

Oracle® GoldenGate
NonStop SQL/MX Installation and Setup Guide
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CHAPTER 1

System requirements and preinstallation instructions

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This chapter contains the requirements for the system and database resources that support Oracle GoldenGate.

Overview of Oracle GoldenGate for NonStop SQL/MX

Oracle GoldenGate supports log-based extraction and replication from a source NonStop SQL/MX database to:

- other supported databases using standard connection methods for those databases.
- a target NonStop SQL/MX database through an HP NonStop OSS ODBC driver. Replicat is installed on the target NonStop SQL/MX database system. Replicat reads data sent from the source to a trail on the target and applies the data to the database through ODBC.

Oracle GoldenGate for NonStop SQL/MX supports data filtering, mapping, and transformation unless noted otherwise in this documentation.

Supported Platforms

To find out which Oracle GoldenGate builds are available for a specific combination of database version and operating system, log onto <http://support.oracle.com> and select the **Certifications** tab. For assistance, click **Tips for Finding Certifications**.

An e-mail and password are required to enter this site.

Operating system requirements

System configuration

Install the Open System Services (OSS) environment.

Disk requirements

Oracle GoldenGate must be installed on a physical disk drive, not on virtual disks that are maintained by NonStop SMF (Storage Management Foundation).

Assign the following free disk space:

- 50-150 MB, depending on the database and platform. This includes space for the compressed download file and space for the uncompressed files. You can delete the download file after the installation is complete.

- 40 MB for the working directories and binaries for each instance of Oracle GoldenGate that you are installing on the system. For example, to install two builds of Oracle GoldenGate into two separate directories, allocate 80 MB of space.
- An additional 1 GB of disk space on any system that hosts Oracle GoldenGate trails, which are files that contain the working data. You may need more or less than this amount, because the space that is consumed by the trails depends on the volume of data that will be processed. Start with 1 GB and adjust as needed. See also the following guidelines.

Storage for Oracle GoldenGate trails

To prevent trail activity from interfering with business applications, assign a separate disk or file system to contain the trail files. These files are created during processing to store all of the data that is captured by Oracle GoldenGate. The default size is 10 megabytes, but can be changed during the configuration process. Trail files accumulate but can be purged according to rules set with the `PURGEOLDEXTRACTS` parameter. You will specify the location of the trails when you configure Oracle GoldenGate.

For trails that are stored at the source location, there should be enough space to handle data accumulation should the network connection fail. In a typical configuration, a secondary Extract process (known as a data pump) sends data from a local trail over the network, and it will fail when the network does. However, the primary Extract that reads the transaction logs and writes to the local trail will continue to do so. This Extract should not be stopped during a failure; otherwise, transaction data might be missed if the transaction logs recycle or get removed from the system before the data is completely captured. There must be enough disk space to hold the data accumulation.

For trails at the target location, provide enough disk space to handle data accumulation according to the purge rules set with the `PURGEOLDEXTRACTS` parameter. Even with `PURGEOLDEXTRACTS` in use, data will always accumulate on the target because it is transferred across the network faster than it can be applied to the target database.

To estimate required trail space

1. Estimate the longest time that the network could be unavailable. Plan to store enough data to withstand the longest possible outage, because otherwise you will need to resynchronize the source and target data if the outage outlasts disk capacity.
2. Estimate how much transaction log volume your business applications generate in one hour.
3. Use the following formula to calculate the required disk space.

[log volume in one hour] x [number of hours downtime] x .4 = trail disk space

This equation uses a multiplier of 40 percent because only about 40 percent of the data in a transaction log is needed by Oracle GoldenGate.

NOTE This formula is a conservative estimate, and you should run tests once you have configured Oracle GoldenGate to determine exactly how much space you need.

Network

- Configure the system to use TCP/IP services, including DNS.

- Configure the network with the host names or IP addresses of all systems that will be hosting Oracle GoldenGate processes and to which Oracle GoldenGate will be connecting. Host names are easier to use.
- Oracle GoldenGate requires some unreserved and unrestricted TCP/IP ports, the number of which depends on the number and types of processes in your configuration. See the Oracle GoldenGate *Windows and UNIX Administrator's Guide* for details on how to configure the Manager process to handle the required ports.
- Keep a record of the ports that you assign to Oracle GoldenGate. You will specify them with parameters when configuring the Manager process.
- Configure your firewalls to accept connections through the Oracle GoldenGate ports.

Database requirements

Database configuration

On a source SQL/MX system, the Extract process uses a program named VAMSERV to capture transaction data from the audit trails. This program is extracted into the installation subvolume when you install Oracle GoldenGate for NonStop SQL/MX. You will be prompted to install VAMSERV in the installation instructions in this guide.

Database user for Oracle GoldenGate processes

- Create a database user that is dedicated to Oracle GoldenGate. It can be the same user for all of the Oracle GoldenGate processes that must connect to a database:
 - Extract (source SQL/MX database)
 - Replicat (target SQL/MX database)
 - DEFGEN (source or target database)

Table 1 Database user privileges

Privilege	Extract user	Replicat user	DEFGEN user
SELECT	X	X	X
DELETE		X	
INSERT		X	
UPDATE		X	
REFERENCES		X	

- To preserve the security of your data, and to monitor Oracle GoldenGate processing accurately, do not permit other users, applications, or processes to log on as, or operate as, the Oracle GoldenGate database user.

- Extract process uses the native NonStop SQL/MX API with embedded SQL. This API does not log on to the database, so no connection authentication is required. The API passes the catalog and schema names through the Oracle GoldenGate API in the format of <catalog>@<schema>. You specify the connection information in the Extract parameter file. It can also be used in Oracle GoldenGate user exits if needed.
- To connect to a target NonStop SQL/MX database, the Replicat process uses an ODBC connection. In addition, the GGSCI command interface connects to a source NonStop SQL/MX database when database commands are issued through it.

SQL/MX Access Privileges

Dedicate an NSK user (groupID.userID) or OSS alias userID to Oracle GoldenGate. This user requires the following access privileges at the SQL/MX data level:

- table
- view
- stored procedure.

Access privileges are granted through the SQL/MX command interface with a GRANT statement. For more information on the GRANT command, see the SQL/MX documentation.

Supported SQL/MX data types

- CHAR
- VARCHAR
- REAL
- DOUBLE
- NUMERIC
- SMALLINT
- LARGEINT
- DECIMAL
- VARCHAR(1)-(4040)
- FLOAT
- PIC
- DATE
- TIME
- TIMESTAMP
- SYSKEY

Limitations of support

- The original SYSKEY values are not preserved on the target. The target database generates a new unique value.
- Oracle GoldenGate does not support negative dates.

Supported objects and operations for SQL/MX

- Oracle GoldenGate supports the extraction and replication of DML operations on tables that contain rows of up to 512 KB in length.

- Oracle GoldenGate supports the maximum number and size of columns per table that is supported by the database.

Non-supported objects and operations for SQL/MX

- Extraction or replication of DDL (data definition language) operations
- Oracle GoldenGate SQLEXEC functionality
- NonStop SQL/MX distributed transactions
- PURGEDATA operations
- Updates to primary keys. (NonStop SQL/MX does not allow updates to primary keys.)

Supported and non-supported object names and case

The following will help you verify whether the name of a supported object qualifies or disqualifies it for inclusion in an Oracle GoldenGate configuration.

Object names and owners

Source and target object names must be fully qualified in Oracle GoldenGate parameter files, as in `fin.emp`. Oracle GoldenGate supports character case as follows.

Case sensitivity

The following are general guidelines for the case-sensitivity of object names as it relates to Oracle GoldenGate. These guidelines may or may not apply to your databases, depending on whether the database or the underlying operating system supports case-sensitivity. Keep in mind that case-sensitivity (or lack thereof) may apply to the source database but not the target, or to the target but not the source.

- If the system or database is case-sensitive, Oracle GoldenGate supports the case sensitivity of database names, owner and schema names, object names, column names, and user names.
- If the system or database is case-insensitive (or is configured for case-insensitivity), Oracle GoldenGate converts all names to upper case.

To preserve case-sensitivity in an Oracle GoldenGate configuration

In Oracle GoldenGate parameter files, specify case-sensitive names exactly as they appear in the database. In `TABLE` and `MAP` parameters, enclose case-sensitive names in double quotes if the other database (the source or target of the case-sensitive objects) is not case-sensitive.

If replicating from a case-insensitive source to a case-sensitive target, enter the source names in upper case in the `Replicat` `MAP` statements, to reflect the fact that `Extract` writes them to the trail as uppercase.

For example:

```
MAP SALES.CUSTOMER, TARGET "Sales.Account";
```

Supported characters

Oracle GoldenGate supports alphanumeric characters in object names and in the names of key columns and non-key columns. Oracle GoldenGate also supports the following non-alphanumeric characters in columns that are not being used by Oracle GoldenGate as a key.

Table 2 Supported non-alphanumeric characters in object names and non-key column names¹

Character	Description
~	Tilde
< >	Greater-than and less-than symbols
/	Forward slash
\	Backward slash
!	Exclamation point
@	At symbol
#	Pound symbol
\$	Dollar symbol
%	Percent symbol
^	Caret symbol
()	Open and close parentheses
_	Underscore
-	Dash
+	Plus sign
=	Equal symbol
	Pipe
[]	Begin and end brackets
{ }	Begin and end curly brackets (braces)

¹ The type of key that is being used by Oracle GoldenGate depends on the definition of a given table and whether there are any overrides by means of a KEYCOLS clause. Oracle GoldenGate will use a primary key, if available, or a unique key/index (selection is dependent on the database). In the absence of those definitions, all columns of the table are used, but a KEYCOLS clause overrides all existing key types. For columns that are being used by Oracle GoldenGate as a key, the characters in the names must be valid for inclusion in a WHERE clause. This list is all-inclusive; a given database platform may or may not support all listed characters.

Non-supported characters

Oracle GoldenGate does not support the following characters in object or column names.

Table 3 Non-supported characters in object and column names¹

Character	Description
&	Ampersand
*	Asterisk
?	Question mark
:	Colon
;	Semi-colon
,	Comma
'	Single quotes
“”	Double quotes
‘	Accent mark (Diacritical mark)
.	Period
	Space

¹ This list is all-inclusive; a given database platform may or may not support all listed characters.

CHAPTER 2

Installing Oracle GoldenGate

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These instructions are for installing Oracle GoldenGate for the first time. To upgrade Oracle GoldenGate from one version to another, follow the instructions on:

<http://www.oracle.com/technology/software/products/goldengate/index.html>

Installing Oracle GoldenGate installs all of the components that are required to run and manage the processing (excluding any components required from other vendors, such as drivers or libraries) and it installs the Oracle GoldenGate utilities. The installation process takes a short amount of time.

Installation overview

To install Oracle GoldenGate, the following steps are required:

- Downloading Oracle GoldenGate
- Installing the Oracle GoldenGate software
- Configuring Manager and other processes

NOTE Before proceeding, make certain that you have reviewed the System Requirements in this guide.

Downloading Oracle GoldenGate

Download the appropriate Oracle GoldenGate build to each system that will be part of the Oracle GoldenGate configuration.

1. Navigate to <http://edelivery.oracle.com>.
2. On the **Welcome** page:
 - Select your language.
 - Click **Continue**.
3. On the **Export Validation** page:
 - Enter your identification information.
 - Accept the **Trial License Agreement** (even if you have a permanent license).
 - Accept the **Export Restrictions**.
 - Click **Continue**.
4. On the **Media Pack Search** page:
 - Select the **Oracle Fusion Middleware** Product Pack.
 - Select the platform on which you will be installing the software.
 - Click **Go**.

5. In the **Results List**:
 - Select the Oracle GoldenGate Media Pack that you want.
 - Click **Continue**.
6. On the **Download** page:
 - Click **Download** for each component that you want.
 - Follow the automatic download process to transfer the mediapack.zip file to your system.

NOTE Before installing the software, review the release notes for any new features, new requirements, or bug fixes that affect your current configuration. Review the readme file for known issues.

Installing Oracle GoldenGate on a NonStop system

1. FTP the SQL/MX ODBC version of Oracle GoldenGate to the NonStop OSS environment in binary mode, and place it in the directory where you want Oracle GoldenGate to be installed.

NOTE Do not use the generic ODBC Oracle GoldenGate build. It must be the SQL/MX version.

2. Run `gzip` with the following command.

```
gzip -d <filename>
```

The file is now decompressed and has a `.tar` extension.

3. Run `tar` with the following command.

```
tar -xvof <filename>
```

All Oracle GoldenGate files are placed in the current directory.

4. From the Oracle GoldenGate subvolume, run the GGSCI program.

```
GGSCI
```

5. In GGSCI, issue the following command.

```
CREATE SUBDIRS
```

6. Issue the following command to exit GGSCI.

```
EXIT
```

7. If this is a **source** NonStop system, perform step 8 and step 9.

8. Run the `ggmxcinstall` script to SQL compile the Extract program on the system and install the `VAMSERV` object module in the `NSK` space.

```
ggmxcinstall <destination>
```

Where: <destination> is the destination NSK volume and subvolume in OSS format, preferably the Oracle GoldenGate installation location. The volume must be a real volume name, not an SMF logical volume name.

9. After ggminstall completes, log on to TACL as SUPER.SUPER and FUP LICENSE the newly installed VAMSERV object.

NOTE The VAMSERV process is similar to the existing AUDSERV process that is part of the Oracle GoldenGate for NonStop product that is used with SQL/MP and Enscribe databases.

Configuring Manager and other processes

To configure Oracle GoldenGate to support your business requirements, see the Oracle GoldenGate *Windows and UNIX Administrator's Guide*. It contains instructions to:

- Configure the Manager process with a TCP/IP port and other optional parameters that control dynamic port assignments, trail file maintenance, automatic startup, and other properties.
- Configure Extract and Replicat processes to support reporting, high availability, disaster recovery, and other topologies.
- Configure security to control user access, file security, and data encryption.
- Configure integration, manipulation, and conversion features that enable you to customize Oracle GoldenGate and support the delivery of data across heterogeneous environments.
- Configure utilities and other tools that support Oracle GoldenGate.

CHAPTER 3

Preparing the system for Oracle GoldenGate processing

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Certain database attributes must be addressed in an Oracle GoldenGate environment. Some steps are required on the source system, some on the target, and some on both.

Required preparations on source and target NonStop systems

Perform these preparations on a source and target system that hosts SQL/MX.

Configuring character sets

To ensure accurate character representation from one database to another, the following must be true:

- The character set of the target database must be a superset of the character set of the source database.
- If your client applications use different character sets, the database character set must be a superset of the character sets of the client applications. In this configuration, every character is represented when converting from a client character set to the database character set.

Assigning row identifiers

Oracle GoldenGate requires some form of unique row identifier on the source and target tables to locate the correct target rows for replicated updates and deletes.

Unless a `KEYCOLS` clause is used in the `TABLE` or `MAP` statement, Oracle GoldenGate selects a row identifier to use in the following order of priority:

1. Primary key
2. First unique key alphanumerically that does not contain a timestamp or non-materialized computed column
3. If none of the preceding key types exist (even though there might be other types of keys defined on the table) Oracle GoldenGate constructs a pseudo key of all columns that the database allows to be used in a unique key, excluding those that are not supported by Oracle GoldenGate in a key or those that are excluded from the Oracle GoldenGate configuration.

NOTE If there are other, non-usable keys on a table or if there are no keys at all on the table, Oracle GoldenGate logs an appropriate message to the report file. Constructing a key from all of the columns impedes the performance of Oracle GoldenGate on the source system. On the target, this key causes Replicat to use a larger, less efficient `WHERE` clause.

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If a table does not have one of the preceding types of row identifiers, or if you prefer those identifiers not to be used, you can define a substitute key if the table has columns that always contain unique values. You define this substitute key by including a KEYCOLS clause within the Extract TABLE parameter and the Replicat MAP parameter. The specified key will override any existing primary or unique key that Oracle GoldenGate finds. For more information about KEYCOLS, see the Oracle GoldenGate *Windows and UNIX Reference Guide*.

Defining an ODBC data source

Follow these steps to specify a data source name (DSN) to which the GGSCI command interface can connect on the source and to which the Replicat process can connect on the target.

1. Log into the NonStop system and select a TACL prompt.
 2. Edit or Tedit the \$SYSTEM.SYSTEM.ODBCDSN ODBC configuration file.
 3. Add the DSN to the [ODBC Data Sources] list, as shown in Figure 1. A DSN of TDM_Default_DataSource and default connection settings are included in this file by default.
 4. Define your data source connection by adding the following lines, referring to Figure 1 as needed:
 - **[<dsn>]:** Replace <dsn> in the heading with the DSN.
 - **Description:** Add a text string description, if needed.
 - **Catalog:** Add the database catalog.
 - **Schema:** Add the database schema.
 - **Server:** Add the NSK server. The server is where the ODBC/MX server is running and must be in the format of TCP:<IP address or domain name>/<IP port> as shown in Figure 1.
 - Add the other parameters only if you want them to be something other than the default settings specified under TDM_Default_DataSource.
- NOTE** The DSN in the ODBCDSN file must exactly match the DSN that is defined in the ODBC/MX service. Data source names are case-sensitive.
5. Save the file and then exit the edit session.

Figure 1 Template for ODBC configuration file

```
TACL> Edit $SYSTEM.SYSTEM.ODBCDSN

[ODBC]
TraceFlags = 6
TraceStart = 0
TraceFile = trlog

[ODBC Data Sources]
TDM_Default_DataSource = NonStop ODBC/MX 2.3
<dsn> = NonStop ODBC/MX 2.3
```



```
DataSourceName = <Driver>

[TDM_Default_DataSource]
Description = Default Data Source
Catalog = CAT
Schema = SCH
DataLang = 0
FetchBufferSize = SYSTEM_DEFAULT
Server = TCP:xxx.xxx.xxx.xxx/xxxx
SQL_ATTR_CONNECTION_TIMEOUT = SYSTEM_DEFAULT
SQL_LOGIN_TIMEOUT = SYSTEM_DEFAULT
SQL_QUERY_TIMEOUT = NO_TIMEOUT

[<dsn>]
Description = <text string describing data source>
Catalog = <target catalog>
Schema = <target schema>
Server = TCP:<ip address or domain name>/<ip port>
```

For more information about the \$SYSTEM.SYSTEM.ODBCDSN file and how to configure ODBC for SQL/MX, see the HP NonStop Open System Services ODBC/MX Client Driver documentation.

Required preparations on a source NonStop system

Oracle GoldenGate supports two-part table names (schema.table) in table mappings and commands, but NonStop SQL/MX names require support for three parts, including a catalog (catalog.schema.table). To map the catalog portion of a table name, you must link it to an Extract group. Only one catalog can be linked to an Extract group. To use more than one catalog in the Oracle GoldenGate configuration, you must create an Extract group for each one.

To link a catalog to an Extract group, use the SOURCEDB and USERID parameters as one entry in the Extract parameter file.

- Supply the catalog name with SOURCEDB.
- Supply the default schema with USERID.

```
SOURCEDB <catalog> USERID <schema>
```

NOTE The API that is used by Extract does not log in to the database, so no authentication password is required.

Required preparations on a target NonStop system

All of the following preparations must be performed on a target NonStop SQL/MX system. For information about preparing other types of target databases, see the Oracle GoldenGate installation and setup documentation for that database.

Disabling triggers and cascade constraints on the target

Disable triggers, cascade delete constraints, and cascade update constraints on target SQL/MX tables, or alter them to ignore changes made by the Oracle GoldenGate database user. Oracle GoldenGate replicates DML that results from a trigger or cascade constraint. If the same trigger or constraint gets activated on the target table, it becomes redundant because of the replicated version, and the database returns an error. Consider the following example, where the source tables are “emp_src” and “salary_src” and the target tables are “emp_targ” and “salary_targ.”

1. A delete is issued for emp_src.
2. It cascades a delete to salary_src.
3. Oracle GoldenGate sends both deletes to the target.
4. The parent delete arrives first and is applied to emp_targ.
5. The parent delete cascades a delete to salary_targ.
6. The cascaded delete from salary_src is applied to salary_targ.
7. The row cannot be located because it was already deleted in step 5.

Configuring ODBC to prevent timeouts on a NonStop target

Follow this procedure to change the ODBC connection timeout on a NonStop target from the SYSTEM_DEFAULT of ten minutes to NO_TIMEOUT.

1. From OSH, run mxci and set the mode to mxcs.

```
/G/DEV01/SUPERDEV 1>mxci  
>>mode mxcs;
```
2. Issue the following command to show current settings.

```
info ds *,detail;  
  
Name: \SYSA.$MX.TDM_Default_DataSource  
CpuList: ALL  
InitPri.....Same as Assoc Server  
CurrentState.....STARTED  
ConnectedServers.....0  
AvailableServers.....4  
LastStateChg.....Apr 12 15:36  
LastUpdate.....Apr 12 14:56  
IdleServer.....4  
IdleTimeout.....SYSTEM_DEFAULT  
MaxServer.....100  
ConnTimeout.....SYSTEM_DEFAULT  
InitServer.....4  
StartAutomatic.....ON  
Trace.....OFF  
SQLPrepareStat.....OFF  
ConnInfoStat.....ON  
SQLExecuteStat.....OFF
```

```
SessionInfoStat.....ON
SQLExecDirectStat.....OFF
SQLStmtStat.....OFF
SQLFetchStat.....OFF
```

3. Change the IdleTimeout and ConnTimeout to NO_TIMEOUT as follows:

```
CS>alter ds "TDM_Default_DataSource", IdleTimeout NO_TIMEOUT;
CS>>alter ds "TDM_Default_DataSource", ConnTimeout NO_TIMEOUT;
```

4. Restart the NonStop SQL/MX server.

Specifying connection authentication on a NonStop target

Add the following parameters to the Replicat parameter file to specify ODBC connection authentication for Replicat to use on the target SQL/MX database.

```
TARGETDB <DSN> USERID <user>, PASSWORD <password>
```

- Use the TARGETDB and USERID parameters as one entry.
- Supply the ODBC data source name with TARGETDB.
- Supply the user name and password with USERID.

Supplying a data-definitions file on a NonStop target

To replicate data between source and target NonStop SQL/MX databases, you must supply source data definitions to the Replicat process, even though the two databases might be identical in version and structure. There are slight differences in the way that metadata is returned to Oracle GoldenGate by the native API from the source database and by ODBC from the target database.

1. Create a data definitions file with the DEFGEN utility.
2. Transfer the definitions file to the target system.
3. Specify the fully qualified name of the definitions file with the SOURCEDEFS parameter in the Replicat parameter file.

For more information about data-definitions files, see the Oracle GoldenGate *Windows and UNIX Administrator's Guide*.

CHAPTER 4

Uninstalling Oracle GoldenGate

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This procedure assumes that you no longer need the data in the Oracle GoldenGate trails, and that you no longer need to preserve the current Oracle GoldenGate environment. To preserve your current environment and data, make a backup of the Oracle GoldenGate directory and all subdirectories before starting this procedure.

On all systems:

1. Run the command shell.
2. (Suggested) Log on as the system administrator or as a user with permission to issue Oracle GoldenGate commands and delete files and directories from the operating system.
3. Change directories to the Oracle GoldenGate installation directory.
4. Run GGSCI.
5. Stop all Oracle GoldenGate processes.
6. Stop the Manager process.

On any system where a Replicat checkpoint table is being used:

7. Log into the database with the DBLOGIN command, and then remove the Replicat checkpoint table by running the DELETE CHECKPOINTTABLE command.

On all systems:

8. Make certain all processes are stopped (including GGSCI).
9. Remove the Oracle GoldenGate files by removing the installation directory.

APPENDIX 1

Oracle GoldenGate installed components



This appendix describes the programs, directories, and other components created or used by the Oracle GoldenGate software in the Oracle GoldenGate installation directory. Additional files not listed here might be installed on certain platforms. Files listed here might not be installed on every platform.

Oracle GoldenGate Programs and Utilities

This section describes programs installed in the root Oracle GoldenGate installation directory.

NOTE Some programs may not exist in all installations. For example, if only capture or delivery is supported by Oracle GoldenGate for your platform, the extract or replicat program will not be installed, respectively. Likewise, special files might be installed to support a specific database.

Table 4 Programs and utilities

Program	Description
cobgen	Generates source definitions based on COBOL layouts. Used for Oracle GoldenGate for Datawise on Stratus.
convchk	Converts checkpoint files to a newer version.
ddlcob	Generates target DDL table creation statements based on COBOL layouts. Used for Oracle GoldenGate for Datawise on Stratus.
ddlgen	Generates target database table definitions based on source database DDL. Used primarily on the NonStop platform.
defgen	Generates data definitions and is referenced by Oracle GoldenGate processes when source and target tables have dissimilar definitions.
emscnt	Sends event messages created by Collector and Replicat on Windows or UNIX systems to EMS on NonStop systems.
extract	Performs capture from database tables or transaction logs or receives transaction data from a vendor access module.
ggmxcinstall	Oracle GoldenGate installation script for the SQL/MX database.
ggsci	User interface to Oracle GoldenGate for issuing commands and managing parameter files.



Table 4 Programs and utilities (continued)

Program	Description
ggsmgr.jcl ggsmgr.proc ggsmgrst.jcl ggsmgrst.proc	Start the Oracle GoldenGate Manager process from a batch job or the operator console on a z/OS system. Installed to support DB2 z/OS databases.
install	Installs Oracle GoldenGate as a Windows service and provides other Windows-based service options.
keygen	Generates data-encryption keys.
logdump	A utility for viewing and saving information stored in extract trails or files.
mgr	(Manager) Control process for resource management, control and monitoring of Oracle GoldenGate processes, reporting, and routing of requests through the GGSCI interface.
replicat	Applies data to target database tables.
reverse	A utility that reverses the order of transactional operations, so that Replicat can be used to back out changes from target tables, restoring them to a previous state.
server	The Collector process, an Extract TCP/IP server collector that writes data to remote trails.
vamserv	Started by Extract to read the TMF audit trails generated by TMF-enabled applications. Installed to support the NonStop SQL/MX database.

Oracle GoldenGate subdirectories

This section describes the subdirectories of the Oracle GoldenGate installation directory and their contents.

NOTE Some directories may not exist in all installations.

Table 5 Subdirectories

Directory	Description
br	Contains the checkpoint files for the bounded recover feature.
cfg	Contains the property and xml files that are used to configure Oracle GoldenGate Monitor.

Table 5 Subdirectories (continued)

Directory	Description
dirchk	<p>Contains the checkpoint files created by Extract and Replicat processes, which store current read and write positions to support data accuracy and fault tolerance. Written in internal Oracle GoldenGate format.</p> <p>File name format is <group name><sequence number>.<ext> where <sequence number> is a sequential number appended to aged files and <ext> is either cpe for Extract checkpoint files or cpr for Replicat checkpoint files.</p> <p>Do not edit these files.</p> <p>Examples: ext1.cpe rep1.cpr</p>
dirdat	<p>The default location for Oracle GoldenGate trail files and extract files that are created by Extract processes to store extracted data for further processing by the Replicat process or another application or utility. Written in internal Oracle GoldenGate format.</p> <p>File name format is a user-defined two-character prefix followed by either a six-digit sequence number (trail files) or the user-defined name of the associated Extract process group (extract files).</p> <p>Do not edit these files.</p> <p>Examples: rt000001 finance</p>
dirdef	<p>The default location for data definitions files created by the DEFGEN utility to contain source or target data definitions used in a heterogeneous synchronization environment. Written in external ASCII. File name format is a user-defined name specified in the DEFGEN parameter file.</p> <p>These files may be edited to add definitions for newly created tables. If you are unsure of how to edit a definitions file, contact Oracle GoldenGate technical support.</p> <p>Example: defs.dat</p>
dirjar	<p>Contains the Java executable files that support Oracle GoldenGate Monitor.</p>
dirout	<p>This directory is not used any more.</p>

Table 5 Subdirectories (continued)

Directory	Description
dirpcs	<p>Default location for status files. File name format is <group>.<extension> where <group> is the name of the group and <extension> is either pce (Extract), pcr (Replicat), or pcm (Manager).</p> <p>These files are only created while a process is running. The file shows the program name, the process name, the port number, and the process ID.</p> <p>Do not edit these files.</p> <p>Examples: mgr.pcm ext.pce</p>
dirprm	<p>The default location for Oracle GoldenGate parameter files created by Oracle GoldenGate users to store run-time parameters for Oracle GoldenGate process groups or utilities. Written in external ASCII format. File name format is <group name/user-defined name>.prm or mgr.prm.</p> <p>These files may be edited to change Oracle GoldenGate parameter values after stopping the process. They can be edited directly from a text editor or by using the EDIT PARAMS command in GGSCI.</p> <p>Examples: defgen.prm finance.prm</p>
dirrec	Not used by Oracle GoldenGate.
dirrpt	<p>The default location for process report files created by Extract, Replicat, and Manager processes to report statistical information relating to a processing run. Written in external ASCII format.</p> <p>File name format is <group name><sequence number>.rpt where <sequence number> is a sequential number appended to aged files.</p> <p>Do not edit these files.</p> <p>Examples: fin2.rpt mgr4.rpt</p>
dirsql	Used by the TRIGGEN utility to store SQL scripts before TRIGGEN was deprecated. Currently used to store training scripts and any user-created SQL scripts that support Oracle GoldenGate.
dirtmp	The default location for storing large transactions when the size exceeds the allocated memory size. Do not edit these files.
dirwlt	Contains the Oracle Wallet that supports Oracle GoldenGate Monitor. This directory is not installed until the utility that creates the wallet is run.
UserExitExamples	Contains sample files to help with the creation of user exits.

Other Oracle GoldenGate files

This section describes other files, templates, and objects created or installed in the root Oracle GoldenGate installation directory.

NOTE Some files may not be installed in your environment, depending on the database and OS platform.

Table 6 Other files

Component	Description
bcpfmt.tpl	Template for use with Replicat when creating a run file for the Microsoft BCP/DTS bulk-load utility.
bcrypt.txt	Blowfish encryption software license agreement.
cagent.dll	Contains the Windows dynamic link library for the Oracle GoldenGate Monitor C sub-agent.
category.dll	Windows dynamic link library used by the INSTALL program.
chkpt_<db>_create.sql	Script that creates a checkpoint table in the local database. A different script is installed for each database type.
db2cntl.tpl	Template for use with Replicat when creating a control file for the IBM LOADUTIL bulk-load utility.
ddl_access.tpl	Template used by the DDLGEN utility to convert source DDL to Microsoft Access DDL.
ddl_cleartrace.sql	Script that removes the DDL trace file. (Oracle installations)
ddl_db2.tpl	Template used by the DDLGEN utility to convert source DDL to DB2 DDL (Linux, UNIX, Windows).
ddl_db2_os390.tpl	Template used by the DDLGEN utility to convert source DDL to DB2 DDL (z/OS systems).
ddl_ddl2file.sql	Script that saves DDL from the marker table to a file.
ddl_disable.sql	Script that disables the Oracle GoldenGate DDL trigger. (Oracle installations)
ddl_enable.sql	Script that enables the Oracle GoldenGate DDL trigger. (Oracle installations)
ddl_filter.sql	Script that supports filtering of DDL by Oracle GoldenGate. This script runs programmatically; do not run it manually.
ddl_informix.tpl	Template used by the DDLGEN utility to convert source DDL to Informix DDL.

Table 6 Other files (continued)

Component	Description
ddl_mss.tpl	Template used by the DDLGEN utility to convert source DDL to SQL Server DDL.
ddl_mysql.tpl	Template used by the DDLGEN utility to convert source DDL to MySQL DDL.
ddl_nopurgeRecyclebin.sql	Empty script file for use by Oracle GoldenGate support staff.
ddl_nssql.tpl	Template used by the DDLGEN utility to convert source DDL to NonStop SQL DDL.
ddl_ora9.sql ddl_ora10.sql ddl_ora11.sql ddl_ora10upCommon.sql	Scripts that run programmatically as part of Oracle GoldenGate DDL support; do not run these scripts.
ddl_oracle.tpl	Template used by the DDLGEN utility to convert source DDL to Oracle DDL.
ddl_pin.sql	Script that pins DDL tracing, the DDL package, and the DDL trigger for performance improvements. (Oracle installations)
ddl_purgeRecyclebin.sql	Script that purges the Oracle recyclebin in support of the DDL replication feature.
ddl_remove.sql	Script that removes the DDL extraction trigger and package. (Oracle installations)
ddl_session.sql ddl_session1.sql	Supports the installation of the Oracle DDL objects. This script runs programmatically; do not run it manually.
ddl_setup.sql	Script that installs the Oracle GoldenGate DDL extraction and replication objects. (Oracle installations)
ddl_sqlmx.tpl	Template used by the DDLGEN utility to convert Tandem Enscribe DDL to NonStop SQL/MX DDL.
ddl_status.sql	Script that verifies whether or not each object created by the Oracle GoldenGate DDL support feature exists and is functioning properly. (Oracle installations)
ddl_staymetadata_off.sql ddl_staymetadata_on.sql	Scripts that control whether the Oracle DDL trigger collects metadata. This script runs programmatically; do not run it manually.
ddl_sybase.tpl	Template used by the DDLGEN utility to convert source DDL to Sybase DDL.

Table 6 Other files (continued)

Component	Description
ddl_tandem.tpl	Template used by the DDLGEN utility to convert source DDL to NonStop SQL DDL.
ddl_trace_off.sql ddl_trace_on.sql	Scripts that control whether DDL tracing is on or off.
ddl_tracelevel.sql	Script that sets the level of tracing for the DDL support feature. (Oracle installations)
debug files	Debug text files that may be present if tracing was turned on.
demo_<db>_create.sql demo_more_<db>_create.sql demo_<db>_insert.sql demo_more_<db>_insert.sql demo_<db>_lob_create.sql demo_<db>_misc.sql	Scripts that create and populate demonstration tables for use with tutorials and basic testing.
.dmp files	Dump files created by Oracle GoldenGate processes for tracing purposes.
ENCKEYS	User-created file that stores encryption keys. Written in external ASCII format.
exitdemo.c	User exit example.
freeBSD.txt	License agreement for FreeBSD.
ggmessage.dat	Data file that contains error, informational, and warning messages that are returned by the Oracle GoldenGate processes. The version of this file is checked upon process startup and must be identical to that of the process in order for the process to operate.
ggserr.log	File that logs processing events, messages, errors, and warnings generated by Oracle GoldenGate.
ggsmsg.dll	Windows dynamic link library used by the INSTALL program.
GLOBALS	User-created file that stores parameters applying to the Oracle GoldenGate instance as a whole.
help.txt	Help file for the GGSCI command interface.
icudt38.dll icuin38.dll icuuc38.dll	Windows shared libraries for International Components for Unicode.

Table 6 Other files (continued)

Component	Description
jagent.bat	Windows batch file for the Java Agent for Oracle GoldenGate Monitor.
jagent.log jagentjni.log	Log files for the Oracle GoldenGate Monitor Agent.
jagent.sh	UNIX shell script for the Java Agent for Oracle GoldenGate Monitor
LGPL.txt	Lesser General Public License statement. Applies to free libraries from the Free Software Foundation.
libxml2.dll	Windows dynamic link library containing the XML library for the Oracle GoldenGate XML procedures.
libxml2.txt	License agreement for libxml2.dll.
marker.hist	File created by Replicat if markers were passed from a NonStop source system.
marker_remove.sql	Script that removes the DDL marker table. (Oracle installations)
marker_setup.sql	Script that installs the Oracle GoldenGate DDL marker table. (Oracle installations)
marker_status.sql	Script that confirms successful installation of the DDL marker table. (Oracle installations)
notices.txt	Third-party software license file.
params.sql	Script that contains configurable parameters for DDL support. (Oracle installations)
pthread-win32.txt	License agreement for pthread-VC.dll.
pthread-VC.dll	POSIX threads library for Microsoft Windows.
prvtclkm.plb	Supports the replication of Oracle encrypted data.
pw_agent_util.bat pw_agent_util.sh	Script files that support the Oracle GoldenGate Monitor Agent.
role_setup.sql	Script that creates the database role necessary for Oracle GoldenGate DDL support. (Oracle installations)
sqlldr.tpl	Template for use with Replicat when creating a control file for the Oracle SQL*Loader bulk-load utility.

Table 6 Other files (continued)

Component	Description
start.prm stop.prm	z/OS paramlib members to start and stop the Manager process.
startmgr stopmgr	z/OS Unix System Services scripts to start the Manager process from GGSCI.
startmgrcom stopmgrcom	z/OS system input command for the Manager process.
tcperrs	File containing user-defined instructions for responding to TCP/IP errors.
usrdecs.h	Include file for user exit API.
xerces-c_2_8.dll	Apache XML parser library.
zlib.txt	License agreement for zlib compression library.

Oracle GoldenGate checkpoint table

When database checkpoints are being used, Oracle GoldenGate creates a checkpoint table with a user-defined name in the database upon execution of the ADD CHECKPOINTTABLE command, or a user can create the table by using the chkpt_<db>_create.sql script, where <db> is the type of database.

Do not change the names or attributes of the columns in this table. You can change table storage attributes as needed.

Table 7 Checkpoint table definitions

Column	Description
GROUP_NAME (primary key)	The name of a Replicat group using this table for checkpoints. There can be multiple Replicat groups using the same table.
GROUP_KEY (primary key)	A unique identifier that, together with GROUPNAME, uniquely identifies a checkpoint regardless of how many Replicat groups are writing to the same table.
SEQNO	The sequence number of the checkpoint file.
RBA	The relative byte address of the checkpoint in the file.
AUDIT_TS	The timestamp of the checkpoint position in the checkpoint file.
CREATE_TS	The date and time when the checkpoint table was created.

Table 7 Checkpoint table definitions

Column	Description
LAST_UPDATE_TS	The date and time when the checkpoint table was last updated.
CURRENT_DIR	The current Oracle GoldenGate home directory or folder.

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