



Best Practices for Setting up NetVault SmartDisk on a DR Disk Backup Appliance

A Dell Technical White Paper

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Introduction

The Dell™ DR4X00 is a high-performance, disk-based backup and recovery appliance that delivers innovative features such as inline deduplication and compression, advanced data protection, and replication. Additionally, the management features, ease of deployment, and an architecture that enables core backup data to remain on disk and online longer can help organizations reduce the complexity associated with backup.

Combined with the power of NetVault SmartDisk, the Dell DR4X00 provides customers with a unique solution stack enabling them to protect data and meet demanding RPO and RTO goals with simplicity and speed.

This not only enables customers to realize lower costs to own and operate data protection functions it also helps customers realize higher and more effective initial investment returns as the integrated solution provides a single point for both software and infrastructure scale and support.

This paper is intended for technical sales, solution architects, backup administrators, system administrators, and IT managers who need to understand how to design and deploy the Dell DR4X00 Advanced Disk Backup & Disaster Recovery Solution with NetVault SmartDisk. Readers should have a working knowledge of DR4X00 disk based backup storage appliance, NetVault Backup, and NetVault SmartDisk software application as well as related backup and disaster recovery operations best practices.

The primary goal of this paper is to provide a step-by step install/configure guide of the DR4X00 with NetVault SmartDisk. In addition, the guide will illustrate key technical considerations and best practices involved in deployment/configuration process of the DR4X00 and NetVault SmartDisk solution.



Executive Summary

This paper provides detailed information about how to set up a Dell™ DR Series Disk Backup Appliance as a target for NetVault® SmartDisk software. In this configuration, NetVault SmartDisk is configured for target object store use for data protection operations. This enables the user to have a simple factoring method for using the storage footprint made available by containers hosted on the DR4X00 backup appliance. See Figure 1 below which illustrates the DR4X00-NetVault SmartDisk Scenario.

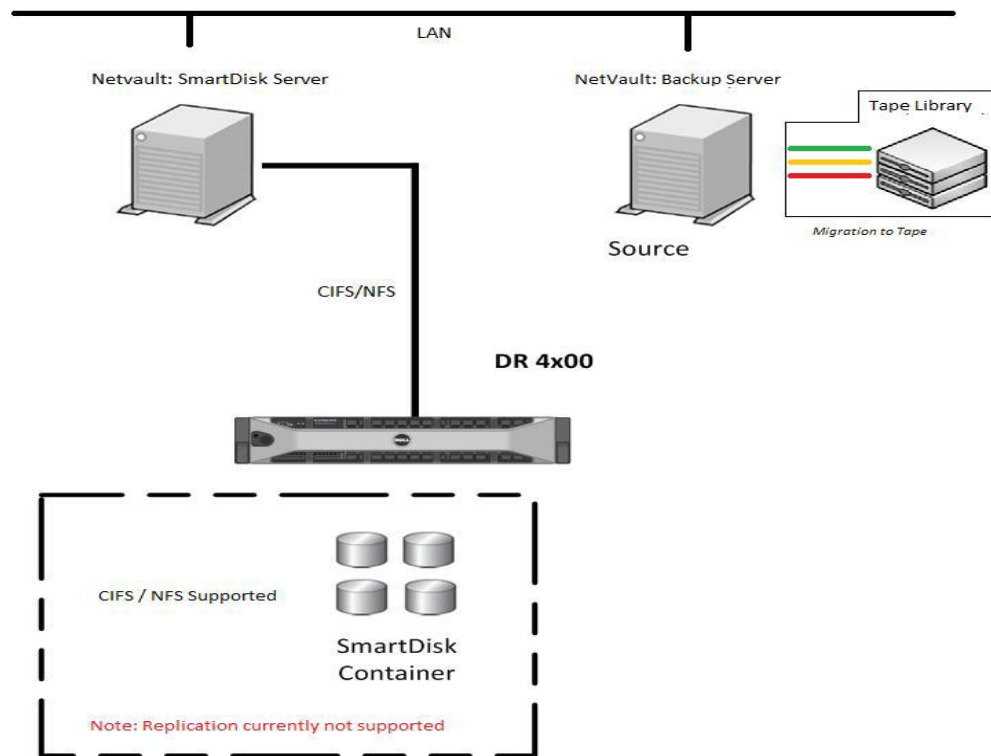


Figure 1: DR4X00-NetVault SmartDisk Scenario.

NOTES:

- The DR4X00 build version and screen shots used for this paper may vary slightly, depending on the version of the DR4X00 operating system.
- See NetVault DR Series Backup Appliance Application notes, DR4X00 and NetVault SmartDisk documentation for additional information.

1 Technical Setup/configuration Best Practices

This section highlights key configuration and setup best practices to successfully add the DR backup Disk appliance for the use with NetVault Backup and NetVault SmartDisk. Please review this section carefully before embarking on the DR4X00 and NetVault install/configuration sequences outlined in chapters 2 through 4 of this guide

NOTE: For NetVault SmartDisk, native DR4X00 replication support is not available at this time.

1.1 General Setup /configuration Best Practices

Refer to the manufacture's documentation for additional details on the following prerequisites.

- Ensure cabling configured correctly.
- Configure interfaces, protocol and addressing.
 - Configure Networking infrastructure to support Jumbo Frames (MTU=9000).
- Preconfigured system to run as the NetVault Backup Server and NetVault SmartDisk Server. Alternatively a separate server can be provisioned and configured to host the NetVault SmartDisk software.
- DR4X00 preconfigured for use with the following attributes established:
 - Proper network connectivity with IP address or DNS name of DR4X00 Backup Appliance.
 - DR4X00 Backup Appliance(s) configured with the appropriate containers needed to host the NetVault SmartDisk instance.
 - For each container defined a network share exported via CIFS or NFS of appropriate permission and size.
 - All authentication requirements fulfilled such as Domain name, username and password for users setup on DR4X00 unit to provide full access to the predefined containers and network share(s) for use as backup repositories.

1.2 DR4X00 Setup/configuration Best Practices

- Each NetVault SmartDisk instance should be created and configured to run within the domain of a single DR4X00 Storage Container. This will allow for easy management of storage consumption therefore each SmartDisk instance should run within its own container.
- Users should be created so that the NetVault Backup server user has full Read/Write access to the container. This is a requirement for NetVault to be able to manage the configuration items and respective objects created within said container during backup, access during recovery, and deletion upon retirement.

1.3 NetVault SmartDisk Setup /configuration Best Practices

- During installation the stage and store spaces should be defined to run from a remote location. This will be configured during installation as the UNC network path of the CIFS share or locally defined mount points for NFS level use over the network.



- After the basic installation of NetVault SmartDisk there are various attributes and settings that need to be made in order to tune the software for use within the DR4X00 Backup Appliance domain. These will include the following attributes post installation and prior to adding the instance to a NetVault Backup domain:
 - Create and configure a Chunk Index and Disk Index directory within the DR4X00 container defined for use. This will be in the same directory structure as the stage and store spaces defined during basic installation.
 - Disable Software DeDuplication. So as to not conflict with the inline deduplication of the DR4X00 this feature must be disabled before the environment is used.
 - Configure Garbage Collection (GC) utility to run anytime. This will enable the reclamation of retired backup segments to occur without the need to predefine windows for this activity.
 - When using CIFS / UNC Paths: Configure the block size to be 512KB.

During installation a stage and store path are defined. These paths will host directory structures needed to operate the SmartDisk software solution.

When prompted for the **stage** and **store** paths input the UNC path of the storage container for Windows systems or the predefined NFS mount for Linux and Unix based systems.

After the initial installation the SmartDisk instance must be configured to run exclusively from the DR4X00 space. By default both the SmartDisk Chunk Index and Disk Index run within predefined directory structures. The goal is to consolidate these two object stores and define them to be hosted within a known space running on the DR4X00 in case a migration or disaster remediation situation occurs. In order to accomplish this, this directory must be manually created and configured for use. It is recommended that an index directory be created within the same directory level as the store and stage directories.

Once this directory is create, following the same guidelines as those outlined for the **stage** and **store** spaces, a set of commands can be issued to configure the SmartDisk instance as follows:

Smartdisk Home >> foundation >> bin >> smartdisk(.sh/.bat) config --add --volume <Index directory path hosted on the DR4X00 Container> --favour "Chunk Index" --favour "Disk Index" --deny "Staging" --deny "Storage"

Smartdisk Home >> foundation >> bin >> smartdisk(.sh/.bat) config --update --volume <Store directory path hosted on the DR4X00 Container > --deny "Chunk Index" --deny "Disk Index" --deny "Staging" --favour "Storage"

Smartdisk Home >> foundation >> bin >> smartdisk(.sh/.bat) config --update --volume <Stage directory path hosted on the DR4X00 Container > --deny "Chunk Index" --deny "Disk Index" --favour "Staging" --deny "Storage"

This will configure the SmartDisk instance to host all the appropriate data segments and indexing information from backup operations in separate and distinct volume locations hosted on the DR4X00 backup appliance.

Once all the appropriate volumes have been defined and attributes configured the rest of the recommended settings should be applied to the SmartDisk instance which will include disabling software deduplication, setting Garbage Collection to run anytime, and configuring block size settings depending on whether the DR4X00 is hosting the SmartDisk instance via CIFS or NFS protocols.

To disable software deduplication, run the following command:

Smartdisk Home >> foundation >> bin >> smartdisk(.sh/.bat) config --dedupe-enable FALSE

To configure the proper space reclamation cycles run the following commands:



```
Smartdisk Home >> foundation >> bin >> smartdisk(.sh/.bat) config --add --gc-window Anytime  
Smartdisk Home >> foundation >> bin >> smartdisk(.sh/.bat) config --add --dedupe-window Never
```

Finally if you are configuring SmartDisk on a CIFS / UNC path hosted on the DR4X00 it is recommended that a block size of 512000 be set before data protection operations are conducted from the target configuration. In order to set the block size of the SmartDisk instance run the following command:

```
Smartdisk Home >> foundation >> bin >> smartdisk(.sh/.bat) config --update --webdav 37453 --block-size 512000
```

Note: By default the block size is set to 32 and the webdav port to 37543. These settings should be considered when using the above for reference.

Once the configuration settings have been applied the SmartDisk services should be restarted. Execute the following command as needed:

```
Smartdisk Home >> foundation >> bin >> smartdisk(.sh/.bat) restart
```

The newly configured SmartDisk instance should be ready for use within a given NetVault Backup domain. Verification of the newly configured volumes and attributes should be conducted by running the following command:

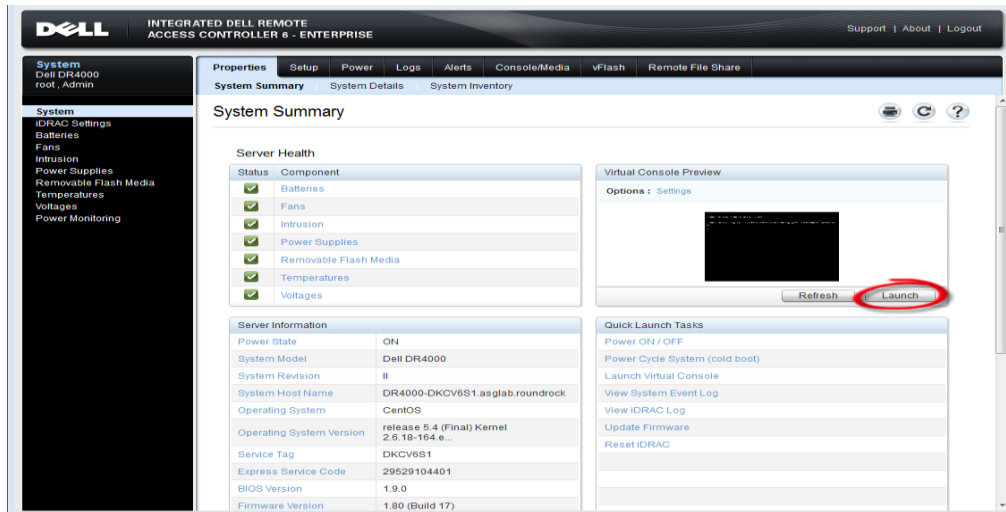
```
Smartdisk Home >> foundation >> bin >> smartdisk(.sh/.bat) config --show
```

Once all settings have been verified and the configuration has been deemed fit for use the SmartDisk instance can now be added to the NetVault Backup server.

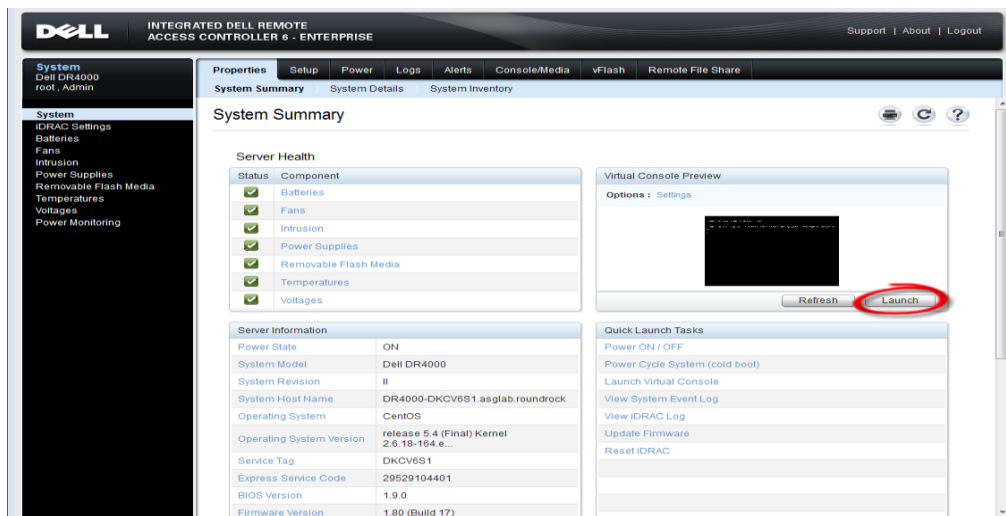


2 Install and Configure the DR4X00

1. Rack and cable the DR4X00 appliance, and power it on.
2. Log into iDRAC using the default address **192.168.0.1**, user name **root**, and the password **calvin**.



3. Launch the virtual console.



4. Once the virtual console is open, log in to the system as user **administrator** and the password **St0r@ge!** (The "0" in the password is the numeral zero.).



```
Ocarina release 1 (EAR-1.00.00) Build: 32050
Kernel 2.6.18-164.el5 on an x86_64

localhost login: administrator
Password: St0r@ge!
```

5. Set the user-defined networking preferences.

```
Would you like to use DHCP (yes/no) ?
Please enter an IP address:
Please enter a subnet mask:
Please enter a default gateway address:
Please enter a DNS Suffix (example: abc.com):
Please enter primary DNS server IP address:
Would you like to define a secondary DNS server (yes/no) ?
Please enter secondary DNS server IP address:
```

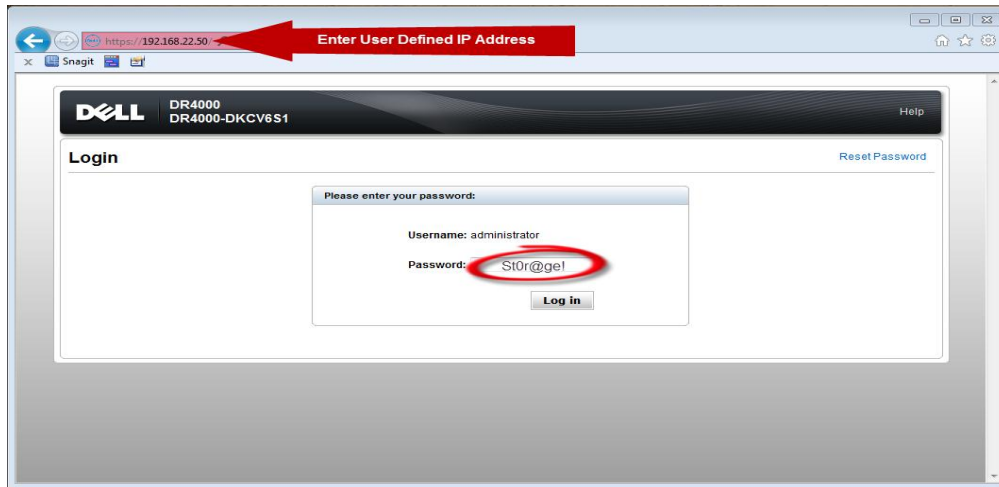
6. View the summary of preferences and confirm that it is correct.

```
=====
                        Set Static IP Address
=====
IP Address           : 10.10.86.108
Network Mask         : 255.255.255.128
Default Gateway      : 10.10.86.126
DNS Suffix           : idmdemo.local
Primary DNS Server   : 10.10.86.101
Secondary DNS Server : 143.166.216.237
Host Name            : DR4000-5

Are the above settings correct (yes/no) ? _
```



7. Log into the DR4X00 administrator console, using the IP address you just provided for the DR4X00, user **administrator** and the password **St0r@ge!** (The "0" in the password is the numeral zero.).



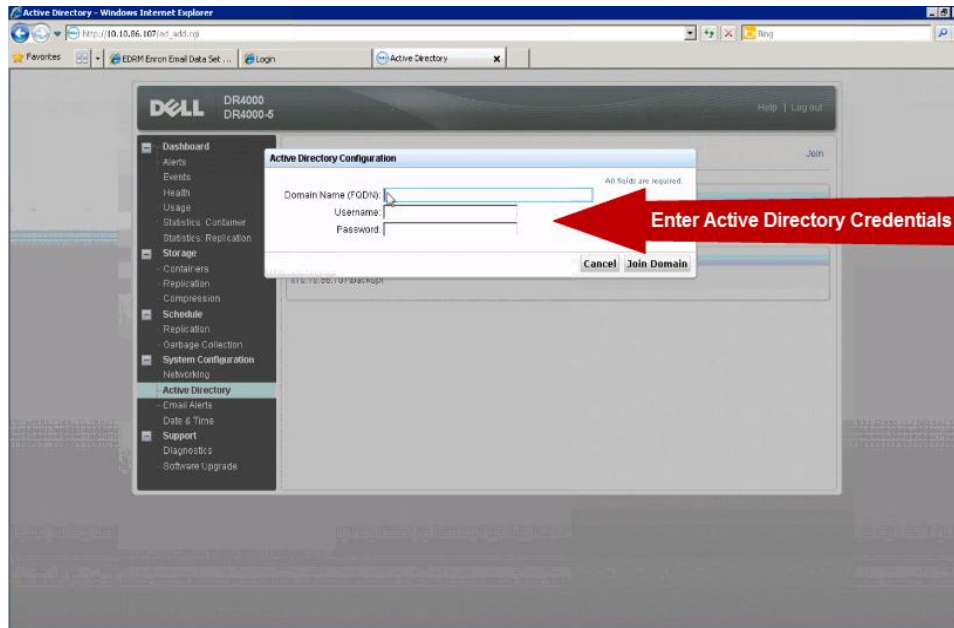
8. Join the DR4X00 to Active Directory.

NOTE: if you do not want to add DR4X00 to Active Directory, see the *Owner's Manual* for guest login instructions.

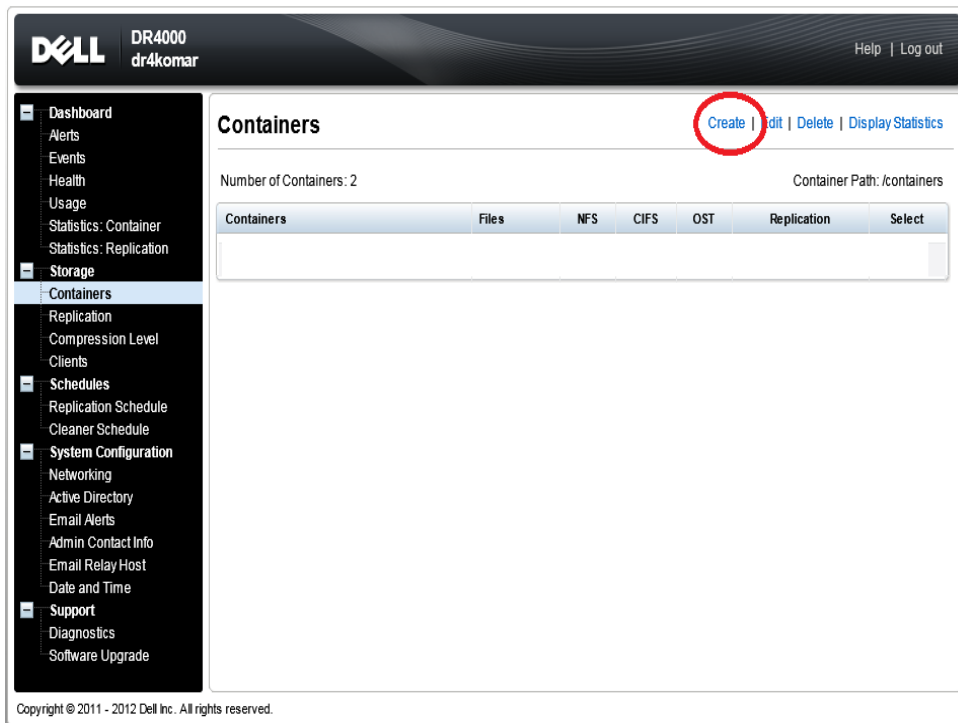
- a. Select **Active Directory** in the tree on the left hand side of the dashboard.



- b. Enter your Active Directory credentials.



9. Create and mount the container.
- c. Select **Containers** in the tree on the left side of the dashboard, and then click the **Create** link at the top of the page.



- d. Enter a **Container Name** and select the **Enable CIFS** check box.

The screenshot shows the 'Create New Container' form in the Dell DR4000 web interface. The form is divided into two main sections: NFS and CIFS. The 'Container Name' field is highlighted with a red arrow and the text 'Name the Container'. The 'Enable CIFS' checkbox is also highlighted with a red arrow and the text 'Select CIFS or NFS'. The 'Add' button for adding clients is highlighted with a red arrow and the text 'Enter Backup Server Info'. The 'Create a New Container' button at the bottom right is circled in red.

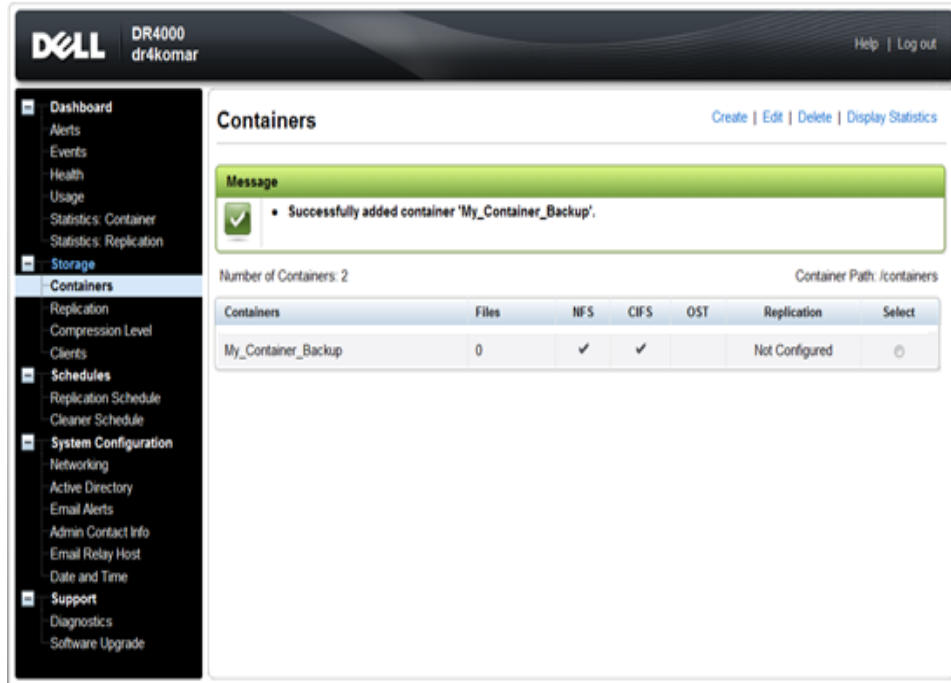
- e. Select the client access credentials preferred.

This screenshot is identical to the one above, showing the 'Create New Container' form. It highlights the same elements: the 'Container Name' field, the 'Enable CIFS' checkbox, the 'Add' button for clients, and the 'Create a New Container' button.

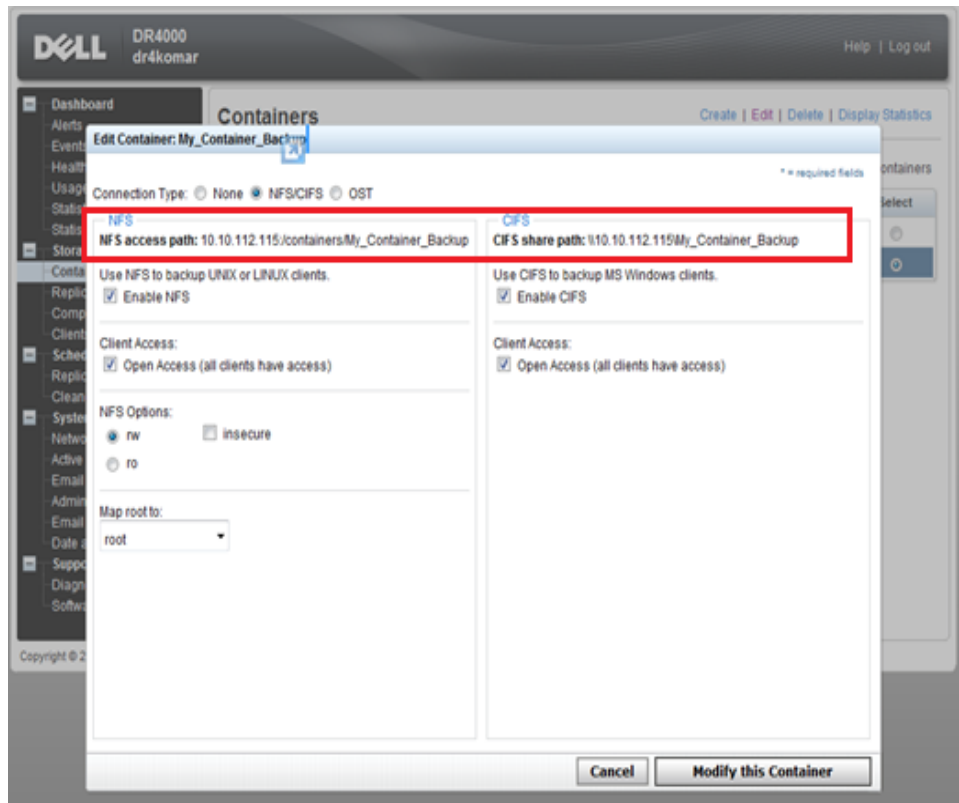
For improved security, Dell recommends adding IP addresses for the following (Not all environments will have all components):



- Backup console (NetVault Server)
 - Hyper-V hosts (on-host proxy for Hyper-V environments)s
 - Off-host proxies (for Hyper-V environments)
 - Backup proxies (for vSphere environments)
- f. Click **Create a New Container**.
 - g. Confirm that the container was added.



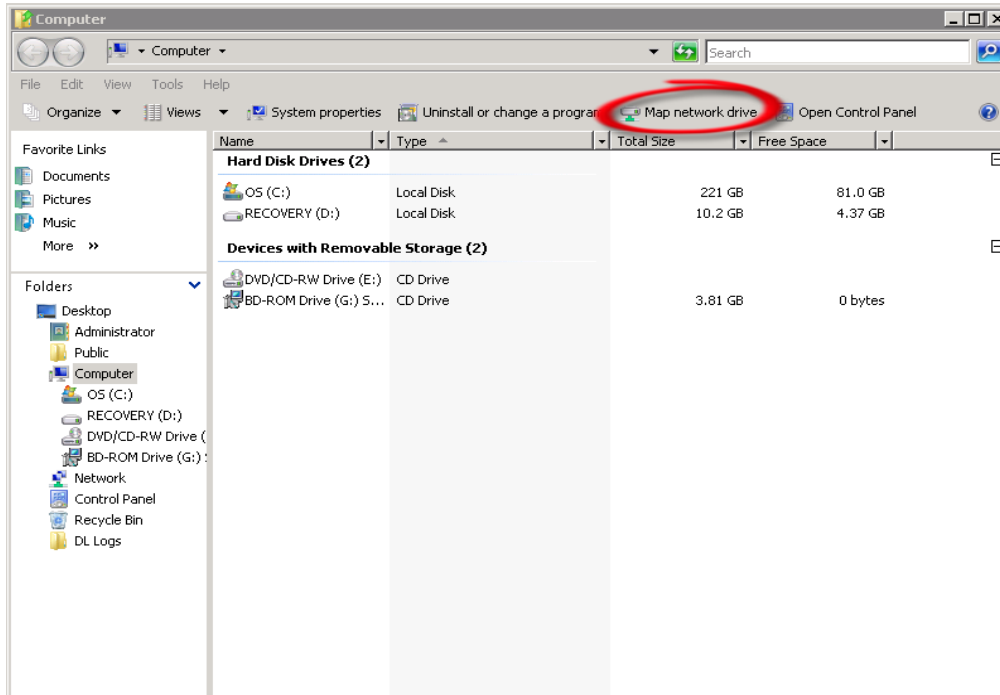
- h. Click **Edit**, and write down the container path, which you will use later to target the DR4X00.



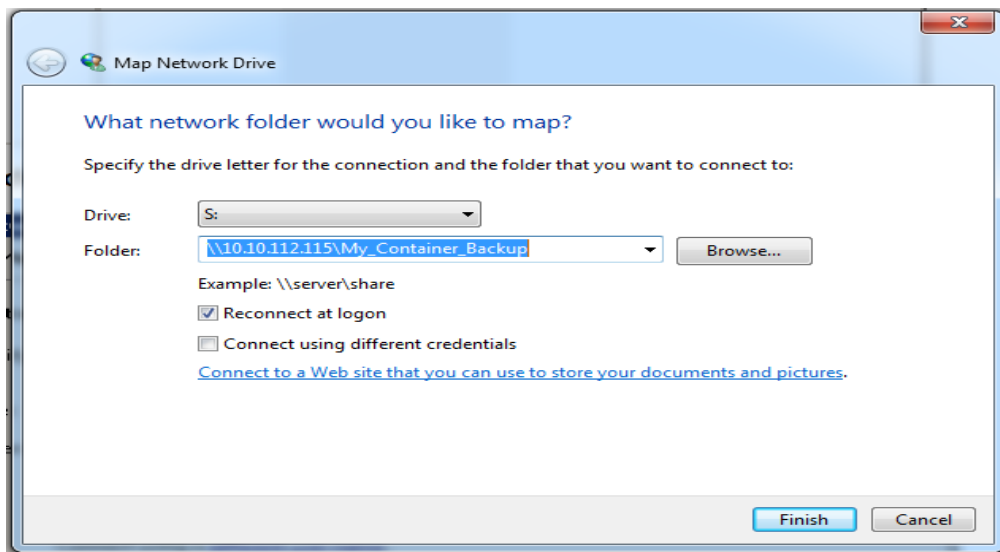
- i. Click **Cancel** to exit.

3 Configure the Backup Server and Install NetVault SmartDisk

1. Log into the media server and click on **Start→My Computer**.
2. Click Map network drive.



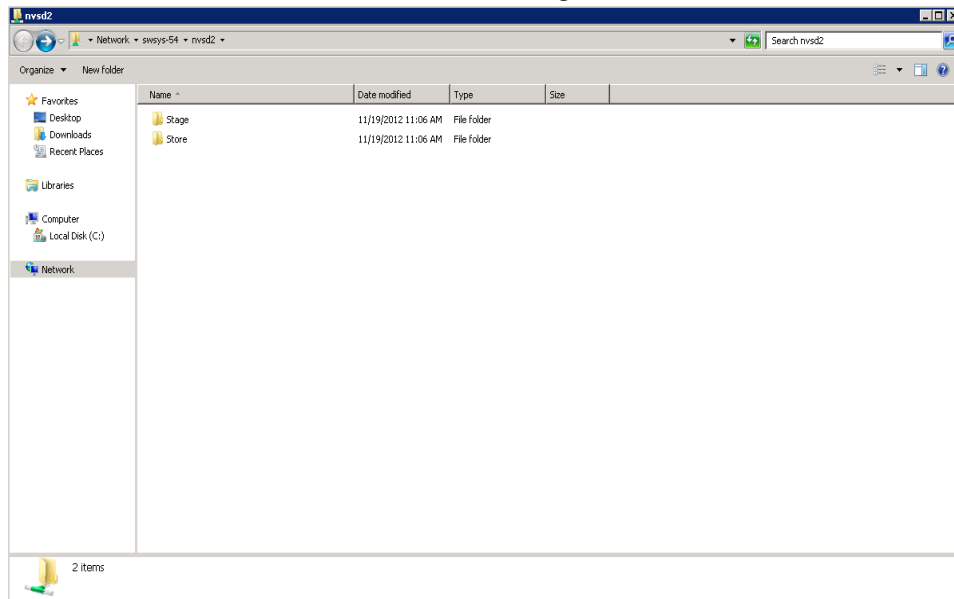
3. For **Folder**, enter the path to the container on the DR4X00.



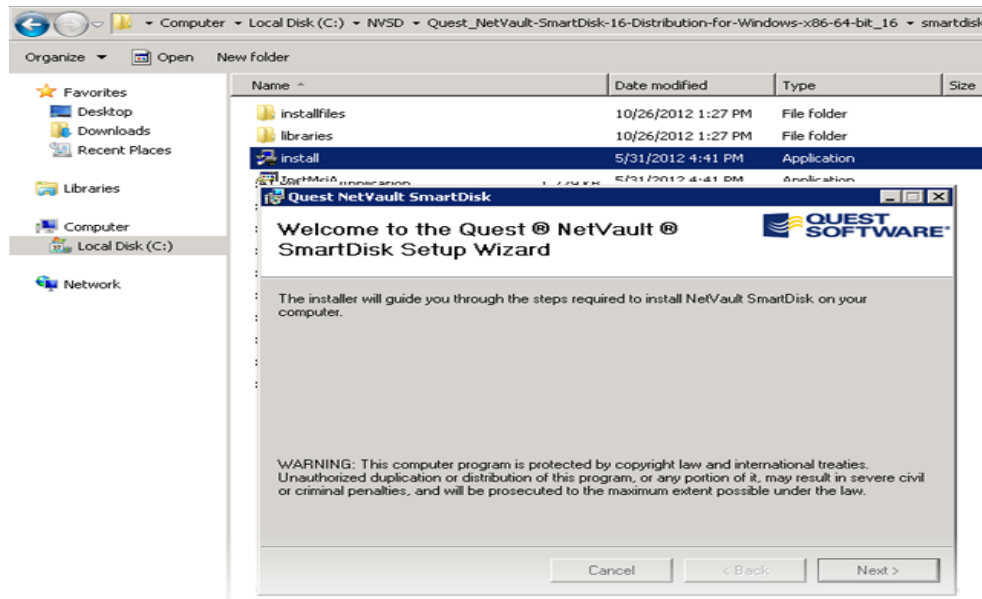
4. Select the **Reconnect at logon** check box.



5. When prompted, enter the DR4X00 login credentials.
6. The DR4X00 container is now mounted to your backup server.
7. In the DR container, create two folders — **Stage** and **Store**.



8. Install NetVault SmartDisk.
 - j. Download or copy the NetVault install application to the backup server.
 - k. Click **install**.



- l. Click Next to start the installation, and select to accept the license agreement.



- m. Create a Non-Privileged User. Enter the **User account** name and **Password** of a local user that will be used as a non-privileged account for NetVault SmartDisk.

Quest NetVault SmartDisk

Non-Privileged User

QUEST SOFTWARE

To enhance security, most of the NetVault SmartDisk processes will be run using an isolated, non-privileged user account. This account will be created if it does not already exist. A local machine account is represented by an empty domain field.

User account name: nvsd

Domain:

Password:

Retype password:

Buttons: Cancel, < Back, Next >

- n. When a warning message states the application will create a new user, select **Yes** and click **Next**.
- o. Select the installation **folder** for SmartDisk.

Quest NetVault SmartDisk

Select Installation Folder

QUEST SOFTWARE

To install NetVault SmartDisk in the default folder, click "Next". To install to a different folder, enter it below or click "Browse".

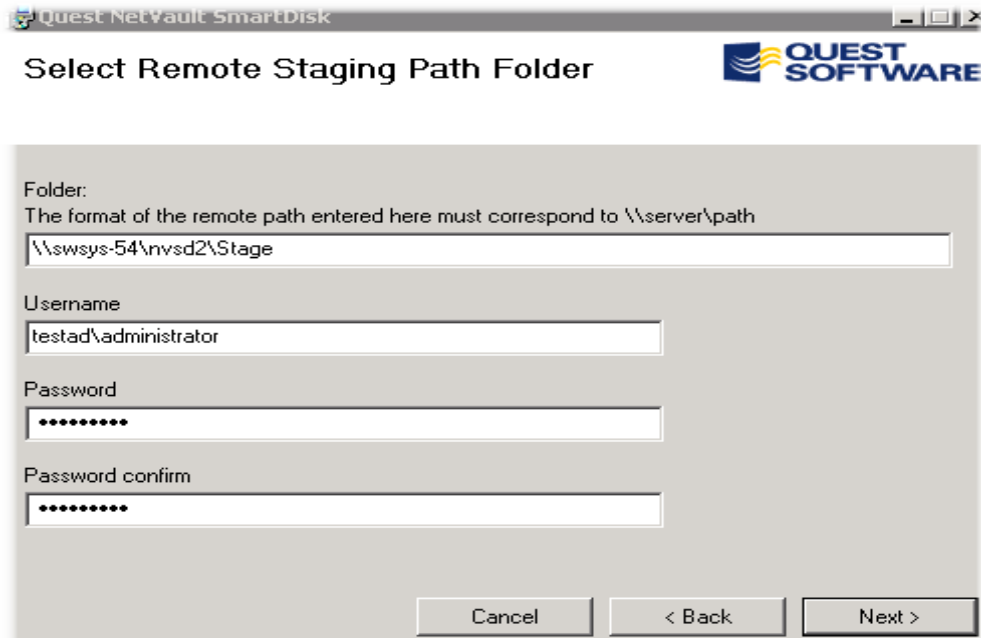
NetVault SmartDisk may be installed anywhere that the nvsd user previously selected has access to (including that user's home directory).

Folder: C:\Program Files\Quest Software\NetVault SmartDisk\

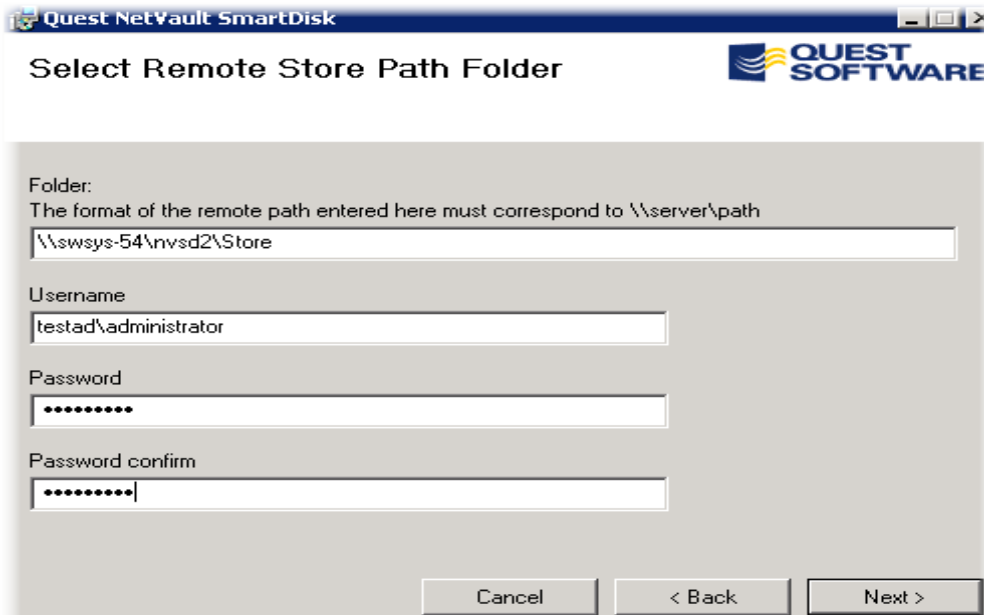
Buttons: Browse..., Disk Cost...

Bottom Buttons: Cancel, < Back, Next >

- p. When prompted, select **Remote** and click **Next**.
- q. Enter the full path to the **Stage** folder that you created in the DR4X00 container, along with the user name and password required to access the folder.

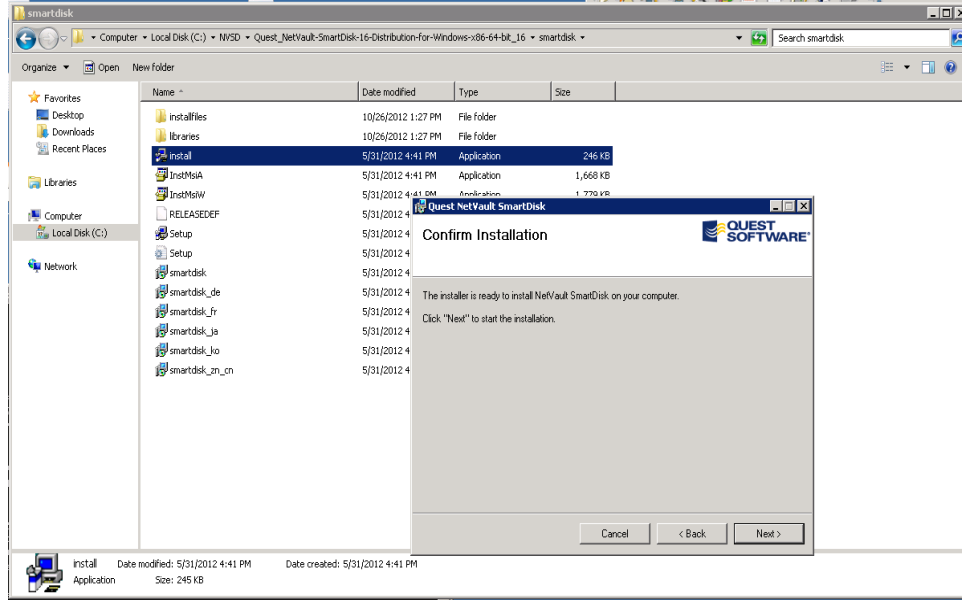


- r. Enter the full path to the **Store** folder that you created in the DR4X00 container, along with the user name and password required to access the folder.

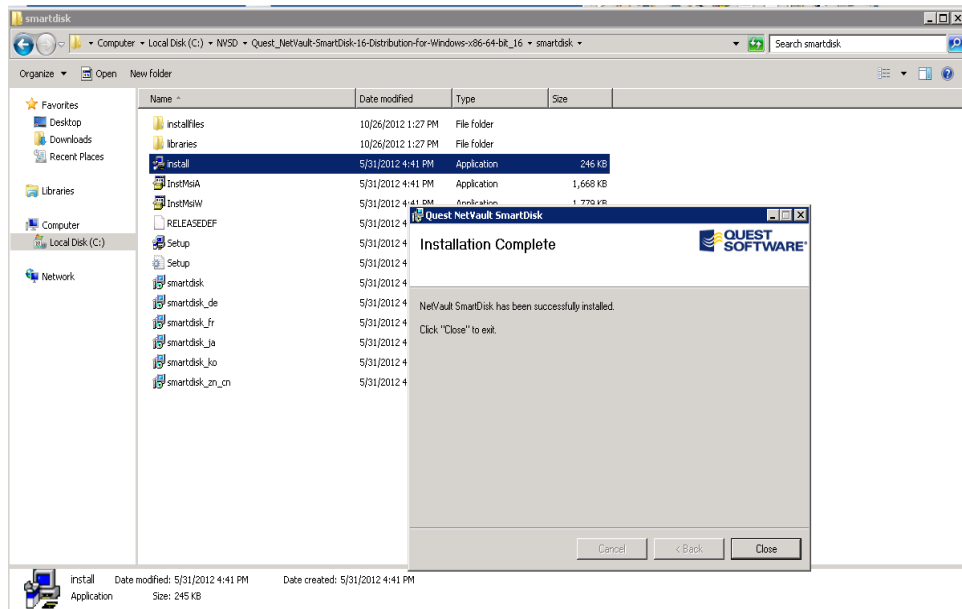


- s. When prompted to enable SmartDisk WebDAV, select **Yes**.
- t. Enter the non-privileged user information that was created in step D.
- u. Click **Next** to confirm the installation





- v. Once the installation is complete, click **Close** to exit



4 Configure NetVault SmartDisk

NOTE: This Chapter assumes that the user has already created the needed CIFS, NFS, CIFS/NFS container and assigned the desired permission(s) as detailed in the Install and Configure the DR4X00 chapter.

4.1 Windows

The steps in this section will require access to the NetVault SmartDisk server and the NetVault NetBackup Server.

1. From a command prompt on the SmartDisk server, cd to the **\NetVault SmartDisk\Foundation\bin** folder.

```
Administrator: Command Prompt
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\administrator.TESTAD>cd \Program Files\Quest Software\NetVault SmartDisk\foundation\bin
C:\Program Files\Quest Software\NetVault SmartDisk\foundation\bin>_
```

2. Run the command **smartdisk.bat config –show** to view the current configuration.
3. Run the following command to disable deduplication for the SmartDisk configuration:
smartdisk.bat config –dedupe-enable FALSE

```
Administrator: Command Prompt
05/31/2012 04:38 PM          384 foundationlicenseinstall.exe.manifest
05/31/2012 04:38 PM          21,939 idptools.sh
05/31/2012 04:38 PM          384 setstanza.exe.manifest
11/19/2012 11:06 AM          414 smartdisk.bat
05/31/2012 04:39 PM          47,064 sqlite3.exe
05/31/2012 04:38 PM          384 sqlite3.exe.manifest
05/31/2012 04:39 PM          2,785 startup.sh.in
05/31/2012 04:39 PM          2,678 trace.sh
05/31/2012 04:39 PM          16,856 traceascii.exe
05/31/2012 04:38 PM          384 traceascii.exe.manifest
05/31/2012 04:39 PM          980 traceupload.sh
05/31/2012 04:39 PM          17,408 winsevicerunner.exe
05/31/2012 04:38 PM          384 winsevicerunner.exe.manifest
05/31/2012 04:39 PM          17,880 wput.exe
05/31/2012 04:38 PM          384 wput.exe.manifest
42 File(s)          2,077,170 bytes
2 Dir(s)          182,562,136,064 bytes free

C:\Program Files\Quest Software\NetVault SmartDisk\foundation\bin>smartdisk.bat
Usage: smartdisk.bat start | stop | restart | status | stats | license | config | logs | dump | password | version | help
C:\Program Files\Quest Software\NetVault SmartDisk\foundation\bin>smartdisk.bat config --dedupe-enable FALSE
Configuration applied
C:\Program Files\Quest Software\NetVault SmartDisk\foundation\bin>_
```

4. Verify that the value has been set to false by using the command: **smartdisk.bat config –show**



```

Administrator: Command Prompt
05/31/2012 04:39 PM      16,856 tracetoascii.exe
05/31/2012 04:38 PM       384 tracetoascii.exe.manifest
05/31/2012 04:39 PM       980 traceupload.sh
05/31/2012 04:39 PM     17,488 winservicerunner.exe
05/31/2012 04:38 PM       384 winservicerunner.exe.manifest
05/31/2012 04:39 PM     17,888 vput.exe
05/31/2012 04:38 PM       384 vput.exe.manifest
42 File(s)      2,077,170 bytes
 2 Dir(s)      182,562,136,064 bytes free

C:\Program Files\Quest Software\NetVault SmartDisk\foundation\bin>smartdisk.bat
Usage: smartdisk.bat start | stop | restart | status | stats | license | config | logs | dump | password | version | help

C:\Program Files\Quest Software\NetVault SmartDisk\foundation\bin>smartdisk.bat config --dedupe-enable FALSE
Configuration applied

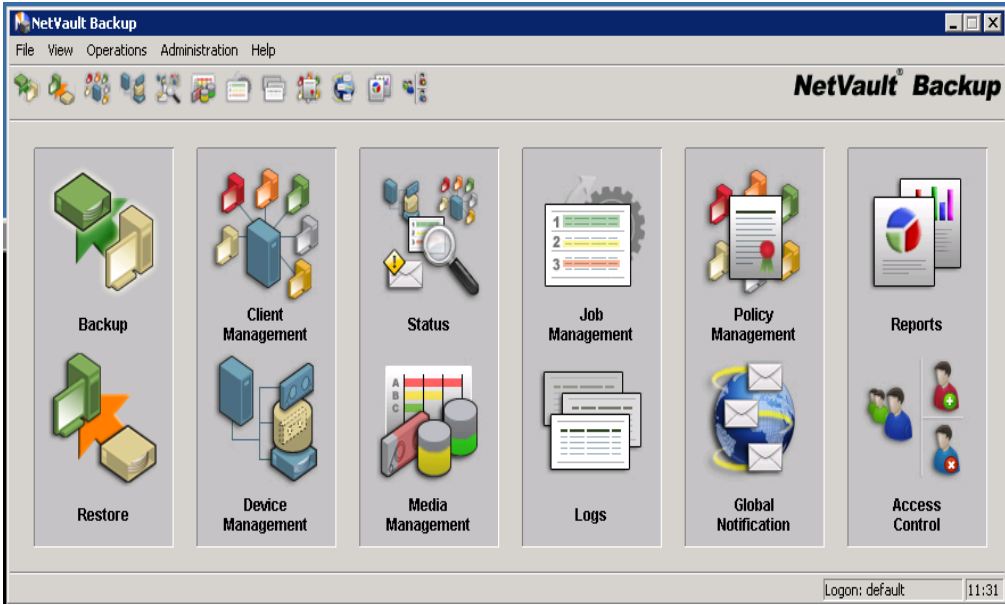
C:\Program Files\Quest Software\NetVault SmartDisk\foundation\bin>smartdisk.bat config --show inore
Current configuration

[Deduplication:Enable]
Value = FALSE

[Interface:Data]
Block Size = 32768, B
Credentials = nsd:6a2f9f57abaae0ee53aaec29f2dcb1
Reformatted Contact Address:

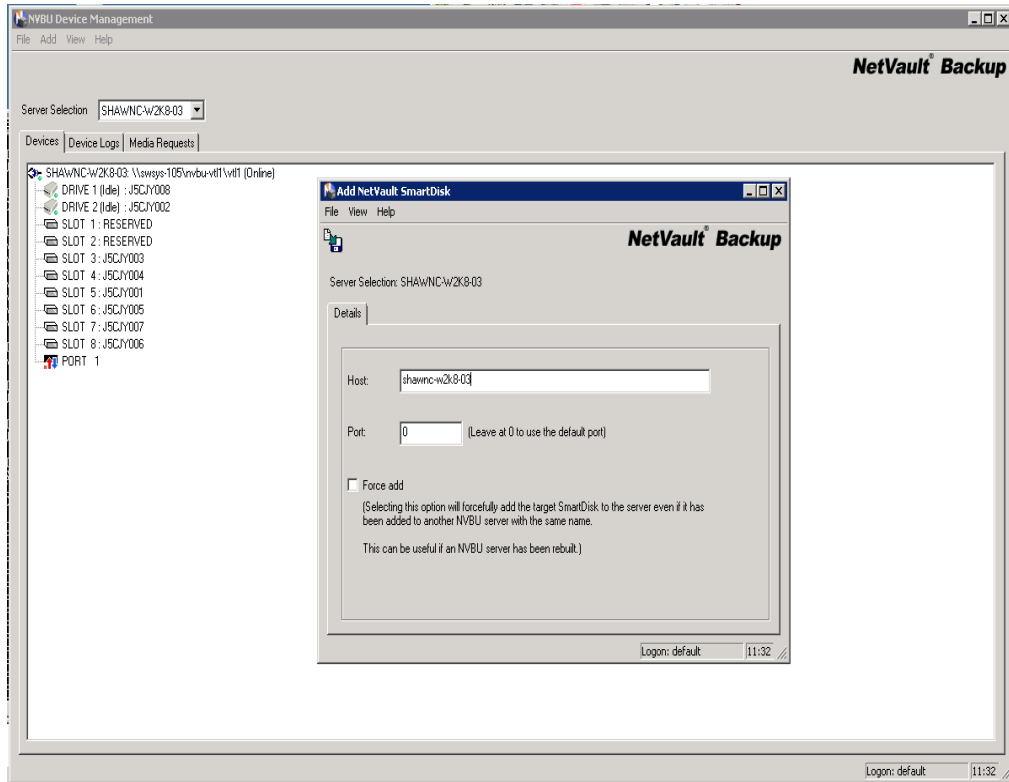
```

5. Run the following command to add the license key for SmartDisk:
smartdisk.bat license -t <license_key>
6. Add the SmartDisk to the NetVault Backup Server as a library



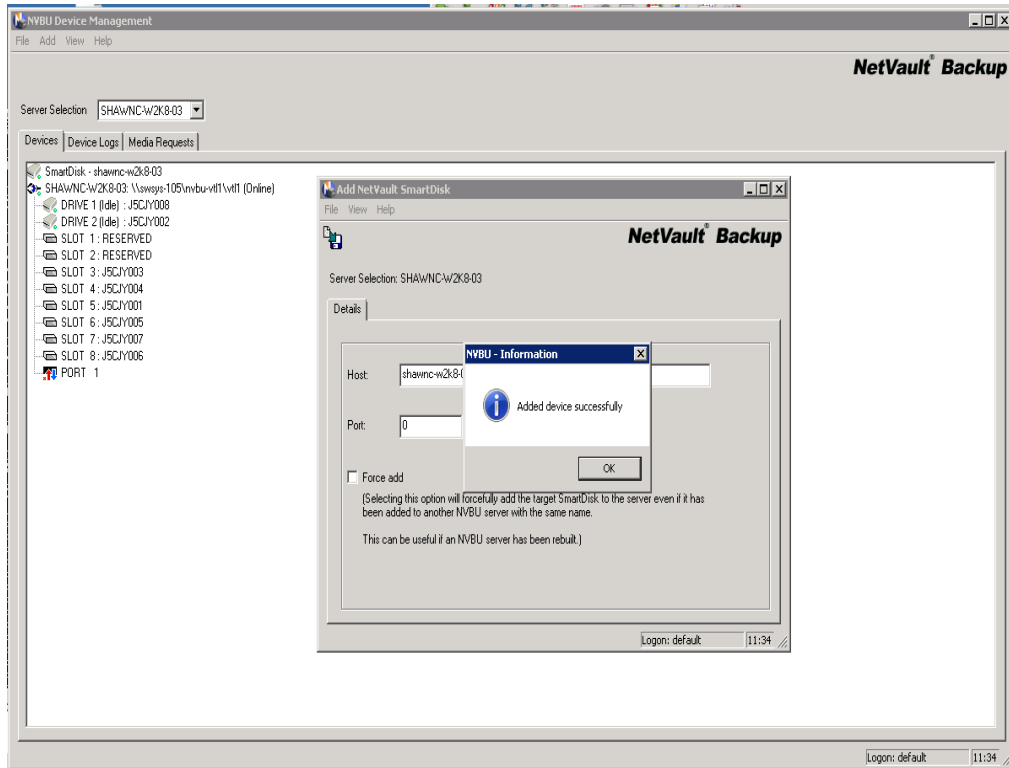
7. Select **Device Management** and under the **Add Section**, Select **Add NetVault SmartDisk**. Type the name of the SmartDisk server within the **Host** Field.



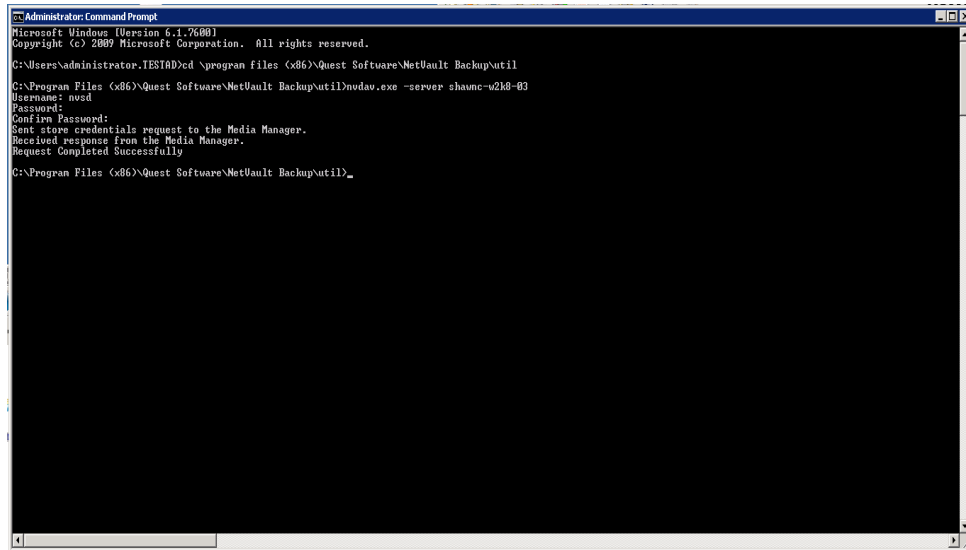


8. Click on the **Save icon** in the top left corner of the Pop up window above. Once the device is added successfully, then click **OK** to exit.



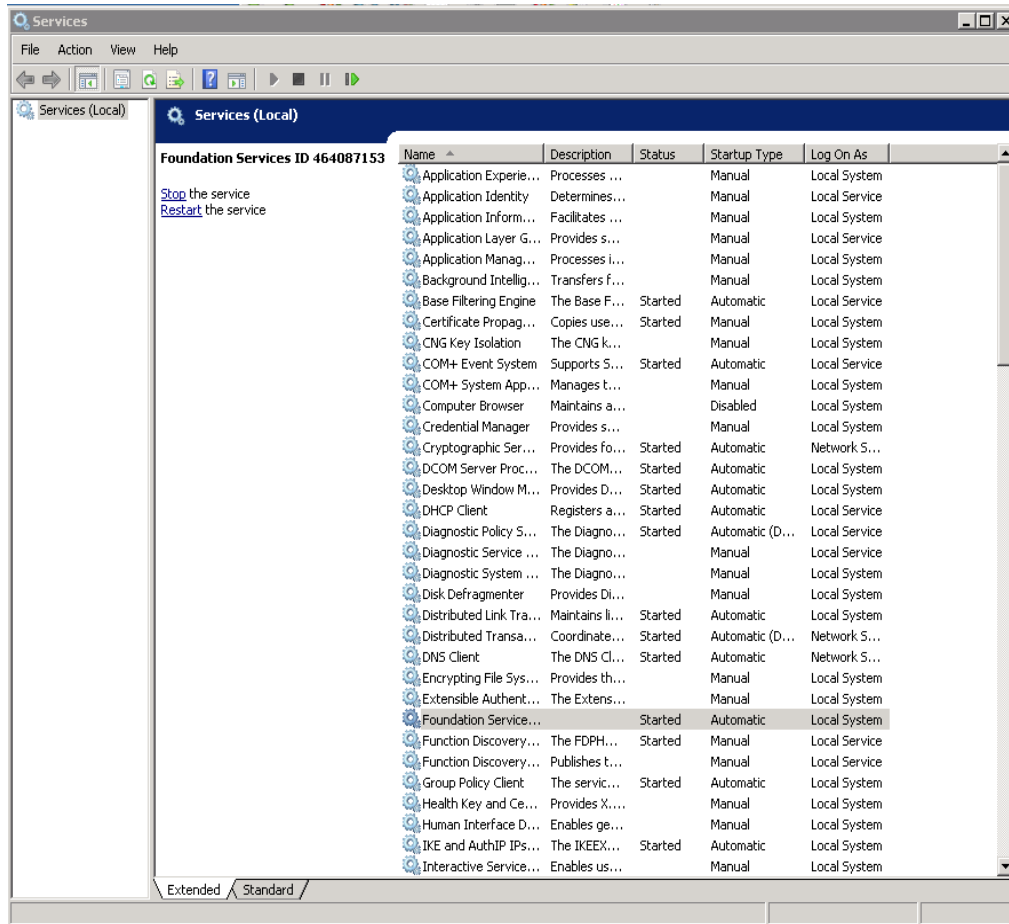


9. Authorize the NDAV (WebDAV) from the NetVault Backup Server by using the command: **"nvdav.exe –server [NetVault Server Name]"**

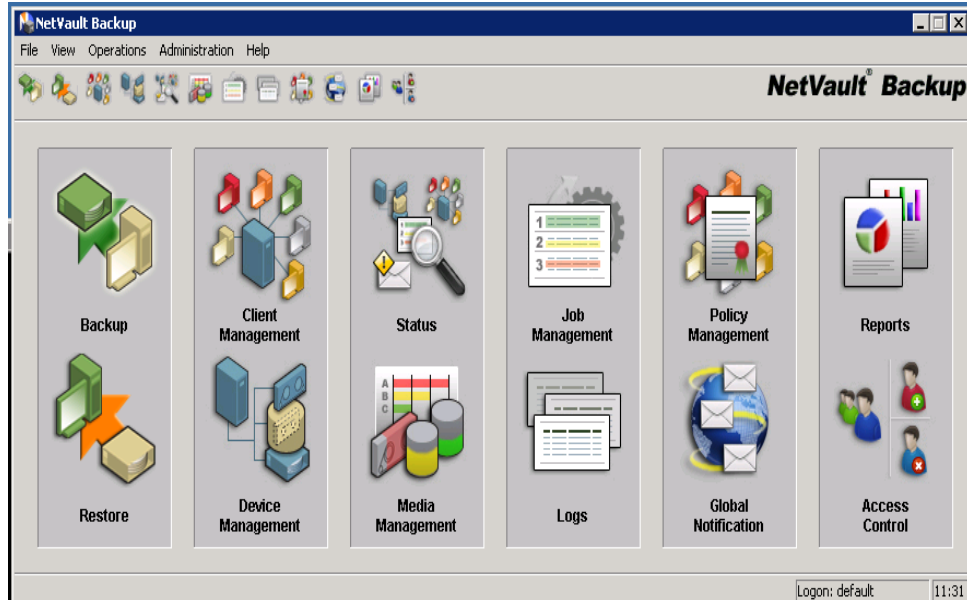


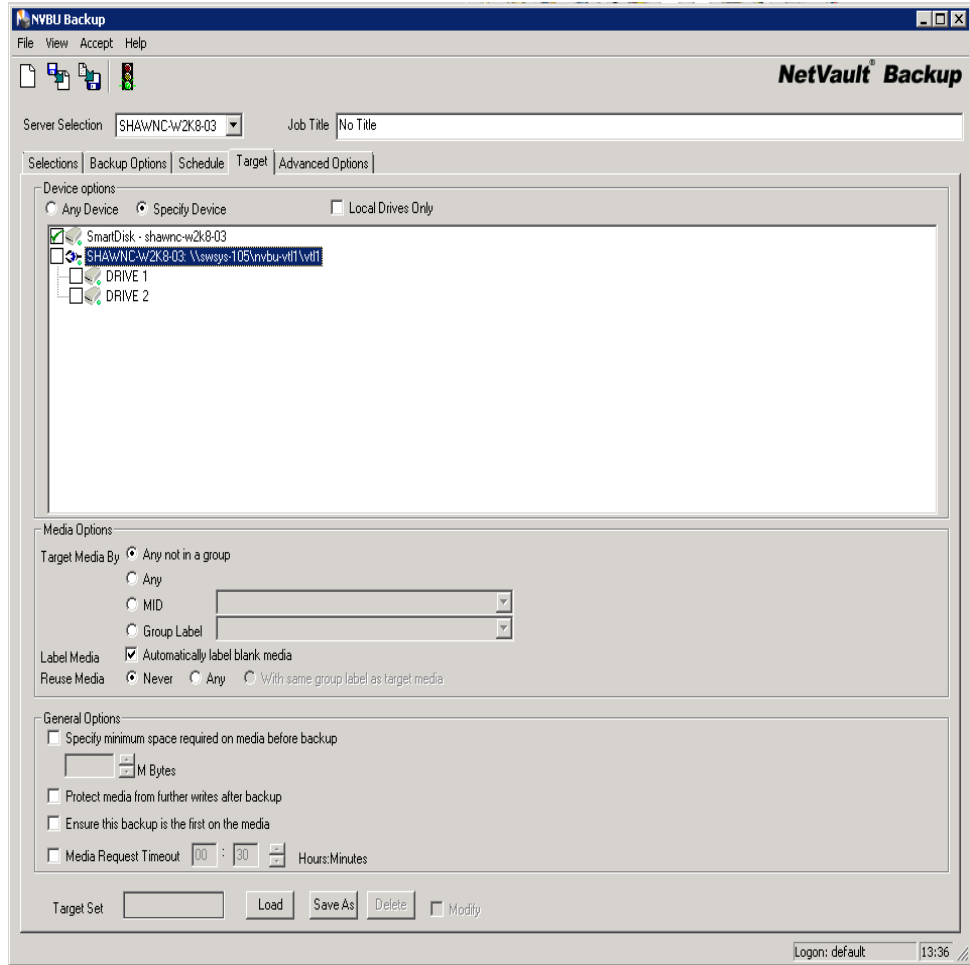
10. Verify SmartDisk (Foundation) Services has started.





11. Assign the SmartDisk Library as the target device for NetVault Backup Job. Select **Backup** and on the **Target** Tab, Select the SmartDisk device as the target.



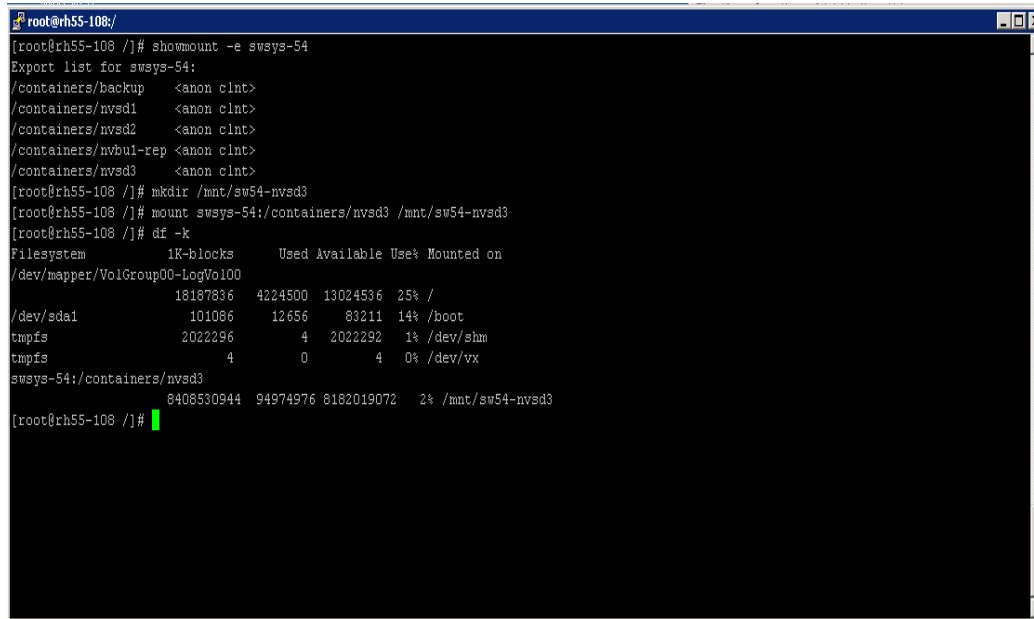


12. Finish configuring the rest of the Backup job parameters and then run it.



4.2 Linux/Unix

1. Mount the container via the NFS path to the Linux/Unix SmartDisk client/server. The local mount point will be used for the SmartDisk path.



```
[root@rh55-108: /]# showmount -e swsys-54
Export list for swsys-54:
/containers/backup <anon clnt>
/containers/nvsd1 <anon clnt>
/containers/nvsd2 <anon clnt>
/containers/nvbui-rep <anon clnt>
/containers/nvsd3 <anon clnt>
[root@rh55-108: /]# mkdir /mnt/sw54-nvsd3
[root@rh55-108: /]# mount swsys-54:/containers/nvsd3 /mnt/sw54-nvsd3
[root@rh55-108: /]# df -k
Filesystem            1K-blocks      Used Available Use% Mounted on
/dev/mapper/VolGroup00-LogVol100
                        18187836    4224500 13024536  25% /
/dev/sda1              101086      12656    83211  14% /boot
tmpfs                  2022296         4  2022292   1% /dev/shm
tmpfs                   4             0         4   0% /dev/vx
swsys-54:/containers/nvsd3
                        8408530944  94974976 8182019072   2% /mnt/sw54-nvsd3
[root@rh55-108: /]#
```



2. Create non-privilege user account. (Excerpt from the SmartDisk Installation Guide).

Authentication Requirements

- **Root-level or administrator account for installation** – Root-level or administrator credentials are only required for use during the installation process, removal process, and, if necessary, manually restarting the NVSD Services.
- **NVSD Non-privileged Group and User** – Security group with full NVSD configuration and monitoring rights.
To create the NVSD Non-privileged Group and Users, follow these guidelines:
 - ❖ **For Linux and UNIX** (the following examples use **sdusr** and **sdgrp** for the user and group, respectively):
 1. If the non-privileged group does not exist, create it.

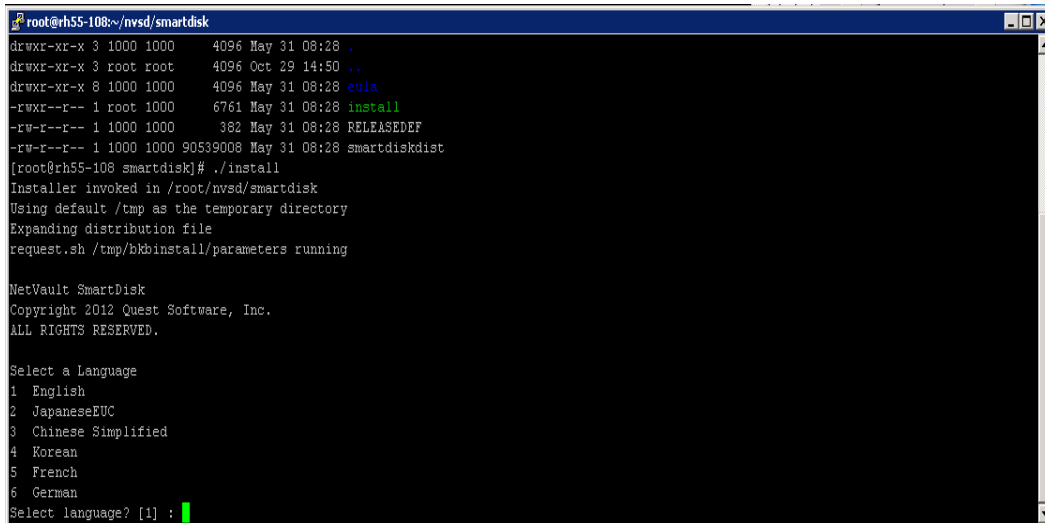
```
# groupadd sdgrp
```
 2. If the non-privileged user does *not* exist, create it and add it to the non-privileged group.

```
# useradd -G sdgrp sdusr
```
 3. Define the password for the non-privileged user.

```
# passwd sdusr
```
 4. If the non-privileged user *does* exist, add it to the non-privileged group.

```
# usermod -a -G sdgrp sdusr
```

3. Install the SmartDisk application. Under the directory that contains the SmartDisk application, launch the installation with the following command: **“./install”**



```
root@rh55-108:~/nvsd/smartdisk
drwxr-xr-x 3 1000 1000 4096 May 31 08:28 .
drwxr-xr-x 3 root root 4096 Oct 29 14:50 ..
drwxr-xr-x 8 1000 1000 4096 May 31 08:28 eula
-rwxr--r-- 1 root 1000 6761 May 31 08:28 install
-rw-r--r-- 1 1000 1000 382 May 31 08:28 RELEASEDEF
-rw-r--r-- 1 1000 1000 90539008 May 31 08:28 smartdiskdist
[root@rh55-108 smartdisk]# ./install
Installer invoked in /root/nvsd/smartdisk
Using default /tmp as the temporary directory
Expanding distribution file
request.sh /tmp/bkinstall/parameters running

NetVault SmartDisk
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Select a Language
1 English
2 JapaneseEUC
3 Chinese Simplified
4 Korean
5 French
6 German
Select language? [1] :
```

4. Select the correct language when prompted.



5. The Install script will step you through the installation. The non-privilege user that was created in Step 2 above will be added. The CLI will prompt the user for the user account details:

SmartDisk supports Post-process deduplication. If you would like to store the staged data (awaiting dedupe) at a separate location to the SmartDisk application, please enter a path below.

Staging path? [/usr/smartdisk/diskmanager/stage]: /mnt/sw54-nvsv3/Stage

Please choose where you would like SmartDisk to store the data it has deduplicated and the index of that data. You should usually choose a fault tolerant disk for this storage. For the index, good random access performance is also important.

(Note: A network share located on a third-party deduplication appliance cannot be used for the Chunk Store).

Store path? [/usr/smartdisk/store] : /mnt/sw54-nvsv3/Store

Would you like to configure WebDAV authentication credentials? (y n) [y] : y

You chose **Yes**

Enter in the non-privilege user for the WebDAV authentication:

WebDAV authentication username? : sdusr

Please enter the WebDAV authentication password for SmartDisk:

Please confirm password:

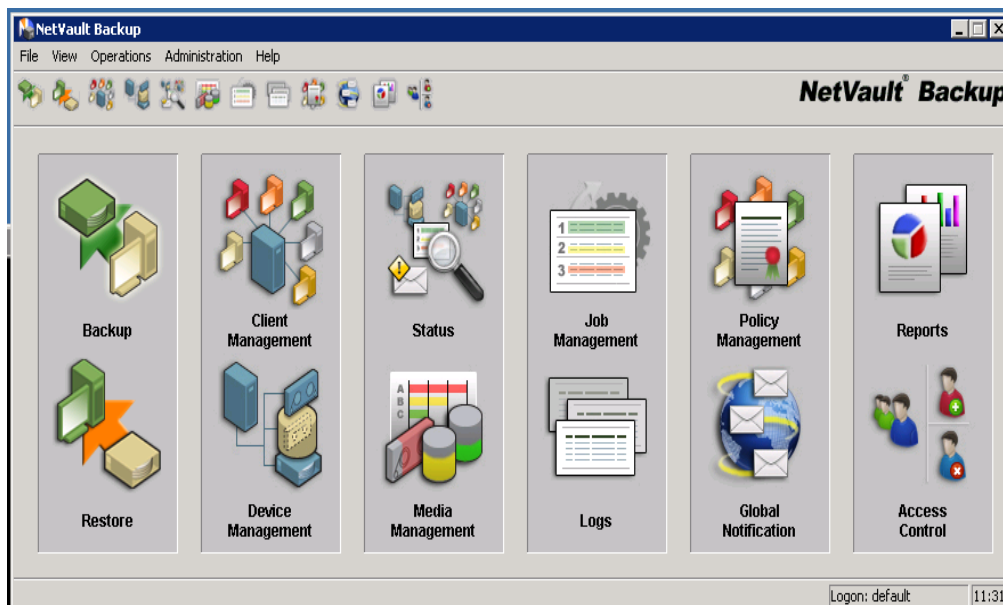
6. Once the installation is completed the system will report that the installation was successful.
7. Disable Deduplication on the SmartDisk. The deduplication feature must be **disabled** when using NetVault on the DR4X00. To disable SmartDisk deduplication, run the following:
"cd usr/smartdisk/foundation/bin"



“./smartdisk.sh config --dedupe-enable FALSE ”

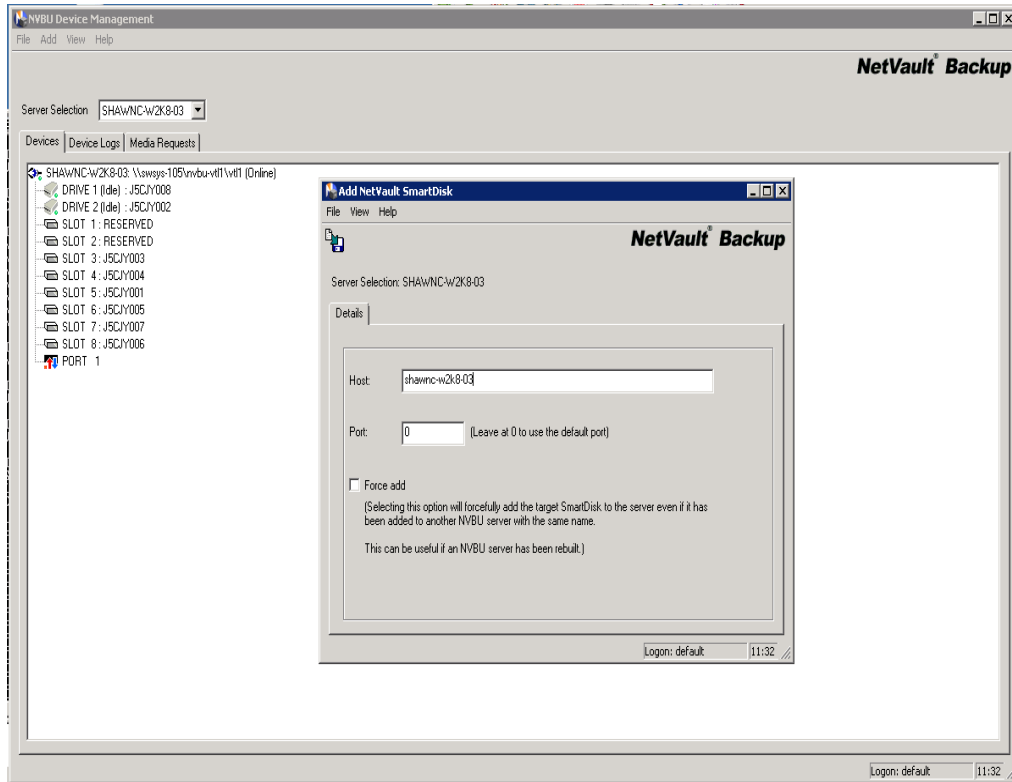
```
root@rh55-108:/usr/smartdisk/foundation/bin
[root@rh55-108 /]# cd /usr/smartdisk/foundation/bin
[root@rh55-108 bin]# ./smartdisk.sh config --dedupe-enable FALSE
Configuration applied
[root@rh55-108 bin]#
```

8. Add the SmartDisk to the NetVault Backup Server as a library



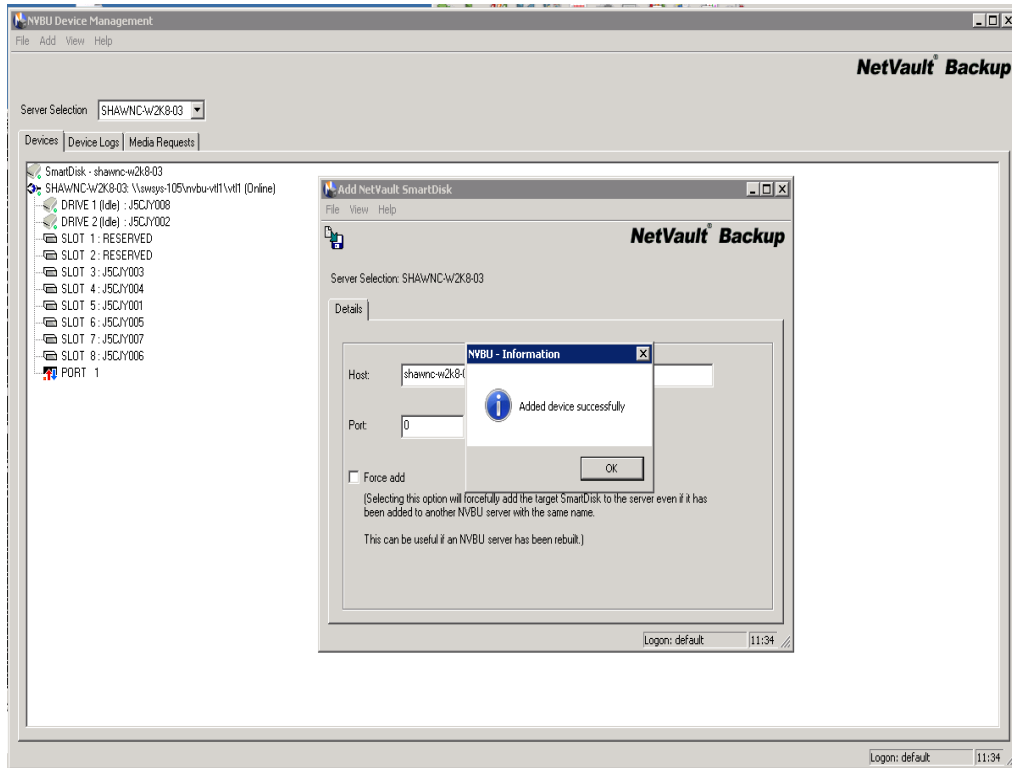
9. Select **Device Management** and under the **Add Section**, Select **Add NetVault SmartDisk**. Type the name of the SmartDisk server within the **Host** Field.





10. Click on the **Save icon** in the top left corner of the Pop up window above. Once the device is added successfully, then click **OK** to exit.





11. Authorize the NDAV (WebDAV) from the NetVault Backup Server by running the command:

`"/nvdav --server <smartDisk_Device_name>"` from **`"/usr/netvault/util"`**.

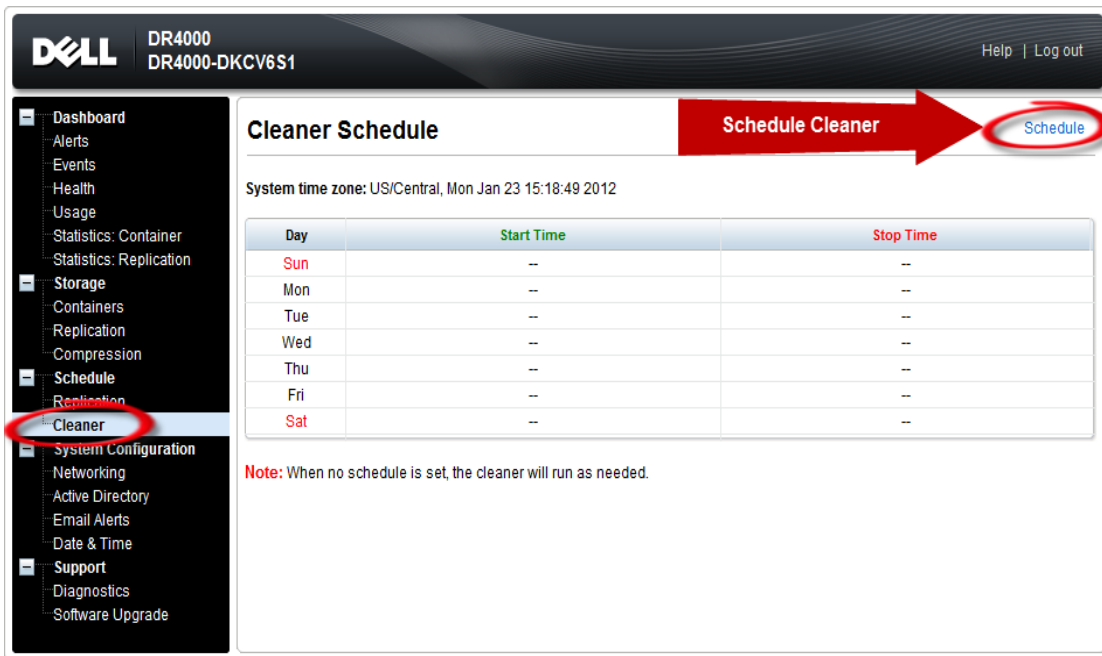




5 Set up the DR4X00 Cleaner

Once all the backup jobs are setup the DR4X00 cleaner must be scheduled. The DR4X00 cleaner should run at least 6 hours per week when backups are not taking place, generally after a backup job has completed.

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.



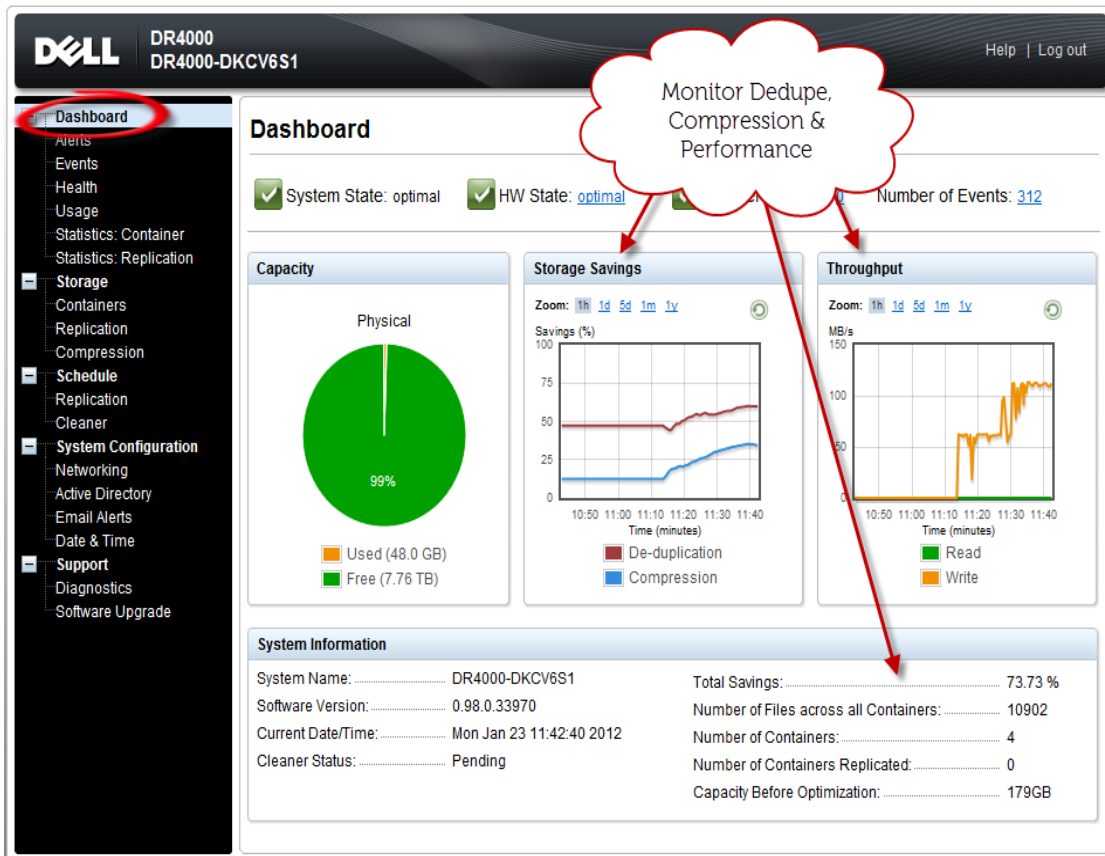
The screenshot shows the Dell DR4000 web interface. The top header displays the Dell logo, the model number DR4000, and the serial number DR4000-DKCV6S1. The left sidebar contains a navigation menu with items like Dashboard, Alerts, Events, Health, Usage, Statistics, Storage, Schedule, Replication, Cleaner, System Configuration, Networking, Active Directory, Email Alerts, Date & Time, Support, Diagnostics, and Software Upgrade. The 'Cleaner' item is circled in red. The main content area is titled 'Cleaner Schedule' and features a red arrow pointing to a 'Schedule Cleaner' button, with a 'Schedule' button circled in red. Below the title, the system time zone is shown as 'US/Central, Mon Jan 23 15:18:49 2012'. A table displays the schedule for each day of the week, with 'Start Time' and 'Stop Time' columns. A note at the bottom states: 'Note: When no schedule is set, the cleaner will run as needed.'

Day	Start Time	Stop Time
Sun	--	--
Mon	--	--
Tue	--	--
Wed	--	--
Thu	--	--
Fri	--	--
Sat	--	--

6 Monitoring Dedupe, Compression & Performance

After backup jobs have run the DR4X00 will track Capacity, Storage Savings and Throughput on the DR4X00 dashboard. This information is valuable in understanding the benefits the DR4X00.

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 complete the ratios will increase. As mentioned before backup jobs with 12 week retention will average a 15x ratio in most cases.



Appendix A Additional Resources

Dell online support resources:

- Dell technical support site: <http://support.dell.com>
- Dell TechCenter is an online IT community where IT professionals connect with Dell customers and employees to share knowledge, best practices, and other information about Dell products and installations: <http://DellTechCenter.com>

Dell DR4X00 -NetVault resources:

- Dell DR4X00 manuals/guides:
<http://support.dell.com/support/edocs/SYSTEMS/DR4X00/en/index.htm>
- Dell DR4X00-NetVault Application Notes guide:
<https://support.quest.com/searchdocumentation.aspx?pr=268446836&k=DR4X00&ActiveTab=3>
- Dell Quest NetVault manuals/guide:
<https://support.quest.com/searchdocumentation.aspx?pr=268446836&k=NetVault&ActiveTab=3>

