Oracle® Fusion Middleware
Upgrading Oracle GoldenGate

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Oracle Fusion Middleware Upgrading Oracle GoldenGate, 12*c* (12.3.0.1)

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Contents

1   Overview of Upgrading Oracle GoldenGate

2   Upgrading Oracle GoldenGate for Oracle Database

3   Upgrading to Release 12c (12.3.0.1) for Heterogeneous Databases

4   Installing Patches for Oracle GoldenGate

Preface

This guide contains instructions for upgrading Oracle GoldenGate Classic Architecture from a previous release of Oracle GoldenGate to release 12*c* (12.3.0.1), as well as instructions on how to patch a version of Oracle GoldenGate 12*c* (12.3.0.1).

- Audience
- Documentation Accessibility
- Related Information
- Conventions

Audience

This guide is intended for system and database administrators who are responsible for operating Oracle GoldenGate and maintaining its performance.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc`.

Accessible Access to Oracle Support

Oracle customers who have purchased support have access to electronic support through My Oracle Support. For information, visit `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info` or visit `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs` if you are hearing impaired.

Related Information

The Oracle GoldenGate Product Documentation Libraries are found at

https://docs.oracle.com/en/middleware/goldengate/index.html

Additional Oracle GoldenGate information, including best practices, articles, and solutions, is found at:

Oracle GoldenGate A-Team Chronicles

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, such as "From the File menu, select **Save**." Boldface also is used for terms defined in text or in the glossary.
italic *italic*	Italic type indicates placeholder variables for which you supply particular values, such as in the parameter statement: `TABLE table_name`. Italic type also is used for book titles and emphasis.
monospace MONOSPACE	Monospace type indicates code components such as user exits and scripts; the names of files and database objects; URL paths; and input and output text that appears on the screen. Uppercase monospace type is generally used to represent the names of Oracle GoldenGate parameters, commands, and user-configurable functions, as well as SQL commands and keywords.
UPPERCASE	Uppercase in the regular text font indicates the name of a utility unless the name is intended to be a specific case.
{}	Braces within syntax enclose a set of options that are separated by pipe symbols, one of which must be selected, for example: `{option1 | option2 | option3}`.
[]	Brackets within syntax indicate an optional element. For example in this syntax, the `SAVE` clause is optional: `CLEANUP REPLICAT group_name [, SAVE count]`. Multiple options within an optional element are separated by a pipe symbol, for example: `[option1 | option2]`.

1
Overview of Upgrading Oracle GoldenGate

This guide contains instructions for upgrading Oracle GoldenGate Classic Architecturefrom previous releases of Oracle GoldenGate, to the current release as well as instructions on how apply patches for Oracle GoldenGate.
Topics:

- Who Should Perform the Upgrade

- Before You Upgrade

- Upgrade Considerations if Using Character-Set Conversion

- Upgrade Considerations if Using Quoted Object Names

1.1 Who Should Perform the Upgrade

Upgrades to Oracle GoldenGate should be performed by an administrator who has thorough knowledge of the commands that are necessary to control processes and obtain status information.

1.2 Before You Upgrade

Before performing the upgrade procedure, read the *Release Notes for Oracle GoldenGate* to determine whether the new release affects the following in your configuration:

- New default process behavior.

- Parameters that changed or were deprecated.

- Parameters that were added to support a desired new feature or database type.

- Parameter default values that have changed.

- New data type support that might require changes to `TABLE` or `MAP` statements.

- Interaction with native database components that might require database change.

You can prevent startup delays that can cause lag by having all of your parameter changes made ahead of time, so that they are ready when you restart the processes. You should not make parameter changes while a process is running, but you can:

1. Make a copy of the parameter file.

2. Make edits to the copy.

3. After you shut down the processes during the upgrade procedure, copy the old parameter file to a new name (to save it as backup).

4. Copy the new parameter file to the old parameter file's name.

1.3 Upgrade Considerations if Using Character-Set Conversion

The Replicat parameter TRAILCHARSET is renamed to SOURCECHARSET in the 12*c* (12.3.0.1) release, but Oracle GoldenGate continues to support TRAILCHARSET as an alias. When upgrading Oracle GoldenGate, you can keep TRAILCHARSET or change it to SOURCECHARSET. One of those parameters is required to support character-set conversion from a pre-11.2.1 Extract if you are not upgrading that Extract at this time. If you are upgrading both Extract and Replicat to the 12*c* release, the information about the source character set is written to the trail automatically, and neither TRAILCHARSET nor SOURCECHARSET is needed.

1.4 Upgrade Considerations if Using Quoted Object Names

Oracle GoldenGate treats strings that are within single quotes as literals. Oracle GoldenGate has supported double-quoted object names since release 11.2 but did not fully implement the rule of single quotes for literals until release 12.1. Supporting double quotes for object names and single quotes for literals brings Oracle GoldenGate into compliance with SQL-92 rules and is now enabled by default. The USEANSISQLQUOTES parameter, which forced the SQL-92 standard in previous releases, is now deprecated.

The change to default SQL-92 rules affects object names in parameter files, input to SQLEXEC clauses, OBEY files, conversion functions, user exits, and commands. You have the following options as a result of this change:

- Retain non-SQL-92 quote rules: Oracle GoldenGate retains backward compatibility to enable the retention of current parameter files that do not conform to SQL-92 rules. To retain non-SQL-92 rules, add the NOUSEANSISQLQUOTES parameter to the GLOBALS file before you perform the upgrade and retain that parameter going forward. NOUSEANSISQLQUOTES affects Extract, Replicat, DEFGEN, and GGSCI.

- Upgrade your parameter files to use SQL-92 rules: Oracle GoldenGate provides the convprm conversion tool which you can run to convert your parameter files to be in conformance with SQL-92 rules. Run the convprm tool before you start the upgrade process.

- Overview of the convprm Tool
- Running convprm

1.4.1 Overview of the convprm Tool

The following describes the convprm tool:

- It is a command line program which can be run either manually or scripted.
- It converts string literals from double-quoted character strings to single-quoted character strings, but leaves double-quoted object names intact. It can distinguish between an object name and a string literal even when both are represented as a sequence of characters delimited with double quotes.

- It escapes quotation marks. Quotation marks must be escaped when the character that is used to delimit the string appears in the literal string itself. For example, the sentence "This character "" is a double quote" contains an escaped quote mark. The sentence 'This character " is a single quote' contains an escaped single quote mark. When converting from double quotes to single quotes, `convprm` removes one of the repeated double quotes from escaped double quotes and escapes the single quotes that are embedded in the character sequence.

- It issues a warning message if `NOUSEANSISQLQUOTES` is specified in the `GLOBALS` file. The message states that the converted parameter file is incompatible with `NOUSEANSISQLQUOTES`, but the parameter file was updated anyway.

- It recursively converts the files that are included through an `OBEY` or `INCLUDE` parameter.

- It creates a backup of the initial parameter file in the same directory as the original file. The backup has the name of the original file with the `.bck` suffix. The creation of a backup file can be disabled when you run the `convprm` tool.

- It converts the character set. The character set for the new parameter file is taken from the `CHARSET` parameter in the original parameter file. Absent that parameter, the character set is taken from the `CHARSET` parameter in the `GLOBALS` file. Absent a `GLOBALS` parameter, the new parameter file is written in the character set of the local operating system.

Table 1-1 provides examples of the conversion outcome.

Table 1-1   Comparison of Input Requirements for [NO]USEANSISQLQUOTES

Input variable	String literal with old syntax	String literal with new syntax
Double quotes are escaped in the old syntax but not in the new syntax.	"abc""def"	'abc"def'
Single quotes are escaped in the new syntax but not in the old syntax.	"abc'def"	'abc''def'

1.4.2 Running convprm

To use the `convprm` tool:

1. Run `convprm` with the following syntax:

   ```
   convprm [options] input_files
   ```

   where:

   - `{-h | --help}` displays usage.
   - `{-v |--version}` displays version information.
   - `{-i | --follow-include}` recursively converts files included through an `OBEY` or `INCLUDE` parameter.
   - `{-n |--no-backup}` does not create a copy of the original file.
   - `{-s | --silent}` does not display status messages.
   - `{-q | --quotes}` performs quote conversion. This is the default.
   - `{-d | --dry-run}` does not change the parameter file or create a backup file. It only prints out what would happen as the result of the conversion.

- *input_files* is a list of the parameter files that are to be converted. Separate each file name with a white space, for example:

  ```
  convprm [options] extfin extacct exthr
  ```

2. Examine the parameter file to make certain the conversion completed successfully. Status messages are displayed at the beginning, during, or at the end of the file conversion process.

On errors, the process abends in the same way as other Oracle GoldenGate executables. All error messages that cause the converter to fail are sent to the Oracle GoldenGate error log.

If you are currently using the USEANSISQLQUOTES parameter, you may remove it or leave it in the parameter files. It is now the default.

2

Upgrading Oracle GoldenGate for Oracle Database

These instructions are for upgrading to Oracle GoldenGate for an Oracle database.
Topics:

- Overview of the Upgrade Procedure for Oracle Database
- Upgrading a Configuration That Includes DDL Support
- Upgrading a Configuration That Includes Oracle Berkeley DB
- Understanding the Scope of the Upgrade Procedure
- Understanding and Obtaining the Oracle GoldenGate Distribution
- Upgrading Oracle GoldenGate Classic Architecture for Oracle Database
- Upgrading Oracle GoldenGate from OUI
- Upgrading Microservices Architecture – GUI Based

2.1 Overview of the Upgrade Procedure for Oracle Database

The upgrade instructions perform a minimal upgrade that deploys only the updated core functionality, without implementing any of the new features, such as Integrated Replicat, updated globalization support, new SQL-92 defaults, and enhanced security features. It is best practice to perform a minimal upgrade first, so that you can troubleshoot more easily in the event that any problems arise. Once you know your environment is upgraded successfully, you can implement the new functionality.

The upgrade instructions also take into consideration the steps to take if you are upgrading the source or target database at the same time that you are upgrading Oracle GoldenGate. Taken into account are the following pre-upgrade requirements:

- Allow the Oracle GoldenGate processes to finish processing all current DML and DDL data in the Oracle GoldenGate trails.
- Disable the DDL trigger if there is no native DDL support.
- When upgrading your database and Oracle GoldenGate simultaneously, you must upgrade the database first.

2.2 Upgrading a Configuration That Includes DDL Support

This section contains considerations and steps you should take when DDL support is active in the current Oracle GoldenGate environment. DDL support in Oracle GoldenGate 12*c* (12.3.0.1) offers two options:

- Integrated mode in Oracle GoldenGate 12*c* (12.3.0.1) supports two DDL capture methods:

- If the source database is Oracle 11.2.0.4 or later, DDL capture support is integrated into the database logmining server and does not require the use of the Oracle GoldenGate DDL trigger and supporting objects, as long as the database `COMPATIBLE` parameter is set to 11.2.0.4 or higher.

- If the source database is earlier than Oracle 11.2.0.4, the Oracle GoldenGate trigger and supporting DDL objects must be used when Extract is in integrated mode.

- Classic capture requires the use of the Oracle GoldenGate DDL trigger and supporting objects regardless of the Oracle version of the source database.

Table 2-1 shows possible DDL upgrade paths and guidelines.

Table 2-1   Possible Upgrade Paths to Oracle GoldenGate and Requirements for DDL Support

Upgrade from:	To: Classic capture using trigger method	To: Integrated capture, no trigger[1]
Classic capture using trigger method (all 11.2.1 database versions)	Cannot be used for a container database. Upgrade Oracle GoldenGate per these upgrade instructions.	Can be used for a container database. 1. Source database must be 11.2.0.4 or higher. 2. Source database `COMPATIBLE` setting must be 11.2.0.4 or higher. 3. Upgrade Oracle GoldenGate per these upgrade instructions.
Integrated capture using trigger method (all 11.2.1 database versions)	Cannot be used for a container database. No DDL upgrade path.	Can be used for a container database. 1. Source database must be 11.2.0.4 or higher. 2. Source database `COMPATIBLE` setting must be 11.2.0.4 or higher. 3. Upgrade Oracle GoldenGate per these upgrade instructions.

1   An upgrade of the database to 11.2.0.4 or 12.1 automatically takes a data dictionary snapshot in the redo stream as part of the patch set upgrade.

2.3 Upgrading a Configuration That Includes Oracle Berkeley DB

When you are upgrading Oracle GoldenGate from release 12.1.2.1 to 12.3.0.1 and have enabled monitoring and the datastore is created by the Performance Metrics server, the best practice is to purge the data store before performing the upgrade. After the upgrade, the datastore is recreated. For more information about purging a datastore, see How to Purge the Datastore. in the *Using the Oracle GoldenGate Microservices Architecture*.

From Oracle GoldenGate 12.3.0.1 onward, all operations related to the datastore have been removed and are taken care of by the Performance Metrics server. To know more, see Monitoring Performance.

2.4 Understanding the Scope of the Upgrade Procedure

Before performing the upgrade, review the following information about upgrading Extract and Replicat. Even though you may only be upgrading the source or target, rather than both, all processes are involved in the upgrade. All processes must be stopped in the correct order for the upgrade, regardless of which component you upgrade, and the trails must be processed until empty.

Oracle recommends that you begin your upgrade with the target rather than the source to avoid the necessity of adjusting the trail file format.

*   Extract Upgrade Considerations
*   Replicat Upgrade Considerations

2.4.1 Extract Upgrade Considerations

If you are using trigger-based DDL support, you must rebuild the DDL objects, even if you plan to use the new triggerless DDL support in integrated capture. After the upgrade, when Oracle GoldenGate is running successfully again, you can follow the steps in this documentation to remove the trigger and DDL objects. See Upgrading a Configuration That Includes DDL Support for DDL upgrade considerations.

If you are upgrading multiple Extract processes that operate in a consolidation configuration (many sources to one target), follow these steps fully to upgrade one Extract at a time.

If you are using integrated capture, you will need to roll over the local and remote trails at the appropriate point in the upgrade steps. The 11.2.1 integrated Extract (version 1) captures `TIMESTAMP WITH LOCAL TIME ZONE` data as UTC, but the 12*c* (12.3.0.1) integrated Extract (version 2) captures it as the local time of the database time zone.

2.4.2 Replicat Upgrade Considerations

All Replicat installations should be upgraded at the same time. It is critical to ensure that all trails leading to all Replicat groups on all target systems are processed until empty, according to the upgrade instructions.

> ⚠ **Caution:**
>
> The hash calculation used by the `@RANGE` function to partition data among Replicat processes has been changed. This change is transparent, and no re-partitioning of rows in the parameter files is required, so long as the upgrade is performed as directed in these instructions. To ensure data continuity, make certain to allow all Replicat processes on all systems to finish processing all of the data in their trails before stopping those processes, according to the upgrade instructions. Note that if the Replicat processes are not upgraded all at the same time, or the trails are not cleaned out prior to the upgrade, rows may shift partitions as a result of the new hash method, which may result in collision errors.

2.5 Understanding and Obtaining the Oracle GoldenGate Distribution

For complete information about how to obtain Oracle Fusion Middleware software, see Obtaining Product Distributions in *Planning an Installation of Oracle Fusion Middleware*.

For more information about locating and downloading Oracle Fusion Middleware products, see the Oracle Fusion Middleware Download, Installation, and Configuration Readme Files on the Oracle Technology Network (OTN).

To obtain Oracle GoldenGate, follow these steps:

1. Go to the Oracle Technology Network: `http://www.oracle.com/technetwork/middleware/fusion-middleware/downloads/index.html`

2. Find the Oracle GoldenGate 18c (18.1.0) release that you want to install.

3. Download the ZIP file appropriate for your system.

2.6 Upgrading Oracle GoldenGate Classic Architecture for Oracle Database

These instructions contain the procedure for performing the minimal upgrade.

Before proceeding, make certain you have reviewed the following preparation information:

- Overview of Upgrading Oracle GoldenGate
- Overview of the Upgrade Procedure for Oracle Database
- Upgrading a Configuration That Includes DDL Support
- Understanding the Scope of the Upgrade Procedure

> **Note:**
>
> If you are using integrated capture and plan to upgrade from trigger-based DDL capture to new native DDL capture, **do not** remove the DDL trigger until prompted. Extract needs to mine DDL to the point where the redo `COMPATIBLE` level is advanced to 11.2.0.4 (or higher). For example, if Extract is behind by a week when the database is upgraded to 11.2.0.4, Extract does not immediately switch to native DDL capture. It must be allowed to process the pre-11.2.0.4 redo first, then Extract upgrades to native DDL capture automatically.

1. (Source system) The new Extract might need to start processing from the normal recovery checkpoint, rather than the bounded recovery checkpoint, if the first record of the oldest open transaction at the time that you stop Extract is in a log that is not on the system. Use the following command in GGSCI to determine the

oldest archive log that you might need to restore when Extract starts. The `Recovery Checkpoint` field shows the oldest log needed for recovery.

```
GGSCI> INFO EXTRACT group, SHOWCH
```

You have two options:

- You can restore the archives back to, and including, the one shown in the recovery checkpoint shown with `INFO EXTRACT`.

- You can clear out the long-running transactions that apply to the Extract that you are upgrading. This can be done by skipping the transactions or by forcing them to the trail as committed transactions. Skipping a transaction may cause data loss, and forcing a transaction to the trail may add unwanted data to the trail if the transaction is rolled back. To skip or force a transaction, follow these steps:

  a. View open transactions with the following command in GGSCI. Record the transaction ID of any transaction that you want to clean up.

  ```
  GGSCI> SEND EXTRACT group, SHOWTRANS
  ```

  b. Clean up old transactions with the `SEND EXTRACT` command, using either the `SKIPTRANS` option to skip a transaction or the `FORCETRANS` option to force a transaction in its current state to the trail as a committed transaction.

  ```
  GGSCI> SEND EXTRACT group, {SKIPTRANS | FORCETRANS} transaction_ID
  [THREAD n] [FORCE]
  ```

  c. After you are finished cleaning up the long-running transactions, force a Bounded Recovery checkpoint.

  ```
  GGSCI> SEND EXTRACT group, BR BRCHECKPOINT IMMEDIATE
  ```

  > **Note:**
  >
  > A forced checkpoint is necessary because the skipped or forced transaction is not cleaned up from the Bounded Recovery checkpoint and will be shown if `SHOWTRANS` is issued again. This is a known issue. For more information about `SEND EXTRACT`, see *Reference for Oracle GoldenGate*.

2. (Source system) Stop all user activity that generates both DML and DDL on objects in your Oracle GoldenGate configuration. After the DML and DDL have been stopped, run the following query. This query provides the minimum SCN needed to ensure all transactions are accounted for.

```
Select MIN(SCN) as INSTANTIATION_SCN
 From (Select MIN(START_SCN) as SCN
        From gv$transaction
       Union All
      Select current_scn
        From gv$database);
```

> **Note:**
>
> You can avoid stopping DML operations when performing the Oracle GoldenGate upgrade, but you should stop DML when there is a requirement to run any SQL, such as DDL or any other upgrade SQL scripts.

3. Record the current SCN from the query result.

4. (Source system, if currently using classic Extract) In GGSCI, issue the `SEND EXTRACT` command with the `LOGEND` option until it shows there is no more redo data to capture.

   (Source system if using integrated Extract) Wait for the Extract recovery checkpoint to progress past the current SCN from the query result. To determine whether Extract is past that SCN in its checkpoints, view the Extract report file.

   ```
   GGSCI> SEND EXTRACT group LOGEND
   ```

5. (Source system) In GGSCI, stop Extract and data pumps.

   ```
   GGSCI> STOP EXTRACT group
   ```

6. (Source system if not upgrading Target) If you are not upgrading Replicat on the target systems at this time, add the following parameter to the Extract parameter file to specify the version of Oracle GoldenGate that is running on the target. This parameter causes Extract to write a version of the trail that is compatible with the older version of Replicat. Before making the changes to the extract parameter file, please take a backup of the Oracle GoldenGate parameter files on source

   ```
   {EXTTRAIL | RMTTRAIL} file_name FORMAT RELEASE major.minor
   ```

7. (Source system, only if currently using trigger-based DDL capture support) Follow these steps:

   a. Run SQL*Plus and log in as a user that has `sysdba` privileges.

   b. Disconnect all sessions that ever issued DDL to avoid an error (ORA-04021). Ensure that no DDL sessions can be started for the duration of this upgrade.

   c. From the Oracle GoldenGate directory, run the `ddl_disable` script to disable the Oracle GoldenGate DDL trigger.

   d. Run the `ddl_remove` script to remove the Oracle GoldenGate DDL trigger and other associated objects and provide the name of the Oracle GoldenGate DDL schema.

      A `ddl_remove_spool.txt` log file is generated that logs the script output and a `ddl_remove_set.txt` file that logs current user environment settings for use in debugging.

   e. Run the `marker_remove` script to remove the Oracle GoldenGate marker support system and provide the name of the Oracle GoldenGate DDL schema.

      A `marker_remove_spool.txt` file is generated that logs the script output and a `marker_remove_set.txt` file for use in debugging.

8. (Target systems) In GGSCI on each target system, issue the `SEND REPLICAT` command with the `STATUS` option until it shows a status of "`At EOF`" to indicate that it finished processing all of the data in the trail. This must be done on all target systems until all Replicat processes return "`At EOF`."

```
GGSCI> SEND REPLICAT group STATUS
```

9. (Target systems) In GGSCI, stop all Replicat processes.

```
GGSCI> STOP REPLICAT group
```

10. (Source and target systems) In GGSCI, stop Manager on the source and target systems.

```
GGSCI> STOP MANAGER
```

11. When updating target systems only, or if updating the target side before the source side, you *must* use STOP to stop all data pumps and any primary Extracts that write directly to those targets on any source running on this target. Any static collectors that may have been started that must be stopped, as well. To verify that there are no server processes running, use process checking shell commands, such as ps and grep.

12. (Source and target systems) Back up the current Oracle GoldenGate installation directory on the source and target systems, and any working directories that you have installed on a shared drive in a cluster (if applicable). You do not need to backup up the dirdat folder because the trail files in this directory can be recreated.

13. If you want to upgrade the source or target database, or both, do so at this time according to the Oracle database upgrade instructions for the new version. Ensure that you start and mount the databases after the upgrade though do not permit DML or DDL transactions on the objects in the Oracle GoldenGate configuration.

14. (Source and target systems) If you are using an Oracle GoldenGate version prior to 11.2.1, grant write permission to the installation user on the existing Oracle GoldenGate directory.

    For example, on UNIX or Linux, run the following command:

    ```
    $ chmod -R u+w existing_Oracle_GoldenGate_directory
    ```

15. (Source and target systems) Install Oracle GoldenGate 18c (18.1.0) using Oracle Universal Installer (OUI) into an existing Oracle GoldenGate directory on the source and target systems. Ensure that you deselect the **Start Manager** option during the OUI installation; otherwise, this may overwrite your existing parameter files. See Installing the Oracle GoldenGate Classic Architecture with Oracle Database in *Installing Oracle GoldenGate* for instructions.

    > **Note:**
    >
    > Oracle recommends that you install with the interactive OUI option for upgrade purposes, rather than using the silent installation.

16. (Target systems, if upgrading Replicat from version 11.2.1.0.0 or earlier) In GGSCI on each target system, issue the following commands to upgrade the Replicat checkpoint tables on those systems. This step updates the table definition to add columns that support the Oracle GoldenGate 18*c* (18.1.0) release.

    ```
    GGSCI> DBLOGIN [{SOURCEDB} data_source]|[, database@host:port] |{USERID {/ |
    user id}[, PASSWORD password]   [algorithm ENCRYPTKEY {keyname | DEFAULT}] |
    USERIDALIAS alias [DOMAIN domain]}
    GGSCI> UPGRADE CHECKPOINTTABLE [owner.table]
    ```

> **✎ Note:**
>
> `owner.table` can be omitted if the checkpoint table was created with the name listed with `CHECKPOINTTABLE` in the `GLOBALS` file.

17. (Source system) On the source system, run the `ulg.sql` script as `sysdba`. This script converts the existing supplemental log groups to the new format required by the new release. This step is required even if you plan to use the new triggerless capture method. The script should run without error; if errors occur, contact Oracle Support.

18. (Source and target systems) Updates to the trail version, the checkpoint storage format, and integrated capture require that you perform the following steps:

    a. In GGSCI, alter the primary Extract process and the associated data pump Extract processes to write to a new trail sequence number. The command should return `Rollover performed`.

    ```
    GGSCI> ALTER EXTRACT group ETROLLOVER
    GGSCI> ALTER EXTRACT primary-extract-group, ETROLLOVER
    GGSCI> ALTER EXTRACT pump-extract-group, ETROLLOVER
    ```

    b. In GGSCI, issue the `INFO EXTRACT` command with `DETAIL` for the primary Extract and the data pumps to verify the trail sequence number.

    ```
    GGSCI> INFO EXTRACT group, DETAIL
    ```

    c. In GGSCI, reposition the data pumps and the Replicat processes to start at the new trail sequence number.

    ```
    GGSCI> ALTER EXTRACT pump, EXTSEQNO seqno, EXTRBA RBA
    GGSCI> ALTER REPLICAT group, EXTSEQNO seqno, EXTRBA RBA
    ```

19. (Source system) If you plan to use new trigger-based DDL support for Oracle Database, use the following sub-steps to rebuild the Oracle GoldenGate DDL trigger environment to a clean state:

    a. Run SQL*Plus and log in as a user that has `sysdba` privileges.

    b. Run the `marker_setup` script to reinstall the Oracle GoldenGate marker support system and provide the name of the Oracle GoldenGate schema.

    c. Run the `ddl_setup` script and provide the name of the Oracle GoldenGate DDL schema.

    d. Run the `role_setup` script to recreate the Oracle GoldenGate DDL role.

    e. Grant the role that you created to all Oracle GoldenGate users under which the following Oracle GoldenGate processes run: Extract, Replicat, GGSCI, and Manager. You may need to make multiple grants if the processes have different user names.

    f. Run the `ddl_enable.sql` script to enable the Oracle GoldenGate DDL trigger.

20. You may now restart DDL and DML activity on the source database.

21. If you made copies of the parameter files to make parameter changes, move the new parameter files into the Oracle GoldenGate directory where the old parameter files were stored then rename them to the same names as the old parameter files. If you are using case-sensitivity support, ensure that you either add `NOUSEANSISQLQUOTES` to your parameter files, or that you ran the `convprm` utility to

convert the quotes as required. See "Upgrade Considerations if Using Character-Set Conversion" for more information.

22. In GGSCI, start the Oracle GoldenGate processes on the source and target systems in the following order.

```
GGSCI> START MANAGER
GGSCI> START EXTRACT group
GGSCI> START EXTRACT pump
GGSCI> START REPLICAT group
```

If you need to restore any log files, Extract will abend with an error that indicates the log to restore. Restore the logs back to, and including that log, and then restart Extract.

2.7 Upgrading Oracle GoldenGate from OUI

The interactive installation provides a graphical user interface that prompts for the required installation information.

1. Unzip and untar the installation file.

2. From the unzipped directory, run the **runInstaller** program on UNIX or Linux, or `run setup.exe` on Windows.

3. On the **Select Installation Option** page, select the Oracle GoldenGate build to install, and then click **Next** to continue.

4. On the **Specify Installation Details** page, specify the following:

   - For **Software Location**, specify the Oracle GoldenGate installation directory. It can be a new or existing directory (for any GoldenGate version prior to 12.1.2.0.0) that is empty and has the amount of disk space shown on the screen or existing Oracle GoldenGate Installation location (in case of upgrading existing oracle GoldenGate Installation). The default location is under installing user's home directory, but Oracle recommends changing it to a local directory that is not mounted and has no quotas. The specified directory cannot be a registered home in the Oracle central inventory. If installing in a cluster, install Oracle GoldenGate on shared storage that is accessible by all of the cluster nodes.

   - (Optional) Select **Start Manager** to perform configuration functions, such as creating the Oracle GoldenGate subdirectories in the installation folder, setting library paths, and starting Manager on the specified port number. To proceed, a database must exist on the system. When Start Manager is selected, the **Database Location and Manager Port** fields are displayed.

     – For Database Location, the database version in the specified location must be Oracle Database 12c if you are installing Oracle GoldenGate for Oracle Database 12c or Oracle Database 11g if you are installing Oracle GoldenGate for Oracle Database11g. The database must have a registered home in the Oracle central inventory. The installer registers the Oracle GoldenGate home directory with the central inventory.

     – For Manager Port, accept the default port number or enter a different unreserved, unrestricted port number for the Manager process to use for inter-process communication. The default port is the first available one starting with 7809. If you are installing multiple instances of Oracle GoldenGate on the same system, each must use a different port number.

5. Click **Next** to continue. In case of upgrading existing Oracle GoldenGate Installation, OUI prompts that the selected Software location has files or directories. Click on **Yes**.

6. The **Create Inventory** page is displayed if this is the first Oracle product to be installed from OUI on a host that does not have a central inventory.

   - For **Inventory Directory**, specify a directory for the central inventory. It can be a new directory or an existing directory that is empty and has the amount of disk space shown on the screen. The directory cannot be on a shared drive.

   - Select an operating system group in which the members have write permission to the inventory directory. This group is used to add inventory information to the Oracle GoldenGate subfolder.

7. On the **Summary** page, confirm that there is enough space for the installation and that the installation selections are correct. Optionally, click **Save Response File** to save the installation information to a response file. You can run the installer from the command line with this file as input to duplicate the results of a successful installation on other systems. You can edit this file or create a new one from a template.

8. Click Install to begin the installation or **Back** to go back and change any input specifications. When Upgrading existing Oracle GoldenGate Installation, OUI will notify that the software location has files or directories. Click **Yes** to continue. You are notified when the installation is finished.

9. If you created a central inventory directory, you are prompted to run the `INVENTORY_LOCATION/orainstRoot.sh` script. This script must be executed as the root operating system user. This script establishes the inventory data and creates subdirectories for each installed Oracle product (in this case, Oracle GoldenGate).

2.8 Upgrading Microservices Architecture – GUI Based

This topic provides the steps for upgrading Microservices architecture.

1. Verify the current version of Oracle GoldenGate Home through Service Manager.

   a. Login to the Service Manager: `http://host:servicemanager_port`

   b. Review the deployment section for your current Oracle GoldenGate home location.

2. Install the new Oracle GoldenGate for Microservices binaries next to the existing binaries.

3. Update the Service Manager and the Deployments with the location of the new Oracle GoldenGate home.

   a. Click **Service Manager**, then the **Deployment name** link.

   b. Next to the deployment details, click the pencil icon. This opens the dialog box to edit the Oracle GoldenGate home.

   c. Update the Oracle GoldenGate home with the complete path to the new Oracle GoldenGate home.

   d. Click **Apply**.

   e. Confirm that the Oracle GoldenGate home has been updated.

   f. Use the action button to restart **Service Manager** or **Deployment**.

> **Note:**
>
> You can confirm that the Oracle GoldenGate home was updated by looking at the process from the operating system for Service Manager (`ps –ef | grep –i servicemanager`). The Service Manager process should be running from the correct Oracle GoldenGate home.

4. To upgrade the associated deployments, follow the same steps for Service Manager after ensuring that all the Extract and Replicat processes in that deployment have been stopped.

3

Upgrading to Release 12*c* (12.3.0.1) for Heterogeneous Databases

These instructions are for upgrading Oracle GoldenGateClassic Architecture in the following heterogeneous database environments:

- DB2 for i
- DB2 LUW
- DB2 z/OS
- MySQL
- SQL Server
- Teradata

Topics:

- Overview of the Upgrade Procedure for Heterogeneous Databases
- Upgrading to Oracle GoldenGate 12c (12.3.0.1) for Heterogeneous Databases

3.1 Overview of the Upgrade Procedure for Heterogeneous Databases

The upgrade instructions perform a minimal upgrade only to deploy the updated core Oracle GoldenGate functionality, without implementing any of the major new 12*c* (12.3.0.1) features at this time, such as coordinated Replicat, updated globalization support, new SQL-92 defaults, and enhanced security features. The best practice is to perform a minimal upgrade first, so that you can troubleshoot more easily in the event that any problems arise. Once you know your environment is upgraded successfully, you can implement the new functionality.

If you are upgrading multiple Extract processes that operate in a consolidation configuration (many sources to one target), follow these steps fully to upgrade one Extract at a time.

All Replicat installations should be upgraded at the same time. It is critical to ensure that all trails leading to all Replicat groups on all target systems are processed until empty, according to these instructions.

> ⚠ **WARNING:**
>
> The hash calculation used by the `@RANGE` function to partition data among Replicat processes has been changed. This change is transparent, and no re-partitioning of rows in the parameter files is required, so long as the upgrade is performed as directed in these instructions. To ensure data continuity, make certain to allow all Replicat processes on all systems to finish processing all of the data in their trails before stopping those processes, according to the upgrade instructions. Note that if the Replicat processes are not upgraded all at the same time, or the trails are not cleaned out prior to the upgrade, rows may shift partitions as a result of the new hash method, which may result in collision errors.

For more information on obtaining the Oracle GoldenGate distribution for heterogeneous databases, see Understanding and Obtaining the Oracle GoldenGate Distribution.

3.2 Upgrading to Oracle GoldenGate 12*c* (12.3.0.1) for Heterogeneous Databases

Even though you may only be upgrading Extract or Replicat, rather than both, all processes are involved in the upgrade. All processes must be stopped in the correct order for the upgrade, regardless of which component you upgrade, and the trails must be processed until empty.

1. (Source and target systems) Back up the current Oracle GoldenGate installation directory on the source and target systems, and any working directories that you have installed on a shared drive in a cluster (if applicable).

2. (Source and target systems, as applicable) Expand version 12*c* (12.3.0.1) of Oracle GoldenGate into a new directory on each system (not the current Oracle GoldenGate directory). Do not create the sub-directories; just complete the steps to the point where the installation files are expanded.

3. (Source system) Stop user activity on objects in the Oracle GoldenGate configuration.

4. (Source system) In GGSCI on the source system, issue the `SEND EXTRACT` command with the `LOGEND` option until it shows there is no more data in transaction log to process.

   ```
   GGSCI> SEND EXTRACT group LOGEND
   ```

5. (Source system) In GGSCI, stop Extract and data pumps.

   ```
   GGSCI> STOP EXTRACT group
   ```

6. (Target systems) In GGSCI on each target system, issue the `SEND REPLICAT` command with the `STATUS` option until it shows a status of "`At EOF`" to indicate that it finished processing all of the data in the trail. This must be done on all target systems until all Replicat processes return "`At EOF`."

   ```
   GGSCI> SEND REPLICAT group STATUS
   ```

7. (Target systems) In GGSCI, stop all Replicat processes.

```
GGSCI> STOP REPLICAT group
```

8. (Source and target systems) In GGSCI, stop Manager on the source and target systems.

```
GGSCI> STOP MANAGER
```

9. If you want to upgrade the source or target database, or both, do so at this time according to the upgrade instructions provided by the database vendor. Make certain to start the databases after the upgrade, but do not permit transactions on the objects in the Oracle GoldenGate configuration.

10. (Source and target systems) Move the expanded Oracle GoldenGate files from the new directory to your existing Oracle GoldenGate directory on the source and target systems.

11. (DB2 for i) Run `ggos400install` without arguments. For an upgrade, no arguments are necessary; however, if you change the library, the old library is left on the system until you remove it. For more information about `ggos400install`, see *Using Oracle GoldenGate for Heterogeneous Databases*.

12. (Target systems, if upgrading Replicat from version 11.2.1.0.0 or earlier only) In GGSCI on each target system, issue the following commands to upgrade the Replicat checkpoint tables on those systems. This step updates the table definition.

```
GGSCI> DBLOGIN {[SOURCEDB data_source] |[, database@host:port] |USERID {/ |
userid}[, PASSWORD password]  [algorithm ENCRYPTKEY {keyname | DEFAULT}] |
USERIDALIAS alias [DOMAIN domain] |[SYSDBA | SQLID sqlid][SESSIONCHARSET
character_set]}
```

```
GGSCI> UPGRADE CHECKPOINTTABLE [owner.table]
```

> **Note:**
>
> *owner.table* can be omitted if the checkpoint table was created with the name listed with CHECKPOINTTABLE in the GLOBALS file.

13. (Source and target systems) Updates to the trail version, the checkpoint storage format, and integrated capture require that you perform the following steps:

   a. In GGSCI, alter the primary Extract process and the associated data-pump Extract processes to write to a new trail sequence number. The command should return "`Rollover performed.`"

   ```
   GGSCI> ALTER EXTRACT group ETROLLOVER
   ```

   b. In GGSCI, issue the INFO EXTRACT command with DETAIL for the primary Extract and the data pumps to verify the trail sequence number.

   ```
   GGSCI> INFO EXTRACT group, DETAIL
   ```

   c. In GGSCI, reposition the data pumps and the Replicat processes to start at the new trail sequence number.

   ```
   GGSCI> ALTER EXTRACT pump, EXTSEQNO seqno, EXTRBA RBA
   ```

   ```
   GGSCI> ALTER REPLICAT group, EXTSEQNO seqno, EXTRBA RBA
   ```

14. (Source system if not upgrading Extract) Add the SOURCECHARSET parameter to the Replicat parameter file. Specify the character set of the source database with this parameter. For more information, see *Reference for Oracle GoldenGate*.

15. (Source system if not upgrading Replicat) If you are not upgrading Replicat on the target systems at this time, add the following parameter to the Extract parameter file to specify the version of Oracle GoldenGate that is running on the target. This parameter causes Extract to write a version of the trail that is compatible with the older version of Replicat.

   ```
   {EXTTRAIL | RMTTRAIL} file_name FORMAT RELEASE major.minor
   ```

   where: version specifies an Oracle GoldenGate release version. major is the major version number, and minor is the minor version number, such as 11.2. Make certain to include the dot.

16. (Oracle GoldenGate upgrades on DB2 z/OS) You might need to re-set the "a" attribute for the Extract process and its DLLs to APF-authorize them to use the privileged API. For more information, see the installation instructions in *Using Oracle GoldenGate for Heterogeneous Databases*.

17. If you made copies of the parameter files to make parameter changes, move the new parameter files into the Oracle GoldenGate directory where the old parameter files were stored, and give them the same names as the old parameter files. If using case-sensitivity support, make certain that you either added NOUSEANSISQLQUOTES to your parameter files, or that you ran the convprm utility to convert the quotes as required. See "Upgrade Considerations if Using Character-Set Conversion" for more information.

18. In GGSCI, start the Oracle GoldenGate processes on the source and target systems in the following order.

   ```
   GGSCI> START MANAGER
   GGSCI> START EXTRACT group
   GGSCI> START EXTRACT pump
   GGSCI> START REPLICAT group
   ```

19. If you need to restore any log files, Extract will abend with an error that indicates the log to restore. Restore the logs back to, and including that log, and then restart Extract.

4

Installing Patches for Oracle GoldenGate

Installing patches is different from Upgrading to Oracle GoldenGate 12*c* (12.3.0.1). This chapter describes the steps to prepare and install patches.

Topics:

- [Downloading Patches for Oracle GoldenGate](#)
- [Patching Oracle GoldenGate for Oracle](#)
- [Patching Oracle GoldenGate for Heterogeneous Databases](#)

4.1 Downloading Patches for Oracle GoldenGate

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

1. Using a browser, navigate to `http://support.oracle.com`.

2. Log in with your Oracle ID and password.

3. Select the **Patches and Upgrades** tab.

4. On the Search tab, click **Product or Family**.

5. In the `Product` field, type **Oracle GoldenGate**.

6. From the Release drop-down list, select the release version that you want to download.

7. Make certain that **Platform** is displayed as the default in the next field, and then select the platform from the drop-down list.

8. Leave the last field blank.

9. Click **Search**.

10. In the Patch Advanced Search Results list, select the patch that best meets your search criteria, making certain that the Oracle GoldenGate patch that you select corresponds to the version of the database that will be used.

    When you select the build, a dialog box pops up under the build description, and then you are advanced to the download page.

11. Click the Patch file name link for each patch that you want to download. The File Download dialog box appears.

12. Select either **Open with** or **Save File**:

To...	Select...
Extract the patch immediately	**Open with**, then select the desired file extraction utility and extract the files to a location on your file system.

To...	Select...
Save the patch for later extraction	Select **Save file**, then save to a directory on your file system.

> **Note:**
>
> Before installing the software, see *Release Notes for Oracle GoldenGate* for any new features, parameter changes, upgrade requirements, known issues, or bug fixes that affect your current configuration.

4.2 Patching Oracle GoldenGate for Oracle

This section provides the prerequisites and steps for installing the Oracle GoldenGate patches for Oracle.

Topics:

- Preparing to Patch
- Installing Patches

4.2.1 Preparing to Patch

Once the patch is downloaded, you need to prepare your environment before you can install it (you need to meet these prerequisites prior to deinstalling, too). To do so, ensure that your system meets the following requirements:

1. Ensure that the Oracle GoldenGate version on which you are installing the patch or from which you are rolling back the patch is Oracle GoldenGate release 12*c* (12.3.0.1) for Oracle.

2. Use the latest version of OPatch. If you do not have the latest version, follow the instructions outlined in the My Oracle Support note 224346.1, available at:

   https://support.oracle.com/CSP/main/article?cmd=show&type=NOT&id=224346.1

   For information about OPatch, see *Patching with OPatch*.

3. Set the `ORACLE_HOME` environment variable to the Oracle GoldenGate installation directory, which is referred to as `ORACLE_HOME`.

4. Set the `PATH` environment variable to include the location of the unzip executable, and the `ORACLE_HOME` and the `ORACLE_HOME/OPatch` directories present in the Oracle GoldenGate home.

5. Verify the Oracle Inventory, which OPatch accesses to install the patches. To verify the inventory, run the following command:

   ```
   $ opatch lsinventory
   ```

   If the command displays any errors, contact Oracle Support and resolve the issue.

4.2.2 Installing Patches

To install the patch, use this procedure:

1. Maintain a location for storing the contents of the patch ZIP file. In the rest of the document, this location (absolute path) is referred to as `PATCH_TOP_DIR`.

2. Extract the contents of the patch ZIP file to the location you created in the previous step.

   For example:

   ```
   $ PATCH_TOP_DIR p14309369_112101_Solaris86-64.zip
   ```

3. Stop Oracle GoldenGate by doing the following:

   a. Run GGSCI.

   b. Stop Manager by running the command:

   ```
   STOP MANAGER
   ```

   c. Stop all Oracle GoldenGate processes by running the command:

   ```
   STOP ER *
   ```

4. Navigate to the `PATCH_TOP_DIR`/*Patch_number* directory:

   ```
   $ cd PATCH_TOP_DIR/Patch_number
   ```

5. Install the patch by running the following command:

   ```
   $ opatch apply
   ```

   > **✎ Note:**
   >
   > When OPatch starts, it validates the patch and ensures that there are no conflicts with the software already installed in the `ORACLE_HOME` of the Oracle GoldenGate release. OPatch categorizes conflicts into the following types:
   >
   > - **Conflicts with a patch already applied to the `ORACLE_HOME`.** In this case, stop the patch installation and contact Oracle Support Services.
   >
   > - **Conflicts with a patch already applied to the `ORACLE_HOME` that is a subset of the patch you are trying to apply.** In this case, continue with the patch installation because the new patch contains all the fixes from the existing patch in the `ORACLE_HOME`. The subset patch will automatically be rolled back prior to the installation of the new patch.

6. If the patch includes new parameters, edit the respective parameter files.

7. Set `ORACLE_HOME` back to the Oracle database home directory.

8. Start the processes from the Oracle GoldenGate home by doing the following:

   a. Invoke GGSCI.

   b. Start Manager by running this command:

   ```
   START MANAGER
   ```

    c. Start all Oracle GoldenGate processes by running this command:

```
START ER *
```

    d. Exit GGSCI.

4.3 Patching Oracle GoldenGate for Heterogeneous Databases

The following steps guide you to install patches for any of the heterogeneous databases released for Oracle GoldenGate.

1. (Source and target systems) Back up the current Oracle GoldenGate installation directory on the source and target systems, and any working directories that you have installed on a shared drive in a cluster (if applicable).

2. (Source and target systems, as applicable) Expand the patch version 12c (12.3.0.1.x) of Oracle GoldenGate into a new directory on each system (not the current Oracle GoldenGate directory). Do not create the sub-directories, just complete the steps to the point where the installation files are expanded.

3. (Source system) Stop user activity on objects in the Oracle GoldenGate configuration.

4. (Source system) In GGSCI on the source system, issue the SEND EXTRACT command with the LOGEND option until it shows there is no more data in transaction log to process.

   ```
   GGSCI> SEND EXTRACT group LOGEND
   ```

5. (Source system) In GGSCI, stop Extract and data pumps:

   ```
    GGSCI> STOP EXTRACT group
   ```

6. (Target systems) In GGSCI on each target system, issue the `SEND REPLICAT` command with the `STATUS` option until it shows a status of "At EOF" to indicate that it finished processing all of the data in the trail. This must be done on all target systems until all Replicat processes return `At EOF`.

   ```
   GGSCI> SEND REPLICAT group STATUS
   ```

7. (Target systems) In GGSCI, stop all Replicat processes:

   ```
   GGSCI> STOP REPLICAT group
   ```

8. (Source and target systems) In GGSCI, stop Manager on the source and target systems.

   ```
   GGSCI> STOP MANAGER
   ```

9. (Source for MySQL with DDL replication enabled) Ensure that there are no new DDL operations during the patching process, then stop the metadata server by executing the following:

   ```
   ./ddl_install.sh stop user-id  password  port-number
   ```

10. (Source and target systems) Move the expanded Oracle GoldenGate files from the new directory to your existing Oracle GoldenGate directory on the source and target systems.

11. (DB2 for i) Run `ggos400install` without arguments. No arguments are necessary for an upgrade, however, if you change the library, the old library is left on the

system until you remove it. For more information about `ggos400install`, see Installing DB2 for i in *Installing Oracle GoldenGate* .

12.

> **Note:**
>
> (Only for the Oracle GoldenGate for SQL Server CDC Extract) Before performing this step, review the steps for Patching Oracle GoldenGate for SQL Server - CDC Extract Requirements.

In GGSCI, start the Oracle GoldenGate processes on the source and target systems in the following order:

```
GGSCI> START MANAGER
GGSCI> START EXTRACT group
GGSCI> START EXTRACT pump
GGSCI> START REPLICAT group
```

13. (Source for MySQL with DDL replication enabled) Restart the `metadata_server` by executing the following:

```
./ddl_install.sh start user-id  password  port-number
```

To patch the Oracle GoldenGate for SQL Server CDC Extract, see:

*   Patching Oracle GoldenGate for SQL Server - CDC Extract Requirements

4.3.1 Patching Oracle GoldenGate for SQL Server - CDC Extract Requirements

You must follow the existing patching procedures in Patching Oracle GoldenGate for Heterogeneous Databases. In addition, you must re-run `ADD TRANDATA` for each table that is already enabled for `TRANDATA` using these steps:

1. Stop all Oracle GoldenGate processes

2. Follow normal patch procedures for binary replacement but do not start any Oracle GoldenGate processes. See Patching Oracle GoldenGate for Heterogeneous Databases for details.

3. Manually stop the SQL Server CDC Capture job for the database. If the job is processing a large transaction, it may take some time before it actually stops.

4. Ensure that the Extract is stopped.

5. Using GGSCI, run `ADD TRANDATA` again for every table that you previously enabled it for, including the heartbeat tables and any Replicat checkpoint table used as a `FILTERTABLE` object for active/active configurations.

> **Note:**
>
> Do not run the `DELETE TRANDATA` command.

6. Manually restart the SQL Server CDC Capture job.

7. Manually restart the Oracle GoldenGate processes such as Extract, Replicat, and Manager.