Quest

Quest® NetVault® Bare Metal Recovery 14.0

User's Guide

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Legend

WARNING: A WARNING icon indicates a potential for property damage, personal injury, or death.

CAUTION: A CAUTION icon indicates potential damage to hardware or loss of data if instructions are not followed.

IMPORTANT NOTE, **NOTE**, **TIP**, **MOBILE**, or **VIDEO:** An information icon indicates supporting information.

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1

Introducing NetVault Bare Metal Recovery Plug-ins

- NetVault Bare Metal Recovery Plug-ins: at a glance
- Key benefits
- Feature summary
- Target audience
- Recommended additional reading

NetVault Bare Metal Recovery Plug-ins: at a glance

Quest® NetVault® Bare Metal Recovery Plug-ins reduce the time required to recover a failed disk drive and restore operations. Online full-partition backups and offline block-level backups can be scheduled as an extension to your existing backup routine. If a server fails, you can use the provided minimal operating system (OS) to recover a system that has no functioning OS. After it is in a state to be restored, the Quest NetVault (NetVault) web-based user interface (WebUI) is used to restore the most recent system image. NetVault Bare Metal Recovery improves your ability to meet Recovery Time Objectives (RTOs) and service-level agreements (SLAs) by eliminating much of the manual intervention and guesswork commonly associated with the task of rebuilding a disk. By automating system recovery—including recovery of operating systems, network settings, system settings, applications, disk partitions, and data—NetVault Bare Metal Recovery ensures that the disk rebuild is completed correctly.

Key benefits

- **Speeds bare metal recovery to minimize downtime**: A typical bare metal recovery can consume an entire day. Using NetVault Bare Metal Recovery, you can reduce the task of rebuilding a disk to a few hours—minimizing downtime and improving user productivity. NetVault Bare Metal Recovery provides protection for operating systems, network settings, systems settings, application binaries, disk partitions, and data. Providing protection down to the partition level, NetVault Bare Metal Recovery lets you choose between online backups, allowing a protected system to remain online and available to your users and offline block-level backups. Using the Plug-in *Offline Client* minimal OS that is provided, NetVault Bare Metal Recovery lets you recover a system that has no functional OS. NetVault Bare Metal Recovery substantially reduces the time consuming manual steps typically required to rebuild the disk and restore operations and enables you to meet aggressive RTOs.
- **Reduces risk by reducing manual intervention**: One problem inherent to bare metal recoveries is the amount of information required to ensure success on the first attempt. A typical manual bare metal recovery may include sixteen or more steps, with each requiring input of values that must be correct to minimize the effect on users. By providing protection down to the partition level during regularly scheduled online or offline backups, NetVault Bare Metal Recovery manages these steps for you, eliminates guesswork, and keeps you current with changes and modified server configurations.

- **Ensures business continuity**: NetVault Bare Metal Recovery provides an added level of protection to ensure business continuity. NetVault Bare Metal Recovery takes advantage of NetVault's integration with a range of backup devices. NetVault Bare Metal Recovery gives you the confidence that your critical system settings are captured regularly and stored offsite for disaster-recovery purposes. When combined with Quest NetVault Plug-ins, NetVault Bare Metal Recovery ensures a comprehensive data-protection strategy.

Feature summary

- Online full partition backups
- Offline block-level backups
- Windows Volume Shadow Copy Service (VSS)-based backups
- Protect boot and system Images on Linux platforms
- Recover machines with no functional OS
- Boot from provided minimal OS to initiate recovery

Target audience

System administration experience is recommended when using the **Plug-in *Offline Client*** or the **Plug-in *Live Client***. Although it is not necessary to have this level of experience to perform routine backups, the initial configuration of each plug-in, the configuration of a target NetVault Bare Metal Recovery Client, and the restore procedure require administrator knowledge.

Recommended additional reading

The following documentation is also available:

- *Quest NetVault Installation Guide:* This guide provides details on installing the NetVault Server and Client software.
- *Quest NetVault Administrator's Guide:* This guide explains how to use NetVault and describes the functionality common to all plug-ins.

You can download these guides from https://support.quest.com/technical-documents/.

2

Deploying NetVault Bare Metal Recovery

- NetVault Bare Metal Recovery components
- NetVault Bare Metal Recovery deployment scenarios

NetVault Bare Metal Recovery components

NetVault Bare Metal Recovery includes two key components, or plug-ins, each of which provides its own form of disaster recovery (DR) backup, and a third component that serves as a basic OS that is used to prepare a target NetVault Bare Metal Recovery Client for backup and restore.

NetVault Bare Metal Recovery includes the following technical components:

- **Plug-in *Offline Client* for x86/x86-64 Clients**
- **Plug-in *Live Client* for Windows**
- **Plug-in *Live Client* for Linux**
- **Plug-in *Server***

The topics that follow provide a brief description of each of these components.

Plug-in *Offline Client* component

The Plug-in *Offline Client* implements a block-by-block backup and restore technique to recover a system. This operation takes the target system offline and makes it unavailable. This step is done to either:

- **Backup**: An ***Offline Backup*** backs up all aspects of a target system—OS, applications, system settings. This step is ideal for new systems that have been configured for use.
- **Restore**: An ***Offline Restore*** recovers a machine that has no functional OS to a previously configured state.

Plug-in *Live Client* for Windows component

The Plug-in *Live Client* for Windows makes it possible to back up a full Windows system ***while it remains online and active***. When recovery is required, the Plug-in *Offline Client* is used to boot the target NetVault Bare Metal Recovery Client and recover data; that is, an Offline Restore is required.

Plug-in *Live Client* for Linux component

The Plug-in Live Client for Linux has two distinct variants. Each requires a specific bootable media to be used based on the version of the plugin data taken during backup. These variants make it possible to back up a full Linux system ***while it remains online and active***.

- Linux Live plugin version 12.x and 14.x: Versions 12.x and 14.x of the Linux Live Client plugin uses the Storix, a third-party DR boot utility, to boot the target NetVault Bare Metal Recovery Client and recover data which generates an ISO image to boot from upon recovery and are backward compatible and functionally inter-operable.
- Linux Live plugin version 13.x: Linux Live Client plugin Version 13.x uses the native VaultOS for the bootable image during recovery and is not inter-operable with versions 12.x or 14.x of the Live Client Backups.

Please refer to the appropriate User Guide version for the plugin features as well as the plugin Compatibility Guide for more details.

Plug-in *Server* component

The Plug-in *Server* resides on the NetVault Server and enables backup and recovery of a target client's data by using the Plug-in *Offline Client* or the Plug-in *Live Client*.

VaultOS component

The Plug-in *Offline Client* includes a component known as VaultOS. VaultOS is a minimal OS that is used to boot a target DR client system to prepare it for backup or restore, depending on the plug-in in use. This minimal OS starts the target client, loads all applicable device drivers, and leaves its hard drive in a state suitable for either backup or restore.

There are two versions of the VaultOS, one that uses a Linux boot loader and one that uses a Windows Preinstallation Environment (Windows PE). The version that you choose to use also affects which Plug-in *Offline Client* features are available to use.

Important notes regarding the VaultOS component

Review the following list of important notes regarding VaultOS. The things that you should be aware of varies depending on whether you are using the Linux-based VaultOS or the Windows PE-based VaultOS.

- Each version of the Plug-in *Offline Client* and Plug-in *Live Client* offers a specific form of the VaultOS. Details on the setup and use of this component are covered in the relevant topic of this guide.
- Physical-to-virtual (P2V) restores and restores to dissimilar hardware are only supported using the Windows PE-based Plug-in *Offline Client*.

NetVault Bare Metal Recovery deployment scenarios

This topic details deployment scenarios for the following NetVault Bare Metal Recovery products.

- Plug-in Offline Client only x86/x86-64 clients with Windows-based NetVault Server deployment
- Plug-in Offline Client only x86/x86-64 Clients with Linux-based NetVault Server deployment
- Plug-in Live Client for Windows with Windows-based NetVault Server deployment

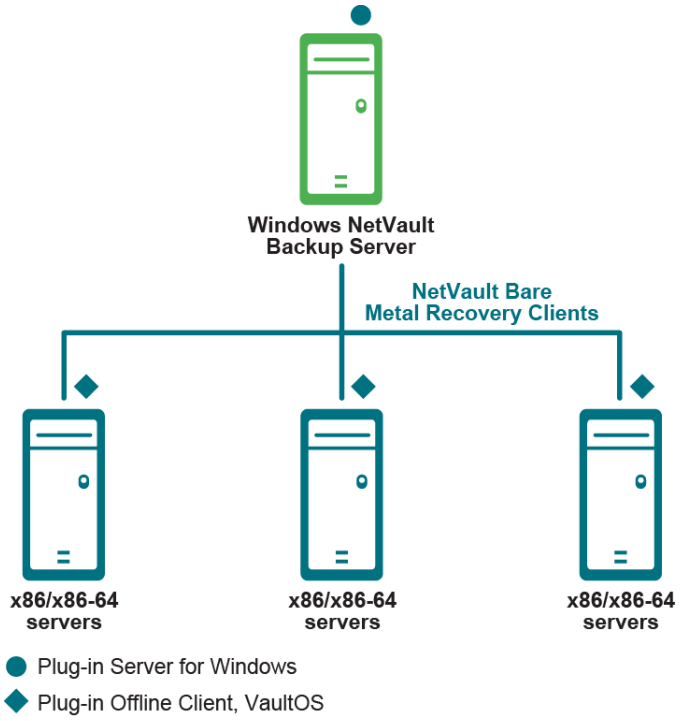
- Plug-in Live Client for Windows with Linux-based NetVault Server deployment
- Plug-in Live Client for Linux with Linux-based NetVault Server deployment
- Plug-in Live Client for Linux with Windows-based NetVault Server deployment
- Plug-in Live Client for Windows and for Linux with Linux-based NetVault Server deployment
- Plug-in Live Client for Windows and for Linux with Windows-based NetVault Server deployment

Plug-in *Offline Client* only x86/x86-64 clients with Windows-based NetVault Server deployment

This scenario is deployed when you want to perform offline or cold backups of Intel x86 Clients and you have deployed a Windows-based NetVault Server.

The Plug-in *Server* for Windows component is installed on the Windows-based NetVault Server, and the Plug-in *Offline Client* is used to perform the backup and recovery of the Intel x86 Clients.

Figure 1. NetVault Bare Metal Recovery for offline only x86/x86-64 clients with Windows-based server



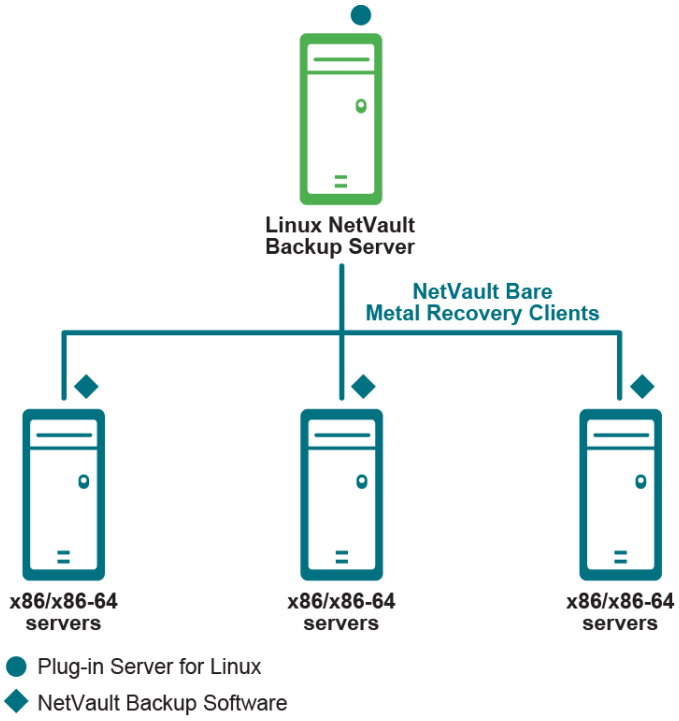
For more information, see Using the Plug-in *Offline Client*.

Plug-in *Offline Client* only x86/x86-64 Clients with Linux-based NetVault Server deployment

This scenario is deployed when you want to perform offline or cold backups of Intel x86 Clients and you have deployed a Linux-based NetVault Server.

The Plug-in *Server* for Linux component is installed on the Linux NetVault Server, and the Plug-in *Offline Client* is used to perform the backup and recovery of the Intel x86 Clients.

Figure 2. NetVault Bare Metal Recovery for offline only x86/x86-64 clients with Linux-based server



For more information, see Using the Plug-in *Offline Client*.

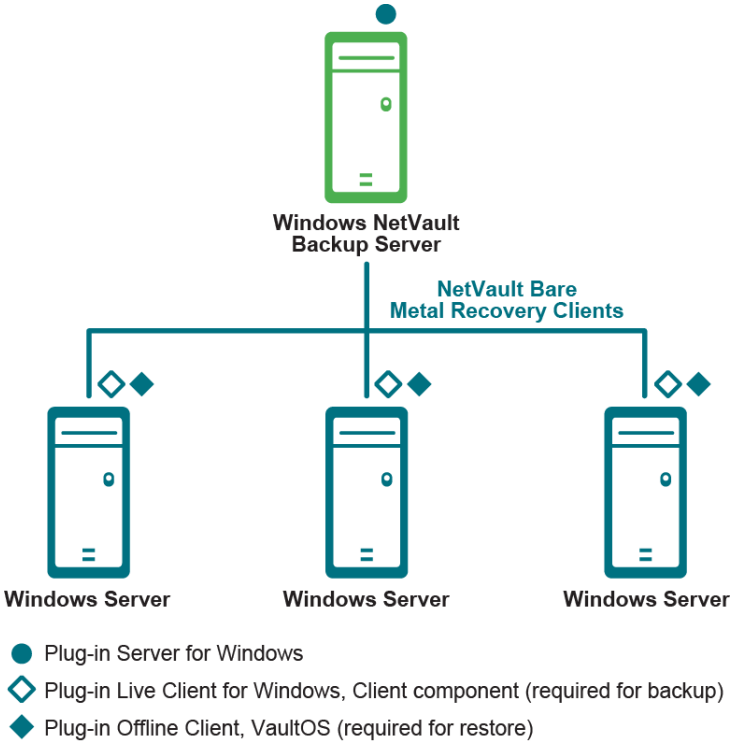
Plug-in *Live Client* for Windows with Windows-based NetVault Server deployment

This scenario is deployed when you want to perform online or hot backups of Windows Clients and you have deployed a Windows-based NetVault Server.

The Plug-in *Server* for Windows component is installed on the Windows-based NetVault Server. The Plug-in *Live Client* for Windows is installed on each Windows Client that you want to protect with online or hot backups.

In this scenario, Plug-in *Offline Client* is used to perform the recovery of the Windows Clients.

Figure 3. NetVault Bare Metal Recovery Client for Windows with Windows-based server



For more information, see Using NetVault Bare Metal Recovery Plug-in *Live Client for Windows*.

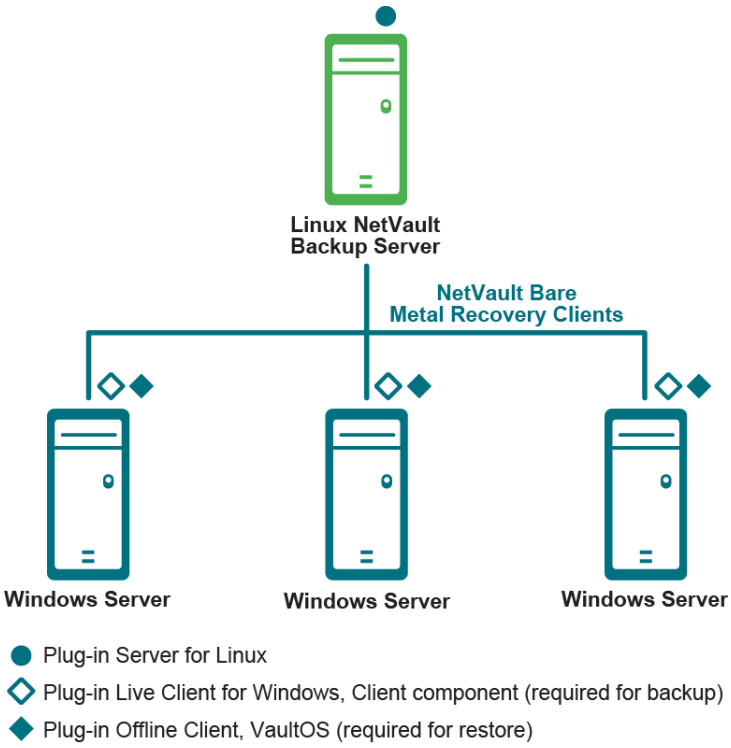
Plug-in *Live Client* for Windows with Linux-based NetVault Server deployment

This scenario is deployed when you want to perform online or hot backups of Windows Clients and you have deployed a Linux-based NetVault Server.

The Plug-in *Server* for Linux component is installed on the Linux-based NetVault Server and the Plug-in *Live Client* for Windows is installed on each Windows Client that you want to protect with online or hot backups.

In this scenario, Plug-in *Offline Client* is used to perform the recovery of the Windows Clients.

Figure 4. NetVault Bare Metal Recovery Client for Windows with Linux-based server



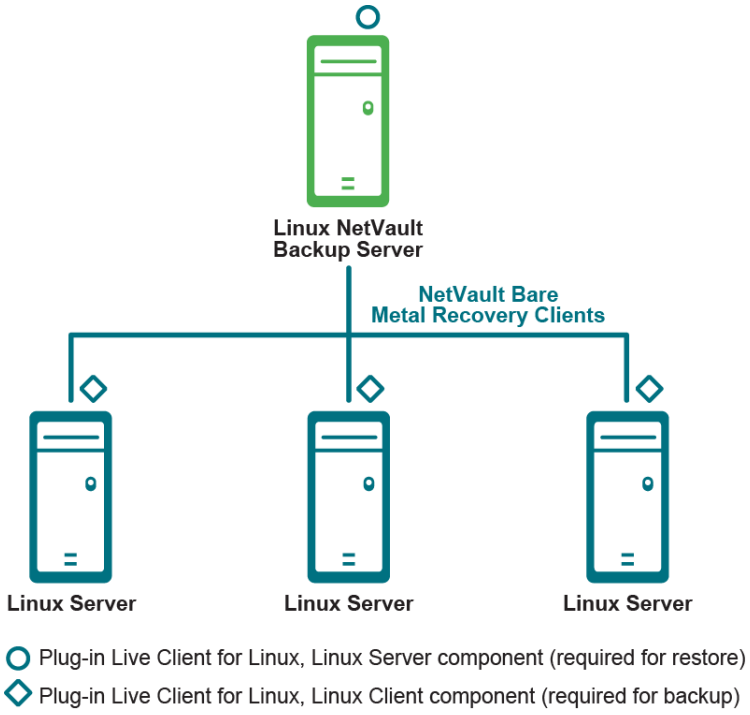
For more information, see Using NetVault Bare Metal Recovery Plug-in *Live Client for Windows*.

Plug-in *Live Client* for Linux with Linux-based NetVault Server deployment

This scenario is deployed when you want to perform online or hot backups of Linux Clients and you have deployed a Linux-based NetVault Server.

The Plug-in *Server* for Linux component is installed on the Linux-based NetVault Server. The Plug-in *Live Client* for Linux, Linux Client Component is installed on each Linux Client that you want to protect with online or hot backups.

Figure 5. NetVault Bare Metal Recovery Client for Linux with Linux Server



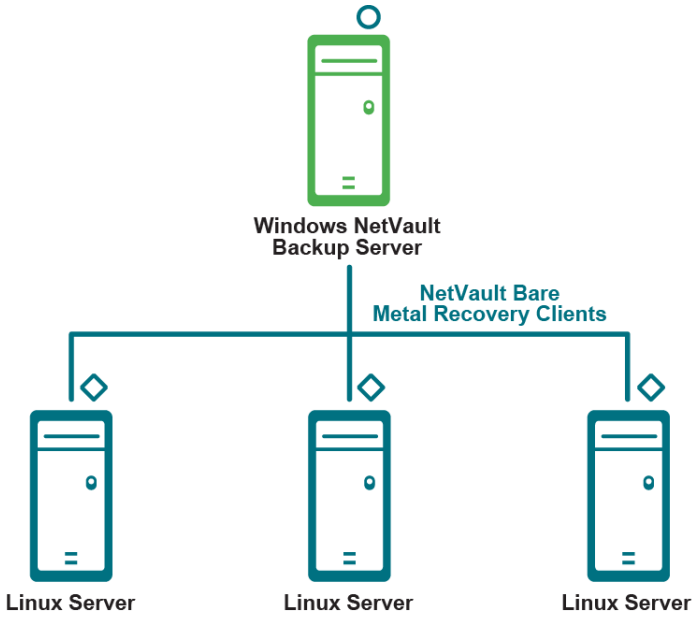
For more information, see Using NetVault Bare Metal Recovery Plug-in *Live Client for Linux*.

Plug-in *Live Client* for Linux with Windows-based NetVault Server deployment

This scenario is deployed when you want to perform online or hot backups of Linux Clients and you have deployed a Windows-based NetVault Server.

The component is installed on the Windows-based NetVault Server and the Plug-in *Live Client* for Linux, Linux Client Component is installed on each Linux Client that you want to protect with online or hot backups.

Figure 6. NetVault Bare Metal Recovery Client for Linux with Windows-based server



For more information, see Using NetVault Bare Metal Recovery Plug-in *Live Client for Linux*.

Plug-in *Live Client* for Windows and for Linux with Linux-based NetVault Server deployment

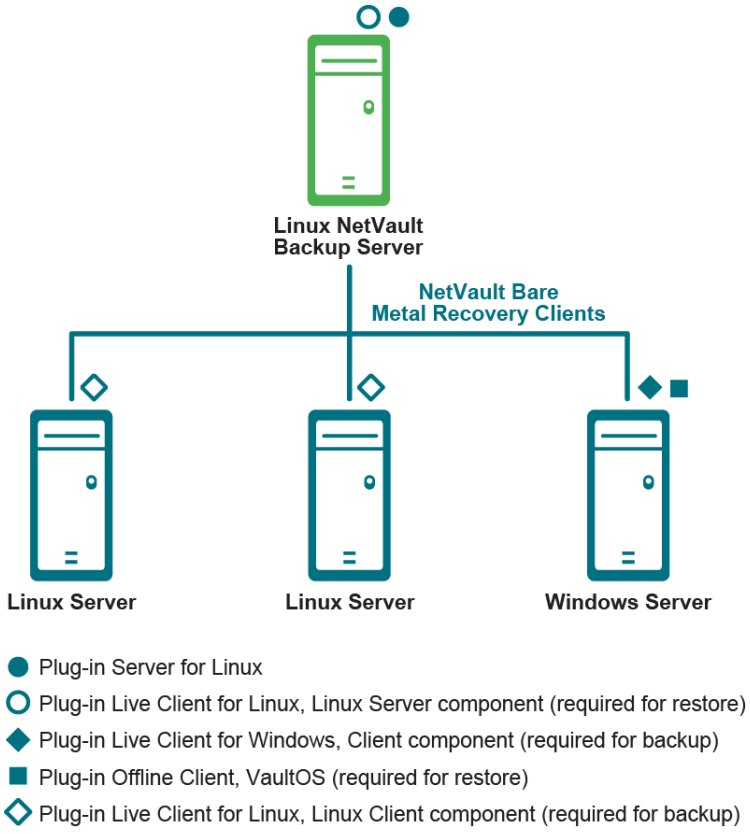
This scenario is deployed when you want to perform online or hot backups of both Linux and Windows Clients and you have deployed a Linux-based NetVault Server.

The Plug-in *Server* for Linux component is installed on the Windows-based NetVault Server. The Plug-in *Live Client* for Linux, Linux-based Client Component is installed on each Linux Client that you want to protect with online or hot backups.

Also, the Plug-in *Server* for Linux component is installed on the Linux-based NetVault Server and the Plug-in *Live Client* for Windows is installed on each Windows Client that you want to protect with online or hot backups.

In this scenario, Plug-in *Offline Client* is used to perform the recovery of the Windows Clients.

Figure 7. NetVault Bare Metal Recovery Client for Windows and Client for Linux with Linux-based server



For more information, see Using NetVault Bare Metal Recovery Plug-in *Live Client for Windows* and Using NetVault Bare Metal Recovery Plug-in *Live Client for Linux*.

Plug-in *Live Client* for Windows and for Linux with Windows-based NetVault Server deployment

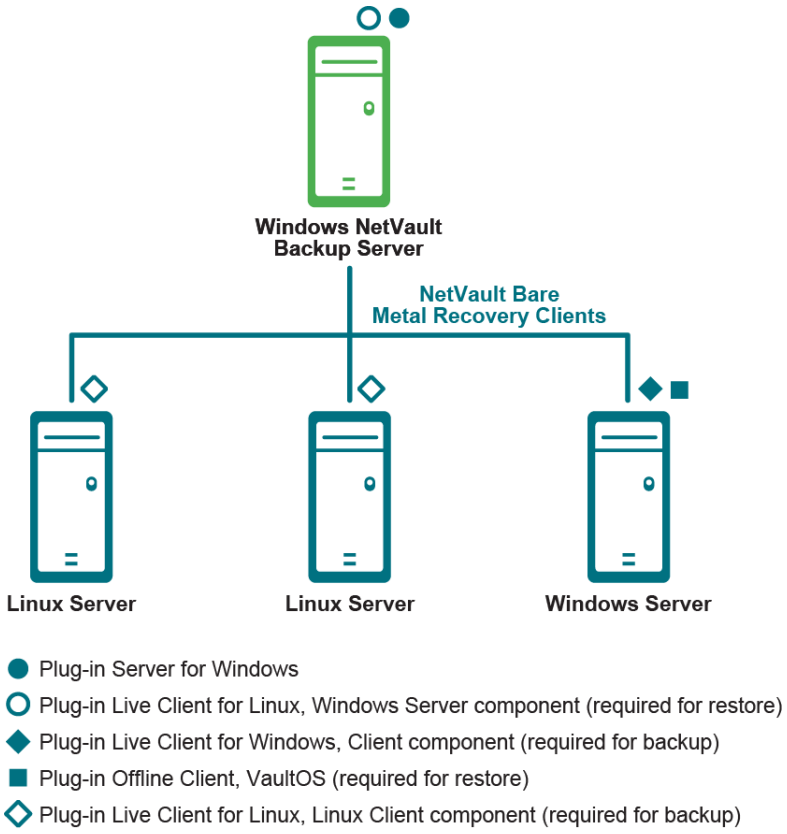
This scenario is deployed when you want to perform online or hot backups of both Linux and Windows Clients and you have deployed a Windows-based NetVault Server.

The Plug-in *Server* for Linux component is installed on the Windows-based NetVault Server and the Plug-in *Live Client* for Linux, Linux-based Client Component is installed on each Linux Client that you want to protect with online or hot backups.

Also, the Plug-in *Server* for Windows component is installed on the Windows-based NetVault Server, and the Plug-in *Live Client* for Windows is installed on each Windows Client that you want to protect with online or hot backups.

In this scenario, Plug-in *Offline Client* is used to perform the recovery of the Windows Clients.

Figure 8. NetVault Bare Metal Recovery Client for Windows and NetVault Bare Metal Recovery for Linux with Windows-based server



For more information, see Using NetVault Bare Metal Recovery Plug-in *Live Client for Windows* and Using NetVault Bare Metal Recovery Plug-in *Live Client for Linux*.

3

Using the Plug-in *Offline Client*

- Plug-in Server: an overview
- Installing and removing Plug-in Server
- Configuring Plug-in Server for use with Plug-in Offline Client
- Booting a NetVault Bare Metal Recovery Client with Plug-in Offline Client
- Backing up data with Plug-in Offline Client
- Restoring data with Plug-in Offline Client

Plug-in *Server*: an overview

The **Plug-in *Server*** resides on the NetVault Server and enables backup and recovery of a target client's data by using the Plug-in *Offline Client*. The processes required to set up and use the **Plug-in *Server*** must be followed in a specific order. The following list outlines how to establish a **Plug-in *Server*** environment.

- **Required components**:
  - Verify that you have the Plug-in *Server* and Plug-in *Offline Client*.
  - If you are installing the hybrid version of the Plug-in *Server* on a pure 64-bit Linux Server that uses the hybrid version of NetVault, you must install the zlib.i686 file first. To do so, run: `yum install zlib.i686`
- **Installation**: Install the Plug-in *Server* on the NetVault Server.
- **Configuration**: Configure the Plug-in *Server*.
  - Create a Plug-in *Offline Client* Boot System, for example, to a writable CD.
  - Add the target NetVault Bare Metal Recovery Clients to the Plug-in *Server* on the NetVault Server.
  - To restore from a physical machine to a virtual machine (P2V), before you begin taking backups, run the following command:

    ```
    dracut -N -f
    ```
- **Backup**: Perform an offline backup of the desired NetVault Bare Metal Recovery Client machine.
  - Boot the target NetVault Bare Metal Recovery Client system with Plug-in *Offline Client*.
  - From the NetVault Server, administer backup of the NetVault Bare Metal Recovery Client by selecting data to be backed up—for example, partitions, drives, volumes.

  IMPORTANT: If you are targeting large-sector—4K—Windows drives for backup, the EFI partition size must be larger than 256 MB. For more information, see https://docs.microsoft.com/en-us/windows-hardware/manufacture/desktop/configure-uefigpt-based-hard-drive-partitions.
- **Restore**: Perform an offline restore to the target NetVault Bare Metal Recovery Client.
  - Boot the target NetVault Bare Metal Recovery Client system with Plug-in *Offline Client*.
  - From the NetVault Server, administer restores to the target NetVault Bare Metal Recovery Client by selecting data included in the DR backup.

Installing and removing Plug-in *Server*

This topic covers the steps required to install, and upgrade, or remove the Plug-in *Server*.

- Prerequisites for installing Plug-in Server
- Installing or upgrading Plug-in Server
- Removing Plug-in Server
- Upgrading Plug-in Server

Prerequisites for installing Plug-in *Server*

Before installing or upgrading the **Plug-in *Server***, review the following points and take the applicable actions:

- **Plug-in *Server* component compatibility**: For the Plug-in *Server* to function correctly, all its associated components ***must be the proper version***; that is, version "X" of the Plug-in *Server* only works with its appropriate version of Plug-in *Offline Client*. For complete compatibility information, see the *Quest NetVault Compatibility Guide*.
- **Existing Plug-in *Server* backups (upgrades *only*)**: Backups performed with earlier versions of this plug-in may not be compatible with the newest release of the plug-in. Before upgrading to the newest version, see the *Quest NetVault Compatibility Guide* for complete compatibility information.

Before installing the Plug-in *Server*, verify that the following requirements have been met:

- The Server version of NetVault software must be installed on at least one machine.
- The NetVault Bare Metal Recovery Client machine—the target of the backup or restore—must have a supported Intel x86-based OS installed.

Installing or upgrading Plug-in *Server*

The Plug-in *Server* must be installed on a NetVault Server.

1. From the machine acting as the NetVault Server, access the **NetVault Configuration Wizard** or **Manage Clients** page.

   NOTE: If the selected clients are all the same type, you can use the configuration wizard to install the plug-in on multiple clients at the same time. When you select multiple clients, verify that the plug-in binary file is compatible with the OS and platforms of the target clients. From the **Manage Clients** page, you can only select one client for plug-in installation.

   - To access the **NetVault Configuration Wizard** page:
     a. In the Navigation pane, click **Guided Configuration**.
     b. On the **NetVault Configuration Wizard** page, click **Install Plugins**.
     c. On the next page, select the applicable clients.
   - To access the **Manage Clients** page:
     a. In the Navigation pane, click **Manage Clients**.
     b. On the **Manage Clients** page, select the machine that contains the NetVault Server, and click **Manage**.
     c. On the **View Client** page, click the **Install Plugin** button ( ).
2. Click **Choose Plug-in File**, navigate to the location of the **".npk"** installation file for the plug-in, for example, on the installation CD or the directory to which the file was downloaded from the website.

   Based on the operating system (OS) in use, the path for this software may vary on the installation CD.

3 Select the file entitled **"drc-*x-x-x-x*.npk,"** where **xxxx** represents the version number and platform, and click **Open**.

> **IMPORTANT:** If you are using the Quest NetVault Installation CD to install a plug-in to a UNIX system, you might have to mount the CD drive before you can access the disk. For instructions on mounting a drive, see the relevant OS documentation. This issue also applies to accessing files for other procedures required for installation of NetVault Bare Metal Recovery.

4 To begin installation, click **Install Plugin**.

After the plug-in is successfully installed, a message is displayed.

Removing Plug-in *Server*

1 In the Navigation pane, click **Manage Clients**.

2 On the **Manage Clients** page, select the NetVault Server or the applicable NetVault Heterogeneous Client, and click **Manage**.

3 In the **Installed Software** table on the **View Client** page, select **Plug-in *Server***, labeled "**VaultDR APM,**" and click the **Remove Plugin** button ( ).

4 In the **Confirm** dialog box, click **Remove**.

Upgrading Plug-in *Server*

1 Uninstall the previous version of the Plug-in *Server*.

For details, see Removing Plug-in Server.

2 Install the new version of the Plug-in *Server*.

For details, see Installing or upgrading Plug-in Server.

Configuring Plug-in *Server* for use with Plug-in *Offline Client*

The second phase of setting up the Plug-in *Server* involves environment configuration, which is divided into two steps. The following topics illustrate the procedures that must be followed to complete these steps.

- Creating a Plug-in Offline Client Boot System
- Adding a NetVault Bare Metal Recovery Client to the Plug-in Server

Creating a Plug-in *Offline Client* Boot System

Before using the Plug-in *Server*, create a Plug-in *Offline Client* Boot System. This minimal OS loads to a target machine's memory, rather than to its hard drive. This process leaves the hard drives inactive (offline) and in a suitable state for backup or restore. The Plug-in *Offline Client* is created on a writable CD. You can also boot from a LiveCD with the Plug-in *Offline Client* binaries on a separate device, such as a Universal Serial Bus (USB) device that uses the 3.0 protocol or earlier. This process is described in Creating a rescue device for use with a LiveCD.

Creating a Linux-based Boot System

The following items are required for this procedure:

- VaultOS ISO image—obtained through download
- A writable DVD and CD drive
- A blank DVD and CD
- DVD- and CD-generation software

NOTE: Quest recommends that you shut down all applications running on this machine before starting this procedure.

1. Download **Plug-in *Offline Client*, VaultOS** from the Quest website.
2. Note the name and location of this file, for example, "/home/vaultos_x86_v*xxx*.zip," where *xxx* represents the software version number.
3. Insert a blank CD in the writable drive.
4. Create a CD with the CD-generation software using the **"vaultos_x86_v*xxx*.iso"** file.

   For details on this procedure, see the relevant documentation for the CD-generation software in use.

Creating a Windows PE-based Boot System

You can complete this process on any Windows system for which the following requirements are met:

- Windows Assessment and Deployment Kit (ADK) for Windows 8—obtained through download
- Windows Server 2012 R2 or later
- **"NetVault Bare Metal Recovery ISO Builder for Plug-in *Offline Client* for Windows"** file—on the Quest NetVault Installation CD or downloaded from the Quest website
- A writable DVD and CD drive
- A blank DVD and CD
- DVD- and CD-generation software

NOTE: Quest recommends that you shut down all applications running on this machine before starting this procedure

1. Download the **Windows ADK** for Windows 8 from: http://www.microsoft.com/en-us/download/details.aspx?id=30652
2. Install the **Windows ADK** on a Windows Server 2012 R2 or later system.

   You can use the default directory, C:\Program Files (x86)\Windows Kits\8.0, or a different directory of your choosing.

   IMPORTANT: Installation of Windows ADK also installs Microsoft .NET Framework if it is not already installed. After .NET Framework is installed, the system is automatically restarted.
3. Extract the **"NetVault Bare Metal Recovery ISO Builder for Plug-in *Offline Client for Windows*"** file to the **Windows ADK** machine.

   This step creates two files, **"nvbmrisocreate.exe"** and **"nvbmriso.pkg."**
4. Verify that the path to where you intend to create the ISO image exists.

   If the directory does not exist when you run the next step, the ISO image is not created.
5. To create the Windows PE ISO image, navigate to the directory that contains the extracted **"nvbmrisocreate.exe"** file, type the following at the command prompt, and press **Enter**:

   The following list describes what you can specify for each option:

- **/TYPE**: If you are working with an earlier version of the Plug-in *Offline Client*, enter **WAIK** for Windows Automated Installation Kit (AIK). If you are using version 6.1 or later, you can enter **ADK**.
- **/PKG**: Enter the full path and filename for the Plug-in *Offline Client* .pkg file that you downloaded separately.
- **/DIR**: Enter the full path to the location of the Windows AIK or ADK directory.
- **/OUT**: Enter the path where the bootable ISO image should be created.
- **/ADDDRV**: Enter the full path where the downloaded device drivers are stored.
- **/BIT:32**: If you must create a backward-compatible version of VaultOS for use with a 32-bit version of Windows PE, enter this option.

Example:

```
nvbmrisocreate /TYPE:ADK
/PKG:"<pathToFile>\nvbmriso.pkg"
/DIR:"C:\Program Files (x86)\Windows Kits\8.0"
/OUT:"C:\temp\bmr.iso"
```

6 Insert a blank CD in the writable drive.

7 Create a CD with CD-generation software using the **"bmr.iso"** file generated in Step 5.

Creating a rescue device for use with a LiveCD

A LiveCD is an OS that boots from a CD without the necessity of installing to a hard drive. This tool lets you initiate DR without the OS on disk. Plug-in *Server* supports booting from a LiveCD with VaultOS on a separate device, such as a USB device (Rescue USB) that uses the 3.0 protocol or earlier, or a different CD (Rescue CD).

The following items are required to create a Rescue CD or Rescue USB device:

- The **"drdaemon"** and **"vaultdr_client.sh"** files—obtained through download.
- A USB port and a USB device with enough space to hold the **"drdaemon"** and **"vaultdr_client.sh"** files; 1 MB is sufficient,

  —or—
- A blank CD and a writable CD drive.

NOTE: You need two CD drives on the target system to use a Rescue CD with a LiveCD.

1 Download **Plug-in *Offline Client*, VaultOS** from the Quest website.

2 Note the name and location of this file, for example, "/home/vaultos_x86_v*xxx*.zip," where *xxx* represents the software version number.

3 Insert a blank CD in the writable drive.

4 Create a CD with the CD-generation software using the **"vaultos_x86_v*xxx*.iso"** file.

For details on this procedure, see the relevant documentation for the CD-generation software in use.

For instructions on booting from a LiveCD, see Booting the NetVault Bare Metal Recovery Client from a LiveCD.

Adding a NetVault Bare Metal Recovery Client to the Plug-in *Server*

To access a NetVault Bare Metal Recovery Client machine correctly for backup and restore, add it to the Plug-in *Server*. After you have added an initial NetVault Bare Metal Recovery Client to the NetVault Server, repeat these steps to add additional clients.

1 In the Navigation pane of the NetVault WebUI, click **Create Backup Job**.

2 Next to the **Selections** list, click ✚.

3 On the **NetVault Selections** page, double-click the NetVault Server—with the Plug-in *Server* installed on it—to open it.

4 Click the Plug-in *Server*, labeled **"VaultDR APM,"** and select **Add Client** from the context menu.

5 When the **Add Bare Metal Recovery Plug-in Offline Client** dialog box is displayed, complete the following fields to add the client:

- **Client Name**: The name of the applicable NetVault Bare Metal Recovery Client. NetVault scans the network, looking for available systems that can be added as NetVault Bare Metal Recovery Clients, and displays them in the drop-down list.
- **Address(es)**: A comma-separated list of addresses that can either be IP addresses or resolvable network names, for example, 10.55.55.1, Server_1, 10.55.55.2, that see the machine to add.
- **Port Number**: The port used to invoke drdaemon, for example, 15555. The default is 10000.

6 Click **Next**.

After the client is successfully added to the server, a message is displayed.

7 Repeat these steps as required until all NetVault Bare Metal Recovery Clients have been added.

Editing an existing NetVault Bare Metal Recovery Client

With a NetVault Bare Metal Recovery Client added to the NetVault Server, the settings made during the original addition process can be edited, if necessary.

1 In the Navigation pane, click **Create Backup Job**.

2 Next to the **Selections** list, click ✚.

3 On the **NetVault Selections** page, double-click the NetVault Server—with the Plug-in *Server* installed on it—to open it.

4 To expand the Plug-in *Server* icon, labeled **"VaultDR APM,"** double-click it.

5 Click the applicable **NetVault Bare Metal Recovery Client**, and select **Edit Client** from the context menu.

6 When the **Edit Bare Metal Recovery Plug-in Offline Client** dialog box is displayed, update the applicable values:

- **Client Name**: This field contains the current name for the selected client. Changing this value updates the name of the NetVault Bare Metal Recovery Client in NetVault.
- **Address(es)**: This field contains the IP address originally set for this client. You can change this value or add additional, comma-separated addresses.
- **Port Number**: This field contains the port used to invoke drdaemon, for example, 15555. The default is 10000.

7 To close the dialog box and commit the changes, click **OK**.

Removing a NetVault Bare Metal Recovery Client

If you must remove an existing NetVault Bare Metal Recovery Client from the NetVault Server, perform the following steps:

1. In the Navigation pane, click **Create Backup Job**.
2. Next to the **Selections** list, click ✚.
3. On the **NetVault Selections** page, double-click the NetVault Server—with the Plug-in *Server* installed on it—to open it.
4. Double-click the Plug-in *Server*, labeled **"VaultDR APM."**
5. Click the applicable client, and select **Remove Client** from the context menu.
6. When the confirmation dialog box is displayed, click **Yes**.

Booting a NetVault Bare Metal Recovery Client with Plug-in *Offline Client*

To use the Plug-in *Server* to back up or restore a target NetVault Bare Metal Recovery Client, take the system offline and boot it with the required components. This process is accomplished by booting the NetVault Bare Metal Recovery Client machine with the Plug-in *Offline Client* Boot System—the media created in the processes explained in Creating a Plug-in Offline Client Boot System. Rather than installing software to the NetVault Bare Metal Recovery Client's hard drive, this boot system loads a minimal OS to the NetVault Bare Metal Recovery Client's memory. Loading the OS to the memory leaves the hard drive inactive (offline) and in a suitable state for either backup or restore.

Booting with Plug-in *Offline Client*

This process entails the configuration of network equipment installed on the target NetVault Bare Metal Recovery Client; that is, loading driver software for the system's network interface card or small computer system interface (NIC/SCSI) card to memory to use the device and access the system.

The overall boot routine with Plug-in *Offline Client* can be broken down into two phases. Also, if you are using the Windows PE-based configuration, you can use one of the following procedures to inject drivers into Windows PE when the network driver is not available on the Windows PE image.

IMPORTANT: Before starting this procedure, verify the boot order of the target NetVault Bare Metal Recovery Client. The machine's CD drive must be the first source of a boot for this process to work.

Using a Windows Server 2012-based virtual machine with Plug-in *Offline Client* for Linux

If your VMware virtual machine (VM) is based on Windows Server 2012 or 2012 R2 and you use the Plug-in *Offline Client* for Linux, update the VMware configuration file to use the E1000 adapter.

1. Locate and open the VMware configuration file.

   This file is located in the directory where you created the virtual machine. For example, C:\Documents and Settings\My Documents\My Virtual Machines\<*machine*>*.vmx.
2. Locate the E100OE entry, and change it to E1000.

3 Save and close the .vmx file.

Gathering NetVault Bare Metal Recovery Client network information

In this first phase of the process, you gather specific network-related information from the NetVault Bare Metal Recovery Client for use in the boot routine, for example, NIC and SCSI interface values. This requirement includes the following values:

- **IP Address**
- **Network Mask**
- **Gateway**

IMPORTANT: If the target NetVault Bare Metal Recovery Client is configured with multiple NIC/SCSI devices for access, Quest recommends that you gather the preceding information for *each device*. The Plug-in Offline Client boot routine recognizes *all* these devices and requests that you configure each, individually, with this information, but only one of the devices must be configured successfully for use.

The following topics offer sample procedures that you can use to obtain these required values, based on the OS in place on the target NetVault Bare Metal Recovery Client.

Gathering the information for Linux-based NetVault Bare Metal Recovery Client

1 Log in locally to the Linux NetVault Bare Metal Recovery Client, and initiate a terminal session.

2 At the prompt, type the following command:

```
ifconfig
```

3 In the content that is revealed, locate and record the **IP Address** and the **Network Mask** values.

4 At the prompt, type the following command:

```
route
```

5 In the content that is revealed, locate and record the **Gateway** value; when the command is issued, this value is revealed as the default value.

Gathering the information for Windows-based NetVault Bare Metal Recovery Client

1 Log in locally to the Windows NetVault Bare Metal Recovery Client, and start a Command Prompt session.

2 At the prompt, type the following command:

```
ipconfig
```

3 In the content that is revealed, locate and record the **IP Address**, **Subnet Mask (Network Mask)**, and **Default Gateway** values.

With all relevant networking information noted, you can boot the target NetVault Bare Metal Recovery Client, as described in the next topic, Booting the NetVault Bare Metal Recovery Client with the Windows PE-based Plug-in Offline Client.

Booting the NetVault Bare Metal Recovery Client with the Linux-based Plug-in *Offline Client*

With all relevant networking information noted, you can boot the target NetVault Bare Metal Recovery Client.

1 Turn off the NetVault Bare Metal Recovery Client, and insert the VaultOS CD; if connected through a USB port, the port must use the 3.0 protocol or earlier.

On reboot, there is a 5-second delay after the boot prompt is displayed.

2 Press **Enter** to start the sequence immediately.

A series of dialog boxes appear as various applications are loaded to system memory. The initial load sequence may take several minutes, during which time the screen may appear blank.

By default, the system uses Dynamic Host Configuration Protocol (DHCP) for the Internet Protocol version 4 (IPv4) and IPv6 settings. If you want to change the network settings, complete the following steps:

a Double-click the **NetCFG** icon on the desktop.

b When the **Network Connections** dialog box is displayed, select the connection that you want to change, and click **Edit**.

> **IMPORTANT:** You can only use one active network interface during the backup and restore operation.

c Click the **IPv4 Settings** tab, select **Manual** from the **Method** list, click **Add**, and enter the IP, netmask, and gateway addresses in the applicable fields. Leave the **DNS servers** field blank.

d Click the **IPv6 Settings** tab, select **Manual** from the **Method** list, click **Add**, and enter the IP, prefix, and gateway addresses in the applicable fields. Leave the **DNS servers** field blank.

e When you are finished, click **Save** to return to the **Network Connections** dialog box, and then click **Close**.

The Client is now prepared for backup or restore.

Booting the NetVault Bare Metal Recovery Client with the Windows PE-based Plug-in *Offline Client*

To boot from a standard Plug-in *Offline Client* CD, perform the following steps.

1 Turn off the NetVault Bare Metal Recovery Client, and insert the Plug-in *Offline Client* CD; if connected through a USB port, the port must use the 3.0 protocol or earlier.

On reboot, the NetVault Bare Metal Recovery graphical user interface (GUI) is displayed.

2 When the **BMR Network Configuration** dialog box is displayed, select the applicable option:

- **Use DHCP** (recommended): To use the Dynamic Host Configuration Protocol (DHCP) to configure the network interface, select this option.
- **Use Static IP Address**: To enter specific IP addresses, select this option, and enter the addresses in the **IP Address**, **Subnet Mask**, and **Default Gateway** fields.

3 To submit the information, click **Config**, and then click **OK** when the confirmation message is displayed.

4 To close the **BMR Network Configuration** dialog box and start the **NetVault Bare Metal Recovery Agent**, click **Exit**.

After the network configuration is completed, the agent is started and the initialization process is finished. The NetVault Bare Metal Recovery Client is now prepared for backup or restore.

You can use the list preceding the **Run** button to output information related to the NetVault Bare Metal Recovery GUI when you issue the **Run** command.

Also, the information displayed in the text window is automatically exported to the **“x:\questbmr\bmr_gui.log”** file.

Loading drivers dynamically

Sometimes, Windows PE might recognize the hardware attached to the target machine. To load drivers without restarting Windows PE, perform the following steps.

NOTE: These steps are based on targeting a network adapter. For other types of hardware, some steps might not be required.

1. Prepare a device, such as a CD, that contains the files needed for the driver, including the **"*.inf"** file.
2. Use the Plug-in *Offline Client* CD to start the NetVault Bare Metal Recovery Client.
3. When the **BMR Network Configuration** dialog box is displayed, click **Exit** to close it.
4. To open a DOS prompt, click **Launch CMD**.
5. Insert the device created in Step 1, which contains the driver files.
6. To load the driver, type the following at the command prompt, and press **Enter**:

   ```
   drvload <pathToDriverINFfile>
   ```

   Example:

   ```
   drvload a:\netadm.inf
   ```
7. To access the **BMR Network Configuration** dialog box, type the following at the command prompt, and press **Enter**:

   ```
   qnet
   ```
8. From the **Network Adapters** list, select the item that you just added, and then continue from Step 2 under Booting the NetVault Bare Metal Recovery Client with the Windows PE-based Plug-in Offline Client.

Injecting drivers and restarting drdaemon to facilitate storage controller recognition

Sometimes, Windows PE might recognize the hardware attached to the target machine. To load drivers without restarting Windows PE, perform the following steps.

1. Prepare a device including the **"*.inf"** file.

   Examples of devices include a USB device that uses the 3.0 protocol or earlier, or a network location that contains the files needed for the driver.
2. Use the Plug-in *Offline Client* CD to start the NetVault Bare Metal Recovery Client.
3. When the **BMR Network Configuration** dialog box is displayed, do one of the following:
   - If the system detects the adapter and displays it in the **Network Adapters** list, select the item, and then complete Step 2 and Step 3 under Booting the NetVault Bare Metal Recovery Client with the Windows PE-based Plug-in Offline Client
   - If the system does not detect the adapter, complete the steps outlined under Loading drivers dynamically.
4. To open a DOS prompt, click **Launch CMD**.
5. Insert the device created in Step 1, or map to the applicable network drive.
6. To load the driver, type the following at the command prompt, and press **Enter**:

   ```
   drvload <pathToDriverINFfile>
   ```

   Example:

   ```
   drvload a:\cpqcissm.inf
   ```
7. To start the Windows Task Manager, type the following at the command prompt, and press **Enter**:

   ```
   taskmgr
   ```

8 In the **Windows Task Manager** screen, select the **Processes** tab, right-click **drdaemon**, select **End Process**, and close the Task Manager.

9 To restart the **drdaemon**, type the following at a command prompt (if necessary, click **Launch CMD** again), and press **Enter**:

```
drdaemon
```

Injecting drivers into the Plug-in *Offline Client* image

If you do not, or cannot, use a device such as a USB device, 3.0 protocol or earlier, to load a driver after Windows PE has started, use the following process to add the driver to the Plug-in *Offline Client* image and then re-create the Plug-in *Offline Client* image with the added driver. To complete this process, you must have Windows ADK for Windows 8 installed, the applicable **"*.inf"** file, a program capable of extracting an ISO image, and a method for repackaging the ISO as a bootable image or bootable CD. The following steps are based on Windows 7; these steps might differ depending on your environment.

1 Download the **Windows ADK** for Windows 8 from: http://www.microsoft.com/en-us/download/details.aspx?id=30652

2 Install the **Windows ADK** on a Windows Server 2012 R2 or later system.

You can use the default directory, C:\Program Files (x86)\Windows Kits\8.0, or a different directory of your choosing.

> **IMPORTANT:** Installation of Windows ADK also installs Microsoft .NET Framework if it is not already installed. After .NET Framework is installed, the system is automatically restarted.

3 Extract the **"NetVault Bare Metal Recovery ISO Builder for Plug-in *Offline Client for Windows*"** file to the **Windows ADK** machine.

This step creates two files, **"nvbmrisocreate.exe"** and **"nvbmriso.pkg."**

4 Verify that the path to where you intend to create the ISO image exists.

If the directory does not exist when you run the next step, the ISO image is not created.

5 To create the Windows PE ISO image, navigate to the directory that contains the extracted **"nvbmrisocreate.exe"** file, type the following at the command prompt, and press **Enter**:

The following list describes what you can specify for each option:

- **/TYPE**: If you are working with an earlier version of the Plug-in *Offline Client*, enter **WAIK** for Windows Automated Installation Kit (AIK). If you are using version 6.1 or later, you can enter **ADK**.
- **/PKG**: Enter the full path and filename for the Plug-in *Offline Client* .pkg file that you downloaded separately.
- **/DIR**: Enter the full path to the location of the Windows AIK or ADK directory.
- **/OUT**: Enter the path where the bootable ISO image should be created.
- **/ADDDRV**: Enter the full path where the downloaded device drivers are stored.
- **/BIT:32**: If you must create a backward-compatible version of VaultOS for use with a 32-bit version of Windows PE, enter this option.

Example:

```
nvbmrisocreate /TYPE:ADK
/PKG:"<pathToFile>\nvbmriso.pkg"
/DIR:"C:\Program Files (x86)\Windows Kits\8.0"
/OUT:"C:\temp\bmr.iso"
/ADDDRV:"C:\Program Files\Down Load Drivers\"
```

6 Insert a blank CD in the writable drive.

7 Create a CD with CD-generation software using the **"bmr.iso"** file generated in Step 5.

Booting the NetVault Bare Metal Recovery Client from a LiveCD

If you are booting the NetVault Bare Metal Recovery Client from a LiveCD, perform the following procedure. If you are booting the NetVault Bare Metal Recovery Client from a standard VaultOS CD, proceed to Booting the NetVault Bare Metal Recovery Client with the Windows PE-based Plug-in Offline Client.

The following items are required for this procedure:

- A LiveCD containing the desired OS.

  Note the following important points:

  - The LiveCD must mount the loop-back device to perform backup and restore with NetVault.
  - Some LiveCDs automatically mount all partitions for devices, which can lead to restore failure if the file system is mounted before a backup or restore job. If you boot with a LiveCD, ensure that the file system is unmounted before performing a backup or restore.
  - Some LiveCDs automatically use the swap partition for swap operations, which can lead to restore failure if the swap partition is used before a backup or restore job. If you boot with a LiveCD, ensure that the LiveCD does not use the swap partition before performing a backup or restore.
- A Rescue device—see Creating a rescue device for use with a LiveCD.
- A USB port, for a Rescue USB device, that uses the 3.0 protocol or earlier, or a secondary CD drive, for a Rescue CD, on the target system. If the drive is connected through a USB port, it must use USB 3.0 protocol or earlier.
- If you are using a Rescue CD, you need two CD drives on the target system—one for the LiveCD and one for the Rescue CD. If connected through USB ports, the drives must use the USB 3.0 protocol or earlier.

IMPORTANT: When using Windows PE-based VaultOS with NetVault SmartDisk, the **Connect ports for devices** option in NetVault uses twice as many ports as there are partitions. For example, if you are restoring to a disk that contains seven partitions, the device connection uses 14 ports.

To boot the client, perform the following steps.

1. Insert the LiveCD in the CD drive—if connected through a USB port, the port must use the 3.0 protocol or earlier—on the target system, and reboot the machine.
2. After the OS starts, plug in the device, 3.0 protocol or earlier, or load the Rescue CD.

   Usually, the LiveCD automatically mounts the USB/CD drive and shows an icon on the desktop.
3. If the LiveCD automatically mounted the USB/CD drive, use the **"mount -l"** command to find the path where the device is mounted.

   Example:

   ```
   # mount -l
   ...
   /dev/sdb1 on /media/disk type ext2 (rw,nosuid,nodev)
   ```
4. If the LiveCD does not automatically mount the USB drive, mount it manually:

   NOTE: To use a Rescue CD by mounting a CD instead of a USB device, follow the same procedure.

   a. To find the USB devices on the system, use the **"ls -l /dev/disk/by-id/usb*"** command.

      Example:

      ```
      # ls -l /dev/disk/by-id/usb*
      root 9 2007-09-26 8:16 /dev/disk/by-id/usb-JetFl -> ../../sdb
      root 10 2007-09-26 8:16 /dev/disk/by-id/usb-JetFl-part1_-> ../../sdb1
      root 10 2007-09-26 8:16 /dev/disk/by-id/usb-JetFl-part2 -> ../../sdb2
      ```

   b. Mount the first partition on the device.

Example:

```
# mount /dev/sdb1 /mnt/usb
```

5 To start drdaemon, run the **"vaultdr_client.sh"** command.

Example:

```
# cd /mnt/usb
# sh vaultdr_client.sh
```

6 If you configured NetVault Bare Metal Recovery to use a port other than the default "10000," exit the **NetVault Bare Metal Recovery Daemon** dialog box, and enter the new port number manually.

a To exit the **NetVault Bare Metal Recovery Daemon** dialog box, press **<Ctrl+C>**.

b At the command prompt, type the following command, and press **Enter**:

```
drdaemon -p port_number
```

where *port_number* is the port you specified in Adding a NetVault Bare Metal Recovery Client to the Plug-in Server or Editing an existing NetVault Bare Metal Recovery Client.

> **NOTE:** If you want to restart NetVault Bare Metal Recovery Daemon from the command prompt without changing the port number, type `drdaemon` and press **Enter**.

7 If you want to enable multipath support, type the following at a command prompt, and press **Enter**:

```
drdaemon -o mpath
```

> **NOTE:** You can enter the **-o mpath** and **-p *port_number*** options together.

Backing up data with Plug-in *Offline Client*

The Plug-in *Server* lets you back up full systems. In addition, the plug-in provides detailed backup capabilities that let you select individual disk partitions for backup. This plug-in includes the following items:

- **OS**
- **Applications**
- **Specific User Information**

From the NetVault Selections page, you can select the following Plug-in *Server* items for backup:

- **Disk Partitions**: All (or individual) partitions can be selected for backup.

  > **IMPORTANT:** If you are targeting large-sector—4K—Windows drives for backup, the EFI partition size must be larger than 256 MB. For more information, see https://docs.microsoft.com/en-us/windows-hardware/manufacture/desktop/configure-uefigpt-based-hard-drive-partitions.

- **Mounted Volumes (Linux and UNIX)**: All of which are backed up as individual partitions.

  > **NOTE:** The **Master Boot Record (MBR)** and the **Partition Table** items are backed up automatically when a partition (all or individual) is backed up using the Plug-in Server. Therefore, these items are not available to select for a backup.

Prerequisites for backing up data with Plug-in *Offline Client*

Before initiating a backup with the Plug-in *Server*, review the following topics for details on prerequisites that must be met.

> **CAUTION: Even if there is no difference between the system devices in a backup and a restore, the order of the disks might be different. If the restored data is started without performing a rename, any data that exists on the disks is lost. To compare the information of the physical disk at backup and restore, note the *Disk Geometry* and *Device Size* at backup. For more information, see Performing a restore in which Disk Numbers are different from the backup.**

Booting the NetVault Bare Metal Recovery Client with Plug-in *Offline Client*

Boot the target NetVault Bare Metal Recovery Client with the Plug-in *Offline Client* to prepare it for the backup. To complete the boot routine, review the steps in Booting with Plug-in Offline Client.

Verifying Disk Geometry and Device Size

Before backing up any portion of a NetVault Bare Metal Recovery Client's hard drive, note the **Disk Size** and the **Disk Geometry** of the selected drive. If these items are not accounted for, a restore might fail.

Example of how to note the Drive Disk Size and Disk Geometry

A Client drive is divided into three partitions. The primary partition is 10 gigabytes (GB), the first logical partition is 7 GB, and the second partition is 3 GB. A backup of the first logical partition is performed with the Plug-in *Server*. On restore of the system after a hard drive failure, if the first logical partition was restored, you must restore it to the proper partition, the first logical partition, or the restore fails.

To verify the geometry and size, perform the following steps.

1. With the NetVault Bare Metal Recovery Client booted using Plug-in *Offline Client*, as outlined in Booting a NetVault Bare Metal Recovery Client with Plug-in Offline Client, access the NetVault Server, and start the NetVault WebUI.
2. In the Navigation pane, click **Create Backup Job**.
3. Next to the **Selections** list, click ✚.
4. On the **NetVault Selections** page, double-click the NetVault Server—the system containing the Plug-in *Server*—to open it.
5. Double-click the applicable NetVault Bare Metal Recovery Client displayed under the plug-in to reveal the disks contained within.
6. To determine the Disk Geometry, click the applicable disk, and select **Disk Geometry** from the context menu.

   The **Device Geometry** dialog box displays details about the partition structure of the selected disk.

   - **Partitions**: Each individual partition is listed here by number and the partition type.
   - **Bootable**: Displays the current state of the partition ("Yes" or "No").
   - **Offset**: Displays the amount by which the partition is offset.
   - **Size**: Displays the size of each partition.
   - **Type**: Displays the type of partition.
7. With this information noted, click **OK**.

8 To determine the overall size of a disk, click the applicable disk, and select **Disk Size** from the context menu.

   The **Device Size** dialog box displays details about the size of the selected disk.

   - **Device**: The number and type of the disk.
   - **Size**: The size of the selected disk.

9 With this information noted, click **OK**.

Backing up data with Plug-in *Offline Client*

Before performing a NetVault Bare Metal Recovery backup, consider the following important points:

- The NetVault Bare Metal Recovery Client machine must be booted with the Plug-in *Offline Client* software before each operation of the Plug-in *Server*, backup or restore. If this procedure is not completed correctly, the NetVault Bare Metal Recovery Client is inaccessible from the NetVault Server. For details on this process, see Booting a NetVault Bare Metal Recovery Client with Plug-in Offline Client.
- When **Disk Raw Mode** is selected, not only is the disk in use backed up, but the entire disk is as well. For example, if 6GB are in use on a 30GB partition, 30GB of media is used to back up the disk. Only use the **Disk Raw Mode** option when a complete hard drive is selected for a Plug-in *Server* backup, that is, not an individual partition.
- Dynamic disks must be backed up by using **Disk Raw Mode** to maintain partition information.
- Plug-in *Offline Client* does not support DR backup spanning multiple libraries. Attempting to restore a backup job that spans multiple libraries fails.
- If your VM is based on Windows Server 2012 or 2012 R2 and you use the Plug-in *Offline Client* for Linux, update the VMware configuration file to use the E1000 adapter. For more information, see Using a Windows Server 2012-based virtual machine with Plug-in Offline Client for Linux.
- If you use the Windows PE-based VaultOS with BitLocker volumes, you must unlock the encrypted drives *before* running the backup job.
- As stated previously, the **MBR** and the **Partition Table** items are backed up automatically when a partition is backed up using the Plug-in Server. Therefore, these items are not available to select for a backup.

You are now ready to perform a backup of the NetVault Server. The procedure for performing backups includes the steps outlined in the following topics:

- Selecting data for a backup with Plug-in Offline Client
- Setting backup options for backing up data with Plug-in Offline Client
- Finalizing and submitting the job for backing up data with Plug-in Offline Client

Selecting data for a backup with Plug-in *Offline Client*

You must use sets—Backup Selection Set, Backup Options Set, Schedule Set, Target Set, and Advanced Options Set—to create a backup job. For more information, see the *Quest NetVault Administrator's Guide*.

1 With the NetVault Bare Metal Recovery Client booted with Plug-in *Offline Client*, access the NetVault Server, and start the NetVault WebUI.

2 In the Navigation pane, click **Create Backup Job**.

   You can also start the wizard from the Guided Configuration link. In the Navigation pane, click **Guided Configuration**. On the **NetVault Configuration Wizard** page, click **Create backup jobs**.

3 In **Job Name**, specify a name for the job.

   Assign a descriptive name that lets you easily identify the job when monitoring its progress or restoring data. The job name can contain alphanumeric and non-alphanumeric characters, but it cannot include non-

English characters. On Linux, the name can have a maximum of 200 characters. On Windows, there is no length restriction. However, a maximum of 40 characters is recommended on all platforms.

4 Next to the **Selections** list, click ✚.

5 Locate the machine acting as the NetVault Server, that is, the machine with the Plug-in *Server* installed, and double-click it to open it.

6 In the list that is displayed, locate the Plug-in *Server*, labeled **"VaultDR APM,"** and double-click it to open it and display the hard disks on the client system.

7 Select one of the following:

- To select the entire disk for a backup, click the box to the left of the disk title.
- To select specific items, double-click a disk to open it. Individual partitions are displayed and made available for selection. NetVault provides data on each type of partition, including the size, status, and type. This information is displayed to the right of each partition, in parentheses. Select the items that you want to back up. Selected items contain a green check, items that are not selected are blank, and omitted items contain a red cross.
  - **Primary Partition**: Each hard disk can contain up to four different "true partitions." They are called the primary partitions, and can be individually selected for backup.
  - **Extended Partition**: This partition is the space on the hard disk ***not allocated*** to the primary partitions. This type of partition ***cannot*** be selected for a backup. To add it, the ***entire*** drive must be selected.
  - **Logical Partition**: Logical partitions allow multiple system images to run in one machine. This option can be multiple instances of the same OS or different systems. Logical partitions can be individually selected for a backup.

8 Click **Save**, enter a name in the **Create New Set** dialog box, and click **Save**.

The name can contain alphanumeric and non-alphanumeric characters, but it cannot include non-English characters. On Linux, the name can have a maximum of 200 characters. On Windows, there is no length restriction. However, a maximum of 40 characters is recommended on all platforms.

Setting backup options for backing up data with Plug-in *Offline Client*

The next step involves creating the Backup Options Set.

1 Next to the **Plugin Options** list, click ✚.

2 Select the applicable options:

- **Disk Raw Mode**: Select this option if you want all partition information for a selected hard drive ignored and a "bit-by-bit" backup of the entire disk image performed. This bit-by-bit form of data transfer occurs during the restore of this backup as well, thus eliminating the need to format the target drive or remove the partition.

  Cases in which **Disk Raw Mode** is desired include:
  - The selected hard drive does not have a partition table.
  - NetVault Bare Metal Recovery cannot recognize the partition table.
  - You are backing up data outside the MBR and partitions, for example, dynamic disks.
- **Compression**: To compress data on the NetVault Bare Metal Recovery Client before transfer during backup, select this option. This option reduces overall network traffic during data transfer and also requires less media space to accommodate the NetVault Bare Metal Recovery backup. This option is useful for partitions that contain a large amount of unused space. Selecting this option usually provides better compression than using a network-based or tape-library-based compression feature.

> **IMPORTANT:** If you use BitLocker and you enable the **Compression** and **Disk Raw Mode** options, the backup process might take longer. This might happen if the size of the data with **Compression** enabled is similar to the size of the uncompressed data and you are using the BitLocker **full volume encryption (FVE)** option. To improve the speed of the backup process, use the BitLocker **used disk space only** option instead of FVE.

- **Back up used blocks only for NTFS partitions**: If you are using the Windows PE-based Plug-in *Offline Client* and the backup includes Windows-based partitions, select this option if you only want to back up the used blocks. If you clear this option, a discrepancy (4 K) between the backup data and the size of the NTFS volume might be reported in the binary log; this option is working as intended, and does not affect a restore. If you are using the Linux-based Plug-in *Offline Client*, this option is visible but not functional.

3. Click **Save**.
4. In the **Create New Set** dialog box, specify a name for the set, and click **Save**.

   The name can contain alphanumeric and non-alphanumeric characters, but it cannot include non-English characters. On Linux, the name can have a maximum of 200 characters. On Windows, there is no length restriction. However, a maximum of 40 characters is recommended on all platforms.

Finalizing and submitting the job for backing up data with Plug-in *Offline Client*

The final steps include setting additional options on the Schedule, Target Storage, and Advanced Options pages, submitting the job, and monitoring the progress through the Job Status and View Logs pages. These pages and options are common to all NetVault Plug-ins. For more information, see the *Quest NetVault Administrator's Guide*.

1. Use the **Schedule**, **Target Storage**, and **Advanced Options** lists to configure any additional required options.
2. Click **Save** or **Save & Submit**, whichever is applicable.

   > **TIP:** To run a job that you have already created and saved, select **Manage Job Definitions** in the Navigation pane, select the applicable job, and click **Run Now**.

   You can monitor progress on the **Job Status** page and view the logs on the **View Logs** page. For more information, see the *Quest NetVault Administrator's Guide*.

Restoring data with Plug-in *Offline Client*

The following topics describe how to restore backups to various configurations, such as a physical machine or a Virtual Machine Disk (VMDK) image.

- Using Plug-in Offline Client to restore data to a physical machine
- Using Plug-in Offline Client to restore data as a VMDK Image
- Using Plug-in Offline Client to recover data to a standby NetVault Bare Metal Recovery Client

> **CAUTION: Before attempting to recover to the same disk that you backed up, verify that all existing partitions have been removed; otherwise, recovery to the same disk might fail, unless the data was backed up using *Disk Raw Mode*.**
>
> **Verify that the Disk Geometry of the OS targeted by the restore matches the geometry of the source OS that was backed up. If they do not match, for example, the source used 32 sectors per track, and the target uses 63 sectors, an error occurs when the system attempts to start.**

Additional notes:

- If your VM is based on Windows Server 2012 or 2012 R2 and you use the Plug-in *Offline Client* for Linux, update the VMware configuration file to use the E1000 adapter. For more information, see Using a Windows Server 2012-based virtual machine with Plug-in Offline Client for Linux.
- If you are using the Windows PE-based VaultOS, review the next topic, Making the disk blank before restoring a backup created using Disk Raw Mode, before continuing.
- When you restart a Plug-in *Offline Client* for Linux that is running on a VMware® VM, you might encounter this error:

  "A fault has occurred causing a virtual CPU to enter the shutdown state. If this fault had occurred outside of a virtual machine, it would have caused the physical machine to restart. The shutdown state can be reached by incorrectly configuring the virtual machine, a bug in the guest operating system, or a problem in VMware Workstation.
  "Click OK to restart the virtual machine or Cancel to power off the virtual machine."

  As indicated, click OK to continue.

Making the disk blank before restoring a backup created using Disk Raw Mode

If you are using the Windows PE-base VaultOS, you created a backup using the Disk Raw Mode option, and you are restoring data to a physical machine or standby NetVault Bare Metal Recovery Client, render the disk blank before beginning the restore and recovery process.

1. Log in locally to the Windows NetVault Bare Metal Recovery Client, and start a Command Prompt session.
2. At the prompt, type the following command:

   ```
   DISKPART
   ```
3. To list all the target disks, type:

   ```
   LIST DISK
   ```
4. To specify the number the target disk that you want to render blank, type:

   ```
   SELECT DISK <number>
   ```
5. To erase the disk, type:

   ```
   CLEAN
   ```
6. After the process is finished, type:

   ```
   EXIT
   ```

Using Plug-in *Offline Client* to restore data to a physical machine

This option lets you recover backups of the client to a physical machine that has the same hardware specification as the machine that was used for backup. It includes the following:

- Prerequisites for restoring data with Plug-in Offline Client to a physical machine
- Restore procedure for using Plug-in Offline Client to restore data to a physical machine
- Post-restore for using Plug-in Offline Client to restore data to a physical machine

CAUTION: Even if there is no difference between the system devices in a backup and a restore, the order of the disks might be different. If the restored data is started without performing a rename, any data that exists on the disks is lost. To compare the information of the physical disk at backup and restore, note the *Disk Geometry* and *Device Size* at backup. For more information, see Performing a restore in which Disk Numbers are different from the backup.

For version 1.1.6 and later, also compare the Disk ID of the targeted disk on the *Create Selection Set* page to the Disk ID of the same disk on the *NetVault Selections* page.

Quest strongly recommends that you disconnect all disks that contain critical data from the server before you boot the Plug-in Offline Client.

Prerequisites for restoring data with Plug-in *Offline Client* to a physical machine

A DR restore procedure is a delicate operation. Before setting up and running a DR restore, the prerequisites covered in the following topics must be met.

Ensure that device filenames match

The target device name on the NetVault Bare Metal Recovery Client, for example, Disk 0 (IDE), must be the same as it was at the time of backup.

IMPORTANT: When relocating a DR backup, ensure that the hard disk installed on the new relocation target has the same name as the hard disk that existed in the original target machine.

Boot the NetVault Bare Metal Recovery Client with Plug-in *Offline Client*

Boot the target NetVault Bare Metal Recovery Client with the Plug-in *Offline Client* to prepare it for the restore of a DR image. To complete the boot routine, perform the steps covered in Booting a NetVault Bare Metal Recovery Client with Plug-in Offline Client.

Gather noted Device Size and Disk Geometry information

This information should have been noted before the backup—see Verifying Disk Geometry and Device Size. Have this information handy to complete the restore correctly.

Obtain new license key if reactivation is required (Windows only)

Sometimes, the restored Windows system might require reactivation. Verify that you have the necessary license key for reactivation.

Verify access to the target NetVault Bare Metal Recovery Client

The NetVault Bare Metal Recovery Client machine that is to serve as a target for the restore must be accessible to the Plug-in *Server*. To check access, perform the following steps.

1. With the NetVault Bare Metal Recovery Client booted with Plug-in *Offline Client*, access the NetVault Server, and start the NetVault WebUI.
2. Access the **NetVault Selections** page to verify that the applicable client machine has been added as a NetVault Bare Metal Recovery Client.
    a. Open the Plug-in *Server* to reveal existing clients.
    b. Click the applicable NetVault Bare Metal Recovery Client, and select **Edit** from the context menu.
    c. When the **Edit Bare Metal Recovery Client** dialog box is displayed, verify that the data is correct or change it as required.
    d. If the NetVault Bare Metal Recovery Client is added correctly, skip to the Restore procedure for using Plug-in Offline Client to restore data to a physical machine topic; otherwise, proceed to the next step.
3. Add the applicable NetVault Bare Metal Recovery Client.

    For detailed instructions, see Adding a NetVault Bare Metal Recovery Client to the Plug-in Server.
4. Continue to the Restore procedure for using Plug-in Offline Client to restore data to a physical machine topic.

Restore procedure for using Plug-in *Offline Client* to restore data to a physical machine

The procedure for restoring a DR restore to a physical machine includes the steps outlined in the following topics:

- Selecting data for a restore
- Setting restore options
- Finalizing and submitting the job

Selecting data for a restore

1. In the Navigation pane of the NetVault WebUI on the NetVault Server, click **Create Restore Job**.
2. On the **Create Restore Job—Choose Saveset** page, select **Plug-in *Server*** from the **Plugin Type** list.
3. To filter the items displayed in the saveset table further, use the **Client**, **Date**, and **Job ID** lists.

    The table displays the saveset name (job title and saveset ID), creation date and time, and size. By default, the list is sorted by creation date.
4. In the saveset table, locate the applicable client, and select the applicable item.

    When you select a saveset, the following details are displayed in the **Saveset Information** area: Job ID, job title, server name, client name, plug-in name, saveset date and time, retirement setting, Incremental Backup or not, Archive or not, saveset size, and snapshot-based backup or not.
5. Click **Next**.
6. On the **Create Selection Set** page, select the data that you want to restore.
    - To restore the entire disk, click the box to the left of the applicable disk title to select it.
    - To select specific items, double-click a disk to open it, and then select the items that you want to restore.
        - The **Dos Compatibility Region** is the first 32k to 512 bytes from start of the disk that immediately follows the Master Boot Record (MBR). NetVault Bare Metal Recovery backs up

this region to support GRUB Stage 1.5. However, this region is always backed up and restored regardless of the existence of GRUB Stage 1.5. This option is not selectable.

- **Master Boot Record & System Partition**
- **Individual Partitions**

Setting restore options

1 On the **Create Selection Set** page, click , and select **Physical Machine** (the default) as the **Restore Type** to restore the backup of a client to a physical machine.

When **Physical Machine** is selected, the **Physical Recovery Options** frame containing the **Restore Name** field is shown. The default value of this field is the NetVault name for the NetVault Bare Metal Recovery Client from which this backup was originally performed, based on the backup saveset selected. This name is associated with a specific IP address that was previously configured. If this value is left at its default setting, selected data is restored to the machine that was originally backed up. You can use this field to relocate restored data to a standby NetVault Bare Metal Recovery Client, if necessary. For complete details on this procedure and its use of this option, see Using Plug-in Offline Client to recover data to a standby NetVault Bare Metal Recovery Client.

If you are using the Windows PE-based Plug-in *Offline Client*, selecting **Physical Machine** also makes the driver-related fields available. These options support using different hardware during a restore.

2 If you are using the Windows PE-based Plug-in *Offline Client*, complete the applicable options:

- **Inject Boot-Critical Device Driver**: If you are restoring to different hardware that also uses a different mass storage controller, select this option. After you select this option, the **Boot-Critical Driver Directory** and **Driver Injection Only** options become available.
- **Boot-Critical Driver Directory**: If you selected the **Inject Boot-Critical Device Driver** option, enter the complete path to the local drive where the drivers for the mass storage controller are stored.
- **Driver Injection Only**: If you previously completed a restore but pointed to an incorrect location in the **Boot-Critical Driver Directory** field, select this option to run the driver-injection portion of the restore process again. This option eliminates the need to restore the data again, but lets you inject the correct drivers. Check that you enter the correct path in the **Boot-Critical Driver Directory** field. By default, the **Inject Boot-Critical Device Driver** option remains selected; do not clear it as this option prevents the **Driver Injection Only** option from working.

Finalizing and submitting the job

The final steps include setting additional options on the Schedule, Source Options, and Advanced Options pages, submitting the job, and monitoring the progress through the Job Status and View Logs pages. These pages and options are common to all NetVault Plug-ins. For more information, see the *Quest NetVault Administrator's Guide*.

1 To save the settings, click **Ok**, and then click **Next**.

2 In **Job Name**, specify a name for the job if you do not want to use the default setting.

Assign a descriptive name that lets you easily identify the job when monitoring its progress. The name can contain alphanumeric and non-alphanumeric characters, but it cannot include non-English characters. On Linux, the name can have a maximum of 200 characters. On Windows, there is no length restriction. However, a maximum of 40 characters is recommended on all platforms.

3 In the **Target Client** list, select the machine on which you want to restore the data.

> **TIP:** You can also click **Choose**, and then locate and select the applicable client in the **Choose the Target Client** dialog box.

4 Use the **Schedule**, **Source Options**, and **Advanced Options** lists to configure any additional required options.

5 Click **Save** or **Save & Submit**, whichever is applicable.

You can monitor progress on the **Job Status** page and view the logs on the **View Logs** page. For more information, see the *Quest NetVault Administrator's Guide*.

NOTE: Be aware of the following items:

- If selecting individual partitions for a restore, also select the **Master Boot Record and System Partition** item. Failure to do so results in a failed restore.
- When performing a restore of a Plug-in *Server* backup, options available in the **Target Client** list should be left at their default settings. If a target other than the intended is selected from this list the restore fails.
- If you select the inject driver-related options, NetVault Bare Metal Recovery attempts to inject the drivers into every disk during the restore process.
- After completing a restore to a different machine, a "disk read error" occurs when you start the new machine if the size of the Integrated Drive Electronics (IDE) disk does not match the size of the IDE disk on the original (backed-up) machine. To work around this issue, change the disk size in the BIOS to match the original machine.
- If you are using the Linux-based Plug-in *Offline Client* with IDE/Parallel Advance Technology Attachment (PATA) disks and the backup was created using Plug-in *Offline Client* v5.6.4 or earlier, use the Rename feature to force the system to reexamine and map the disk correctly. Partitions backed up before v5.7.1 are named using an "hd<*x*>" format, while v5.7.1 and later use an "sd<*x*>" format. Failure to use the rename feature causes the restore to fail with a "Error: All disk name requested from client is not equal to the backup disk name /dev/hda" message.
- If you are using the Linux-based Plug-in *Offline Client* and you are migrating a physical server to a virtual environment in which the Client is Windows-based, install the disk drivers on the OS *before* you back up the machine. For more information, see NetVault Bare Metal Recovery physical-to-virtual (P2V) recovery.

Post-restore for using Plug-in *Offline Client* to restore data to a physical machine

After restoring a backup to a different machine, review following points and take the applicable action:

- **Network connection renamed**: Because a different network card is in use, the Network Connection is automatically renamed to local area connection 2.
- **Physical address**: Because a different network card is in use, the physical address, Media Access Controller 9MAC), is different. If you use applications that rely on this address, work with the application's vendor to address the change.

Using Plug-in *Offline Client* to restore data as a VMDK Image

This option lets you recover backups of the client to a VMDK Image, which can then be attached to a VM created from VMware. This option converts the backup of a physical machine to a VM.

Plug-in *Server* must be installed on the NetVault Server.

This procedure includes the steps outlined in the following topics:

- Selecting data for a restore using Plug-in Offline Client to restore data as a VMDK Image
- Setting restore options for using Plug-in Offline Client to restore data as a VMDK Image
- Finalizing and submitting the job for using Plug-in Offline Client to restore data as a VMDK Image
- Creating the VM from the restored VMDK Image

Selecting data for a restore using Plug-in *Offline Client* to restore data as a VMDK Image

1. In the Navigation pane of the NetVault WebUI on the NetVault Server, click **Create Restore Job**.
2. On the **Create Restore Job—Choose Saveset** page, select **Plug-in *Server*** from the **Plugin Type** list.
3. To filter the items displayed in the saveset table further, use the **Client**, **Date**, and **Job ID** lists.

   The table displays the saveset name (job title and saveset ID), creation date and time, and size. By default, the list is sorted by creation date.
4. In the saveset table, locate the applicable client, and select the applicable item.

   When you select a saveset, the following details are displayed in the **Saveset Information** area: Job ID, job title, server name, client name, plug-in name, saveset date and time, retirement setting, Incremental Backup or not, Archive or not, saveset size, and snapshot-based backup or not.
5. Click **Next**.
6. On the **Create Selection Set** page, select the data that you want to restore.
   - To restore the entire disk, click the box to the left of the applicable disk title to select it.
   - To select specific items, double-click a disk to open it, and then select the **Master Boot Record & System Partition** and individual partitions that you want to restore.

IMPORTANT: If restoring to a VMDK Image, both **Master Boot Record & System Partition** and the individual partitions or the restore job fails.

Setting restore options for using Plug-in *Offline Client* to restore data as a VMDK Image

1. On the **Create Selection Set** page, click , and select **VMDK Images** as the **Restore Type**.

   This type of restore provides two additional options—either to restore the VMDK Image to a local directory of the NetVault Server or to restore to a remote VMware ESX or VMware ESXi Server.
2. If you want to restore the VMDK Image to a local directory of the NetVault Server, in the **Local Target Directory** box of the **VMDK Recovery Options** frame, enter a valid path to the location for storing recovered images.

   If this field is left blank, the default is the NetVault "temp" directory, "…/NetVault/tmp."
3. If you want to restore the VMDK Image to a remote ESX or ESXi Server, complete the following steps:
   a. Select the **Restore to Remote ESX Server** check box in the **VMDK Recovery Options** frame.
   b. Enter the values for **ESX Host**, **Port**, **Username**, **Password**, and **Path**.

      These options are required to restore VMDK Images directly to an ESX or ESXi Server. This step is useful when there is no local storage space on the NetVault Server machine or when using ESX or ESXi Server.
      - **ESX Host**: Enter the host name or IP address of the ESX or ESXi Server.
      - **Port**: Enter the remote console port on the ESX or ESXi Server.
      - **Username**: Enter the user name for logging in to the ESX or ESXi Server.
      - **Password**: Enter the password for the specified user name.
      - **Path**: Enter the directory on the ESX or ESXi Server where the VMDK files should be created. This path should always start with a datastore within square brackets—**[datastore] dir**. If the path specified does not exist, the plug-in cannot connect to the ESX or ESXi Server.

Finalizing and submitting the job for using Plug-in *Offline Client* to restore data as a VMDK Image

The final steps include setting additional options on the Schedule, Source Options, and Advanced Options pages, submitting the job, and monitoring the progress through the Job Status and View Logs pages. These pages and options are common to all NetVault Plug-ins. For more information, see the *Quest NetVault Administrator's Guide*.

1. To save the settings, click **Ok**, and then click **Next**.
2. In **Job Name**, specify a name for the job if you do not want to use the default setting.

   Assign a descriptive name that lets you easily identify the job when monitoring its progress. The name can contain alphanumeric and non-alphanumeric characters, but it cannot include non-English characters. On Linux, the name can have a maximum of 200 characters. On Windows, there is no length restriction. However, a maximum of 40 characters is recommended on all platforms.
3. In the **Target Client** list, select the machine on which you want to restore the data.

   TIP: You can also click **Choose**, and then locate and select the applicable client in the **Choose the Target Client** dialog box.
4. Use the **Schedule**, **Source Options**, and **Advanced Options** lists to configure any additional required options.
5. Click **Save** or **Save & Submit**, whichever is applicable.

   You can monitor progress on the **Job Status** page and view the logs on the **View Logs** page. For more information, see the *Quest NetVault Administrator's Guide*.

Creating the VM from the restored VMDK Image

After the restore job has completed, you can create a VM from the restored VMDK file using the VMware Server console.

1. Log in to the VMware Server console.
2. Confirm that the VMDK file is located in the datastore path that was specified under **ESX Server Options**.
3. On the VMware ESX or VMware ESXi Server, browse the datastore and navigate to the specified path.

   The path should contain a file with the extension ".vmdk".
4. In the upper-left corner of the VMware Server console, click the **Create Virtual Machines** icon.
5. When the **Configuration** dialog box is displayed, select **Custom**, and click **Next**.
6. In the **Name** field on the **Name and Location** dialog box, enter a descriptive name for your VM, and click **Next**.
7. When the **Datastore** dialog box is displayed, select a datastore in which to store the VM, and click **Next**.
8. When the **Virtual Machine Version** dialog box is displayed, select the version, and click **Next**.
9. When the **Guest Operating System** dialog box is displayed, select the guest OS, and click **Next**.
10. When the **CPUs** dialog box is displayed, select the number of virtual processors on the VM, and click **Next**.
11. When the **Memory** dialog box is displayed, configure the VM's memory size, and click **Next**.
12. When the **Network** dialog box is displayed, configure the VM's network connections, and click **Next**.
13. When the **SCSI Controller** dialog box is displayed, select the SCSI Controller type, and click **Next**.

    NOTE: NetVault Bare Metal Recovery only supports LSI Logic Parallel SCSI controllers for ESX 4.0 and LSI Logic SCSI for ESX 3.5.
14. When the **Select a Disk** dialog box is displayed, select **Use an existing virtual disk**, and click **Next**.

15 When the **Browse Datastores** dialog box is displayed, navigate to the datastore to locate the VMDK file, select it, and click **OK**.

16 When the **Advanced Options** dialog box is displayed, select any applicable options, and click **Next**.

17 When the **Ready to Complete** dialog box is displayed, review the summary of the VM you created, and then click **Finish**.

18 When the new VM is displayed in the left pane of the VMware console, right-click it, and select **Open Console** from the menu.

19 Turn on the VM from the console.

The Windows logo is displayed following a successful boot.

NOTE: Additional notes for creating the VM from the restored VMDK Image:

- Quest recommends installing VMware Tools before using the VM. For instructions, see the VMware documentation for instructions.
- The **"@"** character cannot be used in the datastore path.
- When restoring to an ESX or ESXi Server, verify that there is sufficient free disk space available on the ESX or ESXi VM. For details on calculating the required disk space, see http://kb.vmware.com/selfservice/microsites/search.do?cmd=displayKC&docType=kc&externalId=1003755
- The block size determines the minimum amount of disk space that any file takes up on Virtual Machine File System (VMFS) datastores. Choose the block size carefully when creating VMFS datastores. The following block sizes are available:
  - 1 MB block size = 256 GB maximum file size
  - 2 MB block size = 512 GB maximum file size
  - 4 MB block size = 1024 GB (1 TB) maximum file size
  - 8 MB block size = 2048 GB (2 TB) maximum file size

Using Plug-in *Offline Client* to recover data to a standby NetVault Bare Metal Recovery Client

If a hardware failure occurs in a specific client machine, you can restore a previous NetVault Bare Metal Recovery backup to a different, preconfigured NetVault Bare Metal Recovery Client, or "standby." To accomplish this restore, use the information provided in the following topics.

Before performing the recovery procedure, consider the following important points:

- This procedure only works when restoring backups performed with the standard Plug-in *Server*.
- The target NetVault Bare Metal Recovery Client, the "standby," for this operation must be preconfigured using the procedure described in Adding a NetVault Bare Metal Recovery Client to the Plug-in Server.
- When attempting this operation, there must be sufficient disk space on the standby machine; otherwise, the operation fails. For more information, see Verifying Disk Geometry and Device Size.
- With this process, the new target machine ***must have*** a similar hardware configuration to that of the originally backed-up machine, regarding the NIC and SCSI cards used. If the hardware in use differs too much from the original, driver software conflicts may occur, resulting in a failed restore.
- Values entered in the **Restore Name** field are case-sensitive. Ensure that the exact NetVault name of the machine to be relocated to is entered in this field; otherwise, the restore fails.
- Relocations of this type ***must be*** restored to the same partition they were backed up from. For example, if a NetVault Bare Metal Recovery backup was taken of a system's **"C:\"** partition on a Windows-based system, the restore must be performed to the relocation target's **"C:\"** partition as well. You cannot restore to a different partition.

- If you are restoring a 64-bit Linux Client that uses the Unified Extensible Firmware Interface (UEFI) with Plug-in *Offline Client* for Linux, add the applicable entry in the UEFI/EFI boot manager the first time that you boot the standby client after the restore. To do so, during the boot routine, press **Esc**, select **Boot Maintenance Manager > Configure boot options > Add boot**, add `HD(1, GPT, <partitionGUID>, <partitionOffset>,<partitionSize>)/EFI/<LinuxDistribution>/grub(64).efi`, and commit the changes.

To recover to a standby NetVault Bare Metal Recovery Client, perform the following steps.

1. In the Navigation pane of the NetVault WebUI, click **Create Restore Job**.
2. On the **Create Restore Job—Choose Saveset** page, select **Plug-in *Server*** from the **Plugin Type** list.
3. To filter the items displayed in the saveset table further, use the **Client**, **Date**, and **Job ID** lists.

   The table displays the saveset name (job title and saveset ID), creation date and time, and size. By default, the list is sorted by creation date.
4. In the saveset table, locate the applicable client, and select the applicable item.
5. Click **Next**.
6. On the **Create Selection Set** page, select and open the disk to be relocated.
7. Click a disk item, and select **Rename** from the context menu.
8. In the **Rename/Relocate** dialog box, enter the Disk Number of the disk to be restored, and click **Ok**.

   For example, enter 0 for system disk 1, 1 for system disk 2, and so on. Evaluation of the SCSI disks is completed before the IDE disks. So a system with two SCSI disks and two IDE disks would have the numbering 0—SCSI 1, 1—SCSI 2, 2—IDE 1, 3—IDE 2.
9. Repeat Step 7 and Step 8 for each disk you want to relocate.
10. On the **Create Selection Set** page, click , and ensure that **Physical Machine** is the selected **Restore Type**.
11. In the **Restore Name** box, enter the name of the preconfigured NetVault Bare Metal Recovery Client that is to serve as the standby machine.
12. Continue with the restore, as explained previously in Using Plug-in Offline Client to restore data to a physical machine, and submit the job.

4

Using NetVault Bare Metal Recovery Plug-in *Live Client*

- Plug-in Live Client overview
- Configuring Plug-in Server for use with Plug-in Live Client
- Installing and removing Plug-in Live Client
- Backing up data with Plug-in Live Client
- Booting a NetVault Bare Metal Recovery Client with Plug-in Offline Client
- Restoring data with Plug-in Live Client

Plug-in *Live Client* overview

This topic describes how to install, configure, and use Plug-in *Live Client* for backing up and restoring data.

Plug-in *Live Client*, referred to as the Plug-in *Live Client*, is a DR solution that lets you back up and restore a hard disk on a target client, including the OS, applications, system settings, partition information, and data.

- **Backup**: Backup lets you target a Windows-based system, and perform a full and complete backup of its contents while the system remains ***online and available*** to users.
- **Recovery**: Recovery requires that you use the included Plug-in *Offline Client* boot utility to take the protected Windows-based system ***offline***, which allows for complete access to its hard disk for restore operations.

In addition, the Plug-in *Live Client* also provides the following features:

- **VSS-based snapshots (Windows)**: For VSS-enabled applications such as SQL Server, Exchange, and SharePoint, the software uses VSS to quiesce these applications before taking the snapshot. Using VSS to quiesce the applications reduces the amount of application crash recovery that must be performed after recovery of the image file. This method is supported on Windows Server 2012 and later.
- **Eliminate backup 'whitespace'**: This feature lets you back up only the used blocks on the partition. For example, if a machine has a **"C:"** drive of size 10 GB and only 6 GB is used, the plug-in only backs up 6 GB, the used space. This feature saves a considerable amount of time and space.
- **Restore as VMDK Image**: This feature restores the backup of a physical machine to a VMDK Image that can be used to create a VM.

IMPORTANT: This plug-in works with the **Plug-in Server**. Before backing up with the **Plug-in Live Client**, install the Plug-in Server and verify connectivity between target NetVault Bare Metal Recovery Clients and the NetVault Server where Plug-in Server is installed. In addition, the Plug-in Server is required to perform all restores of **Plug-in Live Client** backups.

Plug-in *Live Client* environment prerequisites

The processes required to set up and use the **Plug-in *Live Client*** must be followed in a specific order. The following list offers a rough outline of how to establish a **Plug-in *Live Client*** environment.

- **Required components**: Verify that you have the Plug-in *Server*, Plug-in *Live Client*, and Plug-in *Offline Client*.
- **Configure the Plug-in *Server*.**
  - Install the Plug-in *Server* on the NetVault Server.
  - Create a Plug-in *Offline Client* Boot System, for example, to a writable CD.
  - Add the target NetVault Bare Metal Recovery Clients to the Plug-in *Server* on the NetVault Server.
- **Uninstall previous version of Plug-in *Live Client* for Linux**: If a previous version of the plug-in is installed, it must be removed before proceeding with the installation. For details, see Removing Plug-in Live Client.
- **Verify access to the Plug-in *Server***: Verify that all target NetVault Bare Metal RecoveryClients are accessible to the **Plug-in *Server***. Failure to do so may result in an inability to perform a restore.
  - Boot the target NetVault Bare Metal Recovery Client system with Plug-in *Offline Client*.
  - From the NetVault Server, access the Plug-in *Server* to ensure that the target NetVault Bare Metal Recovery Client is accessible to the Plug-in *Server*.
- **Configure the Plug-in *Live Client*.**
  - Add client machines to be backed up by the Plug-in *Live Client* to the NetVault Server; that is, by using the **Manage Clients** page in the NetVault WebUI.
  - Install the Plug-in *Live Client* on any NetVault Heterogeneous Client machine requiring ***active*** DR backups, for example, the clients added in Step ▪, but not the NetVault Server itself.
- **Perform online backups with the Plug-in *Live Client***: From the NetVault Server, perform online backups as required, of each NetVault Bare Metal Recovery Client using the Plug-in *Live Client*, for example, OS, applications, system settings.
- **Recovery**: Perform an ***offline*** restore to the target NetVault Bare Metal Recovery Client.
  - Boot the target NetVault Bare Metal Recovery Client system with Plug-in *Offline Client*.
  - From the NetVault Server, administer restores to the target NetVault Bare Metal Recovery Client by selecting data included in the Plug-in *Live Client* backups.

Configuring Plug-in *Server* for use with Plug-in *Live Client*

The second phase of setting up the **Plug-in *Server*** involves environment configuration. The topics that follow fully illustrate the procedures that must be followed to complete both of these steps.

- Creating a Plug-in Offline Client Boot System
- Adding a NetVault Bare Metal Recovery Client to the Plug-in Server for use with Plug-in Live Client

NOTE: The only configurations required apply to the use of the Plug-in Server. There are no configuration requirements necessary with the **Plug-in Live Client**, and there are no configuration options available.

Creating a Plug-in *Offline Client* Boot System

The initial backup requirement with the Plug-in *Server*, and all restore operations, require the use of the Plug-in *Offline Client* Boot System to boot the target NetVault Bare Metal Recovery Client. This minimal OS loads to a target machine's memory, rather than to its hard drive. This process leaves the hard drives inactive (offline) and in a suitable state for backup or restore.

The Plug-in *Offline Client* is created on a writable CD. The Plug-in *Server* lets you create a bootable CD that can be used to prepare a client machine for the restore process.

Creating a Linux-based Boot System for use with Plug-in *Live Client*

The following items are required for this procedure:

- VaultOS ISO image—obtained through download
- A writable DVD and CD drive
- A blank DVD and CD
- DVD- and CD-generation software

NOTE: Quest recommends that you shut down all applications running on this machine before starting this procedure

Creating a Linux-based Boot System for use with Plug-in Live Client

1. Download the **Plug-in *Offline Client*** from the Quest website.
2. Note the name and location of this file, for example, "\home\vaultos_x86_v*xxx*.zip," where *xxx* represents the software version number.
3. Insert a blank CD in the writable drive.
4. Create a CD with the CD-generation software using the **"vaultos_x86_v*xxx*.iso"** file.

   For details on this procedure, see the relevant documentation for the CD-generation software in use.

Creating a Windows PE-based Boot System for use with Plug-in *Live Client* for Windows

You can complete this process on any Windows system for which the following requirements are met:

- Windows ADK for Windows 8—obtained through download
- Windows Server 2012 R2 or later system
- **"NetVault Bare Metal Recovery ISO Builder for Plug-in *Offline Client* for Windows"** file—on the Quest NetVault Installation CD or downloaded from the Quest website
- A writable DVD and CD drive
- A blank DVD and CD
- DVD- and CD-generation software

NOTE: Quest recommends that you shut down all applications running on this machine before starting this procedure

Creating a Windows PE-based Boot System for use with Plug-in Live Client for Windows

1. Download the **Windows ADK** for Windows 8 from: http://www.microsoft.com/en-us/download/details.aspx?id=30652
2. Install the **Windows ADK** on a Windows Server 2012 R2 or later system.

   You can use the default directory, C:\Program Files (x86)\Windows Kits\8.0, or a different directory of your choosing.

   IMPORTANT: Installation of Windows ADK also installs Microsoft .NET Framework if it is not already installed. After .NET Framework is installed, the system is automatically restarted.

3 Extract the **"NetVault Bare Metal Recovery ISO Builder for Plug-in *Offline Client for Windows*" file** to the **Windows ADK** machine.

   This step creates two files, **"nvbmrisocreate.exe"** and **"nvbmriso.pkg."**

4 Verify that the path to where you intend to create the ISO image exists.

   If the directory does not exist when you run the next step, the ISO image is not created.

5 To create the Windows PE ISO image, navigate to the directory that contains the extracted **"nvbmrisocreate.exe"** file, type the following at the command prompt, and press **Enter**:

   The following list describes what you can specify for each option:

   - **/TYPE**: If you are working with an earlier version of the Plug-in *Offline Client*, enter **WAIK**. If you are using version 6.1 or later, you can enter **ADK**.
   - **/PKG**: Enter the full path and filename for the Plug-in *Offline Client* .pkg file that you downloaded separately.
   - **/DIR**: Enter the full path to the location of the Windows AIK or ADK directory.
   - **/OUT**: Enter the path where the bootable ISO image should be created.
   - **/ADDDRV**: Enter the full path where the downloaded device drivers are stored.
   - **/BIT:32**: If you must create a backward-compatible version of VaultOS for use with a 32-bit version of Windows PE, enter this option.

   Example:

```
nvbmrisocreate /TYPE:ADK
/PKG:"<pathToFile>\nvbmriso.pkg"
/DIR:"C:\Program Files (x86)\Windows Kits\8.0"
/OUT:"C:\temp\bmr.iso"
/ADDDRV:"C:\Program Files\Down Load Drivers\"
```

6 Insert a blank CD in the writable drive.

7 Create a CD with CD-generation software using the **"bmr.iso"** file generated in Step 5.

Installing VaultOS on a writable CD for use with Plug-in *Live Client*

The VaultOS ISO image lets you create a bootable CD that can be used to prepare a Client machine for the restore process. This procedure can be performed on any machine that meets the following requirements:

The following items are required for this procedure:

- VaultOS ISO image, either from the installation CD or obtained through download
- A writable CD drive
- A blank CD
- CD-generation software

To create the CD, perform the following steps.

NOTE: Quest recommends that you shut down all applications running on this machine before starting this procedure

1 Based on installation type installation CD or downloaded file), navigate to the following directory:

   …\<*OperatingSystem*>\vaultdr\vaultos

2 Locate the CD image file entitled **"vaultos_x86_v*xxx*.iso"** where ***xxx*** indicates the VaultOS software version.

If you are using an installation CD, copy it to the machine's local hard drive. Otherwise, note the directory path to this file.

3 Insert a blank CD in the writable drive.

4 Create a CD with the CD-generation software using the **"vaultos_x86_v*xxx*.iso"** file.

For details on this procedure, see the relevant documentation for the CD-generation software in use.

Adding a NetVault Bare Metal Recovery Client to the Plug-in *Server* for use with Plug-in *Live Client*

To access a NetVault Bare Metal Recovery Client machine correctly for backup and restore, add it to the Plug-in *Server*. After you have added an initial NetVault Bare Metal Recovery Client to the NetVault Server, repeat these steps to add additional clients.

To add a NetVault Bare Metal Recovery Client to the Plug-in Server for use with Plug-in Live Client

1 In the Navigation pane of the NetVault WebUI, click **Create Backup Job**.

2 Next to the **Selections** list, click ✚.

3 On the **NetVault Selections** page, double-click the NetVault Server—with the Plug-in *Server* installed on it—to open it.

4 Click the Plug-in *Server*, labeled **"VaultDR APM,"** and select **Add Client** from the context menu.

5 When the **Add Bare Metal Recovery Plug-in Offline Client** dialog box is displayed, complete the following fields to add the client:

- **Client Name**: The name of the applicable NetVault Bare Metal Recovery Client. NetVault scans the network, looking for available systems that can be added as NetVault Bare Metal Recovery Clients, and displays them in the drop-down list.

  > **IMPORTANT:** The **Client Name** must be the NetVault Bare Metal Recovery Client name exactly as it is displayed on the NetVault Bare Metal Recovery Client machine. If the **Client Name** is not the same, restore jobs may fail.

- **Address(es)**: A comma-separated list of addresses that can either be IP addresses or resolvable network names—for example, 10.55.55.1, Server_1, 10.55.55.2—that see the machine to add.
- **Port Number**: The port used to invoke drdaemon, for example, 15555. The default is 10000.

6 Click **Next**.

After the client is successfully added to the server, a message is displayed.

7 Repeat these steps as required until all NetVault Bare Metal Recovery Clients have been added.

Editing an existing NetVault Bare Metal Recovery Client for use with Plug-in *Live Client*

With a NetVault Bare Metal Recovery Client added to the NetVault Server, the settings made during the original addition process can be edited, if necessary.

Editing an existing NetVault Bare Metal Recovery Client for use with Plug-in Live Client

1 In the Navigation pane, click **Create Backup Job**.

2 Next to the **Selections** list, click ✚.

3 On the **NetVault Selections** page, double-click the NetVault Server—with the Plug-in *Server* installed on it—to open it.

4 To expand the Plug-in *Server* icon, labeled **"VaultDR APM,"** double-click it.

5 Click the applicable **NetVault Bare Metal Recovery Client**, and select **Edit Client** from the context menu.

6 When the **Edit Bare Metal Recovery Plug-in Offline Client** dialog box is displayed, update the applicable values:

- **Client Name**: This field contains the current name for the selected client. Changing this value updates the name of the NetVault Bare Metal Recovery Client in NetVault.
- **Address(es)**: This field contains the IP address originally set for this client. You can change this value or add additional, comma-separated addresses.
- **Port Number**: This field contains the port used to invoke drdaemon, for example, 15555. The default is 10000.

7 To close the dialog box and commit the changes, click **OK**.

Removing a NetVault Bare Metal Recovery Client from use with Plug-in *Live Client*

If you must remove an existing NetVault Bare Metal Recovery Client from the NetVault Server, complete the following procedures.

Removing a NetVault Bare Metal Recovery Client from use with Plug-in Live Client

1 In the Navigation pane, click **Create Backup Job**.

2 Next to the **Selections** list, click ✚.

3 On the **NetVault Selections** page, double-click the NetVault Server—with the Plug-in *Server* installed on it—to open it.

4 Click the Plug-in *Server*, labeled **"VaultDR APM,"** and select **Remove Client** from the context menu.

5 When the confirmation dialog box is displayed, click **Yes**.

Installing and removing Plug-in *Live Client*

The **Plug-in *Server*** must be installed on a NetVault Server, which is completed through the Manage Clients page.

- Installing or upgrading Plug-in Server for use with Plug-in Live Client
- Adding Plug-in Live Clients for use with Plug-in Live Client
- Installing or upgrading Plug-in Live Client
- Upgrading Plug-in Live Client
- Removing Plug-in Live Client

Installing or upgrading Plug-in *Server* for use with Plug-in *Live Client*

Before installing the Plug-in *Live Client*, install the **Plug-in *Server***. Before installing the **Plug-in *Server***, verify that the following requirements have been met:

- The Server version of the NetVault software must be installed on at least one machine.
- The NetVault Bare Metal Recovery Client machine—the target of the backup or restore—must have a supported operating system installed.

IMPORTANT: For the Plug-in Server to function correctly, all its associated components must be the proper version; that is, version "X" of the **Plug-in Server** only works with its appropriate version of Plug-in *Live Client*. For details on supported versions, see the *Quest NetVault Compatibility Guide*.

Installing or upgrading Plug-in Server for use with Plug-in Live Client

1. From the machine acting as the NetVault Server, access the **NetVault Configuration Wizard** or **Manage Clients** page.

   NOTE: If the selected clients are all the same type, you can use the configuration wizard to install the plug-in on multiple clients at the same time. When you select multiple clients, verify that the plug-in binary file is compatible with the OS and platforms of the target clients. From the **Manage Clients** page, you can only select one client for plug-in installation.

   - To access the **NetVault Configuration Wizard** page:
     a. In the Navigation pane, click **Guided Configuration**.
     b. On the **NetVault Configuration Wizard** page, click **Install Plugins**.
     c. On the next page, select the applicable clients.
   - To access the **Manage Clients** page:
     a. In the Navigation pane, click **Manage Clients**.
     b. On the **Manage Clients** page, select the machine that contains the NetVault Server, and click **Manage**.
     c. On the **View Client** page, click the **Install Plugin** button ( ).
2. Click **Choose Plug-in File**, navigate to the location of the **".npk"** installation file for the plug-in, for example, on the installation CD or the directory to which the file was downloaded from the website.

   Based on the operating system (OS) in use, the path for this software may vary on the installation CD.
3. Select the file entitled **"drc-*x-x-x-x*.npk,"** where **xxxx** represents the version number and platform, and click **Open**.

   IMPORTANT: If you are using the Quest NetVault Installation CD to install a plug-in to a UNIX system, you might have to mount the CD drive before you can access the disk. For instructions on how to accomplish this step, see the relevant operating system's documentation. This issue also applies to accessing files for other procedures required for installation of NetVault Bare Metal Recovery.
4. To begin installation, click **Install Plugin**.

   After the plug-in is successfully installed, a message is displayed.

Adding Plug-in *Live Client*s for use with Plug-in *Live Client*

After the **Plug-in *Server*** is installed on the NetVault Server, the next step is to add the client machines that are to be backed up using the Plug-in *Live Client*. This step is accomplished by using the Manage Clients page of the NetVault WebUI on the NetVault Server. For complete details on the use of this window to add clients to the NetVault Server, see the *Quest NetVault Administrator's Guide*.

With the desired clients added, the Plug-in *Live Client* can be installed remotely from the NetVault Server.

Installing or upgrading Plug-in *Live Client*

Install Plug-in *Live Client* on each NetVault Heterogeneous Client from which Plug-in *Live Client* functionality is desired; that is, if attempting to conduct a Plug-in *Live Client* backup of a remote NetVault Heterogeneous Client, this plug-in ***must be*** installed on that client.

Before installing the Plug-in *Live Client*, verify that the following requirements have been met:

- At least the Client version of NetVault software must be installed.
- The client machine—the target of the backup or restore—must be running a supported Windows platform. For details on the Windows platforms supported by the Plug-in *Live Client*, see the *Quest NetVault Compatibility Guide*.
- Approximately 10–20 percent of the hard drive's space must remain free and available for use.
- The **Plug-in *Server*** must be installed on the NetVault Server.
- The system to serve as the NetVault Bare Metal Recovery Client must have been added to the NetVault Server by using the Manage Clients page, as explained in Adding Plug-in Live Clients for use with Plug-in Live Client.

NOTE: Before you upgrade Plug-in *Live Client* for Linux from version 12.x or earlier to 14.0, uninstall the 12.x or earlier instance of the plug-in.

To install or upgrade Plug-in Live Client

1. From the machine acting as the NetVault Server, access the **NetVault Configuration Wizard** or **Manage Clients** page.

   NOTE: If the selected clients are all the same type, you can use the configuration wizard to install the plug-in on multiple clients at the same time. When you select multiple clients, verify that the plug-in binary file is compatible with the OS and platforms of the target clients. From the **Manage Clients** page, you can only select one client for plug-in installation.

   - To access the **NetVault Configuration Wizard** page:
     a. In the Navigation pane, click **Guided Configuration**.
     b. On the **NetVault Configuration Wizard** page, click **Install Plugins**.
     c. On the next page, select the applicable client—one or more of the clients added in Adding Plug-in Live Clients for use with Plug-in Live Client.
   - To access the **Manage Clients** page:
     a. In the Navigation pane, click **Manage Clients**.
     b. On the **Manage Clients** page, select the applicable client (one of the clients added in Adding Plug-in Live Clients for use with Plug-in Live Client), and click **Manage**.
     c. On the **View Client** page, click the **Install Plugin** button ( ).
2. Click **Choose Plug-in File**, navigate to the location of the **".npk"** installation file for the plug-in, for example, on the installation CD or the directory to which the file was downloaded from the website.

Based on the operating system (OS) in use, the path for this software may vary on the installation CD.

3 Select the file entitled **"drw-*x*-*x*-*x*-*x*.npk"** for Windows or **"drx-xxxx.npk"** for Linux, where **xxxx** represents the version number and platform, and click **Open**.

4 To begin installation, click **Install Plugin**.

After the plug-in is successfully installed, a message is displayed.

Upgrading Plug-in *Live Client*

1 Uninstall the previous version of Plug-in *Live Client*; for details, see Removing Plug-in Live Client.

2 Install Plug-in *Live Client*; for details, see Installing or upgrading Plug-in Live Client.

IMPORTANT: After completing the upgrade process, re-create backup and restore jobs.

Removing Plug-in *Live Client*

1 In the Navigation pane, click **Manage Clients**.

2 On the **Manage Clients** page, select the applicable NetVault Heterogeneous Client, and click **Manage**.

3 In the **Installed Software** table on the **View Client** page, select the applicable plug-in for removal, for example, **Plug-in *Live Client* for Windows**, and click the **Remove Plugin** button ( ).

4 In the **Confirm** dialog box, click **Remove**.

Backing up data with Plug-in *Live Client*

Backups of a target NetVault Bare Metal Recovery Client are broken down into a two-part process. The topics that follow illustrate all the steps used to perform both phases of the Plug-in *Live Client* backup process.

- Prerequisites for backing up data with Plug-in Live Client for Windows
- Performing an online backup of data using Plug-in Live Client for Windows

Prerequisites for backing up data with Plug-in *Live Client* for Windows

This topic documents any prerequisite procedures that must be followed, before performing a backup with the Plug-in *Live Client*.

The following limitations apply to backups performed with the Plug-in *Live Client* for Windows:

- Backup of Dynamic Disks is not supported.
- Backup of Active Directory is not supported.
- The Plug-in *Live Client* checks for the required VMware driver during a backup. If the required driver is not present, the backup job completes with warnings. If recovery to a VMDK Image is not intended, the VMware driver is not required and you can update the configuration file to disable the warning.
  - **To update the configuration file, perform the following steps:**
    a Locate and open the **"nvdrw.cfg"** file in a text editor.

    This file is located in **\\NetVault\config**. If the file does not exist, you can create it.

b Add the following section:

```
[VM Option]
CheckVmDriver=FALSE
```

c Save and close the file.

- **To install the VMware device driver, perform the following steps:**

  a Download the VMware drivers from the Quest website.

  NOTE: For VMDK Image recovery, only SCSI drivers are supported.

  b Copy the required device driver, for example, **"vm_lsi_2012.inf,"** to the physical machine.

  c To install the required device driver on the physical machine, locate the file on the physical machine.

  d Right-click it, and select **Install** from the menu.

  e When the **Hardware Installation** warning message is displayed, click **Continue Anyway**.

  f Reboot the system for the new settings to take effect.

- If the space allocated for shadow copies on the volume is insufficient, the oldest persistent shadow copy may be lost when you perform a backup. For information about shadow copies and how they are implemented, see the MSDN Library page at: http://msdn.microsoft.com/en-us/library/bb968832(VS.85).aspx
- For instructions on allocating space for shadow copies, see: http://technet.microsoft.com/en-us/library/cc786104.aspx

Verifying access to the Plug-in *Server* for use with Plug-in *Live Client*

Before using the Plug-in *Live Client* to perform active backups of a target NetVault Bare Metal Recovery Client, verify that the NetVault Bare Metal Recovery Client is bootable with Plug-in *Offline Client*, and that it is accessible to the **Plug-in *Server***. This procedure is performed to ensure that the target NetVault Bare Metal Recovery Client is accessible at restore time. Note the following:

- Failure to perform this verification process may result in the inability to restore backups taken with the Plug-in *Live Client*.
- You only need to perform this procedure ***once*** for a target NetVault Bare Metal Recovery Client, unless its networking hardware is changed later. If so, you must perform these procedures again.
- This procedure must be performed for each NetVault Bare Metal Recovery Client that is to be backed up with the Plug-in *Live Client*.

Part 1: Boot the NetVault Bare Metal Recovery Client with Plug-in *Offline Client*

Boot the target NetVault Bare Metal Recovery Client with the Plug-in *Offline Client* to prepare it for the backup. To complete the boot routine, review all the steps in Booting a NetVault Bare Metal Recovery Client with Plug-in Offline Client.

Part 2: Verify access to the NetVault Bare Metal Recovery Client

1 After you have booted the NetVault Bare Metal Recovery Client using Plug-in *Offline Client*, outlined in Booting a NetVault Bare Metal Recovery Client with Plug-in Offline Client, access the NetVault Server and start the NetVault WebUI.

2 Access the **NetVault Backup** window, and double-click the NetVault Server—the system containing the **Plug-in *Server***—to open it.

3 Open the **Plug-in *Server*** by double-clicking it.

4 Locate the appropriate NetVault Bare Metal Recovery Client displayed under the plug-in, and double-click it to open it.

   One of two results occurs:

   - **System disks are revealed**: If selectable disks are revealed, you have verified that the NetVault Bare Metal Recovery Client is accessible.
   - **An error message is revealed**: If a dialog box displays stating **"Failed to connect to client,"** the NetVault Bare Metal Recovery Client is not accessible. This issue occurs for any number of reasons. The most common reason is that the networking hardware was not correctly configured during boot of the NetVault Bare Metal Recovery Client with Plug-in *Offline Client*. Reboot the target NetVault Bare Metal Recovery Client with Plug-in *Offline Client*, outlined in Booting a NetVault Bare Metal Recovery Client with Plug-in Offline Client, and ensure that the proper network-related values are used.

Performing an online backup of data using Plug-in *Live Client* for Windows

As noted in previous topics, the Plug-in *Live Client* lets you back up full systems and individual partitions contained within that system, while they remain online and active.

The following topics describe the steps required to complete a successful backup with Plug-in *Live Client*:

- Selecting data for a backup with Plug-in Live Client
- Setting backup options for a backup with Plug-in Live Client
- Finalizing and submitting the job for a backup with Plug-in Live Client

Selecting data for a backup with Plug-in *Live Client*

You must use sets—Backup Selection Set, Backup Options Set, Schedule Set, Target Set, and Advanced Options Set—to create a backup job and create a DR image. For more information, see the *Quest NetVault Administrator's Guide*.

To select data for a backup with Plug-in Live Client for Windows using Windows Server 2012 or later

1 In the Navigation pane of the NetVault WebUI running on the NetVault Server, click **Create Backup Job**.

   You can also start the wizard from the Guided Configuration link. In the Navigation pane, click **Guided Configuration**. On the **NetVault Configuration Wizard** page, click **Create backup jobs**.

2 In **Job Name**, specify a name for the job.

   Assign a descriptive name that lets you easily identify the job when monitoring its progress or restoring data. The job name can contain alphanumeric and non-alphanumeric characters, but it cannot include non-English characters. On Windows, there is no length restriction. However, a maximum of 40 characters is recommended on all platforms.

3 Next to the **Selections** list, click ✚.

4 Double-click the NetVault Client that is to serve as a target for a DR backup, that is, a machine containing an installation of the Plug-in *Live Client* for Windows, to open it.

5 In the list of installed plug-ins, double-click the client that you want to back up, for example, the client on which the Plug-in *Live Client* is installed)

6 To open the Plug-in *Live Client* and display the hard disks on the client system, double-click the Plug-in *Live Client*.

7 Select one of the following:

- To select the entire disk for a backup, click the box to the left of the disk title.
- To select specific items, double-click a disk to open it. Individual partitions are displayed and made available for selection. Information about each partition is displayed; for example, the partition number; the drive letter assigned—**"C:"**, **"D:"**; the file system—NTFS, HPFS. Select the items that you want to back up. Selected items contain a green check, items that are not selected are blank, and omitted items contain a red cross.

8 Click **Save**, enter a name in the **Create New Set** dialog box, and click **Save**.

The name can contain alphanumeric and non-alphanumeric characters, but it cannot include non-English characters. On Windows, there is no length restriction; however, a maximum of 40 characters is recommended.

Setting backup options for a backup with Plug-in *Live Client*

The next step involves creating the Backup Options Set.

To set backups options for a backup with Plug-in Live Client

1 If you are using Windows Server 2012 or later and you do *not* want to back up only used blocks on a partition, click ✚ next to the **Plugin Options** list.

2 Clear the **Back up used blocks only for NTFS partitions** option.

This option lets you back up only the used blocks on the partition, which can save a considerable amount of space and time. For example, if a machine has a 10 GB **"C:"** drive and only 6 GB is used, selecting this option backs up 6 GB because this amount is the actual used space. The **Back up used blocks only for NTFS partitions** option is selected by default. If you clear this option, a discrepancy (4 K) between the backup data and the size of the NTFS volume might be reported in the binary log; this feature is working as intended, and does not affect a restore.

3 Click **Save** to save the set.

4 In the **Create New Set** dialog box, specify a name for the set, and click **Save**.

The name can contain alphanumeric and non-alphanumeric characters, but it cannot include non-English characters. On Windows, there is no length restriction; however, a maximum of 40 characters is recommended.

Finalizing and submitting the job for a backup with Plug-in *Live Client*

The final steps include setting additional options on the Schedule, Target Storage, and Advanced Options pages, submitting the job, and monitoring the progress through the Job Status and View Logs pages. These pages and options are common to all NetVault Plug-ins. For more information, see the *Quest NetVault Administrator's Guide*.

To finalize and submit the job for a backup with Plug-in Live Client

1 Use the **Schedule**, **Target Storage**, and **Advanced Options** lists to configure any additional required options.

2 Click **Save** or **Save & Submit**, whichever is applicable.

> **TIP:** To run a job that you have already created and saved, select **Manage Job Definitions** in the Navigation pane, select the applicable job, and click **Run Now**.

You can monitor progress on the **Job Status** page and view the logs on the **View Logs** page. For more information, see the *Quest NetVault Administrator's Guide*.

NOTE: Be aware of the following:

- Attempts to perform a Plug-in *Live Client* backup of a system whose hard disk is full or nearly full, may fail. The plug-in requires a portion of the local system's hard disk to synchronize data. If enough free space is not available for this synchronization of data, the backup fails.
- On Windows Server 2012 clients and later, you cannot take two backup snapshots at the same time, for example, if you initiate simultaneous backups on two clients from the same server. Shadow copy creation is serialized. This issue is a known limitation of Volume Shadow Copy Service (VSS).
- The **Master Boot Record (MBR)** and the **Partition Table** items are backed up automatically when a partition (all or individual) is backed up with this plug-in.
- Plug-in *Live Client* does not support DR backups spanning multiple libraries. Attempting to restore a backup job that spans multiple libraries fails.

Booting a NetVault Bare Metal Recovery Client with Plug-in *Offline Client*

When performing backups using the Plug-in *Live Client*, a target NetVault Bare Metal Recovery Client can be active and currently in use by a user, that is, ***online***. However, various operations associated with the Plug-in *Live Client* require that the target NetVault Bare Metal Recovery Client is taken ***offline*** and made accessible to the NetVault Server. This process includes the following operations:

- **Verifying access to the Plug-in *Server***
- **All restore operations**

To bring a target DR system to this offline state, the Plug-in *Offline Client* is used to load a minimal OS to a target NetVault Bare Metal Recovery Client's memory. The Plug-in *Offline Client* boot routine entails the configuration of network equipment installed on the target NetVault Bare Metal Recovery Client; that is, loading driver software for the system's NIC/SCSI card to memory to use the device and access the system. This boot routine varies based on the version of Plug-in *Offline Client* in use:

Booting with Plug-in *Offline Client*

This process entails the configuration of network equipment installed on the target NetVault Bare Metal Recovery Client; that is, loading driver software for the system's NIC/SCSI card to memory to use the device and access the system.

IMPORTANT: Before starting this procedure, verify the boot order of the target NetVault Bare Metal Recovery Client. The machine's CD drive must be the first source of a boot for this process to work.

Gathering NetVault Bare Metal Recovery Client network information

In this first phase, you gather specific network-related information from the NetVault Bare Metal Recovery Client for use in the boot routine, for example, NIC and SCSI interface values. This requirement includes the following values:

- **IP Address**
- **Network Mask**

- **Gateway**

IMPORTANT: If the target NetVault Bare Metal Recovery Client is configured with multiple NIC/SCSI devices for access, Quest recommends that you gather the preceding information for *each device*. The Plug-in Offline Client boot routine recognizes *all* these devices and requests that you configure each, individually, with this information, but only one of the devices actually must be configured successfully for use.

To obtain network values for Windows

1. Log in locally to the Windows-based NetVault Bare Metal Recovery Client, and start a Command Prompt session.
2. At the prompt, type the following command:

   ```
   ipconfig
   ```

3. In the content that is revealed, locate and record the **IP Address**, **Subnet Mask (Network Mask)**, and **Default Gateway** values.

To obtain network values for Linux

1. Log in locally to the Linux-based NetVault Bare Metal Recovery Client and start a terminal session.
2. At the prompt, enter the following command:

   ```
   ifconfig
   ```

3. In the content that is revealed, locate and record the **IP Address**, **Subnet Mask (Network Mask)**, and **Default Gateway** values.

Booting the NetVault Bare Metal Recovery Client with the Linux-based Plug-in *Offline Client*

With all relevant networking information noted, you can boot the target NetVault Bare Metal Recovery Client.

To boot the NetVault Bare Metal Recovery Client with the Linux-based Plug-in Offline Client

1. Turn off the NetVault Bare Metal Recovery Client, and insert the VaultOS CD; if connected through a USB port, the port must use the 3.0 protocol or earlier.

   On reboot, there is a 5-second delay after the boot prompt is displayed.
2. Press **Enter** to start the sequence immediately.

   A series of dialog boxes appear as various applications are loaded to system memory. The initial load sequence may take several minutes, during which time the screen may appear blank.

   By default, the system uses DHCP for the IPv4 and IPv6 settings. If you want to change the network settings, complete the following steps:

   a. Double-click the **NetCFG** icon on the desktop.

   b. When the **Network Connections** dialog box is displayed, select the connection that you want to change, and click **Edit**.

      IMPORTANT: You can only use one active network interface during the backup and restore operation.

   c. Click the **IPv4 Settings** tab, select **Manual** from the **Method** list, click **Add**, and enter the IP, netmask, and gateway addresses in the applicable fields. Leave the **DNS servers** field blank.

   d. Click the **IPv6 Settings** tab, select **Manual** from the **Method** list, click **Add**, and enter the IP, prefix, and gateway addresses in the applicable fields. Leave the **DNS servers** field blank.

   e. When you are finished, click **Save** to return to the **Network Connections** dialog box, and then click **Close**.

The Client is now prepared for backup or restore.

Booting the NetVault Bare Metal Recovery Client with the Windows PE-based Plug-in *Offline Client*

With all relevant networking information noted, you can boot the target NetVault Bare Metal Recovery Client. To boot from a standard Plug-in *Offline Client* CD, perform the following steps.

NOTE: Booting the NetVault Bare Metal Recovery Client with the Windows PE-based Plug-in *Offline Client* applies only to the Plug-in *Live Client* for Windows.

To boot the NetVault Bare Metal Recovery Client with the Windows PE-based Plug-in Offline Client

1. Turn off the NetVault Bare Metal Recovery Client, and insert the Plug-in *Offline Client* CD; if connected through a USB port, the port must use the 3.0 protocol or earlier.

   On reboot, the NetVault Bare Metal Recovery interface is displayed.

2. When the **BMR Network Configuration** dialog box is displayed, select the applicable option:

   - **Use DHCP** (recommended): To use the Dynamic Host Configuration Protocol (DHCP) to configure the network interface, select this option.
   - **Use Static IP Address**: To enter specific IP addresses, select this option, and enter the addresses in the **IP Address**, **Subnet Mask**, and **Default Gateway** fields.

3. To submit the information, click **Config**, and then click **OK** when the confirmation message is displayed.

4. To close the **BMR Network Configuration** dialog box and start the **NetVault Bare Metal Recovery Agent**, click **Exit**.

   After the network configuration is completed, the agent is started and the initialization process is completed. The NetVault Bare Metal Recovery Client is now prepared for backup or restore.

   You can use the list preceding the **Run** button to output information related to the NetVault Bare Metal Recovery GUI when you issue the **Run** command.

   Also, the information displayed in the text window is automatically exported to the **"x:\questbmr\bmr_gui.log"** file.

Restoring data with Plug-in *Live Client*

The restore of data backed up with the Plug-in *Live Client* is handled by the **Plug-in *Server*.** Backups performed using the Plug-in *Live Client* are revealed beneath the **Plug-in *Server*** node, labeled "**VaultDR APM,**" on the **Create Selection Set** page of the NetVault WebUI.

The topics that follow illustrate all the procedures required to perform a restore of a Plug-in *Live Client* backup.

- Restoring to a physical machine with Plug-in Live Client for Windows
- Restoring data as a VMDK Image with Plug-in Live Client for Windows

IMPORTANT: Verify that the Disk Geometry of the OS targeted by the restore matches the geometry of the source OS that was backed up. If they do not match, for example, the source used 32 sectors per track, and the target uses 63 sectors, an error occurs when the system attempts to start.

Restoring to a physical machine with Plug-in *Live Client* for Windows

The following topic details the procedure required to recover a Plug-in *Live Client* backup to a physical machine with the same hardware specifications as the machine used for the backup.

Prerequisites for restoring to a physical machine with Plug-in *Live Client* for Windows

The restore procedure for a Plug-in *Live Client* backup is a delicate operation. Before setting up and running a restore, the following prerequisites must be met.

BitLocker volumes

Volumes that are encrypted using BitLocker on Windows Server 2012 clients and later lose encryption after restore. If you are using BitLocker, enable encryption again when you restore the machine.

Shadow copies for Windows

Windows uses VSS persistent snapshots to implement shadow copies in Windows Server 2012 and later. When restored, Windows does not properly recognize these shadow copies. They can become orphaned and consume disk space.

Microsoft does not recommend backing up shadow copies. However, the Plug-in *Live Client* performs backups at the block level so there is no way to prevent the backup of snapshot files. Manually delete the snapshot files and enable shadow copies on the recovered volume again.

For instructions on deleting shadow copies, see: http://technet.microsoft.com/en-us/library/cc776119.aspx

For instructions on enabling shadow copies, see: http://technet.microsoft.com/en-us/library/cc776483.aspx

In addition, Quest recommends limiting the amount of space allocated to shadow copies to 300 megabytes (MB). This step deletes the cache files. Alternatively, disable shadow copies.

For more information on Microsoft-recommended best practices for shadow copies, see: http://technet.microsoft.com/en-us/library/cc753975.aspx

Windows disk management

Windows Server 2012 and later automatically assigns drive letters to new-found partitions following a restore. This behavior can be controlled by using the **diskpart.exe** command. For more information, see http://technet.microsoft.com/en-us/library/cc773140.aspx.

Ensure that device filenames match

The target device name on the NetVault Bare Metal Recovery Client, for example, **"Disk 0 (IDE),"** must be the same as it was at the time of backup.

Boot the NetVault Bare Metal Recovery Client with Plug-in *Offline Client*

Boot the target NetVault Bare Metal Recovery Client with the Plug-in *Offline Client* to prepare it for the restore of a DR image. To complete the boot routine, perform the steps covered in Booting a NetVault Bare Metal Recovery Client with Plug-in Offline Client.

Verify access to the target NetVault Bare Metal Recovery Client

The NetVault Bare Metal Recovery Client machine that is to serve as a target for the restore must be accessible to the **Plug-in *Server***. The topic that follows outlines the required steps for this verification.

NOTE: Quest recommends that the target machine for the restore has the same hardware configuration as the original machine.

1. With the NetVault Bare Metal Recovery Client booted with Plug-in *Offline Client*, access the NetVault Server, and start the NetVault WebUI.
2. Access the **NetVault Backup** window to verify that the applicable client machine has been added as a NetVault Bare Metal Recovery Client.
    a. Open the Plug-in *Server* to reveal existing clients.
    b. Locate and right-click the applicable NetVault Bare Metal Recovery Client, and select **Edit** from the menu.
    c. When the **Edit Bare Metal Recovery Client** dialog box is displayed, verify that the data is correct or change it as required.
    d. If the NetVault Bare Metal Recovery Client is added correctly, continue to the next topic, Restore procedure for restoring data with Plug-in Live Client; otherwise, proceed to the following step.
3. Add the applicable NetVault Bare Metal Recovery Client.

    For detailed instructions, see Adding a NetVault Bare Metal Recovery Client to the Plug-in Server for use with Plug-in Live Client.
4. Close the **NetVault Backup** window of the Plug-in *Server*, and continue to the Restore procedure for restoring data with Plug-in Live Client topic.

Restore procedure for restoring data with Plug-in *Live Client*

The following topics illustrate how to restore a Plug-in *Live Client* backup to a physical machine.

- Selecting data for a restore with Plug-in Live Client
- Setting restore options for restoring data with Plug-in Live Client
- Finalizing and submitting the job for restoring data with Plug-in Live Client

Selecting data for a restore with Plug-in *Live Client*

1. With the NetVault Bare Metal Recovery Client booted with Plug-in *Offline Client*, access the NetVault Server, and start the NetVault WebUI.
2. In the Navigation pane, click **Create Restore Job**.
3. On the **Create Restore Job—Choose Saveset** page, select **Plug-in *Server*** from the **Plugin Type** list.
4. To filter the items displayed in the saveset table further, use the **Client**, **Date**, and **Job ID** lists.

   The table displays the saveset name (job title and saveset ID), creation date and time, and size. By default, the list is sorted by creation date.
5. In the saveset table, locate the applicable client, and select the applicable item.

   When you select a saveset, the following details are displayed in the **Saveset Information** area: Job ID, job title, server name, client name, plug-in name, saveset date and time, retirement setting, Incremental Backup or not, Archive or not, saveset size, and snapshot-based backup or not.
6. When the backed-up NetVault Bare Metal Recovery Client machine is displayed, double-click it to open it and list the disks that were backed up.
7. On the **Create Selection Set** page, locate each applicable disk, and click the box to its left to select it for a restore.

   You can also expand each disk to view its contents. To open the applicable disk, double-click it. With a disk open, individual items can be selected for restore if desired. Selectable items for a restore consist of:

   - **Master Boot Record and System Partition**
   - **Individual Partitions**
8. Click **Next**.

Setting restore options for restoring data with Plug-in *Live Client*

1. On the **Create Selection Set** page, click , and select **Physical Machine**—the default—as the **Restore Type**.

   When **Physical Machine** is selected, the **Physical Recovery Options** frame containing the **Restore Name** field is shown. The default is the NetVault name for the NetVault Bare Metal Recovery Client from which this backup was originally performed (based on the saveset selected on the **Create Selection Set** page). This name is associated with the client created under the Plug-in *Server*. You can use this field to relocate restored data to a standby NetVault Bare Metal Recovery Client, if necessary. For complete details on this procedure and the use of this option, see Using Plug-in Offline Client to recover data to a standby NetVault Bare Metal Recovery Client.
2. For Windows, select the applicable driver-related options; these options support using different hardware during a restore:

   - **Inject Boot-Critical Device Driver**: If you are restoring to different hardware that also uses a different mass storage controller, select this option. After you select this option, the **Boot-Critical Driver Directory** and **Driver Injection Only** options are available.

- **Boot-Critical Driver Directory**: If you selected the **Inject Boot-Critical Device Driver** option, enter the complete path to the local drive where the drivers for the mass storage controller are stored.
- **Driver Injection Only**: If you previously completed a restore but pointed to an incorrect location in the **Boot-Critical Driver Directory** field, select this option to run the driver-injection portion of the restore process again. This option eliminates the need to restore the data again, but lets you inject the correct drivers. Check that you enter the correct path in the **Boot-Critical Driver Directory** field. By default, the **Inject Boot-Critical Device Driver** option remains selected; do not clear it as this option prevents the **Driver Injection Only** option from working.

Finalizing and submitting the job for restoring data with Plug-in *Live Client*

The final steps include setting additional options on the Schedule, Source Options, and Advanced Options pages, submitting the job, and monitoring the progress through the Job Status and View Logs pages. These pages and options are common to all NetVault Plug-ins. For more information, see the *Quest NetVault Administrator's Guide*.

1. To save the settings, click **Ok**, and then click **Next**.
2. In **Job Name**, specify a name for the job if you do not want to use the default setting.

   Assign a descriptive name that lets you easily identify the job when monitoring its progress. The job name can contain alphanumeric and non-alphanumeric characters, but it cannot include non-English characters. On Windows, there is no length restriction; however, a maximum of 40 characters is recommended.
3. In the **Target Client** list, select the **NetVault Server** from the list of machines; restores of Plug-in *Live Client* backups ***must be*** routed through the NetVault Server.

   TIP: You can also click **Choose**, and then locate and select the applicable client in the **Choose the Target Client** dialog box.

   This step sets the chosen machine as the intended target. This setting works in tandem with the **Restore Name** option to route the restore properly.
4. Use the **Schedule** and **Advanced Options** lists to configure any additional required options.
5. Click **Save** or **Save & Submit**, whichever is applicable.

   You can monitor progress on the **Job Status** page and view the logs on the **View Logs** page. For more information, see the *Quest NetVault Administrator's Guide*.

   NOTE: Be aware of the following:

   - When entering a name in the **Restore Name** field, ensure that the value used is the ***NetVault machine name*** for the target machine, taking case sensitivity into account. The NetVault machine name can be found in the Manage Clients page.
   - As mentioned earlier, route a restore of this type through the NetVault Server to use its locally installed **Plug-in *Server*** components. This step writes all restored data to the machine named in the **Restore Name** field, ***not*** to the NetVault Server.
   - If you select either of the inject driver-related options, NetVault Bare Metal Recovery attempts to inject the drivers into every disk during the restore process.
   - After you restore the system, it displays the Windows Error Recovery screen when it is started the first time. This behavior is expected, and you can opt to start Windows normally.

Restoring data as a VMDK Image with Plug-in *Live Client* for Windows

The following topic details the procedures required to recover a Plug-in *Live Client* backup to a VMDK Image, which you can then attach to a VM created from a VMware. This process lets you convert the backup of a physical machine to a VM.

Plug-in *Server* must be installed on the NetVault Server.

This procedure includes the steps outlined in the following topics:

- Selecting data for a restore as a VMDK Image with Plug-in Live Client for Windows
- Setting restore options for a restore as a VMDK Image with Plug-in Live Client for Windows
- Finalizing and submitting the job for a restore as a VMDK Image with Plug-in Live Client for Windows
- Creating the VM for a restore as a VMDK Image with Plug-in Live Client for Windows

Selecting data for a restore as a VMDK Image with Plug-in *Live Client* for Windows

1. In the Navigation pane of the NetVault WebUI on the NetVault Server, click **Create Restore Job**.
2. On the **Create Restore Job—Choose Saveset** page, select **Plug-in *Server*** from the **Plugin Type** list.
3. To filter the items displayed in the saveset table further, use the **Client**, **Date**, and **Job ID** lists.

   The table displays the saveset name (job title and saveset ID), creation date and time, and size. By default, the list is sorted by creation date.
4. In the saveset table, locate the applicable client, and select the applicable item.

   When you select a saveset, the following details are displayed in the **Saveset Information** area: Job ID, job title, server name, client name, plug-in name, saveset date and time, retirement setting, Incremental Backup or not, Archive or not, saveset size, and snapshot-based backup or not.
5. Click **Next**.
6. On the **Create Selection Set** page, locate each applicable disk, and click the box to its left to select it for a restore.

   You can also expand each disk to view its contents. To open the applicable disk, double-click it. With a disk open, individual items can be selected for restore if desired. Selectable items for a restore consist of:

   - **Master Boot Record and System Partition**
   - **Individual Partitions**

   IMPORTANT: If restoring to a VMDK Image, select both **Master Boot Record & System Partition** and the individual partitions or the restore job fails.

Setting restore options for a restore as a VMDK Image with Plug-in *Live Client* for Windows

1. On the **Create Selection Set** page, click , and select **VMDK Images** as the **Restore Type**.

   This type of restore provides two additional options—either to restore the VMDK Image to a local directory of the NetVault Server or to restore to a remote VMware ESX or VMware ESXi Server.
2. If you want to restore the VMDK Image to a local directory of the NetVault Server, in the **Local Target Directory** box of the **VMDK Recovery Options** frame, enter a valid path to the location for storing recovered images.

   - Restore the VMDK Image to a local directory of the NetVault Server.

     From the **VMDK Recovery Options**, enter a valid path in the **Local Target Directory** field for storing the recovered images. If this field is left blank, the default is the NetVault temp directory, **"…/NetVault/tmp"**.
   - Restore the VMDK Image directly to a remote ESX or ESXi Server. This process is useful when there is no space on the local storage on the NetVault Server machine or when users are using an ESX or ESXi Server.

a From the **VMDK Recovery Options**, select **Restore to Remote ESX Server**.

b Enter the values for **ESX Host**, **Port**, **Username**, **Password**, and **Path**.

- **ESX Host**: Enter the host name of the IP address of the ESX or ESXi Server.
- **Port**: Enter the remote console port on the ESX or ESXi Server.
- **Username**: Enter the user name for logging in to the ESX or ESXi Server.
- **Password**: Enter the password for the specified user name.
- **Path**: Enter the directory on the ESX or ESXi Server where the VMDK files should be created. This path should always start with a datastore within square brackets: **[datastore] dir**. If the path specified does not exist, the plug-in cannot connect to the ESX or ESXi Server.

Finalizing and submitting the job for a restore as a VMDK Image with Plug-in *Live Client* for Windows

The final steps include setting additional options on the Schedule, Source Options, and Advanced Options pages, submitting the job, and monitoring the progress through the Job Status and View Logs pages. These pages and options are common to all NetVault Plug-ins. For more information, see the *Quest NetVault Administrator's Guide*.

1 To save the settings, click **Ok**, and then click **Next**.

2 In **Job Name**, specify a name for the job if you do not want to use the default setting.

Assign a descriptive name that lets you easily identify the job when monitoring its progress. The job name can contain alphanumeric and non-alphanumeric characters, but it cannot include non-English characters. On Windows, there is no length restriction; however, a maximum of 40 characters is recommended.

3 To use the Plug-in *Server* components installed on the NetVault Server, in the **Target Client** list, select the NetVault Server from the list of machines

> **TIP:** You can also click **Choose**, and then locate and select the applicable client in the **Choose the Target Client** dialog box.

Restores of Plug-in *Live Client* backups ***must*** be routed through the NetVault Server. This step sets the chosen machine as the intended target. This setting works in tandem with the **Restore Name** option to route the restore properly.

4 Use the **Schedule** and **Advanced Options** lists to configure any additional required options.

5 Click **Save** or **Save & Submit**, whichever is applicable.

You can monitor progress on the **Job Status** page and view the logs on the **View Logs** page. For more information, see the *Quest NetVault Administrator's Guide*.

Creating the VM for a restore as a VMDK Image with Plug-in *Live Client* for Windows

After the restore job has completed, you can create a VM from the restored VMDK file by using the VMware Server console.

1 Log in the VMware Server console.

2 Confirm that the VMDK file is located in the datastore path that was specified under **ESX Server Options**.

3 On the VMware ESX or VMware ESXi Server, browse the datastore and navigate to the specified path.

The path should contain a file with the extension ".vmdk".

4 In the upper-left corner of the VMware Server console, click the **Create Virtual Machines** icon.

5 When the **Configuration** dialog box is displayed, select **Custom**, and click **Next**.

6 In the **Name** field on the **Name and Location** dialog box, enter a descriptive name for your VM, and click **Next**.

7 When the **Datastore** dialog box is displayed, select a datastore in which to store the VM, and click **Next**.

8 When the **Virtual Machine Version** dialog box is displayed, select the version, and click **Next**.

9 When the **Guest Operating System** dialog box is displayed, select the guest OS, and click **Next**.

10 When the **CPUs** dialog box is displayed, select the number of virtual processors on the VM, and click **Next**.

11 When the **Memory** dialog box is displayed, configure the VM's memory size, and click **Next**.

12 When the **Network** dialog box is displayed, configure the VM's network connections, and click **Next**.

13 When the **SCSI Controller** dialog box is displayed, select the SCSI Controller type, and click **Next**.

> **NOTE:** NetVault Bare Metal Recovery only supports LSI Logic Parallel SCSI controllers for ESX 4.0 and LSI Logic SCSI for ESX 3.5.

14 When the **Select a Disk** dialog box is displayed, select **Use an existing virtual disk**, and click **Next**.

15 When the **Browse Datastores** dialog box is displayed, navigate to the datastore to locate the VMDK file, select it, and click **OK**.

16 When the **Ready to Complete** dialog box is displayed, review the summary of the VM you created, and then click **Finish**.

17 When the new VM is displayed in the left pane of the VMware console, right-click it, and select **Open Console** from the menu.

18 Turn on the VM from the console.

The Windows logo is displayed following a successful boot.

> **NOTE:** Be aware of the following:
>
> - Quest recommends installing VMware Tools before using the VM. For instructions, see the VMware documentation.
> - The **"@"** character cannot be used in the datastore path.
> - When restoring to an ESX or ESXi Server, verify that there is sufficient free disk space available on the ESX or ESXi VM. For details on calculating the required disk space, see: http://kb.vmware.com/selfservice/microsites/search.do?cmd=displayKC&docType=kc&externalId=1003755
> - The block size determines the minimum amount of disk space that any file takes up on VMFS datastores. Choose the block size carefully when creating VMFS datastores. The following block sizes are available:
>   - 1 MB block size = 256 GB maximum file size
>   - 2 MB block size = 512 GB maximum file size
>   - 4 MB block size = 1024 GB (1 TB) maximum file size
>   - 8 MB block size = 2048 GB (2 TB) maximum file size

5

Using NetVault Bare Metal Recovery Plug-in *Live Client* for Linux

- Plug-in Live Client for Linux: an overview
- Installing and removing Plug-in Live Client for Linux
- Generating a DR image for use with Plug-in Live Client for Linux
- Creating the required bootable CD for use with Plug-in Live Client for Linux
- Recovering a DR image for use with Plug-in Live Client for Linux

Plug-in *Live Client* for Linux: an overview

This topic describes how to install, configure, and use Plug-in *Live Client* for Linux for backing up and restoring data.

The Plug-in *Live Client* for Linux supports DR operations for Linux x86 and x86-64-based systems. This plug-in can back up and recover an entire disk including the OS, applications, system settings, partition information, and data. The plug-in enables online backup a full Linux system, thus allowing system administrators to conduct DR backups while eliminating system downtime for users.

After the plug-in is correctly installed and configured, a DR image of a live system can be taken and saved for future recovery if a system failure occurs. During creation of this image, the Plug-in *Live Client* for Linux can automatically include all information pertaining to the networking hardware in use by the target Linux NetVault Bare Metal Recovery Client machine, that is, driver information files. These files are then compiled into a separate CD creation file, **".iso"** file format, that can be saved along with the DR image. At the time of recovery, this file is recovered and used to create a bootable CD, complete with the necessary driver files that were taken from the Linux NetVault Bare Metal Recovery Client. Using this CD, the Linux NetVault Bare Metal Recovery Client can be successfully booted to a state that allows for the recovery of the DR image.

The Plug-in *Live Client* for Linux does *not* support the following:

- Backup of Named Pipe file and Socket file.
- Backup of unmounted partitions.
- Backup of NFS-mounted partitions.
- Backup of EVMS file system.
- For large sparse files, the **BB Agent Timeout** must be configured to a large value. For details on the **BB Agent Timeout** option, see Storix installation for Plug-in Live Client for Linux.

Installing and removing Plug-in *Live Client* for Linux

This topic covers the installation procedures required to install Plug-in *Live Client* for Linux for use with NetVault.

- Prerequisites for installing Plug-in Live Client for Linux
- Installing or upgrading Plug-in Live Client for Linux on each Linux-based NetVault Bare Metal Recovery Client
- Removing Plug-in Live Client for Linux

Prerequisites for installing Plug-in *Live Client* for Linux

Certain prerequisites must be met before a system administrator can successfully install this plug-in. Ensure that all the following points have been accounted for:

- **Plug-in *Live Client* for Linux obtained**: Download the plug-in from the Quest website or the Quest NetVault Installation CD.
- **Separate NetVault Server established**: A machine that does not serve as a Linux NetVault Bare Metal Recovery Client must be set up with the Server version of NetVault installed. This machine must have network connectivity to all desired Linux NetVault Bare Metal Recovery Clients.

  IMPORTANT: NetVault requires that you install the Plug-in Live Client for Linux on *both* the NetVault Server *and* each applicable NetVault Client. Installation of the plug-in is required on the Client machine during backup and on the Server machine during restore. If the NetVault Server is running an OS other than Linux, ensure that the correct version of this plug-in is available for installation on this OS. For example, if the NetVault Server is running Windows, the Windows version of the Plug-in Live Client for Linux is required for installation on the NetVault Server, while the Linux-based version of the plug-in is required for installation on all target NetVault Bare Metal Recovery Clients. If both the NetVault Server and the desired NetVault Bare Metal Recovery Clients are running Linux, only a single version of the plug-in is required.

- **Uninstall previous version of Plug-in *Live Client***: If a previous version of the plug-in is installed, it must be removed before proceeding with the installation. For details, see Removing Plug-in Live Client for Linux.
- **Client machine memory requirement**: All machines that are to serve as NetVault Bare Metal Recovery Clients must have ***at least 128 MB of RAM*** installed.
- **Linux NetVault Bare Metal Recovery Client machines configured as NetVault Clients**: All machines that serve as Linux NetVault Bare Metal Recovery Clients must have ***at least*** the Client version of NetVault installed. Also, each machine must be successfully added to the NetVault Server as NetVault Clients by using the Manage Clients page.

  NOTE: For complete instructions on installing the Server or Client version of NetVault and adding a machine to the NetVault Server to serve as a NetVault Heterogeneous Client, see the *Quest NetVault Administrator's Guide*.

- **100 MB free space on all target machines for plug-in installation**: All machines that the plug-in is to be installed on must have 100 MB of free space to accommodate a third-party DR boot utility application that is used by this plug-in to perform backups and restores.
- **Extra free hard disk space on target NetVault Bare Metal Recovery Clients**: This plug-in uses existing free space on a target NetVault Bare Metal Recovery Client's hard disk to synchronize the backup of currently online files. If a target NetVault Bare Metal Recovery Client's hard disk is full, or nearly full, attempts to perform an online backup may fail.

- **The “genisoimage” or “mkisofs” utility installed and available on all Linux NetVault Bare Metal Recovery Clients**: The plug-in requires installation of either of these components to allow for the creation of **“.iso”** CD creation files from any potential Linux NetVault Bare Metal Recovery Clients. These components may not be automatically available with all installations of Linux.

  To verify that one of these components is installed, issue the following commands:

  ```
  rpm -qa | grep genisoimage
  ```

  ```
  rpm -qa | grep mkisofs
  ```

  If the component ***does not exist*** on an intended Linux NetVault Bare Metal Recovery Client, it can be obtained and installed as follows:

  a Access your copy of the Linux installation media, and locate the **“genisoimage*.rpm”** or **“mkisofs*.rpm”** file.

  b With this file available on the NetVault Bare Metal Recovery Client, that is, through copying the file or direct download, open a terminal session, and navigate to the location of the file.

  c To initiate the installation, enter the following command, and follow the install prompts as they appear:

  ```
  rpm -i <installationFileName>
  ```

- **The “SYSLINUX” package installed (SUSE Linux 9.0, ONLY)**: This version of the Plug-in *Live Client* for Linux uses a specific boot loader application for the creation of the bootable CD that is required for the restore procedure. Default installations of SUSE Linux 9.0 do not offer support for this boot loader application. Therefore, the SYSLINUX package must be installed on all NetVault Bare Metal Recovery Client systems running SUSE Linux 9.0. At time of this publication, this component could be found for download at: http://syslinux.zytor.com
- **The “vim-6.3.84-2.i586.rpm” package installed (SUSE Linux 10, ONLY)**: Backups of SUSE Linux 10 NetVault Bare Metal Recovery Clients fail, unless this package is installed. At time of this publication, this package could be obtained from: http://rpm.pbone.net/index.php3/stat/17/dept/4/idg/Productivity_Editors_Vi
- **Enable RAM file system and RAM disk (initramfs/initrd) support**: Support for ramdisk is enabled by default. If it is not, run **make menuconfig** or **make xconfig** from the kernel source directory and set the **Initial RAM filesystem and RAM disk (initramfs/initrd) support** option under **General setup**. The **.config** parameters are **BLK_DEV_INITRD** and **BLK_DEV_RAM**.

  During a backup, the Plug-in *Live Client* for Linux uses Storix to create a bootable image from the currently running Linux installation. While booting, it tries to load its data into a temporary ramdisk (**root=/dev/ram0**). To complete this process, the booted kernel must have ramdisk support. Because the plug-in uses the same kernel that the previously running system was using, the original kernel must have support for ramdisk enabled.

  If ramdisk support is not enabled, an attempt to boot from the boot image fails with the following messages:

  - “Kernel panic: VFS: Unable to mount root fs on unknown-block(1,0)”
  - Message regarding a failed “__find_get_block_slow()” function

- **Additional configuration for Xen Dom0 machine**: On a Xen Dom0 machine, complete the following steps:

  a Open **“/boot/grub/grub.conf”** and find the section from which the machine was booted.

  b Create a file named **“/storix/config/multibootfile”** with a line specifying the full path to the hypervisor file as shown in the following example:

  ```
  /boot/xen.gz-2.6.18-53.el5
  ```

  If this process is not completed, backups may fail with the following error: “Cannot find the Xen hypervisor file which the system was booted with. Without this process, you cannot install a system. Create the file **/storix/config/multibootfile** with a line specifying the full path to the hypervisor file and recreate the boot media.”

> **IMPORTANT:** NetVault's Plug-in *for Encryption* functionality is not supported for use with this plug-in. Ensure that this functionality is *disabled* before installing and using NetVault Bare Metal Recovery. For details on uninstalling the Plug-in *for Encryption*, see the *Quest NetVault Plug-in for Encryption User's Guide*.

- **Multipath support**: If you intend to use multipath support, verify that your environment meets the following requirements. For more information, see the *Storix System Backup Administrator DM-Multipath Guide*, which is available at http://www.storix.com/download/sbaDM-Multipath.pdf.
  - **Software requirements**: At a minimum, you must have:
    - dm-multipath-tools version 0.4.5, also known as device-mapper-multipath
    - device-mapper version 1.02
    - udev version 039-10
  - **Device-detection requirements**:
    - **Device naming**: The SBAdmin software must be able to recognize your devices before creating a backup. There are multiple ways your multipath devices can be named. How the devices are named depends on the **"user_friendly_names"** setting in **"/etc/multipath.conf,"** aliases set up in **"/etc/multipath.conf,"** and UDEV rules. Multipath support with SBAdmin requires the setting **"user_friendly_names yes"** and that you use a UDEV rule that creates a symbolic link from the device node to the device in **"/dev/mpath."**
    - **Entries in "/etc/fstab"**: Different Linux distributions handle multipath devices differently. One area that can cause problems with the SBAdmin software is the mount entry in the **"/etc/fstab"** file. Some distributions use an underlying path device, which causes problems when the software queries the device for size and geometry. If your **"/etc/fstab"** file is using the **"/dev/disk/by-uuid/*"**—where ***** is a numerical value—naming convention, change the entries to the dm-multipath device name or to use the **"/dev/disk/by-name/*"** naming convention.
    - **Systems with non-English characters in filenames or directories:** If you use non-English characters in filenames or system names, you must update the **"/.stdefaults"** file before completing a backup job. In the **"/.stdefaults"** file, specify the applicable language and set the tar flag to blank. For example, if you are using a system that includes files that use Japanese characters, you must update the file with the following entries:

      ```
      LANG=ja_JP.utf8
      TARFLAGS=
      ```

      > **TIP:** To display a list of supported language values, type: `'locale -a'`

Installing or upgrading Plug-in *Live Client* for Linux on each Linux-based NetVault Bare Metal Recovery Client

1 From the machine acting as the NetVault Server, access the **NetVault Configuration Wizard** or **Manage Clients** page.

> **NOTE:** If the selected clients are all the same type, you can use the configuration wizard to install the plug-in on multiple clients at the same time. When you select multiple clients, verify that the plug-in binary file is compatible with the OS and platforms of the target clients. From the **Manage Clients** page, you can only select one client for plug-in installation.

- To access the **NetVault Configuration Wizard** page:
  a In the Navigation pane, click **Guided Configuration**.
  b On the **NetVault Configuration Wizard** page, click **Install Plugins**.
  c On the next page, select the applicable client, that is, one or more of the Linux-based clients previously added to the NetVault Server as NetVault Clients.
- To access the **Manage Clients** page:
  a In the Navigation pane, click **Manage Clients**.
  b On the **Manage Clients** page, select the applicable client, that is, a Linux-based client previously added to the NetVault Server as a NetVault Client, and click **Manage**.
  c On the **View Client** page, click the **Install Plugin** button ( ).

2 Click **Choose Plug-in File**, navigate to the location of the ***Linux-based version*** of the **".npk"** installation file for the plug-in, for example, on the installation CD or the directory to which the file was downloaded from the website.

Based on the operating system (OS) in use, the path for this software may vary on the installation CD.

3 Select the file entitled **"drx-*x-x-x-x*.npk,"** where **xxxxx** represents the version number and platform, and click **Open**.

4 To begin installation, click **Install Plugin**.

After the plug-in is successfully installed, a message is displayed.

Storix installation for Plug-in *Live Client* for Linux

Installation of this plug-in on the NetVault Server and each Linux Client also creates two additional directories on the machine:

- **/storix**
- **/opt/storix**

These directories contain **Storix SBAdmin**—a third-party DR boot utility application that is used by this plug-in to perform backups and restores. The data contained within these directories is required by this plug-in. Removal of these directories results in the inability to use the plug-in.

When you install the Plug-in *Live Client* for Linux, two additional Storix directories are created—the **Storix Bin** directory and the **Storix Temp** directory.

The **Storix Bin** directory is where the Storix software is installed. With Plug-in *Live Client* for Linux 3.0 and earlier, the **Storix Bin** directory is located in **/opt/storix/bin** by default. With Plug-in *Live Client* for Linux 3.1 and later, the default **Storix Bin** directory is **/usr/bin**—the binaries in this directory set up the correct environment and then call the scripts in **/opt/storix/bin**.

The **Storix Temp** directory contains the **"linuxboot.iso"** file after a successful backup. It resides in **/storix/temp** by default. With Plug-in *Live Client* for Linux 3.0 and earlier, both the **Storix Bin** and **Storix Temp** directory locations can be changed by using NetVault Configurator. With Plug-in *Live Client* for Linux 3.1 and later, only the directory location for **Storix Temp** can be changed through the **VaultDR Linux Online** section on the **Plug-in Options** dialog box. The **Storix Bin** directory can only be changed from the configuration file.

The **BB Agent Timeout** option can also be set through the **VaultDR Linux Online** section on the **Plug-in Options** dialog box. This option indicates the time (in seconds) that the plug-in waits for a Storix request before timing out. The default is 360 seconds.

If you change the location of the **Storix Temp** directory, before performing a DR backup by using the NetVault WebUI, configure the new Storix Temp path in the **Plug-in Options** dialog box.

For example, if you change the **Storix Temp** directory to **/storix/temp222**, perform the following steps.

1. On the Linux Client, create the directory where the Boot Image should reside:

   ```
   mkdir /storix/temp222
   ```

2. In the Navigation pane of the NetVault WebUI, click **Change Settings**.
3. Click **Client Settings**.
4. Select the client on which Plug-in *Live Client* is installed, and click **Next**.
5. On the **Settings** page, click **Plugin Options**.
6. In the **VaultDR Linux Online** section of the dialog box, modify the path and name in the **Storix Temp Directory** field so that it is identical to the path and name created in Step 1.
7. To save the settings, click **Apply**.

Removing Plug-in *Live Client* for Linux

1. In the Navigation pane, click **Manage Clients**.
2. On the **Manage Clients** page, select the applicable machine, that is, the NetVault Server or an NetVault Client with the Plug-in *Live Client* for Linux installed, and click **Manage**.
3. In the **Installed Software** table on the **View Client** page, select the applicable plug-in for removal, for example, **Plug-in *Live Client* for Linux**, and click the **Remove Plugin** button ( ).
4. In the **Confirm** dialog box, click **Remove**.

Removal of associated subdirectories for Plug-in *Live Client* for Linux

As outlined in Storix installation for Plug-in Live Client for Linux, installation of this plug-in on a Linux NetVault Bare Metal Recovery Client creates additional subdirectories that are required for use by this plug-in. The removal process outlined in the previous topic does not automatically remove these additional **"storix"** directories and other related data.

1. From the machine containing the installation of this plug-in, navigate to **/opt/storix/bin**:

   ```
   cd /opt/storix/bin
   ```

2. At the command prompt, issue the following command to remove the remaining directories:

   ```
   ./stuninstall
   ```

3. Respond **"y"** to each prompt that is displayed regarding the removal of user configuration and history files.

   The following shows the screen output for these steps.

   ```
   # cd /opt/storix/bi
   # ./stuninstall
   ```

```
This program will remove Storix System Backup Administrator software
from the system. You may choose to keep the user configuration files in the
/storix directory will not be removed in case you decide to reinstall this or
another version at a later time.

Do you wish to also remove the user configuration and history files
in the data (/storix) directory (y/n)? y

Are you sure you want to remove the software (y/n)? y
Removing system startup configuration ...
Removing program files ...
Removing user data and history files ...

Storix System Backup Administrator has been removed.
```

4 Remove the **/usr/netvault/util/linux** directory by using the following command:

```
rm -irf /usr/netvault/util/linux
```

5 Remove the README files by using the following command:

```
rm -irf /usr/netvault/util/RE*
```

6 Remove the **/usr/netvault/util/stinstall** directory by using the following command:

```
rm -irf /usr/netvault/util/stinstall
```

Generating a DR image for use with Plug-in *Live Client* for Linux

IMPORTANT: Attempts to perform a Plug-in Live Client for Linux backup of a system whose hard disk is full or nearly full, may fail. The plug-in requires a portion of the local system's hard disk to synchronize data. If enough free space is not available for this synchronization of data, the backup fails.

If you changed the default **Storix Temp** directory, described in Storix installation for Plug-in Live Client for Linux, ensure that the new **Storix Temp** directory exists before continuing with the steps in the following topics.

- Selecting data for a backup with Plug-in Live Client for Linux
- Setting backup options for a backup with Plug-in Live Client for Linux
- Finalizing and submitting the job for a backup with Plug-in Live Client for Linux

Selecting data for a backup with Plug-in *Live Client* for Linux

You must use sets—Backup Selection Set, Backup Options Set, Schedule Set, Target Set, and Advanced Options Set—to create a backup job and create a DR image. For more information, see the *Quest NetVault Administrator's Guide*.

1 In the Navigation pane of the NetVault WebUI running on the NetVault Server, click **Create Backup Job**.

You can also start the wizard from the Guided Configuration link. In the Navigation pane, click **Guided Configuration**. On the **NetVault Configuration Wizard** page, click **Create backup jobs**.

2 In **Job Name**, specify a name for the job.

Assign a descriptive name that lets you easily identify the job when monitoring its progress or restoring data. The job name can contain alphanumeric and non-alphanumeric characters, but it cannot include non-English characters. On Linux, the name can have a maximum of 200 characters. However, a maximum of 40 characters is recommended on all platforms.

3 Next to the **Selections** list, click ✚.

4 Double-click the NetVault Client that is to serve as a target for a DR backup, that is, a machine containing an installation of the Plug-in *Live Client* for Linux, to open it.

5 In the list of installed plug-ins, locate the Plug-in *Live Client* for Linux, labeled **"Plug-in *Live Client* for Linux,"** and double-click it to open it.

An icon representing the NetVault Bare Metal Recovery Client is displayed.

6 From this level of the selection tree, select the entire Linux Client for inclusion in a DR backup.

Two items appear as non-selectable for the Linux NetVault Bare Metal Recovery Client machine:

- **Boot Image**: The plug-in scans the Linux NetVault Bare Metal Recovery Client machine and incorporates required system information, that is, NIC card driver files, and various OS data files into a CD creation file—entitled **"linuxboot.iso"**. This file can be restored to the NetVault Server where it would be used to create a bootable CD. This CD is then used to boot the same Linux NetVault Bare Metal Recovery Client the **Boot Image** data was taken from to prepare it for the recovery of its backed-up **System Image** information.
- **System Image**: The plug-in performs a DR backup of the entire client system. This backup includes all system information for the Linux NetVault Bare Metal Recovery Client, including all partition and **Disk Boot Record** information.

  Note the following important points:

  - The **Boot Images** data backup incorporates driver information files from the **/lib/modules** directory on the client machine. Before backing up this data, ensure that proper device information files for all the devices used by the target client are available in the **/lib/modules** directory.

    Note that:

    - The boot CD is unable to load devices for which proper device driver files are not available in the **Boot Images** backup.
    - The boot CD only loads those devices for which the device drivers are supported by the third-party DR boot utility application used by the Plug-in *Live Client* for Linux.
  - Plug-in *Live Client* for Linux does not support the backup of Access Control Lists (ACLs) and attribute information. When a backup of a target Linux system is performed, these details are not included. After the restore of this backup is performed, any ACLs/attributes must be manually recreated.

7 Click **Save**, enter a name in the **Create New Set** dialog box, and click **Save**.

The name can contain alphanumeric and non-alphanumeric characters, but it cannot include non-English characters. On Linux, the name can have a maximum of 200 characters. However, a maximum of 40 characters is recommended on all platforms.

Setting backup options for a backup with Plug-in *Live Client* for Linux

Plug-in *Live Client* for Linux does not support any backup options. Although ✚ is enabled in the WebUI, there are no options to set.

Finalizing and submitting the job for a backup with Plug-in *Live Client* for Linux

The final steps include setting additional options on the Schedule, Target Storage, and Advanced Options pages, submitting the job, and monitoring the progress through the Job Status and View Logs pages. These pages and options are common to all NetVault Plug-ins. For more information, see the *Quest NetVault Administrator's Guide*.

1. Use the **Schedule**, **Target Storage**, and **Advanced Options** lists to configure any additional required options.
2. Click **Save** or **Save & Submit**, whichever is applicable.

   TIP: To run a job that you have already created and saved, select **Manage Job Definitions** in the Navigation pane, select the applicable job, and click **Run Now**.

   You can monitor progress on the **Job Status** page and view the logs on the **View Logs** page. For more information, see the *Quest NetVault Administrator's Guide*.

NOTE: To recover the new Plug-in Live Client for Linux, see Booting the NetVault Bare Metal Recovery Client with the Linux-Based Plug-in *Offline Client*.

Creating the required bootable CD for use with Plug-in *Live Client* for Linux

With a successful DR image taken, the next phase of the DR procedure is the creation of a CD that contains the proper OS and device driver files for the target NetVault Bare Metal Recovery Client to boot this machine when a recovery is required. This required data is included in a **Boot Image** during the backup of a target NetVault Bare Metal Recovery Client. A CD-creation file entitled **"linuxboot.iso"** is created and saved on ***both*** the target NetVault Bare Metal Recovery Client itself and on the piece of media targeted by the backup. This process allows an administrator to select from various different methods to create this CD. Any number of methods can be used to access this data and create this required CD. The following topics cover two example methods that can be used to accomplish this task.

Creating the CD and saving it for future use with Plug-in *Live Client* for Linux

Performed before the need for a recovery, this method lets you create this required CD from the **"linuxboot.iso"** file that was saved ***locally*** on the target NetVault Bare Metal Recovery Client, and then store this CD for later use.

The following items are required to create the CD:

- Writable CD drive—available locally on the target NetVault Bare Metal Recovery Client
- One blank, writable CD
- CD-generation software—installed locally on the target NetVault Bare Metal Recovery Client

This procedure can be performed on any machine that has access to a writable CD drive and the **"linuxboot.iso"** file.

1. From the target NetVault Bare Metal Recovery Client, insert a blank, writable CD into the drive.
2. Start the CD-generation software, and access the **"linuxboot.iso"** file.

   This file resides in the directory named in the **Boot Images Directory** field for this particular backup job; for example, the default is **/storix/temp**. If this value was not changed before backup, the file is located in this directory.

3 Using this file, create the CD using the utilities within the CD-generation software.

> **IMPORTANT:** As CD-generation software varies, no instruction is given here on how to start or administer its use. For complete instructions on generating a CD using an **".iso"** CD creation file, see the relevant software's documentation.

4 With the CD completed, remove it from the drive and label it appropriately so that it can be easily referenced for future use; for example, assign a label corresponding to something specific about the target NetVault Bare Metal Recovery Client, such as its OS-assigned name.

Creating the CD at the time of recovery for use with Plug-in *Live Client* for Linux

With this method, you can create this required CD using data recovered from the actual DR image backup, at the point that a recovery is required.

The following items are required to create the CD:

- Writable CD drive—available locally on the target NetVault Server
- One blank, writable CD
- CD-generation software—installed locally on the target NetVault Server

You must first recover the **Boot Image** data taken from the backup of the target Linux NetVault Bare Metal Recovery Client.

- Selecting data for a restore with Plug-in Live Client for Linux
- Finalizing and submitting a restore with Plug-in Live Client for Linux

Selecting data for a restore with Plug-in *Live Client* for Linux

1 In the Navigation pane of the NetVault WebUI on the NetVault Server, click **Create Restore Job**.

2 On the **Create Restore Job—Choose Saveset** page, select **Plug-in *Live Client* for Linux** from the **Plugin Type** list.

3 To filter the items displayed in the saveset table further, use the **Client**, **Date**, and **Job ID** lists.

The table displays the saveset name (job title and saveset ID), creation date and time, and size. By default, the list is sorted by creation date.

4 In the saveset table, locate the NetVault Client that was configured as the Linux NetVault Bare Metal Recovery Client in question, and select the backup saveset that contains a backup of the **Boot Image** data for the target NetVault Bare Metal Recovery Client.

When you select a saveset, the following details are displayed in the **Saveset Information** area: Job ID, job title, server name, client name, plug-in name, saveset date and time, retirement setting, Incremental Backup or not, Archive or not, saveset size, and snapshot-based backup or not.

5 When the NetVault Client is displayed in the tree, double-click it to reveal the data included in the DR image.

6 Locate the **"linuxboot.iso"** file, and select it for recovery.

> **IMPORTANT:** Only include the **"linuxboot.iso"** file in this recovery job. Any other items selected for recovery during this procedure are not successfully restored.

7 Click **Next**.

Finalizing and submitting a restore with Plug-in *Live Client* for Linux

The final steps include setting additional options on the Schedule, Source Options, and Advanced Options pages, submitting the job, and monitoring the progress through the Job Status and View Logs pages. These pages and options are common to all NetVault Plug-ins. For more information, see the *Quest NetVault Administrator's Guide*.

1 In **Job Name**, specify a name for the job.

Assign a descriptive name that lets you easily identify the job when monitoring its progress. The job name can contain alphanumeric and non-alphanumeric characters, but it cannot include non-English characters. A maximum of 40 characters is recommended.

2 In the **Target Client** list, select the NetVault Server as the target for the restore.

> **TIP:** You can also click **Choose**, and then locate and select the applicable client in the **Choose the Target Client** dialog box.

3 Leave all other options available on the **Schedule**, **Source Options**, and **Advanced Options** lists at their default settings.

4 Click **Save** or **Save & Submit**, whichever is applicable.

You can monitor progress on the **Job Status** page and view the logs on the **View Logs** page. For more information, see the *Quest NetVault Administrator's Guide*.

The file is recovered to **…/tmp** directory on the NetVault Server, where **…** represents the NetVault installation directory.

> **IMPORTANT:** Recovery of the **Boot Image** information, regardless of the Linux NetVault Bare Metal Recovery Client it was performed from, creates a CD-creation file entitled **"linuxboot.iso"** in the **…/tmp** directory. If **Boot Image** information is recovered from an additional Linux NetVault Bare Metal Recovery Client using these steps, its **"linuxboot.iso"** file is restored and *overwrites* any file of the same name in this directory *without warning*. Therefore, Quest recommends that you complete this process for a single Linux NetVault Bare Metal Recovery Client, *before* you try to recover backed-up **Boot Image** information from an additional Linux NetVault Bare Metal Recovery Client.

5 Insert a blank, writable CD into a CD writer that is accessible to the NetVault Server.

6 Start the CD-generation software, access the **"linuxboot.iso"** file that resides in the directory named in Step 1, and create the CD using the necessary utilities within the CD-generation software.

> **NOTE:** As CD-generation software varies, no instruction is given here on how to start or administer its use. For complete instructions on generating a CD using an **".iso"** CD creation file, see the relevant software's documentation.

7 With the CD completed, remove it from the drive, and label it appropriately.

For example, assign a label corresponding to something specific about the target NetVault Bare Metal Recovery Client, such as its OS-assigned name.

> **IMPORTANT:** Provided the hardware configuration in the target Linux NetVault Bare Metal Recovery Client *does not change*, this CD can be saved for future use in booting the client for the recovery of future DR images recorded with this plug-in. However, if new networking hardware is implemented or the device driver files in the client machine change any time, the **Boot Image** data for the client must be backed up again and this procedure must be repeated to create a CD.
>
> The Boot CD is unable to load devices for which proper driver files are not incorporated in the **Boot Image** backup. Quest recommends that you test the boot media on the target Linux NetVault Bare Metal Recovery Client for successful loading of all the devices during boot up process.

Recovering a DR image for use with Plug-in *Live Client* for Linux

The steps required to recover a DR image performed with the Plug-in *Live Client* for Linux vary based on how the data was originally managed during backup. The following topics cover the processes required to complete each of these steps.

IMPORTANT: Plug-in Live Client for Linux version 4.0 cannot be used to restore data that was backed up using a previous version of the Plug-in Live Client. To recover pre-4.0 data, use the same version of the Plug-in Live Client for Linux that was used to back it up.

The Plug-in Live Client for Linux can only process one restore at a time.

The recovery process modifies some of the files. Original copies of the modified files are stored in: **/storix/temp/storix_install**

Restoring data using a DR image with Plug-in *Live Client* for Linux

As noted in the previous topic, you must first set up a recovery job for a Linux NetVault Bare Metal Recovery Client from the NetVault WebUI on the NetVault Server. You must also start this job before you try to boot the Linux NetVault Bare Metal Recovery Client with the created CD.

- Selecting data for a restore with a DR image with Plug-in Live Client for Linux
- Setting restore options for a DR image with Plug-in Live Client for Linux
- Finalizing and submitting the job for a restore with a DR image with Plug-in Live Client for Linux

Selecting data for a restore with a DR image with Plug-in *Live Client* for Linux

1. In the Navigation pane of the NetVault WebUI on the NetVault Server, click **Create Restore Job**.
2. On the **Create Restore Job—Choose Saveset** page, select **Plug-in *Live Client* for Linux** from the **Plugin Type** list.
3. To filter the items displayed in the saveset table further, use the **Client**, **Date**, and **Job ID** lists.

   The table displays the saveset name (job title and saveset ID), creation date and time, and size. By default, the list is sorted by creation date.
4. In the saveset table, locate the NetVault Client that was configured as the Linux NetVault Bare Metal Recovery Client in question, and select the applicable backup saveset—identified by its title, which is the name given to the DR image in the **Job Name** field at the time of backup.

   When you select a saveset, the following details are displayed in the **Saveset Information** area: Job ID, job title, server name, client name, plug-in name, saveset date and time, retirement setting, Incremental Backup or not, Archive or not, saveset size, and snapshot-based backup or not.
5. When the Linux NetVault Bare Metal Recovery Client is displayed in the tree, select the entire DR image.

   Although you can double-click it to reveal its individual contents, all data items must be selected for the restore to work correctly. The browse functionality is only intended to allow you to view the contents of the backup saveset—not select individual items for the recovery.

> **NOTE:** If a disk is comprised of *four* primary partitions, the *fourth* partition is automatically converted to an *extended logical* partition during the recovery. Having a fourth primary partition inhibits the ability to add more partitions to the disk later. By converting the fourth partition to a logical one, you can use additional space on a hard disk to create future partitions, for example, if the recovery is being performed to disk that is larger than the original. There is ***no*** data loss associated with this behavior. You are alerted to this fact during the boot routine in a dialog box of the **System Installation for Linux**; for details on this process, see Booting the target NetVault Bare Metal Recovery Client with the appropriate OS and drivers for use with Plug-in Live Client for Linux.

6 Click **Next**.

Setting restore options for a DR image with Plug-in *Live Client* for Linux

On the **Create Selection Set** page, click to reveal the following fields:

- **Client Hostname**: This field contains the NetVault Machine Name of the Linux NetVault Bare Metal Recovery Client that was the target of the DR backup.
- **Restore Server Port**: This field lets you choose the port for incoming connections on the server. Usually, the default port of 10666 is available. Follow the procedure under Reconfiguring the communication port for the target NetVault Bare Metal Recovery Client for use with Plug-in Live Client for Linux (optional) if a different port is required.

Finalizing and submitting the job for a restore with a DR image with Plug-in *Live Client* for Linux

The final steps include setting additional options on the Schedule, Source Options, and Advanced Options pages, submitting the job, and monitoring the progress through the Job Status and View Logs pages. These pages and options are common to all NetVault Plug-ins. For more information, see the *Quest NetVault Administrator's Guide*.

1 To save the settings, click **Ok**, and then click **Next**.

2 In **Job Name**, specify a name for the job.

Assign a descriptive name that lets you easily identify the job when monitoring its progress. The job name can contain alphanumeric and non-alphanumeric characters, but it cannot include non-English characters. A maximum of 40 characters is recommended.

3 In the **Target Client** list, select the NetVault Server from the list of displayed machines to set it as the intended target.

> **TIP:** You can also click **Choose**, and then locate and select the applicable client in the **Choose the Target Client** dialog box.

Restores ***must*** be routed through the NetVault Server to use the necessary components installed there. The setting in this list works in tandem with the value revealed in the **Client Hostname** field to route the restore properly.

4 Use the **Schedule** and **Advanced Options** lists to configure any additional required options.

5 Click **Save** or **Save & Submit**, whichever is applicable.

NOTE: On completion of this process, the job is added to the NetVault job queue; however, unlike a traditional NetVault restore job, it does not begin running. The steps covered in Booting the target NetVault Bare Metal Recovery Client with the appropriate OS and drivers for use with Plug-in Live Client for Linux *must* be successfully performed before the job begins.

If you attempt a second restore after processing a restore that failed, the second restore might stop responding (hang) when it begins creating the logical volume. If this issue occurs, blank the target disk and run the restore process again.

Booting the target NetVault Bare Metal Recovery Client with the appropriate OS and drivers for use with Plug-in *Live Client* for Linux

The following topics detail the procedures to be used to boot a target Linux Client machine to recover a DR image backup.

Prerequisites for booting the target NetVault Bare Metal Recovery Client for use with Plug-in *Live Client* for Linux

Ensure the following have taken place before attempting to boot the NetVault Bare Metal Recovery Client:

- **Bootable CD created**: A Plug-in *Live Client* Boot CD must have been previously created for the target Linux Client, using the procedures outlined in Creating the required bootable CD for use with Plug-in Live Client for Linux.
- **CD drive set as primary boot source on target NetVault Bare Metal Recovery Client**: The Linux machine serving as the NetVault Bare Metal Recovery Client must have its CD drive—if connected through a USB port, it must use USB 3.0 protocol or earlier—set up as the primary boot source to have the machine boot from CD, for example, by accessing the system's BIOS application and setting the Drive as the primary boot source.
- **NetVault Server and Client information gathered**: After booting the target Linux Client with the created boot CD, configure the machine using various information, including the following:
  - **NetVault Server IP Address**
  - **Linux NetVault Bare Metal Recovery Client IP Address**
  - **Gateway Address**, if applicable
  - **Subnet Mask**
- **Communication port free for use**: Verify that the communication port is available and accessible to the Plug-in *Live Client* for Linux. If the default port 10666 is not available, reconfigure the communication port before proceeding. For details on reconfiguring the port, see Reconfiguring the communication port for the target NetVault Bare Metal Recovery Client for use with Plug-in Live Client for Linux (optional). If default port 10666 is available, skip to **Boot procedure for the target NetVault Bare Metal Recovery Client for use with Plug-in Live Client for Linux**.

  NOTE: In most circumstances, the 10666 port is available for use. Circumstances under which it is not available include if a system administrator had assigned it for use to a different application or if you have a firewall set up on a different port.

Reconfiguring the communication port for the target NetVault Bare Metal Recovery Client for use with Plug-in *Live Client* for Linux (optional)

The Plug-in *Live Client* for Linux listens on port 10666 by default. If you have a firewall configured, you may need to change the communication port to perform a recovery; for example, you want use port 12345 instead. Perform the following steps:

1. Open the firewall for port 12345.

   This step allows communication between the NetVault Bare Metal Recovery Client and the NetVault Server to be restored.

2. In the Navigation pane of the NetVault WebUI on the Plug-in *Server*, click **Create Restore Job**.
3. On the **Create Restore Job—Choose Saveset** page, select the applicable saveset, and click **Next**.
4. On the **Create Selection Set** page, click .
5. In the **Restore Server Port** field, enter **12345**.

   After setting the port number on the Plug-in *Server*, update it on the NetVault Bare Metal Recovery Client as well.

6. To save the settings, click **Ok**.
7. Boot from the CD; described in Boot procedure for the target NetVault Bare Metal Recovery Client for use with Plug-in Live Client for Linux.
8. After the **System Installation for Linux** application starts and the **SYSTEM INSTALLATION AND MAINTENANCE** menu is displayed, select **System Recovery Utility**, and press **Enter**.
9. To open a maintenance shell prompt, select **Start a Maintenance Shell**, and press **Enter**.
10. From the maintenance shell, run the following commands:

    ```
    maint> echo "ServerPort=12345" > /tmp/nvdrx.cfg
    maint> exit
    ```

11. Proceed with the boot procedure described in Boot procedure for the target NetVault Bare Metal Recovery Client for use with Plug-in Live Client for Linux.

Boot procedure for the target NetVault Bare Metal Recovery Client for use with Plug-in *Live Client* for Linux

To boot the Linux NetVault Bare Metal Recovery Client, perform the following steps.

> **IMPORTANT:** If the target Linux NetVault Bare Metal Recovery Client includes any Raw format disks, a specific boot procedure must be followed to preserve any data that currently exists on those disks. You must use this procedure because the Plug-in Live Client for Linux does not support the backup and restore of Raw format disks. For more information, see Accommodating for Raw disks for use with Plug-in Live Client for Linux.

1. Insert the created CD into the CD drive—if connected through a USB port, the port must use the 3.0 protocol or earlier—on the target Linux NetVault Bare Metal Recovery Client, and reboot the machine.

   The boot routine begins as the necessary files are loaded from the CD to system memory. This procedure can take several minutes, depending on the hardware configuration of the target Linux NetVault Bare Metal Recovery Client.

   On successful boot off the CD, the **System Installation for Linux** application starts and the initial screen is displayed.

> **NOTE:** The **System Installation for Linux** application offers several utilities that can be used to customize a DR recovery. However, the use of all these utilities is not covered in this guide. Only the tools required to perform a standard recovery operation are covered here.

> **IMPORTANT:** While Quest strongly recommends that only the utilities required to perform a standard DR recovery be used with this plug-in, the **System Installation for Linux** application contains a built-in help system that offers brief instructions on its use. This help system can be accessed on a per screen basis by using the **F1** key.

2. If necessary, use the arrow keys to navigate to the **Select Install Device/Backup** option, default selection, and press **Enter** to select it.
3. When the **Set Install Device or Server** dialog box is displayed, use the arrow keys to navigate to the **Set or Change Network Configuration** option located following the **Install from Remote Device** heading, and press **Enter** to select it.
4. When the **Set or Change Network Install Configuration** dialog box is displayed, enter the following information under the **TCP/IP Configuration** heading, using the arrow keys to navigate between the four fields:
   - **Server IP Address**: Enter the IP address assigned to the NetVault Server that was used to start the job in the previous section.
   - **Client IP Address**: Enter the IP address assigned to the machine serving as the Linux NetVault Bare Metal Recovery Client.
   - **Gateway Address**: Enter the gateway address in use by the network, if applicable.

     > **IMPORTANT:** Use of the **Gateway** field is optional. If Plug-in Server and Plug-in Live Client are in the same network segment, ensure that this field *remains blank*. Only include a gateway value if Server and Client exist in a *different* segment.

   - **Subnet Mask**: Enter the Subnet Mask value in use by the network.
5. With the previous four values entered, use the arrow keys to navigate to the **Network Device** field, following the **Adapter Configuration** heading.
6. When the available commands listed in the bar at the bottom of the dialog box are updated to reveal the **"F4=List"** option, press **F4** to display a list of NICs available in the Linux Client.
7. In the sub-window that starts, use the arrow keys to navigate to the NIC to be used, and press **Enter** to select it.
8. When **Network Device** field is updated to reveal the selected NIC, press either **F3** or **Esc** to confirm all settings, exit the dialog box, and return to the **Set Install Device or Server** dialog box.
9. Because no additional settings are required, press either **F3** or **Esc** to the dialog box and return to the **System Installation and Maintenance** dialog box.

   The informational fields in the lower-left corner are updated to reveal the values entered; that is, the Service field is updated to reveal the IP address entered for the NetVault Server.
10. Use the arrow keys to navigate to the **Install the System with Current Settings** option, and press **Enter** to initiate the job.

    If all settings were correctly entered, the process continues; otherwise, a red dialog box is displayed stating that the job could not be initiated.

    > **IMPORTANT:** For this process to start successfully, the applicable recovery job must have already been set up and started from the NetVault Server, as outlined in Restoring data using a DR image with Plug-in Live Client for Linux.

11. When the frame in this dialog box is updated with a message stating that the selected disks are erased and overwritten on the Linux NetVault Bare Metal Recovery Client if the operation is continued, press the **Y** key to confirm and start the recovery.

The Boot CD ejects automatically before rebuilding the system.

IMPORTANT: If you are using Storix, restoring to the same client or a different client of the same disk size—either of which is configured as part of a logical group and volume—causes the following message to appear: “The following non-fatal errors must be corrected before continuing: Disk sdb: This disk is not large enough for the partitions as they are currently defined. You must reduce the space requirements on this disk by at least 7MB by removing the partitions or reducing their sizes.” To work around this issue, use the **View/Change Installation Settings** feature in Storix to adjust the partition sizes.

To allow the recovery process to re-create a striped logical volume across multiple disks, manually change the stripe size. From the **Main Menu** in Storix, select **View/Change Installation Settings > Logical Volume Management > Add or Change Logical Volume**. Select the applicable volume, and press **Enter**. Change the **Stripe Size** from **0** to the size that was originally configured.

Accommodating for Raw disks for use with Plug-in *Live Client* for Linux

Multiple topics have noted that the Plug-in *Live Client* for Linux does not support the backup and restore of Raw format disks. However, after the standard boot routine discussed in the previous topic is fully followed, any Raw format disks are automatically initialized, and the restore of data starts. As a result, any data that exists on these raw format disks ***is lost***. To boot a target Linux NetVault Bare Metal Recovery Client that contains any Raw format disks to omit them from the restore, perform the following steps:

CAUTION: This procedure *must* be followed to ensure that data items on any existing raw formatted disks are preserved. Quest cannot be held liable if this procedure is not followed to boot a machine containing raw disks and data is lost.

IMPORTANT: The process described in Restoring data using a DR image with Plug-in Live Client for Linux must be followed before attempting this configuration. If the DR backup job has not been initially queued up to run, it is not possible to complete this process; that is, this configuration must be performed after the job has been started in the NetVault WebUI.

1. Perform Step 1 through Step 9 outlined in Boot procedure for the target NetVault Bare Metal Recovery Client for use with Plug-in Live Client for Linux; do not complete the process, that is, do ***not*** perform Step 10 and Step 11.
2. After returning to the **System Installation and Maintenance** dialog box, use the arrow keys to navigate to the **View/Change Installation Settings** option, and press **Enter**.

   Various dialog boxes appear as the backup job information is read from the NetVault Server. This process may take several minutes to complete.
3. If a frame is displayed in this dialog box stating that the disks on the system match the current configuration, press **Enter**.
4. When the **Change Installation Settings Menu** dialog box is displayed, press **Enter** to select the default option, **Select Disks to Use for Installation**.
5. After the dialog box updates with a frame containing a list of disks that are currently available on the target system, use the **Arrow** keys to select the disk to leave out of the restore, that is, the Raw partition formatted disk, and press **Enter** to select it.
6. After the frame updates to display a list of available options for the selected disk, use the **Arrow** keys to select the **DO NOT RESTORE the Disk Backup Data** option, and press **Enter** to select it.

   IMPORTANT: Before selecting the **DO NOT RESTORE This Disk Backup Data** option for a drive, ensure that the selected drive is the one to omit. After the drive has been omitted from the restore, it cannot be added back in; that is, the only way to change the configuration is to reboot the Linux NetVault Bare Metal Recovery Client, and restart this entire process.

7 After the frame updates with a message indicating that selecting this disk omits it from recovery, press the **Y** key to confirm.

   With the omit command confirmed, the frame in the dialog box reveals the list of disks on the target system, and the disk that is to be omitted from the recovery is labeled as **"---------AVAILABLE---------"**.

8 To omit additional disks, repeat Step 5 through Step 7.

9 With the applicable disks omitted from the recovery, press **Esc** or **F3** ***twice*** to return to the **System Installation and Maintenance** dialog box.

   The informational fields in the lower-left corner are updated to reveal the values entered; that is, the **Service** field is updated to reveal the IP address entered for the NetVault Server.

10 Use the arrow keys to navigate to the **Install the System with Current Settings** option, and press **Enter** to initiate the job.

   If all settings were correctly entered, the process continues; otherwise, a red dialog box is displayed stating that the job could not be initiated.

11 When the frame in this dialog box is updated with a message stating that the selected disks are erased and overwritten on the Linux NetVault Bare Metal Recovery Client if the operation is continued, press the **Y** key to confirm and start the recovery.

   The Boot CD ejects automatically before rebuilding the system.

Monitoring job progress and finalizing a recovery with Plug-in *Live Client* for Linux

From the NetVault Server, you can monitor the progress of any job through the **Job Status** page. While it is not necessary to monitor a job's progress, Quest recommends that you monitor progress when performing a recovery of a NetVault Bare Metal Recovery Client. After the recovery of a Linux NetVault Bare Metal Recovery Client has completed, you must perform a last task to bring it back online. By monitoring the recovery job, you are alerted to the completion of a job and this final task can be performed.

NOTE: This topic offers an example of the use of the **Job Status** page of the NetVault WebUI for monitoring the progress of a Linux DR recovery operation to finalize the job. The tools made available in this dialog box are not exclusive to the Plug-in Live Client for Linux and complete information about their use can be found in the *Quest NetVault Administrator's Guide*.

1 With the recovery job running, click **Monitor Job** in the Navigation pane.

2 In the list of jobs displayed, locate the in-progress Linux DR recovery job.

   IMPORTANT: If you must stop the job, you can also access the **Abort** command the same way. If you use this command to stop a recovery job, NetVault *stops* the transfer of data. However, the **System Installation for Linux** application currently running on the Linux NetVault Bare Metal Recovery Client stalls and its commands, while still accessible are *not* usable. A full reboot of the Linux NetVault Bare Metal Recovery Client must be performed with the CD inserted in the drive to reactivate the application for use.

   Various information pertaining to the selected job is displayed, including the plug-in in use and data-transfer-rate values. The **Run Status** field displays the status of the job, for example, **Waiting for Media** or **Reading from Media**. As the recovery completes, data transfer values stop and this field is updated to **Restore Complete**.

3 To complete the recovery process, locally access the Linux NetVault Bare Metal Recovery Client machine, and reboot it by using the **Reboot the System** command in the **System Installation for Linux** application—type **exit** at the maintenance shell prompt, or manually shut down the system.

   The Linux NetVault Bare Metal Recovery Client boots and its file system should be recovered to the point when the DR image was taken.

“Superblock last…” messages appear during fsck process

You might encounter an issue with a restore that causes either fsck errors related to clock inconsistencies or forced checks on systems that do not use Universal Time Coordinated (UTC). These errors appear as “Superblock last mount time is in the future” messages the first time that the system is restarted after the restore. You can ignore this issue, or you can work around it by using the following steps:

1 Use the Storix media to boot the target client.

2 Open a maintenance shell in Storix, and run the following command.

```
hwclock --hctosys --localtime
```

3 Perform the restore.

Completing post-restore requirements for use with Plug-in *Live Client* for Linux

After a restore process completes on a target Linux Client, the following points apply to that machine:

- **The “hosts” file for the Target is modified**: A restore modifies the target NetVault Bare Metal Recovery Client machine’s entry in its **“…/etc/hosts”** file; for example, after recovery, the host name does ***not*** appear along with the IP address and the alias for this client in the **“…/etc/hosts”** file. The machine is still accessible through its IP address, but for it to be accessible through its host name, this file must be edited to incorporate the appropriate host name information. For information about this “hosts” file and how it should be edited to include the proper host name for the target Linux machine, see the relevant Linux documentation.
- **Perform a restore of the modified files backup (if applicable)**: With the recovery completed, you can now restore the files backed up in the Plug-in *for FileSystem* backup described in Recovering a DR image for use with Plug-in Live Client for Linux. This process restores these files to their state before the DR recovery.
- **Change to boot loader application**: If running a version of the Linux boot loader utility other than GRUB, after a DR image is recovered on a target Linux Client, the boot loader utility is replaced with the GRUB version of this application.
- **GRUB entries**: Storix never assumes that you are reinstalling onto the same physical hardware or restoring to the same storage configuration. Therefore, it is never guaranteed that the previous GRUB entries are valid. The only GRUB entry guaranteed to be valid after restore is the entry created by Storix.
- **Volume labels and Volume UUIDs:** For systems that use universal unique identifiers (UUIDs) for booting or mounting, review and edit the **“/boot/grub/grub.conf”** and **“/etc/fstab”** with the correct device UUID. For more information, see Updating the UUID information manually.
- **Change in the start-end sector location for a DR restore**: After a recovery of a DR image, the start-end sector for a restored partition may be different from its original backed-up location. The partition size remains the same size, but no unallocated space is created after the Master Boot Record. Therefore, some boot loaders, for example, GRUB, are not usable, because they require this additional, unallocated space. This requirement is because the Linux Loader (LILO) version of the boot loader utility that is automatically established after a recovery, as explained previously, does not require this unallocated space.
- **Change to swap partition**: During a recovery, the NetVault Bare Metal Recovery for Linux module implicitly modifies the **“/etc/fstab”** file entry for the swap partition.

  Example:

  For example, before the restore, “fstab” contains the following entry for the swap device:

  ```
  LABEL=SWAP-sda2     swap     swap     defaults     0 0
  ```

  After the restore, the original swap entry is commented out and a new entry is added:

  ```
  # Updated by Storix System Installation
  #LABEL=SWAP-sda2     swap     swap     defaults     0 0
  ```

```
/dev/sda2           swap    swap    defaults    0 0
```

The swap partition is enabled automatically, but the label for the swap partition is removed.

- **File-system checking is enabled**: A restore modifies the **“Maximum mount count”** and **“Check interval”** parameters, which enable file-system checking. For systems that should not have these parameters enabled based on the number of mounts or a specific period, use the following commands to disable the options manually:

```
# tune2fs -c -1 <deviceName>
```

```
# tune2fs -i 0 <deviceName>
```

Updating the UUID information manually

The UUID of each file system is re-created when you use the Plug-in Live Client for Linux to restore data. If the UUID is used in the **“/boot/grub/grub.conf”** and **“/etc/fstab”** files and they are restored from a previous backup with the Plug-in *for FileSystem*, the system fails to boot because the UUID values do not match the values on the actual file systems. To work around this issue, manually update the files.

The following procedure shows commands that use examples such as “dev” and “sda.” When running these commands in your environment, replace the applicable information with the correct information for your environment.

1. Log in with root, and change to a working directory.
2. Use the Plug-in *for FileSystem* and a previous backup to restore the **“/boot/grub/grub.conf”** and **“/etc/fstab”** files to the working directory.
3. To identify and note the name of the device file and its mount point, run the following command:

```
# mount | grep ^/dev
/dev/sda3 on / type ext4 (rw)
/dev/sda1 on /boot type ext4 (rw)
#
```

4. To identify and note the swap device information, run the following command:

```
# swapon -s
Filename     Type         Size       Used   Priority
/dev/sda2    partition    2097144    0      -1
#
```

5. To export the UUID for the device partition, including the swap information, and save it to a file, run the following command.

   Specify each device name, such as “sda1”, “sda2”, and “sda3” after the “in” statement on the command line. A file with the name @device_partition_name@ for each device partition that contains an associated UUID is created in the working directory.

```
# export LANG=C; export LC_ALL=C
# for dev in sda1 sda2 sda3
> do
>   ls -l /dev/disk/by-uuid/ | awk "/$dev\$/
 {print \$9}" > @$dev@
> done
#
```

6. Verify that the files have been created for the partition and that the UUID is recorded in each file for its respective partition.
7. Use a text editor to open the **“grub.conf”** file.
8. For the entry that contains **“root=UUID=x-x-x-x-x”**, match the **“x-x-x-x-x-x”** to the partition name, and then replace the UUID with the partition name.

   Example before change:

```
kernel /vmlinuz-2.6.32-131.0.15.el6.x86_64 ro
```

```
root=UUID=dc8ee87c-1ac3-4ece-ab53-f19cd1ebaf7e rd_NO_LUKS …
```

Example after change:

```
kernel /vmlinuz-2.6.32-131.0.15.el6.x86_64 ro
root=UUID=@sda3@ rd_NO_LUKS …
```

9 Use a text editor to open the **“fstab”** file.

10 Using the information noted in Step 3 and Step 4, change the UUID to the device partition name for all mount and swap partitions.

Example before change:

```
UID=dc8ee87c-1ac3-4ece-ab53-f19cd1ebaf7e
/          ext4    defaults    1 1
UUID=6c285d5c-9669-4791-a214-2ed007a7e454
/boot      ext4    defaults    1 2
UUID=84fd7dad-f9a8-4102-9102-fa62c8def671
swap       swap    defaults    0 0
```

Example after change:

```
UUID=@sda3@ /          ext4    defaults    1 1
UUID=@sda1@ /boot      ext4    defaults    1 2
UUID=@sda2@ swap       swap    defaults    0 0
```

11 To change the device name to its UUID in the **“grub.conf”** and **“fstab”** files, run the following command:

```
# for dev in @*@
> do
>   sed -i "s/$dev/$(cat $dev)/g" grub.conf fstab
> done
```

12 Use a text editor to open the **“grub.conf”** and **“fstab”** files, and verify that the device names were replaced with their corresponding UUIDs.

13 Make a backup copy of **“/boot/grub/grub.conf”** and **“/etc/fstab”**.

```
# cp -a /boot/grub/grub.conf /boot/grub/grub.conf.org
# cp -a /etc/fstab /etc/fstab.org
```

14 Copy the **“grub.conf”** and **“fstab”** files from the working directory to the original location, and re-create the symbolic link from **“grub.conf”** to “menu.lst”.

```
# cp -a grub.conf /boot/grub/grub.conf
# cp -a fstab /etc/fstab
## cd /boot/grub
# rm menu.lst
# ln -s ./grub.conf menu.lst
#
```

15 Restart the server, and verify that it starts correctly.

If the system fails to boot, use a rescue disk to start the system in rescue mode, copy back the backup files created in Step 13 to the original location, and restart the server. Review the newly created **“grub.conf”** and **“fstab”** files again, make any necessary corrections, and repeat Step 13 through Step 15.

6

NetVault Bare Metal Recovery physical-to-virtual (P2V) recovery

- Installing SCSI and IDE device drivers on a physical machine
- Supported physical to virtual configurations

Installing SCSI and IDE device drivers on a physical machine

The processes for recovering from a physical machine to a virtual machine apply only to Windows operating systems.

If you are using the Linux-based Plug-in *Offline Client* and you are migrating a physical server to a virtual environment in which the Client is Windows-based, install the disk drivers on the OS before you back up the machine. The restored VM does not boot up because the restored image contains SCSI/IDE drivers for the source physical machine. The restored VM does not have the drivers for the target VM's SCSI/IDE controller. This issue causes a blue screen error and the boot fails, as it cannot find any disks.

The solution is to create the **".inf"** file that informs the Windows installer to load the appropriate drivers to the system and make correct registry entries every time Windows boots. Installation of the ".inf" file is required prior backing up the physical machine so that after the restore, the correct driver is loaded and detects the VMware IDE/SCSI controller.

Quest provides the following device driver ".inf" files:

- **"vm_ide_2012.inf"**: IDE device driver for Windows Server 2012 and later
- **"vm_lsi_2012.inf"**: SCSI device driver for Windows Server 2012/2012 R2 and later

NOTE: The device driver must be installed on the source (physical) machine, but the type of device driver must match the target (virtual) machine. For example, to migrate a Windows Server 2012 physical machine with a SATA driver to a VM with a SCSI driver, install **"vm_lsi_2012.inf"** on the physical machine. For all supported configurations, see Supported physical to virtual configurations.

You can download the device driver ".inf" files from the Quest website.

1. Copy the required device driver, for example, **"vm_ide_2012.inf,"** to the physical machine.
2. Locate the file on the physical machine, right-click it, and select **Install** from the menu.
3. When the **Hardware Installation** warning message is displayed, click **Continue Anyway**.
4. Reboot the system for the new settings to take effect.

Supported physical to virtual configurations

The following configurations are currently supported for Windows Server 2012 (32/64-bit) and later.

Table 1. Supported configurations

Source (physical)	Target (VM)
IDE	IDE
IDE	SCSI
SATA	IDE
SATA	SCSI
SCSI	IDE
SCSI	SCSI

A

Troubleshooting

- Excluding LUNs from the NetVault Selections pages
- Performing a restore in which Disk Numbers are different from the backup
- Access denied during MBR recovery
- VMware ESX and ESXi Server 4.x and earlier not supported with Windows PE
- Attaching a restored VMDK image to a VM fails to power on the machine [DNBMR-1223]
- VMDK restore job to remote ESXi 6.0 fails with failure to clone error [DNBMR-1249]

Excluding LUNs from the NetVault Selections pages

In some instances of using the Windows PE-based Plug-in *Offline Client*, the logical unit numbers (LUNs) of a Fibre Channel card are identified as drives by the Windows Disk Manager. As a result, NetVault might also interpret the LUNs as drives, display them on the **NetVault Selections** page, and attempt to include them in a backup job if they are selected. The VSS Backup job then fails because of this issue. To work around this issue, you can edit the **"nvdrw.cfg"** file to prevent the LUNs from appear on the **NetVault Selections** page.

To update the file

1 Locate and open the **"nvdrw.cfg"** file in a text editor.

For the Plug-in *Offline Client*, this file is located in **\\Windows\System32**. For the Plug-in *Live Client*, this file is located in **\\NetVault\config**. If the file does not exist, you can create it.

2 Update the file to include a section similar to the following; replace the applicable segments with the information for your card:

```
[Disk Vendor:Product]
IgnoreDisk=LSI, Universal Xport
```

3 Save and close the file.

4 For the Plug-in *Offline Client*, complete the following steps to restart the drdaemon:

a On the NetVault Bare Metal Recovery Client, start the Windows Task Manager by typing the following at a command prompt, and pressing **Enter**:

```
taskmgr
```

b In the **Windows Task Manager** screen, select the **Processes** tab, right-click **drdaemon**, select **End Process**, and close the Task Manager.

c To restart the **drdaemon**, type the following at a command prompt; if necessary, click **Launch CMD** again; and press **Enter**:

```
drdaemon
```

5 For the Plug-in *Live Client*, access the Windows Task Manager on the NetVault Bare Metal Recovery Client, select the **Processes** tab, right-click **nvdrw**, select **End Process**, and close the Task Manager.

6 Access the **NetVault Selections** page of the **NetVault Backup** window, and verify that the changes are reflected.

Performing a restore in which Disk Numbers are different from the backup

In some instances, the Disk Number assigned to a drive during backup might be different for the restore. To work around this issue, note the Disk ID and disk order displayed on the **Create Selection Set** page, use the **Plug-in *Offline Client*** to boot the machine that is targeted for the restore, and then note whether the disk order is different. If the order is different, use the **Rename** option during the restore process to prevent data loss.

To determine whether the disk order is different

1 In the Navigation pane of the NetVault WebUI on the NetVault Server, click **Create Restore Job**.

2 On the **Create Restore Job—Choose Saveset** page, select **Plug-in *Server*** from the **Plugin Type** list.

3 In the saveset table, double-click the applicable saveset to open it.

4 When the backed-up client machine is displayed, double-click it to open it and list the disks that were backed up.

5 Note the information displayed within the parentheses for each disk.

6 Use the Plug-in *Offline Client* to boot the NetVault Bare Metal Recovery Client that is targeted by the restore, access the NetVault Server, and open the **NetVault Selections** page.

7 Drill down to the disk-level of the client, and note the current disk order.

If the order is different, use the Rename option during the restore.

Access denied during MBR recovery

During recovery of a Master Boot Record (MBR), if you receive an error message that indicates access was denied because a filesystem is still mounted, you must manually unmount the filesystem and complete the recovery process again.

VMware ESX and ESXi Server 4.x and earlier not supported with Windows PE

Because the Plug-in *Offline Client* for Windows PE is based on Windows 8, you might encounter the following error if you boot a VM that resides on VMware ESX or ESXi Server 4.x or earlier:

```
Your PC ran into a problem and needs to restart. We're just collecting some error
info, and then we'll restart for you. (0% complete)
If you would like to know more, you can search online later for this error:
HAL_INITIALIZATION_FAILED
```

For more information, see http://support.microsoft.com/kb/2814803.

Attaching a restored VMDK image to a VM fails to power on the machine [DNBMR-1223]

Restoring a Plug-in Live Client Windows backup to a local directory VMDK image and then attaching it to a virtual machine (VM) created from VMware can fail to power on the VM with the following error: Failed - Unsupported or invalid disk type 2 for ‘scsi0:0’. Ensure that the disk has been imported.

This error happens ESXi version 6.5 fails to address the VMDK descriptor.

To resolve the issue, after you restore the VMDK image, complete one of the following two methods:

- **Method 1:** While attaching the VMDK to the VM, change the storage controller from SCSI to IDE.
- **Method 2:** Use vmkfstools to convert the flat disk vmdk to a vmdk descriptor file. For more information, see https://kb.vmware.com/s/article/1028943.

VMDK restore job to remote ESXi 6.0 fails with failure to clone error [DNBMR-1249]

The VMDK restore job from a Windows NetVault Server to a remote ESXi virtual machine fails with the error “ERROR: Failed to clone remote VMDK disk.”

This error happens because The Windows NetVault Server does not have the VDDK certificate registry key.

To resolve this issue, add the following registry key on the Windows NetVault Server:

```
HKEY_LOCAL_MACHINE/SOFTWARE/Wow6432Node/VMware, Inc./VMware Virtual Disk
Development Kit/VerifySSLCertificates

REG_DWORD 0 = OFF
```

About us

Quest provides software solutions for the rapidly-changing world of enterprise IT. We help simplify the challenges caused by data explosion, cloud expansion, hybrid datacenters, security threats, and regulatory requirements. We are a global provider to 130,000 companies across 100 countries, including 95% of the Fortune 500 and 90% of the Global 1000. Since 1987, we have built a portfolio of solutions that now includes database management, data protection, identity and access management, Microsoft platform management, and unified endpoint management. With Quest, organizations spend less time on IT administration and more time on business innovation. For more information, visit www.quest.com.

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- Engage in community discussions.
- Chat with support engineers online.
- View services to assist you with your product.