Oracle® Cloud

Migrating Oracle Database Cloud Schema Service Applications to Oracle Cloud Infrastructure

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Oracle Cloud Migrating Oracle Database Cloud Schema Service Applications to Oracle Cloud Infrastructure,

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About Migrating

Learn how to migrate Oracle Application Express applications from Oracle Database Cloud Schema Service to Oracle Autonomous Data Warehouse and Oracle Autonomous Transaction Processing.

Topics:

- Why Migrate to Oracle Cloud Infrastructure
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- About Migrating to Oracle Autonomous Database
- About Migration Task Flow

Why Migrate to Oracle Cloud Infrastructure

Oracle encourages you to migrate your existing cloud resources to Oracle Cloud Infrastructure regions. You can gain several advantages by doing so.

In Oracle Cloud, you provision resources in specific regions, which are localized to geographic locations. Certain regions support the Oracle Cloud Infrastructure platform.

Oracle Cloud Infrastructure is Oracle's modern cloud platform that's based on the latest cloud technologies and standards. It provides more consistent performance and better features at lower costs. Oracle continues to invest in Oracle Cloud Infrastructure, including the addition of new regions, services, and features. See Data Regions for Platform and Infrastructure Services.

You can benefit from these additional administrative features when you migrate your cloud resources to Oracle Cloud Infrastructure:

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

To learn more, see Upgrade Your Classic Services to Oracle Cloud Infrastructure.

About Oracle Cloud Infrastructure

Get familiar with basic Oracle Cloud Infrastructure security, network, and storage concepts.

Cloud resources in Oracle Cloud Infrastructure are created in logical compartments. You also create fine-grained policies to control access to the resources within a compartment.

You create instances within an Oracle Cloud Infrastructure region. You also specify an availability domain (AD), if supported in the selected region.

A virtual cloud network (VCN) is comprised of one or more subnets, and an instance is assigned to a specific subnet. Oracle Cloud Infrastructure does not allow you to reserve specific IP addresses for platform services.

A subnet's security lists permit and block traffic to and from specific IP addresses and ports.

Instances can communicate with resources outside of Oracle Cloud by using Oracle Cloud Infrastructure FastConnect, which provides a fast, dedicated connection to your on-premises network. Alternatively, use an IPSec VPN.

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.

To learn more, see Key Concepts and Terminology in the Oracle Cloud Infrastructure documentation.

About Migrating to Oracle Autonomous Database

Oracle Autonomous Database on Oracle Cloud Infrastructure delivers self-driving, self-securing, self-repairing database services that scale instantly to meet the demands of mission critical applications.

Oracle Application Express (APEX) on Oracle Autonomous Transaction Processing and Oracle Autonomous Data Warehouse provides a preconfigured, fully managed and secured environment to both develop and deploy world-class applications and RESTful services. Oracle APEX applications, data, and RESTful services can be migrated from Oracle Database Cloud Schema Service to Oracle Autonomous Database.

To learn more, see:

- Autonomous Database + APEX

- Getting Started with Autonomous Transaction Processing in *Using Oracle Autonomous Transaction Processing*

- Getting Started with Autonomous Data Warehouse in *Using Oracle Autonomous Data Warehouse*

- Oracle Database Cloud Schema Service in *Oracle Help Center*

About Migration Task Flow

The following workflow guides you through the steps to migrate Oracle Application Express (APEX) apps, data and RESTful services from Oracle Database Cloud Schema Service to Oracle Autonomous Transaction Processing or Oracle Autonomous Data Warehouse.

1. Create the Data Pump export in Schema Service. This export file is used to move all of your existing data objects, apps, and RESTful services.

2. Stage the Data Pump export file in Oracle Cloud Infrastructure Object Storage.

3. Connect to Autonomous Database using client credentials and import the schema using the Oracle Data Pump `impdp` utility.

4. Create an APEX workspace in Autonomous Database. This workspace will be used to restore your apps and RESTful services.

5. Restore your APEX apps and workspace files using the APEX Application Archive productivity app.

6. Import your RESTful services from the APEX Application Archive productivity app using APEX SQL Workshop. Then, migrate imported RESTful services to ORDS-based RESTful services.

7. Complete Post-Migration tasks in Autonomous Database if applicable.

Once you have completed these steps are able to run your APEX apps. Please note that Oracle Autonomous Database runs Oracle APEX 19.1. Therefore, your apps are upgraded when they are restored. Your apps should run without issue, but should be thoroughly tested. Developers should also go into each app and review the Upgrade Application report within Utilities for any additional upgrades they may want to implement that were not automatically performed.

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Prepare to Migrate

Prepare for migration by creating a Data Pump export file that includes database objects, APEX application definitions, and RESTful Services definitions, and staging the export file in Oracle Cloud Infrastructure Object Storage.

Topics:

- Create the Data Pump Export in Schema Service
- Stage the Data Pump Export in Object Storage

Create the Data Pump Export in Schema Service

In your Oracle Database Cloud Schema Service create a Data Pump Export file of the Oracle Application Express (APEX) app you want to migrate.

Follow the steps in Export Your Database Schema in the *Using Oracle Database Cloud Schema Service* to export data structures and data to Secure FTP or Object Storage Classic. APEX app definitions and RESTful services are automatically included in this export.

Once the export file is available (for example, `aaab.zip`), download it and extract `export.dmp` and `param.helper` files. Examine the `param.helper` text file to identify the APEX tablespace name that was used in your Schema Service database. You will provide this tablespace name to `impdp` utility later.

> ✏️ **Note:**
>
> If you have APEX Application Archive productivity app installed in your Schema Service workspace, uninstall it prior to submitting the data export request. In APEX App Gallery, find the APEX Application Archive app, click **Manage**, then click **Remove**. If you need to retain past archives, submit a separate data export request and wait for it to become available before uninstalling the app.

For additional information, see:

- Download a Data Export in *Using Oracle Database Cloud Schema Service*
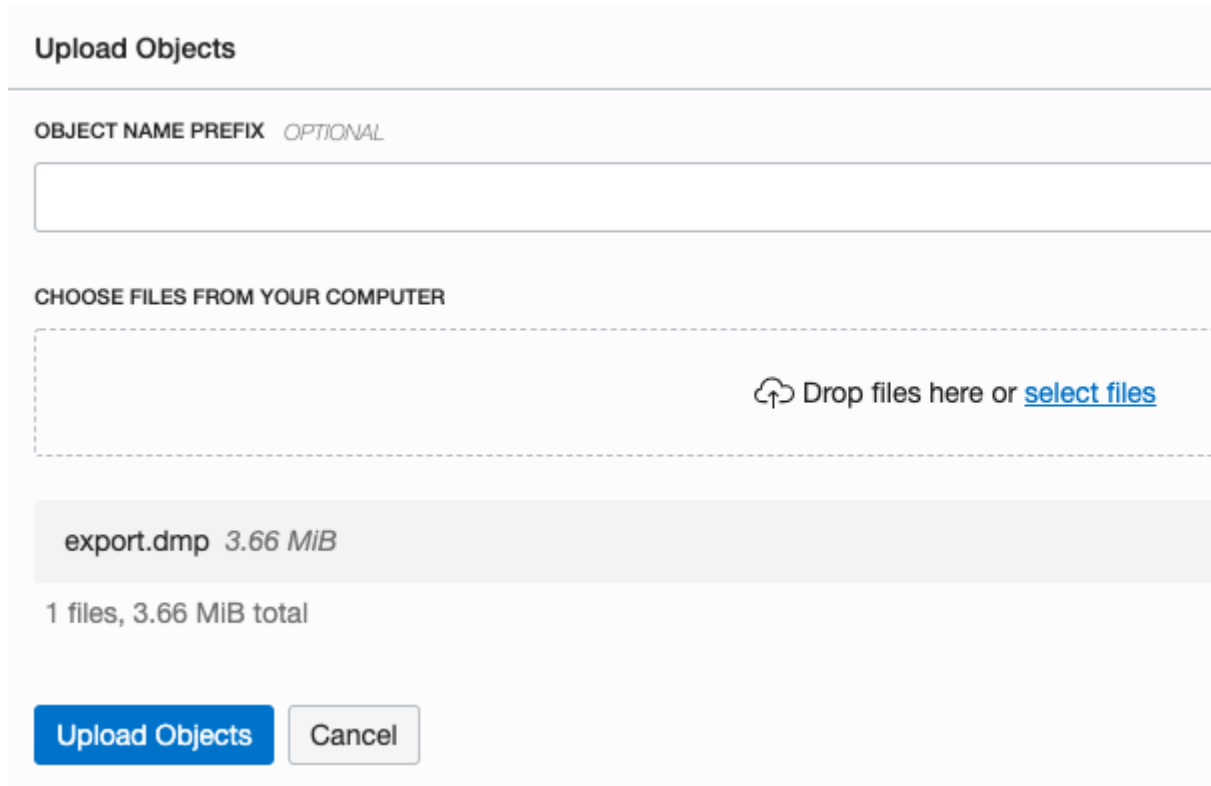- Downloading Objects in *Using Oracle Cloud Infrastructure Object Storage Classic*

Stage the Data Pump Export in Object Storage

Follow the steps below to import the Data Pump file, `export.dmp`, to Oracle Cloud Infrastructure Object Storage where Oracle Autonomus Database will be able to access it. This additional step is required as Oracle Database Cloud Schema Service does not support data export directly to Object Storage.

> **✏️ Note:**
>
> Oracle recommends that you upload large Data Pump export files using Oracle Cloud Infrastructure CLI rather than the Object Storage console. To learn more, see Using Multipart Uploads in *Oracle Cloud Infrastructure Documentation*.

1. Sign in to Oracle Cloud Infrastructure.

2. Expand the top left menu and, in the Core Infrastructure section, expand the Object Storage sub-menu and click **Object Storage**.

3. Pick an existing compartment and the existing bucket or create a new bucket.

4. Click on the bucket name and then click **Upload Objects**.

5. Choose the Data Pump export file, `export.dmp`, and click **Upload Objects**.

Upload Objects

OBJECT NAME PREFIX *OPTIONAL*

CHOOSE FILES FROM YOUR COMPUTER

⌂ Drop files here or select files

export.dmp *3.66 MiB*

1 files, 3.66 MiB total

Upload Objects Cancel

6. After the upload completes, open the context menu for the uploaded `export.dmp`. Click **View Object Details**, and copy the URL Path (URI) value. You will provide this value to the `impdp` utility later.

For additional information, see:

• Using the Console to upload and download objects in *Managing Objects* in *Oracle Cloud Infrastructure Documentation*

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Migrate Your Apps

Migration involves importing data into your Autonomous Database using Data Pump, creating a new APEX workspace, restoring APEX apps and workspace files into this workspace, and importing RESTful Services.

Topics:

- Import Schema in to Oracle Autonomous Database
- Create an APEX Workspace in Autonomous Database
- Restore APEX Apps and Workspace Files
- Import RESTful Services

Import Schema in to Oracle Autonomous Database

Follow the steps below to import the Data Pump file (`export.dmp`) in to your Oracle Autonomous Database.

See To create an auth token in *Managing User Credentials* in *Oracle Cloud Infrastructure Documentation*. Copy the auth token as it will not be displayed again.

> ✎ **Note:**
>
> Oracle recommends to use the Oracle Instant Client downloaded from Autonomous Database service console (Development page, Download Oracle Instant Client link).

1. Sign in to your Oracle Autonomous Transaction Processing or Oracle Autonomous Data Warehouse service console and click **Development**.

2. Click **Download Oracle Instant Client** and save the zip file.

3. Unzip the file and set the `$ORACLE_HOME` environment variable to point to this directory.

4. On the Administration page, click **Download Client Credentials (Wallet)** and save the zip file.

5. Extract the file into `$ORACLE_HOME/network/admin` directory.

6. Inspect `tnsnames.ora` file included in the zip to see the list of service names to connect to. Identify the "high" service name of the database into which you are migrating.

7. Use SQL*Plus to connect to your Autonomous Database as the ADMIN user using the service name you identified in the previous step.

8. Run the following to create a credential using the `DBMS_CLOUD` package. Replace `OCI_USERNAME` with your Oracle Cloud Infrastructure username and `OCI_AUTH_TO-`

`KEN` with your Oracle Cloud Infrastructure auth token you created in a previous step.

```
BEGIN
  DBMS_CLOUD.CREATE_CREDENTIAL(
      credential_name => 'def_cred_name',
      username        => 'OCI_USERNAME',
      password        => 'OCI_AUTH_TOKEN'
    );
END;
/
```

9. Use `impdp` Data Pump utility to import your Schema Service export file from Oracle Cloud Infrastructure Object Storage to your Autonomous Database. Replace `SERV-ICE_NAME` with the "high" service name of your Autonomous Database. Replace `APEX_TABLESPACE` with the Oracle Application Express (APEX) tablespace name used in your Schema Service database. Replace `EXPORT_FILE_URL` with the URL to the `export.dmp` file uploaded in Object Storage. Enter the password for the AD-MIN database user when prompted. Make note of the database user that is created by the import operation.

```
impdp admin@SERVICE_NAME credential=def_cred_name directory=da-
ta_pump_dir remap_tablespace=APEX_TABLESPACE:data \
dumpfile='EXPORT_FILE_URL' \
parallel=2 transform=segment_attributes:n transform=dwcs_cvt_iots:y
transform=constraint_use_default_index:y \
exclude=cluster,db_link
```

For example:

```
impdp admin@demo_high credential=def_cred_name directory=data_pump_dir
remap_tablespace=APEX_1234567890:data \
dumpfile='https://objectstorage.us-phoenix-1.oraclecloud.com/n/.../
b/.../o/export.dmp' \
parallel=2 transform=segment_attributes:n transform=dwcs_cvt_iots:y
transform=constraint_use_default_index:y \
exclude=cluster,db_link
```

10. Connect to your Autonomous Database as ADMIN using SQL*Plus and reset the password for the database user that was created as a result of the Data Pump import. The password must conform to the Autonomous Database password complexity rules.

```
alter user USERNAME identified by "PASSWORD" account unlock;
```

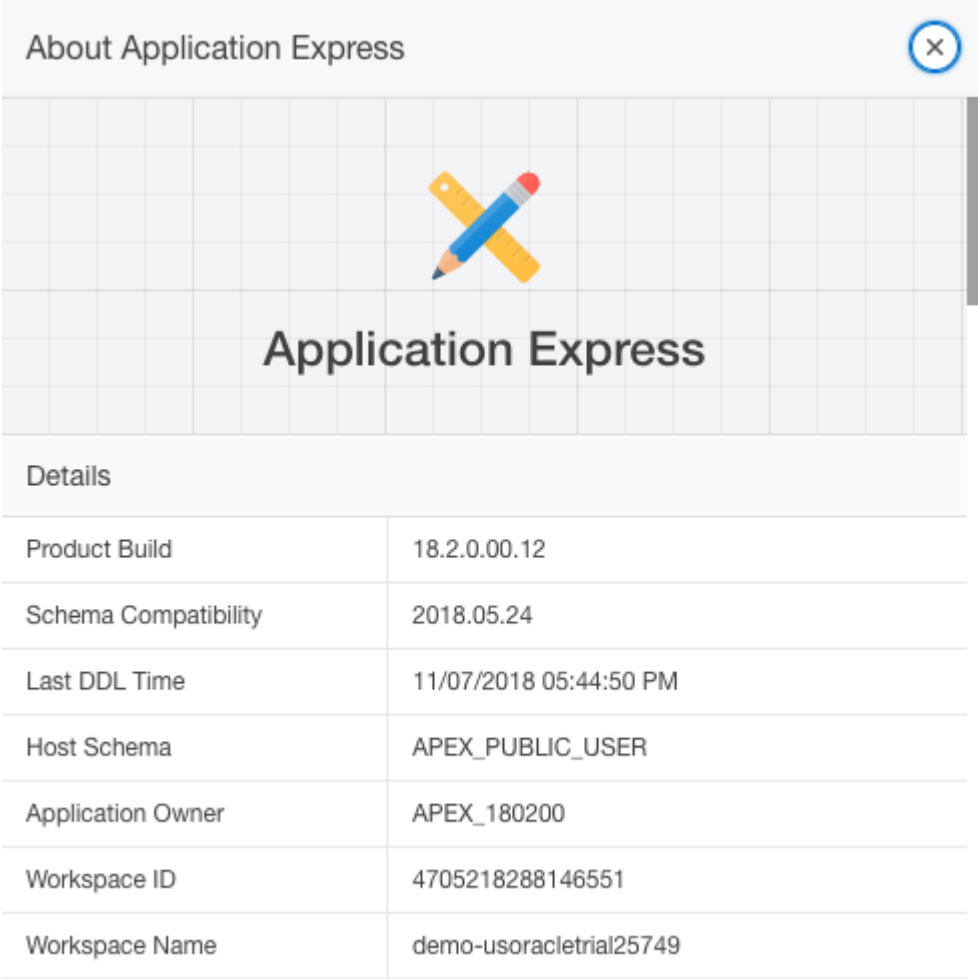For additional information, see:

- Import with Oracle Data Pump Version 18.3 or Later in *Using Oracle Autonomous Transaction Processing*

- Import with Oracle Data Pump Version 18.3 or Later in *Using Oracle Autonomous Data Warehouse*

- Creating Users with Autonomous Database in *Using Oracle Autonomous Transaction Processing*

- Creating Users with Autonomous Database in *Using Oracle Autonomous Data Warehouse*

Create an APEX Workspace in Autonomous Database

Follow the steps below to create an Oracle Application Express (APEX) workspace in your Oracle Autonomous Database. To ensure transparent workspace migration, the new workspace uses the same workspace ID as your existing Oracle Database Cloud Schema Service workspace.

1. Sign in to your Oracle APEX workspace in your Schema Service.

2. Click the ? icon in the upper right. Choose **About**, and then copy your Workspace ID.

3. Sign in to your Autonomous Database service console.

4. Click **Development** on the left side, then click **APEX**.
   Oracle Application Express Administration Services sign-in page appears.

> **✎ Note:**
>
> If you already created a workspace, the workspace sign-in page appears
> instead. In this case, to proceed, click the **Administration Services** link.

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5. Enter the Autonomous Database administrator (ADMIN) password on the sign-in
   page and click **Sign In to Administration**.

6. In Administration Services, click **Create Workspace** and select the Database User
   that you imported. Ensure the Workspace Name matches your Schema Service
   workspace. Expand the Advanced section and enter the same Workspace ID as
   you copied in an earlier step. Click **Create Workspace**.

7. Click the link of the workspace name in the success message. The workspace sign-in page appears with Workspace and Username fields populated. Enter the password for the database user and click **Sign In**.

8. Click **Set APEX Account Password** and enter the same password you just used to sign in to Oracle APEX.

9. Click **App Builder**, then click **Install a Productivity or Sample App**.
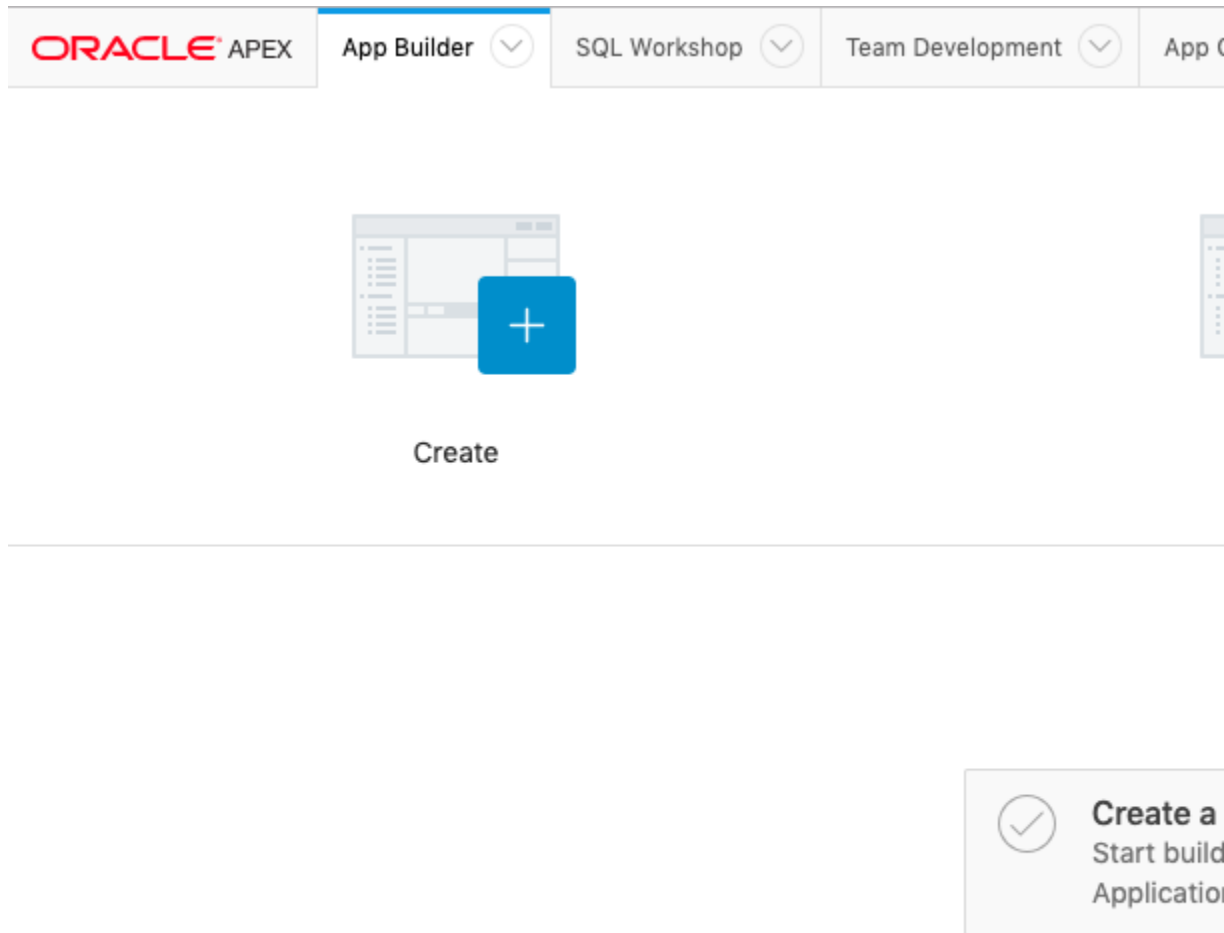
10. Find the APEX Application Archive app in the App Gallery list and click **Install App**. Click **Next**, then click **Install App**.

For additional information, see:

- Creating Oracle Application Express Workspaces Autonomous Transaction Processing in *Using Oracle Autonomous Transaction Processing*

- Creating Oracle Application Express Workspaces in Autonomous Database Warehouse in *Using Oracle Autonomous Data Warehouse*
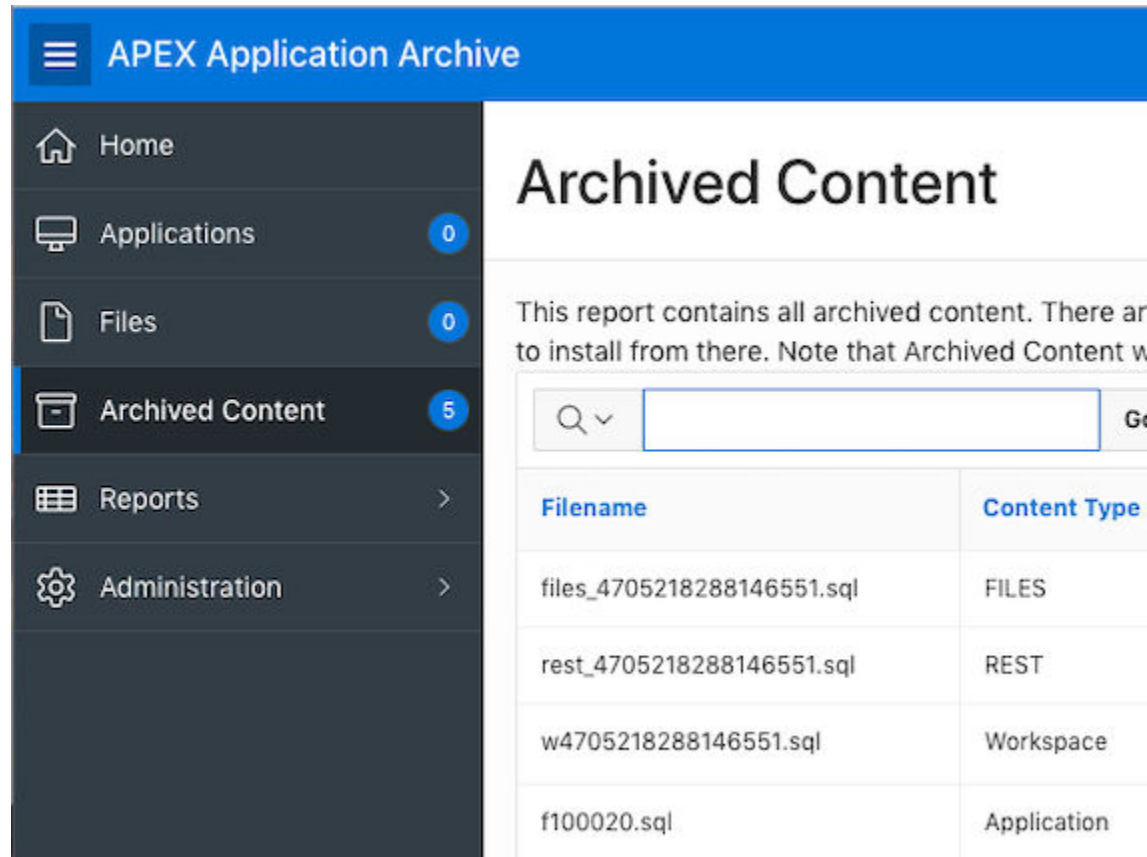
Restore APEX Apps and Workspace Files

Use APEX Application Archive productivity app to import Oracle Application Express (APEX) apps and static workspace files into your Autonomous Database.

Import Oracle APEX Apps

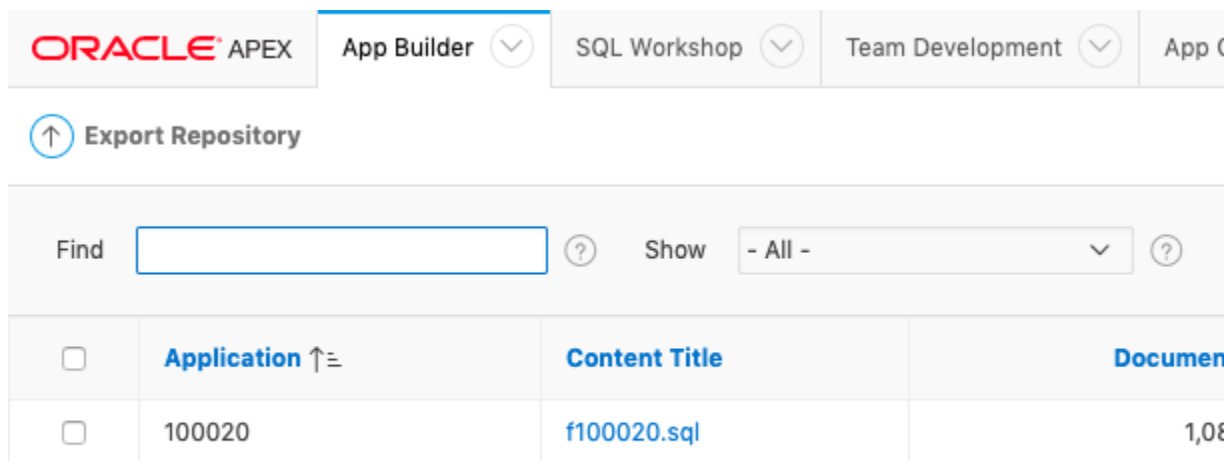To import Oracle APEX apps into your Autonomous Database:

1. Run the APEX Application Archive productivity app, sign in using the database user that you imported, and complete the first time setup if prompted.

2. Click **Archived Content** and then click **Restore** for the application you want to restore.

The archive is exported to the Export Repository within the APEX App Builder.
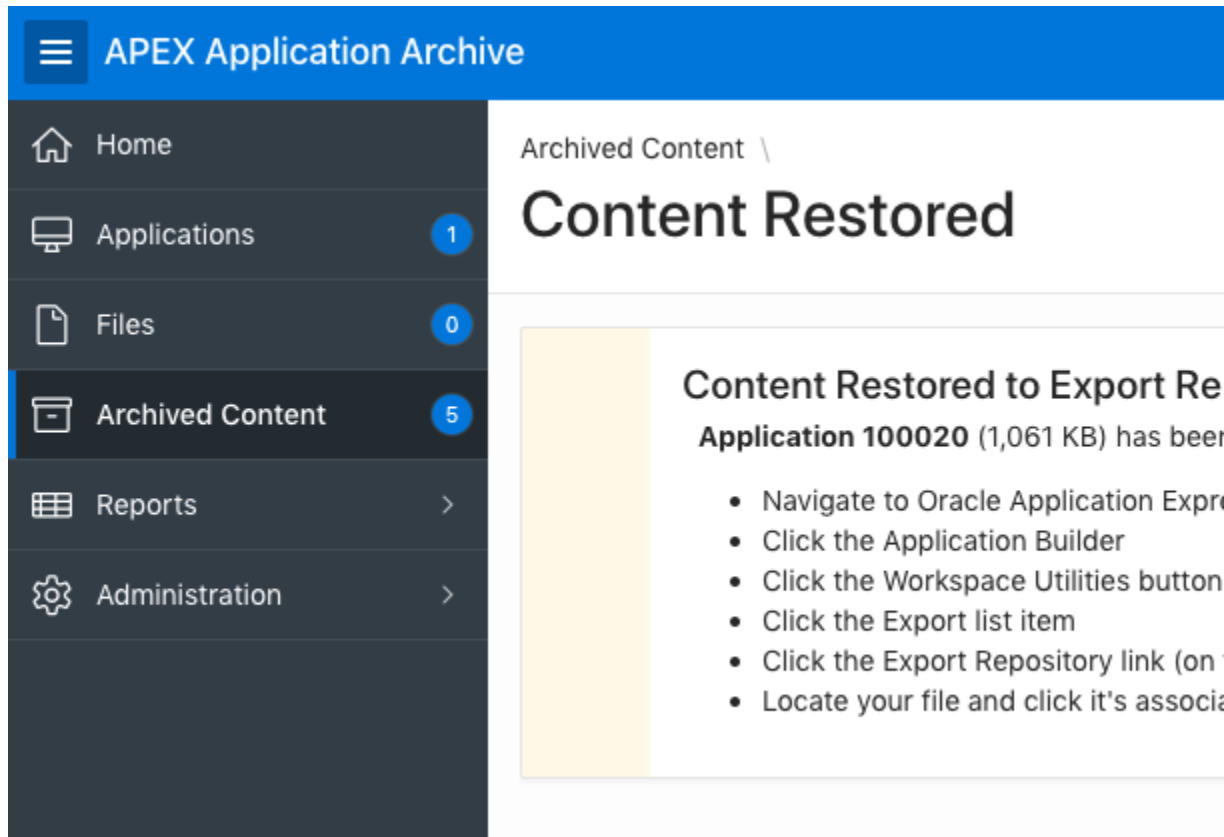
3. Go back to App Builder. Click **Workspace Utilities** and then click **Export**.

4. In the Tasks section, click **Export Repository**.

5. Now you should see the application SQL file that you restored. Click **Install** and then select the **Reuse Application ID From Export File** option. Click **Install Application**.

6. Repeat this process for all APEX apps you want to import into your Autonomous Database.

Import Static Workspace Files

To import Oracle Application Express (APEX) static workspace files into your Autonomous Database:

1. In the APEX Application Archive productivity app, click **Archived Content**.

2. Search for "FILES" content type to find the latest archive that contains workspace files. Click **Download**.

3. In APEX SQL Workshop, click **SQL Scripts**. Click **Upload** and then upload the archive file.

4. Once the file is uploaded, click the **Run** icon associated with this file. Click **Run Now**.

5. In APEX App Builder, open the app that uses workspace files.

6. Click **Shared Components**, then click **Static Workspace Files** in the Files section. Confirm that the expected workspace files are listed.

See Complete the Post-Migration Tasks for additional tasks that may be required before you can run your APEX apps in Autonomous Database.

Import RESTful Services

Use APEX Application Archive productivity app to import RESTful services into your Autonomous Database. Autonomous Database only supports ORDS RESTful services, so you must migrate your RESTful services once imported.

To import RESTful Services into your Autonomous Database:

1. Run the APEX Application Archive productivity app, sign in using the database user that you imported, and complete the first time setup if prompted.

2. Click **Archived Content**.

3. Search for "REST" content type to find the latest archive that contains RESTful services. Click **Download**.

4. In APEX SQL Workshop, click **SQL Scripts**. Click **Upload** then upload the archive file.

5. Once the file is uploaded, click the **Run** icon associated with this file. Click **Run Now**.

6. Return to SQL Workshop and click **RESTful Services**.

7. Click **APEX Based RESTful Services**.

8. Click **Migrate to ORDS RESTful Services**, then click **Migrate**.

9. Return to RESTful Services page, click **ORDS Based RESTful Services** to review the migrated modules and privileges.

10. (Optional) On APEX Based RESTful Services page, delete the modules that have been successfully migrated. Once all legacy modules have been deleted, accessing RESTful Services page will immediately display ORDS RESTful Services.

For additional information, see:

• Create Applications with ORDS on Autonomous Database in *Using Oracle Autonomous Transaction Processing*

• Create Applications with ORDS on Autonomous Database in *Using Oracle Autonomous Data Warehouse*

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Complete the Post-Migration Tasks

You may need to complete additional tasks after migration to Autonomous Database before you can fully utilize your Oracle Application Express (APEX) apps and RESTful services.

Further, review restrictions and limitations for Oracle APEX in Autonomous Database for additional items that may impact your apps.

Topics:

- Unsupported APEX Authentication Schemes
- Applications that Send Email

To learn more, see:

- Restrictions and Limitations for Oracle Application Express with Autonomous Transaction Processing in *Using Oracle Autonomous Transaction Processing*
- APEX Restrictions and Limitations Autonomous Database in *Using Oracle Autonomous Data Warehouse*

Unsupported APEX Authentication Schemes

Oracle APEX in Autonomous Database does not support certain application authentication schemes. If your application in Schema Service uses "Oracle Cloud Identity Management" authentication scheme, you must switch to a different authentication scheme after importing this application into Autonomous Database.

To change authentication scheme for your APEX application in Autonomous Database:

1. Open your application in APEX App Builder.
2. Click Shared Components, then click Authentication Schemes in the Security section.
3. Click Create, click Next.
4. Enter the Name for your new authentication scheme and select a supported Scheme Type (for example, "Application Express Accounts").
5. Click Create Authentication Scheme.
6. Run the application.

Applications that Send Email

If your applications in Schema Service send outbound email using `APEX_MAIL` or built-in Application Express dialogs, further configuration is required in Autonomous Database.

To learn more, see:

- APEX Sending Email from APEX Autonomous Database in *Using Oracle Autonomous Transaction Processing*