

# Oracle® Fusion Middleware

## Release Notes for Oracle GoldenGate



12c (12.3.0.1)

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August 2017

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# Conventions

The following text conventions are used in this document:

Convention	Meaning
<b>boldface</b>	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
<i>italic</i>	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
<code>monospace</code>	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.





# 1

## Introduction

This chapter introduces the Release Notes for Oracle GoldenGate 12c (12.3.0.1).

**Topics:**

- [Latest Release Information](#)
- [Purpose of this Document](#)
- [System Requirements and Specifications](#)
- [Certification Information](#)
- [Product Documentation](#)
- [Oracle Support](#)
- [Licensing Information](#)
- [Downloading and Applying Required Patches](#)

## Latest Release Information

This document is accurate at the time of publication. Oracle will update the release notes periodically after the software release. You can access the latest information and additions to these release notes on the Oracle Technology Network at:

<http://www.oracle.com/technetwork/indexes/documentation/index.html>

## Purpose of this Document

This document contains the release information for Oracle Fusion Middleware Release for Oracle GoldenGate.

Oracle recommends you review its contents before installing, or working with the product.

## System Requirements and Specifications

Oracle Coherence follows the Fusion Middleware system requirements and certifications for production environments. For more information, see <http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html>.

## Certification Information

To see versions of platforms and related software for which <product name> is certified and supported, go to <http://www.oracle.com/technetwork/middleware/ias/downloads/fusion-certification-100350.html>.

## Product Documentation

For complete documentation on Oracle GoldenGate, go to <http://docs.oracle.com/en/middleware/>.

## Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support at <https://support.oracle.com>

## Licensing Information

Licensing information for Oracle Fusion Middleware is available at:

<http://oraclestore.oracle.com>

Detailed information regarding license compliance for Oracle Fusion Middleware is available at:

Licensing Information

## Downloading and Applying Required Patches

Go to My Oracle Support to download the latest software patches.

<https://support.oracle.com>

See the `README` file in the patch distribution for up-to-date information on the software fixes provided by the patch.

To download and install the latest software patch:

1. Login to My Oracle Support.
2. Click the **Patches & Updates** tab.
3. Under the Patch Search tab, select **Product or Family (Advanced Search)**, and select the **Include all patches in a product family** check box.
4. Enter **Oracle GoldenGate** as the product, select the platform and release, and click **Search**.

The list of currently available patches for Oracle GoldenGate is returned.

For CDC Extract you may need these software patch:

- For SQL Server 2012, 2014, and 2016, Microsoft has identified and fixed an issue where some `UPDATE` operations may be written incorrectly to a CDC staging table as an `INSERT` followed by a `DELETE`, rather than a `DELETE/INSERT` pair. This may cause downstream replication issues, such as a primary key violation, therefore it is recommended to apply the Microsoft fix for this issue: <https://support.microsoft.com/en-us/help/3030352>
- For SQL Server 2016, prior to enabling supplemental logging, ensure that you have patched the SQL Server instance based on the following bug fix from Microsoft: <https://support.microsoft.com/en-us/help/3166120/fix-could-not-find->

[stored-procedure-sys.sp-cdc-parse-captured-column-list-error-in-sql-server-2016](#) If the instance is not correctly patched with the Microsoft fix, issuing `ADD TRANDATA` against a table for the database may incorrectly report that supplemental logging succeeded, when in fact it may not have; therefore no records will be captured for that table.



# 2

## What's New in this Release

This chapter describes the features, enhancements, and changes made to Oracle GoldenGate. Oracle updates the release notes periodically after the software release. This document is accurate at the time of publication.

### Topics:

- [New Features](#)
- [Default Behavior Changes](#)
- [Deprecated Features](#)

## New Features

This section describes the features and enhancements made to Oracle GoldenGate.

### Topics:

- [12.3.0.1 - Initial Release](#)

### 12.3.0.1 - Initial Release

#### Microservices Architecture

Oracle GoldenGate Microservices Architecture is a new architecture that illustrates server applications running as part of the Oracle GoldenGate environment. It is comprised of **services** that provide REST API interfaces for configuration, administration, and monitoring with included HTML5 Web applications. This is supported with Oracle Database only.

#### Single Service Manager per Installation

Oracle recommends that you create only one Service Manager on a system where you install MA to facilitate easy upgrades.

#### Oracle Database Sharding

Oracle GoldenGate provides a cohesive platform for a sharded Oracle Database, allowing data replication across various sharded database topologies. All the functionality of a sharded database, in addition to providing pre-configured Oracle GoldenGate replication as part of the `GDSCTL DEPLOY` command, is included. This is supported with Oracle Database only.

#### Parallel Replicat

Parallel replicat is a new variant of Replicat that applies transactions in parallel to improve the performance. It takes into account dependencies between transactions, similar to Integrated Replicat. The dependency computation, parallelism of the mapping, and apply is performed outside the database and can be off-loaded to another server. The transaction integrity is maintained in this process. In addition, parallel replicat supports the parallel apply of large transactions by splitting a large transaction into chunks and applying them in parallel. This is supported with Oracle Database only.

## Procedural Replication

Integrated Replicat has been enhanced to allow you to replicate certain Oracle-supplied PL/SQL procedures that cannot be replicated as DML or DDL. This requires that the source and target databases are Oracle Database 12c Release 2 (12.2) and later.

## Automatic Conflict Detection and Resolution

You can configure and manage Oracle GoldenGate to automate conflict detection and resolution when it is configured in Oracle Database 12c Release 2 (12.2) and later.

### DBA\_GOLDENGATE\_SUPPORT\_MODE has a new value PLSQL

This view has a new value, PLSQL.

### ADD TRANDATA, INFO TRANDATA, and ADD SCHEMATRANDATA enhancements

These commands are enhanced to provide additional table handling information by adding the NOVALIDATE option:

- Warning on object type table, xmltype table, iot table, cluster table
- Support mode, including full support, support using fetch, or not supported
- List of Oracle GoldenGate key columns
- Columns and their types that caused the table to be unsupported or fetch supported
- Fetch restrictions
- Warning on lack of unique key

## PMSRVR Commands

The PMSRVR commands control the Performance Metrics Server.

### TRANLOGOPTIONS

The FETCHINLINESFLOB and VALIDATEINLINESFLOB options are added to the TRANLOGOPTIONS parameter.

The DLFAILOVER\_TIMEOUT *seconds* option provides a configurable timeout in seconds to allow for standby database reinstatement post-role transition.

The DISABLESOFTEOFDELAY option sets the wait time that the EOFDELAY will take effect when an EOF is reported along with records to be returned.

The SUPPRESSNOOPUPDATES option allows you to control whether no-op updates are filtered or not in Integrated Extract.

### GETENV

The JULIANTIMESTAMP\_PRECISE option is added to the GETENV parameter.

### ALLOWNULLABLEKEYS | NOALLOWNULLABLEKEYS

The ALLOWNULLABLEKEYS | NOALLOWNULLABLEKEYS GLOBALS parameter changes the key selection logic.

### ADD HEARTBEATTABLE and ALTER HEARTBEATTABLE

The TARGETONLY and NOTARGETONLY options are added to these parameters. This is available with Oracle Database only.

### MAPALLCOLUMNS | NOMAPALLCOLUMNS

MAPALLCOLUMNS | NOMAPALLCOLUMNS are added as Global parameters and as an option to the MAP parameter to control whether or not Replicat obtains non-key columns.

## Error Log Enhancements

You can control the `ggserr.log` file behavior.

### OUTPUTFORMAT

Use the `OUTPUTFORMAT` parameter to output data in text, SQL, and XML formats.

### CACHEMGR

The `CACHEVMUSAGE` option .

## SQLEXEC on Before and AfterImages

This functionality should work for any type of Extract or Replicat including Integrated Replicat. It allows a `SQLEXEC` to call the stored procedure and return the masked value for `BAN`, and then use that returned value in the `WHERE` `CLAU` similar to:

```
SQLEXEC (BEFOREFILTER, SPNAME MASK_COL, PARAMS (in_mask = BAN, mask_type =
'CHARACTER', OPTIONS = 'N'),
```

Where the return value, `MASK_RESULT`, returns the masked value of the `BAN` column. The other options are to mask it using only character data (A-Z, a-z, 0-9), and the last `OPTIONS` is a list of possible options, such as whether the value should be deterministic or which values to encrypt.

In processing `UPDATE` and `DELETE` statements, you want the stored procedure to take the `BEFORE` image of the value and use that masked value in the `WHERE` `CLAU`.

However, Oracle GoldenGate does not do this by default, so the `MOD_COMPARE_COLS` option is introduced so that you can control the values that are used in the `WHERE` `CLAU`. The `MOD_COMPARE_COLS` option works similar to `COLMAP` except that the values for the assigned columns are used in the `WHERE` `CLAU` instead of as values in the actual `SET` clause.

```
IGNOREINSERTS
```

```
GETUPDATES
```

```
GETDELETES
```

```
TABLE ADM. MESSAGE_LOG, TARGET ADM. MESSAGE_LOG,
```

```
SQLEXEC (BEFOREFILTER, SPNAME MASK_COL, PARAMS (in_mask = BEFORE.BAN, mask_type =
'CHARACTER', OPTIONS = 'N'),
```

```
COLMAP (USEDEFAULTS, pk_col = @GETVAL(MASK_COL.mask_result)),
```

```
MOD_COMPARE_COLS (BAN = MASK_COL.MASK_RESULT);
```

In this example, the `WHERE` `CLAU` for `UPDATES` and `DELETES` (since we are using `IGNOREINSERTS`) are modified to use the `MASK_COL.MASK_RESULT` value from the `SQLEXEC` statement instead of using the actual before image of the `BAN` column from the trail.

## MySQL

- Support for extraction and replication of DDL (data definition language) operations is introduced.
- InnoDB now supports up to 1017 columns.
- Support added for Capture and Delivery to MySQL Database with TDE Enabled.
- MySQL (v12.2.0.1.0) has been certified for delivery to Amazon Aurora, which is derived from MySQL v5.6 for both a single instance and a cluster setup of Amazon Aurora.

## SQL Server

- A new CDC-based Extract is introduced.

- The CDC-based Extract supports capture from SQL Server 2016 databases enabled with TDE, and remote capture.
- Capture from a source database configured as a Primary or read-only Synchronous mode Secondary of an AlwaysOn Availability group.
- Delivery to SQL Server 2016 targets.
- New parameters `TRANLOGOPTIONS NO` and `MANAGECDCCLEANUP` added for SQL Server CDC Extract. `MANAGECDCCLEANUP` is the default and instructs the CDC Extract to check for the Oracle GoldenGateCleanup task objects.
- For the CDC Extract, there is a new utility `ogg_cdc_cleanup_setup.bat`, which is used to create the Oracle GoldenGateCDC Cleanup job and associated objects, for controlling data retention in the CDC tables.
- TLS 1.2 support has been added for Oracle GoldenGatefor SQL Server, and requires the Extract to run with the new `DBOPTIONS DRIVER SQLNCLI11` parameter.
- Single user `TRANLOGOPTIONS EXCLUDEUSER` functionality has been added for the SQL Server Classic Extract. However, multiple excluded users are not supported.

### z/OS

- There is no longer a native z/OS build. This allows Oracle GoldenGatefor DB2 for z/OS to maintain compatibility with the other platform features and significantly reduces the MIPs costs associated with running the product.
- Extract uses stored procedures to read the transaction log.
- AES encryption and 64-bit support is included.
- BATCHSQL is now supported for DB2 z/OS

### IBMi

- `COLCHARSET` support now functional in `TABLE` specifications in Extract
- TEXT data conversions significantly more efficient in Extract when writing Unicode trails

## Default Behavior Changes

This section describes the default behavior changes made to Oracle GoldenGate in relation to the last release.

### Topics:

- [12.3.0.1 - Initial Release](#)

### 12.3.0.1 - Initial Release

#### System Change Number

The value size is expanded from 6 bytes to 8 bytes. This is applicable to Oracle Database 12c Release 2 (12.2) and later.

#### Extract

Checkpointing was changed to support the 8-byte representation for both classic and integrated Extract.



### Long Identifiers

Support for long identifiers limit of 128 bytes was added. This is applicable to Oracle Database 12c Release 2 (12.2) and later.

### Oracle Database

- Support for the Local Undo Oracle Database 12.2 feature, which allowed each PDB to use its own, local undo tablespace, has been added.
- Classic capture mode when replicating a `CREATE USER` command using the DDL trigger was changed and now the trigger owner and the Extract login user *must* match.

### Character Sets for Pluggable Databases

Oracle GoldenGate now provides replication support for pluggable databases with different character sets.

### DB2 LUW `EOFDELAY`

The `EOFDELAY` wait time will take effect even when an `EOF` is reported along with records to be returned.

### DB2 for i Database

The default behavior of a DB2 for I Extract has been reverted to convert all character data to Unicode. Extracts with multiple journals are no longer allowed by default

### (CDC Extract) `TRANSDATA`

If you encounter the following error: Could not find stored procedure 'sys.sp\_cdc\_parse\_captured\_column\_list' When adding `TRANSDATA` to a SQL Server 2016 table, you may be required to install a patch related to the following SQL Server bug: <https://support.microsoft.com/en-us/help/3166120/fix-could-not-find-stored-procedure-sys.sp-cdc-parse-captured-column-list-error-in-sql-server-2016>

### `@RANGE`

The `@RANGE` function now abends when there missing or NULL columns.

## Deprecated Features

This section describes the deprecated and no longer supported features of Oracle GoldenGate.

### Topics:

- [Deprecated Features](#)

## Deprecated Features

### 12.3.0.1 - Initial Release

#### Oracle GoldenGate Director

Oracle GoldenGate Director is not supported with Oracle GoldenGate 12.3.0.1 release. Use Oracle GoldenGate Studio instead.

#### `SYSLOG`

The `SYSLOG` parameter for `GLOBALS` and `MGR.PRM` is removed.

**Reverse Utility**

The reverse utility is deprecated.

**INFO MARKER**

The `INFO MARKER` command is deprecated. Extract and Replicat no longer check the marker table history from NKS source.

**NOASYNCTRANSPROCESSING**

The `NOASYNCTRANSPROCESSING` option of `TRANLOGOPTIONS` is deprecated. There is no default behavior change.

**FORMATASCII, FORMATSQ, and FORMATXML**

The new `OUTPUTFORMAT` parameter replaces the deprecated `FORMATASCII`, `FORMATSQ`, and `FORMATXML` parameters.

**CACHEMGR**

The `CACHEPOOL n` and `CACHEFSOPTION { MS_SYNC | MS_ASYNC }` options are deprecated.

**EXTFILE, EXTTRAIL, RMTFILE, RMTTRAIL**

These parameters have been deprecated for Data Pump. The Data Pump writes the output trail in the same format and metadata endian as the input source trail file:

`FORMAT RELEASE`

`TRAILBYTEORDER`

**TRAILCHARSETUNICODE**

The Extract `TRAILCHARSETUNICODE` parameter has been deprecated because the default behavior of a DB2 for I Extract is now reverted to convert all character data to Unicode. The character conversion efficiency has been significantly improved., however if a table must be sent without conversion, `COLCHARSET(PASSTHRU)` may be used on the `TABLE` statement.

**USEANSISQLQUOTES | NOUSEANSISQLQUOTES**

The `GLOBALS USEANSISQLQUOTES | NOUSEANSISQLQUOTES` parameters have been deprecated.

# 3

## Known Issues and Workarounds

This chapter describes the known issues at the time of release.

### Topics:

- [Known Issues and Workarounds - Initial Release](#)

## Known Issues and Workarounds - Initial Release

### Issue

Bug Number: 26190334

Impacted Release: 12.3.0.1

Impacted Platforms: All

JAgent supports only the Classic mode for Oracle GoldenGate. MA is not supported.

### Workaround

No workaround available.

### Issue

Bug Number: 25897967

Impacted Release: 12.3.0.1

Impacted Platforms: All

If there are Oracle GoldenGate12.3 processes running when `OGG_HOME/deinstall/deinstall.sh` is executed, then those processes continue to run after deinstallation. The orphaned services' process IDs become defunct because the associated binaries no longer exist. However, the Service Manager process is kept alive and remains listening on the original port. Subsequent attempts to add deployments (after reinstalling Oracle GoldenGateMicroservices Architecture) may be blocked due to the discovery of the active, existing Service Manager port.

### Workaround

When uninstalling Oracle GoldenGateMA, the best practice is to delete all affiliated deployments and/or stop their processes. In addition, identify the process ID of the Service Manager and manually kill the process. If the Service Manager is set up as an operating system service daemon, `deinstall.sh` does not clean up the configuration, so this task is also manual.

### Issue

Bug Number: 26104564

Impacted Release: 12.3.0.1

Impacted Platforms: All

When an "execute" task is deleted, the associated ER process is killed. This is because the task owns the running state of the ER process.

#### Workaround

The correct method of creating an "execute" task is as follows:

1. Create the ER process in stopped state.
2. Create the task.
3. Start the task.

#### Issue

Bug Number: 25502490

Impacted Releases: 12.3.0.1

Impacted Platforms: Solaris SPARC or Solaris x86\_64

The `LD_LIBRARY_PATH_64` environment variables must be set correctly before running Oracle GoldenGate on Solaris SPARC or Solaris x86\_64.

#### Workaround

Before running the configuration wizard or any Oracle GoldenGate executables, you can resolve this issue in one of two ways:

- Remove the `/usr/sfw/lib/sparcv9` directory, that is installed with Solaris, from the `LD_LIBRARY_PATH_64` environment variable . Oracle recommends this workaround.
- Update the `LD_LIBRARY_PATH_64` environment variable to include `$OGG_HOME/lib` as the first entry.

#### Issue

Bug Number: 22826452

Impacted Releases: 12.3.0.1

Impacted Platforms: All

Do not use `WILDCARDRESOLVE IMMEDIATE` in a multitenant environment if performing DDL on that system. Extract may fail to capture records after the DDL operations.

#### Workaround

No workaround available.

#### Issue

Bug Number: 22739872

Impacted Releases: 12.3.0.1

Impacted Platforms: All

When using `XAGENABLE`, if you start manager from GGSCI and it immediately abends the command may hang.

### **Workaround**

No workaround available

### **Issue**

Bug Number: 22967088

Impacted Releases: 12.3.0.1

Impacted Platforms: All

If Integrated Replicat abends with OGG-006650CI Error Flushing database inbound server, '..' (status = 3117-: two-task save area overflow), disabling ENABLEMONITORING.

### **Workaround**

Restart the Replicat.

### **Issue**

Bug Number: 19512704

Impacted Releases: 12.3.0.1

Impacted Platforms: All

Using STRCAT to concatenate a string that has used BINTOHEX returns the wrong information.

### **Workaround**

No workaround available.

### **Issue**

Bug Number: N/A

Impacted Releases: 12.3.0.1

Impacted Platforms: All

NOUSERID is only supported with downstream Integrated Extract.

### **Workaround**

No workaround available.

### **Issue**

Bug Number: N/A

Impacted Releases: 12.3.0.1

Impacted Platforms: All

[NO]MAPINVISIBLECOLUMNS does not function properly with user exits.

**Workaround**

No workaround available.

**Issue**

Bug Number: N/A

Impacted Releases: 12.3.0.1

Impacted Platforms: Aix

You must install the XL C++ runtime environment (RTE) version 13.1 on the systems that you want to use Oracle GoldenGate because it cannot run with older RTE versions.

**Workaround**

Ensure that the RTE version 13.1 is installed before you install Oracle GoldenGate.

**Issue**

Bug Number: 26564428;

Impacted Releases: 12.3.0.1

Impacted Platforms: Solaris 10

The Performance Metrics Server home page does not correctly display statistics.

**Workaround**

None.

**Issue**

Bug Number: 26564428;

Impacted Releases: 12.3.0.1

Impacted Platforms: Oracle Linux 6

When a source schema name is appended to the derived object (indexes and triggers) during DDL (like `CREATE TRIGGER tkggul.mytrigger1`), then the derived object is not mapped correctly by the Replicat. Since `mapderived` is default for Replicat, the statement should map per the map statements.

**Workaround**

Do not append a source schema name to the derived object name in DDL statement so that the statement is executed on the correct schema.

**Issue**

Bug Number: 26533353;

Impacted Releases: 12.3.0.1

Impacted Platforms: N/A

Creating deployment with the **Integrate with XAG** option results in the Service manager not starting.;

**Workaround**

None.

**Issue**

Bug Number: 26501195;

Impacted Releases: 12.3.0.1

Impacted Platforms: Solaris 10

**Workaround**

The MA Service Manager and server web pages do not display in Solaris 10. To display these pages, upgrade to Solaris 11.

**Issue**

Bug Number: 26596046 ;

Impacted Releases: 12.3.0.1

Impacted Platforms: All

Oracle GoldenGatefor non-Oracle Bi-Directional and Cascading HEARTBEATABLE implementations are not working correctly.

**Workaround**

None.

**Issue**

Bug Number: 26593572;

Impacted Releases: 12.3.0.1.0 (Microservices edition only)

Impacted Platforms: All

Admin Client does not allow connection to deployment as a non-admin user.

**Workaround**

Admin Client can only connect to the deployment using the credentials specified during deployment.

**Issue**

Bug Number: 26613655;

Impacted Releases: 12.3.0.1

Impacted Platforms: CDC Extract for SQL Server

ADD HEARTBEATABLE does not create all objects needed by CDC Extract.

### Workaround

After creating the HEARTBEATABLE entries, use GGSCI to `ADD TRANDATA schema.gg_heartbeat` and `ADD TRANDATA schema.gg_heartbeat_seed`.

### Issue

Bug Number: NA;

Impacted Releases: 12.3.0.1

Impacted Platforms:

Mozilla Firefox browser is not supported on MAC OS for embedded UI.

### Workaround

Use Google Chrome browser.

### Issue

Bug Number: 25061436;

Impacted Releases: 12.3.0.1

Impacted Platforms: IBM I

An issue has been raised with IBM about the generation of system sequence numbers where the system sequence numbers roll back during the one hour window in the fall daylight savings time adjustment period at 2 a.m. This can cause a loss of data and/or hung Extract. IBM is currently working to resolve this issue.

### Workaround

Shut down the Extract during the fall Daylight Savings Time change at or before 2 a.m. local time and wait until 2 a.m. standard time has passed to restart Extract.

### Issue

Bug Number: 26546679;

Impacted Releases: 12.3.0.1

Impacted Platforms: All

For tables that contain `SPARSE` columns, the `sql_variant` data type, or the `FILESTREAM` attribute, Extract may fail if processing DML for these tables. .

### Workaround

You must remove these tables from Extract with either the `TABLEEXCLUDE` parameter, or you can remove `TRANDATA` for the specific tables with `DELETE TRANDATA`

### Issue

Bug Number: 26492075;

Impacted Releases: 12.3.0.1

Impacted Platforms: All



Due to a limitation with SQL Server's Change Data Capture abilities, column level collations that are different from the database collation, may cause incorrect data to be written to the CDC tables for character data, and Extract may capture them as they are written to the CDC tables.

**Workaround**

None.

**Issue**

Bug Number: 26046195;

Impacted Releases: 12.3.0.1

Impacted Platforms: SQL Server 2008/2008R2 CDC Extract

SQL Server 2008 and 2008R2 Change Data Capture may write a Primary Key update to the CT staging table as a Delete or Insert that is not part of the same transaction. If this occurs, data written to the trail is as a Delete, followed by an Insert, and this could impact target foreign key constraints.

**Workaround**

Disable target table foreign key constraints.



# 4

## Bugs Fixed and Enhancements in this Release

This chapter describes the bugs fixed and enhancements at the time of release.

### Topics:

- [Initial Release – August 2017](#)
- [Bugs Fixed in 12.3.0.1](#)

### Initial Release – August 2017

#### **CACHEMGR and CACHESIZE can be placed in GLOBALS parameter**

For Extracts and Replicats, `CACHEMGR` and all its options can be placed in the `GLOBALS` parameter, except for `CACHEDIRECTORY`.

#### **Extended Timestamp Precision for RECORD, TIMESTAMP**

`@GETENV` has two new values: `RECORD_TIMESTAMP_PRECISE` and `TRANSACTION_TIMESTAMP_PRECISE`. These options return the timestamp value with fractional precision, which implies that the values are returned from YEAR to MICROSECONDS or MILLISECONDS, depending on the type of database.

#### **@STREQNULL, @STRCMPNULL Functions Added**

`@STREQNULL` and `@STRCMPNULL` functions work the same way as `@STREQ` and `@STRCMPNULL`, respectively. However, when two arguments passed to the function are both `NULL`, the functions return value because both values are identical. `@STREQNULL` returns 1 and `@STRCMPNULL` returns 0.

#### **SQLEXEC Before Image is Supported with Parameter SQLEXECONBEFOREIMAGE**

A new parameter `SQLEXECONBEFOREIMAGE` introduced to support `SQLEXEC` execution on Before Image records, because `SQLEXEC` execution only happens after image records.

#### **Enhancement of Filter USERNAME for SQL Server Classic Extract**

SQL Server classic extract can now filter by user.

### Bugs Fixed in 12.3.0.1

