Setting Up the Dell™ DR Series System as an NFS or CIFS Backup Target on Oracle Recovery Manager®

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Executive summary

This paper provides guideline about how to set up the Dell DR Series System as a backup to disk target for RMAN® over CIFS/Rapid CIFS and NFS/Rapid NFS.

For additional information, see the DR Series system documentation and other data management application best practices whitepapers for your specific DR Series system at:

http://www.dell.com/powervaultmanuals

Note: The DR Series System/RMAN build version and screenshots used for this paper may vary slightly, depending on the version of the DR Series System/ RMAN software version used.

About RMAN

RMAN (Recovery Manager) is a backup and recovery manager supplied for Oracle databases by the Oracle Corporation. Oracle Corporation recommends RMAN as its preferred method for backup and recovery and has written command-line and graphical (via Oracle Enterprise Manager) interfaces for the product. The following illustration shows a typical implementation of the backup infrastructure with the Dell DR Series system. The DR Seriees system offers optimized replication of data from one system to another over the WAN for disaster recovery.
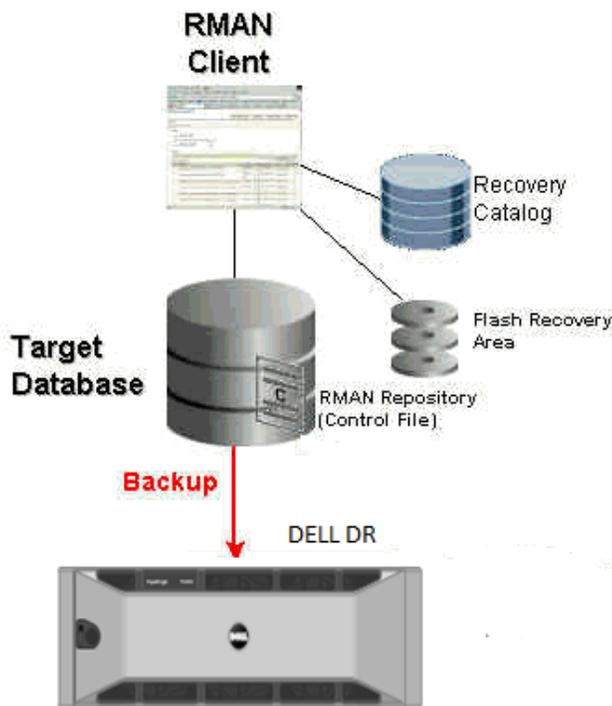
Dell DR Series System: RMAN: Baseline Scenarios

1   Installing and configuring the DR Series system

1. Rack and cable the DR Series system, and power it on. Initialize the DR Series system.

   In the *Dell DR Series System Administrator Guide*, refer to the following topics: "iDRAC Connection", "Logging in and Initializing the DR Series System and "Accessing IDRAC6/Idrac7 Using RACADM" for more information.

2. Log on to iDRAC using the default address **192.168.0.120**, or the IP address that is assigned to the iDRAC interface, with the user name and password: "**root/calvin**".
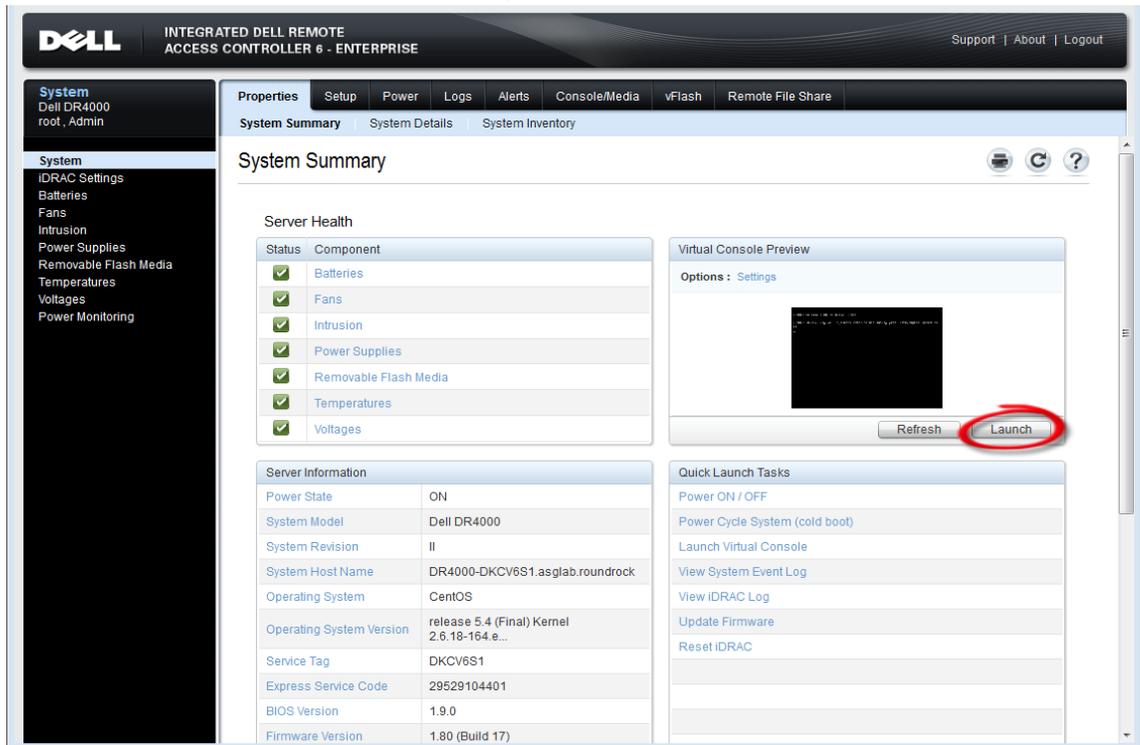
3. Launch the virtual console.
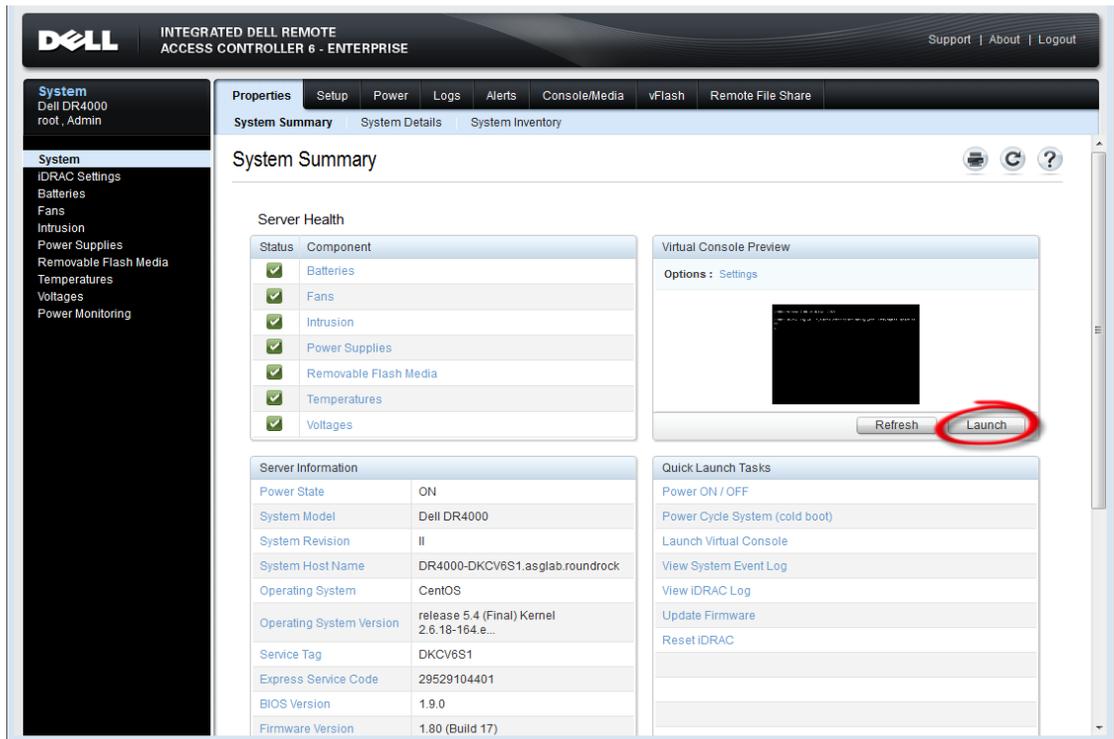
4. After the virtual console is open, log on to the system as user **administrator** with the password **St0r@ge!** (The "0" in the password is the numeral zero).

5. Set the user-defined networking preferences.
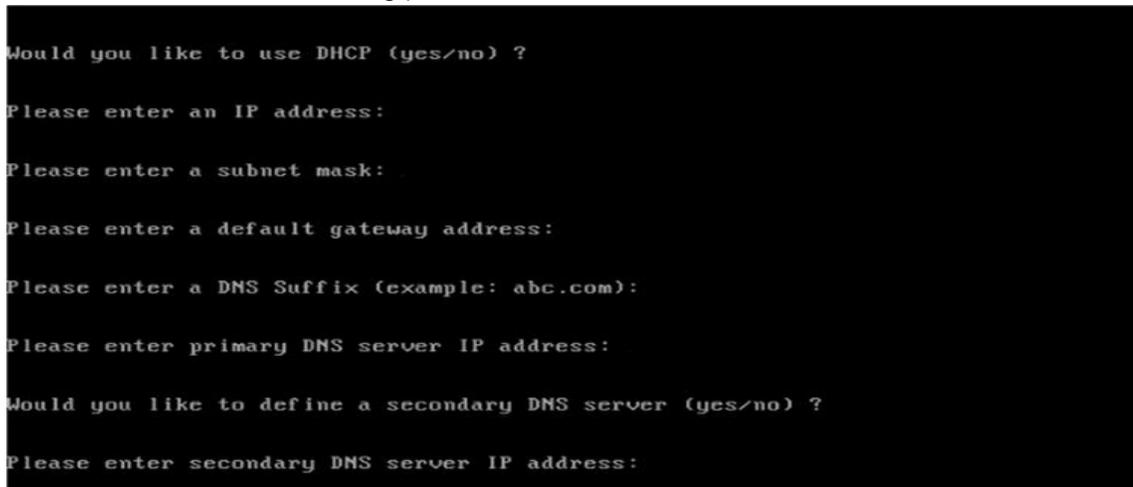
6. View the summary of preferences and confirm that it is correct.
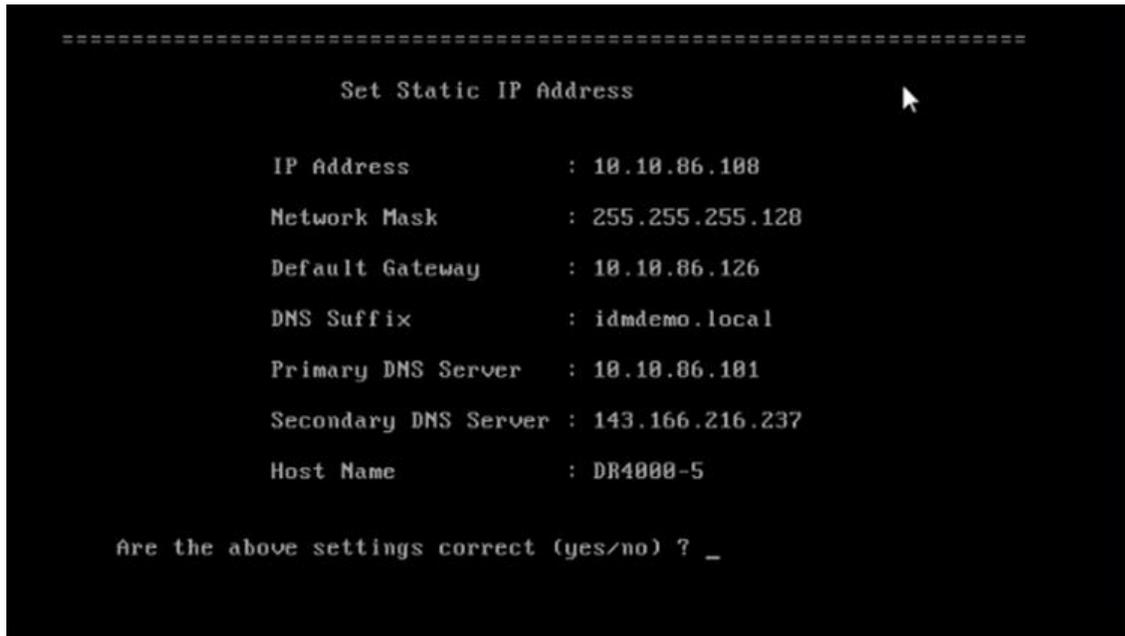
7. Log on to DR Series system administrator console using the IP address you just provided for the DR Series system with the username **administrator** and password **St0r@ge!** (The "0" in the password is the numeral zero.).
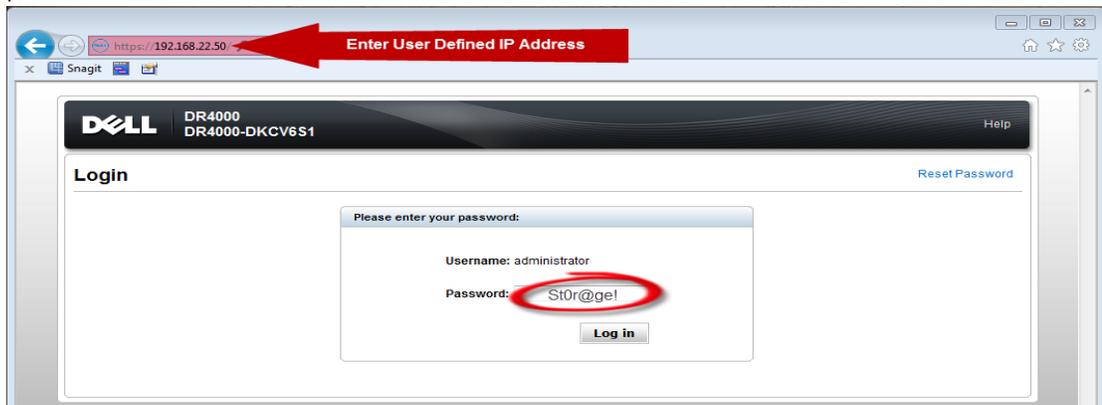
8. Join the DR Series system to Active Directory.

Note: If you do not want to add the DR Series system to Active Directory, please see the *DR Series System Owner's Manual* for guest logon instructions.

a. Under System Configuration in the left navigation area, click **Active Directory**.
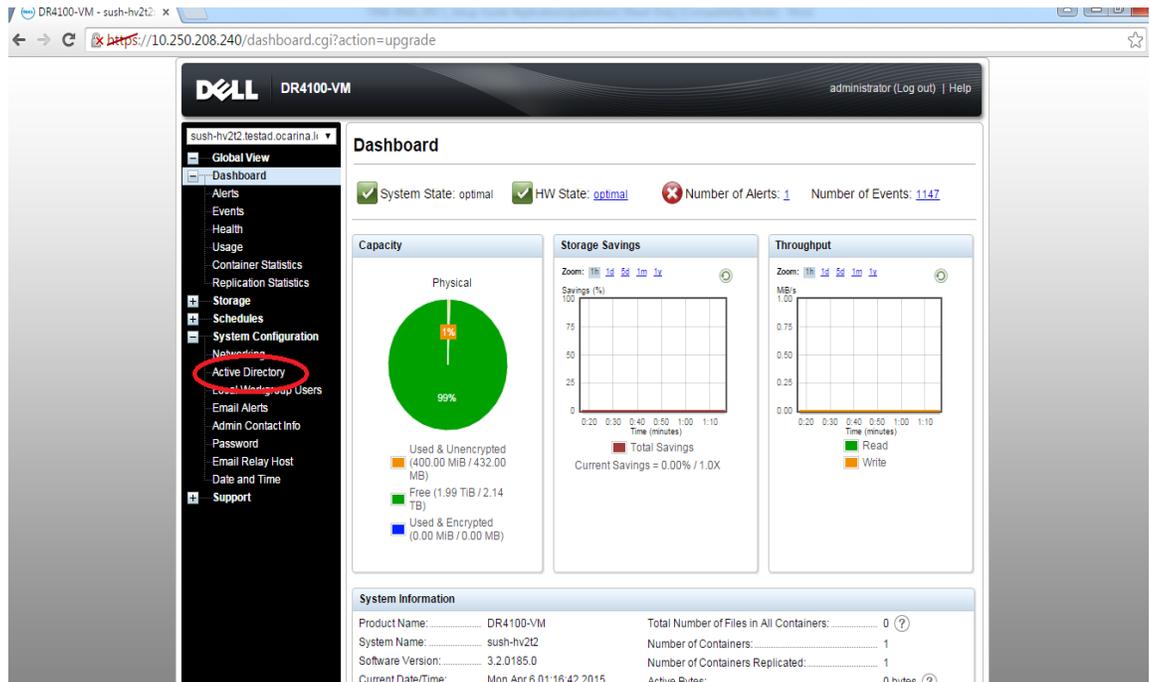
b. Enter your Active Directory credentials.
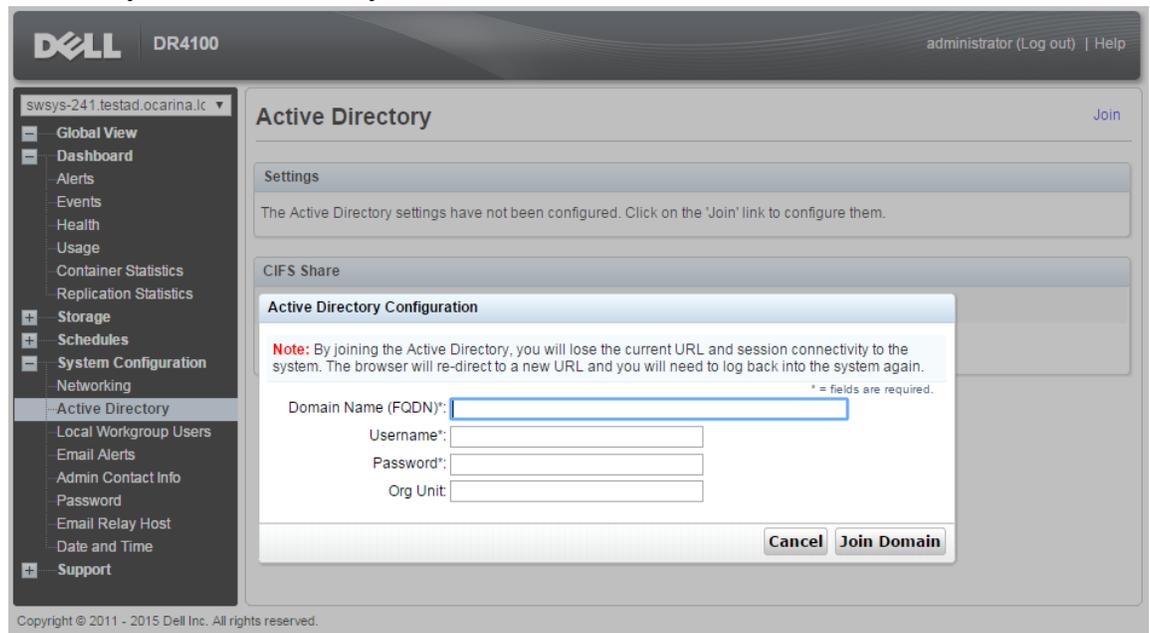
9. Create and mount the container by selecting **Storage** > **Containers** in the left navigation area, and then clicking **Create** at the top of the page.

10. Enter a Container Name, click **Next**.

11. Select the **NAS (NFS, CIFS)** option and click **Next**.

12. Enable the access protocols as needed, and then click **Next**.
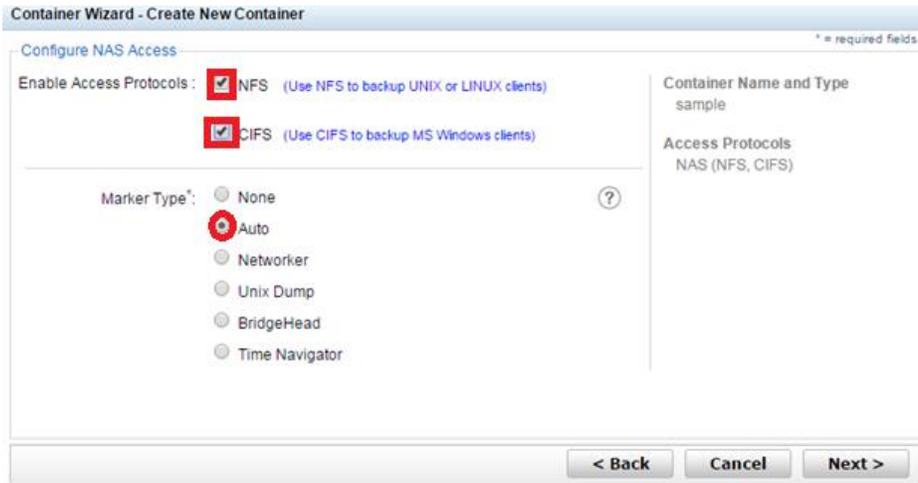
13. For NFS, provide the client access information and click **Next**.
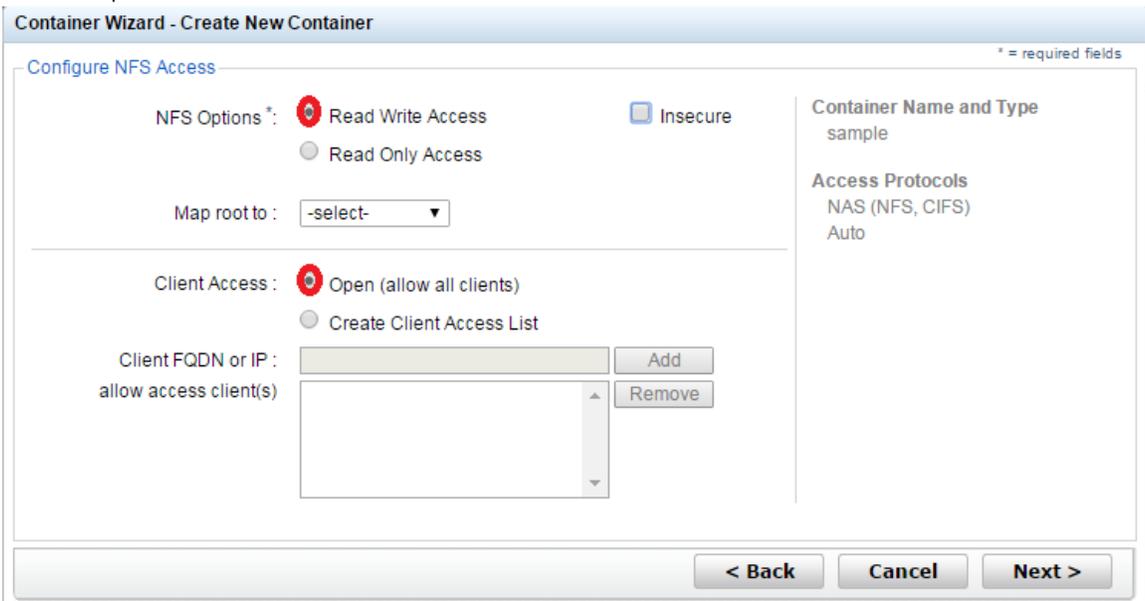
14. For CIFS, provide the client access control information and click **Next**.
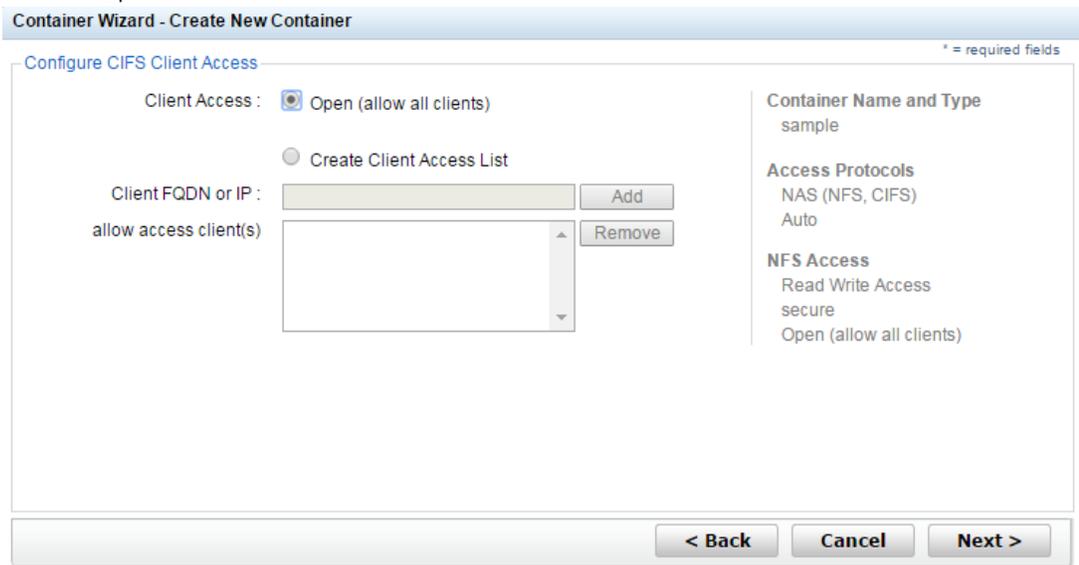
Note: For improved security, Dell recommends adding IP addresses for the Backup console (RMAN). Not all environments will have all components.

15. Click **Create a New Container**, and then confirm that the container is added.

16. Select the Container that was just created and click **Edit.** Note the container share/export path, which you will use later to target the DR Series system.

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2 Configuring a backup job on RMAN over a CIFS target

2.1 Oracle settings for Windows RMAN Online Backup

There are two options for RMAN to authenticate to the DR Series system through CIFS.

- <u>DR is joined into an Active Directory Domain</u>: Integrate RMAN Node and DR Series System with Active Directory

  - Ensure the AD user has appropriate ACLs to the DR Series System Container share

- <u>DR is standalone CIFS server</u>: Make sure this CIFS user has appropriate access permission to the DR Series system container share. Oracle RMAN Backup Node will use this user to authenticate to DR Series system share in Workgroup mode.

  - To set the password for local CIFS administrator on the DR Series system, log on to the DR using SSH.
    i. Log on with the username Administrator, and password St0r@ge!
    ii. Run the following command:

       ```
       authenticate --set --user administrator
       ```

> **Note**: The CIFS administrator account is a separate account from the administrator account used to administer the appliance. After an authentication method is chosen, set the RMAN Oracle service account to use the CIFS administrator account.

2.2 Default RMAN backup configuration

The Default settings for RMAN are listed below with command show all.

2.3 RMAN backup settings to DR Series system backup

The RMAN backup settings changed for taking backup to Dell DR Server systems over CIFS.

1. Configure channel to use UNC path of the DR Series system container.

```
CONFIGURE CHANNEL DEVICE TYPE DISK MAXOPENFILES 1 FORMAT '\\<UNCPath to
the container noted above >/ora_df%t_s%s_s%p';
```

2. Configure RMAN to back up the control file after each backup.

2.4   RMAN backup of full database

Backup Oracle Database using RMAN with BACKUP INCRMENTAL LEVEL 0 DATABASE FILESPERSET 1;

2.5   RMAN incremental backup of database

Incremental Backup Oracle Database using RMAN with BACKUP INCRMENTAL LEVEL 1 DATABASE
FILESPERSET 1;

```
Administrator: Command Prompt - rman

RMAN> BACKUP INCREMENTAL LEVEL 1 DATABASE FILESPERSET 1;

Starting backup at 11-JUN-14
using channel ORA_DISK_1
channel ORA_DISK_1: starting incremental level 1 datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
input datafile file number=00004 name=E:\APP\ADMINISTRATOR\ORADATA\CIFS\USERS01.DBF
channel ORA_DISK_1: starting piece 1 at 11-JUN-14
channel ORA_DISK_1: finished piece 1 at 11-JUN-14
piece handle=\\SWSYS-33.OCARINA.LOCAL\BACKUP\ORA_DF849927481_S36_S1 tag=TAG20140611T025800 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:07
channel ORA_DISK_1: starting incremental level 1 datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
input datafile file number=00001 name=E:\APP\ADMINISTRATOR\ORADATA\CIFS\SYSTEM01.DBF
channel ORA_DISK_1: starting piece 1 at 11-JUN-14
channel ORA_DISK_1: finished piece 1 at 11-JUN-14
piece handle=\\SWSYS-33.OCARINA.LOCAL\BACKUP\ORA_DF849927488_S37_S1 tag=TAG20140611T025800 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01
channel ORA_DISK_1: starting incremental level 1 datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
input datafile file number=00002 name=E:\APP\ADMINISTRATOR\ORADATA\CIFS\SYSAUX01.DBF
channel ORA_DISK_1: starting piece 1 at 11-JUN-14
channel ORA_DISK_1: finished piece 1 at 11-JUN-14
piece handle=\\SWSYS-33.OCARINA.LOCAL\BACKUP\ORA_DF849927489_S38_S1 tag=TAG20140611T025800 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01
channel ORA_DISK_1: starting incremental level 1 datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
input datafile file number=00003 name=E:\APP\ADMINISTRATOR\ORADATA\CIFS\UNDOTBS01.DBF
channel ORA_DISK_1: starting piece 1 at 11-JUN-14
channel ORA_DISK_1: finished piece 1 at 11-JUN-14
piece handle=\\SWSYS-33.OCARINA.LOCAL\BACKUP\ORA_DF849927490_S39_S1 tag=TAG20140611T025800 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01
Finished backup at 11-JUN-14

Starting Control File and SPFILE Autobackup at 11-JUN-14
piece handle=C:\APP\ADMINISTRATOR\PRODUCT\11.2.0\DBHOME_3\DATABASE\C-1234308199-20140611-01 comment=NONE
Finished Control File and SPFILE Autobackup at 11-JUN-14

RMAN>
```

2.6 Backup with different options

BACKUP ARCHIVELOG ALL;

BACKUP DATABASE PLUS ARCHIVELOG;

2.7 RMAN restore of Oracle database from DR Series system

The following screen shot shows the restore process of Oracle Database through RMAN from DR Series system images.

```
Administrator: C:\Windows\system32\cmd.exe - rman                                    _ □ ✕

RMAN> restore database;

Starting restore at 11-JUN-14
using target database control file instead of recovery catalog
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=129 device type=DISK

channel ORA_DISK_1: starting datafile backup set restore
channel ORA_DISK_1: specifying datafile(s) to restore from backup set
channel ORA_DISK_1: restoring datafile 00001 to E:\APP\ADMINISTRATOR\ORADATA\DEMO\SYSTEM01.DBF
channel ORA_DISK_1: reading from backup piece \\SWSYS-58.OCARINA.LOCAL\BACKUP\ORA_DF849935901_S5_S1
channel ORA_DISK_1: piece handle=\\SWSYS-58.OCARINA.LOCAL\BACKUP\ORA_DF849935901_S5_S1 tag=TAG20140611T051821
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:14
channel ORA_DISK_1: starting datafile backup set restore
channel ORA_DISK_1: specifying datafile(s) to restore from backup set
channel ORA_DISK_1: restoring datafile 00002 to E:\APP\ADMINISTRATOR\ORADATA\DEMO\SYSAUX01.DBF
channel ORA_DISK_1: reading from backup piece \\SWSYS-58.OCARINA.LOCAL\BACKUP\ORA_DF849935916_S6_S1
channel ORA_DISK_1: piece handle=\\SWSYS-58.OCARINA.LOCAL\BACKUP\ORA_DF849935916_S6_S1 tag=TAG20140611T051821
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:03
channel ORA_DISK_1: starting datafile backup set restore
channel ORA_DISK_1: specifying datafile(s) to restore from backup set
channel ORA_DISK_1: restoring datafile 00003 to E:\APP\ADMINISTRATOR\ORADATA\DEMO\UNDOTBS01.DBF
channel ORA_DISK_1: reading from backup piece \\SWSYS-58.OCARINA.LOCAL\BACKUP\ORA_DF849935920_S7_S1
channel ORA_DISK_1: piece handle=\\SWSYS-58.OCARINA.LOCAL\BACKUP\ORA_DF849935920_S7_S1 tag=TAG20140611T051821
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:01
channel ORA_DISK_1: starting datafile backup set restore
channel ORA_DISK_1: specifying datafile(s) to restore from backup set
channel ORA_DISK_1: restoring datafile 00004 to E:\APP\ADMINISTRATOR\ORADATA\DEMO\USERS01.DBF
channel ORA_DISK_1: reading from backup piece \\SWSYS-58.OCARINA.LOCAL\BACKUP\ORA_DF849935921_S8_S1
channel ORA_DISK_1: piece handle=\\SWSYS-58.OCARINA.LOCAL\BACKUP\ORA_DF849935921_S8_S1 tag=TAG20140611T051821
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:01
Finished restore at 11-JUN-14

RMAN>
```

2.8 RMAN restore of archive logs from DR Series system images

```
RMAN> RESTORE ARCHIVELOG ALL;

Starting restore at 18-JUN-14
using channel ORA_DISK_1

channel ORA_DISK_1: starting archived log restore to default destination
channel ORA_DISK_1: restoring archived log
archived log thread=1 sequence=23
channel ORA_DISK_1: restoring archived log
archived log thread=1 sequence=24
channel ORA_DISK_1: restoring archived log
archived log thread=1 sequence=25
channel ORA_DISK_1: restoring archived log
archived log thread=1 sequence=26
channel ORA_DISK_1: restoring archived log
archived log thread=1 sequence=27
channel ORA_DISK_1: restoring archived log
archived log thread=1 sequence=28
channel ORA_DISK_1: restoring archived log
archived log thread=1 sequence=29
channel ORA_DISK_1: reading from backup piece
\\10.250.242.108\ORARDCIFS\LARGE_DF850522883_S6_S1
channel ORA_DISK_1: piece
handle=\\10.250.242.108\ORARDCIFS\LARGE_DF850522883_S6_S1 tag=TAG20140618T002123
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:10
channel ORA_DISK_1: starting archived log restore to default destination
channel ORA_DISK_1: restoring archived log
archived log thread=1 sequence=30
```

```
channel ORA_DISK_1: reading from backup piece
\\10.250.242.108\ORARDCIFS\LARGE_DF850522946_S9_S1
channel ORA_DISK_1: piece
handle=\\10.250.242.108\ORARDCIFS\LARGE_DF850522946_S9_S1 tag=TAG20140618T002226
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:01
Finished restore at 18-JUN-14

RMAN>
```

To restore archive logs to a different location, use the following RMAN command. The default location of the archive log restore will be where they are created.

```
RUN
  {
      SET ARCHIVELOG DESTINATION TO '/oracle/temp_restore';
      RESTORE ARCHIVELOG ALL;
  }
```

3 Replicating Oracle RMAN database images

First, you need to create containers on the source and target DR Series systems and then configure replication between those source and target DR containers. Both of the DR Series systems should be on the same version. Refer to the *Dell DR Series System Administrator's Guide* for information about configuring cascaded replication.
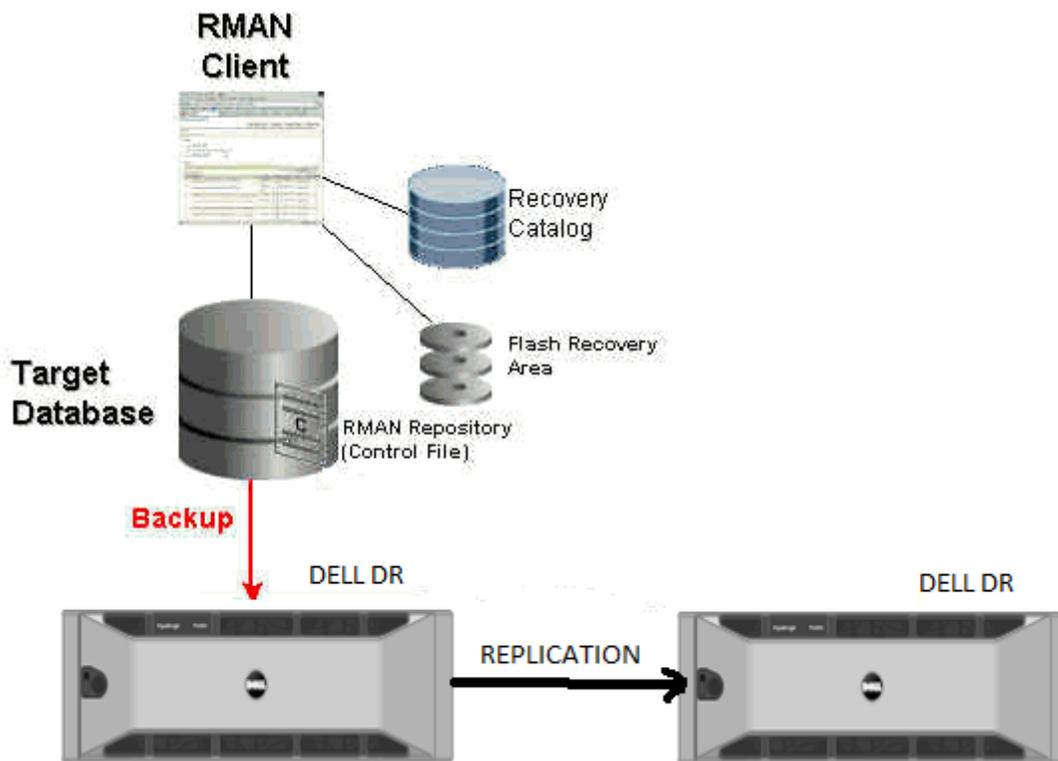
Replication of Oracle Database to target DR Series system

3.1 RMAN restore from replication DR Series system container

To restore the Oracle Database from replication container, first detach the replication on the target container, and run the following commands to import the backup images into the RMAN Catalog.

```
RMAN> catalog start with '<UNC Path of the DR replication container>';

Searching for all files that match the pattern <UNC Path of the DR replication
container>

List of Files Unknown to the Database
=====================================
File Name<UNC Path of the DR replication container>\ORA_DF848183546_S112_S1
File Name: <UNC Path of the DR replication container>\ORA_DF848183663_S114_S1
File Name: <UNC Path of the DR replication container>\ORA_DF848183662_S113_S1
```

```
Do you really want to catalog the above files (enter YES or NO)? yes
Cataloging files...
Cataloging done

List of Cataloged Files
=========================
File Name: <UNC Path of the DR replication container>\ORA_DF848183546_S112_S1
File Name: <UNC Path of the DR replication container>\ORA_DF848183663_S114_S1
File Name: <UNC Path of the DR replication container>\ORA_DF848183662_S113_S1
```

4 Configuring a backup job on RMAN over an NFS target

4.1 Create a storage device for NFS

For NFS backup using RMAN, a target folder needs to be created as an NFS share directory. This is the location to which backup objects will be written. (This is not required while adding CIFS share.)

1. Mount the DR Series System NFS share onto the NFS share directory which backup objects will be written in the RMAN environment.
2. For example:

   ```
   mount –t nfs <ip address of DRXXXX>:/containers/sample
   /mnt/RMANtargetContainer
   ```

3. Verify the NFS share. One way is to try using the Linux command "cat /proc/mounts". The rsize and wsize of the connects in the command output should be 512K.

In the RMAN settings use the below command to add the NFS mount path as device.

```
CONFIGURE CHANNEL DEVICE TYPE DISK MAXOPENFILES 1 FORMAT   '/<Mount point path
on RMAN server>/ora_df%t_s%s_s%p';
```

> **Note**: Please follow the instructions in Section 3 as the backup and other settings are the same as that of CIFS.

5 Creating a storage device for Rapid CIFS

5.1 About the Rapid CIFS plugin

Rapid CIFS enables write operation acceleration on clients that use CIFS file system protocols. These accelerators allow for better coordination and integration between DR Series systems backup, restore, and optimized duplication operations with Data Management Applications (DMAs) such as CommVault, EMC Networker, and Tivoli Storage Manager. For a current list of supported DMAs, see the *Dell DR Series System Interoperability Guide*. Rapid CIFS is a Windows-certified filter driver that ensures that only unique data is written to the DR Series system. All chunking and hash computations are done at the client level.

5.2 Configure Rapid CIFS

To configure Rapid CIFS on windows operating systems download and install the plugin DellRapidCIFS-xxxxx.msi on the Oracle server.

Refer to the *Dell DR Series System Administrator's Guide* for the download location and for more information.

Below is the output for Rapid CIFS configured backup.

```
RMAN> BACKUP INCREMENTAL LEVEL 1 DATABASE filesperset 1;
Starting backup at 02-JUN-14
using channel ORA_DISK_1
channel ORA_DISK_1: starting incremental level 1 datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
input datafile file number=00001
name=E:\APP\ADMINISTRATOR\ORADATA\BLOCK\SYSTEM01.DBF
channel ORA_DISK_1: starting piece 1 at 02-JUN-14
channel ORA_DISK_1: finished piece 1 at 02-JUN-14
piece handle=\\SWSYS-33.OCARINA.LOCAL\BACKUP\ORA_DF849163738_S17_S1
tag=TAG20140602T064858 comment=NONE
----------------Screen O/P truncated----------------------
Starting Control File and SPFILE Autobackup at 02-JUN-14
piece handle=C:\APP\ADMINISTRATOR\PRODUCT\11.2.0\DBHOME_3\DATABASE\C-1689233326-
20140602-03 comment=NONE
Finished Control File and SPFILE Autobackup at 02-JUN-14
```

To check the Client Side optimization:

```
C:\Program Files\Dell\Rapid CIFS>rdcifsctl.exe stats -s
Aggregate Statistics:
  Total Bytes Written: 2,411,298,816
    Total Bytes Sent: 1,378,067,343
Total Network Savings: 42.8496


C:\Program Files\Dell\Rapid CIFS>rdcifsctl.exe stats -s
Aggregate Statistics:
Total Bytes Written: 2,412,691,456
Total Bytes Sent: 1,379,461,495
Total Network Savings: 42.8248
```

6 Creating a storage device for Rapid NFS

6.1 About the Rapid NFS plugin

Rapid NFS enables write operation acceleration on clients that use NFS file system protocols. These accelerators allow for better coordination and integration between DR Series systems backup, restore, and optimized duplication operations with Data Management Applications (DMAs) such as CommVault, EMC Networker, and Tivoli Storage Manager. For the current list of supported DMAs, see the *Dell DR Series System Interoperability Guide*.

Rapid NFS is a client file system type that ensures that only unique data is written to the DR Series system. It uses user space components and file system in user space (FUSE) to accomplish this. Metadata operations such as file creates and permission changes go through the standard NFS protocol, whereas write operations go through Rapid NFS.

6.2 Configuring Rapid NFS

For Rapid NFS to configure on Linux system we need to install plugin bin file, DellRapidNFS-xxxxx-xxxxx-x86_64.bin.The rpm after install looks like DellRapidNFS-310093.0-52425.x86_64.

1. To mount as Rapid NFS:

   ```
   mount -t rdnfs <ip address of DRXXXX>:/containers/sample
   /mnt/RMANtargetContainer
   ```

2. Verify the NFS share. One way is to try using the Linux command "cat /proc/mounts". The rsize and wsize of the connects in the command output should be 512K.

Refer to the *Dell DR Series System Administrator's Guide* for the download location and for more information.

7 General best practices for RMAN backups to the DR Series system

The Dell DR Series system supports RMAN backups over both CIFS and NFS protocols. With client side optimization drivers like Rapid CIFS and Rapid NFS backups become faster and more efficient. Several options exist with RMAN that every DBA should be aware of. These effect how RMAN behaves when performing its backup duties. Some of the most important are outlined here because they affect how RMAN will interact with a Dell DR Series deduplication appliance. Refer to Oracle's documentation for more details.

Multiplexing of data is not recommended as it adversely affects the deduplication savings. Every time data gets multiplexed, the patterns may change, and the deduplication algorithm can fail to decipher the duplicates. Specify **FILESPERSET = 1** when backing up to a DR Series system. FILESPERSET controls how many data files are written to a particular file within the backup set.

- Backup database FILESPERSET=1

  Specify **MAXOPENFILES = 1** for each channel defined. This will ensure that each RMAN channel only reads from a single file at any one time. It is recommended to keep the value at minimum.

- CONFIGURE CHANNEL DEVICE TYPE DISK MAXOPENFILES 1 FORMAT   '<UNCPath of the DR container>/ora_df%t_s%s_s%p';
- Turn on change block tracking by using below command.

  SQL> ALTER DATABASE ENABLE BLOCK CHANGE TRACKING USING FILE '<Path on the   RMAN server Oracle Home>/oradata/rman_change_track.f';

- Configure RMAN settings to backup control file and SPFILE.

  Auto backup on
  CONFIGURE CONTROLFILE AUTOBACKUP ON;
  Keep CONFIGURE BACKUP OPTIMIZATION OFF every time for better savings.

  RMAN **encryption** should NOT be used as the deduplication savings get affected.

A listing of the global parameters can be generated by the "show all" RMAN command:

```
RMAN> show all;

RMAN configuration parameters for database with db_unique_name APPLE are:
CONFIGURE RETENTION POLICY TO REDUNDANCY 1; # default
CONFIGURE BACKUP OPTIMIZATION OFF; # default
CONFIGURE DEFAULT DEVICE TYPE TO DISK; # default
CONFIGURE CONTROLFILE AUTOBACKUP ON;
CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK TO '%F'; # default
CONFIGURE DEVICE TYPE DISK PARALLELISM 1 BACKUP TYPE TO BACKUPSET; # default
CONFIGURE DATAFILE BACKUP COPIES FOR DEVICE TYPE DISK TO 1; # default
CONFIGURE ARCHIVELOG BACKUP COPIES FOR DEVICE TYPE DISK TO 1; # default
CONFIGURE CHANNEL DEVICE TYPE DISK FORMAT   '/mnt/apple_nfs/apple_%u_%s_%p';
CONFIGURE MAXSETSIZE TO UNLIMITED; # default
CONFIGURE ENCRYPTION FOR DATABASE OFF; # default
CONFIGURE ENCRYPTION ALGORITHM 'AES128'; # default
```

```
CONFIGURE COMPRESSION ALGORITHM 'BASIC' AS OF RELEASE 'DEFAULT' OPTIMIZE FOR
LOAD TRUE ; # default
CONFIGURE ARCHIVELOG DELETION POLICY TO NONE; # default
CONFIGURE SNAPSHOT CONTROLFILE NAME TO
'/home/orabase/product/11.2.0/db_1/dbs/snapcf_apple.f'; # default
```

8 Setting up the DR Series system cleaner

Performing scheduled disk space reclamation operations are recommended as a method for recovering disk space from system containers in which files were deleted as a result of deduplication.

The cleaner runs during idle time. If your workflow does not have a sufficient amount of idle time on a daily basis, then you should consider scheduling the cleaner to force it to run during a scheduled time.

If necessary, you can perform the procedure shown in the following screenshot to force the cleaner to run. After all of the backup jobs are set up, the DR Series system cleaner can be scheduled. The DR Series system cleaner should run at least three hours per day when backups are not taking place, and generally after a backup job has completed.

Dell recommends scheduling the cleaner at a separate time from backup and replication jobs.
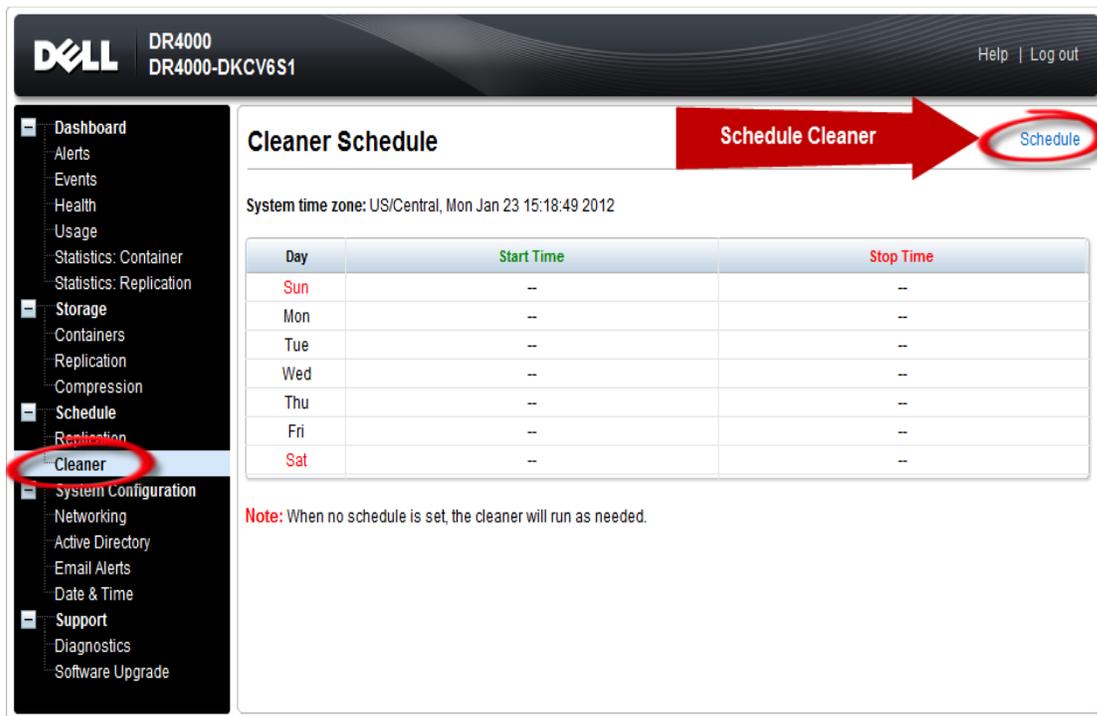
9 Monitoring deduplication, compression, and performance

After backup jobs have run, the DR Series system tracks capacity, storage savings, and throughput on the DR Series system dashboard. This information is valuable in understanding the benefits of the DR Series system.

Note: Deduplication ratios increase over time. It is not uncommon to see a 2-4x reduction (25-50% total savings) on the initial backup. As additional full backup jobs are completed, the ratios will increase. Backup jobs with a 12-week retention will average a 15x ratio, in most cases.