

# CA ARCserve® D2D for Linux

User Guide  
r16.5 SP1



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# Chapter 1: Understanding CA ARCserve D2D for Linux

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This section contains the following topics:

[Introduction](#) (see page 9)

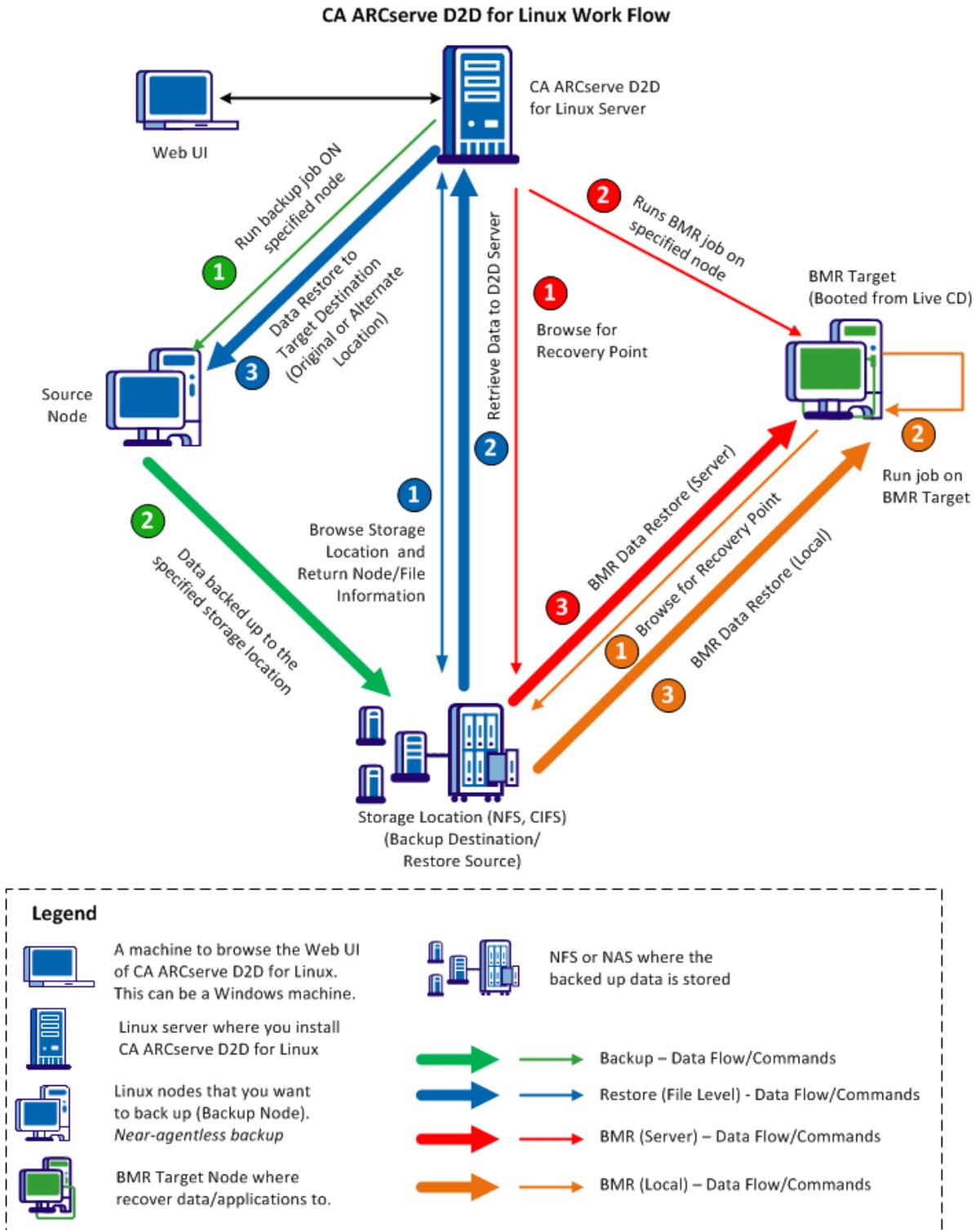
## Introduction

CA ARCserve D2D for Linux is a disk-based backup product that is designed for Linux operating systems. It provides a fast, simple, and reliable way to protect and recover critical business information. CA ARCserve D2D for Linux tracks changes on a node at the block level and then backs up only those changed blocks in an incremental process. As a result, CA ARCserve D2D for Linux lets you perform frequent backups, reducing the size of each incremental backup (and the backup window) and providing a more up-to-date backup. CA ARCserve D2D for Linux also provides the capability to restore files or folders and perform a bare metal recovery (BMR) from a single backup. You can store the backup information either on a Network File System (NFS) share, Common Internet File System (CIFS) share, or in the backup source node.

BMR is the process of restoring a computer system from *bare metal*. Bare metal is a computer without any operating system, drivers, and software applications. The restoration includes installing the operating system, software applications, drivers, and then restoring the data and settings. BMR is possible because when CA ARCserve D2D for Linux performs a backup of data, it also captures information that is related to the operating system, installed applications, drivers, and so on. After a BMR is complete, the target node has the same operating system and data as the production node.

CA ARCserve D2D for Linux uses a near-agentless approach to enable fast and flexible protection of all your Linux clients. The feature totally eliminates the need to manually install agents on each client node, thereby fully automating the detection, configuration, and protection of all your Linux clients. You can install CA ARCserve D2D for Linux to help protect your entire Linux production environment. The server where you install CA ARCserve D2D for Linux is known as D2D Server. After you install CA ARCserve D2D for Linux, you can then connect to the D2D Server over a network and can open the user interface using a web browser.

The following diagram shows the overall work flow of CA ARCserve D2D for Linux:







# Chapter 2: Installing/Uninstalling CA ARCserve D2D for Linux

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This section contains the following topics:

[How to Install CA ARCserve D2D for Linux](#) (see page 13)

[How to Upgrade CA ARCserve D2D for Linux](#) (see page 17)

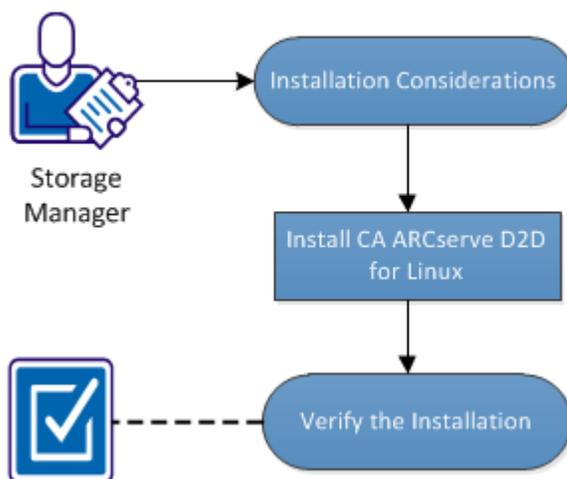
[How to Uninstall CA ARCserve D2D for Linux](#) (see page 20)

## How to Install CA ARCserve D2D for Linux

Install CA ARCserve D2D for Linux on a Linux server to protect and manage all your backup source nodes from one UI. It is not necessary to install this software on the backup source nodes.

The following diagram displays the process to install CA ARCserve D2D for Linux:

### How to Install CA ARCserve D2D for Linux



**Perform these tasks to install CA ARCserve D2D for Linux:**

- [Installation Considerations](#) (see page 14)
- [Install CA ARCserve D2D for Linux](#) (see page 14)
- [Verify the Installation](#) (see page 17)

## Installation Considerations

Consider the following points before you begin the installation:

- When you perform a Preboot Execution Environment (PXE)-based BMR, the CA ARCserve D2D for Linux server and the production source nodes have to be in the same subnet. If they are not in the same subnet, ensure that there is a gateway to forward the PXE broadcast packets across subnets.
- If the backup destination is an NFS server, verify that the NFS server supports *lock*. Also, verify that the root user has write access on the Linux nodes.
- To use an NFS server as the backup destination, install the NFS client package on the Linux nodes.
- Perl and sshd (SSH Daemon) are installed on the CA ARCserve D2D for Linux server and the Linux nodes that you want to back up.
- The unattended or silent installation is not supported.

## Install CA ARCserve D2D for Linux

Install CA ARCserve D2D for Linux on a D2D Server to manage backup and restore operations. After you install CA ARCserve D2D for Linux, you can open the user interface from any computer using a web browser.

At the beginning of installation, the installation script verifies if some of the mandatory applications are installed on the D2D Server and the applications are running.

The following mandatory applications are required for the installation file to work:

- sshd (SSH Daemon)
- Perl

The installation file also verifies the following optional applications at the beginning of the installation:

- rpc.statd - This application is used by the NFS server to implement the file lock.
- mkisofs - CA ARCserve D2D for Linux uses this application to create a Live CD.
- mount.nfs - CA ARCserve D2D for Linux uses this application to mount the NFS server.
- mount.cifs - CA ARCserve D2D for Linux uses this application to mount the CIFS server.
- ether-wake - CA ARCserve D2D for Linux uses this application to send the wake-on-lan request.

**Note:** Ensure that the D2D Server has a minimum 1-GB memory. For more information about the system requirements for a D2D server, see the *Release Notes*.

**Follow these steps:**

1. Log in to the D2D Server as a root user.
2. Download the CA ARCserve D2D for Linux installation package (\*.bin file) and the restore-utility package file to the root folder.

**Important!** When you download the two installation package files to a local folder, the full path of this local folder must not contain any special characters except blank spaces and the path should only include the following characters: a-z, A-Z, 0-9, - and \_.

3. Provide the execution permission to the installation package.
4. Perform one of the following steps depending on the location of the installation package and the restore-utility package:

- If the installation package and the restore-utility package are in the same folder, then run the following command to begin the installation:

```
./<linux_installation_file_name>.bin
```

**Note:** If you rename the restore-utility package, the package name must include the restore utility characters for the installation command to automatically find the restore-utility package and install it. If the package name does not have the restore utility characters, then you must provide the full path of the restore-utility package.

The installation package verifies the supported platform and displays a confirmation message.

If a non-supported platform is detected, type Y and press Enter to confirm the non-supported platform installation.

- If the installation package and the restore-utility package are in different folders, then provide the path of the restore-utility package in the first parameter:

```
./<linux_installation_file_name>.bin --path=/<path_of_the  
restore-utility_package>
```

The installation package verifies the supported platform and displays a confirmation message.

If a non-supported platform is detected, type Y and press Enter to confirm the non-supported platform installation.

**Note:** If a non-English operating system is detected, you are prompted to select the applicable language before continuing with the installation process.

5. Type Y and press Enter to confirm the installation.

The installation package displays the licensing agreement information.

6. Type Y and press Enter to accept the licensing agreement.

The CA ARCserve D2D for Linux installation process begins.

When the restore-utility package installation is complete, the Live CD build information is displayed.

The Live CD is built at the following location:

`/opt/CA/d2dserver/packages`

**Note:** Live CD is required to get the IP address of the target node when you perform a Bare Metal Recovery (BMR).

CA ARCserve D2D for Linux is installed and the URL to browse the D2D Server is displayed.

**Note:** Ensure that the following incoming ports are enabled on your firewall for the D2D Server:

- TCP port 22 (SSH Server)
- Broadcast port 67 (Boot Server)
- 8014 (D2D Web Service)
- User Datagram Protocol (UDP) port 69 (TFTP Server)

Ensure that the following incoming port is enabled on your firewall for the client nodes that you want to back up:

- TCP port 22 (SSH Server)

Ensure that the required outgoing port for NFS, CIFS, or both backup destinations are enabled on your firewall for the D2D Server and client nodes.

CA ARCserve D2D for Linux is successfully installed.

## Verify the Installation

Verify that the installation is complete after you have installed CA ARCserve D2D for Linux.

**Follow these steps:**

1. Open a web browser from any Windows computer.
2. Enter the URL of the D2D Server that is displayed on the install screen.  
Example: `https://hostname:8014`  
The CA ARCserve D2D for Linux login page opens.
3. Enter your root login credentials and click Login.  
The CA ARCserve D2D for Linux user interface opens.

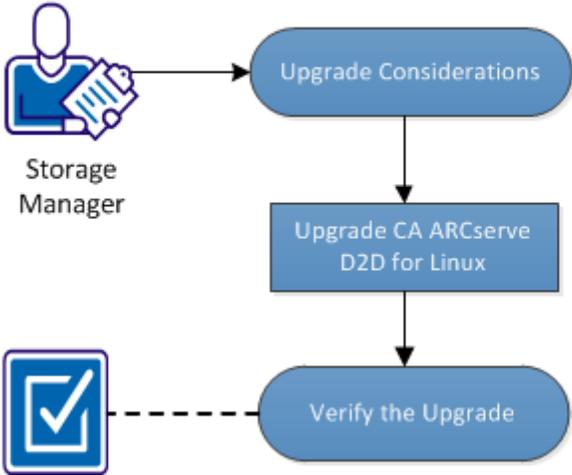
CA ARCserve D2D for Linux is successfully installed and verified.

## How to Upgrade CA ARCserve D2D for Linux

Upgrade CA ARCserve D2D for Linux to the next release to avail several modifications and enhancements on the features and performance of CA ARCserve D2D for Linux.

The following diagram displays the process to upgrade CA ARCserve D2D for Linux:

### How to Upgrade CA ARCserve D2D for Linux



**Perform these tasks to upgrade CA ARCserve D2D for Linux:**

- [Upgrade Considerations](#) (see page 18)
- [Upgrade CA ARCserve D2D for Linux](#) (see page 18)
- [Verify the Upgrade](#) (see page 20)

## Upgrade Considerations

Consider the following points before you begin the upgrade:

- Ensure that you schedule your upgrade when there are no backup jobs running.

## Upgrade CA ARCserve D2D for Linux

Upgrade CA ARCserve D2D for Linux to the next release to avail several modifications and enhancements on the features and performance of CA ARCserve D2D for Linux.

When you install the upgrade, CA ARCserve D2D for Linux tries to detect an existing installation.

- If CA ARCserve D2D for Linux detects an existing installation, it automatically performs the upgrade process. All existing configurations (e.g. configuration files, database) are saved and upgraded.
- If CA ARCserve D2D for Linux does not detect any existing installation, it automatically performs a new installation.

**Follow these steps:**

1. Log in to the D2D Server as a root user.
2. Download the CA ARCserve D2D for Linux installation package (\*.bin file) and the restore-utility package file to the root folder.

**Important!** When you download the two installation package files to a local folder, the full path of this local folder must not contain any special characters except blank spaces and the path should only include the following characters: a-z, A-Z, 0-9, - and \_.

3. Provide the execution permission to the installation package.

4. Perform one of the following steps depending on the location of the installation package and the restore-utility package:

- If the installation package and the restore-utility package are in the same folder, then run the following command to begin the installation:

```
./<linux_installation_file_name>.bin
```

**Note:** If you rename the restore-utility package, the package name must include the restore utility characters for the installation command to automatically find the restore-utility package and install it. If the package name does not have the restore utility characters, then you must provide the full path of the restore-utility package.

The installation package verifies the supported platform and displays a confirmation message.

If a non-supported platform is detected, type Y and press Enter to confirm the non-supported platform installation.

- If the installation package and the restore-utility package are in different folders, then provide the path of the restore-utility package in the first parameter:

```
./<linux_installation_file_name>.bin --path=/<path_of_the  
restore-utility_package>
```

The installation package verifies the supported platform and displays a confirmation message.

If a non-supported platform is detected, type Y and press Enter to confirm the non-supported platform installation.

The installation package detects an existing installation and displays a confirmation message for upgrade.

5. (Optional) Type Y and press Enter to confirm application dependencies.

The installation package verifies application dependencies.

6. Type Y and press Enter to confirm the installation.

The installation package displays the licensing agreement information.

7. Type Y and press Enter to accept the licensing agreement.

The CA ARCserve D2D for Linux installation process begins.

When the restore-utility package installation is complete, the Live CD build information is displayed.

The Live CD is built at the following location:

```
/opt/CA/d2dserver/packages
```

**Note:** Live CD is required to get the IP address of the target node when you perform a Bare Metal Recovery (BMR).

CA ARCserve D2D for Linux is successfully upgraded.

## Verify the Upgrade

Verify that the upgrade is complete after you have upgraded CA ARCserve D2D for Linux to the next release. D2D Server stores a backup of the existing configurations files. After the verification is complete, delete the backup of the existing configurations files.

**Follow these steps:**

1. Open a web browser from any Windows computer.
2. Enter the URL of the D2D Server.  
**Example:** `https://hostname:8014`  
The CA ARCserve D2D for Linux login page opens.
3. Enter your root login credentials and click Login.  
The CA ARCserve D2D for Linux user interface opens.
4. Verify that D2D Server is working properly.
5. Log into the D2D Server as a root user.
6. Navigate to the `d2dserver.bak` folder and delete the folder.  
`/opt/CA/d2dserver.bak`

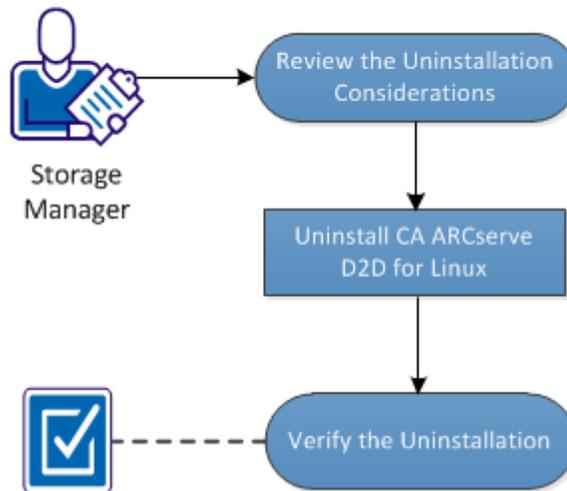
CA ARCserve D2D for Linux is successfully upgraded and verified.

## How to Uninstall CA ARCserve D2D for Linux

Uninstall CA ARCserve D2D for Linux from the Linux server to stop protecting all your nodes.

The following flowchart shows the uninstallation process of CA ARCserve D2D for Linux:

### How to Uninstall CA ARCserve D2D for Linux



**Perform these tasks to uninstall CA ARCserve D2D for Linux:**

- [Review the Uninstallation Considerations](#) (see page 21)
- [Uninstall CA ARCserve D2D for Linux](#) (see page 21)
- [Verify the Uninstallation](#) (see page 22)

## Review the Uninstallation Considerations

Consider the following points before you begin the uninstallation:

- You have the root login credentials to the D2D Server.
- You do not have any running jobs. If a job is running, you cannot uninstall CA ARCserve D2D for Linux.

## Uninstall CA ARCserve D2D for Linux

You can uninstall CA ARCserve D2D for Linux from the command line of the D2D Server. The uninstall process removes all the files and directories that are created during the installation of the software.

**Follow these steps:**

1. Log in to the D2D Server as a root user.
2. Navigate to the *bin* folder where CA ARCserve D2D for Linux is installed with the following command:

```
# cd /opt/CA/d2dserver/bin/
```

3. Run the following command to uninstall CA ARCserve D2D for Linux:

```
# ./d2duninstall
```

A message displays after the uninstallation is complete.

CA ARCserve D2D for Linux is uninstalled from the server.

## Verify the Uninstallation

Verify that the CA ARCserve D2D for Linux is removed from the server after the uninstallation process is complete.

Navigate to the following folder and verify that CA ARCserve D2D for Linux is removed:

```
/opt/CA/d2dserver
```

You have verified the uninstallation of CA ARCserve D2D for Linux. CA ARCserve D2D for Linux is removed from the Linux server.

# Chapter 3: User Interface

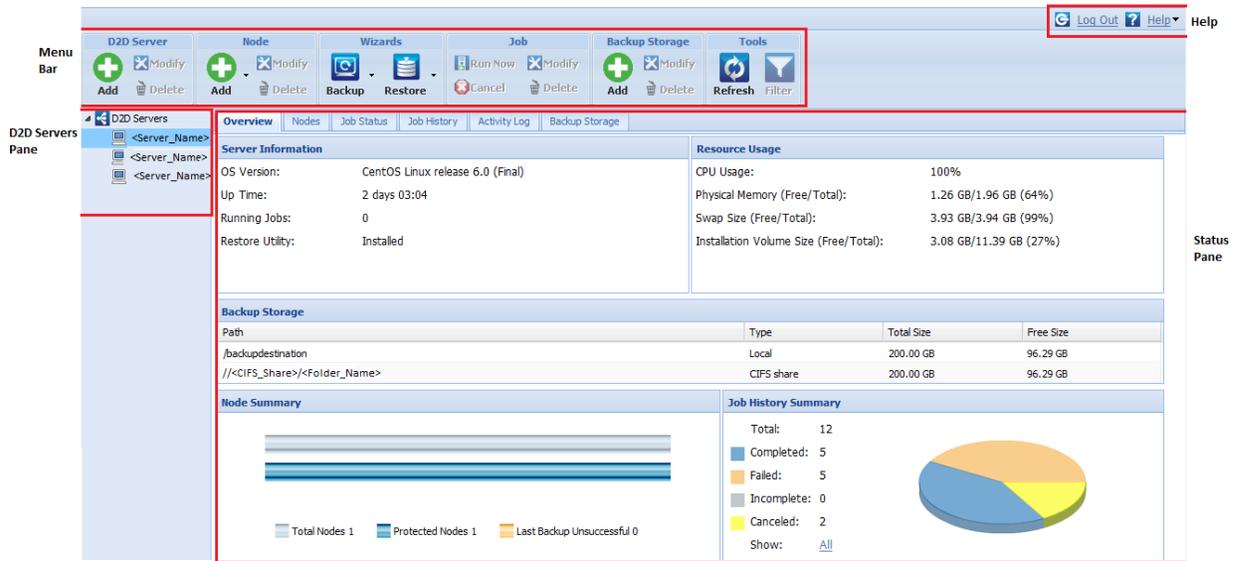
This section contains the following topics:

[How to Navigate the CA ARCserve D2D for Linux User Interface](#) (see page 23)

## How to Navigate the CA ARCserve D2D for Linux User Interface

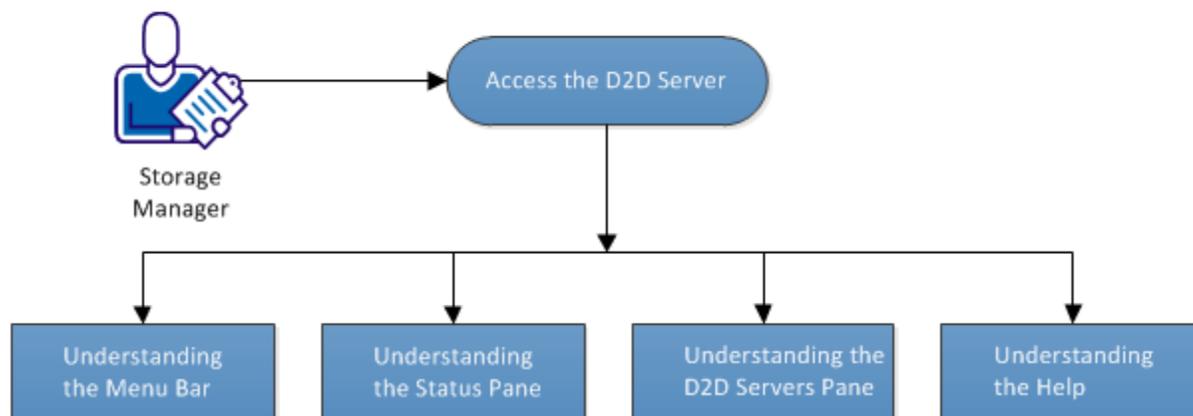
Before you start using CA ARCserve D2D for Linux, you must be familiar with the user interface (UI). From the interface, you can manage nodes, manage backup storage locations, manage backup and restore jobs, and access the help topics.

The homepage interface includes four main areas: Menu bar, Status pane, D2D Servers pane, and Help.



The following diagram displays the process to navigate the CA ARCserve D2D for Linux interface:

### How to Navigate the CA ARCserve D2D for Linux User Interface



**Perform these tasks to get started with the D2D Server interface:**

- [Access the D2D Server](#) (see page 24)
- [Understanding the Menu Bar](#) (see page 25)
- [Understanding the Status Pane](#) (see page 27)
- [Understanding the D2D Servers Pane](#) (see page 31)
- [Understanding the Help](#) (see page 32)

## Access the D2D Server Interface

As a storage manager, you can access the D2D Server using the web interface. Log in with root or non-root credentials to access the D2D Server. Use the IP address that was received during the installation of CA ARCserve D2D for Linux to log in to the server. If you have recorded the host name of the server, you can log in to the server using that host name.

**Note:** For more information about providing the login permission to the non-root users, see [Grant Login Permissions to the Non-Root Users](#) (see page 168).

**Follow these steps:**

1. Open a web browser and type the IP address of the D2D Server.

**Note:** By default, the D2D Server follows https protocol and uses the 8014 port.

2. Enter the login credentials and click Login.

The D2D Server interface opens.

The D2D Server is successfully accessed.

## Understanding the Menu Bar

The menu bar lets you perform the following tasks:

- Manage D2D Servers
- Manage nodes
- Manage backup jobs
- Manage restore jobs
- Manage backup storage locations
- Filter searches
- Refresh pages

The following screen displays the menu bar:



The menu bar includes the following options:

### D2D Server

Lets you add, modify, and delete servers that have CA ARCserve D2D for Linux installed. You can install CA ARCserve D2D for Linux to multiple servers and can manage all installed servers from a central UI. The nodes that are managed by the selected server are displayed in the Status pane. All the added servers are displayed in the D2D Servers pane. You cannot modify or delete the central server. A central server is the first server that is displayed in the D2D Servers pane. You can modify and delete other servers from the D2D Servers pane. The Modify button lets you update only the Port Number of the servers.

### Node

Lets you add, modify, and delete nodes that you want to back up. Nodes are the machines that you want to back up. You can add multiple nodes to be backed up. You can also discover nodes that are present in your network using a script. You can add at least 200 nodes for each server.

## Wizards

Lets you launch the Backup Wizard and the Restore Wizard to help guide you through the backup and restore process.

- The Backup Wizard contains a drop-down list with three available options:

### Back Up

Use this option if you have not previously added any nodes to be backed up. Selecting this option launches the Backup Wizard and lets you add your nodes during the process.

### Back Up Selected Nodes

Use this option if you have previously added your nodes before launching the Backup Wizard. If you click Back Up Selected Nodes without adding any nodes or selecting the existing nodes, you get an error message. To avoid this error, select the node from the Nodes tab and then select Back Up Selected Nodes.

### Add Selected Nodes to an Existing Job

Use this option if you have an existing backup job and you want to apply the same backup settings to new nodes. You do not have to configure the Backup Wizard.

- The Restore Wizard contains a drop-down list with two available options:

### Bare Metal Recovery (BMR)

Use this option to perform a BMR. You can perform a BMR using the IP address or MAC address of the bare-metal computer to be recovered.

### Restore File

Use this option to perform a file-level restore. You can select specific files from a recovery point and restore those files.

## Job

Lets you manage jobs that you create. A job is an instance of a backup or a restore operation. After you create a backup job for a node, you do not have to create another job to run a backup for the same node next time. However, you have to create a restore job each time you want to perform a BMR.

## Backup Storage

Lets you add and manage the backup storage locations. The backup storage location could be Network File System (NFS) share, Common Internet File System (CIFS) share, or Local. Local is a local path in the D2D Server.

When you add a backup storage location, you have to provide your credentials for the selected backup storage location. You can only modify the user name and password of the CIFS share. You cannot modify any details of the NFS share. Select the Run script when free space is less than checkbox to run the `backup_storage_alert.sh` script when the free space is less than the specified value. This value can be a percentage of the total space at the backup destination or a minimum amount of space (in MB) at the backup destination. The `backup_storage_alert.sh` script can be configured to send an alert when the available free space becomes less than the specified value.

**Note:** For more information about configuring the `backup_storage_alert.sh` script, see *How to Integrate and Automate CA ARCserve D2D for Linux with the Existing IT Environment*.

After you add a backup storage location, you can view the corresponding total file size and the empty space in the Status pane. Select a backup storage location to see the recovery sets and recovery points, and the used space for each node that are backed up in that backup storage location. The added storage destinations are also displayed in the Backup Destination page of the Backup Wizard and in the Recovery Points page of the Restore Wizard.

## Tools

The tools menu includes the Refresh button and the Filter button.

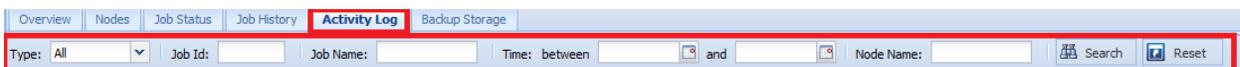
### Refresh

Lets you refresh the selected display area in the Status pane, including the Activity Log to view the latest backup or restore status messages.

### Filter

Lets you filter information displayed in the Status pane based on your input. The Filter button acts like a switch so that you can show and hide filters using the same button. When you show filters, the search fields are displayed in the Status pane. When you hide filters, the search fields are removed from the Status pane.

The following screen displays the filters applied to the Activity Log:



## Understanding the Status Pane

The Status pane is the area that displays all the information in the UI. The Status pane includes six tabs that let you view information based on the selected tab.

The following screen displays the Status pane:

The screenshot shows the Status pane with the following sections:

- Server Information:**
  - OS Version: CentOS Linux release 6.0 (Final)
  - Up Time: 1 days 07:45
  - Running Jobs: 0
  - Restore Utility: Installed
- Resource Usage:**
  - CPU Usage: 100%
  - Physical Memory (Free/Total): 1.31 GB/1.96 GB (66%)
  - Swap Size (Free/Total): 3.93 GB/3.94 GB (99%)
  - Installation Volume Size (Free/Total): 3.08 GB/11.39 GB (27%)
- Backup Storage:**

Path	Type	Total Size	Free Size
/backupdestination	Local	200.00 GB	96.32 GB
//<CIFS_Share>/<Folder_Name>	CIFS share	200.00 GB	96.32 GB
- Node Summary:**
  - Total Nodes 1
  - Protected Nodes 1
  - Last Backup Unsuccessful 0
- Job History Summary:**
  - Total: 12
  - Completed: 5
  - Failed: 5
  - Incomplete: 0
  - Canceled: 2
  - Show: [All](#)

The Status pane includes the following tabs:

**Overview**

Provides a summary of the following items:

**Server Information**

Displays the operating system version, time elapsed since the server started, and the licensing information for CA ARCserve D2D for Linux. It also displays whether the restore utility is installed on this server.

**Resource Usage**

Displays the usage of CPU, total and available physical memory, and swap size. It also displays the installation volume size.

### **Backup Storage**

Displays all backup session locations that you have added and the available space in each location. This information helps you plan your next backup location depending on the available storage space.

### **Node Summary**

Displays a graphical representation of the nodes that are protected and nodes with last unsuccessful backups. Node Summary includes the following categories:

Total Nodes display the number of nodes that are included in CA ARCserve D2D for Linux, regardless of the backup status.

Protected Nodes displays the number of nodes that the most recent backup was successful and are considered protected in case a recovery is necessary.

Last Backup Unsuccessful displays the number of nodes that the most recent backup was not successful (failed, canceled, incomplete). Depending on the cause of the unsuccessful backup, some of these nodes are unprotected in case a recovery is necessary.

### **Job History Summary**

Displays a pie chart that summarizes the history of all jobs. The summary does not include the running jobs.

The following fields are not self-explanatory:

Incomplete displays the number of jobs that ran successfully with minor changes. For example, when you restore files from Red Hat 6 to Red Hat 5, the files are restored successfully but some attributes are missing in the restored files.

Other displays the number of jobs that you canceled.

### Nodes

Displays all nodes that you have added to the D2D Server. You can apply filters to the Nodes tab to search for the required nodes. The Nodes tab also includes a context menu. The context menu lets you search the job status or the job history for the selected node. The context menu also lets you restore data. You can filter the job history or the job status using either the job name or the node name. If you search the job history for the selected node, then the Job History tab opens with the search filter applied to the tab. Similarly, if you search the job status, then the Job Status tab opens with the search filter applied to the tab. The Restore option lets you perform BMR or File-level restore. It opens the Restore Wizard and displays all the recovery points of the selected node.

Node Name	User Name	Backup Job	Recovery Point Count	Last Result	Operating System	Description
Node 1	root	Backup - 6/22/2013 6:3...	10	✓	CentOS Linux release 6.0	
Node 2	root	6:3...	41	✓	CentOS Linux release 6.0	
Node 3	root	:16:...	0	✗	Red Hat Enterprise Linux Ser...	

### Job Status

Displays the list of backup and restore jobs that are created, including the status of each job. Use this tab to run a backup or restore job and rerun a backup job. You can see the progress of backup or restore jobs that you run. You can apply filters to the Job Status tab to search for the required jobs. The Job Status tab also includes a context menu. The context menu lets you search the job history for the selected job. You can filter the job history using either the job name or the node name. If you search the job history for the selected job, then the Job History tab opens with the search filter applied to the tab.

The following screen displays the context menu in the Job Status tab:

Job Name	Job Id	Job Type	Node Name	Job Phase	Status	Execution Time
Backup - 7/1/2013 8:33:00 PM		Backup				

### Job History

Displays the list of backup and restore jobs that were previously run. You can apply filters to the Job History tab to search for the required job history. When you select a job, the status of that job is displayed at the bottom of the page.

### Activity Log

Displays a list of processing messages and status messages for backup and restore jobs. Refresh the Activity Log to get the latest messages for recent backup and restore jobs. You can apply filters to the Activity Log tab to search for required activity logs.

### Backup Storage

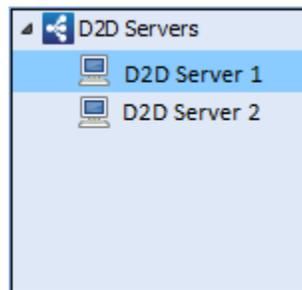
Displays the backup destination that you have added from the menu bar. You can view the free storage space and manage your backup destination. This option is useful if you want to know the available free space at any particular backup destination to plan your backup. When you add a storage destination, this destination appears in the Backup Wizard.

## Understanding the D2D Servers Pane

The D2D Servers pane displays the list of D2D Servers that are managed by the current server. You can add servers from the menu bar and can manage all the servers from one interface. If you have added multiple servers, then the Status pane displays the status of the selected server. Each server can manage at least 200 client nodes.

Typically the first server displayed in the D2D Servers pane is the central D2D server and other servers are member servers. If you are managing multiple servers from a central server then verify that the version of the central server and member servers are same.

The following screen displays the D2D Servers pane:



## Understanding the Help

The Help dialog lets you access the Help topics of CA ARCserve D2D for Linux. You can perform the following tasks from the Help dropdown list:



The following options are available in the Help dropdown list:

### **Help**

Lets you access the CA ARCserve D2D for Linux bookshelf.

### **User Guide**

Lets you access the CA ARCserve D2D for Linux User Guide.

### **Support and Community Access**

Lets you access the CA ARCserve D2D for Linux support site and ARCserve community sites. You can perform the following tasks from Support and Community Access:

- View product specific
- Access the ARCserve official website
- Provide feedback to the development team
- Read tips and comments from the ARCserve experts

- Chat with a support executive
- Subscribe to RSS feeds

**Social Networking**

Lets you get connected with ARCserve social networking communities such as Facebook and Twitter.

**Manage License**

Lets you access the License Management dialog and manage all your licenses from a central interface.

**About**

Lets you view the product information (version number and build number) and access the Release Notes of CA ARCserve D2D for Linux.



# Chapter 4: Using CA ARCserve D2D for Linux

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This section contains the following topics:

[How to Manage the Licenses](#) (see page 35)

[How to Manage Jobs](#) (see page 39)

[How to Back up Linux Nodes](#) (see page 41)

[How to Modify and Rerun a Backup Job](#) (see page 66)

[How to Perform a File-Level Recovery](#) (see page 70)

[How to Create a Bootable Live CD](#) (see page 82)

[How to Create a CentOS-Based Live CD](#) (see page 85)

[How to Perform a Bare Metal Recovery \(BMR\) for Linux Machines](#) (see page 89)

[How to Automatically Recover a Virtual Machine](#) (see page 111)

[How to Integrate and Automate CA ARCserve D2D for Linux with the Existing IT Environment](#) (see page 122)

[How to Manage the D2D Server Settings](#) (see page 150)

[How to Manage the D2D Server from the Command Line](#) (see page 156)

[How to Manage the Non-Root Users](#) (see page 167)

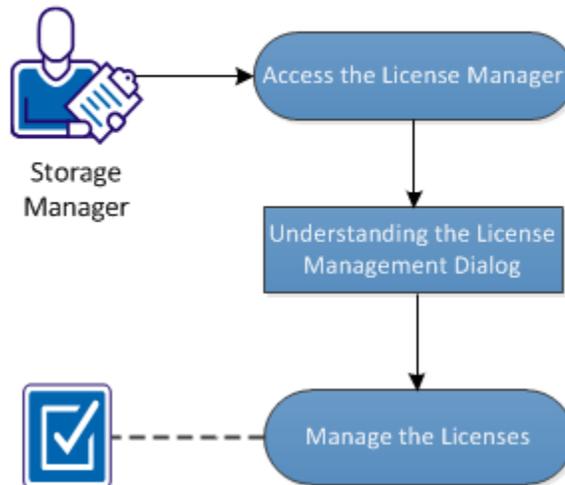
## How to Manage the Licenses

CA ARCserve D2D for Linux requires you to license your product to receive authorized and uninterrupted access to the related components. In addition, if you want to deploy CA ARCserve D2D for Linux to remote locations, you must license these remote sites to take advantage of the benefits CA ARCserve D2D for Linux provides.

CA ARCserve D2D for Linux will function for a trial period of 30 days after you begin using it. Then, apply an appropriate license key to continue using it. CA ARCserve D2D for Linux lets you manage the licenses for all of your D2D Servers from a central interface.

The following diagram displays the process to manage licenses:

### How to Manage the Licenses



Complete the following tasks to manage the licenses:

- [Access the License Manager](#) (see page 36)
- [Understanding the License Management Dialog](#) (see page 37)
- [Manage the Licenses](#) (see page 38)

## Access the License Manager

You must access the License Management dialog from the CA ARCserve D2D for Linux web interface to manage all your licenses.

### Follow these steps:

1. Log in to the CA ARCserve D2D for Linux web interface.
2. From the home page, click Help, Manage License.

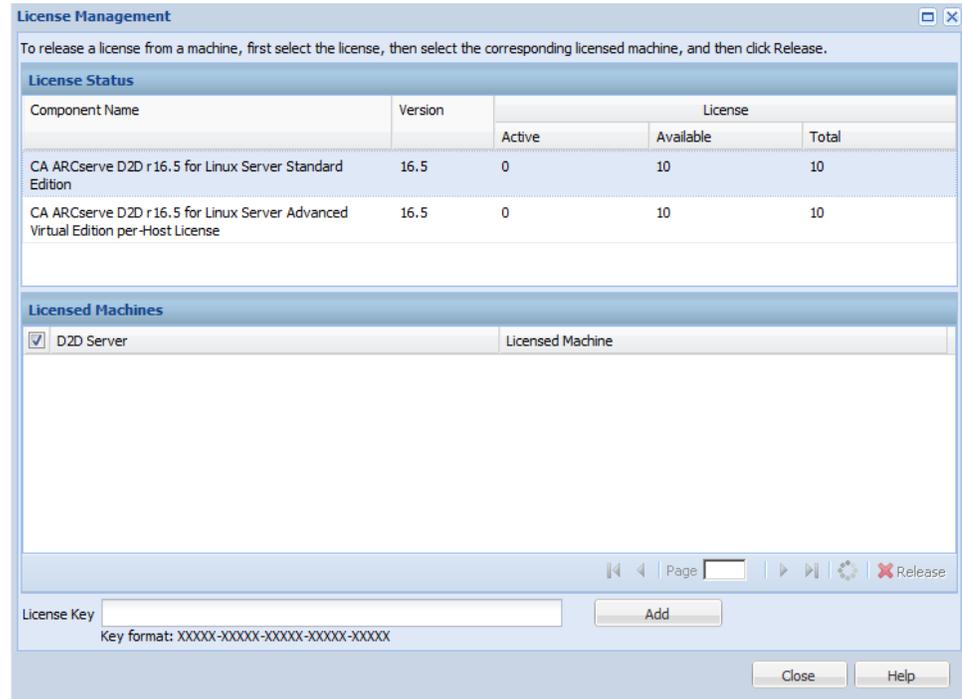
The License Management dialog opens.

The license manager is accessed.

## Understanding the License Management Dialog

The License Management dialog lets you manage all your licenses for CA ARCserve D2D for Linux. You can manage the licenses for multiple D2D Servers from a single interface.

The following screen displays the License Management dialog:



The License Management dialog is divided into two sections: License Status and Licensed Machines.

### License Status

#### Component Name

Identifies the name of the license.

#### Version

Identifies the release number of the license.

**Active**

Identifies the number of licenses that are currently being used to back up the nodes.

**Available**

Identifies the number of licenses that are still available in the license pool and that can be used to back up Linux machines.

**Total**

Identifies the total number of licenses that have been obtained to back up the machine. Total is the sum of Active and Available licenses.

**Licensed Machines**

**D2D Server**

Identifies the Linux server where you have installed CA ARCserve D2D for Linux.

**Licensed Machines**

Identifies the Linux machines for which you have applied a license to protect those machines.

## Manage the Licenses

You can add and release licenses from the License Management dialog. The added license is displayed in the License Management dialog. If you do not want to backup any machine anymore, you can release the license from that machine.

**Follow these steps:**

- To add a license, follow these steps:
  - a. Check the license key on your media case or on your License certificate.
  - b. Enter the license key in the License Key field and click Add.
  - c. Close and open the License Management dialog.

The license is added and is listed in the License Status area.
- To release a license, follow these steps:
  - a. Select the license from the License Status area.
  - b. Select the D2D Server from Licensed Machines and click Release.
  - c. Close and open the License Management dialog.

The license is released from the machine.

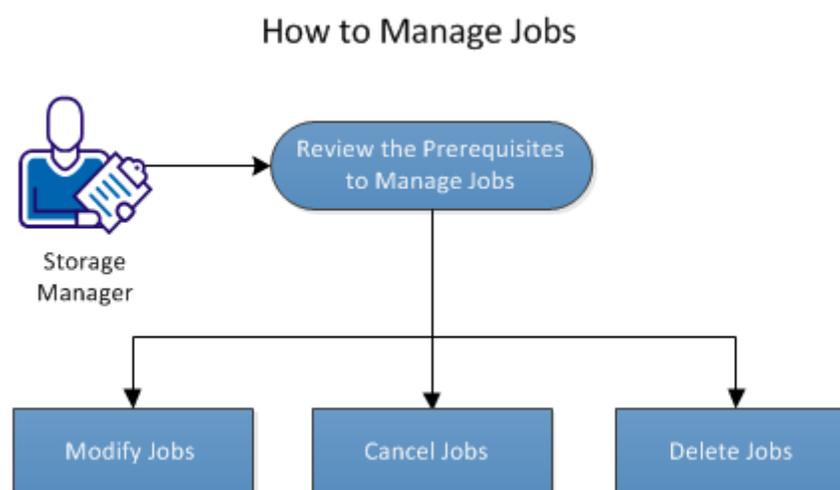
The licenses are successfully managed.

## How to Manage Jobs

After you create a backup or a restore job, you can manage all your jobs from the Job menu. Managing a job includes the following tasks:

- Modifying a job
- Canceling a job
- Deleting a job

The following diagram displays the process to manage jobs:



Perform these tasks to manage your jobs:

- [Modify Jobs](#) (see page 40)
- [Cancel Jobs](#) (see page 40)
- [Delete Jobs](#) (see page 41)

## Review the Prerequisites to Manage Jobs

Consider the following prerequisites before you manage your jobs:

- You have a valid existing job to manage
- You have the appropriate permission to manage jobs.

## Modify Jobs

You can open any existing job and modify the settings for the job from the web interface. For example, if you want to change the backup destination for an already protected machine, you do not have to create a new job. You can open the existing job that protects the machine and modify only the backup destination section. Your all other settings remain unchanged except the backup destination settings.

**Follow these steps:**

1. Select a job from the Job Status tab.
2. Click Modify from the Job menu.  
The wizard for the selected job opens.
3. Modify your settings in the wizard.
4. Click Submit on the Summary page of the wizard.  
The job is submitted and the job runs depending on your settings.

The job is successfully modified.

## Cancel Jobs

You can cancel a running job from the web interface of CA ARCserve D2D for Linux.

**Follow these steps:**

1. Select a job from the Job Status tab.
2. Click Cancel from the Job menu.  
The Cancel job dialog opens.
3. Select one of the following options from the Cancel job for dropdown list:  
**Selected node**  
Specifies that the job is canceled only for the selected node.  
**All nodes protected by the selected job**  
Specifies that the job is canceled for all the nodes protected by the selected job.
4. Click OK.  
The job is canceled.

## Delete Jobs

You can delete a job when you do not want to protect or restore a machine anymore. You can also delete a job that protects a group of nodes. When you delete a job, the previously backed up recovery points still remain available in the specified backup destination. You can use those recovery points to restore your data.

For a running job, the Delete option is inactive. You have to cancel the running job and then delete the job.

**Follow these steps:**

1. Select a job from the Job Status tab.
2. Click Delete from the Job menu.

The Delete job dialog opens.

3. Select one of the following options from the Delete job for dropdown list:

**Selected node**

Specifies that the job is deleted only for the selected node.

**All nodes protected by the selected job**

Specifies that the job is deleted for all the nodes protected by the selected job.

4. Click OK.

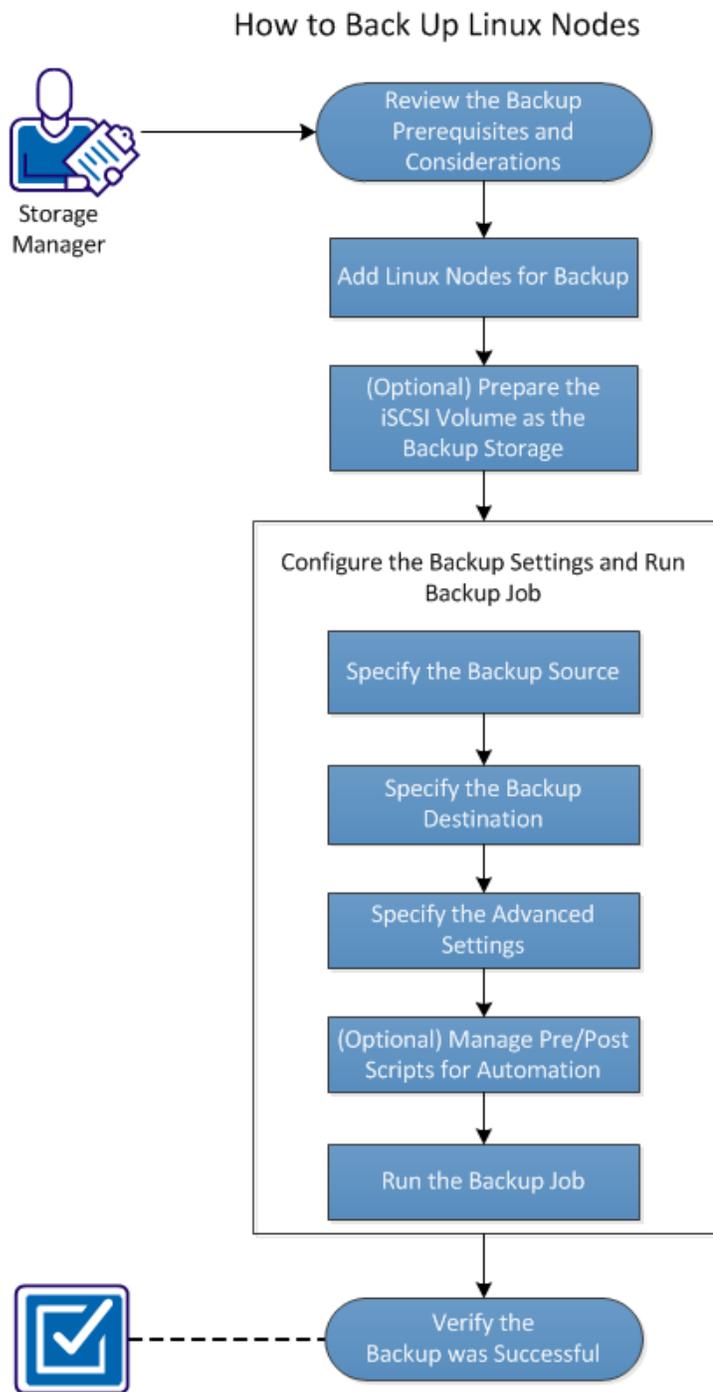
The job is deleted.

## How to Back up Linux Nodes

CA ARCserve D2D for Linux lets you back up Linux nodes and data that are stored in it. You can also back up the D2D Server itself like any other Linux node.

When CA ARCserve D2D for Linux performs a backup of data, it also captures information that is related to the operating system, installed applications, drivers, and so on, from the production node. As a result, when you restore the backed up data, you can perform a BMR or you can restore files specific to your need.

The following diagram displays the process to back up Linux nodes:



**Perform these tasks to back up a Linux node:**

- [Review the Backup Prerequisites](#) (see page 43)
- [Add Linux Nodes for Backup](#) (see page 46)
- [\(Optional\) Prepare the iSCSI Volume as the Backup Storage](#) (see page 48)
- [Configure the Backup Settings and Run Backup Job](#) (see page 49)
  - [Specify the Backup Source](#) (see page 49)
  - Specify the Backup Destination
  - [Specify the Advanced Settings](#) (see page 53)
    - [\(Optional\) Manage Pre/Posts Scripts for Automation](#) (see page 62)
  - [Run the Backup Job](#) (see page 65)
- [Verify the Backup was Successful](#) (see page 66)

## Review the Backup Prerequisites and Considerations

Verify the following requirements before performing a backup:

- You have the supported hardware and software requirements for the backup node.  
**Note:** For more information about the supported hardware and software requirements, see the *Release Notes*.
- You have a valid destination to store your backed up data.
- You have the user names and passwords of nodes that you want to back up.
- The */tmp* folder in the backup node has a minimum of 300 MB space. The */tmp* folder is used to process the accumulation of incremental blocks.
- Perl and sshd (SSH Daemon) are installed on the nodes that you want to back up.
- mount.nfs is installed on the nodes that you want to back up.
- mount.cifs is installed on the nodes that you want to back up.
- The backup node can access your backup destination and you have the write permission.

To rerun a backup job, verify that you have backed up the node before and you have a valid backup job.

Review the following backup considerations:

- To optimize the management of your Recovery Points, you should consider the following recommendations when scheduling the frequency of your backups:
  - For systems that are protected with Incremental Backups performed every 15 minutes, you should schedule a Full Backup every week (to refresh your base image).
  - For systems that are protected with Incremental Backups performed every hour, you should schedule a Full Backup every month (to refresh your base image).

**Note:** If the amount of space used to store your backup images is a concern, you should consider scheduling your Full Backups less frequently to consume less storage space.

## Disk Supported by CA ARCserve D2D for Linux

Different types of disks are supported for CA ARCserve D2D for Linux backup source and backup disks. The following matrix lists the types of disks that are supported for each function.

### **Backup and BMR Support**

Fake RAID, also called Embedded RAID, provided by the BIOS on the motherboard is not supported by CA ARCserve D2D for Linux.

## Add Linux Nodes for Backup

Add Linux nodes so that you can back up those nodes to a backup storage location. Linux nodes are your machines that you want to back up. You can either add nodes manually or you can run a script to discover and add nodes.

### Follow these steps:

1. Enter the URL of the D2D Server in a web browser to open the user interface.  
**Note:** During the installation of CA ARCserve D2D for Linux, you received the URL to access and manage the server.
2. Perform the following tasks if you want to discover nodes using a script:
  - a. Click Add from the Node menu and select Discovery.  
The Node Discovery dialog opens.
  - b. Select a script from the Script drop-down list.  
**Note:** For more information about creating the node discovery script, see Discover Nodes Using a Script in How to Integrate and Automate CA ARCserve D2D for Linux with the Existing IT Environment.
  - c. Specify the Schedule and click OK.  
The Node Discovery dialog closes and the node discovery process starts. The Activity Log tab is updated with a new message.

3. Perform the following tasks if you want to add each node manually:
  - a. Click Add from the Node menu and select Hostname/IP Address.

The Add Node dialog opens.

- b. Enter the host name or IP address of the Linux node, the user name that has the root permission, and the password.

**Note:** If the default ssh port of the node is changed, you can add the node as following:

<IP Name>:Port Number

**Example:** xxx.xxx.xxx.xxx:123

Where, xxx.xxx.xxx.xxx is the IP address and 123 is the port number.

- c. (Optional) Enter a description for the node to assist you in locating the node.
  - d. Select one of the following options.

**Add and More**

Lets you add multiple nodes one at a time. After you finish adding your nodes, click Add and Close or Close to close the Add Node dialog.

**Add and Close**

Lets you add one node and then the Add Node dialog closes.

**Close**

Closes the dialog without adding any nodes.

4. Click the Nodes tab and verify that new nodes are listed in it.

Linux nodes are added for backup.

## (Optional) Prepare the iSCSI Volume as the Backup Storage

You can store your recovery points to an Internet Small Computer System Interface (iSCSI) volume. iSCSI is used to manage data transfer and storage over a network using the IP standard.

Verify that you have the latest release of the iSCSI-initiator software installed on your D2D Server. The initiator software on RHEL systems is packaged as `iscsi-initiator-utils`. The initiator software on SLES systems is packaged as `open-iscsi`.

### Follow these steps:

1. Log in to the shell environment of the backup source node.
2. Run one of the following commands to start the iSCSI initiator daemon.
  - For RHEL systems:

```
/etc/init.d/iscsid start
```

The service on RHEL systems is named `iscsid`.
  - For SLES systems:

```
/etc/init.d/open-iscsi start
```

The service on SLES systems is named `open-iscsi`.
3. Run a discovery script to discover the iSCSI target host.

```
iscsiadm -m discovery -t sendtargets -p <ISCSI-SERVER-IP-ADDRESS>:<Port_Number>
```

The default port value of iSCSI target host is 3260.
4. Make a note of the iSCSI Qualified Name (IQN) of the iSCSI target host found by the discovery script before you manually log into the discovered target.
5. List the available block device of the backup source node.

```
#fdisk -l
```
6. Log in to the discovered target.

```
iscsiadm -m node -T <iSCSI Target IQN name> -p <ISCSI-SERVER-IP-ADDRESS>:<Port_Number> -l
```

You can see a block device in the `/dev` directory of the backup source node.
7. Run the following command to obtain the new device name:

```
#fdisk -l
```

You can see an additional device named `/dev/sd<x>` on the backup source node. For example, consider the name of the device is `/dev/sdc`. This device name is used to create a partition and a file system in the following steps.

8. Format and mount the iSCSI Volume.
9. Create a partition and a file system on the backup source node using the following commands.

```
# fdisk /dev/sdc
```

If you have create only one partition, then use the following command to create a file system for the single partition:

```
# mkfs.ext3 /dev/sdc1
```

10. Mount the new partition using the following commands:

```
# mkdir /iscsi
```

```
# mount /dev/sdc1 /iscsi
```

The new partition is mounted and the iSCSI volume is ready to be used as a backup storage in a backup job.

11. (Optional) Add the following record to the `/etc/fstab` folder so that the iSCSI volume automatically connects with the D2D Server after you restart the server.

```
/dev/sdc1 /iscsi ext3 _netdev 0 0
```

The iSCSI volume is ready to be used as the backup storage.

## Configure the Backup Settings and Run Backup Job

Configure the backup settings using the Backup Wizard. You can back up your data to a Network File System (NFS) location, Network-attached storage (NAS), Common Internet File System (CIFS), or to a source local location. A source local location is a location in the backup source node where the backed up data is stored. The backup process is initiated by a backup job. The Backup Wizard creates the backup job and runs the job. Each time that you perform a successful backup, a recovery point is created. A recovery point is a point-in-time copy of the backup node.

### Specify the Backup Source

Specify the backup source nodes in the Backup Wizard so that you can back up those nodes to a desired location. The Backup Source page of the Backup Wizard displays the node that you want to backup. Use the Add button on this page to add more nodes for backup.

**Note:** If you open the Backup Wizard using the Back Up Selected Nodes button, then all the selected nodes are listed in the wizard page. If you open the Backup Wizard using the Back Up button, then nodes are not listed in the wizard page. You have to add nodes using the Add button in the wizard page.

**Follow these steps:**

1. Select the nodes that you want to back up from the Nodes tab.
2. Click Backup, and select the Back Up Selected Nodes option from the Wizard menu.  
The D2D Server page of the Backup Wizard opens. The D2D Server page displays the server name.
3. Click Next.  
The Backup Source page opens. The previously selected nodes are displayed on this page.
4. (Optional) Click Add in the Backup Source page to add more nodes and provide the details in the Add Node dialog.
5. (Optional) Click the Exclude Volumes icon.  
The Exclude Volume Settings dialog opens which includes all the volumes of that node.
6. (Optional) Select the check box for each volume that you do not want to back up and click OK.  
The Exclude Volume Settings dialog closes.  
**Note:** To exclude a specific volume from all the backup nodes, enter the volume name at the bottom of the Backup Source page. If you exclude the `/` volume or the `/boot` volume of a node, then you cannot perform a BMR of that node.
7. Click Next.  
The Backup Destination page opens.  
The backup source is specified.

## Specify the Backup Destination

Specify a location to store the backed up data (recovery points) in the Backup Destination page of the Backup Wizard. The backup destination could be an NFS share, a CIFS share, or Source local. Source local is the backup source node. If your backup destination is Source local, then the backup data is written to its own local disk directly.

If a physical disk includes two logical volumes, then you can specify one volume as the backup source and the other volume as the backup destination.

**Note:** If you select Source local as your backup destination, the D2D Server cannot manage the recovery points. To manage the recovery sets, see Manage the Recovery Sets in How to Manage the D2D Server Settings.

**Follow these steps:**

1. Select a destination from the Backup Destination drop-down list and enter the complete path of the storage location.
  - If you have selected NFS share, then type the Backup Destination detail in the following format:  
IP address of the NFS Share:/full path of the storage location  
**Note:** Some versions of Data Domain NAS do not support the file locking mechanism of NFS. As a result, such NFS share cannot be used as a backup destination. For more information about this issue, see Compatibility Issues with CA ARCserve D2D for Linux in the [Release Notes](#).
  - If you have selected CIFS share, then type the Backup Destination detail in the following format:  
//hostname/share\_folder  
**Note:** The shared folder name cannot contain any spaces.
  - If you have selected Source local, then you have to modify some settings so that the D2D Server can manage the recovery points. For example, consider server-A as the host name of the D2D Server and node-B as the host name of the source node. Now, follow these steps to modify the settings of node-B:
    - Ensure that the NFS server is running. You can run the following command to verify the NFS server status:  
*service nfs status*
    - If the NFS server is not running, run the following command to start the NFS server:  
*service nfs start*
    - If your backup destination folder on node-B is */backup/test*, then add the following line to */etc/exports*:  
*/backup/test server-A(rw,no\_root\_squash)*  
Now, run the following command:  
*exportfs -a*
    - On the D2D Server UI, add *node-B:/backup/test* as a backup storage location. The Source local storage location is displayed in the Backup Destination drop-down list.

2. Click the arrow button to validate the Backup Destination information.

If the backup destination is invalid, an error message is displayed.

3. Select a compression level from the Compression drop-down list to specify a type of compression that is used for backup.

The available options for Compression are:

#### **Standard Compression**

Specifies that this option provides a good balance between the CPU usage and the disk space usage. This compression is the default setting.

#### **Maximum Compression**

Specifies that this option provides the highest CPU usage (lowest speed), but also has the lowest disk space usage for your backup image.

4. Select an algorithm from the Encryption Algorithm drop-down list and type the encryption password, if necessary.

- a. Select the type of encryption algorithm that you want to use for backups.

Data encryption is the translation of data into a form that is unintelligible without a deciphering mechanism. CA ARCserve D2D for Linux data protection uses secure, AES (Advanced Encryption Standard) encryption algorithms to achieve the maximum security and privacy of your specified data.

The available format options are No Encryption, AES-128, AES-192, and AES-256. (To disable encryption, select No Encryption).

- A full backup and all its related incremental backups must use the same encryption algorithm.
- If the encryption algorithm for an incremental backup has changed, you must perform a full backup.

For example, if you change the algorithm format and then you run an incremental backup, then the backup type automatically converts to a full backup.

- b. When an encryption algorithm is selected, you must provide (and confirm) an encryption password.

- The encryption password is limited to a maximum of 23 characters.
- A full backup and all its related incremental backups use the same password to encrypt data.

5. Click Next.

The Advanced page opens.

The backup destination is specified.

## Specify the Advanced Settings

Specify the backup schedule, recovery set settings, and pre-backup and post-backup settings on the Advanced page.

The following diagram displays the Advanced page of the Backup Wizard. In this diagram, None option is selected for the Schedule Type.

The screenshot shows the 'Advanced' page of the Backup Wizard. The left sidebar contains navigation buttons for 'D2D Server', 'Backup Source', 'Backup Destination', 'Advanced' (selected), and 'Summary'. The main content area is divided into several sections:

- Schedule:** 'Schedule Type' is set to 'None'. A note states: 'The backup job will run only when it is triggered manually. You could select this option when you want to customize a job schedule using a script.'
- Recovery Set Settings:** A warning icon indicates: 'When you specify a number of recovery sets to retain, ensure that you have enough free space available for the specified number plus two additional full backups.' The 'Specify the number of recovery sets to retain' field is set to '2'. Under 'Start a new recovery set on every:', 'Selected day of the week' is selected and set to 'Sunday', and 'Selected day of the month' is set to '1'.
- Throttle Backup:** The checkbox 'Limit backup write speed to' is unchecked, with a field for 'MB/min'.
- Pre/Post Scripts Settings:**
  - Run on D2D server:** 'Before job is started' and 'After job is over' are both set to 'None'.
  - Run on target machine:** 'Before job is started', 'After job is over', 'Before snapshot is taken', and 'After snapshot is taken' are all set to 'None'.

At the bottom, there are navigation buttons: '<Previous', 'Next>', 'Cancel', and 'Help'.

The following settings are available on the Advanced page:

- The Schedule settings ensure that the backup job runs periodically at a specified time.
- The Recovery Set Settings ensures periodic maintenance of the recovery sets. If the number of recovery sets exceeds the specified number, then the oldest recovery set is deleted to maintain the specified number all the time.
- The Throttle Backup setting lets you enable and specify the maximum speed (MB/min) at which the backups are written.
- The Pre/Post Scripts Settings defines the scripts that can be run on the D2D Server and the target node. You can configure the scripts to take specific actions before the start of a job, during the job is running, or after the completion of the job.

To optimize the management of your Recovery Points, you should consider the following recommendations when scheduling the frequency of your backups:

- For systems that are protected with Incremental Backups performed every 15 minutes, you should schedule a Full Backup every week (to refresh your base image).
- For systems that are protected with Incremental Backups performed every hour, you should schedule a Full Backup every month (to refresh your base image).

**Note:** If the amount of space used to store your backup images is a concern, you should consider scheduling your Full Backups less frequently to consume less storage space.

**Follow these steps:**

1. Set the start date and time by selecting one of the following options from the Schedule Type dropdown list:

**Simple**

Select the Simple option to schedule the Incremental Backup, Full Backup, and Verify Backup per the specified Start Date and Start Time. For each type of backup, you can also specify the repeat duration for a backup or never repeat a backup. The start date and time is fixed for all types of backup. So, you cannot specify a different start date and time for different types of backup.

**Note:** For more information about the backup types, see *Understanding the Types of Backup* (see page 59).

Schedule Type

**Set start date and time**  
Specify the scheduled starting date and time for the full, incremental, and verify backups.

Start Date  Start Time  :

**Incremental Backup**  
Incrementally backs up only the data that has changed since the last successful backup.

Repeat Every

**Full Backup**  
Backs up all selected data from the machine.

Repeat Every  Days  
 Never

**Verify Backup**  
Performs a confidence check to compare data from the last successful backup with data from the source, and then incrementally backs up (resynchronizes) only the differences.

Repeat Every  Days  
 Never

### Advanced

Select the Advanced option to specify multiple backup schedules each day of the week. You can specify different start date and time for different types of backup. You can add, modify, delete, and clear the Advanced schedule. When you click Clear, all the Advanced backup schedules are deleted from the Advanced Schedule Tray.

▼ **Schedule**

Schedule Type

Start Date

Time	Backup Type	Repeat
☰ Sunday		
☰ Monday		
📅 10:00 PM	Incremental Backup	Never
☰ Tuesday		
📅 10:00 PM	Incremental Backup	Never
☰ Wednesday		
📅 10:00 PM	Incremental Backup	Never
☰ Thursday		
📅 10:00 PM	Incremental Backup	Never
☰ Friday		

**Advanced Schedule Tray**

**To add a backup schedule, follow these steps:**

- a. Click Add.

The Add backup schedule dialog opens.

- b. Specify your backup schedule options and click OK.

The specified backup schedule displays on the Advanced Schedule Tray.

**None**

Select the None option to create the backup job and stores the job in the Job Status tab. This option will not run the job because there is no specified schedule. When you submit the job, the status of the job changes to Ready. When you want to run the job, you have to select the job and click Run Now from the Job menu. Each time you want to run the job, you must run the job manually. You can also write a script to run this job at your own customized schedule.

2. Specify your recovery set settings.

**Note:** For more information about the recovery sets, see *Understanding the Recovery Sets* (see page 60).

**Specify the number of recovery sets to retain**

Specifies the number of recovery sets retained.

**Start a new recovery set on every:**

**Selected day of the week**

Specifies the day of the week selected to start a new recovery set.

**Selected day of the month**

Specifies the day of the month selected to start a new recovery set. Specify 1 through 30, or the last day of the month.

**Note:** The D2D Server checks for the number of recovery sets in the configured backup storage every 15 minutes and deletes any extra recovery set from the backup storage location.

3. Specify the throttle backup value.

You can specify the maximum speed (MB/min) at which backups are written. You can throttle the backup speed to reduce CPU or network use. However, limiting the backup speed has an adverse effect on the backup window. As you lower the maximum backup speed, it increases the amount of time to perform the backup. For a backup job, the Job Status tab displays the average Read and Write speed of the job in progress and the configured throttle speed limit.

**Note:** By default, the Throttle Backup option is not enabled and backup speed is not being controlled.

4. Specify your pre-backup settings and post-backup settings in Pre/Post Scripts Settings.

These scripts run script commands for actions to take before the start of the job and/or upon the completion of the job.

**Note:** The Pre/Post Script Settings fields are populated only if you already created a script file and placed it at the following location:

```
/opt/CA/d2dserver/usr/prepost
```

**Note:** For more information about creating the pre/post scripts, see *Manage Pre/Post Scripts for Automation* (see page 62).

5. Click Next.

The Summary page opens.

The advanced schedule is specified.

**Note:** If at a given time there is more than one type of backup scheduled to be performed simultaneously, the type of backup that will be performed is based on the following priorities:

- Priority 1 - Full backup
- Priority 2 - Verify backup
- Priority 3 - Incremental backup

For example, if you schedule all three types of backups to be performed simultaneously, CA ARCserve D2D for Linux will perform the Full Backup. If there is no Full Backup scheduled, but you scheduled a Verify Backup and Incremental Backup to be performed simultaneously, CA ARCserve D2D for Linux will perform the Verify Backup. A scheduled Incremental Backup is performed only if there is no conflict with any other type of backup.

## Understanding the Types of Backup

You can specify the following types of backup in the Advanced page of the Backup Wizard:

### **Incremental Backup**

Backs up only those blocks that have changed since the last successful backup. The advantages of Incremental Backup are that it is a fast backup and it produces a small backup image. CA ARCserve D2D for Linux uses a driver to monitor the changed blocks in the source node since the last successful backup.

The available options are Repeat and Never. If you select the Repeat option, you must also specify the elapsed time period (in minutes, hours, or days) between backup attempts.

**Minimum:** 15 minutes

**Default:** 1 day

### **Full Backup**

Backs up the entire source node. Depending on the volume size of the backup node, Full Backup produces a large backup image and usually takes a longer time to complete. The available options are Repeat and Never.

If you select the Repeat option, you must also specify the elapsed time period (in minutes, hours, or days) between backup attempts.

**Minimum:** 1 day

**Default:** Never (no scheduled repeat)

### **Verify Backup**

Verifies that the protected data is valid and complete by performing a confidence check of the stored backup image to the original backup source. If necessary, the image is resynchronized. A Verify Backup looks at the most recent backup of each individual block and compares the content and information to the source. This comparison verifies that the latest backed up blocks represent the corresponding information at the source. If the backup image for any block does not match the source (possibly because of changes in the system since the last backup), CA ARCserve D2D for Linux refreshes (resynchronizes) the backup of the block that does not match. You can also use a Verify Backup (very infrequently) to get the guarantee of full backup without using the space required for a full backup.

**Advantages:** Produces a small backup image when compared to full backup because only the changed blocks (blocks that do not match the last backup) are backed up.

**Disadvantages:** Backup time is long because all source blocks are compared with the blocks of the last backup.

The available options are Repeat and Never. If you select the Repeat option, you must also specify the elapsed time period (in minutes, hours, or days) between backup attempts.

**Minimum:** 1 day

**Default:** Never (no scheduled repeat)

The type of backup that runs depends on the following situations:

- If you run the backup job for the first time for the selected nodes, the first backup is always a Full Backup.
- If you run the backup job again for the same set of nodes and the backup destination is also same, the backup type is Incremental Backup.
- If you run the backup job for the same set of nodes but the backup destination is different, the backup type is Full Backup. This is because you have changed the backup destination and for the new destination this is the first backup. So, the first backup is always a Full Backup.
- If you delete your node and then add the same node again but you do not change the backup destination, the backup will be a Verify Backup. This is because you have already backed up that node in your previous backup jobs. When you delete the node and then you add the node again, the backup job verifies all the blocks of that node with the last backup image. When the backup job decides that it is the same node then it backs up only the changed blocks. If the backup job does not find any backup image of that node in the backup destination, the backup type is a Full Backup.

## Understanding the Recovery Sets

A recovery set is a storage setting where a group of recovery points backed-up over a specified period is stored as one set. A recovery set includes a series of backups, starting with a full backup, and then followed by a number of incremental, verify, or full backups. You can specify the number of recovery sets to retain.

The Recovery Set Settings ensures periodic maintenance of recovery sets. When the specified limit is exceeded, the oldest recovery set is deleted. The following values define the default, minimum, and maximum recovery sets in CA ARCserve D2D for Linux:

**Default:** 2

**Minimum:** 1

**Maximum number of recovery sets:** 100

**Maximum number of recovery points (Including one Full backup):** 1344

**Note:** If you want to delete a recovery set to save backup storage space, reduce the number of retained sets and D2D Server automatically deletes the oldest recovery set. Do not attempt to delete the recovery set manually.

**Example Set 1:**

- Full
- Incremental
- Incremental
- Verify
- Incremental

**Example Set 2:**

- Full
- Incremental
- Full
- Incremental

A full backup is required to start a new recovery set. The backup that starts the set will be automatically converted to a full backup, even if there is no full backup configured or scheduled to be performed at that time. After the recovery set setting is changed (for example, changing the recovery set starting point from the first backup of Monday to the first backup of Thursday), the starting point of existing recovery sets will not be changed.

**Note:** An incomplete recovery set is not counted when calculating an existing recovery set. A recovery set is considered complete only when the starting backup of the next recovery set is created.

**Example 1 - Retain 1 Recovery Set:**

- Specify the number of recovery sets to retain as 1.  
D2D Server always keeps two sets to keep one complete set before starting the next recovery set.

#### Example 2 - Retain 2 Recovery Sets:

- Specify the number of recovery sets to retain as 2.

D2D Server deletes the first recovery set when the fourth recovery set is about to start. This ensures that when the first backup is deleted and the fourth is starting, you still have two recovery sets (recovery set 2 and recovery set 3) available on disk.

**Note:** Even if you choose to retain only one recovery set, you will need space for at least two full backups.

#### Example 3 - Retain 3 Recovery Sets:

- The backup start time is 6:00 AM, August 20, 2012.
- An incremental backup runs every 12 hours.
- A new recovery set starts at the last backup on Friday.
- You want to retain 3 recovery sets.

With the above configuration, an incremental backup will run at 6:00 AM and 6:00 PM every day. The first recovery set is created when the first backup (must be a full backup) is taken. Then the first full backup is marked as the starting backup of the recovery set. When the backup scheduled at 6:00 PM on Friday is run, it will be converted to a full backup and marked as the starting backup of the recovery set.

### (Optional) Manage Pre/Post Scripts for Automation

Pre/Post scripts let you run your own business logic at specific stages of a running job. You can specify when to run your scripts in Pre/Post Script Settings of the Backup Wizard and the Restore Wizard in the UI. The scripts can be run on the D2D Server depending on your setting.

Managing the pre/post script is a two part process, consisting of creating the pre/post script and placing the script in the prepost folder.

#### Create Pre/Post Scripts

##### Follow these steps:

1. Log into the D2D Server as a root user.
2. Create a script file using the environment variables in your preferred scripting language.

##### Pre/Post Script Environment Variables

To create your script, use the following environment variables:

##### **D2D\_JOBNAME**

Identifies the name of the job.

**D2D\_JOBID**

Identifies the job ID. Job ID is a number provided to the job when you run the job. If you run the same job again, you get a new job number.

**D2D\_TARGETNODE**

Identifies the node that is being backed up or restored.

**D2D\_JOBTYPE**

Identifies the type of the running job. The following values identify the D2D\_JOBTYPE variable:

**backup.full**

Identifies the job as a full backup.

**backup.incremental**

Identifies the job as an incremental backup.

**backup.verify**

Identifies the job as a verify backup.

**restore.bmr**

Identifies the job as a bare-metal recovery (bmr). This is a restore job.

**restore.file**

Identifies the job as a file-level restore. This is a restore job.

**D2D\_SESSIONLOCATION**

Identifies the location where the recovery points are stored.

**D2D\_PREPOST\_OUTPUT**

Identifies a temp file. The content of the first line of the temp file is displayed in the activity log.

**D2D\_JOBSTAGE**

Identifies the stage of the job. The following values identify the D2D\_JOBSTAGE variable:

**pre-job-server**

Identifies the script that runs on the D2D Server before the job starts.

**post-job-server**

Identifies the script that runs on the D2D Server after the job completes.

**pre-job-target**

Identifies the script that runs on the target machine before the job starts.

**post-job-target**

Identifies the script that runs on the target machine after the job completes.

**pre-snapshot**

Identifies the script that runs on the target machine before capturing the snapshot.

**post-snapshot**

Identifies the script that runs on the target machine after capturing the snapshot.

**D2D\_TARGETVOLUME**

Identifies the volume that is backed up during a backup job. This variable is applicable for pre/post snapshot scripts for a backup job.

**D2D\_JOBRESULT**

Identifies the result for a post job script. The following values identify the D2D\_JOBRESULT variable:

**success**

Identifies the result as successful.

**fail**

Identifies the result as unsuccessful.

**D2DSVR\_HOME**

Identifies the folder where D2D Server is installed. This variable is applicable for the scripts that run on the D2D Server.

The script is created.

**Note:** For all scripts, a return value of zero indicates success and a nonzero return value indicates failure.

### Place the Script in the Prepost Folder and Verify

All the pre/post scripts for a D2D Server are centrally managed from the prepost folder at the following location:

```
/opt/CA/d2dserver/usr/prepost
```

#### Follow these steps:

1. Place the file in the following location of the D2D Server:  

```
/opt/CA/d2dserver/usr/prepost
```
2. Provide the execution permission to the script file.
3. Log into the CA ARCserve D2D for Linux web interface.
4. Open the Backup Wizard or the Restore Wizard and navigate to the Advanced tab.
5. Select the script file in the Pre/Post Script Settings drop-down list and then submit the job.
6. Click Activity Log and verify that the script is executed to the specified backup job.  
The script is executed.

The pre/post scripts are successfully created and placed in the prepost folder.

### Run the Backup Job

Run the backup job so that a recovery point is created. You can use this recovery point to restore data.

On the Summary page, review the summary of the backup details and provide a job name to distinguish it from other jobs.

#### Follow these steps:

1. Review the summary and enter a job name.  
The Job Name field has a default name initially. You can enter a new job name of your choice but you cannot leave this field empty.
2. (Optional) Click Previous to modify any settings on any wizard pages.
3. Click Submit.  
The backup process starts. In the Job Status tab, the job is added and the backup status is displayed.

The backup job is created and run.

## Verify the Backup was Successful

After the backup job is complete, verify that the recovery point is created at the specified destination.

**Follow these steps:**

1. Navigate to the specified destination where you have stored your backup data.
2. Verify that the backup data is present in that destination.

For example, if the backup job name is *Demo* and the backup destination is `xxx.xxx.xxx.xxx:/Data`, then navigate to the backup destination and verify that a new recovery point is generated.

The backup data is successfully verified.

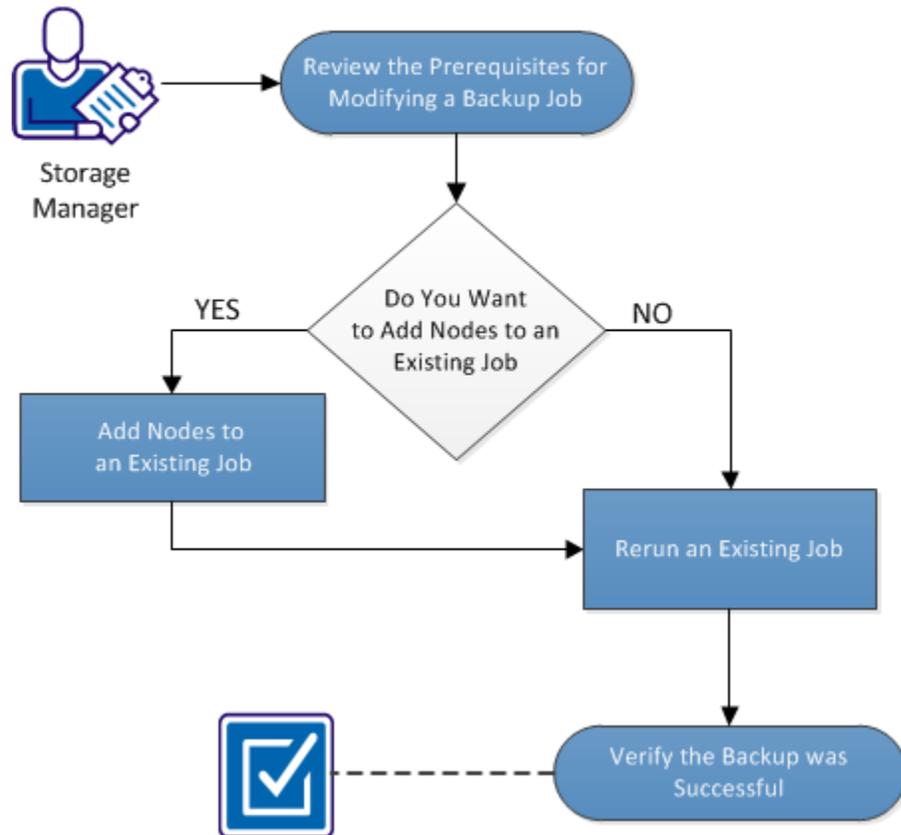
The Linux nodes are successfully backed up.

## How to Modify and Rerun a Backup Job

If you have already created a job for a node, you can modify it and rerun the job multiple times. You do not have to create another job to protect the same node. If you do not want to make any changes to the job, you can also run the job without modifying it. Modifying a job includes adding a node to an existing job, configuring the job settings, or both.

The following diagram displays the process to modify and rerun a backup job:

### How to Modify and Rerun a Backup Job



**Perform these tasks to modify and rerun a backup job:**

- [Review the Prerequisites for Modifying a Backup Job](#) (see page 67)
- [Do You Want to Add Nodes to an Existing Job](#) (see page 68)
- [Add Nodes to an Existing Job](#) (see page 68)
- [Rerun an Existing Job](#) (see page 68)
- [Verify the Backup was Successful](#) (see page 70)

### Review the Prerequisites for Modifying a Backup Job

Verify the following requirements before you modify and rerun a backup job:

- You have a valid backup job.
- You have added the nodes to the CA ARCserve D2D for Linux user interface.

## Do You Want to Add Nodes to an Existing Job

If you already have a backup job and you want to protect new nodes with the same backup settings, you can add nodes to an existing job. After you add the nodes, you can also modify the backup settings and run the job.

## Add Nodes to an Existing Job

You can add new nodes to an existing backup job and can run the job. All the settings of the selected job are applied to the new node and you do not have to configure any new backup settings. Use this option if you want to keep the same backup settings for all the nodes.

### Follow these steps:

1. Select all the new nodes from the Nodes tab in the Status pane.
2. From the Wizard menu, click Backup and select Add Selected Nodes to an Existing Job.

The Add Selected Nodes into an Existing Job dialog opens.

3. Select a job from the Job Name drop-down list and click OK.

The node is added to the selected backup job and the Protected column in the Nodes tab changes to Yes.

Nodes are added to an existing job.

## Rerun an Existing Backup Job

Rerun the backup job to take another backup of the specified nodes. A recovery point is created after each successful backup. If you have already backed up a node, you do not have to create another backup job to back up that node again. All of the previous jobs are listed in the Job Status tab in the Status pane.

When you rerun a backup job, specify the type of job that you want to rerun.

**Note:** If you update any information in the Backup Destination page of the Backup Wizard before rerunning a job, the job type automatically changes to *Full Backup*.

**Follow these steps:**

1. Enter the URL of the CA ARCserve D2D for Linux server in a web browser to open the user interface.

**Note:** During the installation of CA ARCserve D2D for Linux, you received the URL to access and manage the server.

2. Click the Job Status tab and select the job that you want to run.
3. Verify that the status of the selected job is Done or Ready.

Done implies that the job is not scheduled and Ready implies that the job is scheduled.

4. Perform one of the following steps:

- To run the job without any changes,

- a. Click Run Now from the Job menu.

The Run backup job now dialog opens.

- b. Select the Backup Type.

- c. Select an option from the Run job for dropdown list:

**Selected Node**

Specifies that the backup job runs for only the selected node.

**All nodes protected by the selected job**

Specifies that the backup job runs for all the nodes protected by the selected job.

- d. Click OK.

The Run backup job now dialog closes. The status of the job changes to Active in the Job Status tab and the same job runs again.

- To modify the job before you run the job, follow these steps:

- a. Select a job and click Modify.

The Backup Wizard opens.

- b. Update the required field in the Backup Wizard.

- c. Click Submit.

The job runs again depending on the job schedule.

The backup job successfully reruns.

## Verify the Backup was Successful

After the backup job is complete, verify that the recovery point is created at the specified destination.

**Follow these steps:**

1. Navigate to the specified destination where you have stored your backup data.
2. Verify that the backup data is present in that destination.

For example, if the backup job name is *Demo* and the backup destination is `xxx.xxx.xxx.xxx:/Data`, then navigate to the backup destination and verify that a new recovery point is generated.

The backup data is successfully verified.

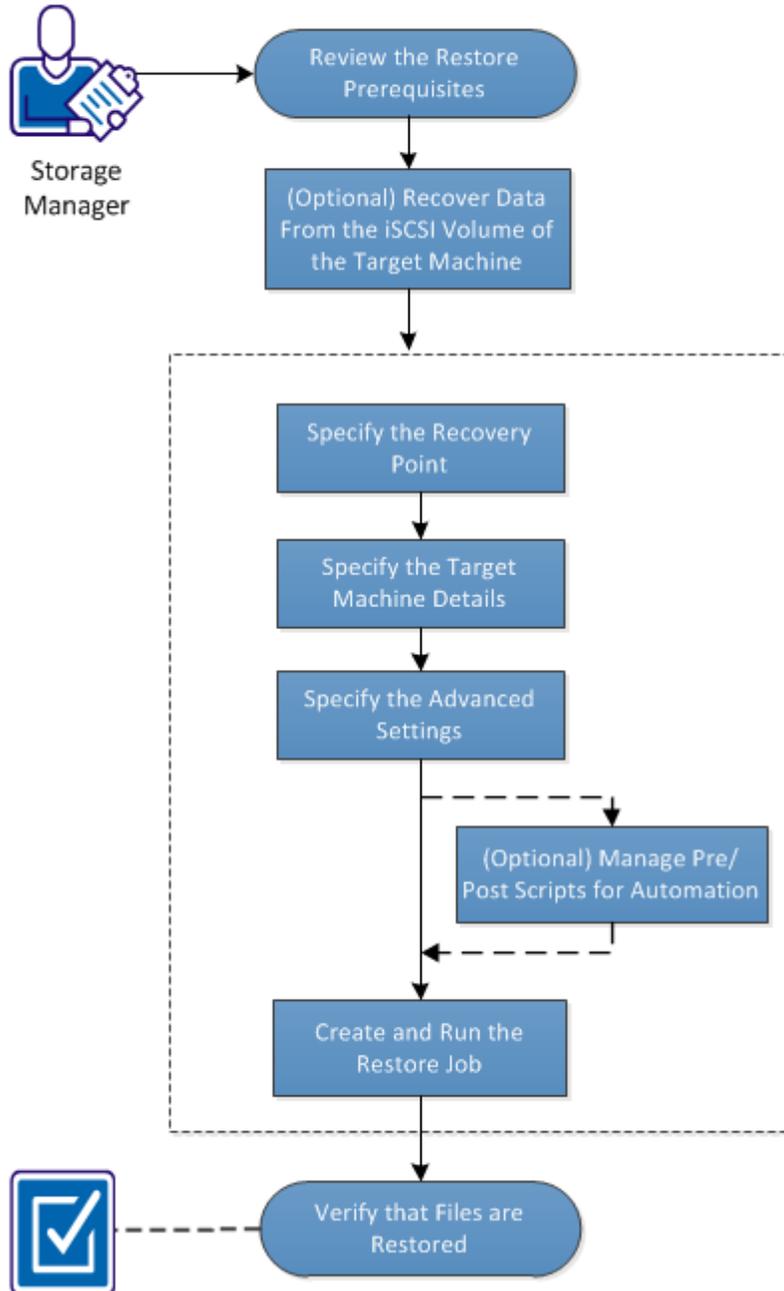
The backup job is successfully modified and rerun.

## How to Perform a File-Level Recovery

A file-level recovery restores individual files and folders from a recovery point. You can restore as minimum as one file from the recovery point. This option is useful if you want to restore selected files and not the entire recovery point.

The following diagram displays the process to perform a file-level recovery:

### How to Perform a File-Level Recovery



**Perform these tasks for a file-level recovery:**

- [Review the Restore Prerequisites](#) (see page 72)
- [\(Optional\) Recover Data from the iSCSI Volume to the Target Machine](#) (see page 73)
- [Specify the Recovery Point](#) (see page 74)
- [Specify the Target Machine Details](#) (see page 76)
- [Specify the Advanced Settings](#) (see page 77)
- [\(Optional\) Manage Pre/Post Scripts for Automation](#) (see page 78)
- [Create and Run the Restore Job](#) (see page 81)
- [Verify that Files are Restored](#) (see page 82)

## Review the Prerequisites

Consider the following options before you perform a file-level recovery:

- You have a valid recovery point and the encryption password, if any.
- You have a valid target node to recover data.
- You have verified that the CA ARCserve D2D for Linux server supports the file system that you want to restore.

For example, RedHat 5.x does not support the *reiserfs* file system. If the operating system of the D2D Server is RedHat 5.x and you want to restore the reiserfs file system, you must install the file system driver to support reiserfs. You can also use CA ARCserve D2D for Linux Live CD to perform the file-level restore because Live CD supports all types of file system.

## (Optional) Recover Data from the iSCSI Volume to the Target Machine

If you have stored your data in an iSCSI target volume, you can connect to the iSCSI volume and recover data. The iSCSI volume lets you manage data and transfer data over a network.

Verify that you have the latest release of the iSCSI-initiator software installed on your D2D Server. The initiator software on RHEL systems is packaged as `iscsi-initiator-utils`. The initiator software on SLES systems is packaged as `open-iscsi`.

### Follow these steps:

1. Log into the shell environment of the D2D Server.
2. Run one of the the following commands to start the iSCSI initiator daemon.
  - For RHEL systems:  

```
/etc/init.d/iscsid start
```

The service on RHEL systems is named `iscsid`.
  - For SLES systems:  

```
/etc/init.d/open-iscsi start
```

The service on SLES systems is named `open-iscsi`.
3. Run a discovery script to discover the iSCSI target host.  

```
iscsiadm -m discovery -t sendtargets -p <ISCSI-SERVER-IP-ADDRESS>:<Port_Number>
```

The default port value of iSCSI target host is 3260.
4. Make a note of the iSCSI Qualified Name (IQN) of the iSCSI target host found by the discovery script before you manually log into the discovered target.
5. List the available block device of the backup source node.  

```
#fdisk -l
```
6. Log in to the discovered target.  

```
iscsiadm -m node -T <iSCSI Target IQN name> -p  
<ISCSI-SERVER-IP-ADDRESS>:<Port_Number> -l
```

You can see a block device in the `/dev` directory of the backup source node.

7. Run the following command to obtain the new device name:

```
#fdisk -l
```

You can see an additional device named `/dev/sd<x>` on the backup source node.

For example, consider the name of the device is `/dev/sdc`. This device name is used to create a partition and a file system in the following steps.

8. Mount the iSCSI volume using the following commands:

```
# mkdir /iscsi
```

```
# mount /dev/sdc1 /iscsi
```

**Note:** When you specify the session location in the Restore Wizard, you need to select Local and enter the path `/iscsi`.

**Example:** `<path>/iscsi`

9. (Optional) Add the following record to the `/etc/fstab` folder so that the iSCSI volume automatically connects with the D2D Server after you restart the server.

```
/dev/sdc1 /iscsi ext3 _netdev 0 0
```

The target machine can now connect to the iSCSI volume and can recover data from the iSCSI volume.

## Specify the Recovery Point

Each time that you perform a backup, a recovery point is created. Specify the recovery point information in the Restore Wizard so that you can recover the exact data that you want. You can restore specific files or all files depending on your requirement.

**Note:** If you have selected Source local as your backup destination, the D2D Server cannot manage the recovery points. The D2D server cannot connect to the Source local directly and so the Recovery Set settings are not applied on the recovery points.

### To restore files from Source local, follow these steps:

- a. Share the backup destination (Source local) and ensure that the D2D server can connect to the backup destination.
- b. Add the shared destination as the backup storage location to the D2D server.

Now, Source local behaves as an NFS backup storage location and you can restore files from the share.

**Follow these steps:**

1. Enter the URL of the D2D server in a web browser to open the CA ARCserve D2D for Linux interface.

**Note:** During the installation of CA ARCserve D2D for Linux, you received the URL to access and manage the server.

2. Click Restore from the Wizard menu and select Restore File.

Restore Wizard - File Restore opens.

You can see the selected D2D server in the D2D Server page of the Restore Wizard.

3. Click Next.

The Recovery Points page of the Restore Wizard opens.

4. Select a session from the Session Location drop-down list and enter the full path of the share.

For example, consider the Session Location as NFS share, xxx.xxx.xxx.xxx as the IP address of the NFS share, and the folder name is *Data*. You would enter xxx.xxx.xxx.xxx:/Data as the NFS share location.

**Note:** If the backed up data is stored in Source local, then you must first convert the source node to an NFS server, and then share the session location.

5. Click Connect.

All the nodes that have been backed up to this location get listed in the Machine drop-down list.

6. Select the node that you want to restore from the Machine drop-down list.

All the recovery points of the selected node get listed.

7. Apply the date filter to display the recovery points that are generated between the specified date and click Search.

**Default:** Recent two weeks.

All the recovery points available between the specified dates are displayed.

8. Select the recovery point that you want to restore and click Add. If the recovery point is encrypted, enter the encryption password to restore data.

The Browse-<node name> dialog opens.

9. Select the files and folders that you want to restore and click OK.

**Note:** If you try to locate a file or folder using the Search field, ensure that you select the highest folder in the hierarchy. The search is conducted on all the child folders of the selected folder.

The Browse-<node name> dialog closes and you return to the Recovery Points page. The selected files and folders are listed under Files/Folders to be restored.

10. Click Next.

The Target Machine page opens.

The recovery point is specified.

## Specify the Target Machine Details

Specify the target node details so that data is restored to that node. You can restore the selected files or folders to the source node or to a new node.

### Follow these steps:

- To restore to the node from where the data was backed up, follow these steps:

1. Select Restore to original location on the Target Machine page.

The Host Name field in Target Machine Settings gets populated with the name of the source node.

2. Enter the user name and the password of the node.
3. Select one of the following options to resolve conflicting files:

#### Overwrite existing files

Specifies that if the file exists in the target machine then the backup file from the recovery point replaces the existing file.

#### Rename files

Specifies that if the file exists in the target machine, then a new file is created with the same file name and *.d2duplicate<x>* file extension. <x> specifies the number of times the file is restored. All the data is restored to the new file.

#### Skip existing files

Specifies that if the same file exists in the target machine, then those files are not restored from the recovery point.

4. Click Next.

The Advanced page opens.

- To restore to a new node, follow these steps:
  1. Select Restore to alternative location on the Target Machine page.
  2. Enter the host name or the IP address of the target node.
  3. Enter the user name and the password of the node.
  4. Enter the path where the data is restored, or click Browse to select the folder where the data is restored and click OK.
  5. Select one of the following options to resolve conflicting files:

**Overwrite existing files**

Specifies that if the file exists in the target machine then the backup file from the recovery point replaces the existing file.

**Rename files**

Specifies that if the file exists in the target machine, then a new file is created with the same file name and *.d2dduplicate<x>* file extension. <x> specifies the number of times the file is restored. All the data is restored to the new file.

**Skip existing files**

Specifies that if the same file exists in the target machine then those files are not restored from the recovery point.

6. (Optional) Select Create root directory.
7. Click Next.

The Advanced page opens.

The target machine details are specified.

## Specify the Advanced Settings

Specify the advanced settings to perform a scheduled recovery of your data. Scheduled recovery ensures that your data is recovered at the specified time even in your absence.

**Follow these steps:**

1. Set the start date and time by selecting one of the following options:

**Run Now**

Starts the file-level restore job as soon as you submit the job.

**Set Starting Date and Time**

Starts the file-level restore job at the specified date and time after submitting the job.

2. (Optional) Select Estimate file size.
3. (Optional) Select a script from the Pre/Post Scripts Settings option.

These scripts run script commands for actions to take before the start of the job and/or upon the completion of the job.

**Note:** The Pre/Post Script Settings fields are populated only if you already created a script file and placed it at the following location:

```
/opt/CA/d2dserver/usr/prepost
```

**Note:** For more information about creating the pre/post scripts, see *Manage Pre/Post Scripts for Automation* (see page 78).

4. Click Next.

The Summary page opens.

The advanced settings are specified.

## (Optional) Manage Pre/Post Scripts for Automation

Pre/Post scripts let you run your own business logic at specific stages of a running job. You can specify when to run your scripts in Pre/Post Script Settings of the Backup Wizard and the Restore Wizard in the UI. The scripts can be run on the D2D Server depending on your setting.

Managing the pre/post script is a two part process, consisting of creating the pre/post script and placing the script in the prepost folder.

### Create Pre/Post Scripts

#### Follow these steps:

1. Log into the D2D Server as a root user.
2. Create a script file using the environment variables in your preferred scripting language.

#### Pre/Post Script Environment Variables

To create your script, use the following environment variables:

##### **D2D\_JOBNAME**

Identifies the name of the job.

**D2D\_JOBID**

Identifies the job ID. Job ID is a number provided to the job when you run the job. If you run the same job again, you get a new job number.

**D2D\_TARGETNODE**

Identifies the node that is being backed up or restored.

**D2D\_JOBTYPE**

Identifies the type of the running job. The following values identify the D2D\_JOBTYPE variable:

**backup.full**

Identifies the job as a full backup.

**backup.incremental**

Identifies the job as an incremental backup.

**backup.verify**

Identifies the job as a verify backup.

**restore.bmr**

Identifies the job as a bare-metal recovery (bmr). This is a restore job.

**restore.file**

Identifies the job as a file-level restore. This is a restore job.

**D2D\_SESSIONLOCATION**

Identifies the location where the recovery points are stored.

**D2D\_PREPOST\_OUTPUT**

Identifies a temp file. The content of the first line of the temp file is displayed in the activity log.

**D2D\_JOBSTAGE**

Identifies the stage of the job. The following values identify the D2D\_JOBSTAGE variable:

**pre-job-server**

Identifies the script that runs on the D2D Server before the job starts.

**post-job-server**

Identifies the script that runs on the D2D Server after the job completes.

**pre-job-target**

Identifies the script that runs on the target machine before the job starts.

**post-job-target**

Identifies the script that runs on the target machine after the job completes.

**pre-snapshot**

Identifies the script that runs on the target machine before capturing the snapshot.

**post-snapshot**

Identifies the script that runs on the target machine after capturing the snapshot.

**D2D\_TARGETVOLUME**

Identifies the volume that is backed up during a backup job. This variable is applicable for pre/post snapshot scripts for a backup job.

**D2D\_JOBRESULT**

Identifies the result for a post job script. The following values identify the D2D\_JOBRESULT variable:

**success**

Identifies the result as successful.

**fail**

Identifies the result as unsuccessful.

**D2DSVR\_HOME**

Identifies the folder where D2D Server is installed. This variable is applicable for the scripts that run on the D2D Server.

The script is created.

**Note:** For all scripts, a return value of zero indicates success and a nonzero return value indicates failure.

### Place the Script in the Prepost Folder and Verify

All the pre/post scripts for a D2D Server are centrally managed from the prepost folder at the following location:

```
/opt/CA/d2dserver/usr/prepost
```

**Follow these steps:**

1. Place the file in the following location of the D2D Server:  

```
/opt/CA/d2dserver/usr/prepost
```
2. Provide the execution permission to the script file.
3. Log into the CA ARCserve D2D for Linux web interface.
4. Open the Backup Wizard or the Restore Wizard and navigate to the Advanced tab.
5. Select the script file in the Pre/Post Script Settings drop-down list and then submit the job.
6. Click Activity Log and verify that the script is executed to the specified backup job.  
The script is executed.

The pre/post scripts are successfully created and placed in the prepost folder.

## Create and Run the Restore Job

Create and run the restore job so that you can initiate the file-level recovery. Verify the recovery point information before you restore the files. If needed, you can go back and can change the restore settings on the wizard.

**Follow these steps:**

1. Verify the restore details on the Summary page of the Restore Wizard.
2. (Optional) Click Previous to modify the information that you have entered on any page of the Restore Wizard.
3. Enter a job name and click Submit.

The Job Name field has a default name initially. You can enter a new job name of your choice but you cannot leave this field empty.

The Restore Wizard closes. You can see the status of the job in the Job Status tab.

The restore job is successfully created and run.

## Verify that Files are Restored

After the completion of restore job, verify that all the files are restored in the target node. Check the Job History and Activity Log tabs in the Status pane to monitor the progress of the restore process.

**Follow these steps:**

1. Navigate to the target machine where you restored data.
2. Verify that the required data from the recovery point is restored.

The files are successfully verified.

The file-level recovery is successfully performed.

## How to Create a Bootable Live CD

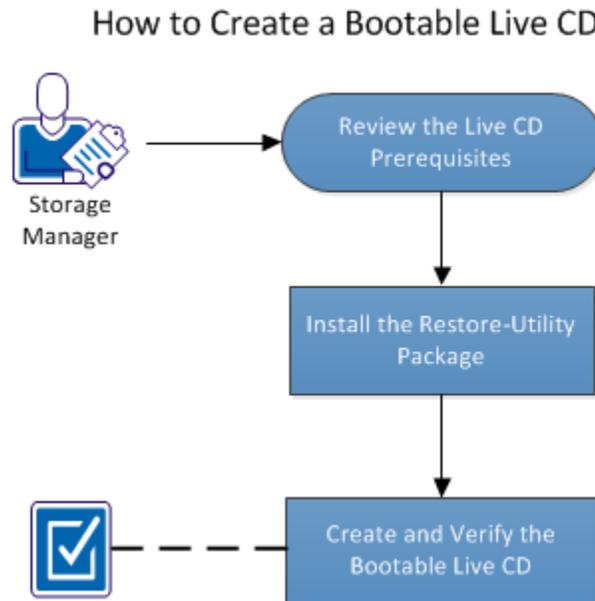
As a storage manager, you can create a bootable Live CD. When created, this bootable Live CD contains a complete read-only image of the computer operating system, and can be used to provide a temporary operating system functionality. This Live CD includes all your system settings and operating system files and can be used to perform the following functions:

- You can use CA ARCserve D2D for Linux without actually installing the product. This allows you to experience and evaluate the product without installing it or making any changes to the existing hard drive of your computer.
- You can install CA ARCserve D2D for Linux (to multiple servers) using only one setup package. Without a Live CD, you must install two separate files (.bin file and restore-utility package) to install CA ARCserve D2D for Linux. The restore-utility package is included in the same Live CD setup package.
- You can perform a Bare Metal Recovery (BMR). You can use this Live CD to get the IP address of the target machine (which is required during the BMR).

The bin folder contains the scripts that you can run from the command line to create a bootable Live CD. The bin folder is located in the following path:

```
# /opt/CA/d2dserver/bin
```

The following diagram displays the process to create a bootable Live CD:



The following list describes each task to create a bootable Live CD:

- [Review the Live CD Prerequisites](#) (see page 83)
- [Install the Restore-Utility Package](#) (see page 84)
- [Create and Verify the Bootable Live CD](#) (see page 84)

## Review the Live CD Prerequisites

Consider the following prerequisites before you create a Live CD:

- You have the root login credentials to log into the D2D Server.
- You have read the Release Notes to understand the functions of a Live CD.
- You have knowledge of Linux scripting.
- You have installed the *mkisofs* tool in the D2D Server. The D2D Server uses the *mkisofs* tool to create the Live CD.iso file.
- You have at least 1024 MB free memory on your machine to boot and run the Live CD.

## Install the Restore-Utility Package

You must install the restore-utility package to perform any restore operations. If you do not install the restore-utility package, you cannot perform file-level restore or BMR. You can install the restore-utility package during the installation of CA ARCserve D2D for Linux. You can also download and install the restore-utility package any time after CA ARCserve D2D for Linux is installed.

After you install the restore-utility package, you can create a Live CD.

### Follow these steps:

1. Log in to the D2D Server as a root user.
2. Navigate to the bin folder using the following command:
3. Run the following command to install the restore-utility package:

```
# cd /opt/CA/d2dserver/bin
```

```
# ./configutility
```

A message is displayed prompting you to provide the path of the restore-utility package.

4. Provide the full path where you have downloaded the restore-utility package.  
The installation begins.

The restore-utility package is installed.

## Create and Verify the Bootable Live CD

Live CD creates the D2D Server's environment without installing the software. Live CD facilitates BMR using IP in a private network.

Live CD is a complete bootable computer operating system which runs in the computer's memory, rather than loading from the hard disk. Live CD allows you to experience and evaluate an operating system without installing it or changing the existing operating system on the computer.

### Follow these steps:

1. Navigate to the bin folder using the following command:
2. Run the following command to create a Live CD:

```
# cd /opt/CA/d2dserver/bin
```

```
# ./makelivecd
```

3. Navigate to the following location and verify that the LiveCD.iso file is created:

```
/opt/CA/d2dserver/packages
```

You have successfully created and verified the bootable Live CD. If you want to use the Live CD on a virtual network, you can directly mount the LiveCD.iso file to the virtual machine. If you want to use you the Live CD on a physical machine, then you must burn the LiveCD.iso image on a media file (CD or DVD) and then use the media file to boot your machine.

## How to Create a CentOS-Based Live CD

As a storage manager, you can create a bootable CentOS-based Live CD. CentOS Live CD is an in-memory computing environment based on CentOS. The purpose of this Live CD is to provide users the capability to experience the CentOS functionality without installing CentOS. The Live CD runs in memory without impacting the hard disk. The changes that you make in the Live CD runtime environment are lost after you restart the machine.

This Live CD includes all your system settings and operating system files and can be used to perform the following functions:

- You can use CA ARCServe D2D for Linux without actually installing the product. This allows you to experience and evaluate the product without installing it or making any changes to the existing hard drive of your computer.
- You can perform a Bare Metal Recovery (BMR). You can use this Live CD to get the IP address of the target machine (which is required during the BMR).

### **When to use the CentOS-based Live CD:**

When the default Live CD cannot identify storage device and network device because of the lack of the device driver.

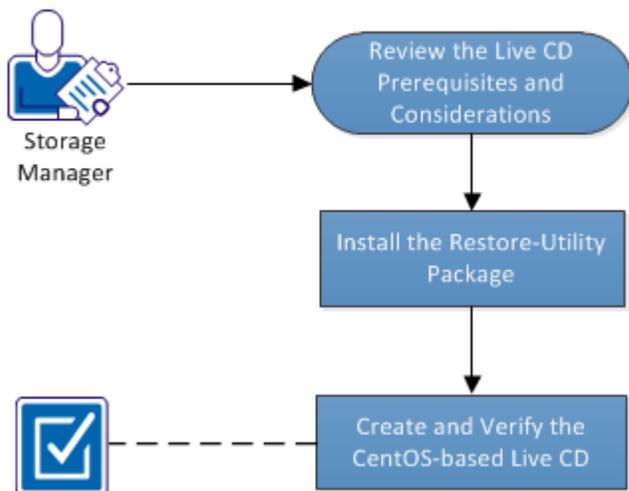
**Note:** The recovery points that you want to restore does not include the device drivers for the storage system of the target BMR machine. As a result, CA ARCServe D2D for Linux will block any attempt to perform a BMR job at an early stage.

The bin folder contains the scripts that you can run from the command line to create a bootable Live CD. The bin folder is located in the following path:

```
# /opt/CA/d2dserver/bin
```

The following diagram displays the process to create a CentOS-based Live CD:

### How to Create a CentOS-Based Live CD



The following list describes each task to create a CentOS-based Live CD:

- [Review the Live CD Prerequisites and Considerations](#) (see page 86)
- [Install the Restore-Utility Package](#) (see page 88)
- [Create and Verify the CentOS-based Live CD](#) (see page 88)

## Review the Live CD Prerequisites and Considerations

Before you create a CentOS-based Live CD, review the following table which compares the default Live CD to the CentOS-based Live CD:

Parameters	Default Live CD	CentOS-based Live CD
<b>D2D Server Installation Media</b>	Supported	Not Supported
<b>Desktop UI</b>	Not supported. Users must use a browser on a Windows machine to browse the D2D Server web UI.	Supported. CentOS-based Live CD includes a browser. Users do not need any additional browser to browse the D2D Server web UI..
<b>Image size</b>	Approximately 400 MB. The image can be burned on a CD.	More than 800 MB. The image must be burned on a DVD.

Parameters	Default Live CD	CentOS-based Live CD
<b>Additional device driver for the Live CD</b>	Not supported	Supported
<b>Local BMR (Recover machine without installing another D2D Server)</b>	Supported	Supported
<b>PXE Boot Image</b>	Supported	Not supported
<b>Remove CD/ISO from the BMR target machine after the machine is booted</b>	Supported	Not supported. DVD/ISO must be mounted on the BMR target machine all the time during the recovery process, until the BMR job is finished and the machine is rebooted.
<b>Live CD operating system environment in English</b>	Yes	Yes. Desktop UI is also in English
<b>Localized language for the D2D Server Web UI</b>	Yes	Yes
<b>Node type support</b>	Support physical machine, VMWare ESX server, RHEV, OVM, Citrix Xen VM	Only support physical machine and VMware ESX server VM

Consider the following prerequisites before you create a CentOS-based Live CD:

- You have installed the following software packages on the D2D Server:
  - genisoimage
  - squashfs-tools
- The CentOS-based Live CD can boot from a physical machine and ESX server VM only. It does not support other virtualization solutions.

## Install the Restore-Utility Package

You must install the restore-utility package to perform any restore operations. If you do not install the restore-utility package, you cannot perform file-level restore or BMR. You can install the restore-utility package during the installation of CA ARCserve D2D for Linux. You can also download and install the restore-utility package any time after CA ARCserve D2D for Linux is installed.

After you install the restore-utility package, you can create a Live CD.

### Follow these steps:

1. Log in to the D2D Server as a root user.
2. Navigate to the bin folder using the following command:  

```
# cd /opt/CA/d2dserver/bin
```
3. Run the following command to install the restore-utility package:  

```
# ./configutility
```

A message is displayed prompting you to provide the path of the restore-utility package.

4. Provide the full path where you have downloaded the restore-utility package.  
The installation begins.

The restore-utility package is installed.

## Create and Verify the CentOS-based Live CD

You can use this Live CD to boot a BMR target machine and then run the BMR job. The following files are used to create the CentOS-based Live CD:

### **makelivecd.centos**

A script used to remaster the CentOS Live CD.

### **CentOS-6.X-i386-LiveCD.iso**

A CentOS Live CD ISO image. The image can be downloaded from the CentOS website.

The being restored recovery point does not contain device driver for target BMR machine's storage system. CA ARCserve D2D for Linux blocks such BMR job at an early stage.

**Follow these steps:**

1. Prepare the device drivers (\*.ko and \*.rpm files) for CentOS and store them in a folder.

**Example:** Store the device drivers in the /tmp/drivers folder.

**Note:** You must provide the device driver that matches the kernel version of the CentOS Live CD.

2. Access the CentOS website and download the 32-bit CentOS 6.0 or later Live CD to the /tmp folder on the D2D Server.

The CentOS-6.X-i386-LiveCD.iso file is downloaded.

3. Navigate to the bin folder (/opt/CA/d2dserver/bin) and run the following command:

```
makelivecd.centos <full_path_to_CentOS_live_cd>  
<path_where_device_drivers_are_stored>
```

**Example:** makelivecd.centos <full\_path\_to\_CentOS\_live\_cd> /tmp/drivers

The script creates the CA ARCserve D2D for Linux Live CD based on CentOS and stores the ISO image file at the following location:

```
/opt/CA/d2dserver/packages/CentOS-LiveCD-for-D2D.iso
```

4. Navigate to the packages folder and verify that the CentOS-LiveCD-for-D2D.iso file is included in the folder.

The CentOS-based Live CD is created and verified.

You have successfully created a CentOS-based Live CD.

## How to Perform a Bare Metal Recovery (BMR) for Linux Machines

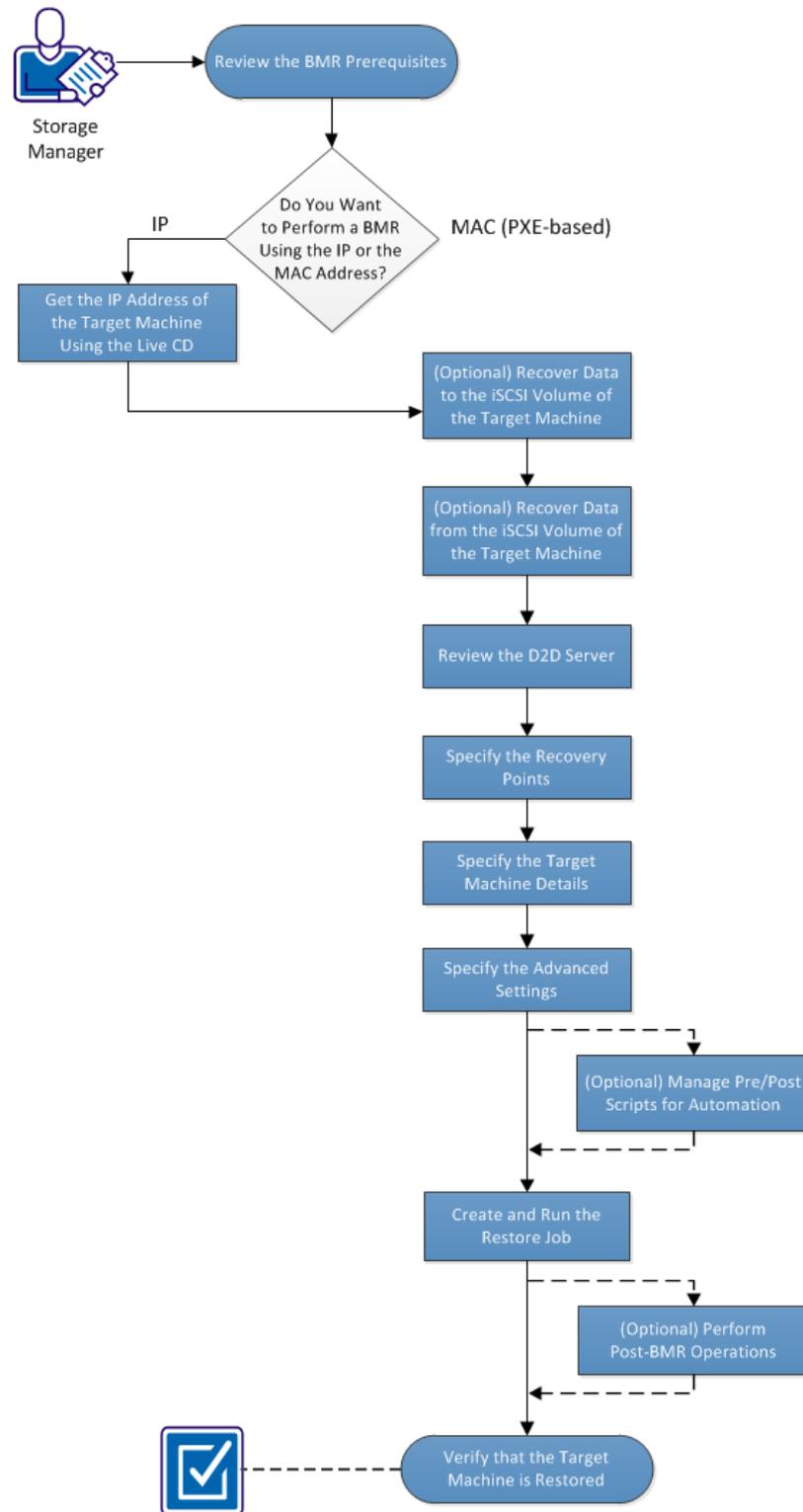
A BMR restores the operating system and software applications, and recovers all the backed-up data. BMR is the process of restoring a computer system from *bare metal*. Bare metal is a computer without any operating system, drivers, and software applications. After the restore is complete, the target machine automatically reboots in the same operating environment as the backup source node and all data is restored.

A complete BMR is possible because when CA ARCserve D2D for Linux performs a backup of data, it also captures information related to the operating system, installed applications, drivers, and so on.

You can perform a BMR using the IP address or the Media Access Control (MAC) address of the target machine. If you boot the target machine using the CA ARCserve D2D for Linux Live CD, you can get the IP address of the target machine.

The following diagram displays the process to perform a BMR:

### How to Perform a Bare Metal Recovery (BMR) for Linux Machines



**Complete the following tasks to perform a BMR:**

- [Review the BMR Prerequisites](#) (see page 93)
- [Get the IP Address of the Target Machine Using the Live CD](#) (see page 93)
- [\(Optional\) Recover Data to the iSCSI Volume of the Target Machine](#) (see page 94)
- [\(Optional\) Recover Data from the iSCSI Volume to the Target Machine](#) (see page 95)
- [Review the D2D Server](#) (see page 97)
- [Specify the Recovery Points](#) (see page 97)
- [Specify the Target Machine Details](#) (see page 99)
- [Specify the Advanced Settings](#) (see page 99)
- [\(Optional\) Manage Pre/Posts Scripts for Automation](#) (see page 101)
- [Create and Run the Restore Job](#) (see page 104)
- [\(Optional\) Perform Post-BMR Operations](#) (see page 104)
- [Verify that the Target Machine is Restored](#) (see page 111)

## Review the BMR Prerequisites

Consider the following options before performing a BMR:

- You have a valid recovery point and the encryption password, if any, for restore.
- You have a valid target machine for BMR.
- You have created the CA ARCserve D2D for Linux Live CD.
- If you want to perform a BMR using the IP address, you must get the IP address of the target machine using the Live CD.
- If you want to perform a PXE-based BMR using the MAC address, you must have the MAC address of the target machine.

## Get the IP Address of the Target Machine Using the Live CD

Before performing a BMR using the IP address, you need to get the IP address of the target machine. A bare-metal machine does not have any IP address initially. So, you have to boot the bare-metal machine using the CA ARCserve D2D for Linux Live CD to get the IP address. After you get the IP address of the target machine, you can configure the static IP of the target machine.

**Follow these steps:**

1. Insert the CA ARCserve D2D for Linux Live CD or mount the .iso file of the CA ARCserve D2D for Linux Live CD into the CD-ROM drive of the target node.

2. Boot the target machine from CD-ROM.

The target machine boots into the CA ARCserve D2D for Linux Live CD environment. On the screen, the IP address of the target machine is displayed.

3. To configure the static IP of the target machine, follow these steps:

- a. On the target machine's screen, press Enter to enter the shell environment.
- b. Run the following command to configure the static IP:

```
ifconfig <NIC name> <static IP address>  
route add default gw <gateway IP address> <NIC name>
```

**Note:** The Network Interface Card (NIC) name depends on your hardware. For example, the typical NIC names are eth0 or em0.

The static IP is configured.

The IP address of the target machine is acquired.

**Important!** Maintain a record of this IP address as it is used in the Restore Wizard when you have to specify the target machine details.

## (Optional) Recover Data to the iSCSI Volume of the Target Machine

You can integrate the iSCSI volume to the target machine and make that volume a part of the target machine. Then you can restore data to the iSCSI volume of the target machine. By doing so, you can manage data and transfer data over a network.

**Important!** When you integrate the iSCSI volume with the target machine, you will lose all the existing data from the iSCSI volume.

### Follow these steps:

1. Insert the CA ARCserve D2D for Linux Live CD or mount the iso file of the CA ARCserve D2D for Linux Live CD into the CD-ROM drive of the target machine.

2. Boot the target machine from the CD-ROM.

The target machine boots into the CA ARCserve D2D for Linux Live CD environment. On the screen, the IP address of the target machine is displayed.

3. Enter the shell environment of the target machine.
4. Run the following command to start the iSCSI initiator daemon:

```
/etc/init.d/iscsid start
```

5. Run a discovery script to discover the iSCSI target host.

```
iscsiadm -m discovery -t sendtargets -p <ISCSI-SERVER-IP-ADDRESS>:<Port_Number>
```

The default port value of iSCSI target host is 3260.

6. Make a note of the iSCSI Qualified Name (IQN) of the iSCSI target host found by the discovery script before you manually log into the discovered target.

7. List the available block device of the backup source node.

```
#fdisk -l
```

8. Log in to the discovered target.

```
iscsiadm -m node -T <iSCSI Target IQN name> -p  
<ISCSI-SERVER-IP-ADDRESS>:<Port_Number> -l
```

You can see a block device in the /dev directory of the backup source node.

9. Run the following command to obtain the new device name:

```
#fdisk -l
```

You can see an additional device named /dev/sd<x> on the backup source node.

The iSCSI volume is integrated with the target volume.

## (Optional) Recover Data from the iSCSI Volume to the Target Machine

If you have stored your data in an iSCSI target volume, you can connect to the iSCSI volume and recover data. The iSCSI volume lets you manage data and transfer data over a network.

### Follow these steps:

1. Insert the CA ARCserve D2D for Linux Live CD or mount the iso file of the CA ARCserve D2D for Linux Live CD into the CD-ROM drive of the target machine.

2. Boot the target machine from the CD-ROM.

The target machine boots into the CA ARCserve D2D for Linux Live CD environment. On the screen, the IP address of the target machine is displayed.

3. Enter the shell environment of the target machine.

4. Run the following command to start the iSCSI initiator daemon:

```
/etc/init.d/iscsid start
```

5. Run a discovery script to discover the iSCSI target host.

```
iscsiadm -m discovery -t sendtargets -p <ISCSI-SERVER-IP-ADDRESS>:<Port_Number>
```

The default port value of iSCSI target host is 3260.

6. Make a note of the iSCSI Qualified Name (IQN) of the iSCSI target host found by the discovery script before you manually log into the discovered target.

7. List the available block device of the backup source node.

```
#fdisk -l
```

8. Log in to the discovered target.

```
iscsiadm -m node -T <iSCSI Target IQN name> -p  
<ISCSI-SERVER-IP-ADDRESS>:<Port_Number> -l
```

You can see a block device in the /dev directory of the backup source node.

9. Run the following command to obtain the new device name:

```
#fdisk -l
```

You can see an additional device named /dev/sd<x> on the backup source node.

For example, consider the name of the device is /dev/sdc. This device name is used to create a partition and a file system in the following steps.

10. Mount the iSCSI volume using the following commands:

```
# mkdir /iscsi  
# mount /dev/sdc1 /iscsi
```

**Note:** When you specify the session location in the Restore Wizard, you need to select Local and enter the path /iscsi.

**Example:** <path>/iscsi

The target machine can now connect to the iSCSI volume and can recover data from the iSCSI volume.

## Review the D2D Server

When you open the Restore Wizard, review the D2D Server where you want to perform the restore operation.

**Follow these steps:**

1. Enter the URL of the D2D Server in a web browser to open the CA ARCserve D2D for Linux interface.

**Note:** During the installation of CA ARCserve D2D for Linux, you received the URL to access and manage the server.

2. Click Restore from the Wizard menu and select Bare Metal Recovery (BMR).

The D2D Server page of the Restore Wizard - BMR opens.

3. Verify the server from the D2D Server drop-down list in the D2D Server page.

You cannot select any option from the D2D Server drop-down list.

4. Click Next.

The Recovery Points page of the Restore Wizard - BMR opens.

The D2D Server is specified.

## Specify the Recovery Points

Each time that you perform a backup, a recovery point is created. Specify the recovery point information in the Restore Wizard so that you can recover the exact data that you want. You can restore specific files or all files depending on your requirement.

**Important!** To perform a BMR from a recovery point, the root volume and the boot volume must be present in the recovery point.

**Follow these steps:**

1. Perform one of the following steps depending on your backup storage.
    - Perform the following steps to access the recovery points if the recovery points are stored on a mobile device:
      - a. Start the target machine using the Live CD.
      - b. Log into the CA ARCserve D2D for Linux web interface from the Live CD.
      - c. Open the BMR Wizard.
      - d. Navigate to the Recovery Points page.
      - e. Select Local as the Session Location on the Recovery Points page of the BMR Wizard.
    - Perform the following steps if the session location is NFS share or CIFS share:
      - a. Select a session from the Session Location drop-down list and enter the full path of the share.

For example, consider the Session Location as NFS share, xxx.xxx.xxx.xxx as the IP address of the NFS share, and the folder name is *Data*. You would enter xxx.xxx.xxx.xxx:/Data as the NFS share location.

**Note:** If the backed up data is stored in Source local, then you must first convert the source node to an NFS server, and then share the session location.
  2. Click Connect.

All the nodes that have been backed up to this location get listed in the Machine drop-down list.
  3. Select the node that you want to restore from the Machine drop-down list.

All the recovery points of the selected node get listed.
  4. Apply the date filter to display the recovery points that are generated between the specified date and click Search.

**Default:** Recent two weeks.

All the recovery points available between the specified dates are displayed.
  5. Select the recovery point that you want to restore and click Next.

The Target Machine page opens.
- The recovery point is specified.

## Specify the Target Machine Details

Specify the target machine details so that data is restored to that machine. A target machine is a bare metal machine where you will perform a BMR. If you restore using the IP address, you need the IP address of the target machine that you previously recorded at the beginning of this process. If you restore using the Media Access Control (MAC) address, you need the MAC address of the target machine.

### Follow these steps:

1. Enter the MAC address or the IP address of the target machine in the MAC/IP Address field.
2. Enter a name in the Host Name field.

The target machine will use this name as the host name after the restore process is complete.

3. Select one of the following options as the network:

#### **DHCP**

Automatically configures the IP address. This is the default option. Use this option if you have a Dynamic Host Configuration Protocol (DHCP) server to restore with the DHCP network.

#### **Static IP**

Manually configures the IP address. If you select this option then, enter the IP Address, Subnet Mask, and Default Gateway of the target machine.

**Important!** Ensure that the Static IP is not used by any other machines on the network during the restore process.

4. (Optional) Select the Reboot option to automatically restart the target node after the BMR is complete.
5. Click Next.

The Advanced page opens.

The target machine details are specified.

## Specify the Advanced Settings

Specify the advanced settings to perform a scheduled BMR of your data. Scheduled BMR ensures that your data is recovered at the specified time even in your absence.

**Follow these steps:**

1. Set the start date and time by selecting one of the following options:

**Run Now**

Starts the restore job as soon as you submit the job.

**Set Special Time**

Starts the restore job at the specified time after submitting the job.

2. (Optional) Select a script from the Pre/Post Scripts Settings option for the D2D server and the target machine.

These scripts run script commands for actions to take before the start of the job and/or upon the completion of the job.

**Note:** The Pre/Post Script Settings fields are populated only if you already created a script file and placed it at the following location:

```
/opt/CA/d2dserver/usr/prepost
```

**Note:** For more information about creating the pre/post scripts, see *Manage Pre/Post Scripts for Automation*, (see page 101)

3. (Optional) Click Show More Settings to display more settings for BMR.
4. (Optional) Reset the password for the specified user name for the recovered target machine.
5. (Optional) Enter the full path of the backup storage location of the recovery points in Recover Point Local Access.
6. (Optional) Enter the full name of the disk in the Disks field to exclude those disks on the target machine from participating in the recovery process.
7. (Optional) Select Enable Wake-on-LAN if you are performing Preboot Execution Environment (PXE) BMR.

**Note:** The Enable Wake-on-LAN option is applicable only for physical machines. Ensure whether you have enabled the Wake-on-LAN settings in the BIOS settings of your physical machine.

8. Click Next.

The Summary page opens.

The advanced settings are specified.

## (Optional) Manage Pre/Post Scripts for Automation

Pre/Post scripts let you run your own business logic at specific stages of a running job. You can specify when to run your scripts in Pre/Post Script Settings of the Backup Wizard and the Restore Wizard in the UI. The scripts can be run on the D2D Server depending on your setting.

Managing the pre/post script is a two part process, consisting of creating the pre/post script and placing the script in the prepost folder.

### Create Pre/Post Scripts

#### Follow these steps:

1. Log into the D2D Server as a root user.
2. Create a script file using the environment variables in your preferred scripting language.

#### Pre/Post Script Environment Variables

To create your script, use the following environment variables:

##### **D2D\_JOBNAME**

Identifies the name of the job.

##### **D2D\_JOBID**

Identifies the job ID. Job ID is a number provided to the job when you run the job. If you run the same job again, you get a new job number.

##### **D2D\_TARGETNODE**

Identifies the node that is being backed up or restored.

##### **D2D\_JOBTYPE**

Identifies the type of the running job. The following values identify the D2D\_JOBTYPE variable:

##### **backup.full**

Identifies the job as a full backup.

##### **backup.incremental**

Identifies the job as an incremental backup.

##### **backup.verify**

Identifies the job as a verify backup.

**restore.bmr**

Identifies the job as a bare-metal recovery (bmr). This is a restore job.

**restore.file**

Identifies the job as a file-level restore. This is a restore job.

**D2D\_SESSIONLOCATION**

Identifies the location where the recovery points are stored.

**D2D\_PREPOST\_OUTPUT**

Identifies a temp file. The content of the first line of the temp file is displayed in the activity log.

**D2D\_JOBSTAGE**

Identifies the stage of the job. The following values identify the D2D\_JOBSTAGE variable:

**pre-job-server**

Identifies the script that runs on the D2D Server before the job starts.

**post-job-server**

Identifies the script that runs on the D2D Server after the job completes.

**pre-job-target**

Identifies the script that runs on the target machine before the job starts.

**post-job-target**

Identifies the script that runs on the target machine after the job completes.

**pre-snapshot**

Identifies the script that runs on the target machine before capturing the snapshot.

**post-snapshot**

Identifies the script that runs on the target machine after capturing the snapshot.

**D2D\_TARGETVOLUME**

Identifies the volume that is backed up during a backup job. This variable is applicable for pre/post snapshot scripts for a backup job.

### **D2D\_JOBRESULT**

Identifies the result for a post job script. The following values identify the D2D\_JOBRESULT variable:

#### **success**

Identifies the result as successful.

#### **fail**

Identifies the result as unsuccessful.

### **D2DSVR\_HOME**

Identifies the folder where D2D Server is installed. This variable is applicable for the scripts that run on the D2D Server.

The script is created.

**Note:** For all scripts, a return value of zero indicates success and a nonzero return value indicates failure.

### [Place the Script in the Prepost Folder and Verify](#)

All the pre/post scripts for a D2D Server are centrally managed from the prepost folder at the following location:

```
/opt/CA/d2dserver/usr/prepost
```

#### **Follow these steps:**

1. Place the file in the following location of the D2D Server:  

```
/opt/CA/d2dserver/usr/prepost
```
2. Provide the execution permission to the script file.
3. Log into the CA ARCserve D2D for Linux web interface.
4. Open the Backup Wizard or the Restore Wizard and navigate to the Advanced tab.
5. Select the script file in the Pre/Post Script Settings drop-down list and then submit the job.
6. Click Activity Log and verify that the script is executed to the specified backup job.

The script is executed.

The pre/post scripts are successfully created and placed in the prepost folder.

## Create and Run the Restore Job

Create and run the restore job so that you can initiate the process of BMR. Verify the recovery point information before you perform a BMR. If needed, you can go back and can change the restore settings.

### Follow these steps:

1. Verify the restore details on the Summary page of the Restore Wizard.
2. (Optional) Click Previous to modify the restore settings on any of the Restore Wizard pages.
3. Enter a job name and click Submit.

The Job Name field has a default name initially. You can enter a new job name of your choice but you cannot leave this field empty.

The Restore Wizard closes. You can see the job in the Job Status tab. If you use the IP address for the BMR, the target machine automatically reboots to the same operating system as the backup source after the BMR process.

If you use the MAC address for BMR, the status in the Job Status tab changes to *Waiting for target node startup*.

4. (Optional) For BMR using the MAC address, start the target machine when you see the *Waiting for target node startup* message in the Job Status tab.

**Note:** If the target machine is already started before you submit the restore job, you must restart the target machine. Ensure that BIOS is configured to boot from the network.

The status in the Job Status column changes to Restoring volume. This indicates the restore is in progress. After the restore job is complete, the target machine automatically reboots with the same operating system as the backup source.

The restore job was successfully created and run.

## (Optional) Perform Post-BMR Operations

The following topics are optional configuration settings that you may have to perform after a BMR:

### Configure X Windows

When you perform a BMR across a dissimilar hardware, X Windows of the restored OS does not function properly and the target node displays an error dialog. The error dialog appears because the display configuration has changed. To resolve this error, follow the instructions in the error dialog to configure the graphic card. After that, you can see the X Windows and the desktop UI.

### Configure the System Fully Qualified Domain Name (FQDN)

When you need an FQDN, then you must configure the FQDN. The BMR process does not automatically configure the FQDN.

#### Maximum character count for FQDN: 63

Follow these steps to configure the FQDN:

1. Edit the `/etc/hosts` file and provide the IP Address, the FQDN name, and the server name.

```
#vi /etc/hosts  
  
ip_of_system servername.domainname.com servername
```

2. Restart the network service.

```
#/etc/init.d/network restart
```

3. Verify the host name and the FQDN name.

```
#hostname  
  
servername  
  
#hostname -f  
  
servername.domainname.com
```

The FQDN is configured.

### Extend the Data Volume after a BMR on Dissimilar Disks

When you perform a BMR to a larger disk than the disk on the original node, some disk space is left unused. The BMR operation does not automatically process the unused disk space. You can format the disk space to a separate partition or resize the existed partition with the unused disk space. The volume that you want to resize must be unused, so you must avoid resizing a system volume. In this section, we will focus on how to extend a data volume with the unused disk space.

**Note:** To avoid data loss, resize your volumes immediately after the BMR process. You can also back up the node before starting the volume resizing task.

When the target machine successfully restarts after the BMR, you can extend the data volume.

### Raw partition volume

For example, a 2-GB disk in the session is restored to a 16-GB disk named */dev/sdb* with only one partition. The */dev/sdb1* raw partition is directly mounted on the */data* directory.

This example is used to explain the procedure of extending Raw partition volume.

#### Follow these steps:

1. Check the status of the */dev/sdb1* volume.

```
# df -h /dev/sdb1
/dev/sdb1          2.0G  40M  1.9G   3% /data
```

2. Umount the */dev/sdb1* volume.

```
# umount /data
```

3. Resize */dev/sdb1* to occupy the entire disk space using the *fdisk* command.

To perform this operation, first delete your existing partition and then recreate it with the same start sector number. The same start sector number is responsible for avoiding the data loss.

```
# fdisk -u /dev/sdb
Command (m for help): p
Disk /dev/sdb: 17.1 GB, 17179869184 bytes
255 heads, 63 sectors/track, 2088 cylinders, total 33554432 sectors
Units = sectors of 1 * 512 = 512 bytes
Device Boot      Start         End      Blocks   Id  System
/dev/sdb1             63      4192964      2096451    83  Linux
Command (m for help): d
Selected partition 1
Command (m for help): n
Command action
e   extended
p   primary partition (1-4)
p
Partition number (1-4): 1
First sector (63-33554431, default 63):
```

Using default value 63

Last sector or +size or +sizeM or +sizeK (63-33554431, default 33554431):

Using default value 33554431

Command (m for help): p

Disk /dev/sdb: 17.1 GB, 17179869184 bytes

255 heads, 63 sectors/track, 2088 cylinders, total 33554432 sectors

Units = sectors of 1 \* 512 = 512 bytes

Device	Boot	Start	End	Blocks	Id	System
/dev/sdb1		63	33554431	16777184+	83	Linux

Command (m for help): w

The partition changes to the same start sector number as the original partition and the end sector number is 33554431.

4. Resize the volume using `resize2fs` command. If necessary, first run the `e2fsck` command.

```
# e2fsck -f /dev/sdb1
```

```
# resize2fs /dev/sdb1
```

5. Mount the volume to the mount point and check the volume status again.

```
# mount /dev/sdb1 /data
```

```
# df -h /dev/sdb1
```

```
/dev/sdb1          16G  43M  16G   1% /data
```

The volume is extended to 16 GB and is ready for use.

#### **LVM volume:**

For example, an 8-GB disk in the session is restored to a 16-GB disk named `/dev/sdc` with only one partition. The `/dev/sdc1` raw partition is used as the only physical volume of the `/dev/mapper/VGTest-LVTest` LVM logical volume whose mount point is `/lvm`.

This example is used to explain the procedure of extending LVM volume.

**Follow these steps:**

1. Check the status of the `/dev/mapper/VGTest-LVTest` volume.

```
# lvsdisplay -m /dev/mapper/VGTest-LVTest
--- Logical volume ---
LV Name                /dev/VGTest/LVTest
VG Name                VGTest
LV UUID                udoBIx-XKBS-1Wky-3FVQ-mxMf-Fay0-tpfP18
LV Write Access       read/write
LV Status              available
# open                 1
LV Size                7.88 GB
Current LE             2018
Segments              1
Allocation             inherit
Read ahead sectors    0
Block device          253:2
---Segments---
Logical extent 0 to 2017:
Type                  linear
Physical volume       /dev/sdc1
Physical extents      0 to 2017
The physical volume is /dev/sdc1, the volume group is VGTest, and the logical
volume is /dev/VGTest/LVTest or /dev/mapper/VGTest-LVTest.
```

2. Umount the `/dev/mapper/VGTest-LVTest` volume.  

```
# umount /lvm
```
3. Disable the volume group in which the `/dev/sdc1` physical volume is located.  

```
# vgchange -a n VGTest
```
4. Create a partition to occupy the unused disk space using the `fdisk` command.  

```
# fdisk -u /dev/sdc
Command (m for help): p
Disk /dev/sdc: 17.1 GB, 17179869184 bytes
255 heads, 63 sectors/track, 2088 cylinders, total 33554432 sectors
Units = sectors of 1 * 512 = 512 bytes
```

```
Device Boot      Start          End      Blocks   Id  System
/dev/sdc1                63     16777215     8388576+  83  Linux

Command (m for help): n
Command action
e   extended
p   primary partition (1-4)
p

Partition number (1-4): 2
First sector (16777216-33554431, default 16777216):
Using default value 16777216
Last sector or +size or +sizeM or +sizeK (16777216-33554431, default
33554431):
Using default value 33554431
Command (m for help): p
Disk /dev/sdc: 17.1 GB, 17179869184 bytes
255 heads, 63 sectors/track, 2088 cylinders, total 33554432 sectors
Units = sectors of 1 * 512 = 512 bytes

Device Boot      Start          End      Blocks   Id  System
/dev/sdc1                63     16777215     8388576+  83  Linux
/dev/sdc2          16777216     33554431     8388608   83  Linux

Command (m for help): w
The /dev/sdc2 partition is created.
```

5. Create a new physical volume.

```
# pvcreate /dev/sdc2
```

6. Extend the volume group size.

```
# vgextend VGTest /dev/sdc2
```

7. Enable the volume group that you have already disabled.

```
# vgchange -a y VGTest
```

8. Extend the logical volume size using the `lvextend` command.

```
# lvextend -L +8G /dev/VGTest/LVTest
```

9. Resize the volume using the `resize2fs` command. If necessary, first run the `e2fsck` command.

```
# e2fsck -f /dev/mapper/VGTest-LVTest
```

```
# resize2fs /dev/mapper/VGTest-LVTest
```

10. Mount the volume to the mount point and check the volume status again.

```
# mount /dev/mapper/VGTest-LVTest /lvm
```

```
# lvsdisplay -m /dev/mapper/VGTest-LVTest
```

```
---Logical volume---
```

```
LV Name           /dev/VGTest/LVTest
VG Name           VGTest
LV UUID           GTP0a1-kUL7-WUL8-bpbM-9eTR-SVzL-WgA11h
LV Write Access   read/write
LV Status         available
# open           0
LV Size          15.88 GB
Current LE       4066
Segments        2
Allocation       inherit
Read ahead sectors 0
Block device     253:2
```

```
--- Segments ---
```

```
Logical extent 0 to 2046:
```

```
Type           linear
Physical volume /dev/sdc1
Physical extents 0 to 2046
```

```
Logical extent 2047 to 4065:
```

```
Type           linear
Physical volume /dev/sdc2
Physical extents 0 to 2018
```

The LVM volume extends to 16 GB and is ready for use.

## Verify that the Target Node is Restored

After the completion of restore job, verify that the target node is restored with relevant data.

**Follow these steps:**

1. Navigate to the target machine that you restored.
2. Verify that the target machine has all the information that you backed up.

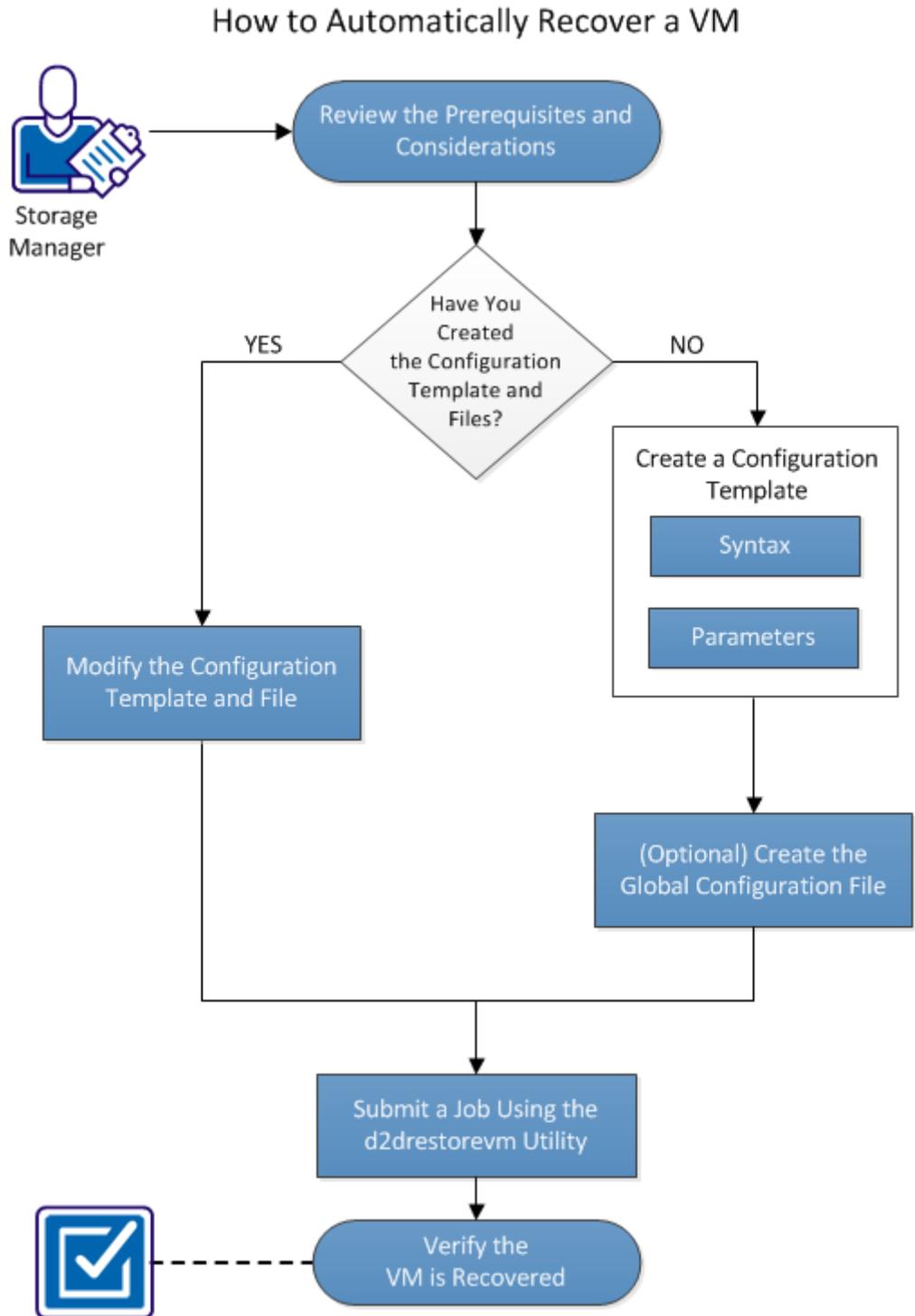
The target machine is successfully verified.

The BMR is successfully performed for Linux Machines.

## How to Automatically Recover a Virtual Machine

You can recover a virtual machine (VM) from the command line of the D2D Server using the `d2drestorevm` utility. The `d2drestorevm` utility automates the process of performing a BMR without the need to manually boot the VM using a Live CD.

The following diagram displays the process to recover a virtual machine from the command line using the d2drestorevm utility:



Perform these tasks to automatically recover a VM:

- [Review the Prerequisites and Considerations](#) (see page 113)
- [Create a Configuration Template](#) (see page 116)
- [\(Optional\) Create the Global Configuration File](#) (see page 119)
- [Modify the Configuration Template and File](#) (see page 121)
- [Submit a Job Using the d2drestorevm Utility](#) (see page 121)
- [Verify the VM is Recovered](#) (see page 122)

## Review the Prerequisites and Considerations

Review the following prerequisites before you restore the VM:

- The following versions of hypervisors are supported for BMR using the d2drestorevm utility:
  - XenServer 6.0 and later
  - RHEV 3.0 and later
  - OVM 3.2
- The VM restore option can be performed from the command line only. This option is not available on the user interface.
- You can use the user interface to monitor the job status and activity logs. You can use the user interface to pause, delete, and rerun the restore VM job. However, you cannot modify the restore VM job.
- Before you restore a VM, you have to manually set up the VM on Xen, Oracle Virtual Machine (OVM), or Red hat Enterprise Virtualization (RHEV).
- When restoring to Xen and OVM virtual machines, the NFS server is required to be installed and running on the D2D Server. Verify that the firewall is not blocking the NFS service and the hypervisor has proper access and permission to use the NFS service on the D2D Server.

- When you restore to RHEV, the Perl interpreter version 5.10.0 and later, and the following modules must be installed on the D2D Server:

XML::Simple

URI::Escape

WWW::Curl

File::Copy

File::Temp

The modules can be installed with the system package manager. You can also use the Perl package manager, CPAN, to install the modules.

**Example:** Install "XML::Simple" using CPAN

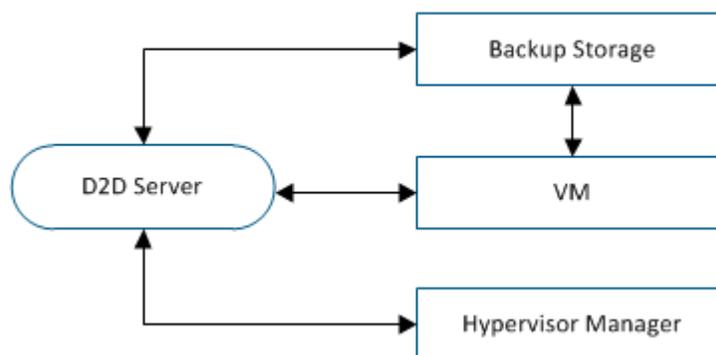
```
# perl -MCPAN -e "install XML::Simple"
```

Run the following command to verify the installation:

```
# perldoc -l "XML::Simple"
```

- To perform a successful VM restore, both the hypervisor and the target VM must have a valid network connection with the D2D Server. The following diagram displays the network requirement:

Network Requirements



The D2D Server will attempt to automatically discover and set up a virtual NIC for the VM. However, sometimes a valid network may not be selected for the NIC. The `vm_network` parameter allows you to specify certain network that the NIC should be connected with. The following considerations are for different virtual platforms:

- On XenServer, after an installation the default network is displayed as Network 0 in XenCenter, which is not the actual network. Any network with name "Pool-wide network associated with xxx" is displayed as "Network 0" on XenCenter. In such cases, rename the default network and use the new value for the `vm_network` parameter.
- On RHEV, when the `vm_network` parameter is not specified, the default rhevm network will have a higher priority.
- On OVM, it is recommended to manually set the `vm_network` parameter when there is more than one network available.
- When using the CIFS share as a backup (session) location, consider the following points:
  - Use the character / instead of \.
  - The `storage_username` and `storage_password` parameters are required to verify the credentials for CIFS shares.

- At least one of the following parameters must be specified for the `d2drestorevm` to work:

`vm_name`

`vm_uuid`

If both parameters are provided, then these parameters must belong to the same virtual machine. If the parameters belong to different virtual machines, you will get an error.

**Review the following considerations before you restore the VM:**

- It is recommended that you restore the sessions from the previous release of CA ARCserve D2D for Linux to the original VMs.
- When you restore a VM in a XenServer PV and the restored VM displays a blank screen but the SSH and other services are active, then verify the `'console=kernel` parameter is set correctly in the boot arguments.
- PV sessions can only be restored to a PV target VM on XenServer and OVM.
- Non-PV sessions can be restored to Non-PV target VMs, such as XenServer HVM, OVM HVM, and RHEV.
- HVM of RHEL 6 series and its derivatives (RHEL 6, CentOS 6, and Oracle Linux6) can be restored to PV VM.

## Create a Configuration Template

Create a configuration file so that the `d2drestorevm` command can restore VMs based on the parameters specified in the file. The `d2drestorevm` file gathers all the specifications from the file and performs the restore based on the specifications.

### Syntax

```
d2drestorevm --createtemplate=[save path]
```

The `d2dutil --encrypt` utility encrypts the password and provides an encrypted password. You must use this utility to encrypt all your passwords. If you use the `--pwdfile=pwdfilepath` parameter, then you must encrypt the password. You can use the utility one of the following methods:

### Method 1

```
echo "string" | d2dutil --encrypt  
string is the password that you specify.
```

### Method 2

Type the "`d2dutil --encrypt`" command and then specify your password. Press Enter and you will see the result on your screen. In this method, the password that you enter is not echoed on the screen.

### Follow these steps:

1. Log in to the D2D Server as a root user.
2. Create the configuration template using the following command:

```
d2drestorevm --createtemplate=[save path]
```

[save path] indicates the location where the configuration template is created.

3. Open the configuration template and update the following parameters in the configuration template:

**job\_name**

Specifies the name of the restore job.

**vm\_type**

Specifies the type of the hypervisor where you restore the VM. The valid types of hypervisors are xen, ovm, and rhev.

**vm\_server**

Specifies the address of the hypervisor server. The address could be either the hostname or IP address.

**vm\_svr\_username**

Specifies the username of the hypervisor. The username must be in the following format for RHEV:

[username]@[domain]

The username must be in the following format for OVM and Xen:

[username]

**vm\_svr\_password**

Specifies the password of the hypervisor. The password is encrypted using the d2dutil encryption utility.

**vm\_name**

Specifies the name of the target VM that is displayed in the hypervisor.

**Important!** The `vm_name` parameter must not contain any special characters except blank spaces and should only include the following characters: a-z, A-Z, 0-9, - and \_.

**vm\_uuid**

Specifies the uuid of the target VM.

**vm\_network**

(Optional) Specifies the network name that you want to use. If you do not provide the network name, then the default network is auto-selected.

**storage\_location**

Specifies the storage server location of the session. The storage location can be CIFS or NFS.

**storage\_username**

Specifies the username when you use the CIFS as the storage location.

**storage\_password**

Specifies the password when you use the CIFS as the storage location. The password is encrypted using the d2dutil encryption utility.

**encryption\_password**

Specifies the session encryption password. The password is encrypted using the d2dutil encryption utility.

**source\_node**

Specifies the node name of the source whose recovery point is used to restore.

**recovery\_point**

Specifies the session that you want to restore. Typically, a recovery session is in the following format: S00000000X, where X is a numeric value. If you want to restore the most recent session, specify the keyword 'last'.

**guest\_hostname**

Specifies the host name that you want to provide after you restore the VM.

**guest\_network**

Specifies the network type that you want to configure. The network could either dhcp or static.

**guest\_ip**

Specifies the IP address when you specify the Static IP.

**guest\_netmask**

Specifies the network mask when you specify the static IP.

**guest\_gateway**

Specify the gateway address when you specify the static IP.

**guest\_reboot**

(Optional) Specifies whether the target VM should be restarted after the VM is restored. The values are yes and no.

**Default:** no

**guest\_reset\_username**

(Optional) Specifies to reset the password to the value you provide in the `guest_reset_password` parameter.

**guest\_reset\_password**

(Optional) Specifies to reset the password to the specified value. The password is encrypted using the `d2dutil` encryption utility.

**force**

Specifies whether to force restore the VM. The values are `yes` and `no`.

**Default:** `no`

4. Save and close the configuration template.

The configuration template is successfully created.

## (Optional) Create a Global Configuration File

The global configuration file (`vm.cfg`) has parameters and values related to storage locations where the VM virtual disks are created. The values for storage locations are auto-detected during the restore process. The `vm.cfg` file overrides the values related to storage locations and other parameters. If you want to specify your own storage location instead of the auto-detected value, you can use the `vm.cfg` file.

The global configuration file is at the following location:

```
/opt/CA/d2dserver/configfiles/vm.cfg
```

The following parameters can be configured in the `vm.cfg` file:

### General Parameters

**D2D\_VM\_PORT**

Allows you to specify a custom port to communicate with the hypervisor server.

- For OVM, the `d2drestorevm` command requires the OVM CLI interface and the default port is 10000.
- For XenServer, the `d2drestorevm` command communicates with the server using the SSH and the default port is 22.

- For RHEV, the `d2drestorevm` command utilizes the Representational State Transfer (REST) API to communicate with the server using HTTPS.

#### OVM Specific Parameters

##### OVM\_ISO\_REPOSITORY

Lets you manually set the repository to upload the D2D Live CD.

##### OVM\_ISO\_UPLOAD\_SERVER

Lets you manually specify the repository server to upload D2D Live CD.

##### OVM\_DISK\_REPOSITORY

Lets you use specific OVM repository to create virtual disks.

**Note:** The `d2drestorevm` utility uses the ID for the OVM specific parameters.

#### RHEV Specific Parameters

##### RHEV\_DISK\_STORAGE\_DOMAIN

Lets you use specific RHEV storage domain to create virtual disks. The `d2drestorevm` utility uses the lexical file name for the RHEV specific parameters.

#### Xen Specific Parameters

##### XEN\_DISK\_SR

Lets you use specific Xen storage repository to create virtual disks. The `d2drestorevm` utility uses the lexical file name for the Xen specific parameters.

#### Follow these steps:

1. Log in to the D2D Server.
2. Create the global configuration file and name it as `vm.cfg`.
3. Open the global configuration file and update the parameters in the file.
4. Save and close the file.
5. Place the file at the `configfiles` folder:

```
/opt/CA/d2dserver/configfiles/vm.cfg
```

The global configuration file is successfully created.

## Modify the Configuration Template and File

If you already have the configuration template and the global configuration file, you can modify the files and restore another VM. You do not have to create another configuration templates and files each time you restore a VM. When you submit the job, a new job is added on the web UI. You can see the activity logs on the web UI.

**Follow these steps:**

1. Log in to the D2D Server as a root user.
2. Open the configuration template from the location where you have saved the file and modify the parameters per your requirement.
3. Save and close the configuration template.
4. (Optional) Open the global configuration file from the following location and modify the parameters per your requirement:

```
/opt/CA/d2dserver/configfiles/vm.cfg
```

5. Save and close the global configuration file.

The configuration template and file are successfully modified.

## Submit a Job Using the d2drestorevm Utility

Run the `d2drestorevm` command to restore the VM. The command verifies the target VM and submits a restore job. The restore job can be seen from the web UI. During the restore process if any requirement is not met, you will get an error. You can view the activity log on the web UI.

**Follow these steps:**

1. Log in to the D2D Server as a root user.
2. Submit the restore job for the VM using the following command:

```
d2drestorevm --template=cfg_file_path [--wait]
```

**Note:** The `--wait` switch lets you return to the shell environment after the restore job is complete. If the `--wait` switch is not present, you return to the shell environment immediately after submitting the job.

The restore job is submitted.

## Verify the VM is Recovered

After the completion of restore job, verify that the target node is restored with relevant data.

**Follow these steps:**

1. Navigate to the VM that you restored.
2. Verify that the VM has all the information that you backed up.

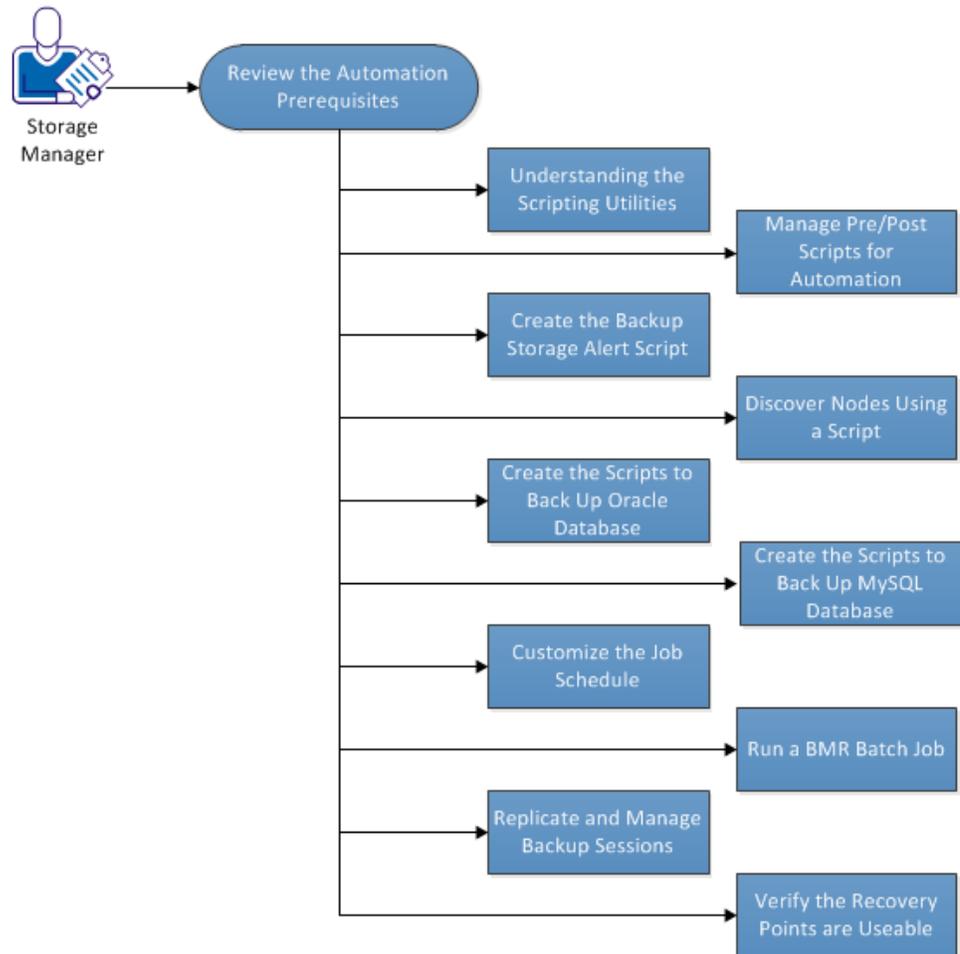
The VM is successfully verified.

## How to Integrate and Automate CA ARCserve D2D for Linux with the Existing IT Environment

As a Storage Manager, you can create scripts and can automate tasks to integrate CA ARCserve D2D for Linux with your existing IT environment. Scripts reduce the manual intervention and decrease the dependency on the web interface of the D2D Server to perform any task. CA ARCserve D2D for Linux also provides the interface and utilities to perform the job management, node management, and activity log management tasks.

The following diagram displays the process to integrate and automate CA ARCserve D2D for Linux with the existing IT environment:

### How to Integrate and Automate CA ARCserve D2D for Linux with the Existing IT Environment



Perform the following tasks to automate and manage CA ARCserve D2D for Linux:

- [Review the Automation Prerequisites](#) (see page 124)
- [Understanding the Scripting Utilities](#) (see page 125)
- [Manage Pre/Post Scripts for Automation](#) (see page 132)
- [Create the Backup Storage Alert Script](#) (see page 135)
- [Discover Nodes Using a Script](#) (see page 135)
- [Create the Scripts to Back Up Oracle Database](#) (see page 137)
- [Create the Scripts to Back Up MySQL Database](#) (see page 139)
- [Customize the Job Schedule](#) (see page 141)
- [Run a BMR Batch Job](#) (see page 142)
- [Replicate and Manage Backup Sessions](#) (see page 143)
- [Verify the Recovery Points are Useable](#) (see page 145)

## Review the Automation Prerequisites

Consider the following prerequisites before you automate and manage CA ARCserve D2D for Linux:

- You have the root login credentials to the D2D Server.
- You have knowledge of Linux scripting.
- You have a better understanding of the CA ARCserve D2D for Linux web interface.

## Understanding the Scripting Utilities

CA ARCserve D2D for Linux provides scripting utilities to help you create your automation script. These utilities are merely for scripting so their output is scripting friendly. The utilities are used to manage nodes, jobs, replicate backup destinations, and manage activity logs.

All the utilities are contained in the *bin* folder at the following location:

```
/opt/CA/d2dserver/bin
```

The `d2dutil --encrypt` utility encrypts the password and provides an encrypted password. You must use this utility to encrypt all your passwords. If you use the `--pwdfile=pwdfilepath` parameter, then you must encrypt the password. You can use the utility one of the following methods:

### Method 1

```
echo "string" | d2dutil --encrypt
```

string is the password that you specify.

### Method 2

Type the "`d2dutil --encrypt`" command and then specify your password. Press Enter and you will see the result on your screen. In this method, the password that you enter is not echoed on the screen.

### Follow these steps:

1. Log into the D2D Server as a root user.
2. Navigate to the *bin* folder using the following command:

```
# cd/opt/CA/d2dserver/bin
```

3. Run the following commands to manage nodes:

```
# ./d2dnode
```

Displays a list of available commands to help you manage all related D2D nodes. Using this command, you can add, delete, and modify nodes. You can also add nodes using the non-root credentials.

```
# ./d2dnode --list
```

Lists all the nodes that are managed by the D2D Server.

```
# ./d2dnode --add=nodename/ip --user=username --password=password  
--description="the description of that node" --attach=jobname --force
```

Adds the specific node to the D2D Server. If you are a root user, use this command to add nodes.

**Note:** If you change the port number of the node, then you must specify the new port number in the `--add` parameter as shown in the following example.

**Example:** # ./d2dnode --add=nodename/ip:new\_port --user=username  
--password=password --description="the description of that node"  
--attach=jobname --force

**--attach=jobname**

Adds a new node to an existing backup job.

**--force**

Adds the node forcefully even if the node is managed by another D2D Server. If you remove the *force* parameter, then the node is not added to this server if it is managed by another D2D Server.

```
# ./d2dnode --add=nodename --user=username --password=password
--rootuser=rootaccount --rootpwd=rootpassword --pwdfile=pwdfilepath
--description=description --attach=jobname --force
```

Adds the specific node to the D2D Server. If you are a non-root user, use this command to add nodes.

**Note:** If you change the port number of the node, then you must specify the new port number in the --add parameter as shown in the following example.

**Example:** # ./d2dnode --add=nodename/ip:new\_port --user=username  
--password=password --rootuser=rootaccount --rootpwd=rootpassword  
--pwdfile=pwdfilepath --description=description --attach=jobname --force

**--user=username**

Specifies the username of the non-root user.

**--password=password**

Specifies the password of the non-root user. If the --pwdfile=pwdfilepath parameter is provided, then you do not have to specify this parameter.

**--rootuser=rootaccount**

Specifies the username of the root user.

**--rootpwd=rootpassword**

Specifies the password of the root user. If the --pwdfile=pwdfilepath parameter is provided, then you do not have to specify this parameter.

**--pwdfile=pwdfilepath**

(Optional) Specifies the password of the root user and non-root user. This is an optional parameter that you use if you have stored the passwords of the root user and non-root users in a separate file. The password file includes the following parameters: --password=password and --rootpwd=rootpassword. For added security, the password must be encrypted using the d2dutil --encrypt utility. After you encrypt the password, replace the old password with the encrypted password in the --pwdfile parameter.

```
# ./d2dnode --node=nodename --attach=jobname
```

Adds the specified node to an existing backup job.

```
# ./d2dnode --modify=nodename/ip --user=username --password=newpassword  
--description=newdescription
```

Modifies the username, password, or the description of the added node. If you are a root user, use this command to modify nodes.

```
# ./d2dnode --modify=nodename --user=username --password=newpassword  
--rootuser=rootaccount --rootpwd=newrootpassword --pwdfile=pwdfilepath  
--description=newdescription
```

Modifies the username, password, or the description of the added node. If you are a non-root user, use this command to modify nodes.

**--user=username**

Specifies the username of the non-root user.

**--password=newpassword**

Specifies the new password of the non-root user.

**--rootuser=rootaccount**

Specifies the username of the root user.

**--rootpwd=newrootpassword**

Specifies the new password of the root user.

**--pwdfile=pwdfilepath**

(Optional) Specifies the password of the root user and non-root user. This is an optional parameter that you use if you have stored the passwords of the root user and non-root users in a separate file. The password file includes the following parameters: **--password=newpassword** and **--rootpwd=newrootpassword**.

```
# ./d2dnode --delete=nodename1,nodename2,nodename3
```

Deletes the specified nodes from the D2D Server. To delete multiple nodes, use a comma (,) as a delimiter.

4. Run the following commands to manage jobs:

```
# ./d2djob
```

Displays a list of commands to help you manage jobs. Using this command, you can run, cancel, and delete jobs.

```
# ./d2djob --delete=jobname
```

Deletes the specified job from the Job Status tab.

```
# ./d2djob --run=jobname --jobtype=1 --wait
```

Runs the specified job. The `--jobtype` parameter is optional. The `d2djob` command automatically identifies the job type from the job name that you specify. If the command identifies a restore job, the restore job starts. If the command identifies a backup job and you do not provide any value for the `--jobtype` parameter, then an incremental backup job starts. The Incremental backup is the default job type.

If you want to specify the job type for a backup job, then the values are 0, 1, and 2, where 0 indicates a Full backup job, 1 indicates an Incremental backup job, and 2 indicates a Verify backup job.

```
# ./d2djob --cancel=jobname --wait
```

Cancels a job that is in progress.

If you include `--wait` in the command, the job status is displayed after the job is canceled. If you do not include `--wait` in the command, the job status is displayed immediately after submitting the cancellation request.

```
# ./d2djob --newrestore=restoreJobName --target=macaddress/ipaddress  
--hostname=hostname --network=dhcp/staticip --staticip=ipaddress  
--subnet=subnetMask --gateway=gateway --runnow --wait
```

Runs a restore job for a new target machine based on an existing restore job. This command lets you use the same restore settings as the existing restore job and only the target machine details are different. If you use this command, you do not have to create multiple restore jobs for different target machines.

You must provide a value for `--newrestore`, `--target`, `--hostname`, and `--network`.

If the value for `--network` is `staticip`, then you must provide a value for `--staticip`, `--subnet`, and `--gateway`. If the value for `--network` is `dhcp`, then you do not have to provide any value for `--staticip`, `--subnet`, and `--gateway`.

If you include `--runnow` in the command, the job runs immediately after you submit the job, irrespective of the job schedule.

If you include the `--wait` parameter in the command, the status message is displayed after the completion of the job. If you do not include `--wait` in the command, the status message is displayed immediately after submitting the job.

5. Run the following commands to create or update the recovery points configuration file. CA ARCserve D2D for Linux uses the configuration file to manage and display the recovery points in the UI.

```
# ./d2drp
```

Creates or updates the recovery points configuration files based on the recovery points detail. Using this command, you can create or update the configuration files.

```
# ./d2drp --build --storagepath=/backupdestination --node=node_name
```

Verifies all recovery points that belong to *node\_name* and update all the recovery points configuration files. If the recovery point configuration files are not present, this command create the files automatically. The `--build` parameter creates the configuration files of recovery points.

```
# ./d2drp --build --storagepath=/backupdestination --node=node_name  
--rp=recovery_point
```

Verifies the specified session name and update all the recovery points configuration files. If the recovery point configuration files are not present, this command create the files automatically. Specify the keyword 'last' for the `--rp` parameter to get the most recent recovery point.

```
# ./d2drp --show --storagepath=path --node=nodeName --rp=recovery_point  
--user=username --password=password
```

Displays system information for the specified recovery point.

**--rp=recovery\_point**

Specifies the recovery point that you want to access. Specify the keyword 'last' to get the most recent recovery point.

**--user=username**

Specifies the username to access the storage location or backup destination.

**--password=password**

Specifies the password to access the storage location or backup destination.

**Note:** For the `--build` parameter, d2drp does not support the NFS share or the CIFS share. If you want to use the NFS share or the CIFS share, you must first mount the share to the local host and then use the mount point as the storagepath.

6. Run the following commands to manage activity logs:

```
# ./d2dlog
```

Displays the format that helps you get the activity logs for the specified job id in the specified format.

```
# ./d2dlog --show=jobid --format=text/html
```

Displays the activity log of the specified job. The format value is optional because the default value is text.

7. Run the following commands to manage the job history:

```
# ./d2djobhistory
```

Displays the job history based on the filters you specify. You can filter the job history by days, weeks, months, and start and end date.

```
# ./d2djobhistory --day=n --headers=column_name1,column_name2,...column_name_n  
--width=width_value --format=column/csv/html
```

Displays the recent job history based on the specified days.

**--headers=column\_name1,column\_name2,...column\_name\_n**

(Optional) Specifies the columns that you want to view in the job history. This is an optional parameter. The predefined columns are ServerName, TargetName, JobName, JobID, JobType, DestinationLocation, EncryptionAlgoName, CompressLevel, ExecuteTime, FinishTime, Throughput, WriteThroughput, WriteData, ProcessedData, and Status.

**--width=width\_value**

(Optional) Specifies the number of characters that you want to display for each column. This is an optional parameter. Each column has its own default width. You can update the width value for each column, where each width value is separated by a comma (,).

**--format=column/csv/html**

Specifies the display format of the job history. The available formats are column, csv, and html. You can specify only one format at a time.

```
# ./d2djobhistory --week=n  
--headers=column_name1,column_name2,...column_name_n --width=width_value  
--format=column/csv/html
```

Displays the recent job history based on the specified weeks.

```
# ./d2djobhistory --month=n  
--headers=column_name1,column_name2,...column_name_n --width=width_value  
--format=column/csv/html
```

Displays the recent job history based on the specified months.

```
# ./d2djobhistory --starttime=yyyymmdd --endtime=yyyymmdd  
--headers=column_name1,column_name2,...column_name_n --width=width_value  
--format=column/csv/html
```

Displays the recent job history based on the specified start and end date.

The scripting utilities have been used to successfully manage nodes, jobs, and activity logs.

## Manage Pre/Post Scripts for Automation

Pre/Post scripts let you run your own business logic at specific stages of a running job. You can specify when to run your scripts in Pre/Post Script Settings of the Backup Wizard and the Restore Wizard in the UI. The scripts can be run on the D2D Server depending on your setting.

Managing the pre/post script is a two part process, consisting of creating the pre/post script and placing the script in the prepost folder.

### Create Pre/Post Scripts

#### Follow these steps:

1. Log into the D2D Server as a root user.
2. Create a script file using the environment variables in your preferred scripting language.

#### Pre/Post Script Environment Variables

To create your script, use the following environment variables:

##### **D2D\_JOBNAME**

Identifies the name of the job.

##### **D2D\_JOBID**

Identifies the job ID. Job ID is a number provided to the job when you run the job. If you run the same job again, you get a new job number.

##### **D2D\_TARGETNODE**

Identifies the node that is being backed up or restored.

##### **D2D\_JOBTYPE**

Identifies the type of the running job. The following values identify the D2D\_JOBTYPE variable:

**backup.full**

Identifies the job as a full backup.

**backup.incremental**

Identifies the job as an incremental backup.

**backup.verify**

Identifies the job as a verify backup.

**restore.bmr**

Identifies the job as a bare-metal recovery (bmr). This is a restore job.

**restore.file**

Identifies the job as a file-level restore. This is a restore job.

**D2D\_SESSIONLOCATION**

Identifies the location where the recovery points are stored.

**D2D\_PREPOST\_OUTPUT**

Identifies a temp file. The content of the first line of the temp file is displayed in the activity log.

**D2D\_JOBSTAGE**

Identifies the stage of the job. The following values identify the D2D\_JOBSTAGE variable:

**pre-job-server**

Identifies the script that runs on the D2D Server before the job starts.

**post-job-server**

Identifies the script that runs on the D2D Server after the job completes.

**pre-job-target**

Identifies the script that runs on the target machine before the job starts.

**post-job-target**

Identifies the script that runs on the target machine after the job completes.

**pre-snapshot**

Identifies the script that runs on the target machine before capturing the snapshot.

**post-snapshot**

Identifies the script that runs on the target machine after capturing the snapshot.

**D2D\_TARGETVOLUME**

Identifies the volume that is backed up during a backup job. This variable is applicable for pre/post snapshot scripts for a backup job.

**D2D\_JOBRESULT**

Identifies the result for a post job script. The following values identify the D2D\_JOBRESULT variable:

**success**

Identifies the result as successful.

**fail**

Identifies the result as unsuccessful.

**D2DSVR\_HOME**

Identifies the folder where D2D Server is installed. This variable is applicable for the scripts that run on the D2D Server.

The script is created.

**Note:** For all scripts, a return value of zero indicates success and a nonzero return value indicates failure.

**Place the Script in the Prepost Folder and Verify**

All the pre/post scripts for a D2D Server are centrally managed from the prepost folder at the following location:

`/opt/CA/d2dserver/usr/prepost`

**Follow these steps:**

1. Place the file in the following location of the D2D Server:  
`/opt/CA/d2dserver/usr/prepost`
2. Provide the execution permission to the script file.
3. Log into the CA ARCserve D2D for Linux web interface.
4. Open the Backup Wizard or the Restore Wizard and navigate to the Advanced tab.

5. Select the script file in the Pre/Post Script Settings drop-down list and then submit the job.
6. Click Activity Log and verify that the script is executed to the specified backup job.  
The script is executed.

The pre/post scripts are successfully created and placed in the prepost folder.

## Create the Backup Storage Alert Script

Create the backup storage alert script so that you can run the script when your backup storage space is less than the specified value. When you add a backup storage location in the UI, you have the option to select the Send alert checkbox. When you select the checkbox, CA ARCserve D2D for Linux monitors the available storage space every 15 minutes. Every time the storage space is less than the specified value, CA ARCserve D2D for Linux runs the *backup\_storage\_alert.sh* script. You can configure the *backup\_storage\_alert.sh* script to perform any task for you when the backup storage space is less.

**Example 1:** You can configure the script to automatically send you an email alert to remind you of the decreasing storage space.

**Example 2:** You can configure the script to automatically delete some data from the backup storage space when the storage space is less than the specified value.

### Follow these steps:

1. Log into the D2D Server as a root user.
2. Create the *backup\_storage\_alert.sh* script using the following variables:

**backupstoragename**

Defines the name of backup storage location. For example, NFS or CIFS.

**freesize**

Defines the available free space in the backup storage location.

3. Place the script at the following location:

```
/opt/CA/d2dserver/usr/alert/backup_storage_alert.sh
```

The *backup\_storage\_alert.sh* script is created.

## Discover Nodes Using a Script

CA ARCserve D2D for Linux provides the capability to run a script that discovers nodes in your network. You can write a script to discover nodes in your network and then place the script in the *discovery* folder.

You can configure the node discovery setting on the web interface and set the frequency of running the script. In the script, you can specify the utilities to discover nodes in your network. After the script discovers a node, use the *d2dnode* command to add that node to CA ARCserve D2D for Linux. There is an activity log for every time the script is run.

**Note:** For all scripts, a return value of zero indicates success and a nonzero return value indicates failure.

If you want to print something into the Activity Log regarding your node discovery script, you can use the following special environment variable:

```
echo "print something into activity log" > "$D2D_DISCOVER_OUTPUT"
```

A sample script is placed in the *discovery* folder at the following location that can discover the Linux nodes in a sub network.

```
/opt/CA/d2dserver/examples/discovery
```

You can copy the sample script to the following location and modify that script per your requirement:

```
/opt/CA/d2dserver/usr/discovery
```

**Follow these steps:**

1. Log into the D2D Server as a root user.
2. Create a node discovery script and place the script in the *discovery* folder at the following location:  

```
/opt/CA/d2dserver/usr/discovery
```
3. Provide the necessary execution permission to the script file.
4. Log into the web interface.
5. Configure the node discovery settings in the Node menu to run your script.
6. Click Activity Log and verify that the script is executed.

The Activity Log displays a list of all discovered nodes.

Nodes are successfully discovered using the script.

## Create the Scripts to Back Up Oracle Database

You can create scripts that you use to back up your Oracle Database. You do not have to stop your database to perform a backup. Verify that the database is in the archive log mode. If it is not in the archive log mode, then change the database to the archive log mode before you back up the database. You create the following two scripts to back up Oracle Database:

- **pre-db-backup-mode.sh** - This script prepares and keeps the entire database in the backup mode.
- **post-db-backup-mode.sh** - This script removes the database from the backup mode.

You can specify the scripts to run on the Oracle Database nodes in Pre/Post Scripts Settings of the Backup Wizard.

### Follow these steps:

1. Log into the D2D Server as a root user.
2. Create the *pre-db-backup-mode.sh* script using to the following code:

```
#!/bin/bash
orauser="oracle"
orasid="orcl"
su - ${orauser} << EOF 2>&1
export ORACLE_SID=$orasid
sqlplus /nolog << EOF 2>&1
connect / as sysdba
alter database begin backup;
exit;
EOF
BOF
```

**Note:** Specify the value for *orauser* and *orasid* variables as defined in your Oracle Database.

3. Create the *post-db-backup-mode.sh* script using the following code:

```
#!/bin/bash
orauser="oracle"
orasid="orcl"
su - ${orauser} << EOF 2>&1
export ORACLE_SID=${orasid}
sqlplus /nolog << EOF 2>&1
connect / as sysdba
alter database end backup;
exit;
EOF
EOF
```

**Note:** Specify the value for *orauser* and *orasid* variables as defined in your Oracle Database.

4. Provide the execution permission to both the scripts.
5. Place both scripts at the following location:  
`/opt/CA/d2dserver/usr/prepost/`
6. Log into the CA ARCserve D2D for Linux web interface.
7. Open the Backup Wizard and navigate to the Advanced tab.
8. In the Pre/Post Scripts Settings option, select the *pre-db-backup-mode.sh* script file from the "Before snapshot is taken" dropdown list.
9. In the Pre/Post Scripts Settings option, select the *post-db-backup-mode.sh* script file from the "After snapshot is taken" dropdown list.
10. Submit the backup job.  
The backup job is submitted.

The scripts are created to back up Oracle Database.

**Note:** CA ARCserve D2D for Linux supports the volume level snapshot. To ensure the data consistency, all data files of the database must be on one volume.

## Create the Scripts to Back Up MySQL Database

You can create scripts that you use to back up MySQL Database. You do not have to stop your database to perform a backup. You create the following two scripts to back up MySQL Database:

- **pre-db-backup-mode.sh** - This script closes all open tables, and it locks all the tables for all the databases with a global read lock.
- **post-db-backup-mode.sh** - This script releases all the locks.

You can specify the scripts to run on the MySQL Database nodes in Pre/Post Scripts Settings of the Backup Wizard.

### Follow these steps:

1. Log into the D2D Server as a root user.
2. Create the *pre-db-backup-mode.sh* script using to the following code:

```
#!/bin/bash
dbuser=root
dbpwd=rootpwd
lock_mysqlldb(){
    (
        echo "flush tables with read lock;"
        sleep 5
    ) | mysql -u$dbuser -p$dbpwd ${ARGUMENTS}
}
lock_mysqlldb &
PID="/tmp/mysql-pllock.$!"
touch ${PID}
```

**Note:** Specify the value for *dbuser* and *dbpwd* variables as defined in your MySQL Database.

3. Create the *post-db-backup-mode.sh* script using the following code:

```
#!/bin/bash
killcids(){
pid="$1"
cids=`ps -ef|grep ${pid}|awk '{if('$pid'==$3){print $2}}`
for cid in ${cids}
do
    echo ${cid}
    kill -TERM ${cid}
done
echo -e "\n"
}
mysql_lock_pid=`ls /tmp/mysql-plock.* | awk -F . '{print $2}`
[ "$mysql_lock_pid" != "" ] && killcids ${mysql_lock_pid}
rm -fr /tmp/mysql-plock.*
```

4. Provide the execution permission to both the scripts.
5. Place both the scripts in the following location:  
`/opt/CA/d2dserver/usr/prepost/`
6. Log into the CA ARCserve D2D for Linux web interface.
7. Open the Backup Wizard and navigate to the Advanced tab.
8. In the Pre/Post Scripts Settings option, select the *pre-db-backup-mode.sh* script file from the "Before snapshot is taken" dropdown list.
9. In the Pre/Post Scripts Settings option, select the *post-db-backup-mode.sh* script file from the "After snapshot is taken" dropdown list.
10. Submit the backup job.  
The backup job is submitted.

The scripts are created to back up MySQL Database.

**Note:** CA ARCserve D2D for Linux supports the volume level snapshot. To ensure the data consistency, all data files of the database must be on one volume.

## Customize the Job Schedule

CA ARCserve D2D for Linux provides the capability to define your own schedule using a script to run a job. If you require to run a job periodically and you cannot schedule using the web UI, you can create a script to define such schedule. For example, you want to run a backup at 10:00 PM on the last Saturday of every month. You cannot define such schedule using the web interface, but you can create a script to define such schedule.

You can submit a backup job without specifying any schedule (using the Manually option on the Advanced page). Use the Linux Cron scheduler to define your customized schedule and run the *d2djob* command to run the job.

**Note:** The following procedure assumes that you have submitted a backup job without specifying any schedule and you want to run a backup at 10:00 PM on the last Saturday of every month.

### Follow these steps:

1. Log into the D2D Server as a root user.
2. Create a script file and enter the following command to run a backup at 10:00 PM on the last Saturday of every month:

```
#!/bin/bash
LAST_SAT=$(cal | awk '$7!=""{t=$7} END {print t}')
TODAY=$(date +%d)
if [ "$LAST_SAT" = "$TODAY" ]; then
    source /opt/CA/d2dserver/bin/setenv
    d2djob --run=your_job_name --jobtype=your_job_type #run your
    backup job here
fi
```

**Note:** You must provide the necessary execution permission to the file.

3. Navigate to the crontab folder and add the following command to your system crontab (/etc/crontab):

```
00 22 * * Saturday root runjob.sh
```

Cron runs the runjob.sh script at 10:00 PM every Saturday. In runjob.sh, it first checks if today is last Saturday of the month. If yes, it uses d2djob to run the backup job.

The job schedule is customized to run a backup at 10:00 PM on the last Saturday of every month.

## Run a BMR Batch Job

If you want to perform a BMR on multiple machines and you want to install the same operating environment on all the machines, you can perform a batch BMR. You do not have to create a job for each BMR job. You can save time and effort, and you can reduce the risk of any error while configuring the BMR machines.

**Note:** You must have a valid recovery point of the source machine that you want to restore. If you do not have a valid recovery point, you must first back up the source machine and then submit a restore job.

You first define all your BMR settings in a template BMR job and then change the target machine's address (IP or MAC), hostname, and network configuration using the following command:

```
d2djob
```

### Follow these steps:

1. Create a BMR job named BMR-TEMPLATE and run the job for one machine of your multiple machines.

**Note:** You can provide any name for the BMR job. You must provide the same job name in the batch BMR script.

2. Log in to the D2D Server as a root user.
3. Create a batch BMR script based on the BMR-TEMPLATE job to automatically submit multiple BMR jobs. Use the following script to create a batch BMR script:

```
#!/bin/sh
prename=lab-server
serverList[0]="<MAC_Address>"
serverList[1]=" <MAC_Address>"
serverList[2]=" <MAC_Address>"
.
.
.
serverList[300]=" <MAC_Address>"
for ((i=0;i<${#serverList[@]};i=i+1))
do
./d2djob --newrestore="BMR-TEMPLATE" --target=${serverList[i]}
--hostname=$prename$i --network=dhcp
done
```

4. Run the batch BMR script.

The script runs. Multiple BMR jobs are created in the UI.

A batch of BMR job is run.

## Replicate and Manage Backup Sessions

You can create a script to replicate your backup sessions so that you can recover your data when your original backup data is corrupted. The backup sessions include all the recovery points that were backed up. You can protect your backup sessions by replicating your backup sessions to a replication destination.

After you have replicated your backup sessions, you can then manage your replication destination by adding the destination to the CA ARCserve D2D for Linux interface.

Replicating and managing backup sessions is a three part process. It includes the following three parts:

- Replicating the backup sessions to the replication destination
- Creating or updating the recovery points configuration files so that recovery points can be managed and displayed on the CA ARCserve D2D for Linux web interface
- Adding the replication destination to the CA ARCserve D2D for Linux web interface

### Replicating the Backup Sessions

You can leverage the Pre/Post Scripts Settings feature in the Backup Wizard to replicate the backup sessions to the replication destination. You can choose any option, such as File Transfer Protocol (FTP), Secure Copy (SCP), or the cp command, to replicate the backup session.

#### Follow these steps:

1. Log into the D2D Server as a root user.
2. Create a pre/post script to replicate the backup sessions.
3. Place the script at the following location:  
`/opt/CA/d2dserver/usr/prepost`
4. Log into the CA ARCserve D2D for Linux web interface.
5. Open the Backup Wizard and navigate to the Advanced page.
6. In the Pre/Post Scripts Settings option for Run on D2D server, select the replication script from the After job is over dropdown list.
7. Submit the backup job.

The backup session is replicated to the backup destination.

### Create or Update the Recovery Point Configuration Files

After you replicate the backup sessions, you create and configure the recovery points configuration file. This file is used to identify the recovery points when you perform the restore operation from the CA ARCserve D2D for Linux interface.

**Follow these steps:**

1. Log into the D2D Server as a root user.
2. Navigate to the following location:  
`/opt/CA/d2dserver/bin`
3. Enter the following command to create or update the recovery points configuration file:

```
./d2drp --storagepath=/backupdestination --node=node_name  
--session=session_name
```

If you provide only the `--storagepath` and `--node` information, then the command updates all the backup sessions for the selected node. If you provide the `--session` information, then the command updates the specific session information.

**Note:** For more information about the `d2drp` command, see *Understanding the Scripting Utilities*.

The recovery points configuration file is created or updated depending on the status of the file.

### Add the Replication Destination

Add the replication destination to the CA ARCserve D2D for Linux interface to manage the destination. After you add the replication destination, you can see the available free space in that destination and manage your data accordingly.

**Follow these steps:**

1. Log into the replication destination.
2. Create a file named `Settings` and enter the following code in the `Settings` file:

```
RecoverySetLimit=n
```

*n* indicates the number of recovery sets that you want to retain in the replication destination.

3. Place the file in the node folder of the replication destination.

For example, `/backup_destination/node_name/Settings`

4. Log into the CA ARCserve D2D for Linux web interface.
5. Add the replication destination from the Backup Storage menu.

The replication destination is added to the CA ARCserve D2D for Linux web interface.

The backup sessions are successfully replicated and managed.

## Verify the Recovery Points are Useable

The d2dverify utility helps to verify the recovery points from various backup sessions are usable. Typically, backup jobs run every day and when you have multiple recovery points you may not be sure if the recovery points are usable for data recovery during a system failure. To avoid such situations, you can perform BMR jobs periodically to verify if the backups are useable. The d2dverify utility helps you automate the task of verifying the usability of the recovery points.

After you set up the required parameters, the d2dverify utility submits the BMR job and recovers data to the specified VM. Then d2dverify starts the VM and runs a script to verify if the applications in the VM function properly. You can also create a schedule to run the d2dverify utility periodically using system utilities such as Linux Cron. For example, you can run the d2dverify utility after the last backup of a recovery set. In such case, d2dverify verifies all recovery points in that recovery set.

**Note:** To know more about scheduling a job using the Linux Cron scheduler, see [Customize the Job Schedule](#) (see page 141).

The d2dverify utility can also be used in the following scenarios:

- You can use the d2dverify utility to migrate the backups of several physical machines to virtual machines.
- After a hypervisor is recovered, you can use the d2dverify utility to restore all the VMs to the new hypervisor.

Consider the following prerequisites before you use the d2dverify utility:

- Identify the source nodes whose backup you want to verify.
- Identify a hypervisor on which VMs will be created.
- Create VMs for each node that you want to verify. Assign the VM name in the following format:

verify\_<node name>

**Note:** You do not require to attach virtual hard disks for these VMs. And you may not attach virtual network to these VMs if you specify "vm\_network" parameters.

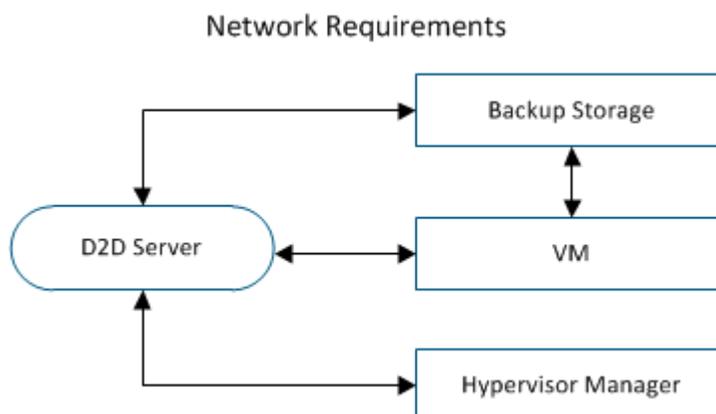
- Review the network requirements
- Identify a network in which the VMs will be connected.

**Note:** The d2dverify utility supports the static IP network only.

**Important!** If the database has the node account information related to a non-root user, then d2dverify will reset the password of the non-root user to 'CAAd2d@2013 for the target VM.

### Network Requirements:

When you use d2dverify, it is recommended to keep the target VMs in an isolated virtual network to avoid any conflict with the production environment. In such cases, the target VMs must be connected to the D2D Server and the backup storage both.



### Hypervisor Support:

d2dverify depends on the d2drestorevm utility to perform the restore. d2dverify supports the following versions of hypervisors:

- XenServer 6.0 and above
- RHEV 3.0 and above
- OVM 3.2

### Arguments:

#### **--template**

Identifies the template that includes the parameters to run the d2dverify utility.

#### **--createtemplate**

Creates an empty template that that includes the parameters to run the d2dverify utility.

**Follow these steps:**

1. Log in to the D2D Server as a root user.
2. Create the template that is used by the d2dverify utility using the following command:

```
d2dverify --createtemplate=file_path
```

3. Open the template and update the following parameters:

**node\_list**

Specifies a list of nodes or a query criteria that queries information from the database of the D2D Server. Each node is separated by a comma, such as Node1,Node2,Node3.

**Notes:** If the ssh port number is not the default port 22, then the format to specify each node is: Node1:new\_port,Node2:new\_port,Node3:new\_port. The VM name is assigned as verify\_<node name>, where node name does not include the port number.

**Example:** Node1:222,Node2:333,Node4:333

The following list is an example of query criteria:

**[node=prefix]**

Finds the node name that contains the defined prefix.

**[desc=prefix]**

Finds the node description that contains the defined prefix.

**guest\_ip\_list =**

Specifies the list of IP address that is applied to each target node respectively. Each IP address is separated with a comma, such as IP1,IP2,IP3. If there is only one IP address available but there are multiple nodes in the node\_list parameter, then the fourth segment of the IP address is increased by one for each node. The d2dverify utility verifies if an IP address has been used. If yes, that IP address is skipped.

For example, if you have three nodes, Node 1, Node 2, and Node 3, and one IP address, xxx.xxx.xxx.xx6, then the IP address is applied as shown in the following list:

**Node 1:** xxx.xxx.xxx.xx6

**Node 2:** xxx.xxx.xxx.xx7

**Node 3:** xxx.xxx.xxx.xx8

**vm\_type**

Specifies the type of the hypervisor. The following three types of hypervisors are valid: xen, ovm, or rhev.

**vm\_server**

Specifies the host name or IP address of the hypervisor manager.

**vm\_svr\_username**

Specifies the user name of the hypervisor manager.

**vm\_svr\_password**

Specifies the password of the hypervisor manager. The password must be encrypted using the d2dutil --encrypt utility.

The following command is used to encrypt the password:

```
echo "password" | d2dutil --encrypt
```

**vm\_network**

Specifies the virtual network that is used by the target VM. It is recommended to specify this parameter when your target VM is connected to multiple virtual networks.

**guest\_gateway**

Specifies the network gateway that is used by the guest operating system (OS) of the target VM.

**guest\_netmask**

Specifies the net mask that is used by the guest OS of the target VM.

**guest\_username**

Specifies the username that is used to connect to the recovered VM. The password is reset to the password specified in the guest\_password parameter. The guest\_username parameter is ignored when you use the d2dverify utility to query information from the D2D Server database. In such cases, the VM guest password is reset to the node's password stored in database.

**guest\_password**

Specifies the password for the guest\_username parameter. The password must be encrypted using the d2dutil --encrypt utility. The guest\_password parameter is ignored when you use the d2dverify utility to query information from the D2D Server database.

**storage\_location**

Specifies the network path of the backup storage location. You do not have to specify the storage location if the nodes in the `node_list` parameter are in the D2D Server database. If the storage location is a CIFS share, use the following format to specify the location:

```
//hostname/path
```

**storage\_username**

Specifies the user name to access the backup storage location. This parameter is not required for an NFS share.

For a Windows domain user, use the following format to specify the location:

```
domain_name/username
```

**storage\_password**

Specifies the password to access the backup storage location. The password must be encrypted using the `d2dutil --encrypt` utility. This parameter is not required for an NFS share.

**recovery\_point = last**

Specifies the session that you want to restore. Typically, a recovery session is in the following format: `S00000000X`, where `X` is a numeric value. `S00000000X` is the folder name of the recovery points. If you want to restore the most recent session, specify the keyword 'last'.

**encryption\_password**

Specifies the encryption password for the recovery point. The password must be encrypted using the `d2dutil --encrypt` utility.

**script**

Specifies the script that you want to run. The script runs on the target machine after a successful recovery. If this parameter is not provided, the `d2dverify` utility runs the 'ls /proc' command on the target machine.

**email\_to\_address**

Specifies the email address of the recipients who will receive reports in an email. You can specify more than one email address, separated by a comma.

**email\_subject**

Specifies the subject line of the email.

**report\_format**

Specifies the format of the report that you will receive in an email. The format could be either text (.txt) or html.

**Default:** html

**node\_not\_in\_db**

Specifies the nodes from the node\_list parameters that are not in the D2D Server database. You must specify the storage\_\* related parameters.

**Value:** yes

**stop\_vm\_after\_recovery**

Specifies that the target VM stops after a successful recovery and verification. The values for this parameter are yes and no.

**Default:** yes

4. Save and close the template.
5. Run the d2dverify utility using the following command:

```
d2dverify --template=file_path
```

**Note:** The d2dverify utility fails if the nodes in the node\_list parameter are added using the public/private key. To resolve this issue, configure the environment variable 'export D2D\_SSH\_IGNORE\_PWD=yes' in the shell environment where you run the d2dverify utility.

The usability of recovery points has been successfully verified.

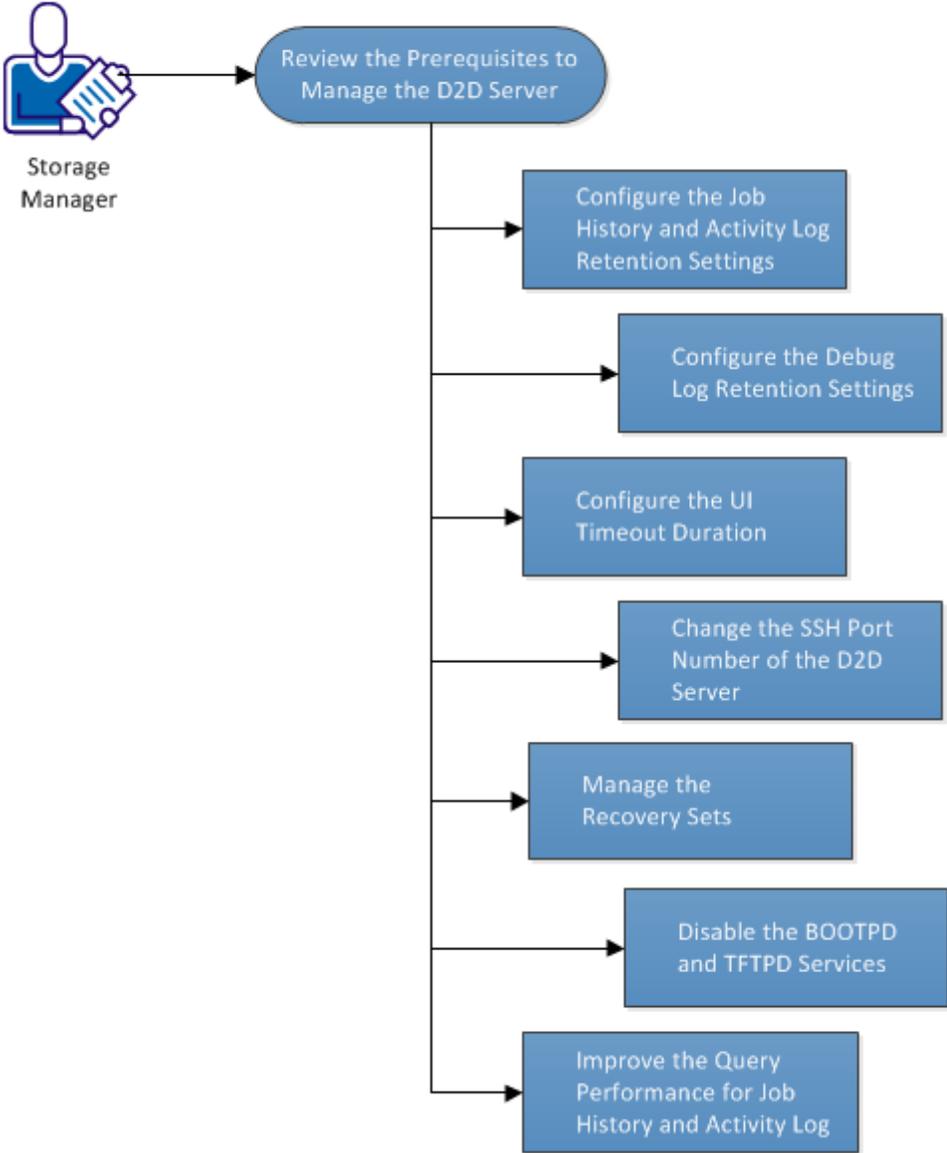
## How to Manage the D2D Server Settings

You can perform the following tasks to manage the D2D Server:

- Configure the duration to retain the Job History and Activity Logs
- Configure the duration to retain the debug logs
- Change the secure shell (SSH) port number of the D2D Server

The following diagram displays the process to manage the D2D Server:

### How to Manage the D2D Server Settings



**Perform the following tasks to manage the D2D Server settings:**

- [Review the Prerequisites to Manage the D2D Server](#) (see page 152)
- [Configure the Job History and Activity Log Retention Settings](#) (see page 152)
- [Configure the Debug Log Retention Settings](#) (see page 153)
- [Configure the UI Timeout Duration](#) (see page 153)
- [Change the SSH Port Number of the D2D Server](#) (see page 154)
- [Manage the Recovery Sets](#) (see page 155)
- [Disable the BOOTPD and TFTP Services](#) (see page 155)
- [Improve the Query Performance for Job History and Activity Log](#) (see page 156)

## Review the Prerequisites to Manage the D2D Server

Consider the following prerequisites before you manage the D2D Server:

- You have the root login credentials to the D2D Server.

## Configure the Job History and Activity Log Retention Settings

You can configure the duration to retain the Job History and Activity Logs. If you want to retain the Activity Logs and Job History for a longer duration, you have to configure the server file.

**Follow these steps:**

1. Log into the D2D Server as a root user.
2. Open the server.cfg file:

```
/opt/CA/d2dserver/configfiles/server.cfg
```

**Note:** If the file is not present, create the server.cfg file.

3. Add the following line in the server.cfg file:

```
job_history_activity_log_keep_day=<number of days>
```

**Example:** To retain the Job History and Activity Log for 30 days, enter the following line:

```
job_history_activity_log_keep_day=30
```

**Note:** By default, the Job History and Activity Logs are retained for 90 days.

The Job History and Activity Log is retained for the specified time.

## Configure the Debug Log Retention Settings

You can configure the duration to retain the debug logs. If you want to retain the debug logs for a longer duration, you have to configure the server file.

**Follow these steps:**

1. Log into the D2D Server as a root user.
2. Open the server.cfg file:

```
/opt/CA/d2dserver/configfiles/server.cfg
```

**Note:** If the file is not present, create the server.cfg file.

3. Add the following line in the server.cfg file:

```
d2d_log_keep_day =<number of days>
```

**Example:** To retain the debug log for 30 days, enter the following line:

```
d2d_log_keep_day =30
```

**Note:** By default, the Debug Logs are retained for 90 days.

The CA ARCserve D2D for Linux debug log is retained for the specified period.

## Configure the UI Timeout Duration

You can configure the webserver configuration file so that you are logged out of the UI when the UI is inactive. After you configure the file, if you do not perform any activity on the UI for the specified duration, you are logged out automatically. You can log in again and resume your activity.

**Follow these steps:**

1. Log into the D2D Server as a root user.
2. Open the server.cfg file from the following location:

```
/opt/CA/d2dserver/configfiles/server.cfg
```

**Note:** If the server.cfg file is not present, create the file.

3. Add the following line in the server.cfg file:

```
ui_timeout=<value>
```

The value must be in minutes. The maximum limit for the UI timeout value is 60.

**Example:**

```
ui_timeout=40
```

The example indicates that if the D2D Server does not detect any activity on the UI for 40 minutes, it logs out the user.

4. Refresh the web browser to implement the changes.

The duration for the UI timeout is configured.

## Change the SSH Port Number of the D2D Server

D2D Server uses the default secure shell (SSH) port 22 to connect to the nodes. If you want to change the default port to a different port, you can configure the server.env file to specify the new port.

**Follow these steps:**

1. Log into the D2D Server as a root user.

2. Open the server.env file.

```
/opt/CA/d2dserver/configfiles/server.env
```

**Note:** If the file is not present, create the server.env file.

3. Add the following line in the server.env file and save the file:

```
export D2D_SSH_PORT=new_port_number
```

The new\_port\_number must be a numeric value.

4. Restart the D2D Server.

After you configure the server.env file, all jobs, except the BMR job, use the new port number to connect to the target node. The BMR job uses the default port.

The SSH port number of the D2D Server is successfully changed.

## Manage the Recovery Sets

Managing the recovery sets include deleting the recovery sets. You should manage your recovery sets regularly so that you are aware of the available free space. You can plan the storage of the recovery sets accordingly. There are two ways to manage the recovery sets:

- **Method 1:** Manage using a dedicated Backup storage. In this method the backup storage manages the recovery sets every 15 minutes. You can manage only those backup storages that the D2D Server can access. If you choose source local as the backup destination, you have to share the local folder.
- **Method 2:** Manage using a Backup Job. In this method the backup job manages the recovery sets. The recovery sets are managed after the backup job is over. You can manage the recovery sets that are stored in source local.

### Follow these steps:

1. Log into the D2D Server as a root user.
2. Open the server.cfg file.

```
/opt/CA/d2dserver/configfiles/server.cfg
```

**Note:** If the file is not present, create the server.cfg file.

3. Add the following line in the server.cfg file and save the file:

```
manage_recoveryset_local=0 or 1
```

The value 0 indicates that the file uses Method 1.

The value 1 indicates that the file uses Method 2.

4. Restart the D2D Server.

The recovery sets are managed from the command line of the D2D Server.

## Disable the BOOTPD and TFTP Services

You can disable the BOOTPD and TFTP services if you do not require the PXE BMR function.

### Follow these steps:

1. Log into the D2D Server as a root user.
2. Open the server.env file.

```
/opt/CA/d2dserver/configfiles/server.env
```

3. Update the following parameter in the server.env file and save the file:

```
export D2D_DISABLE_PXE_SERVICE=yes
```

4. Restart the D2D server

```
/opt/CA/d2dserver/bin/d2dserver restart
```

The BOOTPD and TFTP services are successfully disabled.

## Improve the Query Performance for Job History and Activity Log

If you have a larger database file, then querying Job History and Activity Log takes a lot of time. You can improve the query time for Job History and Activity Log using specific switches and get your output in a short time.

### Follow these steps:

1. Log into the D2D Server as a root user.

2. Open the server.cfg file:

```
/opt/CA/d2dserver/configfiles/server.cfg
```

**Note:** If the file is not present, create the server.cfg file.

3. Add the following lines in the server.cfg file:

- To improve Job History query performance, add the following line:

```
skip_getting_job_history_count=true
```

- To improve Activity Log query performance, add the following line:

```
skip_getting_activity_log_count=true
```

4. Save the server.cfg file.

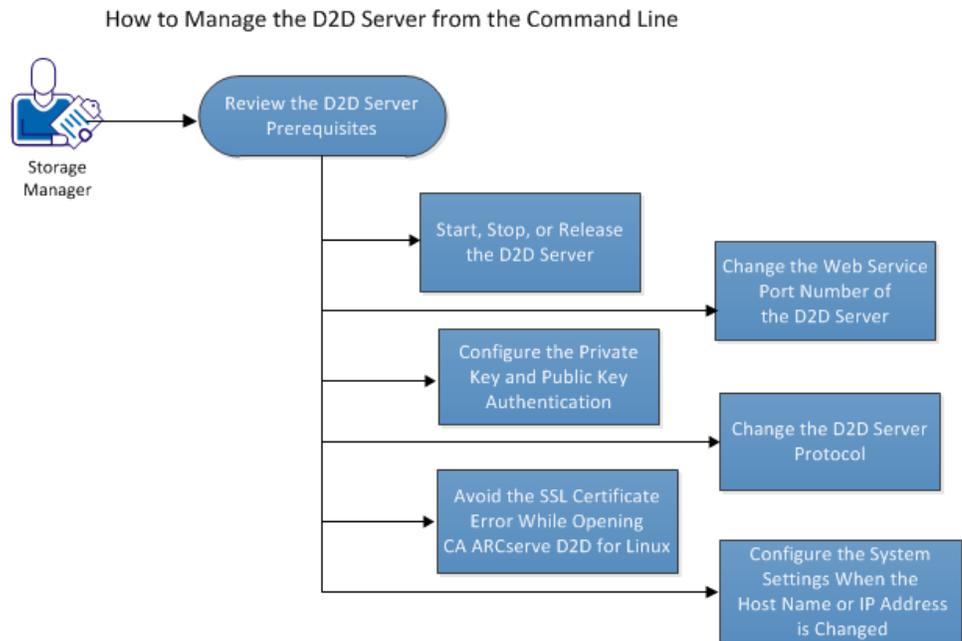
The query time for Job History and Activity Log has been successfully improved.

## How to Manage the D2D Server from the Command Line

The D2D Server performs all the processing tasks of CA ARCserve D2D for Linux. For smooth functioning of CA ARCserve D2D for Linux, you must ensure that the D2D Server is running all the time. You can log into the D2D Server and manage the server using some commands.

For example, if you want to access the web interface of CA ARCserve D2D for Linux, you must ensure that the web server is running. You can verify the running status of the web server from the D2D Server and ensure proper functioning of CA ARCserve D2D for Linux.

The following diagram displays the process to manage the D2D Server from the command line:



Perform the following tasks to manage the D2D Server:

- [Review the D2D Server Prerequisites](#) (see page 157)
- [Start, Stop, or Release the D2D Server](#) (see page 158)
- [Change the Web Service Port Number of the D2D Server](#) (see page 159)
- [Configure the Private Key and Public Key Authentication](#) (see page 159)
- [Change the D2D Server Protocol](#) (see page 161)
- [Avoid the SSL Certificate Error While Opening CA ARCserve D2D for Linux](#) (see page 162)
- [Configure the System Settings When the Host Name or IP Address is Changed](#) (see page 163)

## Review the D2D Server Prerequisites

Consider the following prerequisites before you manage the D2D Server:

- You have the root login credentials to the D2D Server.

## Start, Stop, or Release the D2D Server

Manage your D2D Server to know the running status of the D2D Server. You can verify whether your D2D Server has stopped or is still running and then manage the server accordingly. CA ARCserve D2D for Linux supports the following command-line functions:

- Start the D2D Server
- Stop the D2D Server
- Release the D2D Server

### Follow these steps:

1. Navigate to the bin folder using the following command:

```
# cd/opt/CA/d2dserver/bin
```

You gain access to the bin folder.

2. From the bin folder, run the following commands depending on the task that you want to perform on the server:

**Note:** If any command is not successful, an error message is displayed explaining the reason.

```
# ./d2dserver start
```

Starts the D2D Server.

If you are successful, a message is displayed informing you that the server has started.

```
# ./d2dserver stop
```

Stops the D2D server.

If you are successful, a message is displayed informing you that the server has stopped.

```
# ./d2dserver restart
```

Restarts the D2D server.

If you are successful, a message is displayed informing you that the server has restarted.

```
# ./d2dserver status
```

Displays the status of the D2D server.

```
# /opt/CA/d2dserver/bin/d2dreg --release
```

Releases the remaining D2D Servers that are managed by the main server.

For example, if D2D Server A manages two other servers, D2D Server B and D2D Server C, then when you uninstall D2D Server A you cannot access D2D Server B and D2D Server C. You can release D2D Server B and D2D Server C using this script and can access those servers.

The D2D Server is successfully managed from the command line.

## Change the Web Service Port Number of the D2D Server

CA ARCserve D2D for Linux uses port 8014 by default. If the 8014 port number is used by other application, CA ARCserve D2D for Linux will not function properly. In such situations, you must change the CA ARCserve D2D for Linux default port number to a different port number.

### Follow these steps:

1. Open the server.xml file from the following location:

```
/opt/CA/d2dserver/TOMCAT/conf/server.xml
```

2. Search the following string in the file and change the port number 8014 to your desired port number:

```
<Connector port="8014" protocol="HTTP/1.1" SSLEnabled="true" maxThreads="150"  
scheme="https" secure="true" clientAuth="false" sslProtocol="TLS"  
keystoreFile="{catalina.home}/conf/server.keystore"  
keystorePass="LinuxD2D"/>
```

3. Run the following command to restart the D2D Server:

```
/opt/CA/d2dserver/bin/d2dserver restart
```

The default port number is changed to your desired port number.

## Configure the Private Key and Public Key Authentication

The public key and the private key allow you to securely connect to the nodes when you do not provide the password. Each time the D2D Server creates an SSH connection with the nodes, the D2D Server verifies the public key and private key for the respective nodes. If the keys do not match, you get an error message.

**Note:**

- Only the users having the root permission are supported to use the public key and private key authentication. It is not necessary to have the user name as root. The non-root users are not supported to use the public key and private key authentication. The non-root users must provide the user name and password authentication.
- Public key and private key authentication takes effect when the password is not provided. The username is still required and it must match the owner of the key.

**Follow these steps:**

1. Log into the D2D Server as a root user.
2. Generate a public/private key using the following ssh-keygen command:  

```
ssh-keygen -t rsa -f server
```

Two files are generated, namely server.pub and server.
3. Copy the public key file server.pub to the following location:  

```
/opt/CA/d2dserver/configfiles/server_pub.key
```
4. Copy the private key file server to the following location:  

```
/opt/CA/d2dserver/configfiles/server_pri.key
```
5. (Optional) Run the following command if you have provided the passphrase while generating the private and public keys:  

```
echo "passphrase" | d2dutil --encrypt > /opt/CA/d2dserver/configfiles/key.pass
```
6. Change the permission for the key.pass file using the following command:  

```
chmod 600 /opt/CA/d2dserver/configfiles/key.pass
```
7. Log into the source node.
8. Copy the content from the server\_pub.key file in the D2D Server to the following location in the node:  

```
/root/.ssh/authorized_keys
```

The private key and the public key are successfully configured. You can connect to the source nodes using the public key and private key.

## Change the D2D Server Protocol

CA ARCserve D2D for Linux is installed with the https protocol. You can change your protocol if you do not want to transfer data with encryption. We recommend you to use https because all the data transferred with https are encrypted. The data transferred with http are plaintext.

### Follow these steps:

1. Open the server.xml file from the following location:

```
/opt/CA/d2dserver/TOMCAT/conf/server.xml
```

2. Search the following string in the server.xml file:

```
<!--<Connector connectionTimeout="180000" port="8014" protocol="HTTP/1.1"/>-->
```

3. Remove the <!-- and --> string characters as shown in the following example:

**Example:** The following string is the desired output after removing the <!-- and --> string characters:

```
<Connector connectionTimeout="180000" port="8014" protocol="HTTP/1.1"/>
```

4. Search the following string in the server.xml file:

```
<Connector port="8014" protocol="HTTP/1.1" SSLEnabled="true" maxThreads="150"
scheme="https" secure="true" clientAuth="false" sslProtocol="TLS"
keystoreFile="${catalina.home}/conf/server.keystore"
keystorePass="LinuxD2D"/>
```

5. Add the <!-- and --> string characters as shown in the following example:

**Example:** The following string is the desired output after adding the <!-- and --> string characters:

```
<!--<Connector port="8014" protocol="HTTP/1.1" SSLEnabled="true"
maxThreads="150" scheme="https" secure="true" clientAuth="false"
sslProtocol="TLS" keystoreFile="${catalina.home}/conf/server.keystore"
keystorePass="LinuxD2D"/>-->
```

6. Run the following command to restart the D2D Server:

```
/opt/CA/d2dserver/bin/d2dserver restart
```

The D2D Server protocol is changed from https to http.

## Avoid the SSL Certificate Error While Opening CA ARCserve D2D for Linux

Remove the custom SSL certificate so that you do not get the certificate error when you open the CA ARCserve D2D for Linux web interface. Once you configure the SSL certificate, you do not get the certificate error again.

### Follow these steps:

- Use the certificate generated by CA ARCserve D2D for Linux for the Firefox browser.
  1. Open CA ARCserve D2D for Linux in Firefox.
  2. Click I Understand the Risks and then click Add Exception.  
The Add Security Exception dialog opens.
  3. Click View to review the certificate.  
The Certificate Viewer dialog opens.
  4. Review the certificate details and click Close.  
You do not have to perform any action on the Certificate Viewer dialog.
  5. On the Add Security Exception dialog, select the Permanently store this exception check box.
  6. Click Confirm Security Exception.  
The certificate is added.
- Use the certificate generated by CA ARCserve D2D for Linux for the Internet Explorer (IE) or the Chrome browser.
  1. Open CA ARCserve D2D for Linux in IE or Chrome.
  2. Click Continue to this website (not recommended).  
The address bar is displayed in red and a Certificate Error message is displayed in the security status bar.
  3. Click Certificate Error.  
The Untrusted Certificate dialog appears.
  4. Click View certificates.  
The Certificate dialog opens.
  5. On the General tab, click Install Certificate.  
The Certificate Import Wizard opens.
  6. Click Next.

7. On the Certificate Store page, select Place all certificates in the following store and then click Browse.

The Select Certificate Store dialog opens.

8. Select Trusted Root Certification Authorities and click OK.

The Certificate Store page of the Certificate Import Wizard opens.

9. Click Next and then click Finish.

The Security Warning dialog opens.

10. Click Yes.

11. Restart IE or Chrome.

The certificate is added.

**Note:** After you add the certificate, the Chrome browser still shows the error icon for the SSL certificate in the address bar. This is a reminder that the certificate is not identified by the certificate authorities but the certificate is trusted by Chrome and all the data transferred in the network is encrypted.

- Perform the following steps to use a signed certificate:
  1. Use the certificate signed by a certificate authority.
  2. Import the signed certificate using the keytool command.

The certificate is added.

The ssl certificate error is resolved.

## Configure the System Settings When the Host Name or IP Address is Changed

If you change the host name or the IP address of the D2D Server or the client node (backup node), you have to configure the system settings. You configure the system settings to help ensure the following items:

- To ensure that the communication between the central server and the member server is good. A member server is a D2D Server that you manage from the central D2D Server. To manage the member server from the central server UI, you must add the member server in the central server UI.
- To ensure that after you change the host name or IP address of the client node you can back up the client node without any error

### When the Host Name of the Central D2D Server is Changed

When you change the host name of the central D2D Server, you must configure the server so that you can use CA ARCserve D2D for Linux without any problem.

#### Follow these steps:

1. Log into the central D2D Server as a root user.
2. To update the host name and the license information, enter the following commands:

```
source /opt/CA/d2dserver/bin/setenv

/opt/CA/d2dserver/sbin/sqlite3 /opt/CA/d2dserver/data/ARCserveLinuxD2D.db
"update D2DServer set Name='New_Hostname' where IsLocal=1"

/opt/CA/d2dserver/sbin/sqlite3 /opt/CA/d2dserver/data/License.db "update
LicensedMachine set ServerName='New_Hostname' where ServerName='Old_Hostname' "
```

3. Rename the keystore file:

```
mv /opt/CA/d2dserver/TOMCAT/conf/server.keystore
/opt/CA/d2dserver/TOMCAT/conf/server.keystore.old
```

4. Create a keystore file using the following keytool Java command.

```
keytool -genkey -alias tomcat -keyalg DSA -keypass <YOUR_VALUE> -storepass
<YOUR_VALUE> -keystore /opt/CA/d2dserver/TOMCAT/conf/server.keystore -validity
3600 -dname "CN=<New Hostname>"
```

**Note:** Update the YOUR\_VALUE field according to your requirement. Typically, the value is your password.

#### Example:

```
keytool -genkey -alias tomcat -keyalg DSA -keypass LinuxD2D -storepass LinuxD2D
-keystore /opt/CA/d2dserver/TOMCAT/conf/server.keystore -validity 3600 -dname
"CN=New Hostname"
```

5. Open the server.xml TOMCAT configuration file and change the keystoreFile value and the keystorePass value according to the keystore file that you just created.

```
<Connector port="8014" protocol="HTTP/1.1" SSLEnabled="true" maxThreads="150"
scheme="https" secure="true" clientAuth="false" sslProtocol="TLS"
keystoreFile="${catalina.home}/conf/server.keystore"
keystorePass="YOUR_VALUE"/>
```

#### Example:

```
<Connector port="8014" protocol="HTTP/1.1" SSLEnabled="true" maxThreads="150"
scheme="https" secure="true" clientAuth="false" sslProtocol="TLS"
keystoreFile="${catalina.home}/conf/server.keystore"
keystorePass="LinuxD2D"/>
```

6. Restart the central D2D Server.

```
/opt/CA/d2dserver/bin/d2dserver restart
```

The central D2D Server is configured.

### When the Host Name or IP Address of the Member Server is Changed

When you change the host name or the IP address of the member D2D Server, configure the member server to manage it from the central server. If you do not configure the member server, then you will have an error when you try to manage it from the central server. A member server is a server that you have added to the central D2D Server web interface.

#### Follow these steps:

1. Log into the member D2D Server as a root user:

2. To change the host name, enter the following commands:

```
source /opt/CA/d2dserver/bin/setenv
/opt/CA/d2dserver/sbin/sqlite3 /opt/CA/d2dserver/data/ARCserveLinuxD2D.db
"update D2DServer set Name='New_Hostname' where IsLocal=1"
```

3. Rename the keystore file:

```
mv /opt/CA/d2dserver/TOMCAT/conf/server.keystore
/opt/CA/d2dserver/TOMCAT/conf/server.keystore.old
```

4. Create a keystore file using the following keytool Java command.

```
keytool -genkey -alias tomcat -keyalg DSA -keypass <YOUR_VALUE> -storepass
<YOUR_VALUE> -keystore /opt/CA/d2dserver/TOMCAT/conf/server.keystore -validity
3600 -dname "CN=<New Hostname>"
```

**Note:** Update the YOUR\_VALUE field according to your requirement. Typically, the value is your password.

#### Example:

```
keytool -genkey -alias tomcat -keyalg DSA -keypass LinuxD2D -storepass LinuxD2D
-keystore /opt/CA/d2dserver/TOMCAT/conf/server.keystore -validity 3600 -dname
"CN=New Hostname"
```

5. Open the server.xml TOMCAT configuration file and change the keystoreFile value and the keystorePass value according to the keystore file.

```
<Connector port="8014" protocol="HTTP/1.1" SSLEnabled="true" maxThreads="150"
scheme="https" secure="true" clientAuth="false" sslProtocol="TLS"
keystoreFile="{catalina.home}/conf/server.keystore"
keystorePass="YOUR_VALUE"/>
```

#### Example:

```
<Connector port="8014" protocol="HTTP/1.1" SSLEnabled="true" maxThreads="150"
scheme="https" secure="true" clientAuth="false" sslProtocol="TLS"
keystoreFile="{catalina.home}/conf/server.keystore"
keystorePass="LinuxD2D"/>
```

6. Restart the member D2D Server.

```
/opt/CA/d2dserver/bin/d2dserver restart
```

7. Log into the central CA ARCserve D2D for Linux web interface.
8. From the D2D Servers pane, select the old host name server.
9. From the D2D Server menu, click Delete.
10. In the Delete dialog, click OK.

The old host name server is deleted.

11. From the D2D Server menu, click Add.

The Add Server dialog opens.

12. Enter the new host name details in the dialog and click OK.

The Add Server dialog closes and the member server with the new host name is added to the UI.

13. Log into the central D2D Server that manages the member D2D Server.

14. To update the license information, enter the following commands:

```
source /opt/CA/d2dserver/bin/setenv
```

```
/opt/CA/d2dserver/sbin/sqlite3 /opt/CA/d2dserver/data/License.db "update  
LicensedMachine set ServerName = 'New_Hostname' where ServerName = 'Old_Hostname' "
```

The member D2D Server is configured.

### When the Host Name or the IP Address of the Client Node is Changed

If you change the host name or the IP address of a node, you can configure the host name or the IP address in the system settings so that you can back up that node without any error.

#### Follow these steps:

1. Log into the backup destination.
2. Locate the folder named "**Old\_Hostname**" in the backup destination of this node and rename it to "**New\_Hostname**".

For example, consider the old host name for node1 is First\_Node. The backup destination for node1 is //Backup\_Destination/LinuxBackup. After the first successful backup, a folder named First\_Node is created in //Backup\_Destination/LinuxBackup. Now, you have modified the old host name to Second\_Node. Locate the First\_Node folder in //Backup\_Destination/LinuxBackup and rename the folder to Second\_Node.

3. Log into the D2D server as a root user.
4. To update the host name, enter the following commands:

```
source /opt/CA/d2dserver/bin/setenv
```

```
/opt/CA/d2dserver/bin/d2drp --storagepath=Backup Destination
--node=New_Hostname
```

```
/opt/CA/d2dserver/sbin/sqlite3 /opt/CA/d2dserver/data/ARCserveLinuxD2D.db
"update JobQueue set TargetName='New_Hostname' where JobType in (1,3,4,5) and
TargetName='Old_Hostname' "
```

```
/opt/CA/d2dserver/sbin/sqlite3 /opt/CA/d2dserver/data/ARCserveLinuxD2D.db
"update TargetMachine set Name='New_Hostname' where Name='Old_Hostname' "
```

**Note:** If you use NFS share or CIFS share as the backup destination, you should mount it to Local share.

**Example:** If your mount point is /mnt/backup\_destination.

```
/opt/CA/d2dserver/bin/d2drp --storagepath=<mount point>
--node=New_Hostname
```

**Note:** If you use Local share, then the command is:

```
/opt/CA/d2dserver/bin/d2drp --storagepath=<local path> --node=New_Hostname
```

5. Log into the central D2D Server as a root user.
6. To update the license information, enter the following command:

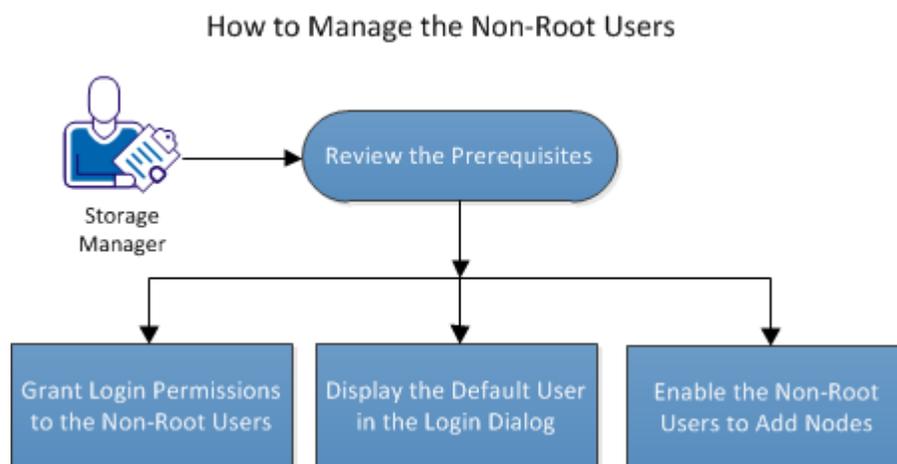
```
/opt/CA/d2dserver/sbin/sqlite3 /opt/CA/d2dserver/data/License.db "update
LicensedMachine set MachineName ='New_Hostname' where MachineName
='Old_Hostname' "
```

The host name is configured to perform a backup without any error.

## How to Manage the Non-Root Users

You can manage all your non-root users that access CA ARCserve D2D for Linux and can define the permissions for the non-root users to limit the access level for CA ARCserve D2D for Linux. You can manage the non-root users by modifying the webserver configuration file (server.cfg file).

The following diagram displays the process to manage the non-root users:



Perform these tasks to manage the non-root users:

- [Grant Login Permissions to the Non-Root Users](#) (see page 168)
- [Display the Default User in the Login Dialog](#) (see page 169)
- [Enable the Non-Root Users to Add Nodes](#) (see page 170)

## Grant Login Permissions to the Non-Root Users

A root user can grant permissions to non-root users to log into the D2D Server. If non-root users get the permission to log into the D2D Server, they can use CA ARCserve D2D for Linux to perform all the data protection and recovery tasks.

**Note:** To grant login permissions to the non-root users, connect to the D2D Server as a root user using the SSH connection.

**Follow these steps:**

1. Log into the D2D Server as a root user.
2. Open the server.cfg file from the following location:

/opt/CA/d2dserver/configfiles/server.cfg

**Note:** If the server.cfg file is not present, create the file.

3. Add the following code to the server.cfg file:

```
allow_login_users=user1 user2
```

**Note:** Use blank spaces to distinguish multiple users.

The code is added.

4. Verify the non-root user can connect to the D2D Server using the SSH connection.

The login permission is granted to the non-users to access the D2D Server.

## Display the Default User in the Login Dialog

You can manage your users and change the name that is displayed in the login dialog of CA ARCserve D2D for Linux. The default user that is displayed in the login dialog is root. If you do not have root users accessing the product, you can change the default name to any non-root user name. You achieve this by modifying the server.cfg that is located in the D2D Server.

**Note:** To modify the server.cfg file, connect to the D2D Server as a root user using the SSH connection.

### Follow these steps:

1. Log into the D2D Server as a root user.

2. Open the server.cfg file from the following location:

```
/opt/CA/d2dserver/configfiles/server.cfg
```

**Note:** If the server.cfg file is not present, create the file.

3. Add the following code to the server.cfg file:

```
show_default_user_when_login=false|true
```

4. Open a web browser and enter the URL of CA ARCserve D2D for Linux.

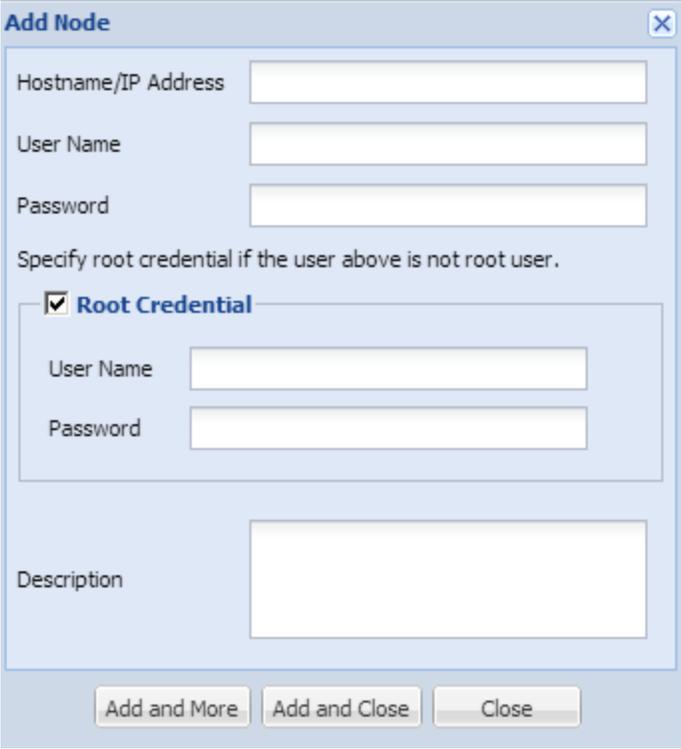
- If you have added the *allow\_login\_users* command, the login dialog displays the first user added in the *allow\_login\_users* command.
- If you have not added the *allow\_login\_users* command, the login dialog displays the root user.

The default user is displayed in the login dialog of CA ARCserve D2D for Linux.

## Enable the Non-Root Users to Add Nodes

If the SSH Server disables the root user login, you can enable the non-root user login to add any nodes. When you enable the non-root user login credentials, the Add Node dialog changes and displays the Root Credential option.

**Note:** If you change the client node credential from a root user to a non-root user, it is recommended that you clear the `/tmp` folder on the client node before you run the backup job.



**Follow these steps:**

1. Log into the D2D Server as a root user.
2. Open the `server.cfg` file from the following location:  
`/opt/CA/d2dserver/configfiles/server.cfg`  
**Note:** If the `server.cfg` file is not present, create the file.
3. Add the following line in the `server.cfg` file to enable the non-root user function:  
`enable_non_root_user=true`  
The non-root user function is enabled.

4. (Optional) Add the following line in the `server.cfg` file to disable the non-root user function:

```
enable_non_root_user=false
```

The non-root user function is disabled.

The non-root users are enabled to add nodes.

**Note:** If you change the password for the root user or the non-root user and then you modify the node, you must reenter both the root password and the non-root password in their respective fields in the Modify Node dialog.

**Note:** The non-root users cannot manage nodes using the `d2dnode` command from the command line.



# Chapter 5: Troubleshooting

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This section contains the following topics:

[CA ARCserve D2D for Linux Fails to Install on Supported Servers](#) (see page 173)

[CA ARCserve D2D for Linux Displays an Operation Timeout Error](#) (see page 174)

[All Scheduled Jobs Fail When the System Time Is Changed to an Already Passed Value](#) (see page 175)

[CA ARCserve D2D for Linux Fails to Mount Linux Software RAID Devices](#) (see page 176)

[A Paravirtual Machine \(PVM\) Displays a Black Screen on the Virtual Network Computing \(VNC\) Client Window When Booted Using a Live CD](#) (see page 176)

[How to Adjust the Disk Boot Sequence After a BMR Job on an Oracle VM Server](#) (see page 177)

[The Backup Job Fails to Collect the BMR-related Information or the BMR Job Fails to Create a Disk Layout](#) (see page 179)

[Backup Read Throughput is Less When the Backup Node is RHEL, CentOS, or Oracle Linux 5.x On a Xen- based PVM](#) (see page 179)

[How to Restore the Previous Version of D2D Server](#) (see page 180)

[SLES 10.X Does Not Start Successfully After a BMR](#) (see page 181)

[The d2drestorevm and d2dverify Jobs Fail on Oracle VM Server](#) (see page 182)

## CA ARCserve D2D for Linux Fails to Install on Supported Servers

**Valid on CentOS 6.x, Red Hat Enterprise Linux (RHEL) 6.x, SUSE Linux Enterprise Server (SLES) 11.x, and Oracle Linux Server 6.x**

### Symptom

When I install CA ARCserve D2D for Linux, the installation fails with the following Linux warning messages:

mkisofs                    Create Live CD image

mount.nfs                    Mount NFS share file system as backup destination and restore source

mount.cifs                    Mount CIFS share file system as backup destination and restore source

The following processes must be running

Inactive Processes                    Affected Function

rpc.statd                    The NFS file locking function does not work

### Solution

At the beginning of the installation, CA ARCserve D2D for Linux verifies if the Linux OS meets the requirement of the D2D Server. If the Linux OS does not meet the minimum requirements, CA ARCserve D2D for Linux displays a warning message to inform you of this problem. The message includes the list of all the packages that are required for D2D Server.

**To troubleshoot this CA ARCserve D2D for Linux installation problem, perform the following steps:**

1. Install the following packages using the *yum* command:
  - genisoimage
  - nfs-utils
  - cifs-utils
2. Run the following two commands:

```
service rpcbind start
service nfs start
```
3. Run the following command to verify if *rpc.statd* is running:

```
ps -ef|grep rpc.statd
```
4. Reinstall CA ARCserve D2D for Linux.

CA ARCserve D2D for Linux is successfully installed.

### CA ARCserve D2D for Linux Displays an Operation Timeout Error

**Valid on CentOS 6.x, Red Hat Enterprise Linux (RHEL) 6.x, SUSE Linux Enterprise Server (SLES) 11.x, and Oracle Linux Server 6.x**

#### Symptom

I get the following error message:

**The operation has timed out. The maximum amount of time to complete the operation has been exceeded. Please try again later.**

I get this message frequently when I perform a file-level restore and browse recovery points that have more than 1000 incremental recovery points.

### **Solution**

The default timeout value is 3 minutes. You can troubleshoot the problem by increasing the timeout value.

#### **Perform the following steps to increase the timeout value:**

1. Log into the D2D Server as a root-user.
2. Add the following system environment variable:

```
D2D_WEBSVR_TIMEOUT
```

The value for the environment variable is a number. The number must be greater than 3. The unit for the value is minute.

3. Restart the D2D server.

The timeout value is successfully increased.

## All Scheduled Jobs Fail When the System Time Is Changed to an Already Passed Value

**Valid on CentOS 6.x, Red Hat Enterprise Linux (RHEL) 6.x, SUSE Linux Enterprise Server (SLES) 11.x, and Oracle Linux Server 6.x**

### **Symptom**

When I change the system time to an already passed value, all my scheduled jobs are affected. The scheduled jobs fail to run after I change the system time to a previous time.

### **Solution**

After you change the system time, restart the D2D service.

#### **Follow these steps to restart the D2D service:**

1. Log into the D2D Server as a root user.
  2. Navigate to the bin folder
- ```
/opt/CA/d2dserver/bin/
```
3. Restart the D2D server using the following command:

```
d2dserver restart
```

The D2D Server restarts.

All the scheduled jobs run per schedule.

## CA ARCserve D2D for Linux Fails to Mount Linux Software RAID Devices

**Valid on CentOS 6.x, Red Hat Enterprise Linux (RHEL) 6.x, SUSE Linux Enterprise Server (SLES) 11.x, and Oracle Linux Server 6.x**

### Symptom

Sometimes the BMR process fails to mount Linux Software RAID devices after the target machine restarts.

### Solution

To solve this problem, restart your target machine.

## A Paravirtual Machine (PVM) Displays a Black Screen on the Virtual Network Computing (VNC) Client Window When Booted Using a Live CD

**Valid on PVM on Oracle VM Server**

### Symptom

On an Oracle VM Server, when I boot the Paravirtual Machine (PVM) using a Live CD, I see a black screen on the VNC client window.

### Solution

To resolve this issue, log into the Live CD console from the backend.

### Follow these steps:

1. Start the VM using a Live CD.
2. Make a note of the VM's ID that you can access from the Oracle VM Manager.



The screenshot shows the configuration page for a Paravirtual Machine (PVM) in Oracle VM Manager. The page has three tabs: Configuration, Networks, and Disks. The Configuration tab is active, displaying various settings for the VM named 'oe15.8\_pvm\_from\_iso'. The VM is currently in a 'Running' state. The operating system is 'Oracle Linux 5'. The VM has 1 processor and 1024 MB of memory. The domain ID is 12. The VM's ID is highlighted in red: 0004fb00000600008ee4bf4b1cd980ec. The start policy is 'Start on best server' and high availability is disabled.

| Property          | Value                                   | Property           | Value                |
|-------------------|-----------------------------------------|--------------------|----------------------|
| Name:             | oe15.8_pvm_from_iso                     | Memory (MB):       | 1024                 |
| Status:           | Running                                 | Processor Cap:     | 100                  |
| Operating System: | Oracle Linux 5                          | Priority:          | 50                   |
| Keymap:           | en-us                                   | Mouse Type:        | Default              |
| Max. Processors:  | 1                                       | Domain Type:       | Xen PVM              |
| Processors:       | 1                                       | Start Policy:      | Start on best server |
| Max. Memory (MB): | 1024                                    | High Availability: | No                   |
| ID:               | <u>0004fb00000600008ee4bf4b1cd980ec</u> |                    |                      |
| Domain ID:        | 12                                      |                    |                      |
| Origin:           |                                         |                    |                      |
| Description:      |                                         |                    |                      |

3. Log into the Oracle VM Server on which the VM is running using the Secure Shell (ssh).
4. Run the `xm console $ID` command as shown in the following diagram:

```
[root@ ~]# xm console 0004fb00000600008ee4bf4b1cd980ec
```

5. (Optional) Press Enter when prompted to confirm the operation.
6. The console of the Xen PVM booted with the Live CD opens.
7. Configure the network.
8. Exit the console by pressing `ctrl+]` or `ctrl+5`.

The issue is resolved.

## How to Adjust the Disk Boot Sequence After a BMR Job on an Oracle VM Server

### Valid on Oracle VM Server

#### Symptom

When I perform a BMR job to a target node on an Oracle VM Server, I get the following warning message in the Activity log:

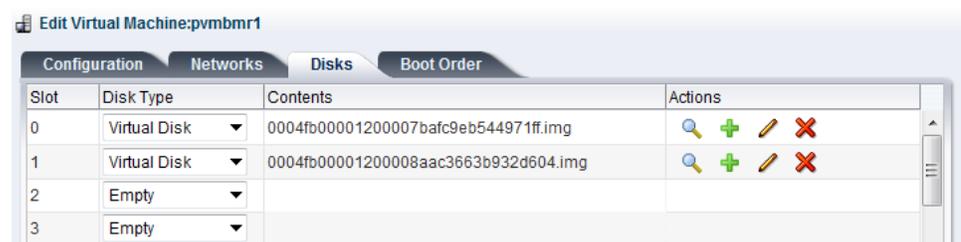
The boot volume is restored to disk `/dev/xxx`. Please adjust the disk boot sequence in the BIOS to boot from `/dev/xxx`.

#### Solution

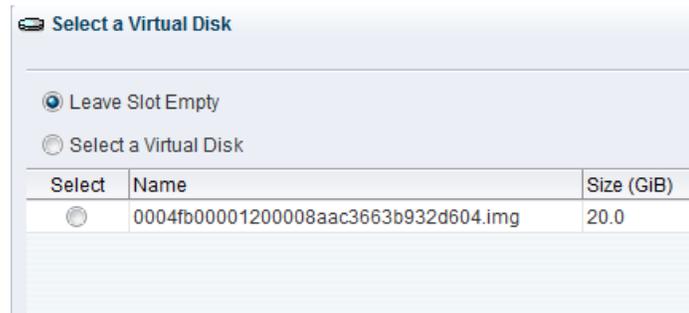
To avoid this problem, swap the disk boot sequence of the BMR target node.

#### Follow these steps:

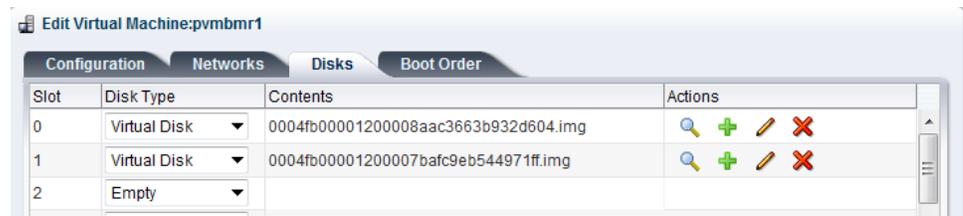
1. Edit the BMR target node from the Oracle VM Manager and click the Disks tab.



2. Select Slot N disk as the Boot Disk.
3. Make a note of the disk name and the slot number N.  
You will use the disk name and the slot number in the later steps.
4. From the Actions column, select the Virtual Machine Disk button.
5. Select the Leave Slot Empty option and click Save.



6. Select Slot 0 Disk and make a note of the disk name.
7. From the Actions column, select the Virtual Machine Disk button.
8. Select the Leave Slot Empty option and click Save.
9. Attach the selected boot disk image to Slot 0 and the original Slot 0 Disk image to Slot N.



10. Boot the BMR target node.

The disk boot sequence is successfully adjusted.

## The Backup Job Fails to Collect the BMR-related Information or the BMR Job Fails to Create a Disk Layout

### Valid on Oracle VM Server for HVM with LVM volume

#### Symptom

When I perform a backup job for an HVM with LVM volumes on an Oracle VM Server, the backup job fails to collect the BMR-related information. Also, when I perform a BMR job for an HVM with LVM volumes on an Oracle VM Server, the BMR job fails to create the disk layout.

#### Solution

To resolve this issue, disable the PV drivers for the backup source node.

#### Follow these steps:

1. Open the Command Prompt window on the backup source node and enter the following command:

```
sfdisk -s
```

2. Verify if the same disk is displayed twice in the result.

For example, xvdX and hdX are the same disk. Verify if both these disks are shown in the result.

3. If yes, then perform the following steps:
  - a. Add the following line to the `/etc/modprobe.d/blacklist` file on the backup source node:

```
blacklist xen_vbd
```

- b. Restart the backup source node and rerun the backup job.

The backup job runs.

4. If no, then contact the CA Support team.

The issue is resolved.

## Backup Read Throughput is Less When the Backup Node is RHEL, CentOS, or Oracle Linux 5.x On a Xen- based PVM

### Valid on Red Hat Enterprise Linux (RHEL), CentOS, SUSE Linux Enterprise Server (SLES) 11.x, and Oracle Linux Server 6.x on a Xen-based PVM

#### Symptom

When I back up an RHEL, CentOS, SLES, Oracle Linux 6.x server on a Xen-based PVM, the backup read throughput value is less.

### **Solution**

To resolve this issue, configure the disk input/output (I/O) scheduler of the VM.

#### **Follow these steps:**

1. Open the Command Prompt window on the backup source node.
2. Run the following command to identify the number of disks the VM has:  

```
ls /dev/xvd*
```
3. Run the following command to identify the I/O scheduler algorithm of the disks:  

```
cat /sys/block/xvda/queue/scheduler
```

The following result is displayed on the VM:

```
[noop] anticipatory deadline cfq
```
4. Run the following command to change the I/O scheduler to cfq:  

```
echo "cfq" > /sys/block/xvda/queue/scheduler
```
5. Verify the I/O scheduler again.  

The following result is displayed on the VM:

```
noop anticipatory deadline [cfq]
```
6. Change the I/O scheduler for every disk.
7. Rerun the backup job.

The backup job runs with an optimum backup read throughput.

## How to Restore the Previous Version of D2D Server

### **Valid on Red Hat Enterprise Linux (RHEL) 6.x and CentOS 6.x for D2D Server**

#### **Symptom**

I tried to upgrade the D2D Server but there was an error during the upgrade. The D2D Server is not working as expected. Now I want to restore the previous version of the D2D Server.

#### **Solution**

When you upgrade to a new release, the D2D Server creates a backup folder that contains all the old configuration files and database files from the previously installed version. The folder is located at the following location:

```
/opt/CA/d2dserver.bak
```

**Follow these steps:**

1. Uninstall the existing D2D Server using the following command:  

```
/opt/CA/d2dserver/bin/d2duninstall
```
2. Install the previously installed version of the D2D Server.
3. Stop the D2D Server using the following command:  

```
/opt/CA/d2dserver/bin/d2dserver stop
```
4. Copy the old configuration files and database files to the d2dserver folder using the following command:  

```
cp -Rpf /opt/CA/d2dserver.bak/* /opt/CA/d2dserver/
```
5. Start the D2D Server using the following command:  

```
/opt/CA/d2dserver/bin/d2dserver start
```

The previously installed version of the D2D Server is successfully restored.

## SLES 10.X Does Not Start Successfully After a BMR

**Valid on SUSE Linux Enterprise Server (SLES) 10.X for BMR on old target machines****Symptom:**

When I perform a BMR using SLES 10.x recovery points to an old target machine, the BMR is successful but the target machine does not start successfully. Also, when I have recovery points from an SLES 10.x old source machine and I try to perform a BMR, the BMR is successful but the target machine does not start successfully.

In both the cases, I get the following error message:

```
No operating system
```

**Solution:**

Modify the boot disk MBR in a Live CD environment and restart the target machine.

**Follow these steps:**

1. Log into the target machine using a Live CD and locate the boot disk  
**Example:** `/dev/sda`
2. Run the following command:  

```
echo -en "\x90\x90" | dd of=/dev/sda seek=156 bs=1
```
3. Restart the target machine and verify if the target machine restarts successfully.

The SLES 10.x target machine successfully starts after a BMR.

## The d2drestorevm and d2dverify Jobs Fail on Oracle VM Server

### **Valid on Oracle VM Server**

#### **Symptom**

When I start d2drestorevm and d2dverify jobs on an Oracle VM Server, all jobs fail. I get the following error message in the Activity Log:

```
Failed to import the ISO image to the hypervisor. Check the hypervisor management console or the debug log for more detailed information.
```

#### **Solution**

Verify if the Oracle VM Server has hung.

#### **Follow these steps:**

1. Log into the Oracle VM Server console and navigate to the Jobs tab.
2. Find all jobs which are in progress status, then abort these jobs.
3. Start the d2drestorevm or d2dverify job again.

If the d2drestorevm or d2dverify job fails again and displays the same error message, log into the Oracle VM Server console and verify if there are any jobs that display the status as In Progress. If there are jobs that display the In Progress status, restart that Oracle VM Server.

The d2drestorevm and d2dverify jobs run successfully.