Introduction

Database lifecycle management consumes a majority of the DBA’s time. Most of the tasks are repetitive and involve complex procedures. Automating life cycle management tasks and using policies to manage them helps simplify management and drives operational efficiency. Here are some of the common use cases.

1. Enable policies to ensure that database backups are taken as needed.
2. Restore databases from backups reliably without requiring complex scripts and processes.
3. Restore databases to a point in time.
4. Quickly create a storage-efficient clone of a running database.
5. Enforce policies during the cloning process to enable cleaning up the production database before a less privileged user gets access to the copy.
6. Save entire database states that can then be used for rollback or re-provisioning.
7. Monitor the databases and exceptions at all levels from a single dashboard.
8. Enable exception-based monitoring using alerts and notifications.

In this exercise, you will learn how Data Director helps automate lifecycle management tasks like backup, cloning and restore among other things.

Pre-Requisites

- You have completed the tasks in Getting Started with Database Provisioning and Getting Started with Database Ingestion.
Using templates to automate backups

The DBAs work begins after a database is provisioned. Depending on the criticality of the database, the DBA needs to ensure backups are taken on a regular basis. Data Director simplifies this task by allowing DBAs to set backup policies on the database. The policies will ensure backups are taken automatically once the database is provisioned.

This session will walk through how you can set backup policies and show how Data Director automates backup tasks.

In this scenario, the database is a critical database and needs to be backed up automatically. It is also required that DBA be able to restore the database to a point-in-time.

The backup policy is set when the database is provisioned. We start by provisioning a new vPostgres database, as follows:

1. Click the Manage & Monitor tab.
2. Click on the vPG database group on the left pane.
3. Click the Databases tab.
4. Click the plus (+) icon to start the Create Database wizard.
5. In Creation Type, select Create Database, click Next.
6. In General, enter the following information:
   1) Name and Description. Enter a name and optionally, a description of the database.
   2) Database Type. Select vPostgres from the drop-down menu.
   3) Base DB Template. Select the vPostgres template from the drop-down menu.
   4) Database Group. This should indicate vPostgres.
   5) Click Next.
7. In Configuration, enter the following information:
   1) Resource Template Select Tiny.
   2) Data disc Allocation Select 5GB.
   3) Parameter group Select the default group.
   4) Backup Template Maximum.
   5) PITR disc allocation: Specify 5GB.
   6) Click Next.
8. In Administrator, enter the following information:
   1) Owner Account Enter an owner account for the database.
   2) Password Enter and confirm the owner account password.
   3) Click Next.
9. In Options, enter the following information:
   i. Expiration. Select a date and time the database expires, and select Stop Database as the default action.
   2) Leave the others as default, and click Next.
10. Click Finish.

The database creation starts, and you can observe status in the progress bar. Notice that once the database is running, a backup is automatically kicked off.
TASK:

- Review the various backup template definitions.
  - To review the definitions, go to Organization Settings page. In the left-pane, click Backup templates. In the center pane, right-click on the backup templates and verify the settings. Refer to the administration guide for details about the settings.
- Review the backup setting for the template that was picked for this exercise.

Locating Backups

In the previous exercise, you used a backup template that automatically created backups. You can review the backups that have been taken.

To locate the backup:

1. Right click on the database and click Open.
2. On the right-pane, go to the Backup & Recovery tab.
3. Review the information in the tab.
   a. You can see the list of backups that were taken.
   b. The timeline of the backup.
   c. The type of backups that are available etc.

Manual Backups

You can also take manual backups.

1. To take a manual backup
   a. On the right-pane, right click on the database.
   c. Choose External Backup, click OK.
2. Once the backup is completed, go back to step 3 and review the information.
3. Take another manual backup, and this time choose Snapshot as the Type.
4. Once the snapshot is completed, expand the time range slider to cover the entire time range.
5. Notice the various points at which backups were taken.

Restoring to a point-in-time

Point-in-time restore enables you to recover the database to a precise point in time in the past. With Data Director, this task can be accomplished with a single click of the button.

To create a point-in-time recovery:

1. Right-click on the database and click Open.
2. On the right-pane, go to the Backup & Recovery tab.
3. Review the timeline by expanding the slider to cover the entire time range.
4. On the blue timeline at the top, locate the spot which you want to recover.
5. Click at that spot.
6. Verify the recovery point time in the dialog. Correct the time, if required.
7. Click **Ok**.
8. When you see the message: “Database will be unavailable during recovery”. Click **OK**.

   **Note:** Alternatively, you can click on **Backup & Recovery** to start the same recovery from there.

Once the recovery is complete and the database is running, check the database to verify that the changes have been rolled back.

### Cloning a database
A typical production database will have 4-6 copies used by various teams. For a DBA, this is a time consuming task due to a variety of reasons, among them the following:

- Whenever a new copy of the database is required, the database has to be provisioned and this normally takes hours if not days.
- It is very hard to maintain compliance when there are multiple copies of databases in the environment.
- When cloning a sensitive database, DBAs need to ensure sensitive data is not passed on to less privileged users. Enforcing this is typically a manual operation.

With Data Director, DBAs can clone a database in minutes, and set retention policies and post-clone scripts to enforce compliance.

Cloning a database in Data Director is a very simple process. Let’s clone the Oracle database.

To clone the Oracle Database:

1. In the production organization, click the **Manage & Monitor** tab.
2. On the left pane, click on the **Orcl** database group.
3. On the right pane, right-click the Oracle database and select **Clone**.
   
   The Clone Database Wizard opens.
   
   1) In **Clone Type**, select **linked clone**.
   
   2) Leave others as default, and click **Next**.

4. In **General**, leave the defaults, click **Next**
5. In **Configuration**:
   
   1) **Resource Template**: Use Medium resource template.
   
   2) Click **Next**.

6. In **Options**:

   1) Specify **expiration** settings, and select an expiration time for the clone. Choose a short time period so that you can verify what happens after the clone expires.
   
   2) For **Action**, select **Stop Database**.
   
   3) Click **Next**.
7. In **Summary**, click **Finish**.
**Enforcing Policies using Post-Clone Script**

When cloning a sensitive database, DBAs need to ensure sensitive data is not passed on to less privileged users. This is typically a manual operation. Using Data Director, you can set a policy to ensure required actions are taken on the database when it is cloned.

The post-clone script works in the following manner:

- Clone administrator enables post-clone script for a database.
- The script is executed automatically after the database is cloned.

We will use an existing database to walk through how an administrator can enable post-clone scripts.

Before enabling post-clone scripts, we will create a few tables in the vPostgres database.

1. Click the Manage & Monitor tab.
2. Click the vPG Database Group in the left pane.
3. Click the Databases tab.
4. Right-click the vPostgres database that was provisioned at the beginning of the exercise and click Open.
5. Click the Console button in the top right corner to launch the console.
6. Click the Enter SQL button to bring up the SQL editor, and create three tables.
   1) Run below Create statements in the editor:
   
```
CREATE TABLE Customer(Cust_id int, Cust_Name varchar(50));

CREATE TABLE Customer_Order(Cust_id int, Order_id int);

CREATE TABLE Customer_Payment(Cust_id int, Credit_Card_Number int);
```
   2) Close the editor.
   3) Close the console.
7. Right-click the database and select Properties.
8. Click the Cloning tab.
   This is where you will set the cloning policy.
   Note: You can set a policy to delete all the data in the credit card column and replace it with random numbers. In this example, we will set a policy that will delete the table whenever the database is cloned.
9. To set the policy, follow this procedure:
   1) Click the (+) icon under post-clone scripts.
   2) Type in a name without space, for example: DropCreditCardTable.
   3) In the SQL Script window type:
      
```
DROP Table customer_payment;
```
   4) You will see the script listed. Choose that script as the default script from the drop down.
   5) Click OK.
10. Clone the database by repeating the above procedure, but this time
   1) Give a new name for the database.
   2) In Options, pick the scripts DropCreditCardTable.
   3) Click Finish to start cloning process.

11. When the clone is created, right-click the clone and select Connect.
   1) Click on the Console button.
   2) Log in to the database with the owner account and password you specified during
      creation of the clone.
   3) In the right pane, expand schema->Public and click on the table.
   4) You will see that the table customer_payment has been deleted.

   NOTE: In this case, you were able to see the drop down list for the scripts. This is because you
   are logged in as the organization administrator. In the Database-as-a-service exercise, when you
   log in as a regular user, you will see that the default script option is grayed out and inactive.

**Summary**

In this exercise you learned how to:

- Automate backup task and manually take different types of backup.
- Recover a database to a point-in-time.
- Clone a database and enforce policies during the cloning process.