DB2 location name to the remote group:

    ```
    INSERT INTO SYSIBM.LOCATIONS (LOCATION, PORT) VALUES ('DB2A', '446');
    ```

- ✔ Is Oracle GoldenGate unable to use RRSAF?

  - On a Sysplex, RRS is sensitive to system crashes. RRS might start normally after a crash, but Oracle GoldenGate might not be able to use RRSAF. You might see messages similar to:

    ```
    ODBC error 58004, native database error -99999***** ABEND******
    ABEND****** {DB2 FOR OS/390}{ODBC DRIVER}  SQLSTATE=58004 ERRLOC=2:170:4;
    RRS "IDENTIFY" failed using DB2 system:DB7G,  RC=0c and REASON=00f30006
    ```

  - To resolve this error, shut down RRS and then rebuild the RRS structures in the Coupling Facilities using your RRS installation job.

- ✔ Did Extract fail and return DB2 reason codes 00C90063 and 00C90064?

  - This can be a symptom of mismatched compression dictionaries. You will need to resynchronize the affected data and start Oracle GoldenGate processing from the initialized state.

✔ Is Oracle GoldenGate returning the following message?

```
2011-01-16 07:32:18  GGS WARNING     228  The current ODBC session does not
support multiple active transactions. GoldenGate recommends using multiple
transactions to ensure transaction integrity and to enable releasing catalog
locks as soon as possible. The ODBC initialization file should have both
'MVSATTACHTYPE=RRSAF' and 'MULTICONTEXT=1'.
```

- This message indicates that the Call Attachment Facility (CAF) is being used, instead of the Resource Recovery Services Attachment Facility (RRSAF). This message can mean one of the following:
  - The ODBC initialization file specified MVSATTACHTYPE=CAF or did not include an MVSATTACHTYPE specification.
  - The ODBC initialization file does not contain a section for the DB2 subsystem.
  - The ODBC initialization file is not valid because it the encoding is not IBM-1047.
  - The ODBC initialization file is not readable (indicates a file permissions problem).
  - No ODBC initialization file was specified. There are several ways to specify which ODBC initialization file should be used; Oracle GoldenGate sets the DSNAOINI environment variable to the path to the ODBC initialization file that it needs to use. For example, "export DSNAOINI=/etc/odbcDB9A.ini".

SQL Server-specific problems

✔ Is Extract generating a warning that says "replication is not enabled?"

- Are you using the NOMANAGESECONDARYTRUNCATIONPOINT parameter so that SQL Server manages the secondary truncation point?
- If so, and if this is the configuration that you want, then did you also issue the ADD TRANDATA command for the tables? If so, you will get this message, because Extract expects the MANAGESECONDARYTRUNCATIONPOINT in that case. The message is generated as part of the truncation point management process.

✔ Did Extract abend with a warning that a DDL change was made to the source table for which it was trying to capture data?

- Oracle GoldenGate does not support DDL capture for SQL Server, so it expects the metadata for the source and target tables to remain constant. An error like this one indicates that DDL of some sort was performed. To perform DDL on a source table, see Chapter 18 of the Oracle GoldenGate *Windows and UNIX Administrator's Guide*.
- Not all DDL changes will cause Extract to abend, but a warning will always be logged. To suppress the warning, use the TRANLOGOPTIONS parameter with the NODDLCHANGEWARNING option in the Extract parameter file.

Teradata module not found

- ✔ Is there a “module could not be found” error?
  - The error appears as follows only for Teradata on a Windows machine running Windows XP:

    ```
    2011-01-22 16:48:15  GGS ERROR    520  VAMRDR-520 DLL LoadLibrary [Error
    126:The specified module could not be found.:occurred loading
    C:\GGS\TERA\TAM.DLL].
    2011-01-22 16:48:15  GGS ERROR    190  PROCESS ABENDING.
    ```

  - Solution: Put the MSVCR71D.dll driver in your C:\WINDOWS\SYSTEM32 folder.

CHAPTER 4

Using the Logdump Utility

Logdump is a utility of Oracle GoldenGate that enables you to search for, filter, view, and save data that is stored in a trail or extract file. To avoid any adverse effects on the data or checkpoints in your trails, use Logdump only with guidance from an Oracle support analyst or an experienced Oracle GoldenGate user.

Getting started with Logdump

This section introduces you to basic Logdump commands that enable you to open files, control the display, navigate through a file, and filter for specific information, among other basic tasks. It also illustrates and explains the components of a record.

Following this section is an alphabetical reference of the Logdump commands.

Viewing the first record

These steps show you how to set up the Logdump environment and start viewing records.

To run Logdump

Run the logdump program from the Oracle GoldenGate installation location. Logdump command lines are numbered so that you can use edit and history commands.

To set up the view

The following commands set up a Logdump environment that shows the information most commonly used when analyzing Oracle GoldenGate trail records.

1. To view the record header with the data:

   ```
   Logdump 1> GHDR ON
   ```

   The record header contains information about the transaction.

2. To add column information:

   ```
   Logdump 2> DETAIL ON
   ```

   Column information includes the number and length in hex and ASCII.

3. To add hex and ASCII data values to the column information:

   ```
   Logdump 3> DETAIL DATA
   ```

4. To view user tokens:

   ```
   Logdump 4> USERTOKEN ON
   ```

   User tokens are custom user-defined information that is specified in a TABLE mapping statement and stored in the trail file for specific purposes.

5. To control how much record data is displayed:

   ```
   Logdump 5> RECLEN <length>
   ```

To open a trail file

1. Open a file with the following command:

   ```
   Logdump 6> OPEN <file_name>
   ```

   Where: <file_name> is either the relative name or fully qualified name of the file, including the file sequence number. For example:

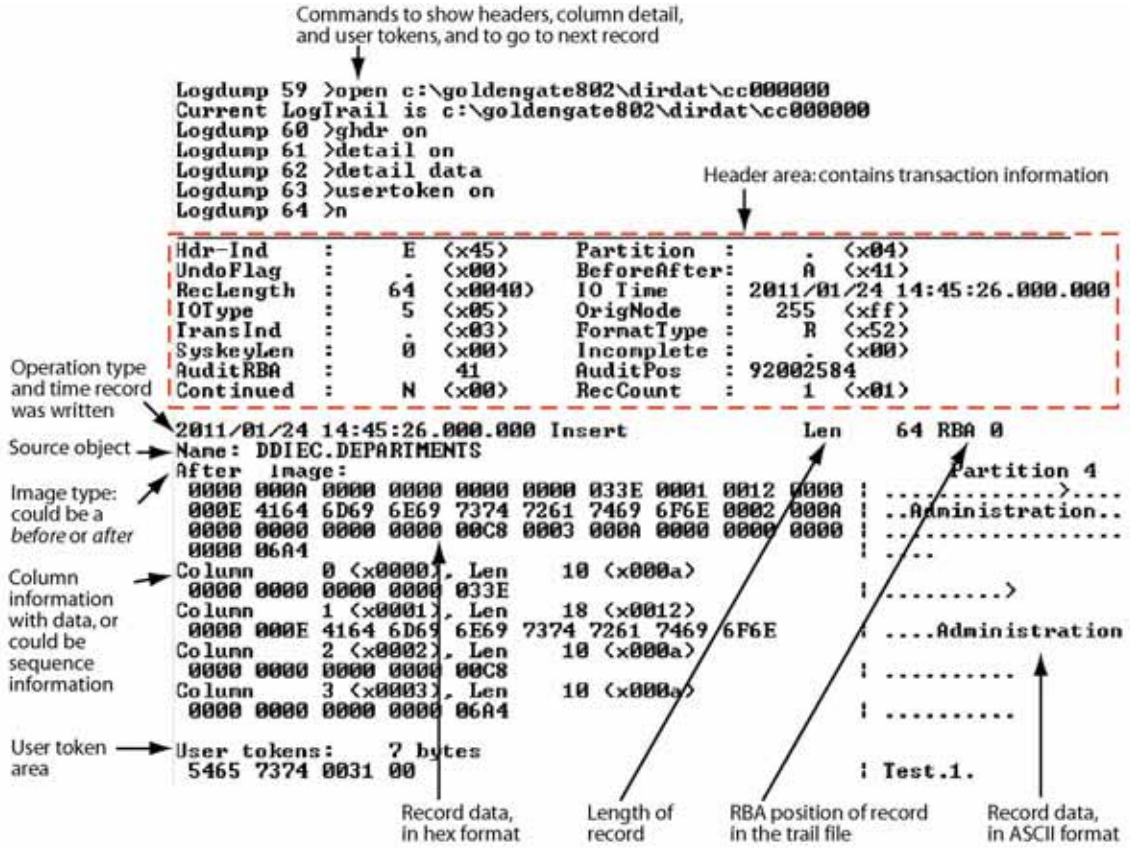
   ```
   open /home/ggs/dirdat/jd000000
   ```

2. To go to the first record and then move through records in sequence:

   ```
   Logdump 7> NEXT
   ```
   (or just type an N)

An Oracle GoldenGate trail record looks similar to the one in the following illustration, depending on what views are activated and what type of record it is. In this case, commands were issued to show the header portion of the record, to show column-level detail, and to show user tokens.

Figure 5 Sample trail record as viewed in Logdump on a Windows system



Executing basic Logdump tasks

The following are some basic tasks that can be performed with Logdump. For detailed information about the commands shown and other available options, see the alphabetical reference beginning on page 82.

To find the next good record header

```
Logdump 8> SCANFORHEADER
```

(or just type `SFH`)

To find the beginning, middle, and end of a transaction

1. Show headers and detail.

```
Logdump 9> GHDR ON
Logdump 10> DETAIL ON
```

2. Go to the next record.

```
Logdump 11> N
```

3. View the TransInd field in the record header. The following tells you where the record is in relation to the transaction.

`TransInd : . (x00)`	First statement in transaction
`TransInd : . (x01)`	Statement in middle of transaction
`TransInd : . (x02)`	Last statement in transaction
`TransInd : . (x03)`	Sole statement in transaction

4. Move through subsequent records by pressing N, and refer to the TransInd field to determine where each one is within the transaction. When TransInd is either x02 or x03, the TransInd of the next record should be x00, starting a new transaction.

To scan for the end of a transaction

```
Logdump 20> SCANFORENDTRANSACTION
```

(or just type `SFET`)

The record shown will be the first one in the next transaction. To confirm, the TransInd field should be x00.

To go to a specific RBA in the file

- To go to an RBA anywhere in the file:

```
Logdump 35> POS <rba>
Logdump 36> N
```

This displays the record located at that RBA.

- To go to the first record in the file:

```
Logdump 37> POS FIRST
```

or...

```
Logdump 37> POS 0
```

To filter based on a table name

- To filter out everything except records containing a specific table name:

```
Logdump 60> FILTER INCLUDE FILENAME <schema>.<table>
```

Now, when you use the N command, you will only see records that satisfy this filter.

- Conversely, to filter out records containing a specific table name, but show everything else, use the EXCLUDE option instead of INCLUDE.

To remove the current filter criteria

```
Logdump 62> FILTER CLEAR
```

To filter on multiple conditions

```
Logdump 65> FILTER INCLUDE FILENAME <schema>.<table>; FILTER RECTYPE
<record_type>; FILTER MATCH ALL
```

Use MATCH ANY or MATCH ALL depending on whether you want the search to match any or all of the filter conditions, respectively, when multiple conditions are specified. The preceding example filters on a name and record type, typically an operation type such as INSERT.

To count the records in a trail file

```
Logdump 67> COUNT
```

This shows a count summary followed by counts for each table.

To save records to a new trail file

- To save the whole file:

  ```
  Logdump 68> SAVE <file>
  ```

  Where: <file> is the name of the new file.

- To save a subset of records:

  ```
  Logdump 69> SAVE <file> <n> RECORDS
  ```

To close the current file and open the next one in the trail

```
Logdump 70> NEXTTRAIL
```

To keep a log of your session

- To start logging:

  ```
  Logdump 71> LOG TO <filename>.txt
  ```

- To write text to the log:

  ```
  Logdump 72> WRITELOG "<text>"
  ```

- To stop logging:

  ```
  Logdump 73> LOG STOP
  ```

To see the current Logdump environment

```
Logdump 74> ENV
```

This shows which features are enabled, such as filtering and header views, and it shows environment information such as the current trail and position.

To get online command help

```
Logdump 75> HELP
```

To exit Logdump

```
Logdump 100> EXIT
```

Or…

```
Logdump 100> QUIT
```

Evaluating transaction size

Use Logdump's TRANSHIST command in conjunction with other Logdump commands to determine whether or not your applications generate large transactions and to identify their relative size. TRANSHIST causes Logdump to track the size of transactions contained in a trail file or extract file in an internal history table. The transactions are ranked in descending order of size, in bytes. When the history table is full, the smallest transaction is removed to allow a larger transaction to be added to the list.

To use statistics generated by TRANSHIST, issue the following series of commands in Logdump:

1. Use TRANSHIST to set the size of the history table that tracks transaction size. The maximum size is 200 bytes. A value of 0 turns off the tracking.

   ```
   TRANSHIST <n>
   ```

2. Use either the TRANSRECLIMIT or TRANSBYTELIMIT command to set a lower boundary for what is considered a normal sized transaction. These commands prevent normal-sized transactions from being tracked. Eliminating normal-sized transactions reduces the amount of data that must be reviewed.

   ```
   {TRANSBYTELIMIT <n bytes> | TRANSRECLIMIT <n records>}
   ```

3. Use Logdump's COUNT command to display the statistics on transaction size, which appear at the end of the output and look like the following excerpt:

   ```
   Transactions with at least 100 records or 100000 bytes
   2011/02/01 09:31:24.000.000    00:00:00.000, Seq 0, RBA 13101
       Bytes/Trans .....    1168167
       Records/Trans ...       1001
       Files/Trans .....          1
   2011/02/01 09:31:35.000.000    00:00:11.000, Seq 0, RBA 1205292
       Bytes/Trans .....    1168167
       Records/Trans ...       1001
       Files/Trans .....          1
   ```

   Logdump scans the file(s) and reports the information.

4. Use Logdump's POSITION <RBA> command to go to each RBA listed in the COUNT output to find out the name of the table that generated the transaction. You can group these tables into their own processing group so that they do not affect processing of other tables that generate normal sized transactions.

Maintaining command history

On Windows and UNIX systems, command history is stored in a file named logdump.hst. The file is created in the home location of the user who first started Logdump.

When Logdump starts up, it looks for the history file in one of the following locations, depending on the platform:

- The USERPROFILE environment variable.
- The $HOME environment variable.

If the file exists, Logdump loads the command history into a buffer. The command history buffer holds 400 commands. Upon termination of the Logdump session, the session's history is appended to the file.

Logdump command reference guide

This is the reference guide for Logdump commands.

Logdump command summary

The following are category summaries of the Logdump commands.

Table 2 Working with files

Commands	Description
CD	Sets the default directory.
LOG	Writes a session log.
NEXTTRAIL	Closes the current file and opens the next file in the trail sequence.
OPEN	Opens a trail file or extract file.
POSITION	Sets the read position in the file.
SAVE	Writes record data to another file.
WRITELOG	Writes text to a session log.

Table 3 Viewing information

Command	Description
COUNT	Displays record count information.
FILES	Displays file names in the current directory.

Table 3 Viewing information (continued)

Command	Description
ENV	Displays current Logdump settings.
FILEHEADER	Displays file header information.
NOTIFY	Displays the number of records scanned, the trail position, and the record timestamp at specified intervals when using COUNT and records are being suppressed from display through filtering options.
SHOW	Displays internal information such as the current Logdump environment, a list of Oracle GoldenGate record types, and current filter settings.
TIME	Displays the current time in local and GMT formats.

Table 4 Selecting data and records

Command	Description
DUMP	Displays the specified number of bytes of data from the current position in the file.
FILTER	Filters the display of records.
NEXT	Displays the next record(s) in the file.
SCANFORENDTRANSACTION	Finds a record that is the last record of, or the only record in, a transaction, and then displays the first record of the next transaction.
SCANFORHEADER	Finds the start of the next record header.
SCANFORRBA	Finds a specific relative byte address.
SCANFORTIME	Finds the next record with a specific timestamp.
SCANFORTYPE	Finds the next record of a specific type.
SKIP	Skips a specified number of records.

Table 5 Making conversions

Command	Description
COMPUTETIMESTAMP	Converts a datetime string to a Julian timestamp.

Table 5 Making conversions (continued)

Command	Description
CTIME	Converts a C timestamp to an ASCII timestamp.
DECRYPT	Decrypts data before displaying it in Logdump.
ENCRYPT	Encrypts file data.
INTERPRETINTERVAL	Displays a 64-bit Julian interval as days-hh:mm:ss:ms:us.
INTERPRETTIMESTAMP	Displays a 64-bit Julian timestamp in ASCII format.

Table 6 Controlling the Logdump environment

Command	Description
ASCIIDATA | EBCDICDATA	Controls whether data is displayed in ASCII or EBCDIC format on an IBM mainframe.
ASCIIDUMP | EBCDICDUMP	Sets the character set on an IBM mainframe.
ASCIIHEADER | EBCDICHEADER	Controls whether the table name is displayed in ASCII or EBCDIC format on an IBM mainframe.
DETAIL	Controls the display of detailed record information.
GHDR	Controls the display of header information.
HEADERTOKEN	Controls the display of header token indicators.
RECLEN	Sets the maximum data output length.
SCANSCROLLING	Controls whether a count notification displays on one line or multiple lines.
TIMEOFFSET	Sets the time offset from GMT.
TRAILFORMAT	Sets the trail format to the old version (pre-Oracle GoldenGate 6.0) or the new version.
TRANSBYTELIMIT	Sets a byte-count threshold for what is defined as a normal-sized transaction.
TRANSHIST	Sets the size of the transaction history table that is used for tracking transaction size.
TRANSRECLIMIT	Sets a record-count threshold for what is defined as a normal-sized transaction.

Table 6 Controlling the Logdump environment (continued)

Command	Description
USERTOKEN	Controls the display of user token data.

Table 7 Miscellaneous commands

Command	Description
DEBUG	Turns on Logdump debugging.
EXIT	Exits Logdump.
FC	Edits a previous command.
HELP	Shows syntax for Logdump commands.
HISTORY	Lists previously issued commands.
OBEY	Executes a series of commands stored in a file.
X	Executes a program from within Logdump.

ASCIIDATA | EBCDICDATA

Use ASCIIDATA or EBCDICDATA to control whether record data is displayed in ASCII or EBCDIC format on an IBM mainframe. You may need to use the ASCIIDUMP command to set the character set first.

Default `ASCIIDATA ON` (same as `EBCDICDATA OFF`)

Syntax `ASCIIDATA {ON | OFF} | EBCDICDATA {ON | OFF}`

ASCIIDUMP | EBCDICDUMP

Use ASCIIDUMP or EBCDICDUMP to set the character set for the output of the DUMP command on an IBM mainframe. The hex part of the dump display is not affected by this command.

Default `ASCIIDUMP ON` (same as `EBCDICDUMP OFF`)

Syntax `ASCIIDUMP {ON | OFF} | EBCDICDUMP {ON | OFF}`

ASCIIHEADER | EBCDICHEADER

Use ASCIIHEADER or EBCDICHEADER to control whether or not the table name in the record header is in ASCII or EBCDIC format on an IBM mainframe. You may need to use the ASCIIDUMP command to set the character set first.

Default ASCIIHEADER ON (same as EBCDICHEADER OFF)

Syntax ASCIIHEADER {ON | OFF} | EBCDICHEADER {ON | OFF}

Syntax

CD

Use CD to set the default directory. An alias for this command is VOLUME.

Default None

Syntax CD <directory>

COMPUTETIMESTAMP

Use COMPUTETIMESTAMP to convert a datetime string to Julian format.

Default None

Syntax COMPUTETIMESTAMP <datetime string>

Argument	Description
<datetime string>	A datetime string in the format of: [[yy]yy-mm-dd] [hh[:mm][:ss]]

Example COMPUTETIMESTAMP 2005-01-01 12:00:00

This returns the following:

```
2005-01-01 12:00:00 is JulianTimestamp 211971340800000000
```

COUNT

Use COUNT to produce a record count summary and other information related to the amount of data in the file. The basic output, without options, shows the following:

- The RBA where the count began
- The number of records in the file
- The total data bytes and average bytes per record
- Information about the operation types
- Information about the transactions

When the DETAIL command is issued prior to issuing COUNT, the information includes a count for each table. COUNT options allow you to show table detail without using the DETAIL command first, set a start and end time for the count, filter the count for a table, trail file, or extract file, and specify a time interval for counts.

For arguments that take a time string, use the following format:

[[yy]yy-mm-dd] [hh[:mm][:ss]]

Default Produce a count summary of all records.

Syntax

```
COUNT
[, DETAIL]
[, END[TIME] <time_string>]
[, FILE <specification>]
[, INT[ERVAL] <minutes>]
[, LOG] <wildcard>]
[, START[TIME] <time_string>]
```

Argument	Description
DETAIL	Adds a count for each table that was processed by Extract to the summary count. The information includes the total and average number of data bytes and information about the operations that were performed. This data can also be obtained by using the DETAIL command before issuing COUNT.
END[TIME] <time_string>	Stops the count with the last record written at the specified time.
FILE <specification>	Specifies the count to be generated for the specified table or group of names designated with a wildcard (*).
INT[ERVAL] <minutes>	Displays statistics for total bytes, average bytes, and number of each type of operation that occurred within a specified interval of time, in minutes. Then it displays the totals for those statistics.
LOG <wildcard>	Produces a count for multiple trail or extract files specified with a wildcard.
START[TIME] <time_string>	Begins the count with the first record written at the specified time.

Example 1

```
COUNT START 2011-01-11 12:00:00 , END 2011-01-12 12:00:00
```

Example 2

```
COUNT INTERVAL 4
```

This displays something similar to the following (individual table count has been truncated due to space constraints):

```
Interval from 2011/02/28 11:30:00.000 to 2011/02/28 11:34:00.000,
Recs                              3
Total Data Bytes                120
  Avg Bytes/Record               40
Delete                            3
Before Images                     3
LogTrail /home/ggs/dirdat/rt000000 has 304 records
Total Data Bytes              12120
Avg Bytes/Record                 39
Delete                            3
Insert                          300
FieldComp                         1
```

```
Before Images                    3
After Images                   301

Average of 303 Transactions
    Bytes/Trans .....           88
    Records/Trans ...            1
    Files/Trans .....            1
HR.JOBS                                          Partition 4
Total Data Bytes              5911
  Avg Bytes/Record              68
Insert                          86
After Images                    86

HR.REGIONS                                       Partition 4
Total Data Bytes               512
  Avg Bytes/Record              32
Insert                          16
After Images                    16
```

Example 3 `COUNT LOG ls*`

This produces a count for all files whose names begin with LS. (Individual table count has been truncated due to space constraints.)

```
Current LogTrail is c:\goldengate802\dirdat\ls000000
Bad record found at RBA 5287, format 5.50)
 2A56 623F                                       | *Vb?
LogTrail c:\goldengate802\dirdat\ls000000 has 33 records
LogTrail c:\goldengate802\dirdat\ls000000 closed
Current LogTrail is c:\goldengate802\dirdat\ls000001
LogTrail c:\goldengate802\dirdat\ls000001 has 99 records
LogTrail c:\goldengate802\dirdat\ls000001 closed
Current LogTrail is c:\goldengate802\dirdat\ls000002
LogTrail c:\goldengate802\dirdat\ls000002 has 0 records
LogTrail c:\goldengate802\dirdat\ls000002 closed
Current LogTrail is c:\goldengate802\dirdat\ls000003
LogTrail c:\goldengate802\dirdat\ls000003 has 0 records
LogTrail c:\goldengate802\dirdat\ls000003 closed
LogTrail c:\goldengate802\dirdat\ls* has 132 records

Total Data Bytes              9468
  Avg Bytes/Record              71
Insert                         132
After Images                   132

Average of 4 Transactions
    Bytes/Trans .....         3951
    Records/Trans ...           33
    Files/Trans .....            3

HR.JOBS                                          Partition 4
Total Data Bytes              5220
```

```
  Avg Bytes/Record              68
Insert                          76
After Images                    76
```

Example 4 `COUNT DETAIL`

This produces something similar to the following:

```
LogTrail /home/ggs/dirdat/rt000000 has 304 records
Total Data Bytes             12120
  Avg Bytes/Record              39
Delete                           3
Insert                         300
FieldComp                        1
Before Images                    3
After Images                   301

Average of 303 Transactions
    Bytes/Trans .....           88
    Records/Trans ...            1
    Files/Trans .....            1

GGS.TCUSTMER                                    Partition 4
Total Data Bytes             12120
  Avg Bytes/Record              39
Delete                           3
Insert                         300
FieldComp                        1
Before Images                    3
After Images                   301

Files      1, Coll      0, Chain      0
```

CTIME

Use CTIME to convert a C timestamp to an ASCII timestamp.

Default None

Syntax `CTIME <C timestamp string>`

Example `CTIME 1109823330`

This returns the following:

```
timestamp  = 1109823330 (0x42268f62)
localtime  = Wed Mar  2 20:15:30 2005
gmtime     = Thu Mar  3 04:15:30 2005
```

DEBUG

Use DEBUG to run debugging for Logdump. Use this command with the guidance of a Oracle GoldenGate support analyst.

Default Disabled

Syntax DEBUG

DECRYPT

Use DECRYPT to decrypt data that was encrypted with Oracle GoldenGate trail encryption, so that it can be viewed with Logdump.

Default OFF

Syntax DECRYPT {OFF | ON [KEYNAME <keyname>]}

Argument	Description
OFF	No decryption. This is the default.
ON [KEYNAME <keyname>]	◆ ON without the KEYNAME clause decrypts data that was encrypted with the ENCRYPTTRAIL parameter without options (256-key byte substitution). ◆ ON with the KEYNAME clause decrypts data that was encrypted with ENCRYPTTRAIL using an AES algorithm and a KEYNAME clause. For <keyname>, supply the logical name of the encryption key that was used in the KEYNAME <keyname> clause of ENCRYPTTRAIL. For reference, the syntax of ENCRYPTTRAIL is: ENCRYPTTRAIL [{AES128 | AES192 | AES256} KEYNAME <keyname>]

Example DECRYPT ON

Example DECRYPT ON KEYNAME mykey

DETAIL

Use DETAIL to include additional information in the Logdump output. By default, Logdump only shows the hex and ASCII representation of the record.

Without options, DETAIL displays the status of record detail (ON or OFF). Options do the following:

- DETAIL ON displays a list of columns that includes the column ID, length, and value in hex and ASCII.
- DATA adds hex and ASCII data values to the column list.
- DETAIL OFF turns off detailed display.

For an illustration of how DETAIL output looks, see Figure 5 on page 78 .

DETAIL can be shortened to DET.

Default Display a column list

Syntax `DETAIL {ON | OFF | DATA}`

Argument	Description
`ON`	Shows detailed column information.
`OFF`	Suppresses detailed column information.
`DATA`	Adds the hex and ASCII data values to the column information.

DUMP

Use DUMP to display a HEX/ASCII or HEX/EBCDIC dump of the specified number of bytes from the open trail or extract file, starting at the current RBA.

Default 256

Syntax `DUMP <bytes>`

Argument	Description
`<bytes>`	The number of bytes forward to display. Valid values are from 1 through 28672.

Example `DUMP 300`

This produces something similar to the following:

```
Dump  300 Bytes at RBA 0
 4700 0047 4800 003B 4500 0041 0000 646D 02F1 3387 | G..GH..;E..A..dm..3.
 841D FE98 0000 0000 0000 0000 5EA8 DC3C 0352 0000 | ..........^..<.R..
 0000 5C54 5249 4C4C 2E24 5141 3031 2E51 4153 5243 | ..\TRILL.$QA01.QASRC
 2E41 4343 544E 005A 0000 4747 0000 4748 0000 3B45 | .ACCTN.Z..GG..GH..;E
 0000 4100 0064 6D02 F133 8784 3CB5 9100 0000 0000 | ..A..dm..3..<.......
 0000 005E A9C7 F403 5200 0000 005C 5452 494C 4C2E | ...^....R....\TRILL.
 2451 4130 312E 5141 5352 432E 4143 4354 5300 5A00 | $QA01.QASRC.ACCTS.Z.
 0047 4700 0048 4800 003C 4500 0041 0000 646D 02F1 | .GG..HH..<E..A..dm..
 3387 84A0 5654 0000 0000 0000 0000 5EAC 4FF0 0352 | 3...VT........^.O..R
 0000 0000 5C54 5249 4C4C 2E24 5141 3031 2E51 4153 | ....\TRILL.$QA01.QAS
 5243 2E46 554E 4354 4E00 5A00 0048 4700 0047 4800 | RC.FUNCTN.Z..HG..GH.
 003B 4500 0041 0000 646D 02F1 3387 84A5 C91B 0000 | .;E..A..dm..3.......
 0000 0000 0000 5EAC 6250 0352 0000 0000 5C54 5249 | ......^.bP.R....\TRI
 4C4C 2E24 5141 3031 2E51 4153 5243 2E47 4754 4B4E | LL.$QA01.QASRC.GGTKN
 005A 0000 4747 0000 4948 0000 3D45 0000 4100 0064 | .Z..GG..IH..=E..A..d
```

ENCRYPT

Use ENCRYPT to encrypt text supplied as an argument. The encryption method is 256-key

byte substitution. The results are printed to screen.

Default None

Syntax `ENCRYPT <text>`

Example `ENCRYPT 123456789`

This produces the following:

```
Before
 3132 3334 3536 3738 39 | 123456789
After
 EF2E C1DC E4A7 68B4 14 | ......h..
```

ENV

Use ENV to show current Logdump settings.

Default None

Syntax `ENV`

Example The following shows typical ENV settings.

```
Current Volume      : C:\GoldenGate802
LogTrail            : c:\goldengate802\dirdat\jd000001
Trail Format        : New
End of File         : 15861
Current Position    : 0
Next Position       : 0
Last Modtime        : 2011/01/27 13:45:51.000.000
Display RecLen      : 140
Logtrail Filter     : On
Show Ghdr           : On
Detail              : On
Trans History       : 0 Transactions, Records 100, Bytes 100000
LargeBlock I/O      : On, Blocksize 57344
Local System        : LittleEndian
Logtrail Data       : BigEndian/ASCII
Logtrail Headers    : ASCII
Dump                : ASCII
Timeoffset          : LOCAL
Scan Notify Interval: 10000 records, Scrolling On
```

EXIT

Use EXIT to exit Logdump and terminate the process. An alias for EXIT is QUIT.

Default None

Syntax `EXIT`

FC

Use FC to edit a previously issued Logdump command and then execute it again. Previous commands are stored in the memory buffer and can be displayed by issuing the HISTORY command (see page 111). Issuing FC without arguments executes the most recently used

command. By using options, you can retrieve a specific command by specifying its line number or a text substring.

Using the editor

The FC command displays the command and then opens an editor with a prompt containing a blank line starting with two dots. To edit a command, use the space bar to position the cursor beneath the character where you want the change to begin, and then enter one of the following arguments. Arguments are not case-sensitive and can be combined.

Argument	Description

`i <text>`	Inserts text. For example:
	`Logdump 24> fc 9`
	`> count`
	`..     i detail`
	`count detail`

`r <text>`	Replaces text. For example:
	`Logdump 25> fc 10`
	`> timeoffset local`
	`..           rgmt`
	`timeoffset gmt`

`d`	Deletes a character. To delete multiple characters, enter a d for each one. For example:
	`Logdump 26> fc 11`
	`> scanforrrbba`
	`..        dd`
	`scanforrba`

`<replacement text>`	Replaces the displayed command with the text that you enter on a one-for-one basis. For example:
	`Logdump 26> fc 10`
	`> scanforrba 107`
	`..           127`
	`scanforrba 127`

To execute the command, press Enter twice, once to exit the editor and once to issue the command. To cancel an edit, type a forward slash (/) twice.

Default Execute the most recent command again

Syntax `FC [<n> | -<n> | <string>]`

Argument	Description
`<n>`	Returns the specified command line. Each Logdump command line is sequenced, beginning with 1 at the start of the session.

Argument	Description
-<n>	Returns the command that was issued <n> lines before the current line.
<string>	Returns the last command that starts with the specified text string.

Example 1 `FC 9`

Example 2 `FC -3`

Example 3 `FC sca`

FILEHEADER

Use FILEHEADER to display the contents of the header of the currently open trail file.

The file header is stored as a record at the beginning of a trail file preceding the data records. The information that is stored in the trail header provides enough information about the records to enable an Oracle GoldenGate process to determine whether the records are in a format that the current version of Oracle GoldenGate supports.

The trail header fields are stored as tokens, where the token format remains the same across all versions of Oracle GoldenGate. If a version of Oracle GoldenGate does not support any given token, that token is ignored. Depracated tokens are assigned a default value to preserve compatibility with previous versions of Oracle GoldenGate.

The current FILEHEADER command applies globally to the Logdump session, until a different FILEHEADER command is issued.

To view the file header

1. Position to the beginning of the trail file with the following Logdump command.

   ```
   pos 0
   ```

2. Issue the following Logdump command to see the first record of the file, the one that contains the file header.

   ```
   next
   ```

To retrieve the file header tokens

To retrieve file header values as input parameters, use the @GETENV function with the GGFILEHEADER option. See the *Windows and UNIX Reference Guide*.

NOTE The Logdump command HEADERTOKEN also shows trail tokens, but it shows a brief summary of each one. FILEHEADER shows actual token values.

Table 8 Oracle GoldenGate file header tokens

Token/subtoken	Data Type	Description
TrailInfo		**Information about the trail file.**
Signature	UINT32	Internal use.

Table 8 Oracle GoldenGate file header tokens

Token/subtoken	Data Type	Description
Compatibility	UINT16	The version of the trail. The compatibility level of the Oracle GoldenGate software must be greater than, or equal to, that of the trail file for a process to be able to read the trail file. Current valid values are 0 or 1.
CharSet	INT32	The global character set of the trail file, as defined in the parameter file or the default value. For example: WCP1252-1 -3 indicates the system default.
CreationTime	Timestamp	The time that the trail file was created, in local GMT Julian time, INT 64.
URI	UString	The universal resource identifier of the process that created the trail file, in the format of: <host_name>:<dir>:[:<dir>][:<dir_n>]<group_name> **Where:** ◆ host_name is the name of the server that hosts the process ◆ dir is a subdirectory of the Oracle GoldenGate installation path. ◆ group_name is the name of the process group that is linked with the process. **Example**: sys1:home:oracle:v9.5:extora Shows where the trail was processed and by which process. This includes a history of previous runs.
URIHistory	UString Vector	List of the URIs of processes that wrote to the trail file before the current process. ◆ For a primary Extract, this field is empty. ◆ For a data pump, this field is URIHistory + URI of the input trail file.
FileName	UString	Name of the trail file. Can be absolute or relative path, with forward or backward slash depending on the filesystem.
MultiPart	Boolean	True/false flag indicating whether the trail file is a single file (such as one created for a batch run) or a sequentially numbered file that is part of a trail for online, continuous processing. If false, the SeqNum subtoken is not valid.
SeqNum	UINT32	The sequence number of the file in the trail, if MultiPart is true. Invalid if multipart is false. The value is the numerical sequence number, without any zero padding.

Table 8 Oracle GoldenGate file header tokens

Token/subtoken	Data Type	Description
FileSize	UINT642	Size of the trail file. Value is NULL until the trail file is completed. Non-NULL values are in bytes.
FirstRecordCSN	CSN	The commit sequence number (CSN) of the first record in the trail file.Value is NULL until the trail file is completed.
LastRecordCSN	CSN	The commit sequence number (CSN) of the last record in the trail file.Value is NULL until the trail file is completed.
FirstRecordIOTime	Timestamp	The time that the first record in the trail file was written.Value is NULL until the trail file is completed.
LastRecordIOTime	Timestamp	The time that the last record in the trail file was written.Value is NULL until the trail file is completed.
MachineInfo		**Information about the local host of the trail file.**
SysName	UString	The name of the operating system, for example: SunOX Linux Microsoft Windows
NodeName	UString	The name of the machine, for example sys1.
Release	UString	The release level of the operating system, for example: 5.10 2.6.9-11.ELsmp
Version	UString	The version of the operating system, for example: s10_69 #1 SMP Fri Feb 24 16:56:28 EST 2006
Hardware	UString	The hardware type of the processor, for example: sun4u x86_64 x86
DatabaseInfo		**Information about the database that produced the data in the trail file.**

Table 8 Oracle GoldenGate file header tokens

Token/subtoken	Data Type	Description

Vendor	UINT16	The name of the database vendor. Some (but not all) examples are:
		`DB2 ZOS`
		`CTREE`
		`MSSQL`
		`MYSQL`
		`ORACLE`
		`SQLMX`
		`SYBASE`
		`TERADATA`
		`TIMESTEN`
		`NONSTOP`
		`ENSCRIBE`

Name	UString	The name of the database, for example findb.
Instance	UString	The name of the database instance, if applicable to the database type, for example ORA1022A.
Charset	INT32	The character set of the database. Currently, the valid value is -1 (unknown). (For some databases, this will be empty.)
MajorVersion	UINT16	The major version of the database.
MinorVersion	UINT16	The minor version of the database.
VerString	UString	The maintenance (patch) level of the database.
ClientCharset	INT32	The character set of the database client. Currently, the valid value is -1 (unknown). (For some databases, this will be empty.)
ClientVerString	UString	The maintenance (patch) level of the database client. (For some databases, this will be empty.)
ProducerInfo		**Information about the Oracle GoldenGate process that created the trail file.**
Name	UString	The group name that is associated with the process.

Table 8 Oracle GoldenGate file header tokens

Token/subtoken	Data Type	Description
DataSource	UINT16	The data source that was read by the process. Can be one of: ◆ DS_EXTRACT_TRAILS (source was an Oracle GoldenGate extract file, populated with change data) ◆ DS_LOG_TABLE (source was an Oracle GoldenGate log table, used for trigger-based extraction) ◆ DS_DATABASE (source was a direct select from database table written to a trail, used for SOURCEISTABLE-driven initial load) ◆ DS_TRAN_LOGS (source was the database transaction log) ◆ DS_INITIAL_DATA_LOAD (source was Extract; data taken directly from source tables) ◆ DS_VAM_EXTRACT (source was a vendor access module) ◆ DS_VAM_TWO_PHASE_COMMIT (source was a VAM trail)
MajorVersion	UINT16	The major version of the process (xx).
MinorVersion	UINT16	The minor version of the process (xx.xx).
MaintenanceLevel	UINT16	The maintenance version of the process (xx.xx.xx).
PatchLevel	UINT16	The patch version of the process (xx.xx.xx.xx).
BuildNumber	UINT16	The build number of the process.
VerString	UString	The version string of the process. For example: 11.1.1.17A not for production
ContinuityInfo		**Contains recovery information that is carried over from the previous trail file in the sequence.**
RecoveryMode	UINT16	Internal use
LastCompletedCSN	CSN	Internal use
LastCompletedXids	Xid	Internal use
LastSCN	CSN	Internal use
LastXid	Xid	Internal use

Default OFF

Syntax FILEHEADER {ON | OFF | DETAIL}

Argument	Description
ON	Enables the display of the file header, showing the main header tokens.
OFF	Disables the display of the file header.
DETAIL	Provides detailed information that includes the sub-tokens.

Example 1 `FILEHEADER ON`

```
TokenID x46 'F' Record Header    Info x00  Length  587
TokenID x30 '0' TrailInfo        Info x00  Length  303
TokenID x31 '1' MachineInfo      Info x00  Length  103
TokenID x32 '2' DatabaseInfo     Info x00  Length   88
TokenID x33 '3' ProducerInfo     Info x00  Length   85
TokenID x34 '4' ContinunityInfo  Info x00  Length    4
TokenID x5a 'Z' Record Trailer   Info x00  Length  587

2011/1/18 13:39:18.951.346 FileHeader           Len   587 RBA 0
Name: *FileHeader*
 3000 012f 3000 0008 660d 0a71 3100 0006 0001 3200 | 0../0...f..q1.....2.
 0008 0000 0016 3300 000c 02f1 7834 eac7 7f3f 3400 | ......3.....x4...?4.
 0037 0031 7572 693a 7465 6c6c 7572 6961 6e3a 3a68 | .7.1uri:tellurian::h
 6f6d 653a 6d63 6361 7267 6172 3a67 6773 3a67 6773 | ome:mccargar:ggs:ggs
 4f72 6163 6c65 3a73 6f75 7263 6536 0000 1700 112e | Oracle:source6......
 2f64 6972 6461 742f 6572 3030 3030 3030 3700 0005 | /dirdat/er0000007...
 0138 0000 0800 01e2 4039 0000 0c00 0000 0000 001d | .8......@9..........

GroupID x30 '0' TrailInfo        Info x00  Length  303
 3000 012f 3000 0008 660d 0a71 3100 0006 0001 3200 | 0../0...f..q1.....2.
 0008 0000 0016 3300 000c 02f1 7834 eac7 7f3f 3400 | ......3.....x4...?4.
 0037 0031 7572 693a 7465 6c6c 7572 6961 6e3a 3a68 | .7.1uri:tellurian::h
 6f6d 653a 6d63 6361 7267 6172 3a67 6773 3a67 6773 | ome:mccargar:ggs:ggs
 4f72 6163 6c65 3a73 6f75 7263 6536 0000 1700 112e | Oracle:source6......
 2f64 6972 6461 742f 6572 3030 3030 3030 3700 0005 | /dirdat/er0000007...
 0138 0000 0800 01e2 4039 0000 0c00 0000 0000 001d | .8......@9..........
 a33b 0000 450a 3634 3136 3138 3936 3932 0000 0000 | .;..E.6416189692....
 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 | ....................
 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 | ....................
 0000 0000 0000 0000 0000 3aff 0045 0000 0000 0000 | ..........:..E......
 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 | ....................
 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 | ....................
 0000 0000 0000 0000 0000 0000 0000 0000 0000 003d | ...................=
 0000 0c02 f178 34eb 556a 403c ff00 0c00 0000 0000 | .....x4.Uj@<........
 0000 00                                           | ...
```

```
GroupID x31 '1' MachineInfo      Info x00  Length  103
 3100 0067 3000 000b 0005 4c69 6e75 7831 0000 0f00 | 1..g0.....Linux1....
 0974 656c 6c75 7269 616e 3200 0014 000e 322e 362e | .tellurian2.....2.6.
 392d 3131 2e45 4c73 6d70 3300 0029 0023 2331 2053 | 9-11.ELsmp3..).##1 S
 4d50 2046 7269 204d 6179 2032 3020 3138 3a32 353a | MP Fri May 2018:25:
 3330 2045 4454 2032 3030 3534 0000 0c00 0678 3836 | 30 EDT 20054.....x86
 5f36 34                                           | _64

GroupID x32 '2' DatabaseInfo     Info x00  Length   88
 3200 0058 3000 0006 0007 3100 000e 0008 4f52 4131 | 2..X0.....1.....ORA1
 3032 3241 3200 000e 0008 6f72 6131 3032 3261 3300 | 022A2.....ora1022a3.
 0008 ffff ffff 3400 0006 0000 3500 0006 0000 3600 | ......4.....5.....6.
 0006 0000 3700 0008 ffff ffff 3800 0010 000a 3130 | ....7.......8.....10
 2e32 2e30 2e32 2e30                               | .2.0.2.0

GroupID x33 '3' ProducerInfo     Info x00  Length   85
 3300 0055 3000 000a 0004 4546 4152 3100 0006 0003 | 3..U0.....EFAR1.....
 3200 0006 0000 3300 0006 0000 3400 0006 0000 3500 | 2.....3.....4.....5.
 0006 0000 3600 0006 0017 3700 0023 001d 5665 7273 | ....6.....7..#..Vers
 696f 6e20 5374 2e20 416e 6472 6577 7320 4275 696c | ion St. Andrews Buil
 6420 3032 33                                      | d 023

GroupID x34 '4' ContinunityInfo  Info x00  Length    4
 3400 0004                                         | 4...
```

Example 2 FILEHEADER DETAIL

```
TokenID x46 'F' Record Header    Info x00  Length  587
TokenID x30 '0' TrailInfo        Info x00  Length  303
TokenID x31 '1' MachineInfo      Info x00  Length  103
TokenID x32 '2' DatabaseInfo     Info x00  Length   88
TokenID x33 '3' ProducerInfo     Info x00  Length   85
TokenID x34 '4' ContinunityInfo  Info x00  Length    4
TokenID x5a 'Z' Record Trailer   Info x00  Length  587

2011/01/18 13:40:26.034.631 FileHeader           Len   587 RBA 0
Name: *FileHeader*
 3000 012f 3000 0008 660d 0a71 3100 0006 0001 3200 | 0../0...f..q1.....2.
 0008 0000 0016 3300 000c 02f1 7834 eac7 7f3f 3400 | ......3.....x4...?4.
 0037 0031 7572 693a 7465 6c6c 7572 6961 6e3a 3a68 | .7.1uri:tellurian::h
 6f6d 653a 6d63 6361 7267 6172 3a67 6773 3a67 6773 | ome:mccargar:ggs:ggs
 4f72 6163 6c65 3a73 6f75 7263 6536 0000 1700 112e | Oracle:source6......
 2f64 6972 6461 742f 6572 3030 3030 3030 3700 0005 | /dirdat/er0000007...
 0138 0000 0800 01e2 4039 0000 0c00 0000 0000 001d | .8......@9..........

GroupID x30 '0' TrailInfo        Info x00  Length  303
 3000 012f 3000 0008 660d 0a71 3100 0006 0001 3200 | 0../0...f..q1.....2.
 0008 0000 0016 3300 000c 02f1 7834 eac7 7f3f 3400 | ......3.....x4...?4.
 0037 0031 7572 693a 7465 6c6c 7572 6961 6e3a 3a68 | .7.1uri:tellurian::h
 6f6d 653a 6d63 6361 7267 6172 3a67 6773 3a67 6773 | ome:mccargar:ggs:ggs
 4f72 6163 6c65 3a73 6f75 7263 6536 0000 1700 112e | Oracle:source6......
```

```
 2f64 6972 6461 742f 6572 3030 3030 3030 3700 0005 | /dirdat/er0000007...
 0138 0000 0800 01e2 4039 0000 0c00 0000 0000 001d | .8......@9..........
 a33b 0000 450a 3634 3136 3138 3936 3932 0000 0000 | .;..E.6416189692....
 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 | ....................
 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 | ....................
 0000 0000 0000 0000 0000 3aff 0045 0000 0000 0000 | ..........:..E......
 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 | ....................
 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 | ....................
 0000 0000 0000 0000 0000 0000 0000 0000 0000 003d | ...................=
 0000 0c02 f178 34eb 556a 403c ff00 0c00 0000 0000 | .....x4.Uj@<........
 0000 00                                           | ...
TokenID x30 '0' Signature        Info x00  Length    8
 660d 0a71                                         | f..q
TokenID x31 '1' Compatibility    Info x00  Length    6
 0001                                              | ..
TokenID x32 '2' Charset          Info x00  Length    8
 0000 0016                                         | ....
TokenID x33 '3' CreationTime     Info x00  Length   12
 02f1 7834 eac7 7f3f                               | ..x4...?
TokenID x34 '4' URI              Info x00  Length   55
 0031 7572 693a 7465 6c6c 7572 6961 6e3a 3a68 6f6d | .1uri:tellurian::hom
 653a 6d63 6361 7267 6172 3a67 6773 3a67 6773 4f72 | e:mccargar:ggs:ggsOr
 6163 6c65 3a73 6f75 7263 65                       | acle:source
TokenID x36 '6' Filename         Info x00  Length   23
 0011 2e2f 6469 7264 6174 2f65 7230 3030 3030 30   | .../dirdat/er000000
TokenID x37 '7' MultiPart        Info x00  Length    5
 01                                                | .
TokenID x38 '8' Seqno            Info x00  Length    8
 0001 e240                                         | ...@
TokenID x39 '9' FileSize         Info x00  Length   12
 0000 0000 0000 1da3                               | ........
TokenID x3b ';' LastCSN          Info x00  Length   69
 0a36 3431 3631 3839 3639 3200 0000 0000 0000 0000 | .6416189692.........
 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 | ....................
 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 | ....................
 0000 0000 00                                      | .....
TokenID x3a ':' FirstCSN         Info xff  Length   69
 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 | ....................
 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 | ....................
 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 | ....................
 0000 0000 00                                      | .....
TokenID x3d '=' LastIOTime       Info x00  Length   12
 02f1 7834 eb55 6a40                               | ..x4.Uj@
TokenID x3c '<' FirstIOTime      Info xff  Length   12
 0000 0000 0000 0000                               | ........

GroupID x31 '1' MachineInfo      Info x00  Length  103
 3100 0067 3000 000b 0005 4c69 6e75 7831 0000 0f00 | 1..g0.....Linux1....
 0974 656c 6c75 7269 616e 3200 0014 000e 322e 362e | .tellurian2.....2.6.
 392d 3131 2e45 4c73 6d70 3300 0029 0023 2331 2053 | 9-11.ELsmp3..).##1 S
 4d50 2046 7269 204d 6179 2032 3020 3138 3a32 353a | MP Fri May 20 18:25:
 3330 2045 4454 2032 3030 3534 0000 0c00 0678 3836 | 30 EDT 20054.....x86
```

```
 5f36 34                                          | _64
TokenID x30 '0' Sysname          Info x00  Length   11
 0005 4c69 6e75 78                                | ..Linux
TokenID x31 '1' Nodename         Info x00  Length   15
 0009 7465 6c6c 7572 6961 6e                      | ..tellurian
TokenID x32 '2' Release          Info x00  Length   20
 000e 322e 362e 392d 3131 2e45 4c73 6d70          | ..2.6.9-11.ELsmp
TokenID x33 '3' Version          Info x00  Length   41
 0023 2331 2053 4d50 2046 7269 204d 6179 2032 3020 | .##1 SMP Fri May 20
 3138 3a32 353a 3330 2045 4454 2032 3030 35        | 18:25:30 EDT 2005
TokenID x34 '4' Hardware         Info x00  Length   12
 0006 7838 365f 3634                              | ..x86_64

GroupID x32 '2' DatabaseInfo     Info x00  Length   88
 3200 0058 3000 0006 0007 3100 000e 0008 4f52 4131 |2..X0.....1.....ORA1
 3032 3241 3200 000e 0008 6f72 6131 3032 3261 3300 |022A2.....ora1022a3.
 0008 ffff ffff 3400 0006 0000 3500 0006 0000 3600 |......4.....5.....6.
 0006 0000 3700 0008 ffff ffff 3800 0010 000a 3130 |....7.......8.....10
 2e32 2e30 2e32 2e30                              | .2.0.2.0
TokenID x30 '0' Vendor           Info x00  Length    6
 0007                                             | ..
TokenID x31 '1' Name             Info x00  Length   14
 0008 4f52 4131 3032 3241                         | ..ORA1022A
TokenID x32 '2' Instance         Info x00  Length   14
 0008 6f72 6131 3032 3261                         | ..ora1022a
TokenID x33 '3' Charset          Info x00  Length    8
 ffff ffff                                        | ....
TokenID x34 '4' MajorVersion     Info x00  Length    6
 0000                                             | ..
TokenID x35 '5' MinorVersion     Info x00  Length    6
 0000                                             | ..
TokenID x36 '6' VerString        Info x00  Length    6
 0000                                             | ..
TokenID x37 '7' ClientCharset    Info x00  Length    8
 ffff ffff                                        | ....
TokenID x38 '8' ClientVerString  Info x00  Length   16
 000a 3130 2e32 2e30 2e32 2e30                    | ..10.2.0.2.0

GroupID x33 '3' ProducerInfo     Info x00  Length   85
 3300 0055 3000 000a 0004 4546 4152 3100 0006 0003 | 3..U0.....EFAR1.....
 3200 0006 0000 3300 0006 0000 3400 0006 0000 3500 | 2.....3.....4.....5.
 0006 0000 3600 0006 0017 3700 0023 001d 5665 7273 | ....6.....7..#..Vers
 696f 6e20 5374 2e20 416e 6472 6577 7320 4275 696c | ion St. Andrews Buil
 6420 3032 33                                     | d 023
TokenID x30 '0' Name             Info x00  Length   10
 0004 4546 4152                                   | ..EFAR
TokenID x31 '1' DataSource       Info x00  Length    6
 0003                                             | ..
TokenID x32 '2' MajorVersion     Info x00  Length    6
 0000                                             | ..
TokenID x33 '3' MinorVersion     Info x00  Length    6
 0000                                             | ..
TokenID x34 '4' MaintLevel       Info x00  Length    6
```

```
 0000                                                  | ..
TokenID x35 '5' BugFixLevel      Info x00  Length    6
 0000                                                  | ..
TokenID x36 '6' BuildNumber      Info x00  Length    6
 0017                                                  | ..
TokenID x37 '7' VerString        Info x00  Length   35
 001d 5665 7273 696f 6e20 5374 2e20 416e 6472 6577 | ..Version St.Andrew
 7320 4275 696c 6420 3032 33                       | s Build 023

GroupID x34 '4' ContinunityInfo  Info x00  Length    4
 3400 0004                                             | 4...
```

FILES

Use FILES to display summary file information for files on the local system. The default command displays all files in the curent directory. To constrain the display to specific files, you can supply a wildcarded name.

This command can be shortened to FI. An alias for this command is DIR or FILEINFO.

Default Show all files in current directory

Syntax `FILES [<directory>]`

Argument	Description
`<directory>`	The name of a directory or a wildcard for specific files. Note: On a Windows system, if any file or directory in the specified path contains spaces, the entire path must be enclosed within double quotation marks.

Example

```
FILES "c:\goldengate ver802\dirdat\cc*"
```

FILTER

Use FILTER to filter the display based on one or more criteria.

- You can string multiple FILTER commands together, separating each one with a semi-colon, as in:

  ```
  FILTER INCLUDE FILENAME fin.act*; FILTER RECTYPE 5; FILTER MATCH ALL
  ```

- To avoid unexpected results, avoid stringing filter options together with one FILTER command. For example, the following would be *incorrect*:

  ```
  FILTER INCLUDE FILENAME fin.act*; RECTYPE 5; MATCH ALL
  ```

Without arguments, FILTER displays the current filter status (ON or OFF) and any filter criteria that are in effect.

Comparison operators

For options that take comparison operators, standard operators may be used. These are:

Table 9 Filter option comparison operators

Operator	Example
Equal	= EQ ==
Less than	< LT
Less than or equal	<= LE
Greater than	> GT
Greater than or equal	>= GE
Not equal	<> NE !=

Note: The absence of an operator implies Equal.

Default Shows current filter settings

Syntax `FILTER [INCLUDE] [EXCLUDE] <filter option>`

Where:

<filter option> can be one of:

```
{
AUDITRBA <rba> [<comparison operator>] |
CLEAR {<filter_spec> | ALL} |
CSN | LogCSN [<comparison operator>] [<value>]
ENDTIME <time_string> |
FILENAME <name> [, <name>] |
GGSTOKEN <token name> [<comparison operator>] [<token value>] |
HEX "<hex_string>" [<byte_range>][, "<hex_string>" [<byte_range>]] [...]
|
INT16 <16-bit_integer> |
INT32 <32-bit_integer> |
IOTYPE <operation type> [, <operation type>] |
MATCH {ANY | ALL} |
OFF |
ON |
PROCESS <process_name> |
RBA <byte address> [<comparison operator>] [...] |
RECLEN <length> [<comparison operator>] |
RECTYPE {<type_number> | <type_name>} |
SHOW |
STARTTIME <time_string> |
STRING [BOTH] [B],<text> [<column_range>]
   [[B],<text> [<column_range>]] [...] |
SYSKEY <system key> [<comparison operator>] [...] |
TRANSIND <indicator> [<comparison operator>] |
TYPE <type> |
UNDOFLAG <type> [<comparison operator>] |
USERTOKEN <token name> [<comparison operator>] [<token value>]
}
```

Argument	Description
`AUDITRBA <rba> [<comparison operator>]`	Filters based on the relative byte address of a commit record. For <comparison operator>, see "Comparison operators" on page 104.

`CLEAR {<filter_spec> | ALL}`	Removes filtering criteria.
	◆ ALL removes all filter criteria.
	◆ <filter_spec> removes only the specified criterion. Specify any FILTER option, but not the value. The following example is valid:
	`FILTER CLEAR STRING`
	The following example is not valid:
	`FILTER CLEAR STRING "Denver"`
	An alias for CLEAR is RESET.

`CSN | LogCSN [<comparison operator>] [<value>]`	Filters based on a commit sequence value. For <comparison operator>, see "Comparison operators" on page 104.
`ENDTIME <time_string>`	Ends the filter at the last record written at the specified time. For the time string, use the format of: [[yy]yy-mm-dd] [hh[:mm][:ss]] Example: `ENDTIME 2011-01-31 23:59:59` Can be shortened to ENDTS or END.
`FILENAME <name> [, <name>]`	Filters based on the name of a SQL table, or a group of names, with the name format being: [catalog.]<owner>.<table> [catalog.]<owner>.<string>* Also filters on the name of a NonStop data file, or a group of names, with the name format being: <volume>.<subvolume>.<file> <volume>.<subvolume>.<string>* FILENAME is case-sensitive. FILENAME can be shortened to FILE or FI. Up to eight name specifications may be supplied.

Argument	Description
HEX "<hex_string>" [<byte_range>] [, "<hex_string>" [<byte_range>]] [...]	Filters based on a hex string and, optionally, a range of columns. To specify a range of columns, use the format of: <start_column>:<end_column> Example: 10:35 This option allows up to eight hex string and column arguments. Hex strings must be enclosed within quotes.
INCLUDE	Specifies that the filter will include the information specified with other options in the current FILTER statement. Can be shortened to INC.
EXCLUDE	Specifies that the filter will exclude the information specified with other options in the current FILTER statement. Can be shortened to EXC.
INT16 <16-bit_integer>	Filters based on a 16-bit integer. Use with 16-bit processors.
INT32 <32-bit_integer>	Filters based on a 32-bit integer. Use with 32-bit processors.
IOTYPE <operation type> [, <operation type>]	Filters based on the type of operation. A list of record types can be viewed with the SHOW RECTYPE command in Logdump. Up to 32 operation types can be specified with IOTYPE.
MATCH {ANY | ALL}	Controls filtering response when multiple filters have been specified. Can be shortened to MAT or MA. ◆ ANY includes a record for display or counts if the condition matches any of the filter conditions. This is the default. ◆ ALL includes a record for display or counts only if the condition matches all of the filter conditions.
OFF	Disables record filtering. By default, filtering is disabled. An alias for this option is DISABLE.
ON	Enables record filtering. An alias for this option is ENABLE.
RBA <byte address> [<comparison operator>] [...]	Filters based on a relative byte address. Accepts either a 32-bit or 64-bit value. Up to 32 specifications can be supplied.
RECLEN <length> [<comparison operator>]	Filters based on a record length, in bytes. For <comparison operator>, see "Comparison operators" on page 104.

Argument	Description

`RECTYPE {<type_number> | <type_name>}`	Filters based on the type of record. Can be either of the following:
	◆ The number assigned to the record type.
	`FILTER RECTYPE 10`
	◆ The name of the record type.
	`FILTER RECTYPE Update`
	To view the record type names and numbers, issue the SHOW RECTYPE command. (See page 119.)

`SHOW`	Displays filter settings. Same as using FILTER without any options.
`STARTTIME <time_string>`	Starts the filter with the first record written at the specified time. For the time string, use the format of: [[yy]yy-mm-dd] [hh[:mm][:ss]] Example: `STARTTIME 2011-01-01 00:00:00` Can be shortened to STARTTS or START.
`STRING [BOTH] [B], <text> [<column_range>] [[B], <text> [<column_range>]] [...]`	◆ <text> filters based on a string. Enclose the string within quotes. ◆ <column_range> filters based on a range of columns. Use the format of: <start_column>:<end_column> Example: `10:35` ◆ BOTH filters on both a string and a column range. ◆ [B] specifies a case-insensitive match. You can match up to eight string and column arguments. If the trail data is EBCDIC, issue the EBCDICDATA ON or ASCIIDATA OFF command before using FILTER STRING to ensure the correct matching. STRING can be shortened to STR.
`SYSKEY <system key> [<comparison operator>] [...]`	Filters based on a NonStop source key. Accepts either a 32-bit or 64-bit value. Up to 32 specifications can be supplied.

Argument	Description
`TRANSIND <indicator> [<comparison operator>]`	Filters based on the TransInd field of the record header. Valid values: 0 = start of transaction 1 = middle of transaction 2 = end of transaction 3 = only record in transaction For example, to filter for the end of a transaction, use the following command, including the spaces in the syntax: `FILTER INCLUDE TransInd > = 2` For <comparison operator>, see "Comparison operators" on page 104.
`UNDOFLAG <type> [<comparison operator>]`	Filters based on the NonStop undo flag. The undo flag is set for records that are undone when a TMF transaction is aborted. Normally, UndoFlag is set to zero, but if the record is the backout of a previously successful operation, then UndoFlag will be set to 1. An undo that is performed by the disc process because of a constraint violation is not marked as an undo. For <comparison operator>, see "Comparison operators" on page 104.
`USERTOKEN <token name> [<comparison operator>] [<token value>]`	Filters based on a specific user token in the trail file header. ◆ <token name> is the name of any token that is defined with the TOKENS clause of a TABLE statement of the Extract parameter file. It is not case-sensitive. ◆ <token value> is either a constant that is enclosed within double quotes or the result of an Oracle GoldenGate column-conversion function, depending on what was specified in the TOKENS clause for <token name>. ◆ For <comparison operator>, see "Comparison operators" on page 104.

Example 1 The following shows filter options modified by comparison operators.

```
FILTER INCLUDE RECLEN > 400
FILTER INCLUDE RECLEN < 200
FILTER INCLUDE TRANSIND <> 1
FILTER INCLUDE SYSKEY > 202172700557313
```

Example 2 The following filters for a data file name and for a relative key 19446, which has a hex value of 00004bf6. Because MATCH ALL is used, a record must meet all of the filter specifications to be included in the filter.

```
FILTER INCLUDE FILENAME $QA01.QAESRC.ACCT*
FILTER INCLUDE HEX "00004bf6" 0:3
FILTER MATCH ALL
```

Example 3 The following filters for tables that start with "ACC," except for the ACCDET table, and for records that contain a timestamp between the specified start and stop times. By default, if a record matches any of the INCLUDE specifications, it is included in the filter.

```
FILTER INCLUDE FILENAME SALES.ACC*
FILTER EXCLUDE FILENAME SALES.ACCDET
FILTER INCLUDE STARTTIME 2011-01-11 17:00:00
FILTER INCLUDE ENDTIME 2011-01-11 19:00:00
```

Example 4 The following shows filter options with multiple specifications. By default, a record that matches any of these specifications will be included in the filter. Note that in the STRING filter, two of the criteria are not case-sensitive, while one is, and the filter is confined to a column range.

```
FILTER INCLUDE IOTYPE insert,update,delete
FILTER INCLUDE STRING b"String1" "string2" b"String3" 25:50
FILTER INCLUDE FILENAME $QA01.QAESRC.ACCT1, $QA01.QAESRC.ACCT2,
$QA01.QAESRC.ACCT3
```

Syntax

GHDR

Use GHDR to control whether or not the record header is displayed with each record. Each record contains a header that includes information about the transaction environment. Without arguments, GHDR displays the status of header display (ON or OFF).

Default OFF

Syntax GHDR {ON | OFF}

HEADERTOKEN

Use HEADERTOKEN to control whether or not header token indicators are displayed with each record. The header token indicators are the following:

G — record header (begin of record)

H — header area

D — data area

T — Oracle GoldenGate internal token

U — user token area (does not display if user tokens are not in use)

Z — end of record

Without arguments, HEADERTOKEN displays the status of header token indicators (ON or OFF).

Default OFF

Syntax HEADERTOKEN {ON | OFF | DETAIL}

Argument	Description
ON	Enables the display of header tokens.
OFF	Disables the display of header tokens.
DETAIL	Provides detailed token values.

Example 1 HEADERTOKEN, without DETAIL

```
TokenID G, Info 0, Length  117
TokenID H, Info 0, Length   45
TokenID D, Info 0, Length   28
TokenID T, Info 0, Length   24
TokenID Z, Info 0, Length  117
```

Example 2 HEADERTOKEN with DETAIL

```
TokenID G, Info 0, Length  146
TokenID H, Info 0, Length   42
 4504 0041 3C00 05FF 402F AE6C 572A F102 F818 8F02 | E..A<...@/.lW*......
 0000 0000 1000 0000 0152 0000 0001 4852 2E4A 4F42 | .........R....HR.JOB
 5300                                              | S.
TokenID D, Info 0, Length   60
TokenID T, Info 0, Length   24
TokenID Z, Info 0, Length  146
```

HELP

Use HELP to view the syntax of Logdump commands.

Default None

Syntax HELP

HISTORY

Use HISTORY to view the most recently issued Logdump commands since the session started, or to reset the command count starting at line 1 again. HISTORY can be shortened to HIST.

NOTE You can use the FC command to re-execute a command in the list. See page 92.

Default Display recent commands

Syntax HISTORY [<n>] [CLEAR]

Argument	Description
<n>	Returns the specified number of previously issued commands, where <n> is any positive number.
CLEAR	Deletes the command history buffer and reverts the command line to 1.

Example HISTORY 3

The results of this command would be similar to:

```
1: ghdr on
2: detail on
3: scanforheader
```

INTERPRETINTERVAL

Use INTERPRETINTERVAL to display a 64-bit Julian time interval in the format of days-hh:mm:ss.ms.us.

Default None

Syntax INTERPRETINTERVAL <interval string>

Argument	Description
<interval string>	A string representing the interval to be converted.

Example INTERPRETINTERVAL 1234567

This produces the following result:

```
Interval 1234567 is 0-00:00:01.234.567
```

INTERPRETTIMESTAMP

Use INTERPRETTIMESTAMP to display a 64-bit Julian timestamp as an ASCII value.

Default None

Syntax INTERPRETTIMESTAMP <timestamp>

Argument	Description
<timestamp>	A JULIANTIMESTAMP value.

Example INTERPRETTIMESTAMP 211976584185800569

This produces the following result:

```
2005/03/03 04:29:45.800.569 GMT
2005/03/02 20:29:45.800.569 LCT
```

LOG

Use LOG to start and stop the logging of Logdump sessions. When enabled, logging remains in effect for all sessions of Logdump until disabled with the LOG STOP command. Without arguments, LOG displays the status of logging (ON or OFF). An alias for LOG is OUT.

Default Disabled

Syntax `LOG <file_name> | STOP}`

Argument	Description
`<file_name>`	Specifies the name of the log file. Specify a full path name to store the file in a directory other than the current working directory.
`STOP`	Stops logging.

Example `LOG /home/ggs/dirrpt/logdumpout.txt`

NEXT

Use NEXT to display the next record or records in the file. The default displays only the next record. NEXT can be shortened to N. An alias for NEXT is RECORD.

Default Display the next 1 record

Syntax `NEXT [<n>]`

Argument	Description
`<n>`	Displays the specified number of subsequent records.

Example `NEXT 10`

NEXTTRAIL

Use NEXTTRAIL to close an open trail file and open the next one in the sequence. An alias for NEXTTRAIL is NT.

Default None

Syntax `NEXTTRAIL`

NOTIFY

Use NOTIFY to display the number of records scanned, the trail position, and the record timestamp at specified intervals when using COUNT and records are being suppressed from display through filtering options. An alias for NOTIFY is NOTIFYINTERVAL.

Instead of displaying each notify interval on a separate line, you can configure Logdump to simply update a single line with each new scan result. See "SCANSCROLLING" on page 119.

Default None

Syntax `NOTIFY <interval>`

Argument	Description
`<interval>`	The notification interval expressed as a number of records.

Example The following shows the usage and result of this command.

```
Logdump 26> NOTIFY 1000
Logdump 27> FILTER INCLUDE FILE sales.res*
Logdump 28> COUNT
Scanned 1000 records, RBA 160380,2011/02/01 08:53:47.768.255
Scanned 2000 records, RBA 729961,2011/02/01 08:56:09.916.128
Scanned 3000 records, RBA 2032683,2011/02/01 08:56:09.916.128
Scanned 4000 records, RBA 3244585,2011/02/01 08:56:09.916.128
Scanned 5000 records, RBA 4568766,2011/02/01 08:56:09.916.128
```

OBEY

Use OBEY to process a file that contains a list of Logdump commands. OBEY is useful for executing commands that are frequently used in sequence.

OBEY can be shortened to O. An alias for OBEY is SOURCE.

Default None

Syntax `OBEY <file name>`

Argument	Description
`<file name>`	The fully qualified name of the file containing the list of commands.

Example `OBEY ./ldcommands.txt`

The preceding command executes a file that might look something like this:

```
ghdr on
usertoken on
detail
filter enable
filter clear
```

```
filter match all
```

OPEN

Use OPEN to open a trail file or extract file in Logdump. Without arguments, the command displays the name of the file that is currently open. Aliases for OPEN are FROM and LOGTRAIL.

Default None

Syntax `OPEN <file_name>`

Argument	Description
`<file_name>`	The fully qualified path name of the trail file or extract file to be opened. To specify a trail file, specify the trail name (a two-character prefix) and the sequence number, for example jd000000.

Example `OPEN /home/ggs/dirdat/jd000000`

POSITION

Use POSITION to set the read position in the file. The position of a record in the file is noted in the record header in the AuditPos field.

Without options, POSITION displays the current read position. Options let you specify an exact position. After you set the position, issue the NEXT command to view the record at that position.

POSITION can be shortened to POS.

Default None

Syntax `POSITION [<bytes> | {0 | FIRST}]`

Argument	Description
`<bytes>`	Specifies the number of bytes into the file at which to read. Use the NEXT command to view the specified record.
`0 | FIRST`	Positions Logdump at the beginning of the file.

Example `POS 77580548`

RECLEN

Use RECLEN to control how much of the record data is displayed. You can use RECLEN to control the amount of scrolling that must be done when records are large, while still showing enough data to evaluate the record. Data beyond the specified length is truncated.

Default 140 bytes

Syntax `RECLEN <n>`

Argument	Description
`<n>`	The number of bytes of the record that is displayed.

Example `RECLEN 280`

SAVE

Use SAVE to write a subset of the records to a new trail or extract file. By saving a subset to a new file, you can work with a smaller file that is easier to debug. Saving to another file also enables you to extract valid records that can be processed by Oracle GoldenGate, while excluding records that may be causing errors.

To set the version of the trail or file (to old or new format), use the TRAILFORMAT command.

Default None

```
SAVE <file_name> [!] {<n> records | <n> bytes}[NOCOMMENT]
[OLDFORMAT | NEWFORMAT]
[TRANSIND <indicator>]
[TRUNCATE]
```

Argument	Description
`<file_name>`	The name of the new file. To specify a trail file, specify the two-character trail name and a sequence number, for example rt000001.
`!`	Overwrites the specified file, if the same file already exists. First a purge is done, and then the specified records are saved to the file.
`<n> records | <n> bytes`	Specifies either a number of records or a number of data bytes to write to the new file. The <n> number of records or bytes are taken forward from the current position in the file. You can change the position with the POSITION command. See page 115.
`NOCOMMENT`	Suppresses the leading and trailing comment records that are placed by default in the new file. These records describe the context of the file. The begin comment record contains source trail information and the position where the save started. The end comment record identifies the end of the saved data. These headers are useful to separate different sets of records that are saved to the same file, but can be omitted.
`OLDFORMAT | NEWFORMAT`	Writes the data in either the current trail format (NEWFORMAT, the default) or the format that was used for Oracle GoldenGate versions 6.0 and earlier (OLDFORMAT).

Argument	Description
TRANSIND <indicator>	Sets the TransInd header field in the records written to one of the following: FIRST MIDDLE END ONLY This allows you to reorder records in a transaction. TRANSIND applies to all records written by a SAVE command.
TRUNCATE	Purges an existing file before saving new information to it.

Example `SAVE /home/ggs/dirdat/rt000001 10 records nocomment`

SCANFORENDTRANSACTION

Use SCANFORENDTRANSACTION to scan for a record that has a transaction indicator of 2 or 3, as shown in the TransInd field of the header. When one of those indicators is found, Logdump displays the first record of the next transaction.

The indicators represent the following:

- 2 — last record in the transaction
- 3 — only record in the transaction

SCANFORENDTRANSACTION can be shortened to SFET.

Default None

Syntax `SCANFORENDTRANSACTION`

SCANFORHEADER

Use SCANFORHEADER to go to the next record header. Before using this command, use the GHDR ON command to show record headers (see page 110). SCANFORHEADER can be shortened to SFH.

Default None

Syntax `SCANFORHEADER [PREV]`

Argument	Description
PREV	Displays the previous record header.

SCANFORRBA

Use SCANFORRBA to scan for the record at a relative byte address specified by the AuditRBA field of the record header. Before using this command, use the GHDR command to show record headers (see page 110). SCANFORRBA can be shortened to SFR.

Default None

Syntax `SCANFORRBA <relative byte address> [<file_name>]`

Argument	Description
`<relative byte address>`	Specifies the relative byte address to find.
`<file_name>`	Constrains the search to an Enscribe or SQL data file. A file name is required even if you are searching a file that is open in Logdump.

Example `SCANFORRBA 321 /home/ggs/dirdat/rt000000`

SCANFORTIME

Use SCANFORTIME to scan for a record that contains a specific timestamp. The timestamp is contained in the IO Time field of the record header. Before using this command, use the GHDR command to show record headers (see page 110). SCANFORTIME can be shortened to SFTS.

Default None

Syntax `SCANFORTIME <time_string> [, <name>]`

Argument	Description
`<time_string>`	Scans for a specific timestamp. For the time string, use the format of: [[yy]yy-mm-dd] [hh[:mm][:ss]]
`<name>`	Constrains the search to a specific table name, or a group of names specified with a wildcard.

Example `SCANFORTIME 2011-01-27 14:33:57`

SCANFORTYPE

Use SCANFORTYPE to scan for the next record of the specified type. SCANFORTYPE can be shortened to SFT.

Default None

Syntax `SCANFORTYPE {<type_name> | <type_number>}`

Argument	Description
<type_name> | <type_number>	Specifies the type of record to search for, either by type name or type number. To view a list of record types and their associated numbers, use the SHOW RECTYPE command (see page 119).

Example Both of the following commands return the same result: They display commit records.

```
SCANFORTYPE Commit
SFT 2
```

SCANSCROLLING

Use SCANSCROLLING to configure Logdump to update a single line after COUNT scans when NOTIFY is enabled. Otherwise, each scan notification appears on a different line. See "NOTIFY" on page 114 for more information.

Default OFF

Syntax SCANSCROLLING {ON | OFF}

Argument	Description
ON	Enables the use of a single line for count notification results.
OFF	Disables the use of a single line, causing a separate line to be used for each notification.

SHOW

Use SHOW to display internal Logdump information, including the current Logdump environment, a list of Oracle GoldenGate record types, and current filter settings. SHOW can be shortened to SH or SHO.

Default None

Syntax

```
SHOW
[ENV]
[FILTER]
[RECTYPE]
```

Argument	Description
ENV	Displays the current Logdump environment. Same as the ENV command (see page 92).
FILTER	Displays current filter settings.

Argument	Description
RECTYPE	Displays a list of Oracle GoldenGate record types that can be displayed with Logdump.

Example 1 `SHOW FILTER`

This shows something similar to the following:

```
Data filters are ENABLED
Include  Match ALL
Rectypes   : Delete
Filename-0 : hr.regions
Exclude  Match ANY
```

Example 2 `SHOW RECTYPE`

This shows results similar to the following. (This list might not reflect all possible record types. New types are added when needed to support new functionality.)

```
LogTrail record types
   1 - Abort                          2 - Commit
   3 - Delete                         4 - EndRollBack
   5 - Insert                         6 - Prepared
   7 - TMF-Shutdown                   8 - TransBegin
   9 - TransRelease                  10 - Update
  11 - UpdateComp                    12 - FileAlter
  13 - FileCreate                    14 - FilePurge
  15 - FieldComp                     16 - FileRename
  17 - AuxPointer                    18 - NetworkCommit
  19 - NetworkAbort                  20 - CurrentPos
  89 - SQL/MX DDL OP                 90 - GGSSQLCol
 100 - GGSPurgedata                 101 - GGSPurgeFile
 102 - GGSCreateFile                103 - GGSAlterFile
 104 - GGSRenameFile                105 - GGSSetmode
 107 - GGSControl                   106 - GGSChangeLabel
 160 - DDL OP                       115 - GGSKeyFieldComp
 117 - GGSKeyFieldComp32            161 - RecordFragment
 116 - LargeObject                  132 - GGSCreateSequence
 133 - GGSAlterSequence             134 - GGSDropSequence
 150 - RestartAbend                 151 - RestartOK
 152 - RecoveryEnd                  200 - GGSBulkio
 201 - GGSFileClose                 202 - GGSLoggerTS
 203 - GGSExtractTS                 204 - GGSCollectTS
 205 - GGSComment                   250 - LibOpenTrace
 251 - LibCloseTrace                252 - LoggerOpenTrace
 253 - LoggerCloseTrace             254 - LoggerAddedInfo
 249 - LoggerAddedStats
```

SKIP

Use SKIP to skip the specified number of records.

Default None

Syntax `SKIP <n>`

Argument	Description
`<n>`	The number of records to skip.

Example `SKIP 50`

TIME

Use TIME to display the current time in local and GMT formats.

Default None

Syntax `TIME`

TIMEOFFSET

Use TIMEOFFSET to set the Logdump time format. Without arguments, TIMEOFFSET displays the current time offset. Options enable you to set the time to the local time, Greenwich Mean Time (GMT), or a specific offset from GMT. The specified time format applies to the timestamps shown in records as well as any Logdump commands that accept a time string argument.

Default `LOCAL`

Syntax `TIMEOFFSET {LOCAL | GMT | GMT + <hh[:mm]> | GMT - <hh[:mm]>}`

Argument	Description
`LOCAL`	Sets the time to that of the local system.
`GMT`	Sets the time to Greenwich Mean Time (GMT).
`GMT + <hh[:mm]>`	Sets the time ahead of GMT by the specified number of hours and, optionally, minutes.
`GMT - <hh[:mm]>`	Sets the time behind GMT by the specified number of hours and, optionally, minutes.

Example `TIMEOFFSET GMT -01`

Syntax

Syntax

TRAILFORMAT

Use TRAILFORMAT to set the version of the Oracle GoldenGate trail or extract file that is being saved when using the SAVE command.

Default NEW

Syntax TRAILFORMAT {NEW | OLD}

Argument	Description
NEW	Sets the format to that used by Oracle GoldenGate version 6.0 and later.
OLD	Sets the format to that used by Oracle GoldenGate versions earlier than 6.0.

TRANSBYTELIMIT

Use TRANSBYTELIMIT to prevent normal-sized transactions from being tracked in the transaction table specified with the TRANSHIST command. It sets a lower boundary for the number of bytes in a transaction and should be set to represent a normal-sized transaction for the environment being evaluated with Logdump. Setting a boundary reduces the amount of data that is stored and, consequently, the amount that must be reviewed when troubleshooting.

Default 10000 bytes

Syntax TRANSBYTELIMIT <n>

Argument	Description
<n>	The number of bytes in a normal-sized transaction.

Example TRANSBYTELIMIT 9000

TRANSHIST

Use TRANSHIST to keep track of the size of transactions in a trail or file. Logdump tracks the transactions in an internal history table in descending order according to the number of bytes of data in each one. When the history table is full, the smallest transaction is removed to allow a larger transaction to be added to the list.

Use TRANSHIST in conjunction with other Logdump commands to determine whether or not your applications generate large transactions and to identify their relative size. This information can be used when deciding how to group tables into different processing groups for faster throughput. For more information, see page 81.

NOTE You can use the SEND EXTRACT command with the SHOWTRANS option to view a list of long-running transactions. Other options enable you to control whether those transactions are ignored or processed by Oracle GoldenGate.

Default 0 (do not maintain history)

Syntax `TRANSHIST <n>`

Argument	Description
`<n>`	Sets the size of the history table, in bytes. Valid values are 0 through 200 bytes. A value of 0 means that no transaction history is maintained.

Example `TRANSHIST 150`

TRANSRECLIMIT

Use TRANSRECLIMIT to prevent normal-sized transactions from being tracked in the transaction table specified with the TRANSHIST command. It sets a lower boundary for the number of records in a transaction and should be set to represent a normal-sized transaction for the environment being evaluated with Logdump. Setting a boundary reduces the amount of data that is stored and, consequently, the amount that must be reviewed when troubleshooting.

Default 100 operations

Syntax `TRANSRECLIMIT <n>`

Argument	Description
`<n>`	The number of records in a normal-sized transaction.

Example `TRANSRECLIMIT 90`

USERTOKEN

Use USERTOKEN to control whether or not user token data is displayed with each record. A user token is data specified by an Oracle GoldenGate user that is stored in the record header and can be mapped to a target column or used for some other purpose during Oracle GoldenGate processing.

Without arguments, USERTOKEN displays the status of user token display (ON or OFF). With the ON option, the name of the token and its length are displayed. The DETAIL option shows the actual token data.

Figure 6 User tokens, with data

```
User tokens         7 bytes
5465 7374 0031 00                | Test.1
```

Default Display token name and length.

Syntax `USERTOKEN {ON | OFF | DETAIL}`

Argument	Description
`ON`	Enables the display of user tokens.
`OFF`	Disables the display of user tokens.
`DETAIL`	Displays the token data.

WRITELOG

Use WRITELOG to write text to the session log. Before using this command, start logging with the LOG command (see page 113).

Default None

Syntax `WRITELOG <text>`

Argument	Description
`<text>`	Any text string. Quotes are optional.

Example `WRITELOG "Customer name is ABC Company."`

X

Use X to execute a program from within Logdump. When you exit the program, the Logdump prompt returns.

Default None

Syntax `X <program> [<string>]`

Argument	Description
`<command>`	The program to run.
`<string>`	A character string, such as input arguments.

Example The following series of commands and output shows how you can exit Logdump, issue other commands from the shell or within GGSCI, and then return to the Logdump command line.

```
Logdump 696 >x ggsci

GoldenGate Command Interpreter
Version .....

GGSCI (sysa) 1> status er *
GGSCI (sysa) 2> start er *
GGSCI (sysa) 3> info er *
GGSCI (sysa) 4> exit
Logdump 697 >
```

Glossary

The following explains terminology contained in this manual.

Term	Definition
abend	*Abnormal end*. The failure or unexpected termination of a process running on a computer system.
after image	The values of a row in a database after an insert or update is performed.
alias Extract	An Extract group that operates on a target system that resides within a more secure network zone than the source system. The purpose of the alias Extract is to initiate TCP/IP connections from the target to the less-trusted source. Once a connection is established, data is processed and transferred across the network in the usual manner by a passive Extract group that operates on the source system.
append mode	The default method of writing to the trail, whereby Extract appends re-read data to the trail file after a failure, instead of overwriting the old data.
Archived Log Only mode (ALO)	A mode of operation for Extract, where the process is configured to read exclusively from the archived transaction logs on a production or standby database system.
batch Replicat processing mode	In batch mode, Replicat organizes similar SQL statements into arrays and then applies them at an accelerated rate. Replicat batches the statements within a memory queue and then applies each batch in one database operation. The behavior of this mode is controlled by the BATCHSQL parameter. See also normal Replicat processing mode.
audit trail	A file on a NonStop Server system that stores modifications made to a database for the purpose of replication and recovery.
before image	The values that exist in a row in a database before a SQL operation is performed on that row.
bidirectional synchronization	Permits load distribution across multiple databases and servers where, in most cases, different users can change the same sets of data and those changes are synchronized by Oracle GoldenGate.
BLOB	See *LOB*.

Term	Definition
Bounded Recovery	Part of the Extract recovery system. Bounded Recovery guarantees an efficient recovery if Extract stops in an unplanned manner and then is started again, no matter how many open transactions there were at the time that Extract stopped, nor how old they were. It sets an upper boundary for the maximum amount of time that it would take for Extract to recover to the point where it stopped and then resume normal processing.
caller	The Oracle GoldenGate process that executes a user exit routine.
canonical format	A data format that Oracle GoldenGate uses to store data in a trail or extract file. This format allows data to be exchanged rapidly and accurately among heterogeneous databases.
cascading synchronization	An Oracle GoldenGate configuration in which data is sent from a source system to one or more intermediary systems and, from those systems, to one or more other systems in a synchronized state.
change synchronization	The process of synchronizing data changes made to a database on one system with a similar set of data on one or more other systems.
checkpoint file	A file on disk that stores the checkpoint generated by Oracle GoldenGate processes.
checkpoint table	A table created in the target database that maintains Replicat checkpoints, used optionally in conjunction with a standard checkpoint file on disk.
checkpoints	Internal indicators that record the current read and write position of an Oracle GoldenGate process. Checkpoints are used by the Extract and Replicat processes for online change synchronization to ensure data accuracy and fault tolerance.
CLOB	See *LOB*.
CMDSEC file	An Oracle GoldenGate file that stores rules for GGSCI command permissions.
Collector	The process that receives data from the Extract process over TCP/IP and writes it to a trail or extract file on the target system.
collisions	Errors that occur when data changes that are replicated by Oracle GoldenGate are applied to a target table, but the target row is either missing or is a duplicate.
column	One among a set of attributes assigned to an entity that is described by a database table. For example, there can be columns for the name, address, and phone number of the entity called “employees.”

Term	Definition
column map	See *map*.
column-conversion functions	Built-in Oracle GoldenGate processing functions that perform comparisons, tests, calculations, and other processing for the purpose of selecting and manipulating data.
commit	A transaction-control statement that ends a transaction and makes permanent the changes that are performed by the SQL statements within that transaction.
Commit Sequence Number (CSN)	A CSN is an identifier that Oracle GoldenGate constructs to identify a transaction for the purpose of maintaining transactional consistency and data integrity. It uniquely identifies a particular point in time in which a transaction commits to the database. The composition and value of the CSN varies, depending on the type of database that generated the transaction. A CSN captures the unique information that a database uses to identify transactions and represents it internally as a series of bytes, but Oracle GoldenGate processes the CSN in a platform-independent manner.
compressed update	A method of logging SQL update operations by which only column values that changed as the result of the update are logged to the transaction log.
conflict resolution	Instructions used in bidirectional synchronization that provide processing and error-handling rules in the event that the same SQL operation is applied to the same row in two or more databases at (or about) the same time.
consolidated synchronization	The process of replicating different data from two or more databases to one central database, such as in data warehousing.
conversion	See *transformation*.
data definitions file	See *source definitions file* and *target definitions file*.
data pump	A secondary Extract process that reads from an extract file or trail. The trail is populated by a primary Extract process that reads from the data source.
data source	The container of the data changes that are to be processed by Oracle GoldenGate. A data source can be: ◆ the transaction log of a database ◆ a Vendor Access Module

Term	Definition
data source name (DSN)	A DSN defines an ODBC connection to a database. A DSN consists of a database name, the database directory, the database ODBC driver name, database authentication information, and other information depending on the database. External applications, such as Oracle GoldenGate, require a DSN, because a DSN enables an application to connect to a database without having to encode the required information within the application program. The three types of DSN are ◆ A system DSN can be used by any entity that has access to the machine. It is stored within the system configuration. ◆ A user DSN can only be used by a specific user. It is stored within the system configuration. ◆ A file DSN is stored in a text file with a .dsn extension. It can be shared among different systems where the required ODBC driver is installed.
data type	An attribute of a piece of data that identifies what kind of data it is and what kinds of operations can be performed on it. For example, an integer data type is a number, and a character data type contains letters.
DDL	*Data Definition Language*. Data that defines the structure of a database, including rows, columns, tables, indexes, and database specifics such as file locations, users, privileges, and storage parameters.
DEFGEN	An Oracle GoldenGate utility that generates a data definitions file.
discard file	An Oracle GoldenGate file containing information about SQL operations that failed. This file is created when a record cannot be processed, but only if the DISCARDFILE parameter exists in the parameter file to specify the location for the file.
DML	*Data Manipulation Language*. Retrieves and manipulates data in a database. In the case of SQL, the actions are “select”, “insert”, “update”, and “delete”.
DSN	See data source name (DSN).
dynamic Collector	A Collector process that the Manager process starts automatically, as opposed to a static Collector.
EMSCLNT	An Oracle GoldenGate utility that distributes Oracle GoldenGate system error messages that originate on Windows and other supported operating systems to the EMS (Event Management Subsystem) server on the NonStop Server.
ENCKEYS file	An Oracle GoldenGate lookup file that stores encryption keys.

Term	Definition
encryption	A method of encoding data into a format that is unreadable to anyone except those who posses a password or decryption code to decipher it.
error log	A file that shows processing events, messages, errors, and warnings generated by Oracle GoldenGate. Its name is ggserr.log and it is located in the root Oracle GoldenGate directory.
event marker system	A system that customizes Oracle GoldenGate to take a specific action during processing based on a record that qualifies for filtering criteria. For example, you can skip the record or stop the Oracle GoldenGate process when the record is encountered. See also event record.
event record	A record in the transaction log that satisfies specific filter criteria and is used to trigger a specific action during processing. See also event marker system.
exceptions map	A special MAP parameter used specifically for error handling, which executes only after an error and sends error data to an exceptions table.
exceptions table	A database table to which information about failed SQL operations is written as the result of an exceptions map. Used for error handling.
Extract	The Oracle GoldenGate program that reads data either from a data source, from source tables, or from a local trail or file. Extract processes the data for delivery to the target system. A *primary Extract* reads the data source or database tables, and a *data-pump Extract* reads a local trail that is populated by a primary Extract.
extract file	A file written by Oracle GoldenGate where data is stored temporarily awaiting further processing during an initial load.
extraction	The processing of reading data from database tables or from a data source in preparation for further processing and/or transmission to a target database.
fetch	A query to the database issued by the Extract process when processing a record from the transaction log. A fetch is required if the data values that are needed to complete the SQL operation are not present in the record.
file header	See header.
filtering	The use of rules to select and exclude data for extraction or replication.
function	A segment of code that can be executed within an application or routine. See also *column-conversion functions*.

Term	Definition
GGSCI	*GoldenGate Software Command Interface*. The primary interface for issuing commands that configure, control, and monitor Oracle GoldenGate.
GLOBALS file	A text file in the root Oracle GoldenGate directory that contains parameters which apply to the Oracle GoldenGate instance as a whole, as opposed to runtime parameters that are specific to a process such as Extract or Replicat.
group	Also known as *process group*. A group consists of an Oracle GoldenGate process (either Extract or Replicat) and the parameter file, the checkpoint file, and any other files associated with that process.
header	A header can be: ◆ **A record header**: an area at the beginning of a record in an Oracle GoldenGate trail file that contains information about the transaction environment for that record. ◆ **A file header**: an area at the beginning of each file in a trail, or at the beginning of an extract file. This header contains information about the file itself, such as the Oracle GoldenGate version.
heterogeneous	A data environment where data is being exchanged among different types of applications, different types of databases, or different operating systems, or among a combination of those things.
homogeneous	A data environment where data is being exchanged among identical types of applications, databases, and operating systems.
initial load	The duplication of source data into a target database to make the two databases identical.
intermediary system	A system on the network that serves as a transfer station between the source and target systems. This system can be host to additional processing activities, such as transformation.
key	A column or columns in a table that are being used as a unique identifier for the rows in that table. Oracle GoldenGate uses the key to find the correct row in the target database and for fetches from the source database. For Oracle GoldenGate, a key can be the primary key, a unique key, a substitute key, or all of the columns of a table in the absence of a defined identifier.
KEYCOLS	A clause in a TABLE or MAP statement that defines a column or columns for Oracle GoldenGate to use as a unique identifier to locate any given row in a table.
KEYGEN	An Oracle GoldenGate utility that generates encryption keys.

Term	Definition
lag	Extract lag is the difference between the time that a record was processed by Extract and the timestamp of that record in the data source. Replicat lag is the difference between the time that the last record in a trail was processed by Replicat and the timestamp of the record in the trail.
latency	The difference in time between when a change is made to source data and when that change is reflected in the target data.
LOB	*Large Object*. A data type in a database that represents an unstructured object that is too large to fit into a character field, such as a Microsoft Word document or a video or sound file. Subsets of LOB are CLOB (Character Large Object) and BLOB (Binary Large Object), which contain character data and binary data, respectively.
log-based extraction	A method of extracting data changes from the database transaction log.
logical name	A name for a stored procedure that represents an instance of the *execution* of the procedure, as opposed to its actual name. For example, logical names for a procedure named “lookup” might be “lookup1,” “lookup2,” and so forth.
LUW	*Linux, UNIX, Windows*. An acronym that describes an application that runs on any of these platforms, such as DB2 LUW.
macro	A computer program that automates a task, such as the implementation of parameters and commands.
Manager	The control program for Oracle GoldenGate processing.
map	An association between a set of source data and a set of target data. A map can include data selection and conversion criteria. These maps are specified in a Replicat MAP parameter.
MAP statement	A Replicat parameter that specifies the relationship between a source table and a target table and the processing rules for those tables.
marker	A record that is inserted into the audit trail on a NonStop Server to identify application-specific events in the context of Extract and Replicat processing. See also event marker system.

Term	Definition
normal Replicat processing mode	The default processing mode for Replicat. In its normal mode, Replicat accumulates operations from multiple source transactions, in transaction order, and applies them as a group within one transaction on the target to improve performance. The GROUPTRANSOPS parameter controls the number of operations that are in this transaction, but the boundary can be adjusted automatically by Replicat to ensure that all operations from the last transaction in the group are included. See also batch Replicat processing mode and source Replicat processing mode.
object	For the purpose of this documentation, the term *object* refers to any logical component of a database that is visible to, and can be created by, its users for the purpose of storing data (for example, tables), defining ownership and permissions (for example, roles), executing an action on another object (for example, triggers), and so forth.
object record	A file containing attributes of the tables and other database objects that are configured for processing by Oracle GoldenGate, such as column IDs and data types.
ODBC	*Open Database Connectivity*. Acronym for a standard interface that enables applications to connect to different types of databases in a uniform manner. The goal of ODBC is to make the process of connecting to a database independent of programming languages, database systems, and operating systems.
online change synchronization	An Oracle GoldenGate processing method in which Extract and Replicat processes run continuously to synchronize data changes unless they are stopped by an Oracle GoldenGate user. Online processes maintain checkpoints in the trail.
online Extract	An Extract group that is configured for online change synchronization.
online processing	See *online change synchronization*.
online Replicat	A Replicat group that is configured for online change synchronization.
operation	A single unit of work. This typically refers to a SQL change made to data or a change made to the structure of an object in the database, but can also refer to any work done by a computer process.

Term	Definition
Oracle GoldenGate Director	Graphical user interface software that enables Oracle GoldenGate users to monitor and manage Oracle GoldenGate processes. The components of Oracle GoldenGate Director are: **Oracle GoldenGate Director Administrator**: A utility used by administrators to define users and instances of Oracle GoldenGate. **Oracle GoldenGate Director Server**: A software module that gathers data about the Oracle GoldenGate processes. **Oracle GoldenGate Director Client**: Software installed on a user's system as an interface to Oracle GoldenGate Director. **Oracle GoldenGate Director Web**: A browser-based user interface to Oracle GoldenGate Director (requires no software to be installed).
Oracle GoldenGate Rollback	A utility that uses before images to undo changes made to a database.
overwrite mode	A method of writing data to the trail that was used in Oracle GoldenGate versions prior to version 10.0. In this mode, Extract overwrites existing data upon recovery, instead of appending it to the end of the trail file.
owner	A logical namespace in a database to which database objects are assigned as part of the organizational hierarchy. Because the ownership of database objects is managed differently by different database types, the term *owner* is used in this documentation to denote whichever entity is recognized by the database as the qualifier of an object name, typically a user or schema name. For example, in a qualified Oracle table name of scott.emp, the owner is scott.
parameter	An input or output value for a computer program, such as the code of an application like Oracle GoldenGate, a stored procedure, a macro, script, or other processing instructions.
parameter file	A file containing parameters that control the behavior of an Oracle GoldenGate process. The default location for parameter files is the dirprm directory in the Oracle GoldenGate installation directory.
pass-through data pump	A data pump that is configured with the PASSTHRU parameter to bypass the need to look up data definitions. This enables faster processing and enables a pump to be used on an intermediary system that has no database.
pass-through Extract	See *pass-through data pump*.

Term	Definition
passive Extract	An Extract process that operates on the source system when an alias Extract is being used on the target. This Oracle GoldenGate configuration is required when security rules do not permit TCP/IP connections to be initiated from the source system (as a typical Extract would do) because the target is inside a more secure network zone. The passive Extract is the data pump, when one is being used; otherwise, it is the primary Extract.
primary Extract	An Extract group that reads from the data source or directly from the database tables. A primary Extract can write to a local trail, which is then read by a data pump Extract, or it can send the data across TCP/IP to the target system.
primary key	An integrity constraint consisting of a column or columns that uniquely identify all possible rows that exist in a table, current and future. There can be only one primary key for a table. A primary key contains an implicit NOT NULL constraint.
process report	A report generated for Extract, Replicat, and Manager that provides information about the process configuration and runtime statistics and events. The default location for process reports is the dirrpt directory of the Oracle GoldenGate installation directory.
record	A unit of information in a transaction log or trail that contains information about a single SQL operation performed on a row in a database. The term *record* is also used to describe the information contained in a specific row of a table.
record header	See header.
remote file	An extract file on a remote system.
remote trail	A trail on a remote system.
Replicat	The Oracle GoldenGate process that applies data to target tables or moves it to another application or destination.
replication	The process of recreating source database operations and applying them to a target database.
report	See *process report*.
report file	See *process report*.
rollback	The act of undoing changes to data that were performed by SQL statement within an uncommitted transaction.
rollover	The closing of one file in a sequence of files, such as a trail, and the opening of a new file in the sequence.

Term	Definition
routine	A segment of code that is executed within an application such as Oracle GoldenGate, which calls functions that retrieve and return values and provide responses. See also *user exit*.
row	Information about a single instance of an entity, such as an employee, that is stored within a database table. For example, a row stores information about "John Doe" in relation to the broader collection of rows that stores information about John and the other employees in a company. Also commonly known as a *record*.
source	The location of the original data that Oracle GoldenGate will be extracting, as in *source database* and *source system*.
source definitions file	A file containing the definitions of the source tables, which is transferred to the target system. This file is used by the Replicat process for data conversion when the source and target tables are dissimilar.
source Replicat processing mode	In source processing mode, Replicat applies SQL operations within the same transaction boundaries that were used on the source. See also normal Replicat processing mode.
statement	An elementary instruction in a computer programming language, for example a SQL statement, parameter statement, or command statement.
static Collector	A Collector process that is started manually by an Oracle GoldenGate user, instead of being started automatically by the Manager process.
stored procedure	A group of SQL, PL/SQL, or Java statements that are stored in the database and called on demand by a process or application to enforce business rules, supplement application logic, or perform other work as needed.
substitute key	A unique identifier that consists of any columns in a table that can uniquely identify the rows in that table. A substitute key is not defined in the definition of a table; it is created by creating a KEYCOLS clause in a TABLE or MAP statement.
synchronization	The process of making or keeping two or more sets of data consistent with one another. To be consistent, one set might be identical to the other, or one set might be a reorganized, reformatted, or expanded version of the other, while retaining the essence of the information itself.
table	A logical unit of storage in a database that consists of rows and columns, which together identify the instances of a particular entity (for example, "employees") and the attributes of that entity, such as name, address, and so forth.

Term	Definition
TABLE statement	An Extract parameter that specifies a source table or tables whose data is to be extracted from the database.
TAM (Teradata Access Module)	An interface between the Change Data Capture (CDC) component of a Teradata database and the Extract process. It allows Oracle GoldenGate to communicate with the Teradata replication components.
target	The destination for the data that is processed by Oracle GoldenGate, as in *target database* and *target system*.
target definitions file	A file containing the definitions of the target tables. This file is transferred to the source system and is used by the Extract process for data conversion when the source and target tables are dissimilar.
task	A special type of initial load in which the Extract process communicates directly with the Replicat process over TCP/IP instead of using a Collector process or trail.
token	A user-defined piece of information that is stored in the header portion of a record in the Oracle GoldenGate trail file. Token data can be used to customize the way that Oracle GoldenGate delivers information.
trace table	A special table created for use by Oracle GoldenGate in an Oracle database. The table is used in conjunction with parameter settings to prevent replicated data from being sent back to the source in a bidirectional synchronization configuration.
trail	A series of files on disk where Oracle GoldenGate stores data temporarily in preparation for further processing. Oracle GoldenGate records checkpoints in the trail for online change synchronization.
transaction	A group of one or more SQL operations (or statements) that are executed as a logical unit of work within a set of beginning and ending transaction-control statements. As a unit, all of the SQL statements in a transaction must execute successfully, or none of the statements can execute. A transaction is part of a system of database measures that enforce data and structural integrity.
transaction log	A set of files that records all of the SQL change operations performed on a database for the purpose of data recovery or replication.
transformation	Also called *conversion*. The process of manipulating source data to the format required by target tables or applications, for example converting dates or performing arithmetic calculations. You can do transformation by means of the Oracle GoldenGate column-conversion functions.

Term	Definition
unidirectional synchronization	A configuration where data changes are replicated in one direction, source-to-target. Changes cannot be made to that same data and then sent back to the source, as is the case in a bidirectional configuration.
unique key	An integrity constraint consisting of a column or columns that uniquely identify all possible rows that exist in a table, current and future. Differs from a primary key in that it does not have an implicit NOT NULL constraint. There can be more than one unique key on a table.
Unit of Work	A set of data operations that are executed as a logical unit in a database, where all must succeed or none can succeed. In IBM terminology, the term *unit of work* is the equivalent of the term transaction in other types of databases.
user exit	A user-created program written in C programming code that is called during Oracle GoldenGate processing to perform custom processing such as to convert data, to respond to database events, and to repair invalid data.
VAM (Vendor Access Module)	An API interface that is used by an Oracle GoldenGate process module to communicate with certain kinds of databases.
VAM trail	A series of files, similar to a transaction log, that are created automatically and aged as needed. Data operations from concurrent transactions are recorded in time sequence, as they occur, but not necessarily in transaction order. Used to support the Teradata maximum protection commit protocol.
wildcard	A placeholder for an unknown or unspecified character or set of characters. A wildcard is a means of specifying multiple names in a parameter or command statement. Oracle GoldenGate supports the asterisk (*) wildcard, which represents any number of unknown characters.

Index

Numerics

509 error 48

A

ADD TRANDATA
- error on table specification 71
- errors on 71
- in DDL support 62
- not issued 58
- to enable logging 54, 56

ADDTRANDATA option, DDLOPTIONS 62
ALLOWLOBDATATRUNCATE option, DBOPTIONS 47
ALO mode, Extract not capturing data 38
ALTARCHIVELOGDEST parameter 40
ALTER DATABASE, excluded 62
ALTER SYSTEM, excluded 62
archive log, not found 40, 41, 43
ASCII
- Logdump display 85
- table name in Logdump 85

ASCIIDATA command, Logdump 85
ASCIIDUMP command, Logdump 85
ASCIIHEADER command, Logdump 85
authentication
- database 37, 44
- operating system 37, 38

authorization failure 00D31024 73
AUTORESTART parameter 19
AUTOSTART parameter 19
auto-starting processes 19

B

bad parameter error 35, 37
BOOTDELAYMINUTES parameter 20
build problems 34

C

CD command, Logdump 86
character set
- as cause of out-of-sync condition 50
- different on source and target 50
- Logdump 85

CHECKPARAMS parameter 35
checkpoint
- frequency, tuning 29
- read, not increasing 45

checkpoint file
- cannot open 37
- validity check 46

checkpoint table errors 45
CMDTRACE parameter 70
COLS option, ADD TRANDATA 54, 56
COLSEXCEPT option, TABLE 55
columns
- adding with ALTER command 43
- missing 54, 56
- numerous in tables 40
- problems with mapping 53

commands
- GGSCI info 9
- Logdump 76

comments, wrong place in DDL 64
commit locks 73
COMPUTETIMESTAMP command, Logdump 86
connection-refused errors 42

conversion
in pass-through mode 42
optimizing 30
COUNT command, Logdump 86
CTIME command, Logdump 89
cursors, open 32, 70

D

data
displaying in Logdump utility 76
missing 57
out-of-sync 49
segregating 20
DATA CAPTURE CHANGES 43
data pump
in pass-through mode 42
tuning 27
data source name, in login 37
database
login failure 37
tuning for Oracle GoldenGate 32
DBOPTIONS parameter 47
DDL troubleshooting 58, 66
DDLOPTIONS parameter 62, 64, 70
DDLTABLE parameter 59
DEBUG command, Logdump 89
debug509.txt file 48
DECRYPT command, Logdump 90
DECRYPTTRAIL parameter 46
DELETE REPLICAT fails 49
derived name not converted 64, 67
DETAIL command, Logdump 90
DIR command, Logdump 103
discard file 14, 68
DISCARDFILE parameter 14, 68
DISCARDROLLOVER parameter 15, 68
disk full 41
DNS server, host name on 42
DUMP command, Logdump 91
DYNAMIC option, WILDCARDRESOLVE 38
dynamic ports error 42
DYNAMICPORTLIST parameter 42

E

EBCDICDATA command, Logdump 85
EBCDICDUMP command, Logdump 85
EBCDICHEADER command, Logdump 85
EMPTYLOBSTRING option, DBOPTIONS 47
ENCRYPT command, Logdump 91
encryption, trail 46
ENV command, Logdump 92
errors
process 11
SQL 14
startup 34
troubleshooting 33
escape characters not converting 55
Event Viewer, Oracle GoldenGate messages in 15
EXIT command, Logdump 92
Extract process
problem solving 38
stopping for long time 41
writing over a trail 47

F

FC command, Logdump 92
FETCHCOLS options, TABLE 54
fetching
failures 54
optimizing 22
FETCHOPTIONS parameter 54
file
discard 14
ggserr.log 13
file header, viewing 94
file, creating from Logdump 116
FILEHEADER command 94
FILEINFO command, Logdump 103
FILES command, Logdump 103
FILTER command, Logdump 103
filters, optimizing 30
FORCETRANS option, SEND EXTRACT 39

FORMATASCII parameter 47
FORMATSQL parameter 47
FORMATXML parameter 47
FROM command, Logdump 115
FUNCTIONSTACKSIZE parameter 37

G

GGSCHEMA parameter 59
GHDR command, Logdump 110
group
cannot delete 49
invalid name 37
missing 35

H

HANDLECOLLISIONS parameter 52
header
scanning for 117
tokens, displaying 110
viewing in Logdump 110
HEADERTOKEN command, Logdump 110
HELP command 7
HELP command, Logdump 111
HISTORY command 111
host name in MGRPORT 42

I

I/O bottlenecks, eliminating 29
IGNOREDATACAPTURECHANGES option, TRANLOGOPTIONS 43
INFO commands 9
INSTR option, DDL 62
INTERPRETINTERVAL command, Logdump 112
INTERPRETTIMESTAMP command, Logdump 112
invalid identifier error 59
IP address in MGRPORT 42

K

key
adding columns with ALTER 43
changing during lag period 59
tables without 50
KEYCOLS clause 43, 49, 54

L

lag
Extract 38
inaccurate report of 71
Replicat 44
LAG command 10
large transactions, managing 32
latency
troubleshooting 44
viewing 10
LD_LIBRARY_PATH 36
library, missing 36
LIST parameter 70
load balancing 20
LOB
length error 44
replicating to Sybase target 47
log
error 13
process 11
system 15
LOG command, Logdump 113
log, transaction
cannot open 41
failure to retain 43
Logdump commands 76
login failure 37
LOGRETAIN parameter 43
LOGTRAIL command, Logdump 115
LTM context, failure to reserve 43

M

Manager
statistics, viewing 10
tuning 19
mapping, problems with 53
marker_status.sql script 59
MARKERTABLE parameter 59
max text repl size parameter 44
MAXDISCARDRECS parameter 68
MAXFETCHSTATEMENTS parameter 70
MAXSQLSTATEMENTS parameter 32, 70
MAXTRANSOPS parameter 32, 46
MD_TAB_MARKERSEQNO 61
memory
Replicat error 46
to process functions 37
used up after network delays 29
z/OS subpool 241 44
messages, viewing 13
MGRPORT parameter 42
module not found error 75

N

network
instability 27, 40
not enough bandwidth 40
transfer problems 40
NEXT command, Logdump 113
NEXTTRAIL command, Logdump 113
NOCROSSRENAME option, DDLOPTIONS 63
NODBCHECKPOINT option, ADD REPLICAT 49
NOMAPDERIVED option, DDLOPTIONS 64, 67
NORENAME option, TABLEEXCLUDE 63
NOTIFY(INTERVAL) command, Logdump 114
NOUSELATESTVERSION option, FETCHOPTIONS 55
NOUSESNAPSHOT option, FETCHOPTIONS 54

O

OBEY command 114
online help, getting 7
OPEN command, Logdump 115
open cursors, number of 32
operations, SQL
fetch failures 54
inaccurate count of 72
missed 57
procedure failures 55
statistics, viewing 10
viewing syntax of 16
OPTYPE option, DDL 62, 67
ORA-04021 error 65
ORACLE_HOME 38
ORACLE_SID 38
OUT command, Logdump 113
OVERFLOWLOGPATH parameter 43

P

parallel processing
diagram 20
Replicat 20
parallel processing, with Oracle GoldenGate 24
parameter file
permissions on 35
reuse problems 57
wrong place 35
parameters
missing or wrong 35
SQLEXEC 55
syntax 35
wrong order 36
pass-through data pump 27
PASSTHRU parameter 27, 42
password, database 37
PATH 36
performance, tuning 19
permissions
checkpoint file 37
database 37, 44
on trail files 46
Oracle GoldenGate files 37
parameter files 35
read transaction log 41
SQLEXEC 55

port number, errors on 42
POSITION command, Logdump 115
prepared statements, too many 70
problem solving procedures 33
procedures, errors on 55
process report
DDL missing 65
not generated 68
PURGEOLDEXTRACTS parameter 69, 70

Q

QUIT command, Logdump 92

R

RAID configuration 30
RANGE function 26, 69
ranges, calculating 26
RBA, finding with Logdump 118
RECLEN command, Logdump 115
RECORD command, Logdump 113
record type, scanning for 118
record, trail
incompatible 47
unreadable format 47
viewing with Logdump 76
REMOVECOMMENTS option, DDLOPTIONS 64
RENAME
converting to ALTER TABLE RENAME 63
failures 64
Replicat process
abends
on data operations 45
on DDL table 65
cannot delete 49
troubleshooting 44
tuning 32
replication not enabled 74
REPORT option
DDLOPTIONS 65
SEND commands 12
REPORT option, DDLOPTIONS 70
REPORT parameter 12
report, process
missing DDL 65
not generated 68
too big 70
using 11
REPORTFILE option, ADD/SEND commands 11
reporting
DDL steps 65
process events and errors 11, 13
REPORTROLLOVER parameter 13, 70
restart processes automatically 19
resynchronizing out-of-sync tables 51
RMTHOST parameter 42
rows
dividing into ranges 26
out-of-sync 49

S

SAVE command, Logdump 116
SCANFORENDTRANSACTION command, Logdump 117
SCANFORHEADER command, Logdump 117
SCANFORRBA command, Logdump 118
SCANFORTIME command, Logdump 118
SCANFORTYPE command, Logdump 118
SCANSCROLLING command, Logdump 119
secondary truncation point, problems with 57
SEND commands 10
server messages, missing 72
SHOW command 119
SHOWINFOMESSAGES option, DBOPTIONS 72
SHOWTRANS option, SEND EXTRACT 39
SHOWWARNINGS option, DBOPTIONS 72
SKIP command, Logdump 121
SKIPTRANS option, SEND EXTRACT 39
snapshot-too-old message 54
SOURCE command, Logdump 114
source definitions, changes to 47
SOURCEDB parameter 37, 43
sp_configure 44
SQL STATE 55032 44

SQL statements, prepared 32
SQLEXEC failures 55
startup
failures 34
speed, improving 38
statistics
operations processed 10
viewing from Director 15
STATS command 10
STATUS command 10
stored procedures, errors on 55
string substitution not working 64, 67
SYSLOG parameter 16
syslogs, Oracle GoldenGate messages in 15

T

tables
default to fetching from 55
missed in transactions 57
problems with mapping 53
resynchronizing 51
TARGETDB parameter 37
TCP/IP
bottlenecks 27
connection refused error 42
not enough bandwidth 40
TCPBUFSIZE option, RMTHOST 29
TCPSOURCETIMER parameter 71
text, writing to Logdump log 124
TIME command, Logdump 121
TIMEOFFSET command, Logdump 121
TIMESTAMP columns, mapping errors 55
timestamps, inaccurate 71
TLTRACE parameter 39
tokens
header, displaying 110
user, displaying in Logdump 123
TRACE option, SQLEXEC 56
TRACE parameter 39
tracing, Oracle GoldenGate 39
trail files
cannot be opened 46
encrypted 46
filling up 68, 69
missing 35, 46
not rolling over 69
purging too soon 70
unreadable format 47
viewing in Logdump 76
TRAILFORMAT command, Logdump 122
TRANLOGOPTIONS parameter 43
transaction log
cannot open 41
not found 40, 41, 43
transactions
converting large to many smaller 32
long-running 38
missed 57
processing in parallel 20
Replicat, tuning 32
TRANSBYTELIMIT command, Logdump 122
TRANSHIST command, Logdump 81, 122
TRANSRECLIMIT command, Logdump 123
triggers on target tables 50
troubleshooting tips 33

U

undo retention, expired 54
user, database 37
USEREXIT parameter 43
USERID parameter 38, 43
USERTOKEN command, Logdump 123

V

VIEW GGSEVT command 14
VOLUME command, Logdump 86

W

warnings
missing from Sybase server messages 72
viewing 13

WARNRATE parameter 13
WILDCARDRESOLVE parameter 38
wildcards 38, 43
WRITELOG command, Logdump 124

X

X command, Logdump 124