Oracle® Cloud

Migrating to Oracle Cloud Infrastructure GoldenGate

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Preface

Using Oracle Cloud Infrastructure GoldenGate describes how to provision, manage, and use OCI GoldenGate deployments and database registrations for data replication.

Audience

This document is intended for database administrators who want to replicate data in the cloud using GoldenGate.

Related Resources

- Get started with Oracle Cloud Infrastructure.
- Get started with Oracle Cloud Infrastructure GoldenGate.

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	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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About Migrating to Oracle Cloud Infrastructure GoldenGate

Oracle Cloud Infrastructure GoldenGate is a cloud native service built entirely on Oracle's 2nd generation cloud platform, Oracle Cloud Infrastructure. It offers you the best-in-class data replication capabilities of Oracle GoldenGate in a secure and robust cloud environment. Use this guide to move your Oracle GoldenGate Classic and Microservices instances to OCI GoldenGate, which currently reside in any of the following:

- Oracle GoldenGate Cloud Classic (1st Generation)
- Oracle Data Integration Platform Cloud
- GoldenGate for Marketplace
- On premise Oracle GoldenGate

Migrating to OCI GoldenGate offers you several advantages. Oracle Cloud Infrastructure is developed using the latest cloud technologies and standards. It provides consistent performance, better features at lower cost, and above all, *security*. Oracle continues to invest in and evolve Oracle Cloud Infrastructure, by regularly adding new regions, services, and features. OCI GoldenGate is a fully managed, cloud native service that provides scaling and elasticity per workload, enabling you to pay per compute unit consumed.

Migrate your instances to Oracle Cloud Infrastructure and benefit from the following administrative features:

- Organize cloud resources into a hierarchy of logical compartments
- Create fine grained access policies for each compartment

Learn more:

- Replicate and Transform Data | Oracle GoldenGate
- Cloud Regions - Infrastructure and Platform Services availability

About Oracle Cloud Infrastructure

Familiarize yourself with basic OCI concepts and how they differ from their equivalent *Oracle Cloud Infrastructure Classic* concepts.

compartments
Enable you to organize and control access to cloud resources. A compartment is a logical group of related resources, such as instances, virtual cloud networks (VCNs), and block volumes, that can only be accessed by certain groups of users who were granted appropriate permissions by an administrator.

regions and availability domains
Oracle Cloud Infrastructure is *physically* hosted in regions and availability domains. A region is a localized geographic area, and an availability domain is one or more data centers located within a region. A region is composed of one or more availability domains. Oracle

Cloud Infrastructure resources are either region-specific, such as a virtual cloud network, or availability domain-specific, such as a compute instance. *Oracle Cloud Infrastructure Classic* doesn't use availability domains.

virtual cloud networks and subnets

A virtual cloud network (VCN) comprises of one or more subnets. You can configure the cloud network with an optional internet gateway to handle public traffic, and an optional IPSec connection or FastConnect to securely extend your on-premises network.

In *Oracle Cloud Infrastructure Classic*, you assign instances to IP networks or the shared network. Typically, you create one subnet for the shared network, and create a separate subnet for each IP network in *Oracle Cloud Infrastructure Classic*. Unlike *Oracle Cloud Infrastructure Classic*, Oracle Cloud Infrastructure doesn't allow you to reserve IP addresses for platform services.

A subnet's security lists permit and block traffic to and from specific IP addresses and ports. In *Oracle Cloud Infrastructure Classic*, an instance's access rules provide similar capabilities, although security lists are configured at the subnet level.

FastConnect

Instances can communicate with resources outside of Oracle Cloud by using Oracle Cloud Infrastructure FastConnect, which provides a fast, dedicated connection to your on premise network. This service is equivalent to Oracle Cloud Infrastructure FastConnect Classic. Alternatively, use IPSec VPN in Oracle Cloud Infrastructure as a replacement for VPN as a Service (VPNaaS) or Corente in *Oracle Cloud Infrastructure Classic*.

bucket

A bucket in Oracle Cloud Infrastructure Object Storage can be used to store files and share them with multiple instances. A user's generated authentication token (auth token) is required to access the bucket. Oracle Cloud Infrastructure Object Storage Classic provides the same service in Oracle Cloud Infrastructure Classic, but does not use auth tokens.

To learn more about each of these concepts, see Key Concepts and Terminology.

OCI Users and Groups

Oracle Cloud Infrastructure uses Identity and Access Management (IAM) to manage users, groups, and policies.

A user's permissions to access Oracle Cloud Infrastructure services come from the *groups* to which they belong. The permissions for a group are defined by *policies*. Policies define what actions members of a group can perform, and in which compartments. Users can then access services and perform operations based on the policies set for the groups they are members of. For example, the following policy grants members of `MyGroup` all privileges to all resources in `MyCompartment`:

```
allow group MyGroup to manage all-resources in compartment
MyCompartment
```

By default, this system is also configured to use Oracle Identity Cloud Service (IDCS) as a federated identity provider. Therefore, when you define policies in Oracle Cloud Infrastructure, you can reuse existing users and groups in Oracle Identity Cloud Service. You can either add users to a new group in Oracle Cloud Infrastructure, or

map an existing Oracle Identity Cloud Service group to an Oracle Cloud Infrastructure group.

While policies control access to services in Oracle Cloud Infrastructure, administrator roles control access to platform services that are found only on the My Services Dashboard of *Oracle Cloud Infrastructure Classic*. Assign Oracle Identity Cloud Service users and groups to administrator roles in order to grant them access to services that are not found in Oracle Cloud Infrastructure.

Learn more:

- How Policies Work
- Common Policies
- Federating with Oracle Identity Cloud Service
- Add a User with Oracle Cloud Administrator Permissions

Migration Scope

You can use this guide to help you migrate your Oracle GoldenGate Classic and Microservices instances for Oracle Database to OCI GoldenGate.

The steps in this guide are verified for Oracle GoldenGate Classic and Microservices architectures for Oracle Database only. The following are **not** within the scope of this guide:

- Heterogeneous Oracle GoldenGate migration
- Initial load Extracts and Replicats
- Oracle GoldenGate Cloud Control functionalities

If you're using Oracle Database Classic Cloud Service, it's recommended that you migrate your Oracle Database Classic Cloud Service to Oracle Database on Oracle Cloud Infrastructure. For steps on how to migrate Oracle Database Classic Cloud Service to Oracle Database on Oracle Cloud Infrastructure, see Select a Method to Migrate Database Instances.

Migration Task Flow

The migration path involves moving Oracle GoldenGate instances to OCI GoldenGate deployments. The migration won't change your current Oracle GoldenGate instance configurations and you can run and manage replications in Oracle GoldenGate after the migration completes.

Here's a high-level overview of the migration tasks to complete:

1. If you haven't done so already, create an Oracle Cloud Infrastructure account, and then create the required resources and policies for OCI GoldenGate.
2. Create the OCI GoldenGate deployment and register databases.
3. Migrate your Oracle GoldenGate Extracts.
4. Migrate your Oracle GoldenGate Extract Pumps.
5. Migrate your Oracle GoldenGate Replicats.
6. Start the new Replicats in the OCI GoldenGate Deployment Console.
7. Ensure that the new Replicat processes are running smoothly and that there are no duplicates in the target database.

8. Clean up and delete all the Oracle GoldenGate instance Extracts and Replicats.

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Preparing to Migrate to OCI GoldenGate

Before you start migrating to OCI GoldenGate, ensure that you consider downtime requirements of your current environment and carefully plan and create what you need for OCI GoldenGate.

Downtime Requirements

This migration process minimally impacts the availability of your current Oracle GoldenGate instance in Oracle Cloud Infrastructure Classic, Marketplace, or on premise. Your current, to-be-migrated Oracle GoldenGate instance's processes will be stopped per migration workflow. When the migration completes, the replication process resumes from where it was stopped. The production database must not have running active transactions to ensure the migration completes smoothly.

Your current Oracle GoldenGate instance's files, such as configuration files, report files, and trail files, are not impacted by the migration.

After the migration completes successfully, clients can be rerouted to OCI GoldenGate.

Network Considerations

OCI GoldenGate is a fully managed cloud service, which means you have no direct access to the underlying operating system resources. Therefore, you're not able to transfer data directly to OCI GoldenGate by copying data directly on to the disk mounts.

When migrating an Oracle GoldenGate instance that's part of the Data Integration Platform Cloud (DIPC) Agent, consider the network performance implications beforehand.

The following information applies to all platforms supported by Oracle GoldenGate for Oracle-to-Oracle replication. The network requirements for Oracle GoldenGate are as follows:

- **Extract**: If running Oracle GoldenGate remotely on a server separate from the database you're capturing from, then performance may be impacted if latency is greater than 80 milliseconds (ms). For Integrated Extract, only the changes to the tables that are being captured are sent to the Extract process itself.

- **Replicat**: If running Oracle GoldenGate remotely on a server separate from the database Oracle GoldenGate applies changes to, then performance may be impacted if the latency is greater than 5ms.

- **For Oracle GoldenGate to Oracle GoldenGate communication**: If you're capturing 100% of the data, then the trail files grow at 30-40% of the generated redo log volume. This means that Oracle GoldenGate sends 30-40% of the generated redo log volume across the network. If the network isn't able to scale to this volume, you can enable compression on the trail file data sent across the network. This compression can typically achieve 8:1 compression ratio or better. You can also modify the TCP window socket size and buffers as well.

Creating Required OCI Resources

Before you migrate to OCI GoldenGate, you must create the required OCI resources:

- Compartments
- VCNs and Subnets
- Users and Groups
- Policies

For more information, see Getting Started with GoldenGate.

Selecting Deployment Shapes

Before you can migrate to OCI GoldenGate, ensure that you set up your OCI GoldenGate resources. When you create an OCI GoldenGate deployment, you're asked to select the number of Oracle Compute Units (OCPUs) the deployment needs.

To idenfity the number of compute shapes for OCI GoldenGate, consider providing similar or higher resources to the shapes you're currently using for your Oracle GoldenGate Cloud Classic or Oracle GoldenGate on Oracle Cloud Infrastructure Classic, Marketplace, or on premise instance.

Oracle Cloud Infrastructure and Oracle Cloud Infrastructure Classic each has its own set of standard compute shapes. For more information, see:

- About Shapes
- Metering and Billing
- Creating a Deployment

OCI GoldenGate also allows you to enable *Auto Scaling*. When you enable auto scaling, the deployment can scale up to three times more compute and memory than the number of OCPUs currently shown in the Scale dialog. One OCPU is equivalent to 16 GB memory. If your workload requires additional OCPUs, then the deployment automatically uses the resources without any manual intervention required when auto scaling is enabled. For more information, see Scaling a Deployment.

Performing Pre-Migration Tasks

Complete the following steps before starting your migration:

1. Back up and secure the data on cloud storage for the Oracle GoldenGate instance you're migrating. Data includes configuration files and trail file data. For steps to perform the backup, see Perform Backup and Restore.

    - The Oracle GoldenGate Cloud Classic data location is `/u02/data/ggdata`.
    - The DIPC data location is in the Agent installation directory, `$OGG_HOME/data`.
    - The on premise data location is `$OGG_HOME/data`.
    - The Oracle GoldenGate Marketplace default data location is `/u02/trails`.

2. For Oracle GoldenGate Cloud Classic or Oracle GoldenGate Marketplace that receive trails from Oracle GoldenGate Classic architecture:

- Because OCI GoldenGate is a fully managed cloud service, no configuration files or trail files are allowed to move into OCI GoldenGate deployments.

- If the Oracle GoldenGate instance you're migrating is receiving trail files from another Oracle GoldenGate Classic instance (let's refer to it as "Dist-instance"), you must first convert Dist-instance into a Micoservices instance.

3. If you're using Classic Extract in the Oracle GoldenGate instance you're migrating, you won't be able to create the same in OCI GoldenGate; you must switch to Integrated Extract. Ensure that you have all required database patches installed to use Integrated Extract. See Recommended patches for Oracle 12*c* or higher.

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Performing Migration Tasks

Since OCI GoldenGate is a fully managed cloud service, you can't migrate Trail and other Oracle GoldenGate configuration files (like Param files) to the OCI GoldenGate deployment. You'll start fresh with OCI GoldenGate. You can, however, work in sync with the Oracle GoldenGate instance you're migrating and the new OCI GoldenGate deployment so that no data is lost during migration. To migrate Oracle GoldenGate to OCI GoldenGate, drain all active open transactions from your source database to the Trail file using the Oracle GoldenGate instance you're migrating, and then switch to the new OCI GoldenGate deployment.

Creating a Deployment

OCI GoldenGate deployments are similar to your full on premise Oracle GoldenGate Microservices or Classic architecture installation's deployments.

For every one Oracle GoldenGate instance that you're migrating, create an equivalent OCI GoldenGate deployment. You may also choose to create OCI GoldenGate deployments for each replication environment architecture needed.

For more information, see Deployments.

Registering the Database

A database registration is an OCI resource that OCI GoldenGate uses to establish networking and connectivity to a source or target database. When you register a database, OCI GoldenGate creates a private network connection between OCI GoldenGate and your tenancy VCN (where your database resides). Database registrations also capture and synchronize database credentials to the OCI GoldenGate deployment. Any changes made to the credentials, such as updating or deleting, is synchronized to OCI GoldenGate.

Ensure that you register all your source and target databases in OCI GoldenGate using the same credentials used with the Oracle GoldenGate instance you're migrating.

For more information, see Database Registrations.

Migrating Extracts

After you register databases and create the necessary OCI GoldenGate deployments, the next important step is to migrate the Extracts from the Oracle GoldenGate instance that you're migrating.

As a fully managed service, OCI GoldenGate is inaccessible by a root user. Trail files and configuration files can't simply be copied into the OCI GoldenGate deployment. To migrate these files, you must first drain all active open transactions in the Trail file of the Oracle GoldenGate instance you're migrating, and then replicate these transactions into the target database.

Perform the following steps for each Change Data Capture (CDC) Extract that you have in the Oracle GoldenGate instance you're migrating. Ensure that you perform the migration steps for all Extracts and Replicats in the same application or database.

1. Add and run a new Extract in the OCI GoldenGate Deployment Console to capture the same tables that you're capturing with the Oracle GoldenGate instance you're migrating. Ensure that you copy the Extract file parameters to the new Extract in the OCI GoldenGate Deployment Console.

   > **Note:**
   >
   > Classic Extract is not supported in OCI GoldenGate. You must switch to Integrated Extract. For more information, see step 3 under Performing Pre-Migration Tasks.

2. Ensure the Extract is running and capturing data, and that the Trail file is filled with data.

3. Force the source database to archive logs:

   ```
   alter system archive log current
   ```

4. Query the source database to determine the current SCN and take note of the number:

   ```
   select current_scn from v$database
   ```

5. In the Oracle GoldenGate instance that you're migrating, run the following commands:

   ```
   info extract [name], showch
   ```

   Review the timestamps displayed under "Recovery Checkpoint" and "Current Checkpoint" and check that the time difference is less than one hour. If the time difference greater than one hour, step 6 will take longer to complete.

   ```
   send extract [name] showtrans
   ```

   This command returns the oldest open transaction tracked by Extract. Take note of the SCN returned. If the result is empty, repeat step 5 and take note of the recovery checkpoint SCN.

6. Wait a few minutes and then repeat step 5 until the oldest open transaction SCN required is higher than the `current_scn` values obtained in step 4.

   > **Note:**
   >
   > If this condition is not met, you need to consider committing the open transactions in your source database so that you can move forward with the migration.

7. At this point, the Oracle GoldenGate instance you're migrating successfully captured all open transactions that weren't captured by the OCI GoldenGate Extract. These transactions applied by the Replicat in the Oracle GoldenGate instance you're migrating to the target database. You can now stop the Oracle GoldenGate instance:

```
stop extract [name], force
```

8. Check and take note of the Extract of the Oracle GoldenGate instance you're migrating's current checkpoint SCN:

```
info extract [name], showch
```

Migrating Data Pump Extracts

This step is optional. If you don't use Data Pump Extract in the Oracle GoldenGate instance that you're migrating, you can proceed to the next migration task.

Perform the following steps for each Data Pump Extract in the Oracle GoldenGate instance that you're migrating:

1. When the Data Pump Extract is at end of file, enter the following command:

```
send extract [name], status
```

2. Stop the Data Pump Extract.

3. Add and run a Distribution Path to replace the Data Pump Extract process.

> ✎ **Note:**
>
> Carefully review the limitations and differences between Data Pump Extract and Distribution Paths. If you're using a Data Pump Extract to query or filter data, then the queries must be moved to TRANLOG Extract and filtering moved to TRANLOG Extract or Replicat.

Migrating Replicats

Perform the following steps for each Change Data Capture Replicat in the Oracle GoldenGate instance that you're migrating:

1. Run the following command to check if Replicat process is at end of file:

```
send replicat [name], status
```

2. After the Replicat process reaches end of file, stop the Replicat. Ensure that it stops gracefully. If it doesn't stop gracefully, you must run the synchronize replicat command.

3. Add a new Replicat process in the OCI GoldenGate Deployment Console. Ensure that it reads from the new Trail file generated by the OCI GoldenGate Extract or Data Pump Extract. Don't run the Replicat yet.

4. In the OCI GoldenGate Deployment Console, position the Replicat to the SCN retrieved from the Extract current checkpoint obtained in Step 8 of Migrating Extracts, and then start the Replicat:

```
start replicat [name], aftercsn <scn>
```

> **Note:**
>
> If you have multiple Extract/Replicat pairs, ensure that you use the correct corresponding SCN.

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Performing Post-Migration Tasks

Now that you've successfully migrated from Oracle GoldenGate to OCI GoldenGate, you can test your deployments and migration scenarios, and then perform clean up tasks.

Testing the Migrated Deployments

Verify that your new OCI GoldenGate deployment is accessible and capturing all change data capture transactions without any data loss during the migration process.

Cleaning up Resources in Oracle GoldenGate

After testing your migrated deployment in OCI GoldenGate, you can delete the original Oracle GoldenGate instance and supporting cloud or on premise resources in Oracle Cloud Infrastructure Classic (Oracle GoldenGate Cloud Service Classic or Oracle Data Integration Platform Cloud) or Oracle GoldenGate on Marketplace. Deleting these resources prevents you from incurring costs for services you no longer use.

When you delete your original GoldenGate instance:

- Compute resources such as block storage volumes and IP addresses are removed.

- The Oracle Database Cloud Service instance isn't deleted; only the database repository and schemas are deleted. You'll continue to incur charges for this database service instance. You may want to retain this database deployment if it's used for other service instances.
  For more information, see Delete DB Deployment.

- The Oracle Object Storage container isn't deleted. You'll continue to incur charges for this storage container. You may want to retain this storage container if it's used for other service instances.
  For more information, see Deleting Containers.

Deleting Oracle GoldenGate Cloud Classic Instances and Resources

To delete your Oracle GoldenGate Cloud Classic instance:

1. Log in to your Oracle Cloud account.

   If you logged in using the OCI Console, click **Applications >** in the global header, select your **Oracle Cloud DataCenter**, and then click **Next**.

2. On the **Oracle Cloud My Services Dashboard** and locate the **Oracle GoldenGate Cloud Service** tile.

3. From the **Action Menu**, select **Open Service Console**.

4. From the **Instances** page, select the instance that you successfully migrated to Oracle Cloud Infrastructure.

5. From the **Manage this Service menu**, select **Delete**.

6. When prompted for confirmaton, click **Delete**.

Deleting the Oracle Data Integration Platform Cloud Instance and Resources

To delete the Oracle Data Integration Platform Cloud instance and resources:

1. Log in to your Oracle Cloud account.

   If you logged in using the OCI Console, click **Applications >** in the global header, select your **Oracle Cloud DataCenter**, and then click **Next**.

2. On the **Oracle Cloud My Services Dashboard**, locate the **Data Integration Platform Cloud** tile.

3. From the **Action Menu**, select **Open Service Console**.

4. From the **Instances** page, select the instance that you successfully migrated to OCI GoldenGate.

5. From the **Manage this Service** menu, select **Delete**.

6. When prompted for confirmation, click **Delete**.

Deleting the Oracle GoldenGate Marketplace Instance

To delete the Oracle GoldenGate Marketplace instance:

1. Log in to the Oracle Cloud Infrastructure Console and then select your region.

2. Open the **Navigation** menu (hamburger icon), click **Developer Services**, and then under **Resource Manager**, click **Stacks**.

3. On the **Stacks** page, click the Oracle GoldenGate Marketplace stack that you migrated to OCI GoldenGate, and then click **Destroy**.

   This releases all the resources the stack used, such as block storage, compute instances, IP addresses, and so on.