

Oracle Utilities Data Intelligence

On-Premises Source Application Setup Guide



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Preface

Learn how to set up and configure an on-premises source application for Oracle Utilities Data Intelligence.

Audience and Scope

This guide is intended for administrators who must set up and configure Oracle Utilities Data Intelligence.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at <https://www.oracle.com/corporate/accessibility/>.

Conventions

The table below describes the conventions used in this document.

Text Conventions

Convention	Meaning
boldface	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.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

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Introduction

This guide describes how to install and configure Oracle GoldenGate Microservices for an Oracle Utilities on-premises source application. Oracle GoldenGate supports change data capture (CDC) and transfers source application data to Oracle Utilities Data Intelligence (OUDI) for processing, analysis, and visualization.

For ongoing data synchronization, OUDI uses Oracle GoldenGate to transfer incremental data changes from the source application database to the target Autonomous Database. Oracle GoldenGate captures committed database transactions, writes the changes to trail files, and transfers the trail files securely to the target environment. To support this process, install and configure Oracle GoldenGate Microservices and establish connectivity between the source and target environments.

In addition to incremental data synchronization, OUDI requires an initial export of source application data. The initial export process generates dump files, log files, and manifest files from the source application database. After the export completes, upload the export artifacts to the customer object storage bucket for processing in the next stage.

The following sections describe the prerequisite tasks, Oracle GoldenGate configuration tasks, initial data export procedures, and performance recommendations for integrating a source application with OUDI.

- [Prerequisites](#)
- [Configure Oracle GoldenGate Microservices](#)
- [Perform the Initial Data Export](#)
- [Performance Recommendations](#)

Assumptions

The following assumptions apply in this document:

- The utility has an Oracle Database installation that supports a source application, such as Customer to Meter (C2M), Meter Data Management (MDM), or Work and Asset Management (WAM).
- The utility has an Oracle Cloud Infrastructure (OCI) Platform as a Service (PaaS) environment or OCI Free Tier tenancy and network connectivity to the server or virtual machine that hosts Oracle GoldenGate Microservices.
- Oracle GoldenGate can connect to the source application database.

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Prerequisites

Complete the prerequisite tasks before you configure Oracle GoldenGate. Establish a secure communication channel with the Oracle Utilities Data Intelligence (OUDI) team before you exchange certificates, credentials, parameter files, and other required artifacts.

Set Up an Object Storage Bucket

Create an object storage bucket if one doesn't exist yet, and provide Oracle Utilities with access to it. See [Provide Oracle Utilities with Access to Object Storage](#).

Download Artifacts from the OUDI Team

The items below will be shared by the OUDI team in your object storage and need to be downloaded.

- Extract parameter file
- Root CA certificate for the target environment
- Operator User Credentials

Perform Networking Tasks

Provide the compartment OCID, VCN OCID, and subnet OCID for your PaaS tenancy to Oracle. The Oracle Cloud Foundation Services (CFS) team uses this information to create a private endpoint in your PaaS tenancy, and provides the private endpoint IP address and fully qualified domain name (FQDN) to you.

Once you have the private endpoint IP address and FQDN, add the required network policies to the PaaS tenancy to enable connectivity from the OUDI tenancy. Add policies similar to the following examples:

Network Policies

```
allow service <OCI_SERVICE_PRINCIPAL> to manage vnics in compartment
<Customer Compartment Name>
allow service <OCI_SERVICE_PRINCIPAL> to use subnets in compartment <Customer
Compartment Name>
allow service <OCI_SERVICE_PRINCIPAL> to use network-security-groups in
compartment <Customer Compartment Name>
allow service <OCI_SERVICE_PRINCIPAL> to inspect work-requests in compartment
<Customer Compartment Name>
```

Provide Master Key Wallet to the OUDI Team

After you complete the Oracle GoldenGate configuration, provide the master key wallet to the OUDI team.

Configure Oracle GoldenGate Microservices

Oracle GoldenGate Microservices captures and transfers transactional changes from the source application database to the target Oracle Utilities Data Intelligence (OUDI) environment. To support change data capture (CDC), install Oracle GoldenGate Microservices, configure connectivity to the source application database, and configure secure communication with the target environment. After you complete the configuration tasks in this section, Oracle GoldenGate can capture database changes and transfer trail files to the target environment for processing.

In this section:

- [Install Oracle GoldenGate Microservices](#)
- [Configure Oracle GoldenGate Deployments](#)

Install Oracle GoldenGate Microservices

Complete the tasks in this section to install Oracle GoldenGate Microservices and prepare the source application environment for change data capture (CDC). These tasks establish database connectivity, configure secure communication, and prepare Oracle GoldenGate for data replication to the target OUDI environment.

Review Operating System Requirements

Before you install Oracle GoldenGate Microservices, review the [hardware and software requirements](#) in the Oracle GoldenGate documentation.

Install GoldenGate Microservices

Install Oracle GoldenGate Microservices according to the steps in the documentation. For more information, see [Installing Oracle GoldenGate](#) and [Performing an Interactive Installation with OUI for MA](#).

Prepare the Source Database for Oracle GoldenGate

Prepare the source application database before you configure Oracle GoldenGate. Complete the [database configuration tasks](#) described in the GoldenGate documentation.

Configure the Root CA Certificate

Configure the root CA certificate that Oracle GoldenGate uses to establish secure communication with the target environment. For more information, see the GoldenGate certificate [configuration documentation](#).

Configure Oracle GoldenGate Deployments

After you install Oracle GoldenGate Microservices, configure the deployment to connect to the source application database and communicate with the target environment. The tasks in this section create the required credentials, configure change data capture, create extract processes, and configure trail file distribution.

Create Database Credentials

Create credentials that Oracle GoldenGate uses to connect to the source application database. For more information, see [Add Database Credentials to Connect to the Source Database](#).

Use the following recommended values when you create the database credentials.

Credential Setting	Recommended Values
Credential Domain	OUDI_GG_SRC
Credential Alias	OUDI_SRC_C2M
User ID	C##GGADMIN@db_hostname:1521/CDB_NAME
Password	<Database PASSWORD for C##GGADMIN>
Verify Password	<Database PASSWORD for C##GGADMIN>

Create Database Operator Credentials

Create operator credentials that Oracle GoldenGate uses to connect to the target Oracle GoldenGate environment. For more information, see [Credential Store Tasks](#).

Use the following recommended values when you create the operator credentials.

Credential Setting	Recommended Values
Credential Domain	OUDI_GG_CONN
Credential Alias	OUDI_GG_OPT
User ID	<TARGET OPERATOR USER>
Password	<TARGET OPERATOR USER PASSWORD>
Verify Password	<TARGET OPERATOR USER PASSWORD>

Add TRANDATA Information

Add TRANDATA information so that Oracle GoldenGate can capture CDC information from the source application database. For more information, see [Add TRANDATA, Heartbeat, and Checkpoint Tables](#).

Use the following values:

- **Table name:** CISADM
- **Scheduling columns:** No
- **All columns:** No
- **Prepare CSN mode:** None

If the **Add TRANDATA Information in the Background?** option is available, ensure that the option is set to **Off**.

Create an Extract Process

Create an extract process using the parameter file received from OUDI team. Use the Oracle GoldenGate documentation for detailed extract creation procedures.

To get started, see [Step 3: Add an Extract](#).

Use the following naming conventions when you create Oracle GoldenGate connection aliases, extract processes, trail files, and trail subdirectories for each source application.

Source Application	Connection Alias	Extract Process	Trail Name	Trail Alias
Customer Cloud Service (CCS)	EW_SRC_CCS_1 EW_SRC_CCS_*	CCS_EX1A CCS_EX2A CCS_EX**	CA CB C*	CCS_1 CCS_*
Customer Care and Billing Cloud Service (CCBCS)	EW_SRC_CCBCS_1 EW_SRC_CCBCS_*	CCB_EX1A CCBC_EX**	BA BB B*	CCBCS_1 CCBCS_*
Digital Assets Cloud Service (DACs)	EW_SRC_WACS_1 EW_SRC_WACS_*	DAC_EX1A DAC_EX2A DAC_EX**	DA DB D*	DACS_1 DACS_*

Source Application	Connection Alias	Extract Process	Trail Name	Trail File Configuration
Meter Solution Cloud Service (MSCS)	EW_SRC_MSCS_1 EW_SRC_MSCS_*	MSC_EX1A MSC_EX**	MA MB M*	MSCS1 MSCS*
Work and Asset Cloud Service (WACS)	EW_SRC_WACS_1 EW_SRC_WACS_*	WAC_EX1A WAC_EX2A WAC_EX**	WA WB W*	WACS1 WACS*

Required Extract Process Settings

Use the following settings when you create an extract process. These settings define the extract process configuration, database connectivity, trail file configuration, and restart behavior.

Category	Setting	Value
General	Process Name	<NAME UNDER 8 CHARS>
General	Description	<Description of the extract process>
General	Intent	High Availability
General	Begin	Now
Trail Configuration	Trail Name	Use the value defined in the naming conventions table.

Category	Setting	Value
Credentials	Credential Domain	<Database credential domain created in the 'Create Database Credentials' step>
Credentials	Credential Alias	<Database credential alias created in the 'Create Database Credentials' step>
Exadata Configuration	Register to PDBs	(For Exadata and on-premises only) If the source environment uses Exadata, select the PDB name Register to PDBs: that appears after you select the database credentials.
Managed Options	Profile Name	Custom
Auto Restart	Max retries	9
Auto Restart	Retry delay	2 minutes
Auto Restart	Retries window	5 minutes
Auto Restart	Restart on failure only	Selected

Update the Extract Parameter File

After you create the extract process, update the extract parameter file with the OUDI-specific configuration.

1. Open the extract parameter file.
2. Add the following parameter immediately before the EXTTRAIL parameter:

```
ENCRYPTTRAIL AES256
```

3. Open the EXTRACT_PARAMETER.prm file provided by the OUDI team.
4. Copy the contents of the OUDI parameter file into the extract parameter file.
5. If the source database uses a pluggable database (PDB), update the SOURCECATALOG parameter to specify the source PDB name. Example:

```
SOURCECATALOG <PDB_NAME>
```

6. Save the parameter file.
7. Click on **Create and Run** to create and start the extract.

Example Extract Parameter File

```
EXTRACT CCS_EX1A

USERIDALIAS EW_SRC_CCS_1 DOMAIN EW_GG_SRC

ENCRYPTTRAIL AES256 <--- ADD this parameter to encrypt the trail

EXTTRAIL CCS1/CA
<CONTENT of PARAMETER FILE>
```

Configure Distribution Paths

Configure a distribution path to transfer trail files securely from the source environment to the target environment. For more information, see [Add a Distribution Path](#).

Use the following settings when you create a distribution path. These settings define source and target connectivity, authentication, trail file configuration, encryption, and restart behavior.

Setting	Value
Reverse proxy enabled	Cleared
Source	Select the extract process and specify the trail name.
Target authentication method	UserID Alias
Target	Enter the target connection details.
Protocol	WSS
Target host	<Private Endpoint FQDN>
Target port	443
Trail subdirectory	Leave blank
Trail name	Use the same value as the extract trail.
Credential domain	OU DI_GG_CONN
Credential alias	OU DI_GG_OPT
Target encryption algorithm	AES256
Configure trail format	Leave blank.
Enable network compression	Leave blank.
Trail size (MB)	500 MB
Begin	Position in Log
Source sequence number	0
Source RBA offset	0
Auto restart	On
Critical	Off
Retry count	10
Retry delay	2 minutes

After you configure the distribution path settings, create the distribution path and start the path.

Create a Master key

Create a master key to encrypt Oracle GoldenGate trail files and credential information.

For more information, see the Oracle GoldenGate documentation:

- [Specifying Encryption Parameters in the Parameter File](#)
- Using the UI: [Add a master key in the deployment console](#)

After you create the master key wallet, upload the wallet file to object storage.

Example wallet location:

```
/<DEPLOYMENT_FOLDER>/var/lib/wallet/cwallet.sso
```

Monitor Oracle GoldenGate

Monitor Oracle GoldenGate extract processes and distribution paths continuously. Ensure that the processes remain operational and process data without interruption.

Oracle GoldenGate extract processes depend on archived redo logs to capture historical transactions. Archive log retention affects how far back an extract process can recover after an outage. If archive logs are removed before an extract process restarts, Oracle GoldenGate might not be able to recover all missed transactions.

For example, if archive logs are retained for 7 days, an extract process must restart within that 7-day period to recover missed transactions. Transactions older than the archive log retention period might not be available for recovery.

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Perform the Initial Data Export

This section describes the manual process for performing the initial export of database dump files from an Oracle Database environment. This procedure is designed for enterprise users managing data extraction in Oracle Database setups, particularly for integration with Oracle Utilities Data Intelligence systems supporting applications like Customer to Meter (C2M), Water Advanced Metering Infrastructure (AMI), or Distribution Automation Management (DAM). The export leverages Oracle Data Pump to generate prioritized dump files (.dmp), associated log files (.log), and JSON manifest files (.json) that catalog the exported content.

To improve export performance and reduce the effect on production systems, the export process organizes tables into priority groups. Each group represents a logical chunk of tables (for example, core schema objects first), allowing administrators to export critical data incrementally. Each priority group is exported separately and uploaded to Oracle Cloud Infrastructure (OCI) object storage together with the associated log files and manifest files.

This manual method ensures idempotency where applicable—such as checking for existing objects before creation—and includes robust error handling to maintain data integrity. It is suitable for one-time initial loads or migrations but can be adapted for recurring backups with automation tools.

In this section:

- [Initial Data Export Prerequisites](#)
- [Export the Database Objects](#)

Initial Data Export Prerequisites

Before performing the initial data export, verify the following requirements to avoid interruptions:

Database and Privileges

Verify the following prerequisites before you begin the export process.

- **Connection:** Access to the source PDB through SQL*Plus, SQL Developer, or SQLcl. Use a service name for the PDB (such as `sqlplus username/password@PDB_SERVICE`).
- **User Privileges:** Log in with a user granted EXP_FULL_DATABASE role (such as a dedicated export user like CISADM). Additional privileges needed:
 - CREATE TABLE for temporary metadata tables.
 - READ and WRITE on the export directory (e.g., DATA_PUMP_DIR).
 - QUERY_REWRITE and SELECT_CATALOG_ROLE for metadata queries.
- **Database Version:** Oracle Database 19c or higher, with Data Pump (expdp/impdp) enabled.
- **Space Allocation:** At least 1.5 times the size of the largest export group in the DATA_PUMP_DIR filesystem. Monitor via V\$DATAFILE and DBA_FREE_SPACE.

Required Files

- **Scripts:** Download from OCI object storage:
 - `EXPORT_TABLE_LIST_GENERATION.sql`: Generates the table export list.
 - `EXADATA_PDB_EXPORT_SCRIPT.sql`: Performs the Data Pump export.
 - `MANIFEST_FILE_GENERATION.sql`: Creates JSON manifests.
- **Configuration Files:** Priority CSV files from ArtifactHub (uploaded by OUDI Team). These files define export groups (such as Priority 100: Critical tables; Priority 10: Auxiliary data). Customize as needed and notify DevOps for pipeline synchronization.
 - `priority_config_ccs.csv` (for CCS/C2M sources)
 - `priority_config_wacs.csv` (for WACS/WAM sources)
 - `priority_config_dacs.csv` (for DACS/DAM sources)

Export the Database Objects

Follow these steps sequentially to export the database objects. Each includes rationale, commands, and verification.

Step 1: Create the Export Metadata Table

Create a temporary table to store module names (such as schemas or table groups) and their priorities.

1. Connect to the source database.

```
sqlplus <username>/<password>@<DB_SERVICE>
```

2. Create the export metadata table.

```
sql CREATE TABLE A1_M0_TO_EXPORT ( M0_NAME VARCHAR2(100), PRIORITY  
NUMBER );
```

Step 2: Load Priority Configuration

Populate the table with data from the system-specific CSV.

1. Select the priority configuration file for the source application.

Source Application	Configuration File
CCS or C2M	<code>priority_config_ccs.csv</code>
WACS or WAM	<code>priority_config_wacs.csv</code>
DACS or DAM	<code>priority_config_dacs.csv</code>

2. Import the configuration data into the `A1_M0_TO_EXPORT` table by using one of the following methods:

- **SQL Developer (GUI)**
 - a. Connect to the source database.

- b. From the database navigator, select the A1_M0_T0_EXPORT table.
- c. Import the selected CSV file.
- d. Map the CSV columns as follows:

CSV Column	Database Column
Column 1	MO_NAME
Column 2	PRIORITY

- **SQL*Loader**

- a. Create a control file named load.ctl.

```
LOAD DATA
  INFILE 'priority_config_ccs.csv'
  INTO TABLE A1_M0_T0_EXPORT
  FIELDS TERMINATED BY ','
  OPTIONALLY ENCLOSED BY '"'
  (
    MO_NAME CHAR(100),
    PRIORITY INTEGER
  )
```

- b. Run the SQL*Loader command.

```
sqlldr <username>/<password>@<DB_SERVICE> control=load.ctl
log=load.log
```

Step 3: Generate the Detailed Export Table List

Use the provided script to expand priorities into a detailed table list.

1. Download the EXPORT_TABLE_LIST_GENERATION.sql script.
2. Run the script in SQL*Plus.

```
sql -- Paste script content here
```

The script queries the A1_M0_T0_EXPORT table and populates the A1_TABLES_T0_EXPORT table.

Step 4: Execute Export for a Single Priority Group

Run the Data Pump export for one priority group (for example, Priority 100).

1. Download EXADATA_PDB_EXPORT_SCRIPT.sql.
2. Update the sample parameters for your schema, export directory, priority, parallel degree, and file name.

```
l_schema_name      VARCHAR2(500) :=
'CISADM';          -- Target schema
l_dir_name          VARCHAR2(500) :=
'DATA_PUMP_DIR';  -- Export directory
```

```

        l_priority          NUMBER :=
100;                                -- Group priority
        l_parallel_degree   NUMBER :=
16;                                -- Parallel workers
    (adjust based on CPU)
        l_file_name         VARCHAR2(500) :=
'A1_CCS1_DATA_DUMP_20250509';      -- Prefix with date

```

3. Run the script in SQL*Plus.

Step 5: Monitor the Data Pump Job

Monitor the Data Pump job to verify that the export completes successfully by running the following SQL query:

```

SELECT *
FROM DBA_DATAPUMP_JOBS
WHERE JOB_NAME LIKE '%_EXPORT_SAAS_%'
ORDER BY STATE;

```

Review the STATE column to determine the job status. Possible values include:

- DEFINING
- EXECUTING
- COMPLETING
- COMPLETED

The export completes successfully when the job state is COMPLETED.

Step 6: Generate the Manifest File

Generate a manifest file after the export completes. The manifest file records metadata about the exported objects and supports downstream import processing.

1. Download MANIFEST_FILE_GENERATION.sql.
2. Update the script parameters. Example:

Sample parameters

```

        l_schema_name       VARCHAR2(500) :=
'CISADM';                    -- Target schema
        l_priority          NUMBER :=
100;                        -- Group priority
        .....
        l_source_context     VARCHAR2(20) :=
'CCS1';                      -- Source for exporting

```

3. Run the script.

The script generates a JSON manifest file for the selected priority group.

Example JSON output:

```
{
  "export": {
    "schema": "CISADM",
    "priority": 100,
    "tables": [
      {
        "name": "TABLE1",
        "rows": 10000,
        "size_mb": 50
      }
    ],
    "checksum": "SHA256:abc123..."
  }
}
```

Step 7: Upload Artifacts to Object Storage

Upload the exported files to object storage in the following order after the export and manifest generation processes complete.

1. Upload the dump files. Example:

Bash

```
oci os object put \
  --bucket-name <bucket> \
  --file <local_dmp_path> \
  --name <remote_dmp_name>
```

2. Upload the log files. Example:

Bash

```
oci os object put \
  --bucket-name <bucket> \
  --file <local_log_path> \
  --name <remote_log_name>
```

3. Upload the manifest file. Example:

Bash

```
oci os object put \
  --bucket-name <bucket> \
  --file <local_json_path> \
  --name <remote_manifest.json>
```

Upload the manifest file last so that downstream processes access the manifest only after all associated export files are available.

Step 8: Repeat for Remaining Groups

Repeat steps 4 through 7 for each remaining priority group (for example, 100, 90, 80, and so on).

1. Update the `l_priority` parameter in the export script.
2. Use a unique value for the `l_file_name` parameter (for example, append priority).
3. Run the export process, generate the manifest file, and upload the export files and manifest file to object storage.

Monitor object storage capacity throughout the export process.

Step 9: Remove Temporary Export Objects

Remove temporary objects after all exports have been uploaded successfully. This frees up space and maintains security.

1. Remove the temporary export tables.

```
DROP TABLE A1_M0_TO_EXPORT PURGE;  
  
DROP TABLE A1_TABLES_TO_EXPORT PURGE;
```

2. Identify any remaining Data Pump jobs.

```
SELECT JOB_NAME  
FROM DBA_DATAPUMP_JOBS  
WHERE JOB_NAME LIKE '%_EXPORT_SAAS_%';
```

If completed Data Pump jobs remain, detach from the jobs and remove any associated job tables according to your organization's Data Pump cleanup procedures. Example:

```
-- For each job returned by the query:  
  
DBMS_DATAPUMP.DETACH(job_name);  
  
DROP TABLE <job_table>;
```

3. **(Optional)** Remove the temporary Data Pump directory if you created one for the export process.

```
BEGIN  
    DBMS_DATAPUMP.DROP_DIRECTORY('DATA_PUMP_DIR');  
END;  
/
```

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Performance Recommendations

Use the following recommendations to optimize export performance and maintain reliable Oracle GoldenGate operations.

- Set `parallel_degree` to a value between 4 and 32 based on available CPU resources.
- Use the `ESTIMATE_ONLY` parameter to estimate export size before running the export.
- Monitor export jobs through Oracle Enterprise Manager to track progress and resource usage.
- Monitor available space in the Data Pump directory and object storage throughout the export process.

After you complete the tasks in this guide, verify that Oracle GoldenGate extract processes, distribution paths, and initial export artifacts are operating as expected. Continue to monitor performance, archive log retention, and object storage uploads to support reliable data delivery to Oracle Utilities Data Intelligence (OUDI).