Oracle Database Snapshot and Cloning with Oracle Snap Management Utility
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Introduction

Oracle Snap Management Utility helps to automate the creation and management of snapshots and clones for Oracle Databases hosted on Oracle ZFS Storage Appliance. This solution provides database administrators the flexibility to copy and protect their Oracle Database by efficiently constructing database clones for production, development, and test environments. This hands-on lab demonstrates the best practices for using Oracle Snap Management Utility.

The following components are pre-installed:

1. Oracle ZFS Storage Appliance VM Simulator running os8.4
2. Oracle Linux 6.6 VM
3. Oracle Database 12c binaries installed
4. Oracle Database named hol2068 installed
5. Oracle Snap Management Utility 1.2.2 installed
Provisioning Oracle Snap Management Utility

Oracle Snap Management Utility (SMU) for Oracle Database is a standalone management tool specifically engineered to work with the Oracle ZFS Storage Appliance. It provides the following:

- A simple, fast, efficient way to create and manage snapshot-based copies and clones of Oracle databases stored on Oracle ZFS Storage Appliance—all through the DBA’s console
- Support for any Oracle 10g, 11g, or 12c database deployed on Oracle ZFS Storage Appliance
- Support for importing RMAN backup images hosted on Oracle ZFS Storage Appliance
- Support for Oracle Solaris, Linux, and Windows clients and database hosts, for databases configured for NAS or SAN storage types
- Support for Oracle Real Application Clusters (RAC)
- Browser interface for easy user accessibility; command line interface for scripting

Oracle Snap Management Utility combines the underlying snapshot, clone, and rollback capabilities of the Oracle ZFS Storage Appliance with standard host-side processing to ensure all operations are consistent. With the Oracle Snap Management Utility, DBAs no longer need to be dependent on IT personnel to backup, restore, recover, or clone databases, allowing both DBAs and storage administrators to focus on their specialty while unburdening IT of time-consuming tasks.

Log in to the Browser User Interface

1. Open a web browser by double-clicking on the Firefox icon on the desktop.

2. Enter https://192.168.56.102:8443/smu into the web browser window.
3. In web browser, enter oracle as Username and oow as Password, then press the LOGIN button.

Add Database Host Account

1. Click on Accounts and then click on the green + icon underneath the Application Host Accounts tab.
2. In the window that appears, enter the following details:
   a. Account – oow2015-linux
   b. Host Name – oow2015-linux
   c. Protocol – SSH2
   d. Port – 22
   e. Delegation – SUDO
   f. User – oracle
   g. Password – oow

Add Storage Account
1. Click on the Storage Accounts tab and then click on the green + icon.
2. In the window that appears, enter the following details:
   a. Account – oow2015-zfssa
   b. Storage Name – oow2015-zfssa
   c. Port – 22
   d. User – oracle
   e. Password – oow
Provisioning Oracle Database 12c

A database named hol2068 has already been created on the Oracle Linux VM. For this lab, the database must first be put into archivelog mode in order to do online backups.

Note: the password for this VM is oow.

Terminal

Open a new terminal session by double-clicking on the Terminal icon on the desktop:

Initialize the Database

1. Use SQL*PLUS to interface with Oracle Database 12c.
   
   $ sqlplus / as sysdba

   SQL*Plus: Release 12.1.0.2.0 Production on Sat Aug 1 09:22:14 2015
   Copyright (c) 1982, 2014, Oracle.  All rights reserved.

   Connected to:
   Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production
   With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

2. Startup the database.

   SQL> startup;
   ORACLE instance started.
   Total System Global Area 734003200 bytes
   Fixed Size 2928728 bytes
   Variable Size 557846440 bytes
   Database Buffers 167772160 bytes
   Redo Buffers 5455872 bytes
   Database mounted.
   Database opened.

3. Put the database into archivelog mode. Please note that this creates inconsistent backups that allows the lab to be done using a live database.

   SQL> shutdown immediate;
   Database closed.
   Database dismounted.
   ORACLE instance shut down.

   SQL> startup mount;
   ORACLE instance started.
   Total System Global Area 734003200 bytes
   Fixed Size 2928728 bytes
Variable Size             557846440 bytes
Database Buffers          167772160 bytes
Redo Buffers                5455872 bytes
Database mounted.

SQL> alter database archivelog;
Database altered.

SQL> alter database open;

Create a New Tablespace
1. Create a new tablescape called hol2068

   SQL> create bigfile tablespace hol2068 datafile
       '/zfssa/hol2068/datafiles/hol2068.dbf' size 100M;
   Tablespace created.

2. Verify the tablespace exists.

   SQL> select tablespace_name from dba_tablespaces;

   TABLESPACE_NAME
   ----------------------------------
   SYSTEM
   SYSAUX
   UNDOTBS1
   TEMP
   USERS
   HOL2068

3. Exit SQL*PLUS

   SQL> quit
Oracle Database 12c Hosted on Oracle ZFS Storage Appliance
Oracle Snap Management Utility can work with either an Oracle Database hosted on Oracle ZFS Storage Appliance, or an RMAN image that is residing on Oracle ZFS Storage Appliance. This section walks through the first use case.

Import the Database
1. From within SMU, click on Applications under Workgroup and then click on the green + icon.

2. In the window that appears, enter the following details:
   a. Name – hol2068
   b. SID/SID Prefix – hol2068
   c. Listener Port – 1521
   d. Password – oow
   e. Host Account – oow2015-linux
   f. Storage Account – oow2015-zfssa

Create a Snap Backup
1. Click on the newly created hol2068 account listed under Applications on the left side of the screen. Then click on the green + icon.
2. In the window that appears, enter the following details:
   a. Name - hol2068sb
   b. Type - Online

3. The snap backup will begin executing and its status will be shown in the Tasks section at the bottom of the screen. Click on the green checkmark icon to view the Task Output.
4. Once complete, a green flag icon should appear under Status.

Delete the Tablespace

1. From the terminal, use SQL*PLUS to interface with Oracle Database 12c.

   ```bash
   $ sqlplus / as sysdba
   
   SQL*Plus: Release 12.1.0.2.0 Production on Sat Aug 1 09:22:14 2015
   
   Copyright (c) 1982, 2014, Oracle. All rights reserved.
   
   Connected to:
   Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production
   With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options
   
   2. Use the drop command to delete the tablespace.

      SQL> drop tablespace hol2068;
   
      Tablespace dropped.
3. Verify the tablespace has been purged.
   SQL> select tablespace_name from dba_tablespaces;

   TABLESPACE_NAME
   -------------------
   SYSTEM
   SYSAUX
   UNDOTBS1
   TEMP
   USERS

4. Exit SQL*PLUS
   SQL> quit

Restore from Snap Backup
1. From within SMU, click on the blue half-circular arrow icon to restore the snap backup from hol2068sb

   ![SMU interface showing the restore process]

   2. Click OK to confirm.

Verify the Snap Backup
1. Use SQL*PLUS to interface with Oracle Database 12c.
   $ sqlplus / as sysdba

   SQL*Plus: Release 12.1.0.2.0 Production on Sat Aug 1 09:22:14 2015

   Copyright (c) 1982, 2014, Oracle. All rights reserved.

   Connected to:  
   Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production  
   With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options
2. Verify tablespace hol2068 has returned.
   SQL> select tablespace_name from dba_tablespaces;

   TABLESPACE_NAME
              -------------------------------
              SYSTEM
              SYSAUX
              UNDOTBS1
              TEMP
              USERS
              HOL2068

3. Exit SQL*PLUS
   SQL> quit

Create a Clone
   1. From within SMU, click on the Clone icon to create a primary clone.

   2. In the window that appears, enter the following details, then click Next.
      a. Host Account - oow2015-linux
      b. Application Name - hol2068c
      c. Database Name - hol2068c
      d. SID/SID Prefix - hol2068c
      e. Listener Port - 1521
      f. Open Mode - Read Write
      g. Database Home - /u01/app/oracle/product/12.1.0/dbhome_1
      h. Password - oow
3. Click Finish to confirm.

Verify Clone Functionality
1. From the terminal, switch the ORACLE_SID to the newly created clone.
   
   $ export ORACLE_SID=hol2068c

2. Use SQL*PLUS to interface with Oracle Database 12c.
   
   $ sqlplus / as sysdba
3. List the available tablespaces.

    SQL> select tablespace_name from dba_tablespaces;

    TABLESPACE_NAME
    ---------------------
    SYSTEM
    SYSAUX
    UNDOTBS1
    TEMP
    HOL2068

4. Exit SQL*PLUS

    SQL> quit
Oracle Database 12c RMAN Backup Hosted on Oracle ZFS Storage Appliance

Create an RMAN Backup from Clone

1. An RMAN backup script has already been created for this lab. It is named imagecopy.rman and can be found in the /home/oracle directory. Use cat to view its contents.

   $ cat imagecopy.rman
   configure controlfile autobackup on;
   run {
      set nocfau;
      allocate channel ch01 device type disk format '/zfssa/hol2068/rman01/%U';
      allocate channel ch02 device type disk format '/zfssa/hol2068/rman02/%U';
      backup as copy database channel ch01 plus archivelog channel ch02;
      backup as copy current controlfile channel ch01;
   }

2. Execute this script using the following commands from the terminal.

   $ export ORACLE_SID=hol2068c
   $ rman target / cmdfile=imagecopy.rman

Deprovision the Clone

1. From within SMU, select the downward arrow next to hol2068 to expose its clone, hol2068c. Select hol2068c and click on the black X icon to deprovision.

2. Enter the clone name hol2068c and click OK to confirm.
Import the RMAN Backup

1. Click on Applications under Workgroup and then click on the downward green arrow icon to import an RMAN image.

2. In the window that appears, enter the following details, then click Next.
   - a. Storage – oow2015-zfssa
   - b. RMAN Image Path – /export/hol2068/rman01,/export/hol2068/rman02

3. On the next screen, enter the following details and click Next.
   - a. Host Account – oow2015-linux
   - b. Account Name – hol2068c
   - c. Database Name – hol2068c
   - d. SID/SID Prefix – hol2068c
   - e. Listener Port – 1521
   - f. Open Mode – Read Write
   - g. Database Home – /u01/app/oracle/product/12.1.0/dbhome_1
   - h. Password – oow
4. Click Finish to complete.

5. The imported RMAN image is now available for snap backups and restores.
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