IFS Aviation Maintenance

Database Installation Guide

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1 Introduction

This guide explains how to install the CAMO database, how to refresh an existing CAMO schema, how to create a read-only user for the CAMO database, and how to run the script to upgrade your database schema to this release version.

Customers who are new to CAMO begin by installing the CAMO base database, which includes the zero-level data that CAMO requires to work. After installing the base data, customers install solution data, which consists of level-10 data (recommended system and reference term data) to implement a specific solution.

2

Before you install

Before you begin installing the CAMO database, the following must be installed on the database server:

- A supported release of Oracle database.

  The releases of the Oracle database that CAMO supports are listed in the *Software Requirements* section of the *Maintenix Installation and Configuration Guide*.
- A database instance has been created for the CAMO database, and that instance is operational. When you create the database instance, do the following:
  - When creating the database instance, you must select the Unicode UTF-8 encoding character set, which is called AL32UTF8 in Oracle. For more information, see *Oracle documentation* (https://docs.oracle.com/en/database/oracle/oracle-database/19/admin/creating-and-configuring-an-oracle-database.html#GUID-2D16B9A8-99A0-48BD-9DFB-FF180EA2CABE).

    For existing databases created with a different character set, it is not mandatory that you convert the encoding into UTF-8. A conversion into UTF-8 is required only if characters that you use are not supported in your existing character set.
  - Set the DISTRIBUTED_LOCK_TIMEOUT initialization parameter to 7200 seconds (2 hours).
  - Set the local operating system to the UTC time zone to avoid problems related to DST (Daylight Savings Time), and validate that Oracle has inherited time zone "+00:00" using `SELECT DBTIMEZONE FROM DUAL;`

You do not have to run the CAMO database installation script on the database server host. If you are planning on installing and running the script on a computer other than the database server, the computer must have the following installed:

- Oracle client software, including the Database Utilities components for importing and exporting.

If you run installation scripts on client computers, ensure that you use a low latency, stable connection.

Required Oracle privileges for the SYSTEM user

To install the CAMO database schema successfully, the Oracle SYS user must grant some privileges to the SYSTEM user, and grant these privileges with the GRANT option, so that the SYSTEM user can grant the same privileges to the CAMO user.

The following is the command syntax to use by the SYS user to grant the required privileges to the SYSTEM user:

```
GRANT EXECUTE ON DBMS_LOCK TO SYSTEM WITH GRANT OPTION;
```

```
GRANT EXECUTE ON DBMS_SCHEDULER TO SYSTEM WITH GRANT OPTION;
```

```
GRANT SELECT ON sys.dba_pending_transactions TO SYSTEM WITH GRANT
 OPTION;
```

```
GRANT SELECT ON sys.pending_trans$ TO SYSTEM WITH GRANT OPTION;
```

```
GRANT SELECT ON sys.dba_2pc_pending TO SYSTEM WITH GRANT OPTION;
```

```
GRANT EXECUTE ON sys.dbms_xa TO SYSTEM WITH GRANT OPTION;
```

Oracle privileges of the CAMO user

When you install the CAMO base database, the CAMO user is created automatically in Oracle. The installation script creates this user automatically, using the name you configure, and grants the user all of the following role and privileges in Oracle, in addition to those that are granted to public in Oracle:

- The CONNECT role
- The AQ_USER_ROLE
- The following system privileges:
  - ALTER SESSION
  - CREATE PROCEDURE
  - CREATE SNAPSHOT
  - CREATE TRIGGER
  - CREATE CLUSTER
  - CREATE JOB

    - CREATE DATABASE LINK
    - CREATE SEQUENCE
    - CREATE SYNONYM
    - CREATE TABLE
    - CREATE TYPE
    - CREATE VIEW
    - CREATE ANY CONTEXT
    - QUERY REWRITE
    - SELECT ANY TABLE
    - FORCE ANY TRANSACTION
    - CHANGE NOTIFICATION
- The following object privileges:
    - EXECUTE ON DBMS_LOCK
    - EXECUTE ON DBMS_SCHEDULER
    - EXECUTE ON DBMS_AQADM
    - EXECUTE ON DBMS_AQ
    - EXECUTE ON DBMS_CQ_NOTIFICATION

Oracle data pump import

The installation of the CAMO base database is done using the Oracle data pump utility (`impdp.exe`), not the original Oracle import utility (`imp.exe`). However, to assist existing customers who exported their existing CAMO database and want to install that schema, IFS still provides the script to install a DMP file using the original import utility. Similarly, scripts are provided to refresh the CAMO schema using either method.

In the CAMO database file set, the scripts for the original import utility have file names that begin with `install-`. Those for use with the data pump import all begin with `datapump-`.

In CAMO, import files for use with the original Oracle import utility have the DMP file extension. Import files for use with the data pump import utility, and exports created from the Data Pump export utility, have the DMPX file extension.

For more information about Oracle data pump, see the *Oracle documentation* (https://docs.oracle.com/en/database/oracle/oracle-database/19/sutil/oracle-data-pump-overview.html#GUID-17FAE261-0972-4220-A2E4-44D479F519D4).

Requirements for using data pump

When using Oracle data pump to import a database, it is necessary for the database server to have access to the folder location where the import file is located. Therefore, you must place the CAMO base database import file (the MAINTENIX.DMPX file) in a folder located either on the database server itself, or on a network share that the database server can access.

In addition, the script that is provided to install the CAMO base database creates an Oracle directory object. This directory object is an alias; it contains a pointer to the full path of the location where the CAMO import file is located. You configure the name to assign to the directory object before running the script, as explained later in this guide.

For more information about the directory object in Oracle, see the *Oracle documentation* (https://docs.oracle.com/en/database/oracle/oracle-database/19/sutil/oracle-data-pump.html#GUID-501A9908-BCC5-434C-8853-9A6096766B5A).

Configure the Oracle Automatic Optimizer Statistics Collection job

CAMO gathers statistics to support query optimization and stable system performance for its own schema objects. Two CAMO statistics gathering jobs are enabled by default and can be configured after installation is complete. For statistics to be maintained on Oracle system objects, we recommend you configure the Oracle Automatic Optimizer Statistics Collection job to target Oracle internal objects.

About this task

The Oracle Automatic Optimizer Statistics Collection job runs as one of Oracle's automated maintenance tasks.

Steps

1. **Validate that Oracle Automatic Optimizer Statistics Collection job is enabled.** `SELECT status FROM dba_autotask_client WHERE client_name = 'auto optimizer stats collection';`
2. **If not enabled, run the following command as SYSTEM** `BEGIN DBMS_AUTO_TASK_ADMIN.ENABLE(client_name=>'auto optimizer stats collection', operation=>NULL, window_name=>NULL); END;`
3. **Validate that Oracle is configured to maintain statistics on system objects only** `SELECT dbms_stats.get_param('AUTOSTATS_TARGET') FROM dual;`
4. **If not set to 'ORACLE', run the following command as SYSTEM** `BEGIN DBMS_STATS.SET_PARAM('AUTOSTATS_TARGET','ORACLE'); END;`

3

Install, refresh, and export the database

This section explains how to do all of the following:

- Install the CAMO database files.
- Install a new CAMO database schema in Oracle.

It is recommended that an Oracle database administrator (DBA), or a person with privileges on the Oracle database instance performs the actions in this section.

Install the database files

About this task

The first thing to do is to install the CAMO database files, which include scripts, properties files, the CAMO base database import file, and various support files. You can install these files on any computer on your network that has the Oracle client installed—you do not have to install them on the database server.

Steps

1. Double-click *install.cmd* in the *<database_install>\install* folder.

   The **Introduction** page of the **Installation Wizard** opens.
2. Click **Next**.

   The **License Agreement** page opens.
3. Read the license agreement. If you agree with the terms, select the **I accept the terms of the License Agreement** option, and then click **Next**.

   The **Choose Install Folder** page opens.
4. Do one of the following:
   - To accept the default installation folder, which is *C:\mxi\database-<release_number>*, click **Next**.

- To choose a different folder from the default, type the full path and folder name, or click Choose to select a folder using a dialog box. Click Next.

The Choose Shortcut Folder page opens.

5. Select Don't create icons, and then click Next.

   The Pre-installation Summary page opens.

6. Review the information on this page to ensure it is accurate, and verify that there is enough disk space available for the installation.
7. If you want to change some of the choices you have made, click Previous to go back to earlier pages of the installation wizard. Otherwise, click Install to proceed.

   The scripts are copied to the location you selected. When the operation is complete, the Important Information page opens; it provides information about the next step required before installing the CAMO database.
8. Click Next.

   The Install Complete page opens. It confirms the successful installation, and displays the path and the folder where the scripts are installed. This guide refers to this folder as the `<database_install>` folder. In the `<database_install>` folder, the following sub-folders exist:

   - ant
   - dataload
   - export
   - install
   - java
   - logs
   - uninstall
9. Click **Done**.

Install the CAMO database schema

Use database-provided scripts to install the CAMO database schema on your database.

These scripts are provided in the database file set to complete the following tasks:

- Installing the CAMO base database.

  This creates a new CAMO schema and data file, creates an CAMO user, and imports the base CAMO database into that schema. The base database delivered with CAMO contains zero-level data, which is required for CAMO to work properly.

  The installation script drops the specified user and tablespace first, so ensure that you are not dropping an existing user whom you want to keep.
- Installing the solution data.

Solution data contains the system and reference data (all level-10 data) that is recommended to implement a specific solution in CAMO; for example, the standard aviation solution or a custom solution created for your organization.

Before running the script, you must do all of the following:

- Put the import file containing the CAMO base database in a folder located either on the database server itself, or on a network share that the database server can access. The import file is called MAINTENIX.DMPX, and it is in the `<database_install>/export` folder in the CAMO database file set you installed.
- Configure your database connection parameters by setting the correct values for the properties included in the `build.properties` file, as follows. To do so, you should have the following information on hand:
  - The password of the Oracle SYSTEM user account.
  - The database service.
  - The full path of the folder where Oracle stores the data files.
  - The CAMO database identifier (DBID) provided by IFS.
  - The path of the location (either on the database server or on a network drive) that the database server can access, where the MAINTENIX.DMPX file is located.

Configure the build.properties file

You can define database connection parameters in `build.properties` so that subsequent scripts can connect and configure the database.

About this task

> **Note** For organizations who want to avoid writing plaintext passwords in `build.properties`, you can set properties with environment variables.

Steps

1. Verify that you have write access for the files in the `<database_install>` folder (the files are not read-only).
2. In a text editor, open the `build.properties` file that is located in the `<database_install>/install` folder.
3. Set the values of the properties listed below with information relevant to your organization:
   - **oracle.connect.host**=<Host name for the database>
   - **oracle.connect.service**=<Service name for the database>
   - **oracle.connect.port**=<Port number for the database>
   - **oracle.datafile.location**=<Full path of the folder where the oracle instance stores its data files>

- **system.username**=`system`
- **system.password**=<Password of the Oracle system user account>
- **maintenix.username**=<Name to assign to the CAMO user schema>
- **maintenix.password**=<Password for the CAMO user schema>
- **oracle.datafile.size**=8192

  This value must be at least equal to the size of the dump file (in MB).
- **maintenix.import.filename**=`MAINTENIX.DMPX`

  Important The file name is case-sensitive on Linux.

- **maintenix.import.path**=<The path of the folder on the database server, or the network location, where the `MAINTENIX.DMPX` file is located. The database server must be able to access this folder.>

  The type of slashes to use in file paths in this properties file depends on the operating system of the database server. If the database server runs on Windows—which uses backslashes—type double backslashes "\\" in path values in the properties file. If the database server runs on an operating system that use forward slashes "/"—such as LINUX—type single forward slashes in path values.
- **maintenix.import.directory**=<The name of the Oracle directory object to create in the Oracle database that will contain a pointer to the location where the `MAINTENIX.DMPX` file is located. The name must not exceed 30 characters.>
- **maintenix.database.id**=<Database identifier (DBID) supplied by IFS>
- **temp.table.space**=<name of the Oracle temporary tablespace>

Leave all other property values as they appear in the file.

4. Save the changes and close the file.
5. In the `<database_install>/install` directory, run `datapump-create-user.bat` (Windows) or `datapump-create-user.sh` (Linux).

Tip

Advanced users who are familiar with Oracle data pump can specify advanced configuration properties in the `datapump.properties` file, located in the `<database_install>/install` folder. See the *Oracle documentation* (https://docs.oracle.com/en/database/oracle/oracle-database/19/sutil/datapump-import-utility.html#GUID-BA74D4F6-2840-4002-A673-0A7D9CBB3D78).

Setting properties in build.properties using environment variables

Any property defined in `build.properties` can be overwritten from the command line before running any scripts. This is useful for customers performing fully scripted installations, or for those with security policies that prohibit writing plaintext passwords to disk.

For example, to avoid storing a plaintext password in the properties file, set the `ANT_OPTS` environment variable:

Windows:

```
set ANT_OPTS=-Dmaintenix.password=<yourpassword>
```

Linux:

```
export ANT_OPTS=-Dmaintenix.password=<yourpassword>
```

You can specify any option from `build.properties`, as long as you prefix it with `-D`. For example, the following code samples run the `datapump-create-user` script without setting any properties in the `build.properties` file:

Windows:

```
set ANT_OPTS="\
-Doracle.connect.host=server.example.com \
-Doracle.connect.port=1521 \
-Doracle.connect.service=OR01 \
-Doracle.datafile.location=D:/oracle/oradata/OR02/data \
-Dsystem.username=system \
-Dsystem.password=manager \
-Dmaintenix.database.id=4650 \
-Dmaintenix.username=MX_ES_DEV4 \
-Dmaintenix.password=MX_ES_DEV4 \
-Dmaintenix.import.path=D:/mx-database/export \
-Dmaintenix.import.directory=DATA_PUMP_IMPORT \
-Dmaintenix.import.filename=MAINTENIX.DMPX \
-Doracle.datafile.size=2500"
datapump-create-user.bat
set ANT_OPTS
```

Linux:

```
export ANT_OPTS="\
-Doracle.connect.host=server.example.com \
-Doracle.connect.port=1521 \
-Doracle.connect.service=OR01 \
-Doracle.datafile.location=/u04/OR01/ \
-Dsystem.username=system \
-Dsystem.password=manager \
```

```
-Dmaintenix.database.id=4650 \
-Dmaintenix.username=MX_ES_DEV4 \
-Dmaintenix.password=MX_ES_DEV4 \
-Dmaintenix.import.path=/u04/DATA_PUMP_IMPORT \
-Dmaintenix.import.directory=DATA_PUMP_IMPORT \
-Dmaintenix.import.filename=MAINTENIX.DMPX \
-Doracle.datafile.size=2500"
./datapump-create-user.sh
export ANT_OPTS
```

Install without using IFS-provided script

If you are experienced with Oracle data pump import, and you installed the CAMO base database (MAINTENIX.DMPX) without using the script provided by IFS, you must run the following post-installation script after importing the base database: `run-post-import-logic.bat` (Windows) or `run-post-import-logic.sh` (Linux).

This script ensures that the CAMO user and the inventory context are set up correctly, and that the database is configured to use the correct database ID.

Install using a previous CAMO import file

About this task

Follow these instructions only if you are installing the database from an export you took of your existing CAMO database, rather than installing the base database provided by IFS, and that the export was created using the original Oracle export utility (exp.exe), not the data pump utility. The export file used must have been generated by the schema user, not the SYSTEM user, and it must contain only one user's data.

CAUTION The installation script drops the specified user and tablespace first, so ensure that you are not dropping an existing user that you want to keep.

Steps

1. Copy the database import file, a DMPX file, to a local folder.
2. In a text editor, open <`database_install`>`/install/build.properties`.
3. Update the values of the following properties:

   In the **Maintenix account information** section:

   - **oracle.datafile.size**=<Maximum size of DMP file to install to the database, in MB. Adjust the size according to the size of your export file.>

   In the **Import File Name** section:

   - **maintenix.import.filename**=<Name of the import file—the DMPX file.>

In the **Import File Location** section:

- **maintenix.import.path**=<Full path of the folder where the import file is located.>

In the **Import Directory** section, leave the value of **maintenix.import.directory** property blank.

4. Update the values of the remaining properties in the `build.properties` file as needed.
5. Go to the `<database_install>/install` folder.
6. Run `datapump-create-user.bat` (Windows) or `datapump-create-user.sh` (Linux).

   The installation executes in a command prompt or console window. When the operation is complete, you see a "Build Successful" message. Otherwise, you see a "Build Failed" message.

   The results and errors, if any, are logged in `<database_install>/install/log/maintenix.log`.

Refresh the CAMO schema

About this task

Perform the following steps to refresh an existing CAMO schema. This cleans out the existing CAMO user, and then imports the contents of the CAMO base database into that schema.

The script you use to refresh the schema deletes the contents (objects) of the user identified in the properties file. Ensure that you are not deleting contents of a database that you want to keep.

Steps

1. Ensure that the `build.properties` file is updated.

   Note Do not specify values for the Oracle system account user name and password because the script does not need or use that information.

2. Save and close the file.

   Note Advanced users who are familiar with Oracle data pump can specify advanced configuration properties in the `<database_install>/install/datapump.properties` file. Details about the advanced properties are available from the Oracle web site.

3. Go to the `<database_install>/install` folder.
4. Run `datapump-clean-user.bat` (Windows) or `datapump-clean-user.sh` (Linux) by double-clicking the file name.

The installation executes in a command prompt or console window. When the operation is complete, you see a "Build Successful" message. Otherwise, you see a "Build Failed" message.

The results and errors, if any, are logged in `<database_install>/install/log/log.xml`.

Tip If you want to refresh the CAMO schema using an import file created using the original Oracle export utility—for example, a file created by exporting an existing CAMO database—use the `install-clean-user.bat` (Windows) or `install-clean-user.sh` (Linux) script located in the `<database_install>/install` folder.

That script also uses the `build.properties` file, but with the following differences:

- The `maintenix.import.path` property can point to a local drive because the DMP file does not have to be accessible from the database server.
- The `maintenix.import.directory` property is not used; leave its value blank.

Create a read-only user for the CAMO database

About this task

You can create a read-only user who can query and see the CAMO database using a script provided with the installer. However, you cannot add, remove, or change any data. This is optional. It can be used, for example, to give access to the database to someone who is creating custom reports for CAMO data.

This script drops, and then creates a read-only Oracle role and read-only CAMO user. You can do this only after you have installed the CAMO base database, because the CAMO user must exist.

Steps

1. Log on to the computer using a user account that has system privileges on the Oracle instance.
2. Go to the `<database_install>/install` folder.
3. Run `install-create-ro-user.bat` (Windows) or `install-create-ro-user.sh` (Linux).

   The installation executes in a command prompt or console window. When the operation is complete, you see a "Build Successful" message. Otherwise, you see a "Build Failed" message.

   If successful, the following are created:

   - A read-only Oracle role called `<maintenix.username>_ro_role`.
   - A read-only CAMO user called `<maintenix.username>_ro`.

where <maintenix.username> is the name of the CAMO user created for the database. The default password of the read-only CAMO user is the same as the current CAMO user.

Any results and errors are logged in <database_install>/install/log/maintenix_ro.log.

4. For security purposes, change the password of the <maintenix_username>_ro user before giving the user name and password to the intended user.

Export the CAMO database

About this task

Follow the instructions in this section to export the contents of your CAMO database using the script provided by IFS. The script uses the Oracle data pump export utility to produce a DMPX file, and puts that file in the same location as the MAINTENIX.DMPX file that was used to create the CAMO base database.

The Oracle directory object that points to the physical location where the DMPX is stored must already exist in Oracle. See "Requirements for Using Data Pump".

Tip Advanced users who are familiar with Oracle data pump can specify advanced configuration properties in the datapump.properties file located in <database_install>/install folder. For details about the advanced properties see the *Oracle documentation* (https://docs.oracle.com/en/database/oracle/oracle-database/19/sutil/datapump-import-utility.html#GUID-BA74D4F6-2840-4002-A673-0A7D9CBB3D78).

Steps

1. Log on to the computer using a user account that has system privileges on the Oracle instance.
2. Go to the <database_install>/install folder.
3. Run datapump-export-user.bat (Windows) or datapump-export-user.sh (Linux).
4. At the prompt, type the name of the CAMO user name and press Enter.
5. At the prompt, type the password of the CAMO user and press Enter.
6. When prompted for the connect string, type the CAMO database alias as stated in tnsnames.ora, and then press Enter.
7. When prompted for the export directory, type name of the Oracle directory object—which points to the location where the export file will be stored—and then press Enter.
8. At the prompt, type the name to use for the export file and press Enter, or only press Enter to accept the default value. The default is to save the export with the following file name:

   <Maintenix_user_name>_<date_of_export>_<time_of_export>.dmpx

9. When prompted, type the name to use for the export log file and press Enter, or only press Enter to accept the default value. The default is to save the export log file with the following file name:

   `<Maintenix_user_name>_<date_of_export>_<time_of_export>-export.log`

   The installation executes in a command prompt or console window. When the operation is complete, you see a "Build Successful" message. Otherwise, you see a "Build Failed" message.

   Note You can create `install_export_user.properties` in the Install folder and pre-fill it to automate steps 4 to 9.

Export the CAMO database without BLOB and CLOB data

About this task

Binary Large Object (BLOB) and Character Large Object (CLOB) is unstructured data that significantly increases the size of an export file. When you export your CAMO database, you can exclude BLOB and CLOB data from the export file; this is useful when, for example, you are exporting the database to troubleshoot and resolve issues that do not use this data. Excluding BLOB and CLOB data reduces the size of the export file, and the time required to perform the export. The exclusion of data is done by replacing BLOB and CLOB data in the export file with empty values.

Steps

1. Create a text file that has the par file extension; this is the parameter file.
2. In the parameter file, add a REMAP_DATA parameter for each BLOB or CLOB column in the database that you want to exclude from the export file. You can create the REMAP_DATA parameters in two different ways:
   - Create them manually, one at a time, by typing them in the parameter file. The syntax of the REMAP_DATA parameter is as follows:

     REMAP_DATA=<schema>.<table>.<column>:<schema>.**utl_remap_pkg**.<function>

     where

     <schema> is the name of your CAMO database schema.

     <table> is the name of the table that contains the BLOB or CLOB data.

     <column> is the name of the column that contains the BLOB or CLOB data.

     <function> is blob_to_empty for columns containing BLOB data, or clob_to_empty for columns containing CLOB data.

- Execute the following SQL statement in your database to create REMAP_DATA parameters automatically for all BLOB and CLOB columns. You can then copy the result into your parameter file, and delete the REMAP_DATA parameters for BLOB and CLOB columns you do not want to exclude.

```
SELECT
   'REMAP_DATA=' || LOWER(USER) || '.' ||
   LOWER(table_name) || '.' ||
   LOWER(column_name) ||':' ||
   LOWER(USER) || '.utl_remap_pkg.' ||
   LOWER(data_type) || '_to_empty'
FROM user_tab_columns
WHERE data_type in ('BLOB', 'CLOB')
AND table_name in (SELECT table_name FROM user_tables)
ORDER BY table_name, column_name;
```

3. In a text editor, open the **<database_install>\install\datapump.properties** file.
4. Set the value of the **oracle.data.pump.parfile** property to be the name of the parameter file , and save the file.
5. Export the database.
6. When the export is completed, open the **<database_install>\install\datapump.properties** file, and delete the value of the **oracle.data.pump.parfile** property, and save the file.

> **CAUTION** If you omit to reset the value of the **oracle.data.pump.parfile** property, running any data pump script, including exports and imports, will exclude the BLOB and CLOB data identified in the parameter file (.par file).

Related tasks

Export the CAMO database

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Upgrading the database schema

When upgrading CAMO from an earlier release, you must upgrade the existing CAMO database schema. Upgrading the schema does the following:

- Updates the CAMO database structure.
- Updates the database's basic level-0 data, which CAMO requires to work properly.
- Updates or moves some of your existing data due to structure and logic changes in the new release.

You can update the database and the server at the same time using the update installer, or you can update the database separately using migration scripts.

Note Some service packs and updates require you to manually add additional grants and privileges. Consult the Release Notes and Pre-Check Guide.

Updating the CAMO database using migration scripts

IFS provides a database upgrade script with each CAMO release, service pack, and update.

CAMO can be upgraded directly to a newer version if you are using 7.2-SP4 or later.

If you are upgrading from a release earlier than CAMO 7.2-SP4, you must first upgrade from your current release to 7.2-SP4 or later, and then upgrade to this CAMO version. Consult your IFS representative for assistance.

You can run upgrade scripts on client computers, but if you do this, ensure that you use a low latency, stable connection.

Note Running the desired version of the database files installer will extract the database upgrade scripts.

Required Oracle privileges for the SYSTEM user

To install the CAMO database schema successfully, the Oracle SYS user must grant some privileges to the SYSTEM user, and grant these privileges with the GRANT option, so that the SYSTEM user can grant the same privileges to the CAMO user.

The following is the command syntax to use by the SYS user to grant the required privileges to the SYSTEM user:

```
GRANT EXECUTE ON DBMS_LOCK TO SYSTEM WITH GRANT OPTION;
```

```
GRANT EXECUTE ON DBMS_SCHEDULER TO SYSTEM WITH GRANT OPTION;
```

```
GRANT SELECT ON sys.dba_pending_transactions TO SYSTEM WITH GRANT
 OPTION;
```

```
GRANT SELECT ON sys.pending_trans$ TO SYSTEM WITH GRANT OPTION;
```

```
GRANT SELECT ON sys.dba_2pc_pending TO SYSTEM WITH GRANT OPTION;
```

```
GRANT EXECUTE ON sys.dbms_xa TO SYSTEM WITH GRANT OPTION;
```

Improving the performance of the upgrade process

This section describes optional properties you can set to speed up the schema upgrade process. The results of using these properties can vary for each environment; therefore, it is advisable to test the properties to evaluate their effectiveness in your environment. By default, the properties are not used. To enable and configure the properties, open the `<database_install>/install/build.properties` file, and look for headings that begin with Upgrade Performance.

Oracle parallel execution usage option

Properties name:

- upgrade.enable.parallel.ddl

- upgrade.enable.parallel.query
- upgrade.enable.parallel.dml
- upgrade.parallel.degree.limit
- upgrade.parallel.min.time.threshold

Description

If your CAMO database is on Oracle Enterprise Edition, you can use the SQL parallel execution feature of Oracle to improve the performance of the database upgrade. You can use parallel execution for any or all of the following operations during the upgrade:

- Data Manipulation Language (DML) statements
- Data Dictionary Language (DDL) statements
- Queries

Although Oracle Standard Edition does not provide parallel execution, enabling parallel execution for DML statements can still improve the overall performance of the upgrade; this is because the triggers and constraints in the most time-consuming DML statements are disabled prior to running the statements, which can make them run faster even if they run serially. See the description of the upgrade.enable.parallel.dml property in the following table.

The parallel execution properties in build.properties are described in the following table.

Property Name	Description and value to set
upgrade.enable.parallel.ddl	Set to true to use parallel execution for DDL statements. Default value: false. When set to true, the following is performed at the start of the upgrade process: ALTER SESSION ENABLE PARALLEL DDL.
upgrade.enable.parallel.query	Set to true to use parallel execution for SQL queries. Default value: false. When set to true, the following is performed at the start of the upgrade process: ALTER SESSION ENABLE PARALLEL QUERY.

Property Name	Description and value to set
upgrade.enable.parallel.dml	Set to true to use parallel execution for DML statements. Default value: false. When set to true, parallel execution is applied only to the DML operations that consume most time during the upgrade process, and the following actions are performed before the targeted DML statements: • COMMIT • ALTER SESSION ENABLE PARALLEL DML • disable all triggers, check constraints, and foreign key constraints on the table • disable all foreign key constraints that reference the table Also, when set to true, the following actions are performed after targeted DML statements: • enable all triggers, check constraints, and foreign key constraints on the table • enable all foreign key constraints that reference the table • COMMIT • ALTER SESSION DISABLE PARALLEL DML
upgrade.parallel.degree.limit	The maximum degree of parallelism to use during the upgrade to ensure that parallel server processes do not flood the system. Supported values are the following CPU, IO, or an integer. This is used to set the value of the Oracle setting PARALLEL_DEGREE_LIMIT for the upgrade session. Consult the Oracle documentation for more information.
upgrade.parallel.min.time.threshold	The minimum execution time a statement requires for the statement to be considered for automatic degree of parallelism. Supported values are the following: AUTO or an integer representing the number of seconds. This is used to set the value of the Oracle setting PARALLEL_MIN_TIME_THRESHOLD for the upgrade session. Consult the Oracle documentation for more information.

If any of the first three properties listed in this table is set to true, meaning that you enabled parallel execution for at least one type of operation, the following is done at the beginning of the upgrade process:

ALTER SESSION SET PARALLEL_DEGREE_POLICY = AUTO

ALTER SESSION SET PARALLEL_DEGREE_LIMIT = <upgrade.parallel.degree.limit>

ALTER SESSION SET PARALLEL_MIN_TIME_THRESHOLD = <upgrade.parallel.min.time.threshold>

Before upgrading

Running the database upgrade with parallel execution sets the Oracle setting PARALLEL_DEGREE_POLICY to AUTO; this setting requires I/O calibration statistics in order to work. Therefore, before running the upgrade process with parallel execution, you must gather IO calibration statistics. For more information, consult the Oracle documentation.

Defer dropping unused table columns option

Property name: upgrade.defer.column.drop

Description

Prevents the upgrade process from dropping table columns that are no longer used in the new release of the database. By default, this property is set to false. This means that the default upgrade process drops the table columns that are no longer needed in the upgraded schema. This generates undo and redo logs.

Setting this property to true replaces the SQL statements that drop the table columns with others that set the columns as unused. This avoids the creation of undo and redo logs for those unused columns during the upgrade, which can significantly increase the performance of the upgrade process.

After upgrading

If you set this property to true, it is recommended you clean up the database manually after the upgrade is completed, to remove the columns that are no longer used. You can log on to the database as the CAMO user and query the USER_UNUSED_COL_TABS view to see all tables that contain columns that are no longer used in the upgraded schema.

To remove unused columns from a table, you can use SQL statements similar to the following example:

```
ALTER TABLE sched_stask DROP UNUSED COLUMNS CHECKPOINT 250;
```

For more information about the statement and its syntax, see the *Oracle documentation* (https://docs.oracle.com/en/database/oracle/oracle-database/19/admin/managing-tables.html#GUID-1AB2E206-EC3E-45CF-93F6-07C6C070FD5F)

Disable redo logging option

Property name: upgrade.disable.redo.logging

Description

Disables the redo logging during the upgrade. By default, this property is set to false. This means that at the beginning and during the upgrade process, all tables and indices are set to LOGGING, and that redo logs are created for all changes.

Setting this property to true has the following effects:

- At the beginning of the upgrade, all tables and indices are set to NOLOGGING.
- During the upgrade all tables and indices created are created with the NOLOGGING clause.
- At the end of the upgrade, all tables and indices that were set to NOLOGGING are set to LOGGING.

CAUTION Disabling redo logging renders the database unrecoverable if you do no back up the database prior to and after the upgrade.

Before and after upgrading

If your CAMO database or tablespace is in FORCE LOGGING mode, you must change it to NO FORCE LOGGING mode prior to upgrading the database with redo logging disabled. Also, because disabling redo logging makes the database unrecoverable, you must do a full export of your CAMO database before upgrading the schema, and after upgrading.

Configure the build.properties file

You can define database connection parameters in `build.properties` so that subsequent scripts can connect and configure the database.

About this task

Note For organizations who want to avoid writing plaintext passwords in `build.properties`, you can set properties with environment variables.

Steps

1. Verify that you have write access for the files in the <database_install> folder (the files are not read-only).
2. In a text editor, open the build.properties file that is located in the <database_install>/install folder.
3. Set the values of the properties listed below with information relevant to your organization:
   - **oracle.connect.host**=<Host name for the database>
   - **oracle.connect.service**=<Service name for the database>
   - **oracle.connect.port**=<Port number for the database>
   - **oracle.datafile.location**=<Full path of the folder where the oracle instance stores its data files>
   - **system.username**=system
   - **system.password**=<Password of the Oracle system user account>
   - **maintenix.username**=<Name to assign to the CAMO user schema>
   - **maintenix.password**=<Password for the CAMO user schema>
   - **oracle.datafile.size**=8192

     This value must be at least equal to the size of the dump file (in MB).
   - **maintenix.import.filename**=MAINTENIX.DMPX

     > **Important** The file name is case-sensitive on Linux.

   - **maintenix.import.path**=<The path of the folder on the database server, or the network location, where the MAINTENIX.DMPX file is located. The database server must be able to access this folder.>

     The type of slashes to use in file paths in this properties file depends on the operating system of the database server. If the database server runs on Windows—which uses backslashes—type double backslashes "\\" in path values in the properties file. If the database server runs on an operating system that use forward slashes "/"—such as LINUX—type single forward slashes in path values.
   - **maintenix.import.directory**=<The name of the Oracle directory object to create in the Oracle database that will contain a pointer to the location where the MAINTENIX.DMPX file is located. The name must not exceed 30 characters.>
   - **maintenix.database.id**=<Database identifier (DBID) supplied by IFS>
   - **temp.table.space**=<name of the Oracle temporary tablespace>

   Leave all other property values as they appear in the file.
4. Save the changes and close the file.
5. In the <database_install>/install directory, run datapump-create-user.bat (Windows) or datapump-create-user.sh (Linux).

Tip

Advanced users who are familiar with Oracle data pump can specify advanced configuration properties in the `datapump.properties` file, located in the `<database_install>/install` folder. See the *Oracle documentation* (https://docs.oracle.com/en/database/oracle/oracle-database/19/sutil/datapump-import-utility.html#GUID-BA74D4F6-2840-4002-A673-0A7D9CBB3D78).

Run the pre-check script

About this task

Before upgrading the schema of your CAMO database, you must identify all data in your current CAMO database that does not comply with the database rules and structure of the new CAMO release, and modify that data to avoid problems. IFS provides a pre-check script that identifies the problematic data records in your database, so that you can address them before upgrading the database schema.

Steps

1. Make sure that the information in the `build.properties` file is populated correctly.
2. Navigate to the `<database_install>/install/upgrade/pre_check` folder.
3. Run `precheck.bat` to run the pre-check script.

A report folder is generated in `<database_install>\install\upgrade\pre_check` after the pre-check script runs successfully. The report folder contains a file titled `summary.html` displaying a summary of all the pre-checks that ran.

Related tasks

Configure the build.properties file

Upgrade the CAMO database using scripts

To upgrade the CAMO database schema for versions 7.2-SP4 and newer, the CAMO user must have the required Oracle privileges.

Prerequisite

You run the pre-check script prior to upgrading.

About this task

Custom upgrade scripts might be necessary. Consult the solution designer of your CAMO system.

Steps

1. Update the properties in the `build.properties` file located in `<database_install>\install` as necessary.

   Note Optionally, set any of the upgrade performance properties to *true*, as needed. Perform the necessary steps before starting the upgrade.

2. Go to the `<database_install>\install\upgrade` folder.
3. Double-click `upgrade.bat` (Windows) or `upgrade.sh` (Linux).

   The upgrade executes in a command prompt or console window. When the operation is complete, you see the Build Successful message. Otherwise, you see the Build Failed message. If the script fails, you can see detailed information about what occurred at the failure point in `<database_install>\install\upgrade\log.xml`. The results and errors, if any, are logged in `<database_install>\install\upgrade\log\upgrade.log`.

Related concepts

Improving the performance of the upgrade process

Related tasks

Run the pre-check script

Updating the CAMO database using the Installer

The CAMO database can be updated with the application server, but depending on the existing version and the update version it may have to be updated separately.

You can install the database portion of the update at the same time as the application server update using the update installer.

The following section outline the steps to install the database update, separately from the CAMO application server update, using the installer or the migration scripts.

Note The Maintenix installers now operate with a bundled OpenJDK instead of Oracle JDK. For new Maintenix installations, the installer places an OpenJDK under the Maintenix /java directory to execute scripts and other tools. When initiating the Maintenix server, it defaults to using the Oracle JDK referenced by the WebLogic installation on the same machine. If that Oracle JDK cannot be found, Maintenix will fall back to using its bundled OpenJDK, but the OpenJDK is not certified by Oracle for use with WebLogic. When Maintenix falls back to using it's bundled OpenJDK, a system administrator should install the latest Oracle JDK certified for WebLogic and follow the steps to update the JDK used with WebLogic provided in the *WebLogic 12.2.1.4 documentation*. When properly updated, Maintenix will detect and use this Oracle JDK.

Update the CAMO database in GUI mode

About this task

To install a CAMO database update using the update installer, you must install and run the installer on the machine where you have installed the CAMO database scripts.

It is recommended that you back up your CAMO database prior to installing the update.

Steps

1. On the machine where you have installed the CAMO database files, create a folder where you will copy your CAMO update installation file set, hereafter referred to as `<Maintenix-update-download-dir>`.

   Note On Linux, ensure that the user performing the installation has read, write, and execute permissions on the `<Maintenix-database-files-dir>` and the `<Maintenix-update-download-dir>`.

2. Go to the `<Maintenix-update-download-dir>` folder.
3. Run `install.cmd` (Windows) or `install.sh` (Linux).
4. On the **Introduction** page, click **Next**.
5. On the **License Agreement** page, select **I accept the terms of the License Agreement**. Click **Next**.
6. On the **Choose Installation Location** page, type the full path to your `<Maintenix-database-files-dir>`. Click **Next**.
7. On the **Select Packages to Install** page, review the selected package and click **Next**.
8. On the **IFS Maintenix Database Information** page, provide the following information:

- Database Connection: Type the address name of the CAMO database in the format `<host>[:port]/<service>` where `<host>` is the hostname of Oracle Database Server, `[port]` (optional) is the port that the database listens on (default 1521), and `<service>` is the service name of the Oracle instance containing the CAMO database.
- Database Username: Type the user name required to connect to the CAMO database.
- Database Password: Type the password required to connect to the CAMO database.

9. Click **Next**.
10. On the **Pre-Install Summary** page, review your selections. Click **Install**.

    If any problem occurs during the installation process, you will see an error message. Consult the installation log files at `<Maintenix-database-files-dir>\logs`, `<Maintenix-install-dir>\logs`, `C:\Users\<user>\AppData\Local\Temp` (Windows only), or `/tmp` (Linux only) for more information about the problem.

Update the CAMO database in console mode

You can update the CAMO database from the console. This process is similar to installing the CAMO database.

About this task

It is recommended that you back up your CAMO database prior to installing the update.

Steps

1. On the machine where you have installed the CAMO database files, create a folder where you will copy your CAMO update installation file set, hereafter referred to as `<Maintenix-update-download-dir>`.

   Note On Linux, ensure that the Linux user performing the installation has read, write, and execute permissions on `<Maintenix-database-files-dir>` and the `<Maintenix-update-download-dir>`.

2. Go to the `<Maintenix-update-download-dir>` folder.
3. Run `console-install.cmd` (Windows) or `console-install.sh` (Linux).
4. Press **Enter** to scroll through the license agreement.
5. Type **Y** to accept the license agreement and press **Enter**.
6. When prompted, type the full path to your `<Maintenix-database-files-dir>` and press **Enter**. Confirm the install folder by typing **Y** and then pressing **Enter**.
7. When prompted, review the package to install and press **Enter**.
8. When prompted, provide the following database information:

- Database Connection: Type the address name of the CAMO database in the format `<host>[:port]/<service>` where `<host>` is the hostname of Oracle Database Server, `[port]` (optional) is the port that the database listens on (default 1521), and `<service>` is the service name of the Oracle instance containing the CAMO database.
- Database Username: Type the user name required to connect to the CAMO database.
- Database Password: Type the password required to connect to the CAMO database.

9. Press **Enter**.
10. Review your installation selections and press **Enter** to continue.
11. When installation is complete, press **Enter** to exit the installer.

Update the CAMO database in silent install mode

You can update the CAMO database by configuring and running the silent install file. This process is similar to installing the CAMO database.

About this task

It is recommended that you back up your CAMO database prior to installing the update.

If your organization's security policy prohibits writing plaintext passwords to disk, use environment variables for the password parameters.

Steps

1. Go to the `<Maintenix-update-download-dir>` folder.
2. Copy the `silent-install.properties` template file.
3. Save the file in your user home folder.

> **Tip** In Windows, the user home folder is the folder identified as the value of the USERPROFILE user. If this variable does not exist, create it and give it a value that is the folder where you will copy the CAMO installation parameters properties file. Consult the Windows Server help for details on creating variables.
>
> On Linux, the user home folder is the folder identified as the value of the HOME variable.
>
> Ensure that the user home folder has write permissions.

4. Using a text editor, open the `silent-install.properties` file.
5. Modify the installation properties as follows.

Parameter name	Value to set
#Choose Installation Location	**Important** If you specify an invalid installation drive, the installation process might stop responding. If your installation appears to not be making progress for an extended period of time, check the InstallAnywhere log files in your `temp` directory for a directory error. If the error occurred, you may need to stop the Java process, correct the path, and restart the CAMO installation.
USER_INSTALL_DIR=	The full path of the folder where you want to install CAMO.
#Customization Tasks	Not applicable
PACKAGESTORUN=CAMO Update	Do not edit this field.
#Database Connection	Not applicable
UPDATEDATABASE	**Yes** or **No** Type **No** if you want to install the database portion separately from the application cluster using migration scripts. Type **Yes** if you want to install the database portion at this time, and then set the following database parameters. **Important** If you choose **Yes**, you must have the SQL Plus client installed to proceed with the database update.
DATABASE_CONNECTION	Database Connection: Type the address name of the CAMO database in the format `<host>[:port]/<service>` where `<host>` is the hostname of Oracle Database Server, `[port]` (optional) is the port that the database listens on (default 1521), and

Parameter name	Value to set
	`<service>` is the service name of the Oracle instance containing the CAMO database.
DATABASE_USERNAME	The user name required to connect to the CAMO database.
DATABASE_PASSWORD	The password required to connect to the CAMO database.
#Jasper Report Variables	Not applicable
UPDATE_JASPER_PROPERTIES	**Yes** or **No**, depending on whether you want to configure JasperReports Server during the installation process. If **Yes**, set the following Jasper parameters.
JASPER_HOST	The host name or IP address of the computer hosting the JasperReports Server or load balancer for the JasperReports Servers in a high availability environment.
JASPER_PORT	The port number of the computer hosting the JasperReports Server or load balancer.
JASPER_USERNAME	The user name CAMO uses to log on to JasperReports Server. The default value is **superuser**.
JASPER_PASSWORD	The password for the JasperReports Server **superuser** account.
JASPER_USE_HTTPS	**Yes** or **No**, whether Jasper has HTTPS (SSL/TLS encrypted) enabled. If **Yes**, CAMO must use HTTPS when communicating with Jasper.
#Administration Credentials	Not applicable
ADMIN_USERNAME	The administration user name.
ADMIN_PASSWORD	The administration password.
#Backup Domain	Not applicable

Parameter name	Value to set
BACKUPDOMAIN	**Yes** or **No**, depending on whether you want to create a backup of the current state of the CAMO application.

Note Verify that there are no blank or trailing spaces in the `silent-install.properties` file. Properties with end-of-line blank spaces can cause the silent installation to fail.

6. Save your changes.
7. Go to the <`Maintenix-database-dir`> folder.
8. Run `silent-install.cmd` (Windows) or `silent-install.sh` (Linux).

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