Quest® NetVault® Bare Metal Recovery 14.1

Plug-ins User 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/.

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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

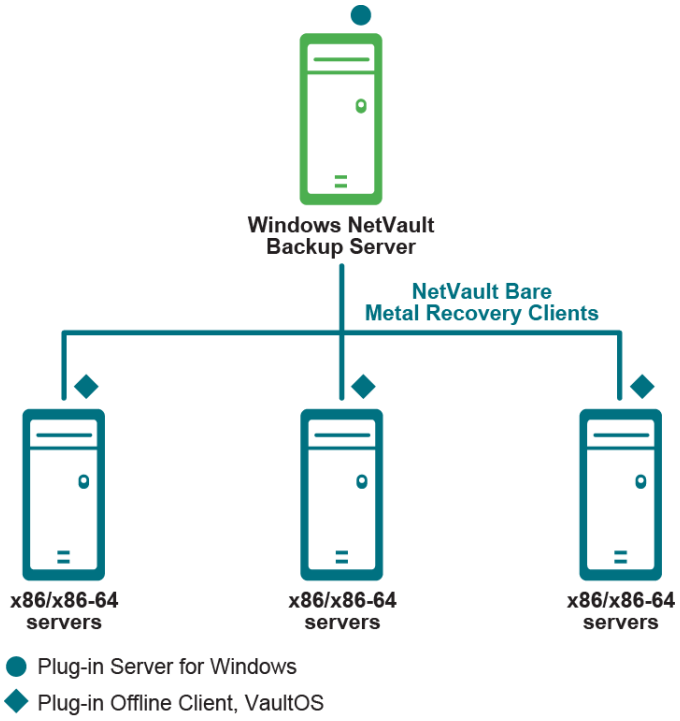
- Plug-in Live Client for Windows with Linux-based NetVault Server deployment
- Plug-in Live Client for Linux with Linux-based NetVault Server deployment
- Plug-in Live Client for Linux with Windows-based NetVault Server deployment
- Plug-in Live Client for Windows and for Linux with Linux-based NetVault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



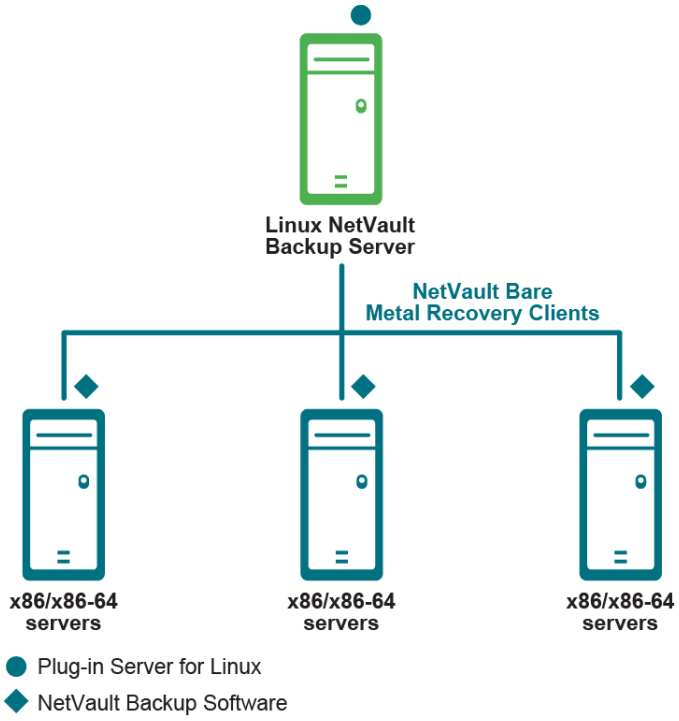
For more information, see Using the Plug-in Offline Client.

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.

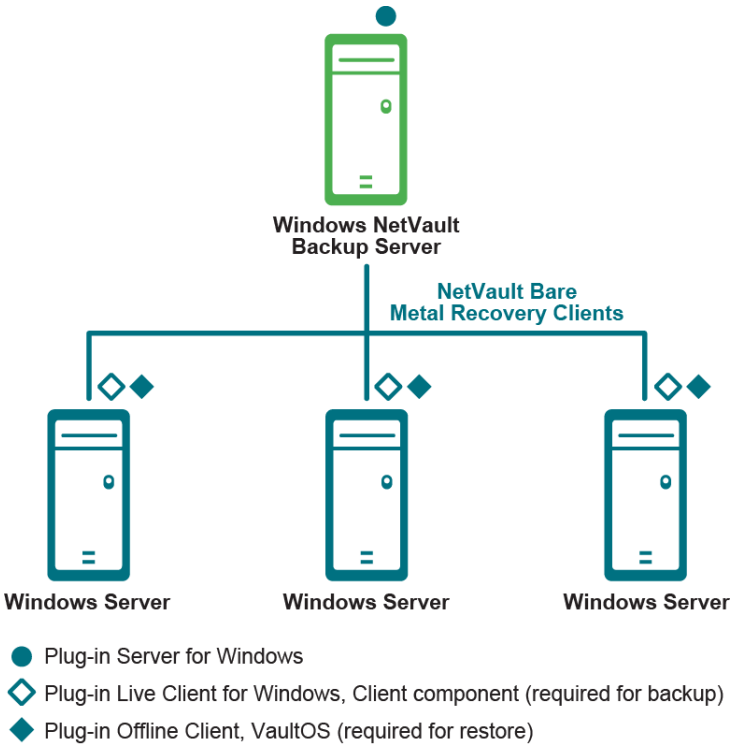
Plug-in *Live Client* for Windows with Windows-based NetVault Server deployment

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.

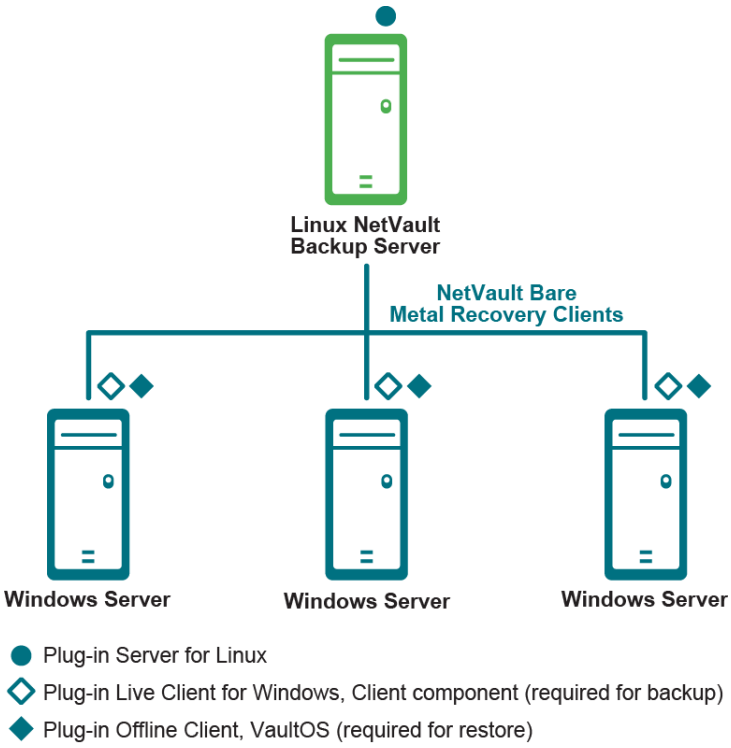
Plug-in *Live Client* for Windows with Linux-based NetVault Server deployment

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



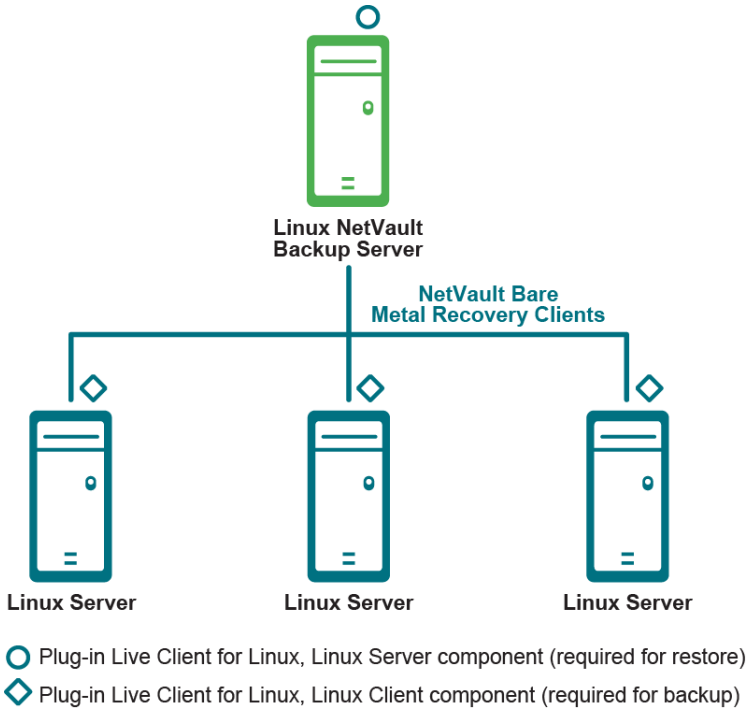
For more information, see Using NetVault Bare Metal Recovery Plug-in Live Client for Windows.

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



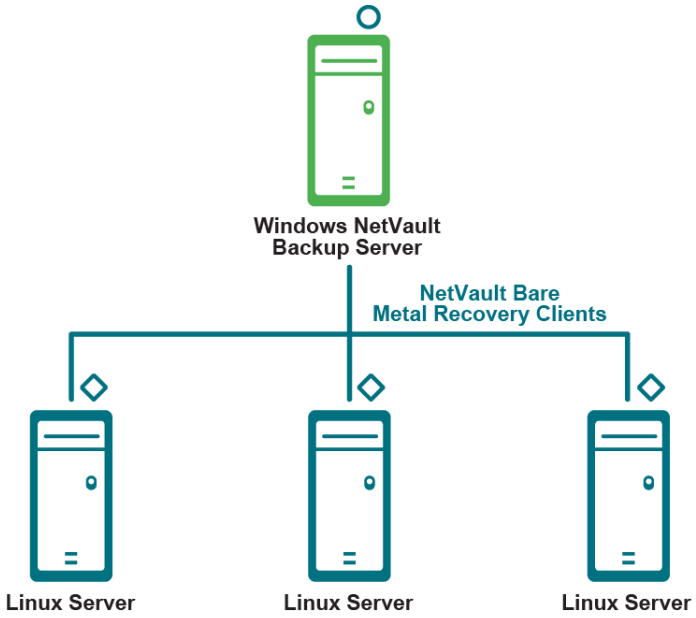
For more information, see Using NetVault Bare Metal Recovery Plug-in Live Client for Linux.

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

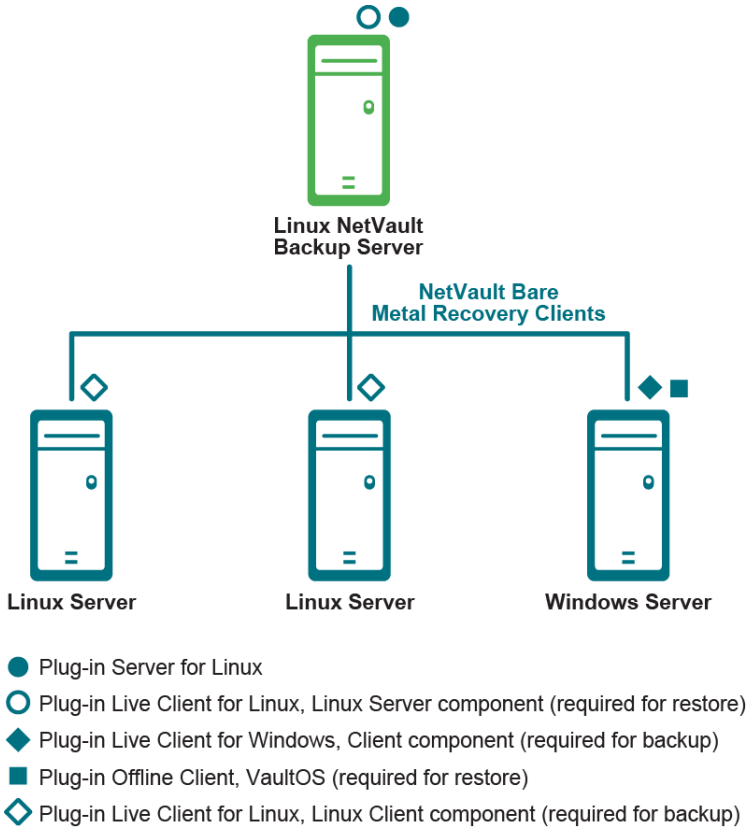
This scenario is deployed when you want to perform online or hot backups of both Linux and Windows Clients and you have deployed a Linux-based NetVault Server.

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

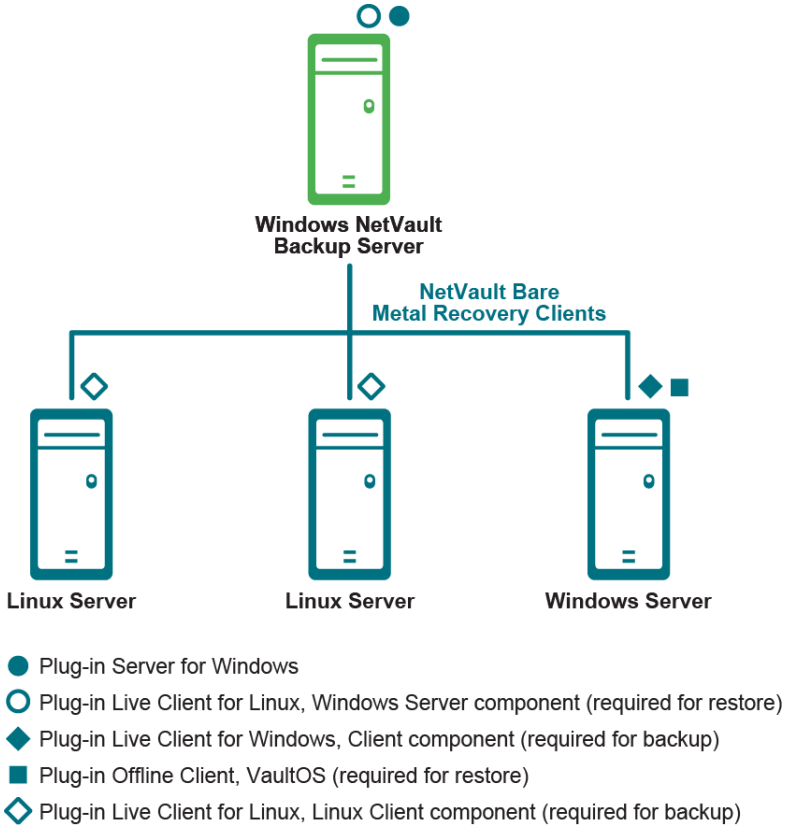
This scenario is deployed when you want to perform online or hot backups of both Linux and Windows Clients and you have deployed a Windows-based NetVault Server.

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 14.1, 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

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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The Support Portal provides self-help tools you can use to solve problems quickly and independently, 24 hours a day, 365 days a year. The Support Portal enables you to:

- Submit and manage a Service Request.
- View Knowledge Base articles.
- Sign up for product notifications.
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- View how-to-videos.
- Engage in community discussions.
- Chat with support engineers online.
- View services to assist you with your product.