2011

Portlock Image Scripting

Portlock Image Scripting

January 7, 2011

Version 1.1

Copyright 2000-2011 Portlock Corporation

The Portlock storage management software described in this document is furnished under a License Agreement and may be used only in accordance with the terms of the agreement.

Version: 1.1

Date of Publication: January, 2011

NO WARRANTY. The technical documentation is being delivered to you AS IS and Portlock makes no warranty as to its accuracy or use. Any use of the technical documentation or the information contained therein is at the risk of the user. Documentation may include technical errors, typographical errors or other inaccuracies. Portlock reserves the right to make changes without prior notice.

Table of Contents

Chapter 1. Introduction

Introduction

Portlock Storage Manager supports scripting of the image command. This document describes Portlock Image Scripting for Portlock Storage Manager version 5.06 and newer. This support also requires version 5.15 of Portlock License Manager and Portlock Boot CD.

Portlock Image Scripts are created and managed by Portlock License Manager. Portlock Image Scripts are executed by Portlock Storage Manager.

A Portlock Image Script automates the imaging of a NetWare server. Storage objects that can be imaged include partitions (FAT-12, FAT-16, FAT-32), volumes (NetWare Traditional and NetWare 5.x NSS), and NSS pools (NetWare 6.x).

Note: On NetWare 6.x, an NSS volume is part of an NSS pool and is not a separate storage object. NSS volumes are imaged when the NSS pool is imaged.

Requirements
- Portlock License Manager 5.15.
- Portlock Boot CD 5.15.
- Portlock Storage Manager 5.06.
- NetWare 4.x, 5.x, 6.x.

Portlock Storage Manager

Portlock Storage Manager runs on NetWare servers and is the program that executes Portlock Image Scripts. Portlock Storage Manager is a NetWare Loadable Module (NLM) and is run from the NetWare console or launched remotely by Portlock License Manager.

Portlock Images scripts are executed by a command line option: "-script=filename".

Portlock License Manager

Portlock License Manager is a Windows program that manages Portlock licenses, Portlock products, downloads and libraries of objects (Portlock Images, ISO Images, etc.).

Portlock License Manager provides direct support for NetWare servers. Key features include:

- Scanning the network for NetWare servers.
- Displaying NetWare storage objects.
- Downloading and installing Portlock Storage Manager to a NetWare server.
- Licensing Portlock Storage Manager on a NetWare server.
- Script creation wizard.
- Imaging a NetWare server.
- Managing Portlock Images.

- Managing NetWare servers that are part of Novell Clusters Services.

Portlock Boot CD

Portlock Boot CD is a complete bootable operating system based upon WinPE 2.1 (Windows Server 2008) or for older hardware WinPE 1.6 (Windows Server 2003). Portlock Storage Manager running on the Portlock Boot CD has nearly the same feature set as when running under NetWare.

Chapter 2. Portlock Storage Manager Script File

Introduction

The Portlock script file contains comments, keywords and commands.

The following example is a complete script that will image all partitions, volumes and pools on a NetWare server.

> *%Date% Friday, February 26, 2010 12:25:27 PM*
> *%Description% This script images all partitions, volumes and pools.*
> *# This script launches Portlock Storage Manager on the NetWare server.*
> *# The image command starts in TCP/IP Server Mode and waits for a remote connection.*
> *#*
> *-script   # This is required to be the first non comment line*
> *-imagetcp=server   # Image server using TCP/IP Server Mode*
> *-compression   # Enable compression*
> *-imageall   # Image all partitions, volumes and pools*

To execute this script, assuming that the above script is located on the NetWare server in a file "SYS:/script.txt", type the following command at the NetWare server console:

> *load sys:/stormgr/stormgr -script=sys:/script.txt*

Normally, Portlock License Manager is used to create and launch a Portlock Image Script.

Comments

A comment is any line that begins with a '#' character. A comment can also begin on a line after a keyword or command. Comments are ignored.

Example:

> *# This is a comment.*
> *-script   # This is a comment located after a command.*

Keywords

A keyword is a reserved word that begins and ends with a '%' character. Keywords are processed by Portlock License Manager and ignored by Portlock Storage Manager. Keywords are primarily used to add meaningful data to a script such as a description, date, version, etc. Appendix A documents keywords.

Example:

> *%Description% This is a description of the script file*
> *%Date% Friday, February 26, 2010 3:23:41 PM*
> *%Version% 1.0.0*

Commands

A command is a reserved word that begins with a '-' character. Commands are processed by Portlock Storage Manager and ignored by Portlock License Manager. Commands are primarily used to specify image parameters, objects to image, etc. Appendix B documents commands.

Example:

> *-script*
> *-compression*
> *-image_vol=SYS*

Chapter 3. Portlock License Manager

Licensing Considerations

Portlock Storage Manager is licensed per server. A Portlock License is a binary file with details such as customer, number of licensed servers, etc. Portlock Licenses are managed by Portlock License Manager.

A Portlock License never expires. A Portlock License includes upgrades and support for a specified period of time determined at purchase. After this time period has expired new updates to our software are not available.

Portlock Licenses can be renewed to extend the upgrade and support time period.

NetWare Server Access Rights

For most operations, admin access rights are required. Portlock License Manager needs to be able to access the SYS volume (specifically SYS:/STORMGR) and requires "Console" rights to load and unload NLMs.

Importing Licenses

To import a Portlock License into Portlock License Manager for installation on a NetWare server, select the menu command "License" -> "Import License into Library". Portlock License Manager will check the license and import the file into the correct library such as "Portlock Storage Manager".

Downloading Portlock Storage Manager

To download Portlock Storage Manager for installation on a NetWare server, select the menu command "Download" -> "Download Portlock Storage Manager". This command will download a list of Portlock Storage Manager versions that are available and display a dialog box to select which version to download.

Installing Portlock Storage Manager

To install Portlock Storage Manager to a NetWare server, select the menu command "PSM" -> "Install Portlock Storage Manager". This command will display a dialog box with options to select the NetWare server, install directory, Portlock License, etc.

Scanning for NetWare servers

Portlock License Manager supports scanning the network for NetWare servers. This command requires that the Novell Client is installed. To scan the network for NetWare servers expand the left tree window "Portlock Library" -> "Remote Systems" -> "NetWare Servers". Then right-click on "NetWare Servers" and select menu command "Network Scan". Portlock License Manager will then scan the network in the background (no dialog will be displayed). A network scan can take several minutes. As NetWare servers are found, they are added to the tree window under "NetWare Servers".

Manually specifying **a** NetWare server

To manually specify a NetWare server expand the left tree window "Portlock Library" -> "Remote Systems" -> "NetWare Servers". Then right-click on "NetWare Servers" and select the menu command

"Add NetWare Server". A dialog will be displayed to accept either the server name or TCP/IP address of the server to add. This server will be remembered and manually adding the same server will not be required.

Imaging a NetWare Server

Portlock License Manager supports imaging a NetWare server and storing the Portlock Image in the Portlock Image Library. To image a NetWare server expand the left tree window "Portlock Library" -> "Remote Systems" -> "NetWare Servers". Then right-click on the desired server under "NetWare Servers" and select the menu command "Image NetWare Server". A wizard will be displayed that will step you thru imaging the NetWare server. This wizard also creates a Portlock Image Script that can be used to repeat an image at a later date.

Creating a Portlock Image Script

Portlock License Manager provides a wizard to assist in creating a Portlock Image Script. This wizard communicates with a NetWare server to determine the storage objects on the server. The wizard then supports selecting which storage objects to image. The created script is then saved for the NetWare server under the tree window "Portlock Library" -> "Remote Systems" -> "NetWare Servers" -> "Server Name" -> "Scripts". You can then select the saved script to execute at a later date.

Running a Portlock Image Script

When Portlock License Manager creates a Portlock Image Script, it is saved for later execution. Right-click on the script located under "Portlock Library" -> "Remote Systems" -> "NetWare Servers" -> "Server Name" -> "Scripts" and select "Image NetWare Server using this script.

Scripting and the Portlock Boot CD

Portlock License Manager supports the same scripting features when a system is booted with the Portlock Boot CD. Systems booted with the Portlock Boot CD have their own section in the tree window "Portlock Library" -> "Remote Systems" -> "Boot CDs" -> "TCP/IP Address" .

Chapter 4. Troubleshooting Problems

Performance Issues (Imaging via TCP/IP)

When imaging a NetWare server, there are five major subsections that contribute to overall performance. Weakness in any section limits overall performance.

- Disk I/O subsystem (read).
- Memory subsystem.
- CPU subsystem (if compression is enabled).
- TCP/IP subsystem.
- Disk I/O subsystem (write).

Key areas to investigate for performance issues are compression and the TCP/IP subsystem.

Disk I/O Subsystem (read)

Portlock Storage Manager does several things before imaging a storage object:

- Perform a file system consistency check.
- Build a block list of used file system sectors.

Checking a file system is very important with today's advanced high performance file systems. NetWare NSS, for example, is built upon a number of B+ Trees. This requires a lot of work reading and analyzing these B+ Trees to ensure that the file system data structures are correct.

While the file system check is being performed, a list of file system blocks is collected. This allows Portlock Storage Manager to optimize the disk I/O reads to be in sorted order. This improves both the image and restore performance by maximizing sequential I/O.

The critical factor is how fast can the disk I/O subsystem (disk drive, storage controller and memory subsystem) can transfer data from the disk drive to memory. Portlock Storage Manager tries to optimize disk reads into sequential reads of 64 KB blocks (128 512 byte sectors) which matches the native maximum transfer block size of most storage controllers.

Portlock Storage Manager has a command to read data from a disk drive to measure read performance. To determine the maximum disk read performance using Portlock Storage Manager, run the "Disk Verify" command selecting "Read-Only Sequential Verify". This command is located under "Drive Commands" -> "Drive Verify".

There are a number of factors that can affect disk read performance:

- Is the disk drive healthy? Defective sectors can cause the disk drive to stop and attempt retries and remapping of sectors. When a drive becomes older, more and more sectors have been remapped which will break sequential disk reads into big seeks across the disk (the defective sector will usually be remapped to a reserved section at the end of the disk).

- Storage Controller firmware. Check the version of the firmware on the storage controller and check the vendor's web site for information on updates. Portlock often sees compatibility issues between specific models of disk drives and controller firmware versions. This is one of the many reasons that enterprise class servers only support specific controllers with specific disk drives with specified firmware versions.
- Storage Controller Mode. If the disk drive is IDE / SATA / SAS, double check which mode the disk controller is running in. Legacy modes provide wider compatibility with operating systems and drivers, but can significantly reduce performance.
- SCSI Subsystems. If the disk drives are connected to SCSI controllers double check the following:
  - o Is the SCSI bus properly terminated. Improper termination can significantly reduce data transfer performance. Check that only the devices at each end of the SCSI bus are terminated. Some devices have a jumper to enable / disable termination - termination in the middle of the SCSI bus will cause issues.
  - o Proper shielding. You don't want signals from other I/O busses (or the maintenance department's vacuum cleaner) causing I/O errors. Today's high speed busses can transfer over a gigabit of data per second and transient noise can cause issues.
  - o Place only similar high speed disk drives on the same SCSI bus.
  - o Do not connect non-disk devices to the same SCSI bus. Tape drives are notorious for resetting the SCSI bus when they have I/O errors with the tape drive. A SCSI bus reset will cause the devices to reset and reinitialize.
- Exclusivity. To maximum performance, minimize other processes from accessing the storage subsystem. If the server is performing a RAID rebuild, database rebuild or queries, etc. don't expect maximum Disk I/O subsystem performance.
- Disk drive and controller memory cache. The cache size and read-ahead strategy on the disk and controller can affect sequential read performance. Review these items as most server class systems are optimized for random I/O performance.

The key factor is to determine the maximum disk transfer speed. This will be the limit on image performance.

Memory subsystem

Portlock Storage Manger tries to minimize copying data in memory wherever possible. Memory speeds are significantly faster than disk I/O speed but when imaging a server with hundreds of gigabytes, memory speeds affect total imaging times.

Another key factor is the amount of memory. A memory starved server will be slower than a server configured with the proper amount of memory. Portlock Storage Manager needs memory to store its internal tables when imaging a storage object. A general rule of thumb is 256 bytes of memory per megabyte of the storage object being imaged (current object and not accumulative). A 1 TB NSS pool will need about 256 MB of memory.

CPU subsystem (if compression is enabled)

The CPU is typically not a factor unless compression is enabled. The faster the processor the faster that data will be compressed. In simple terms, compression will slow down the image process but factors such as TCP/IP subsystem performance may make compression a good option; available disk space to store the Portlock Images may require compression.

Compression Items:

- Is the storage object's data compressible? If file system compression is already enabled, then attempting to compress already compressed data will just waste time.
- If the storage and CPU subsystem is faster than the network subsystem, compressing data can decrease the total time to transfer data over the network.

To determine the effect of compression on image performance, run a test image with Portlock Storage Manager and select the destination device being the "NULL device". The NULL device is a special object in Portlock Storage Manager where data is discarded. This will allow real world performance measurements of imaging a system and measuring the effect of compression on your system's data. For example your disk subsystem is reading 50 Megabytes per second but with compression enabled, image performance drops to 12 Megabytes per second, you can determine where the bottleneck is. In this case the CPU / Memory subsystem cannot compress data as fast as the disk drives can deliver data.

TCP/IP subsystem

The TCP/IP subsystem consists of the TCP/IP protocol stack, Ethernet controller, cabling and switches.

Note: Portlock often gets support calls from customers who are getting terrible performance over the network. These customers are using cross-over cables between servers. This is a terrible idea and is not supported by the 100 or 1000 megabit Ethernet standards. The issue is that there is no authority to negotiate speed or duplex mode. This often results in the worst case scenario: 10 Megabit, simplex mode. Another case is using cheap low cost hubs or switches between servers. In the simplest of terms, you get what you pay for with hardware. If you desire maximum performance invest is good quality hardware and this includes using higher-end Ethernet switches.

There are a number of factors that can affect TCP/IP performance:

- Ethernet controller. Using better controllers will typically result in better performance. Low cost Ethernet controllers burden the server's CPU with massive numbers of interrupts. A Gigabit Ethernet controller can transfer about 800 megabits of data per second. Given an Ethernet frame size of approximately 1500 bytes this translates into about 500,000 interrupts per second. Using TCP/IP offload and larger Ethernet frame sizes (often called jumbo frames) can improve performance.
- Ethernet connection speed. Your controller may be a gigabit controller but due to poor quality cables, transient noise, overloaded or slower switches, the controller may be negotiating a slower speed such as 100 megabit. If your controllers are 100 megabit, upgrade to gigabit controllers (and skip the $29.00 models).

- Ethernet cables. The quality of your Ethernet cables is very important. Use category 5 cables as a minimum. For noisy environments consider shielded cables. The connectors on Ethernet cables use simple locking mechanisms for holding the wires and a wire can easily become loose causing faulty or noisy connections. Check the length of your cabling and the number of hops between the server and the destination. We often see network configurations with ad-hoc switches added to the network here and there to increase distances. This will definitely limit data transfer speeds.
- Ethernet switches. Do not use Ethernet hubs. Use high quality smart switches so that there is a virtual connection between the server and the system receiving the data.

Portlock Storage Manager has a command to assist in determining TCP/IP data transfer performance. Go to "System Commands" -> "Send File" and enter a dash ('-') character for the file name. Portlock Storage Manager will then send random data over the TCP/IP connection. Using the same option with the "Recv File" command will allow you to measure that maximum speed that your TCP/IP subsystem can send random data.

Disk I/O subsystem (write)

The same factors that affect disk read performance apply to disk write performance. However, there are several other factors to consider.

How is the disk subsystem organized? A single disk drive will typically be faster for sequential write performance (in the real world) than a disk array. If your disk array is setup as RAID-5, RAID-6 or a derivative, write performance can be much slower than reads.

Review items such as memory cache, cache strategy, battery backup cache, etc. Some vendors deliberately slow down write performance if the battery backup cache module is not installed. Double check that the battery is still working properly.

Portlock Storage Manager has a command to write data to a disk drive to measure write performance. To determine the maximum disk write performance using Portlock Storage Manager, run the "Disk Verify" command selecting "Write Sequential Verify". This command is located under "Drive Commands" -> "Drive Verify". *Warning: This command overwrites a disk drive destroying data. Use this command only on empty disk drives with no file systems or partitions.*

Another factor to consider when writing the received image data to a disk file is the file system caching performance. Windows, for example, will typically cache file data in memory and then lazily write this data to disk. Portlock often sees high performance during the beginning of an image that then quickly drops off once the receiving side's file system cache memory is exhausted. Test and measure file write performance using files sizes that are typical of the size of the Portlock Images that you are creating.

Double check where you are writing the Portlock Image. If you are writing the Portlock Images to a shared (mapped) drive that is remote, then you are basically transferring the data over the network twice. Once from the server to the receiver and then back over the network to the storage location.

Chapter 5. Tips and Techniques

NetWare 5.x

NetWare 5.x does not support online imaging. To image the SYS volume, it must be dismounted. Dismounted the SYS volume can affect a number of applications on the NetWare server. Any application or NLM that has open files on the SYS volume should be unloaded or exited.

Portlock Storage Manager supports two script commands: -exec_ncf_0 and -exec_ncf_1 which can be created to handle pre-image and post-image processing. This can be important when dismounting the SYS volume for an image.

Portlock recommends when imaging a NetWare server that includes dismounting the SYS volume:

1. Schedule the server image during non-peak user hours. Portlock Storage Manager supports scripting and when used with CRON the server can be imaged at times when server utilization is low.
2. Create four scripts. The first script will run 15 minutes before the image begins. The second script runs Portlock Storage Manager. The third script is executed by Portlock Storage Manager before the image process begins. The fourth script is executed by Portlock Storage Manager after the image completes.
3. Execute the first and second scripts by placing the script file names in the NetWare CRONTAB file. CRON can then run the scripts and automatically notify users and run Portlock Storage Manager.
4. After the image completes, consider just rebooting the server. This simplifies complications due to dependencies on applications and services. Add the command "-reboot" to the Portlock Image Script. The Portlock Image Wizard (part of Portlock License Manager) makes this easy.

Script to run 15 minutes before imaging the server:
1. Send a broadcast message to all users that are logged in that maintenance will begin and to logoff.
2. Disable logins so that new users can not login.

Example Script:

broadcast "The NetWare Server ACCOUNTING is going down for maintenance in 15 minutes. Please logoff from Server ACCOUNTING."
disable login

Pre image script to be run by Portlock Storage Manager:
1. Determine which applications are running on the server. Unload or exit all applications that are affected by dismounting volumes including the SYS volume. Typical applications include backup programs, antivirus programs, etc.
2. Determine which services are running on the server. Unload or exit these services. Typical services include web servers, ftp servers, CIFS, NFS, Apple Talk, etc.

3. Place command in a script file, example name "sys:/pre_img.ncf", and add the Portlock Image command *-exec_ncf_0="sys:/pre_img.ncf"* to the Portlock Image Script. The Portlock Image Wizard (part of Portlock License Manager) makes this easy.

Example Script:

> *unload cron*
> *java -exit*
> *unload nfsadmin*
> *unload pkernel*
> *unload afptcp*
> *cifsstop*
> *nfsstop*
> *unload conlog*

Post image script to be run by Portlock Storage Manager:
1. Reload or restart the applications and services that we stopped in the pre-image script.
2. Re-enable logins.

Example Script:

> *load conlog*
> *load cron*
> *load java*
> *load nfsadmin*
> *load pkernel*
> *load afptcp*
> *cifsstrt.ncf*
> *nfsstart.ncf*

Disable Login
To disable logins the command is "disable login".

Enable Login
To enable logins the command is "enable login".

Broadcast Message
To broadcast a message to all users the command is "broadcast message to send". An example is "broadcast The NetWare Server ACCOUNTING is going down for maintenance in 15 minutes. Please logoff from Server ACCOUNTING".

CONLOG.NLM
CONLOG captures all console messages and by default writes to sys:\etc\console.log. Before dismounting the SYS volume unload this NLM. The command is "unload conlog".

CRON.NLM

CRON is NetWare's program scheduler. This program uses sys:\etc\crontab. CRON runs by default once per minute. While imaging a dismounted SYS volume, CRON will not be able to access the crontab file. Before dismounting the SYS volume unload this NLM. The command is "unload cron".

JAVA.NLM

Java is a programming language with some similarities to C++. NetWare uses Java for the graphical GUI. Before dismounting the SYS volume exit Java. The command is "java -exit". To restart Java: "load java".

CIFS

CIFS is NetWare's Common Internet File System which supports network sharing of NetWare volumes. Before dismounting the SYS volume, stop CIFS. The command is "CIFSSTOP". To restart CIFS the command is "CIFSSTRT".

NFSADMIN

PKERNEL

AFPTCP

CIFSSTOP

NFSSTOP

NetWare 6.5

NetWare 6.5 supports online imaging. Online imaging uses snapshots so that the server's volumes do not need to be dismounted while imaged. This dramatically simplifies imaging a NetWare server and reduces the impact of imaging. Since volumes do not need to be dismounted, most applications and services will not need to be unloaded or stopped.

Note: Novell has fixed a lot of issues with snapshots. If you plan to use Portlock's online imaging features, make sure that Service Pack 8 is installed.

However, online imaging does affect the performance of the NetWare server. Snapshots require recording volume blocks as they change on the disk so that the snapshots stay consistent. Snapshots require "freezing" and "thawing" applications so that their file metadata is consistent. The Freeze phase means that the applications are requested to stop and write any required data to disk. The Thaw phase notifies the applications that they can resume processing.

Snapshots require free space within the NSS Pool that is the "snapshot pool". The amount of free space within the snapshot pool depends on how busy the system is and how much data is written to the volumes within the pools. A simple rule of thumb is 5% to 20% of the used space of all volumes within the pools being imaged.

Once the snapshots are created, Portlock Storage Manager then images the snapshots instead of the original pools. Once the image is complete, the snapshots are deleted.

Chapter 6. Frequently Asked Questions

Does Portlock Storage Manager support Novell Cluster Services (NCS)?

Yes for NetWare 6.5; No for NetWare 5.1. This equates to the version of NCS shipped with NetWare 6.5 SP5 thru SP8.

An important point is that the support for NCS detection and management is located in Portlock License Manager. Portlock Storage Manager version 5.05 and newer support Novell Cluster Services version 2.71 and newer when running scripts created by Portlock License Manager.

Portlock License Manager has specific support for NCS. Under the NetWare Servers tree view will be an entry for each node of the cluster and an entry for the virtual cluster node. This includes specific support for local and shared storage. For shared storage, detection of pool ownership is supported so that shared pools cannot be imaged from a cluster node that does not own the shared pool.

A key feature of Portlock's support for NCS is online imaging. This means that the cluster can continue to operate with no service interruptions. A factor to consider is the I/O load that imaging a server places on storage, network and CPU bandwidth.

Does Portlock Storage Manager support shared storage?

Yes for NetWare 6.5.

Does Portlock Storage Manager support scheduling scripts?

No. NetWare has built-in support for scheduling programs via CRON.NLM. Consult the NetWare documentation for CRON.NLM and the required entries for CRONTAB.

http://www.novell.com/coolsolutions/feature/7174.html

An example CRON entry for running a Portlock Image Script everyday Monday - Friday at 4:30 AM:

*30 4 * *1-5 load sys:/stormgr/stormgr -script=sys:/scripts/script.txt*

The command line that CRON executes can be placed into an NCF file. For example, create the file sys:/scripts/Mon_Fri.ncf. In this file place the following text line:

"load sys:/stormgr/stormgr -script=sys:/scripts/Mon_Fri.txt"

Then add the following line to your CRONTAB file:

*30 4 * *1-5 sys:/scripts/Mon_Fri.ncf*

On NetWare 6.x, why is imaging only an NSS volume not supported?

NSS Volumes are not a storage object on the disk in NetWare 6.x. Instead they are a subdirectory with quotas in an NSS Pool. NSS Pools provide a number of more advanced features such as storage pooling

and storage over-commit but the NSS volumes are no longer a separate object that can be imaged independently of the NSS Pool.

Why does Portlock Storage Manager do a Pool Check or Volume Check before imaging a Pool or Volume?

Portlock Storage Manager implements block based imaging rather than file based imaging. Block based imaging provides a number of advantages such as speed, complete backups that include NDS, trustees, rights, etc. During the Pool or Volume Check, the integrity of the storage object is verified, but also the list of blocks to be imaged is created during this phase. If the Pool or Volume is in an inconsistent state then the image process could image the wrong data resulting in a corrupted restore.

Why does Portlock Storage Manager report disconnect errors when imaging to an FTP server.

FTP servers often have short connection timeouts. A pool or volume check can be a lengthy operation. During this time, no data is transferred to the FTP server, so the FTP server may determine that the client is idle. The FTP server will disconnect the client which causes Portlock Storage Manager to abort the image. Review the connection timeout settings on the FTP server and increase the timeouts to be larger than the time that it takes Portlock Storage Manager to complete a pool or volume check for the largest object that you plan to image.

Does Portlock Storage Manager support compressing images?

Yes. See the section "CPU subsystem (if compression is enabled)" to review the impact of enabling compression on system performance.

How much does compression reduce the image size?

There is no simple answer to this question. It depends on the data being compressed. If your file system is already using compression or the files are already compressed (e.g. graphics files) then enabling compression will not affect the size of the image files.

Portlock Storage Manager uses ZLIB compression. There are some published benchmarks on compressing various types of data sets available on the Internet.

How long does it take to image my system?

There is no simple answer to this question. It depends on your hardware and the data being imaged. See the Chapter 5 in this document for specific details on performance.

Appendix A. Keywords

A keyword is a reserved word that begins and ends with a '%' character. Keywords are processed by Portlock License Manager and ignored by Portlock Storage Manager. Keywords are primarily used to add meaningful data to a script such as a description, date, version, etc. Keywords are normally followed by text and this text is treated as a string. The text can be optionally followed by a comment. Keywords can be located anywhere in a script file but must start at the beginning of a line.

Example:

%Description% This is a Portlock Image Script. # This is a comment and will be ignored

%Author%
The %Author% keyword documents the author of the script.

Example:

%Author% Bob Jones

%Date%
The %Date% keyword documents the date that the script was created. The string following this keyword is a descriptive string and is displayed but not parsed by Portlock License Manager.

Example:

%Date% Friday, February 26, 2010 3:23:41 PM

%Description%
The %Description% keyword describes the script. The string following this keyword is a descriptive string and is displayed but not parsed by Portlock License Manager.

Example:

%Description% This script was generated by the Portlock License Manager Wizard

%Version%
The %Version% keyword documents the version of the script file. The string following this keyword is a descriptive string and is displayed but not parsed by Portlock License Manager.

Example:

%Version% 1.0.0

Appendix B. Commands

A command is a reserved word that begins with a '-' character. Commands are processed by Portlock Storage Manager and ignored by Portlock License Manager. Commands are primarily used to specify image parameters, objects to image, etc. Most commands are followed by an "=' character and options. The command can be optionally followed by a comment. Commands can be located anywhere in a script file but must start at the beginning of a line. An exception is the "-script" command which must be the first non-comment line in the script file.

Format Commands

-script

The -script command signifies that this file is a Portlock Image Script. This command must be the first non-comment line in the script file.

Example:

> *-script*

Portlock Boot CD Options

These commands are valid for Portlock Storage Manager running from the Portlock Boot CD which is based upon WinPE. These commands are ignored when running under NetWare.

The –os and –servername commands are optional but if they are not included in a script when running from the Portlock Boot CD, Portlock Storage Manager will prompt the user on the NetWare server for the correct information which will pause the script waiting for a response.

-os=arg1

The –os command specifies the NetWare version that Portlock Storage Manager should assume when running from the Portlock Boot CD. This option is ignored when running under NetWare.

Arg1:

Arg1 is a decimal number from the set 3,4,6,65. This number represents the version of NetWare.

- NetWare 3.x: 3
- NetWare 4.x: 4
- NetWare 5.x: 5
- NetWare 6.0:   6
- NetWare 6.5:   65

Example:

> *-os=65   # Set the NetWare version to 6.5*

Notes:

The partition format for NetWare 3.x and 4.x is the same. The partition format changed in NetWare 5.x and again in NetWare 6.0. NetWare 6.0 and 6.5 use different partition formats. It is important to specify the correct NetWare version when imaging a system using the Portlock Boot CD. The Portlock Boot CD will detect the installed version of NetWare so that Portlock License Manager can display the correct version. This check is performed by Portlock OS Manager. This information is displayed in the Portlock License Manager list view window when "Boot CDs" is selected in the tree view.
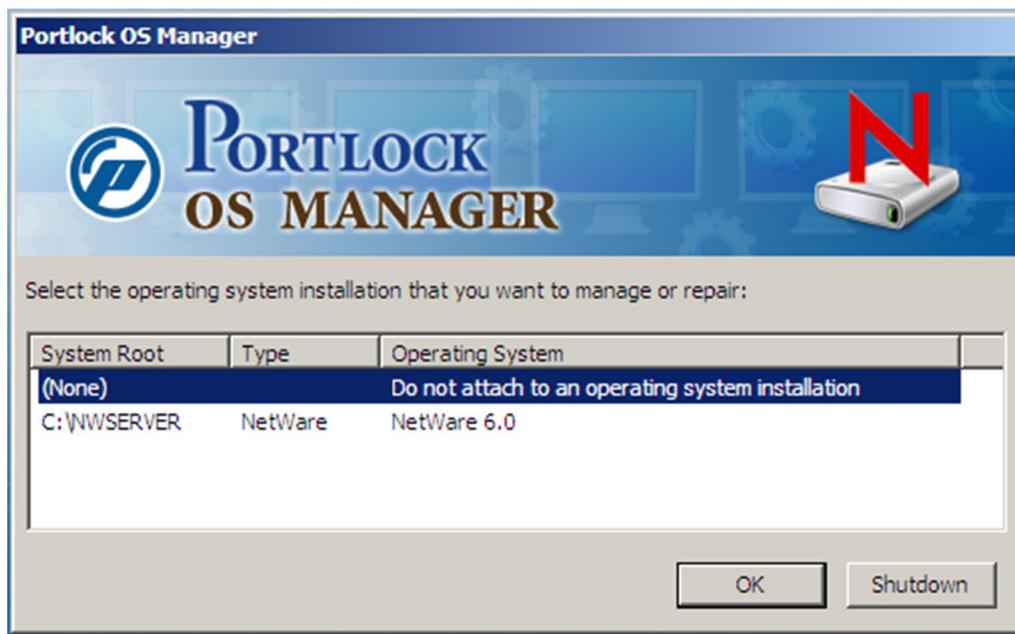
-servername=arg1
The –servername command specifies the NetWare File Server Name that Portlock Storage Manager will use for the image header. This name is used by Portlock License Manger to index images. This option is ignored when running under NetWare.

Arg1:

Arg1 is string. This is the file server name. Maximum string length is 47 characters.

Option Commands

-autoname=[arg1]

The -autoname command specifies that Portlock Storage Manager is to auto name image files when image spanning is enabled.

Example:

> *-autoname*
> *-autoname=0*
> *-autoname=1*

Arg1:

Arg1 is optional and is a decimal number of either 0 or 1. The value 0 turns off auto naming and the value 1 turns on auto naming.

-compression

The -compression command specifies that Portlock Storage Manager is to compress the contents of a Portlock Image. This command defaults to compression level 5 "medium".

Example:

> *-compression*

-compression=arg1

The -compression command specifies that Portlock Storage Manager is to compress the contents of a Portlock Image. This command also specifies the compression level (1-9).

Arg1:

Arg1 is a decimal number between 1 and 9. Higher numbers increase the compression level.

Example:

> *-compress=1 # Minimum compression level*
> *-compress=5 # Normal compression level. This is the default compression level*
> *-compress=9 # Maximum compression. Can be very slow.*

-crc32=arg1

The -crc32 command specifies that Portlock Storage Manager is to calculate crc32 on the image data and store the crc32 value in the image block headers. CRC32 is enabled by default. Calculating crc32 is CPU intensive.

Arg1:

Arg1 is a decimal number with a value of 0 or 1. 0 disables crc32 and 1 enables crc32.

Example:

> *-crc32=0   # Disable crc32*
> *-crc32=1   # Enable crc32*

-exec_ncf_0=<arg1>

The -exec_ncf_0 command specifies that Portlock Storage Manager will execute an NCF file before the image begins. An NCF is a NetWare server batch file. The NCF file can contain any commands that Novell NetWare supports. This command is typically used to unload NLMs and exit applications that may be affected by the image process.

Arg1:

Arg1 is a filename. This is the full path name on the NetWare server.

Example:

> *-exec_ncf_0="SYS:/pre_img.ncf*

Example File Contents:

> *unload cron*
> *java -exit*
> *unload nfsadmin*
> *unload pkernel*
> *unload afptcp*
> *cifsstop*
> *nfsstop*
> *unload conlog*

-exec_ncf_1=<arg1>

The -exec_ncf_1 command specifies that Portlock Storage Manager will execute an NCF file after the image completes. An NCF is a NetWare server batch file. The NCF file can contain any commands that Novell NetWare supports. This command is typically used to load NLMs and restart applications that may be affected by the image process.

Arg1:

Arg1 is a filename. This is the full path name on the NetWare server.

Example:

> *-exec_ncf_1="SYS:/post_img.ncf*

Example File Contents:

> *load conlog*
> *load cron*
> *load java*
> *load nfsadmin*
> *load pkernel*
> *load afptcp*
> *cifsstrt.ncf*
> *nfsstart.ncf*

-ftp_port=<arg1>

The -ftp_port command specifies the TCP port that Portlock Storage Manager will use to connect to FTP servers. The default TCP port is 21.

Arg1:

Arg1 is a decimal number between 1 and 65535. TCP ports below 1024 are normally reserved by the operating system. Consult your IT department and consult various TCP/IP specifications when deciding on which TCP port numbers to use.

Example:

> *-ftp_port=21*

-logfile=<arg1>

The -logfile command specifies that Portlock Storage Manager will create a logfile during program execution.

Note: Do not specify a filename that is located on a partition or volume that will be imaged unless the -online command is specified. Normally partitions and volumes are dismounted during image commands and dismounting will close all open files on the storage object.

Arg1:

Arg1 is a filename. The file will be created. An existing file will be overwritten.

Example:

> *-logfile=sys:/stormgr.log*

-nwio

The –nwio command is specified the NetWare I/O subsystem to use. This is only supported for NetWare 3.x and 4.x servers. These server versions support two I/O subsystems:

- NWIO which is the older NetWare 3.x DSK driver interface.
- NWPA which is the newer NetWare 4.x HAM driver interface. NWPA is the only option for NetWare 5.x and 6.x servers.

Example:

-nwio

See also:

-nwpa

-nwpa

The –nwpa command is specified the NetWare I/O subsystem to use. This is only supported for NetWare 3.x and 4.x servers. These server versions support two I/O subsystems:

- NWIO which is the older NetWare 3.x DSK driver interface.
- NWPA which is the newer NetWare 4.x HAM driver interface. NWPA is the only option for NetWare 5.x and 6.x servers.

Example:

-nwpa

See also:

-nwio

-port=<arg1>

The -port command specifies the TCP port that Portlock Storage Manager will use for TCP/IP based communications or data transfers. The default TCP port is 19000.

Arg1:

Arg1 is a decimal number between 1 and 65535. TCP ports below 1024 are normally reserved by the operating system. Consult your IT department and consult various TCP/IP specifications when deciding on which TCP port numbers to use.

Example:

-port=19000

-reboot

The -reboot command specifies that Portlock Storage Manager will reboot the server after an image completes.

Example:

> *-reboot*

-script_timeout=arg1

The –script_timeout command determines how long Portlock Storage Manager will display an error dialog during the execution of a script before automatically dismissing the error message. This can be useful when debugging scripts that fail. The default timeout is 5 seconds. You can set this timeout to be a large number and then press [ENTER] to dismiss the dialog once you have reviewed its contents.

Arg1:

Arg1 is a decimal number that represents the number of seconds to display an error dialog during script execution.

Example:

> *-script_timeout=60   # Display each error message for 60 seconds*

-spansize=arg1

The -spansize command specifies that Portlock Storage Manager is to create spanned image files. Normally Portlock Storage Manager will create a single file that has no size limit. The span size command specifies that maximum image file size that will be created. This is useful for destinations that have file system limitations on file sizes such as FAT-16, FAT-32 and some FTP servers. This is also useful when you plan to burn the image files to optical media.

Arg1:

Arg1 is a decimal number that represents the maximum file size in bytes. The valid range is between 1,000,000 and 4,999,999,999.

Example:

> *-spansize=1000000   # Limit the image file size to 1 million bytes*
> *-spansize=650000000   # Limit the image file size to 650 million bytes. A typical size for CD-R.*

-ssl_ftp=arg1

The -ssl_ftp command specifies that Portlock Storage Manager will use SSL / TLS when sending commands and data to an FTP server. This command is used with the -imageftp command.

Example:

-ssl_ftp   *#Enable SSL*

-ssl_ftp=0   *#Do not use SSL*

-ssl_ftp=1   *#Enable SSL*

See also:

-imageftp

-tape_fixed

The -tape_fixed command specifies that Portlock Storage Manager will use fixed sized blocks when writing to a tape drive. The size of a fixed length block is determined by the tape drive but is typically 512 bytes. Consult the specification for the tape drive to determine which mode is required (fixed or variable length blocks). DAT drives typically use fixed length blocks.

Example:

-tape_fixed

See also:

-tape_variable

-tape_variable

The -tape_variable command specifies that Portlock Storage Manager will use variable length blocks when writing to a tape drive. The size of a variable length block is 32,768 bytes. Consult the specification for the tape drive to determine which mode is required (fixed or variable length blocks). Most high performance tape drives use variable length blocks.

Example:

-tape_variable

See also:

-tape_fixed

Destination Commands

-imagefile=arg1

The -imagefile command specifies that Portlock Storage Manager is to write the Portlock Image to a disk file located on the same server being imaged. The file can be located on a DOS partition or a NetWare volume.

Arg1:

Arg1 is a filename. Use a full path name such as C:\stormgr.img or SYS:\stormgr.img

Example:

> *-imagefile=c:\stormgr.img*
> *-imagefile=sys:\stormgr.img*

See also:

> -imageftp
> -imagetape
> -imagetcp

-imageftp=arg1,arg2,arg3,arg4

The -imageftp command specifies that Portlock Storage Manager is to write the Portlock Image to an FTP server via TCP/IP.

Arg1:

Arg1 is an TCP/IP address. This is the address of the FTP server to write the image to.

Arg2:

Arg2 is the user name to use for authentication with the FTP server.

Arg3:

Arg3 is the password to use for authentication with the FTP server.

Arg4:

Arg4 is the file name to create on the FTP server.

Example:

> *-imageftp=192.168.1.10,anonymous,user@test.com,stormgr.img*

See also:

> -imagefile
> -imagetape
> -imagetcp
> -ftp_port
> -ssl_ftp

Notes:

FTP servers often have short connection timeouts. A pool or volume check can be a lengthy operation. During this time, no data is transferred to the FTP server, so the FTP server may determine that the client is idle. The FTP server will disconnect the client which causes Portlock Storage Manager to abort

the image. Review the connection timeout settings on the FTP server and increase the timeouts to be larger than the time that it takes Portlock Storage Manager to complete a pool or volume check for the largest object that you plan to image.

-imagetape=arg1

The -imagetape command specifies that Portlock Storage Manager is to write the Portlock Image to a tape drive located on the same server being imaged.

Arg1:

Arg1 is a number starting with zero. The first tape drive located on the server is 0. Use Portlock Storage Manager "Tape Commands" menu to determine which tape drive matches which number.

Example:

> *-imagetape=0*

See also:

> -tape_fixed
> *-tape_variable*
> *-imagefile*
> *-imageftp*
> *-imagetcp*

-imagetcp=client=arg1

The -imagetcp=client command specifies that Portlock Storage Manager is to connect to the TCP/IP address specified by arg1 and send the Portlock Image via TCP/IP.

Arg1:

Arg1 is a TCP/IP address and is not a host name. This is the destination that is waiting for a connection from Portlock Storage Manager. The destination is usually Portlock License Manager or Portlock Storage Manager.

Example:

> *-imagetcp=client=192.168.10.155*

-imagetcp=server

The -imagetcp=server command specifies that Portlock Storage Manager is to wait for a connection from another program and then send the Portlock Image via TCP/IP. Portlock Storage Manager will wait for a connection on TCP port 19000. This TCP port can be changed with the -port command.

Note: "server" specifies the mode and is not the name of a server.

Example:

-imagetcp=server

See also:

-port

Storage Object Commands

-imageall

The -imageall command specifies that Portlock Storage Manager is to image all partitions, volumes and pools.

Note: The -skip_dos, -skip_vol and -skip_pool commands can be used with -imageall to skip certain storage objects.

Example:

-imageall

See also:

-skip_dos
-skip_vol
-skip_pool

-image_dos=<arg1>

The -image_dos command specifies that Portlock Storage Manager is to image the partition with the volume label arg1. Supported partition types include FAT-12, FAT-16 and FAT-32 and FAT based diagnostic partitions.

Note: A DOS partition without a label cannot be imaged unless the -imageall command is specified.

Note: NetWare does not enforce unique volume labels for DOS partitions. Portlock recommends reviewing the volume labels for each DOS partition, if the server has more than one partition of this type. Change the volume labels to be unique for each partition. Ensure that each DOS partition has a unique descriptive name.

This command also supports vendor diagnostic partitions such as:

- Type 0x12 (HP / Compaq Diagnostic Partition).
- Type 0xdb (Dell Restore Partition).
- Type 0xde (Dell Utility Partition).
- Type 0xfe (IBM Diagnostic Partition).

Arg1:

Arg1 is a string that represents the volume label for the partition.

Example:

> *-image_dos=NWLOCALVOL   #This is the default volume label that NetWare 6.5 assigns to the booting DOS partition.*

-image_vol=<arg1>

The -image_vol command specifies that Portlock Storage Manager is to image the specified NetWare Traditional volume or NetWare 5.x NSS volume.

Note: Online imaging of NetWare Traditional and NetWare 5.x NSS volumes is not supported by NetWare.

Note: This command is only supported for NetWare Traditional volumes on NetWare 6.x. NSS Volumes on NetWare 6.x are part of NSS pools. Use the -image_pool command for NSS volumes on NetWare 6.x.

Arg1:

Arg1 is a string that represents the volume name to image.

Example:

> *-image_vol=SYS*

-image_pool=<arg1>

The -image_pool command specifies that Portlock Storage Manager is to image the specified NetWare NSS pool. All volumes within the NSS pool are imaged.

Note: NetWare 6.5 supports online imaging of NSS pools. Add the command line options *"-online*" and *"-snapshot*" to image a pool while it is mounted and active.

Arg1:

Arg1 is a string that represents the pool name to image.

Example:

> *-image_pool=SYS   # Image the NSS pool SYS and all of its volumes*
> *-snapshot=TEST   # Use the NSS pool TEST for the pool snapshots*
> *-online   # Enable online imaging of NSS pools*

-skip_dos=arg1

The -skip_dos command specifies that Portlock Storage Manager is to not image the specified partition. This command is used with -imageall to selectively not image certain partitions.

Arg1:

Arg1 is a string that represents the volume label for the partition to skip.

Example:

-skip_dos=NWLOCALVOL

See also:

-image_dos

-skip_vol=arg1

The -skip_vol command specifies that Portlock Storage Manager is to not image the specified volume. This command is used with -imageall to selectively not image certain volumes.

Note: This command does not apply to NSS volumes located in NSS pools on NetWare 6.x.

Arg1:

Arg1 is a string that represents the volume name to skip.

Example:

-skip_vol=SYS

-skip_pool=arg1

The -skip_pool command specifies that Portlock Storage Manager is to not image the specified NSS pool. This command is used with -imageall to selectively not image certain NSS pools.

Arg1:

Arg1 is a string that represents the NSS pool name to skip.

Example:

-skip_pool=SYS

Appendix C. Portlock Storage Manager and FTP Servers.

Introduction.

Novell NetWare does not support mounting Windows shares on the server. This means that you cannot use a Windows share on another computer as a image destination or restore source directly from NetWare. Using FTP servers is one method to get around this NetWare limitation. This section will cover some of the basics of FTP server configuration issues such as firewall (FTP PASV option) and security (using SSL / TLS).

The first step is to setup an account on your FTP server with write permissions. If you don't have write permissions Portlock Storage Manager will not be able to upload image files. The next step is to determine the type of data connections that your FTP server supports and that your firewalls allow. This involves using or not using the FTP PASV command. For data security review the FTP server support for encrypted data transfers (SSL / TLS).

Portlock Storage Manager supports sending image files to FTP servers and restoring from image files stored on FTP servers. This includes support for Active Mode, Passive Mode, encryption (SSL / TLS), image spanning and image file auto naming. Note: encryption support means that the commands and data transferred to the FTP server is encrypted and not that the image file itself is encrypted. At this time Portlock Storage Manager does not support encrypting image files.

Portlock License Manager includes a setup page in the Create Script Wizard to help you setup the connection information for FTP servers. This page supports searching for FTP servers on your network, testing that a connection can be established with the FTP server and that the login credentials are correct. This page will check if the specified image file already exists on the server to warn about overwriting existing images. The FTP server information and credentials are saved in the registry. The password is encrypted before storing in the registry.

FTP Server Configuration.

Review the following settings on your FTP server. The names may be different for your particular server.

- FTP Port. This should be port 21. This is the port that Portlock Storage Manager will use to connect to the FTP server. The -ftp_port command can change the port that Portlock Storage Manager uses.
- Connection Timeout. This is the number of seconds that a client can be idle before being disconnected. Portlock Storage Manager will not transfer data to the FTP server during some tasks such as a Pool or Volume check and the FTP server might determine that the client is idle and disconnect. This will cause Portlock Storage Manager to abort the image.
- Passive Mode Settings. If passive mode is not enabled on your FTP server, then you need to disable passive mode in Portlock Storage Manager.
- Speed Limit Settings. Some FTP servers can limit the data transfer rate from clients.

- SSL / TLS settings. If you plan to encrypt command and data transfers between the FTP server and Portlock Storage Manager, then SSL / TLS will need to be setup and enabled on the FTP server.

Active / Passive Mode.

FTP data transfers involve creating two communications channels. One for commands and one for data. There are two FTP modes that a client and server can negotiate: Active Mode and Passive Mode. FTP clients typically use passive mode when transferring data to / from an FTP server.

Active mode means that the Portlock Storage Manager will first connect to the FTP server on port 21, which creates the command channel, and then wait for the FTP server to connect back to Portlock Storage Manager, which creates the data channel. If the FTP server is on a public network and you are located on a private network or behind a NAT based firewall, then active mode cannot be used because the FTP server cannot connect to private IP addresses.

Passive mode means that Portlock Storage Manager will first connect to the FTP server on port 21, which creates the command channel and then requests a new TCP/IP address / port number from the FTP server for the data connection and then finally connects to the returned address, which creates the data channel. If you are behind a NAT based firewall then passive mode is required.

If the FTP server and Portlock Storage Manager are located on an internal network then either mode can be used.

The command -pasv can be used to control which mode Portlock Storage Manager uses with FTP servers.

Automatically finding FTP servers on your network.

Portlock License Manager supports searching for FTP servers. The Create Image Wizard has an option for scanning the network. Click the button "Search" and a background task will scan the network for servers that respond to connection requests on port 21. Once you click the search button, the button title changes to "Refresh" so that the list of FTP servers can be reloaded. Portlock License Manager will remember the FTP servers that are found during a network scan. Once a successful login during the FTP Server Connection Test dialog runs, the user credentials will also be saved in the registry with the password encrypted.

The screenshot is the "Create Script Wizard" page for entering the FTP server information.
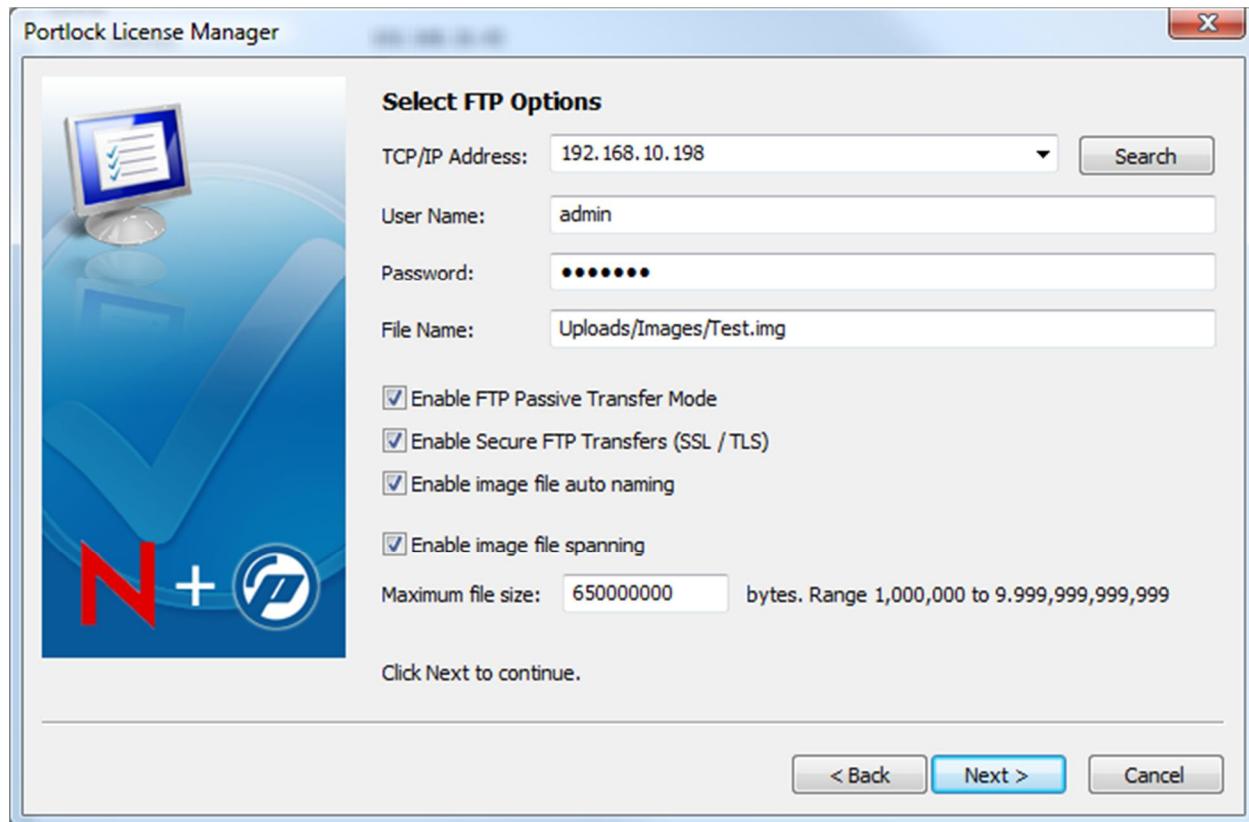
Appendix D. Example: Imaging a NetWare 5.1 Server

Introduction.

In this example we will use Portlock License Manager to image a NetWare server. Portlock License Manager runs on Windows XP SP2, Windows Vista and Windows 7 (x86 and x64 platforms).

Start Portlock License Manager. Review the opening screen. There are two primary windows. The left window provides a tree view of various objects. The right window provides a list view of selected objects in the tree view that changes based upon the selection in the left window.
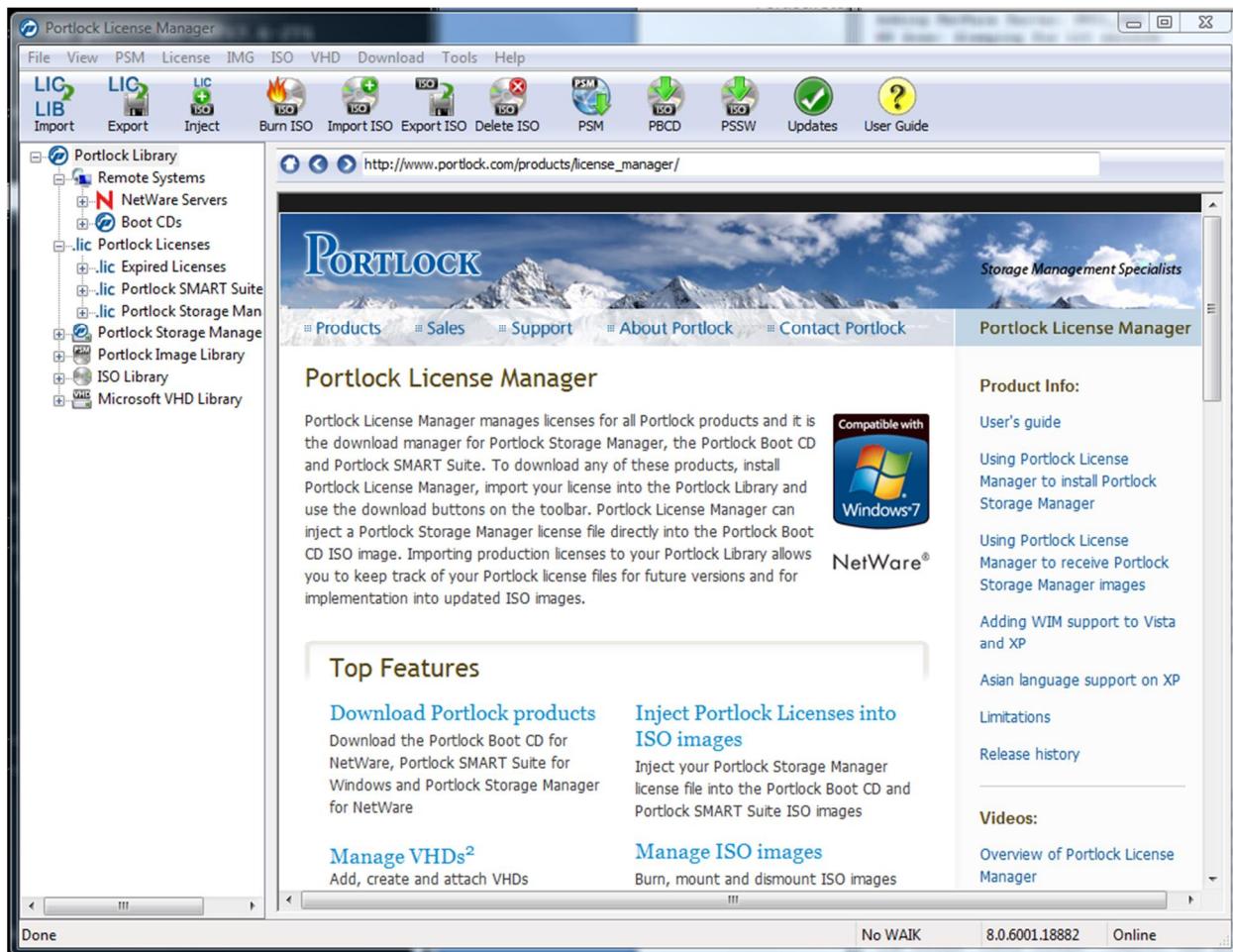
Find the item "NetWare Servers" in the tree view. This item will contain the NetWare servers that are visible to the workstation. If the desired NetWare server is not displayed, right-click on "NetWare Servers", select "Add NetWare Server" and then enter the TCP/IP address or server name of the desired NetWare server.

The list view will display various details of the NetWare servers. In this example, we have four servers displayed. One is a NetWare 5.1 SP8 server and the others are a NetWare 6.5 SP8 Cluster. The cluster has two servers (CLUSTERA and CLUSTERB). The virtual cluster server is named "cluster". Note that Portlock License Manager displays information about the version of Novell Cluster Services version and node numbers.
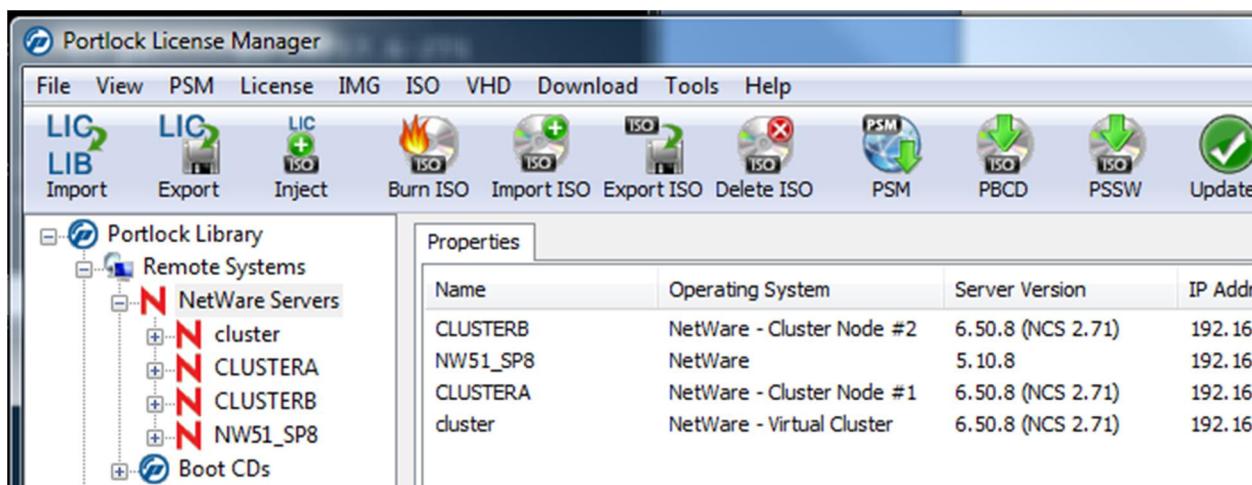
Select the server in the tree view. The list view will change and display information about the NetWare volumes that are currently mounted on the server. This information is static - to update, right-click on the server name and select "Refresh Server Information".
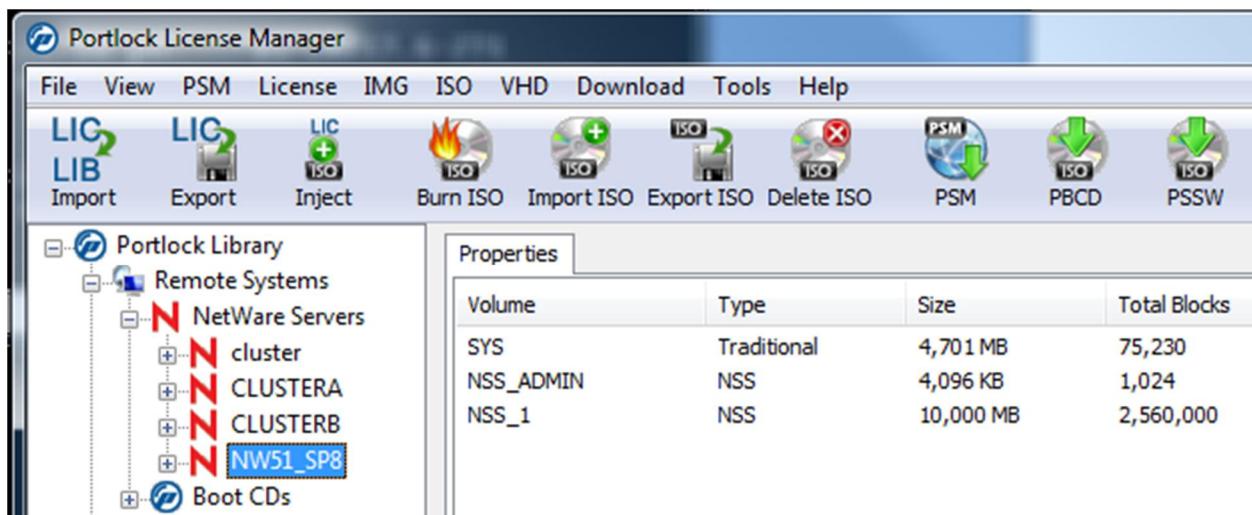
There are two methods to image a NetWare server. Immediately via the "Image NetWare Server" command and via a saved Portlock Image Script. When you select "Image NetWare Server" a script is

created and saved under the NetWare server's name. In this example, we will create a script first and then execute the script.

Right-click on the server name in tree view. Select "Create Script Wizard". The wizard displays an introductory screen. After reviewing the screen, click Next.
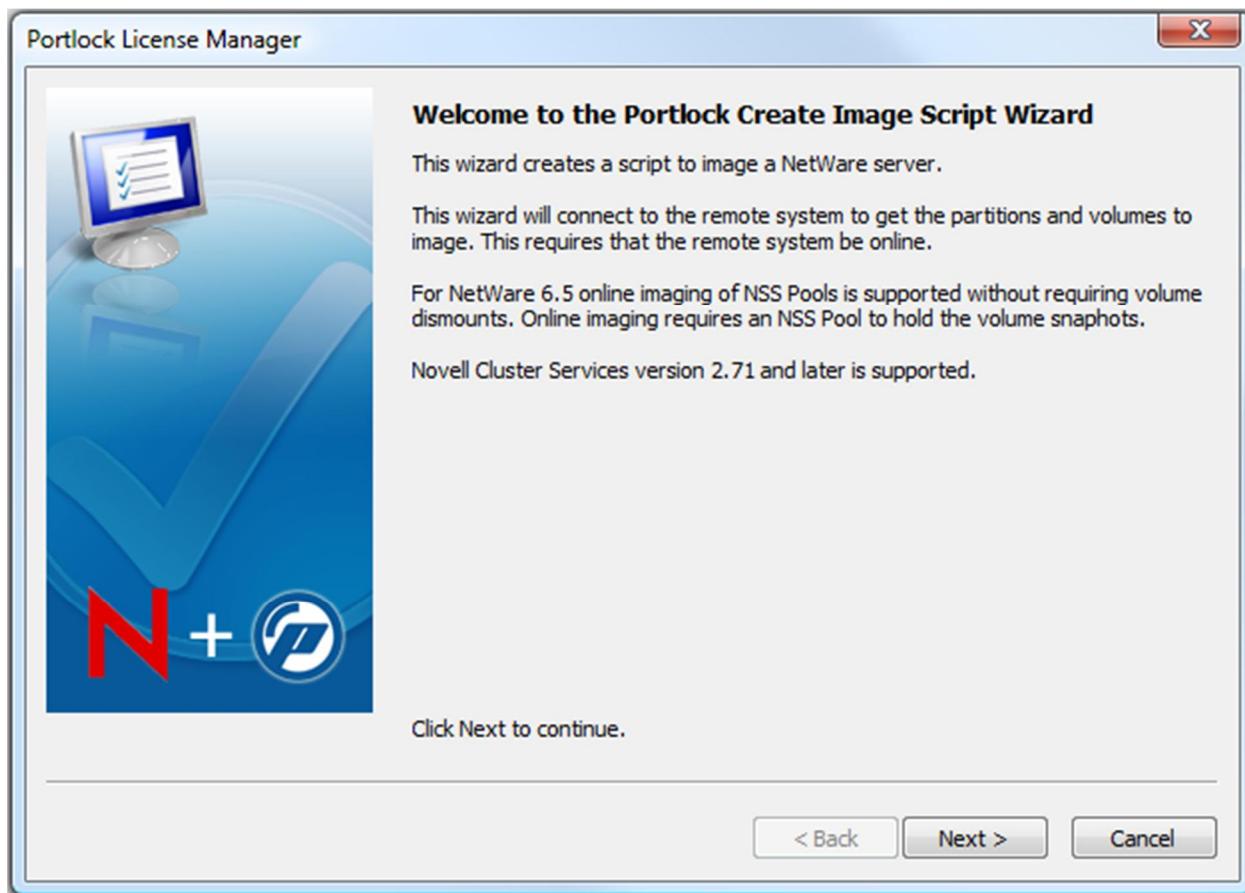
The screen shows the name of the NetWare server. When the next button is clicked, Portlock License Manager will connect to the NetWare server and launch Portlock Storage Manager. Portlock Storage Manager will create a list of storage objects on the server and send this information back to Portlock License Manager. This connection requires admin rights to the server. If Portlock Storage Manager is not installed on the NetWare server, this phase will fail. To correct this problem cancel the wizard. Then right-click on the NetWare server and select "Install Portlock Storage Manager".
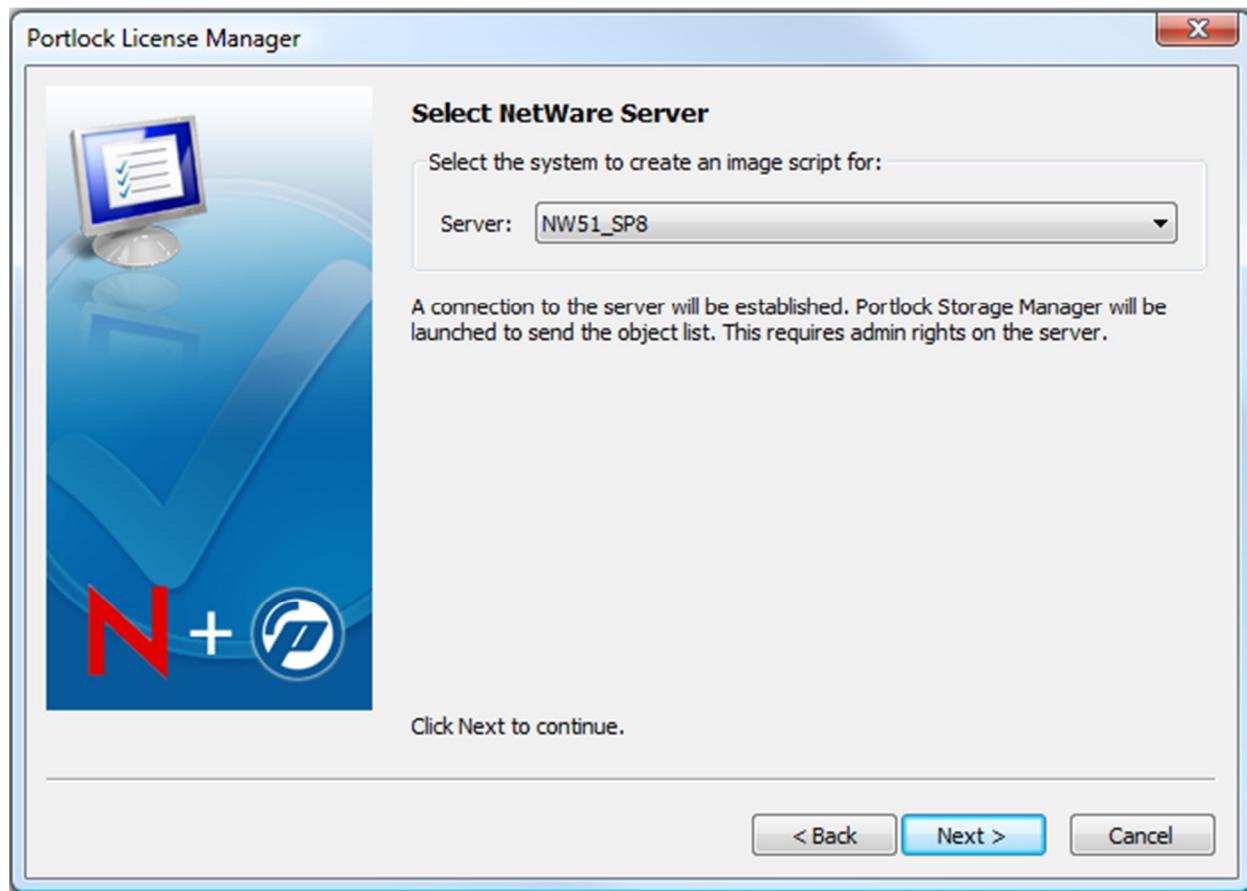
This screen displays options for the image script. After setting the desired options click Next.

- Name. This is the name of the script. Do not enter a path name as the script will be stored in the tree view under NetWare Servers.
- Enable image compression. This option enables or disables compression of the data created by the image command.
- Calculate crc32 values for image data. This option enables crc32 checksum information to be added to the data created by the image command. During an image restore, the data will be verified against the saved crc32 values.

Portlock License Manager

Select Image Options

Specify the script name:

Name: Disaster Recovery Image Script

☑ Enable image compression

Compression level:
- ○ Compression Low
- ● Compression Medium
- ○ Compression High

☑ Calculate crc32 values for image data

Click Next to continue.

< Back   Next >   Cancel
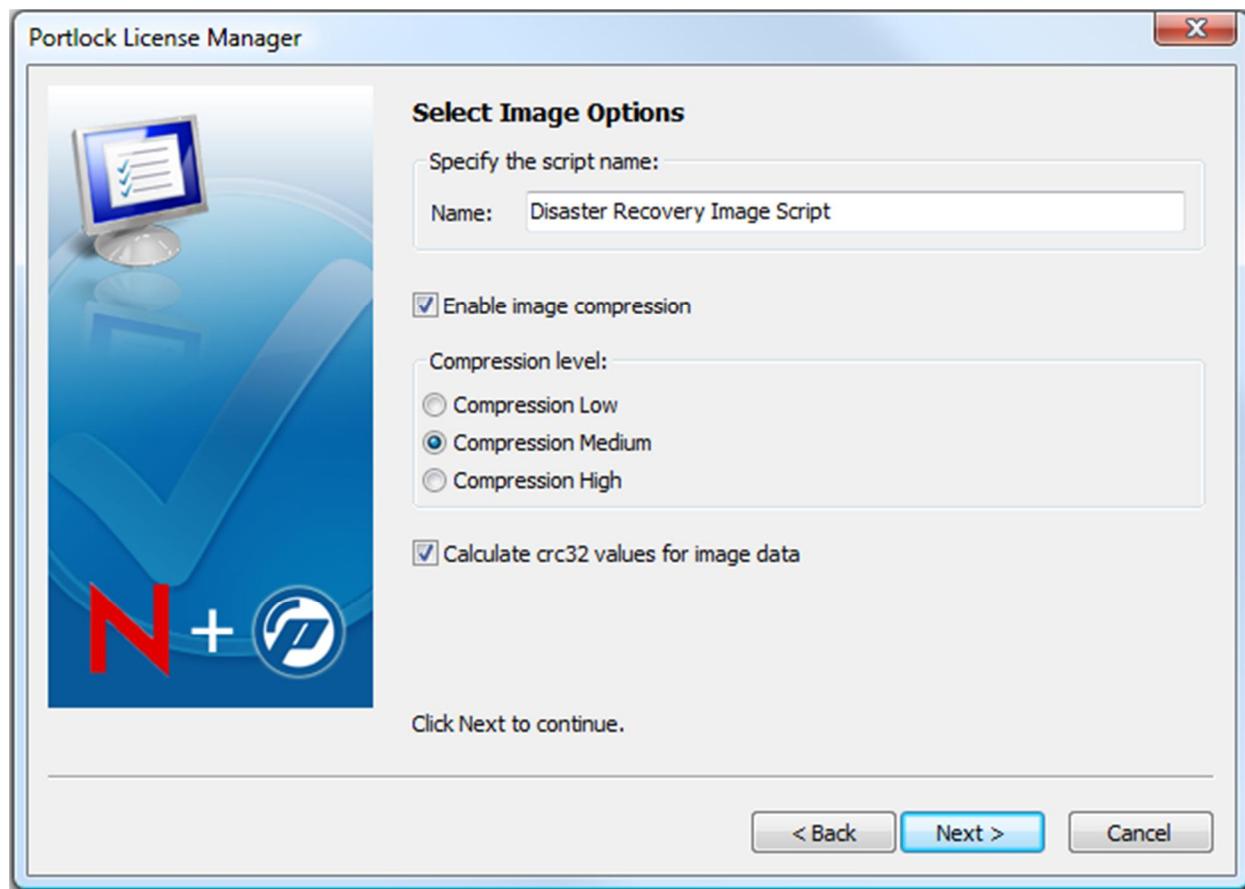
This screen displays options that are performed before the image begins. This is done via a NetWare batch file (NCF). If desired, specify the full path name to the script located on the NetWare server. Portlock License Manager does not create the NCF file.

In this example, the script "sys:/pre_img.ncf" is specified. This script file contains the following content:

```
broadcast "Portlock Storage Manager is starting"
```
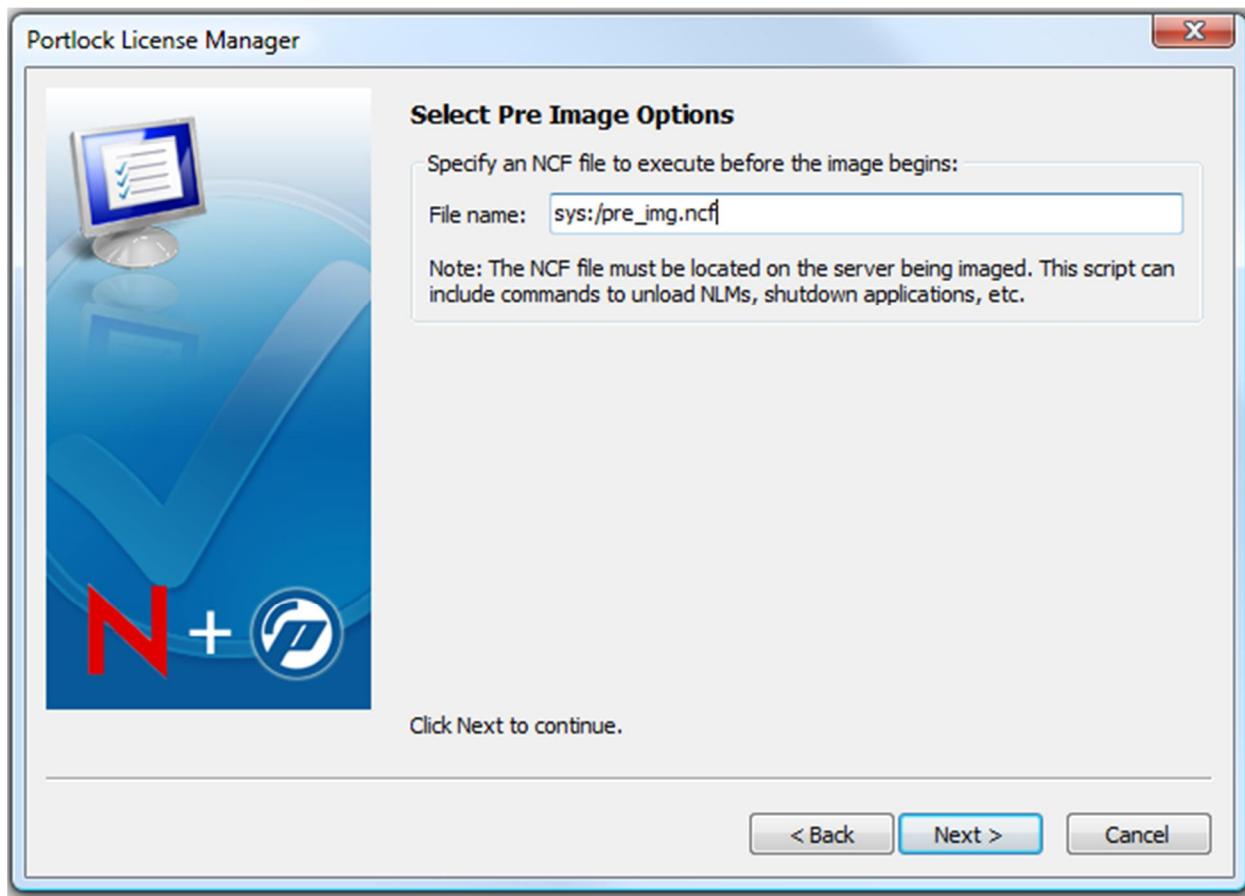
This screen displays options that are performed after the image completes. This is done via a NetWare batch file (NCF). If desired, specify the full path name to the script located on the NetWare server. Portlock License Manager does not create the NCF file.

There are two additional options that control if the server is rebooted or shutdown after the image completes.

In this example, the script "sys:/post_img.ncf" is specified. This script file contains the following content:

```
broadcast "Portlock Storage Manager has completed the server image"
```
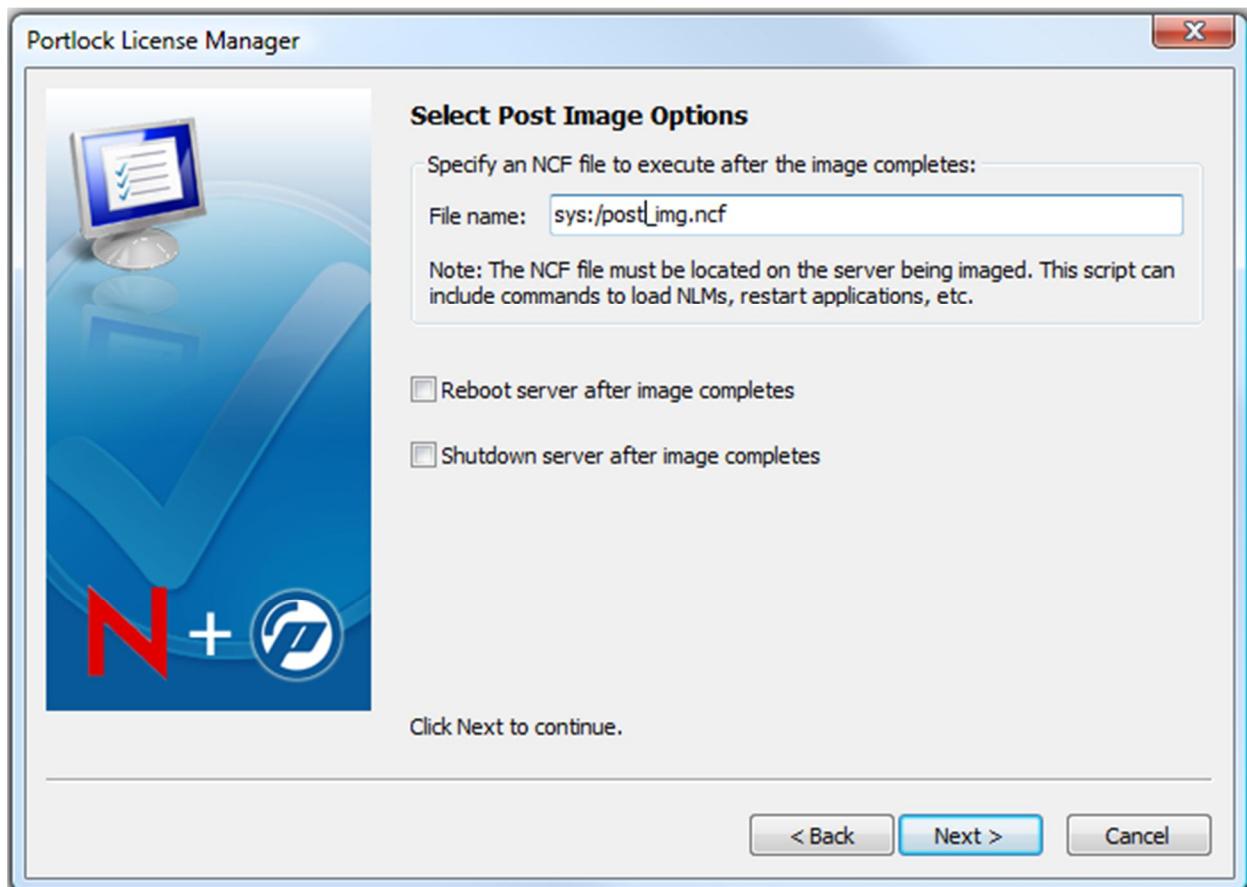
This screen displays options for selecting where to store the image. In this example TCP/IP is used. Portlock Storage Manager will then image the NetWare server and send the image data over TCP/IP.
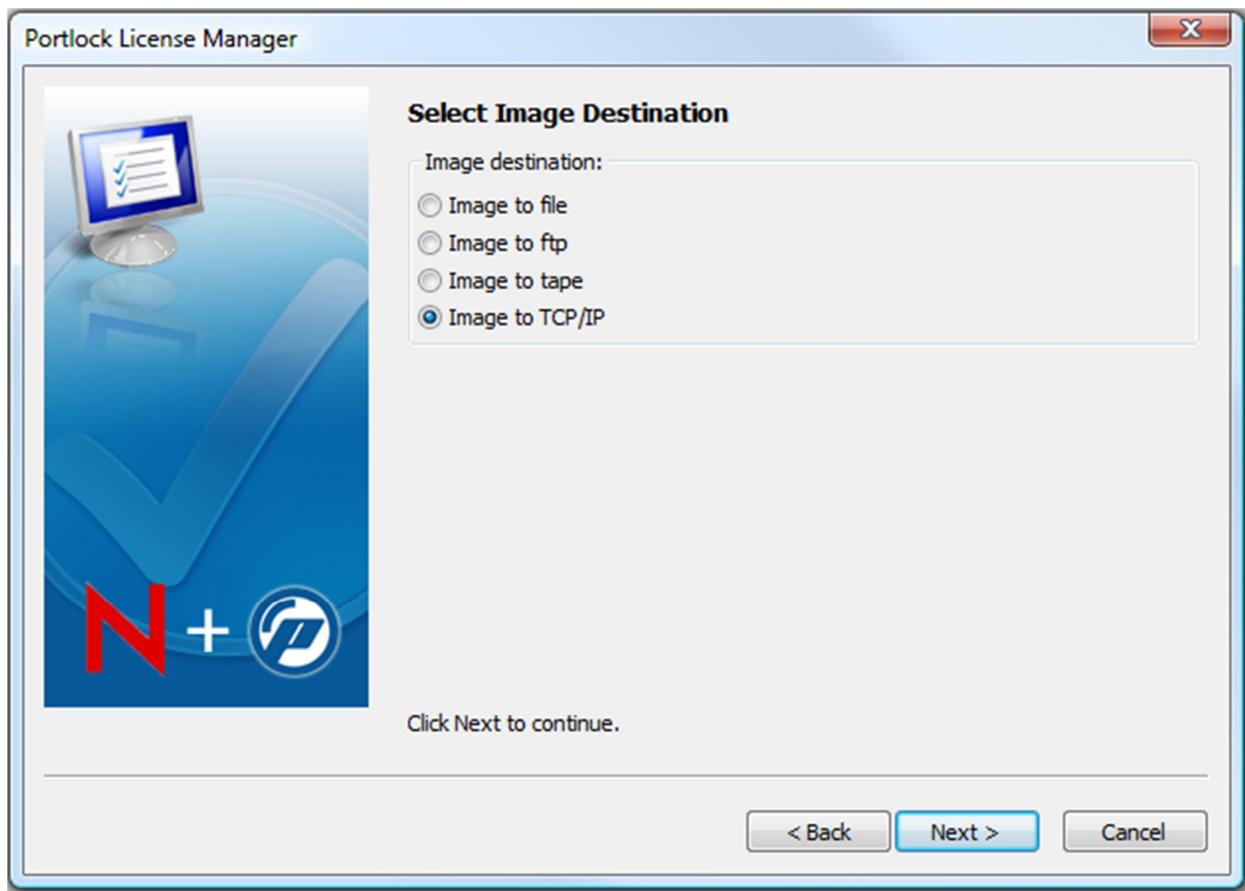
This screen shows the options for TCP/IP. In this example, Portlock Storage Manager will connect back to Portlock License Manager at TCP/IP address 192.168.10.99. If the workstation has more than one TCP/IP address, click the pull-down choice box and select the TCP/IP address that has the fastest connection to the NetWare server.

There are several options that can be selected:

- Server Mode. Portlock Storage Manager will start and then wait for a connection from Portlock License Manager. Use this mode when you want to monitor an image command. Normally Client Mode is used so that the image command runs in the background in Portlock License Manager.
- Client Mode connecting to Portlock License Manager. This is the normal mode. Portlock Storage Manager will connect to Portlock License Manager and upload the server image.
- Client Mode. Select this mode when you want to manually specify the TCP/IP address of where Portlock Storage Manager will connect to. This could even be the TCP/IP address of another system that is running Portlock License Manager.
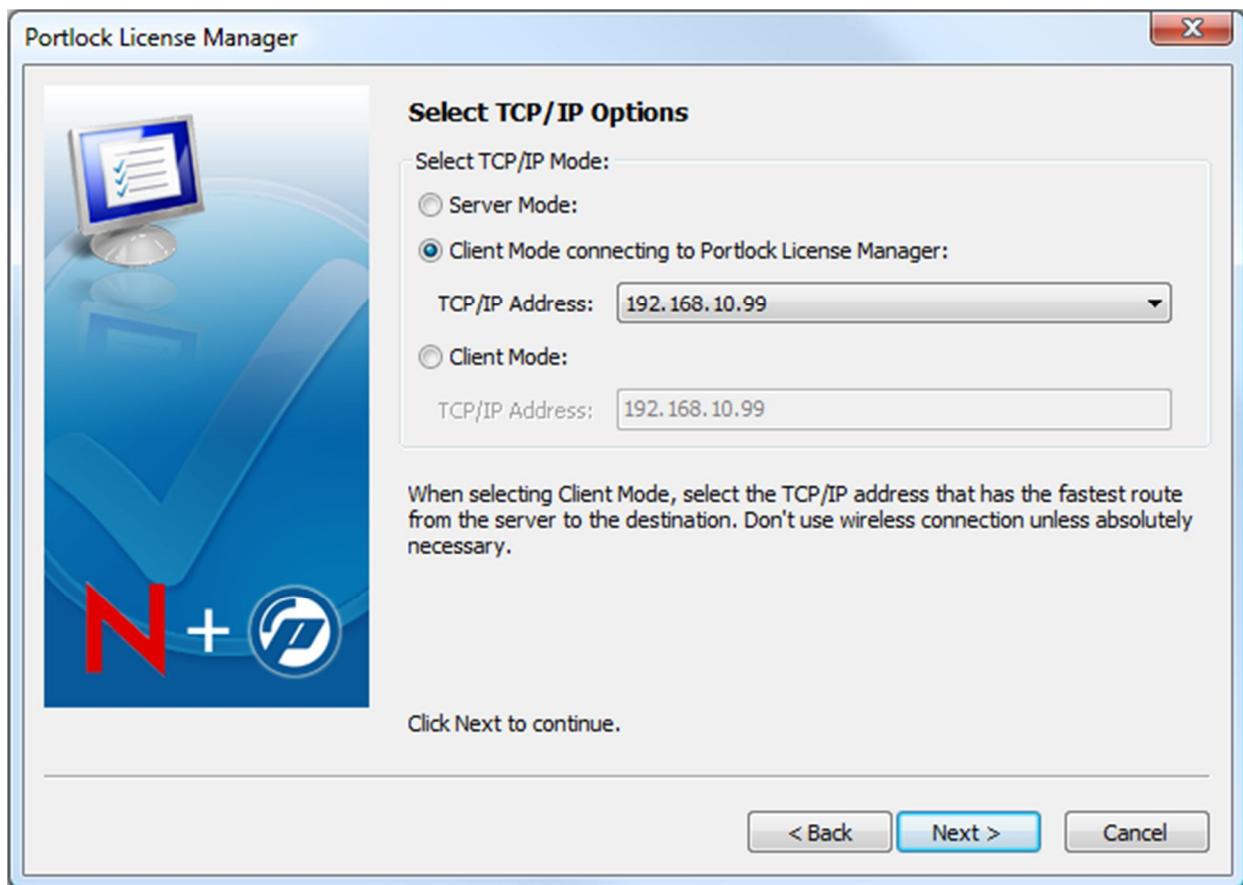
This screen displays the objects that can be imaged. In this example, there are three objects:

- FAT16 DOS partition. This is the partition that the server boots from.
- SYS Volume. This is a NetWare Traditional volume holding the operating system.
- USERS Volume. This is a NetWare NSS volume for the users data on the system.

The objective in this example is to create a disaster recovery image of the operating system. This needs to include the booting DOS partition and the SYS volume. Therefore we select the DOS partition, the SYS volume and deselect the USERS volume.

Portlock License Manager

Image Items

Status	Name	Type	Size
☑ Image	DRDOS	FAT16	1,506 MB
☑ Image	SYS	NetWare Traditional Volume	4,701 MB
☐ Skip	USERS	NetWare NSS Volume	10,000 MB

Click Next to continue.

< Back   Next >   Cancel
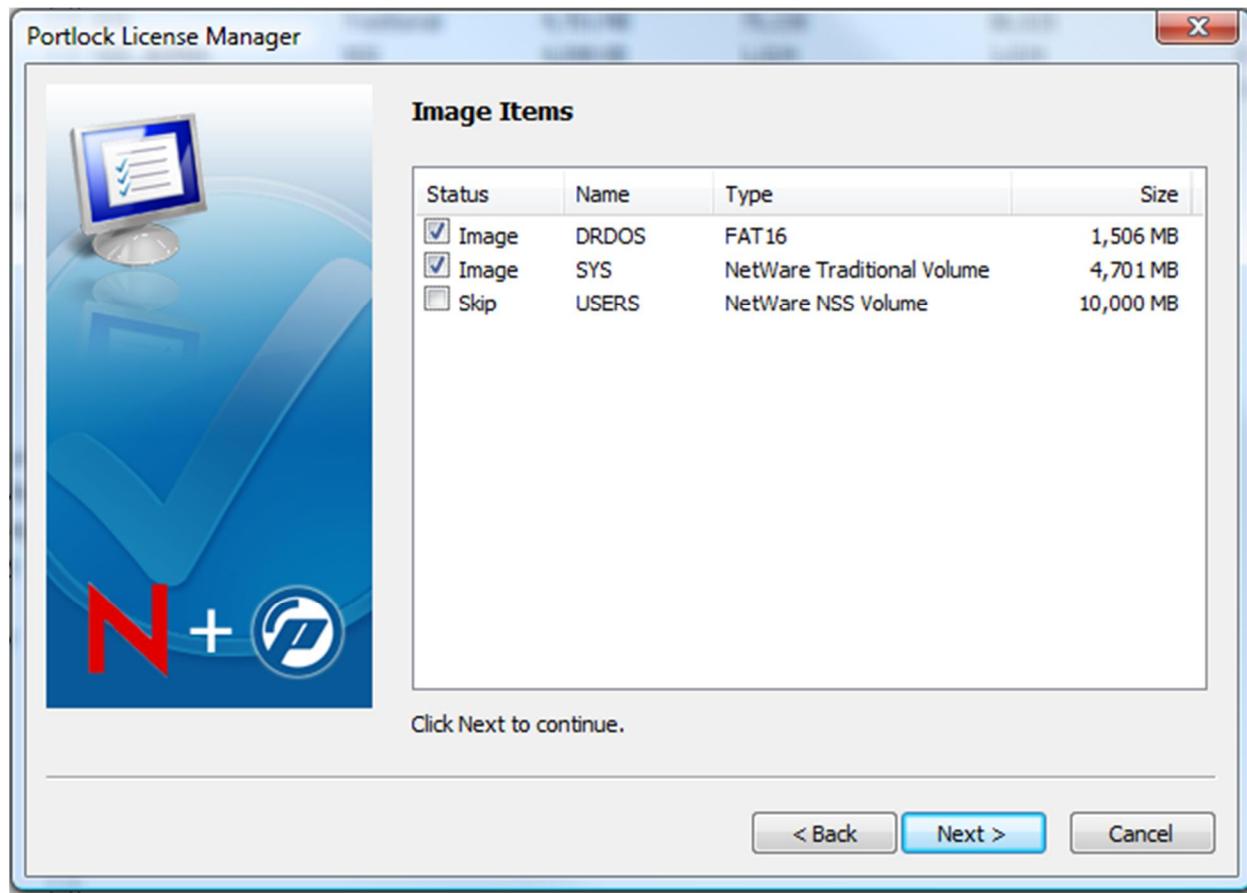
This screen displays that all information has been collected. Once the Finish button is clicked, the script will be saved in tree view under the item "Scripts". Review the following screens.
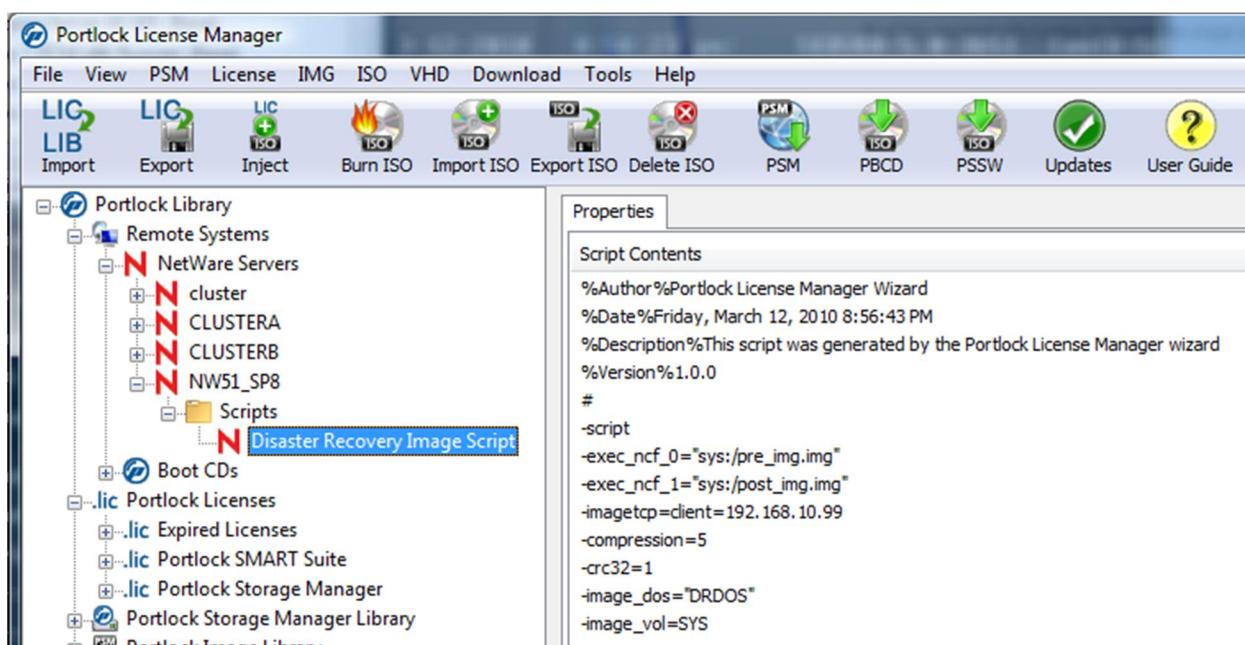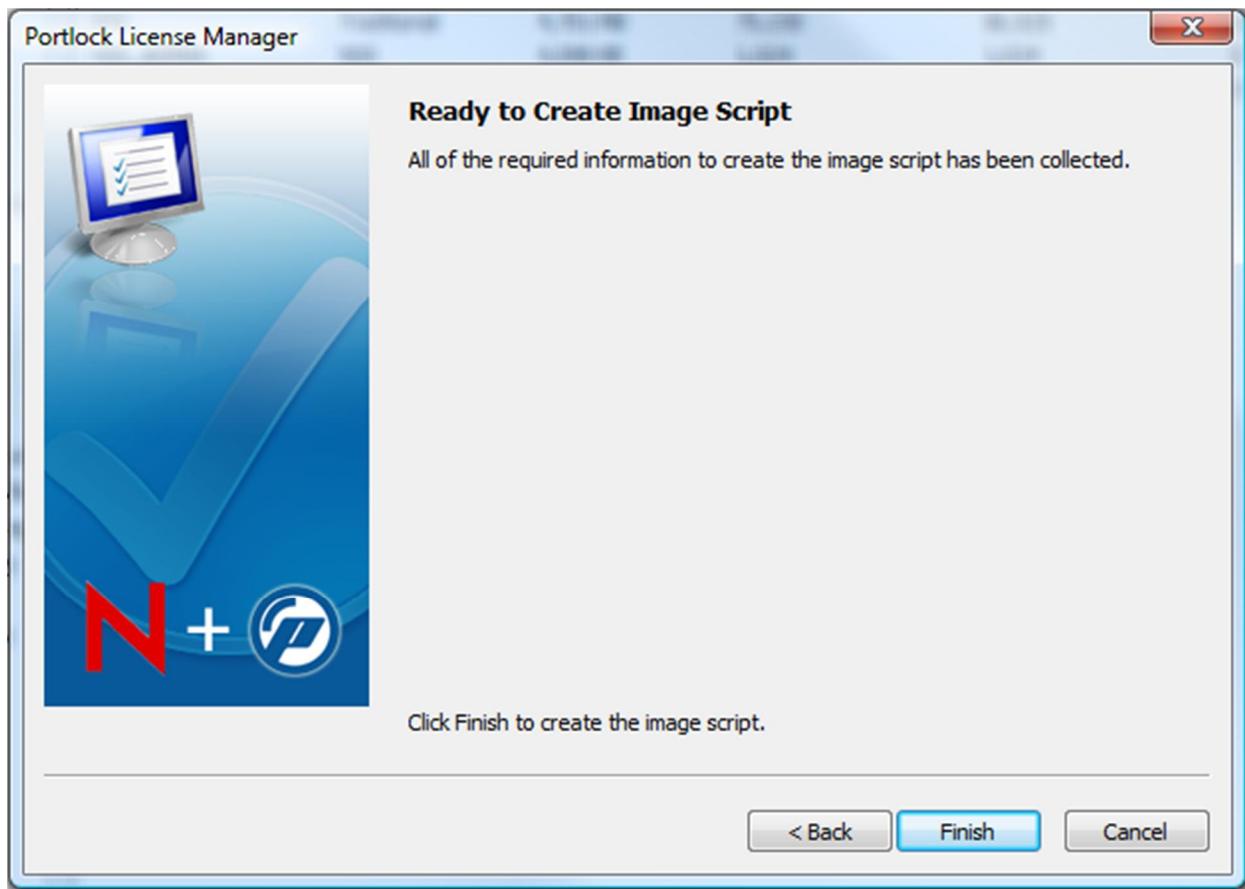
The script that is created for this example has the following content. Refer to other sections of this document for details on each line of this script.

%Author%   Portlock License Manager Wizard
%Date%   Friday, March 12, 2010 8:56:43 PM
%Description%   This script was generated by the Portlock License Manager Wizard
%Version%   1.0.0
#
-script
-exec_ncf_0="sys:/pre_img.img"
-exec_ncf_1="sys:/post_img.img"
-imagetcp=client=192.168.10.99
-compression=5
-crc32=1
-image_dos="DRDOS"
-image_vol=SYS

Now that the script has been created, the script can be executed at any time. Select the script in the tree view, right-click and select "Image NetWare server using this script". The following steps will occur:

- Portlock License Manager will open a connection to the NetWare server.
- Portlock License Manager will copy the script to the server with the destination file name "sys:/script.txt".
- Portlock Storage Manager will then be launched with the option "-script=sys:/script.txt".
- Portlock Storage Manager will first execute the script command "-exec_ncf_0".
- Portlock Storage Manager will connect to Portlock License Manager using the TCP/IP address 192.168.10.99.
- Portlock License Manager will accept the connection, verify the NetWare server name and create a directory to receive the image.
- Portlock Storage Manager will then image the server using the commands in the script. The image data will be transferred to Portlock License Manager over TCP/IP.
- Portlock Storage Manager will execute the script command "-exec_nf_1".

When Portlock License Manager accepts the connect from Portlock Storage Manager, the status window will be displayed. The status window displays status for current and previous uploads and downloads since program start.

In this example, a complete disaster recovery image of the NetWare 5.1 SP8 server took 3 minutes 43 seconds. Using this image, a NetWare server can be restored from bare-metal in just a few minutes. All critical information including NDS, server and user IDs, trustees, directory restrictions, etc are saved in the image.
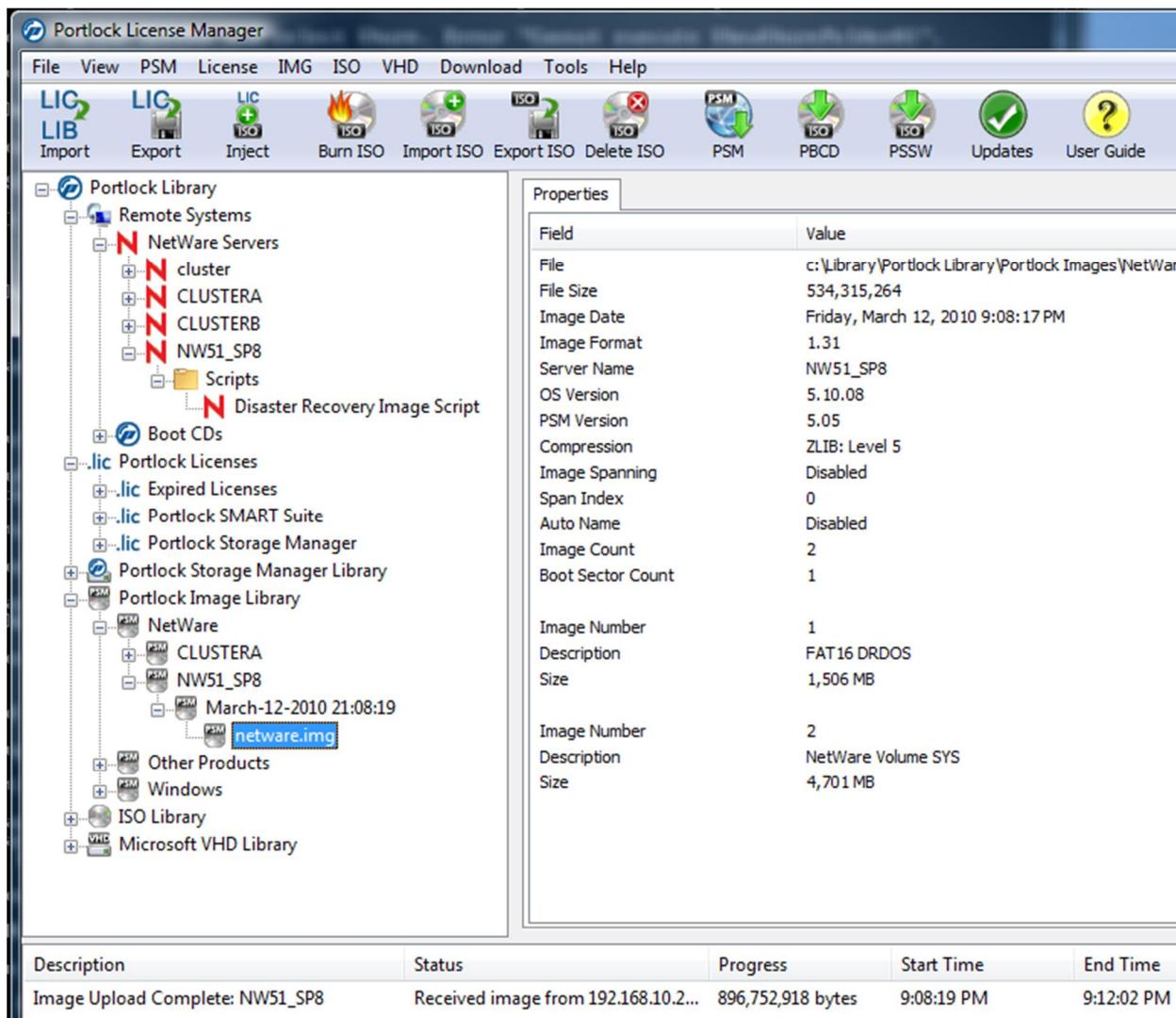
Portlock Images are stored in the tree view under "Portlock Image Library". Under this item is the name of the server and the date of the image. When the image is selected in the tree view, details about the image are displayed in the list view.

To restore a NetWare server from a Portlock Image, select the image in the tree view, right-click and select "Send Portlock Image". Then boot the system to be restored with the Portlock Boot CD, start Portlock Storage Manager and restore the server selecting "Portlock License Manager" as the restore source.
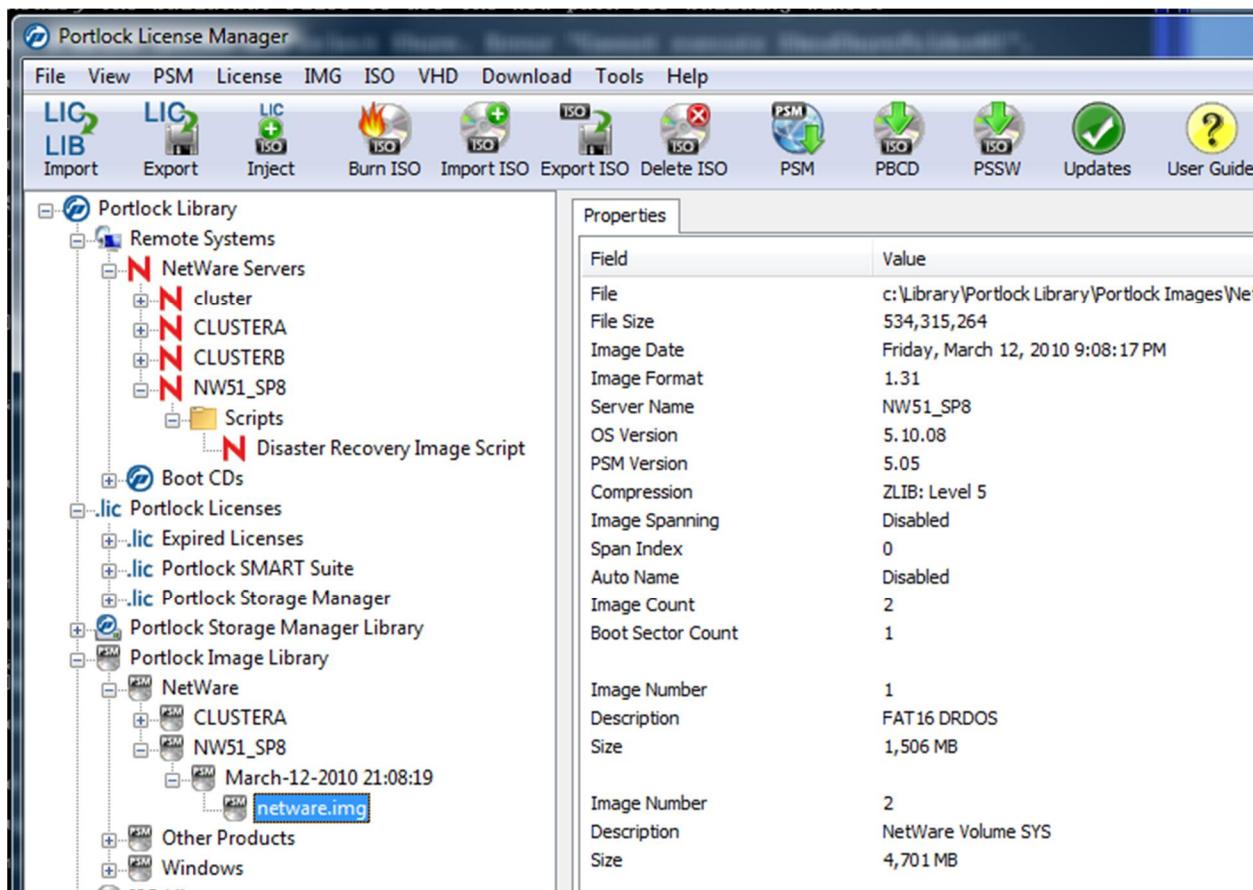
Appendix E. Example: Imaging **a** NetWare 6.0 Server using the Portlock Boot CD and an FTP Server

Introduction.

In this example we will use Portlock License Manager to image a NetWare server that is booted with the Portlock Boot CD and send the image to an FTP server.

Start Portlock License Manager. Review the opening screen. There are two primary windows. The left window provides a tree view of various objects. The right window provides a list view of selected objects in the tree view that changes based upon the selection in the left window.

Boot the server using the Portlock Boot CD. Once the Portlock Boot CD completes its boot process, the following screen is displayed. Note the licensing information and the TCP/IP address.
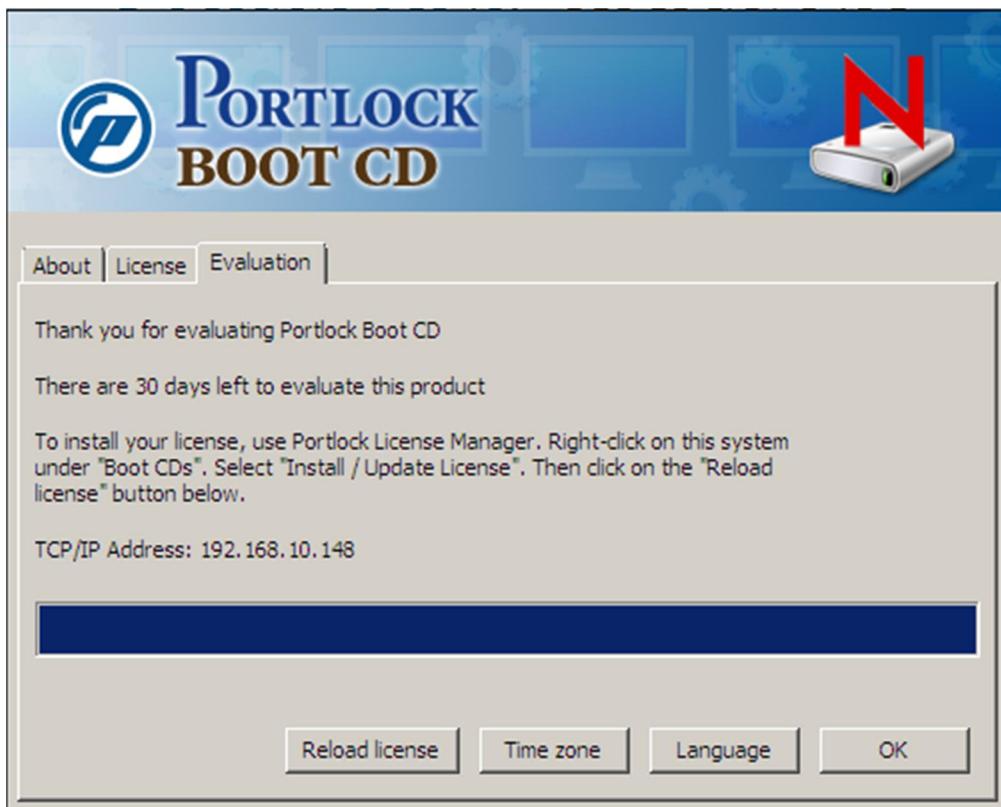
Within Portlock License Manager locate the item "Boot CDs" in the tree view. This tree item will contain the remote systems that are visible to the workstation. During the Portlock Boot CD startup up a broadcast is sent over TCP/IP that can be received by Portlock License Manager if the two systems are connected to the same network. Note: routers typically do not route broadcast messages.

If Portlock License Manager does not see the remote system, you can manually add this system. Right-click on "Boot CDs", select "Add system" and then enter the TCP/IP address that you noted above. If the remote system has more than one TCP/IP address, select the one that either matches the workstation's subnet or is the fastest to your workstation.
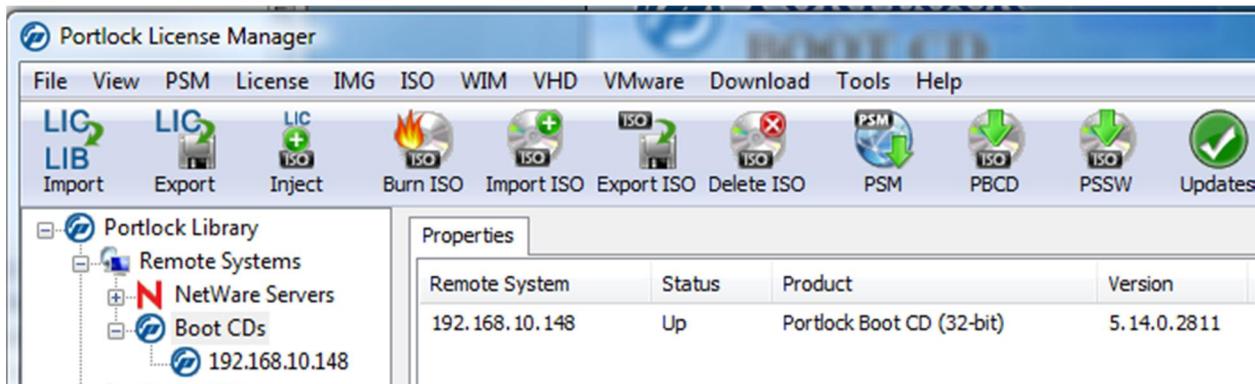
Portlock Storage Manager requires a license to operate without restrictions. If the license information displayed in the Portlock Boot CD startup screen shows "evaluation" then you will need to install your license. Under "Boot CDs" right-click on the remote system, select "Install / Update License". This will start the "Install Portlock Storage Manager License" dialog that will copy the desired license to the server. Once the license is installed, click on the "Reload license" button from the Portlock Boot CD to reload the new license.
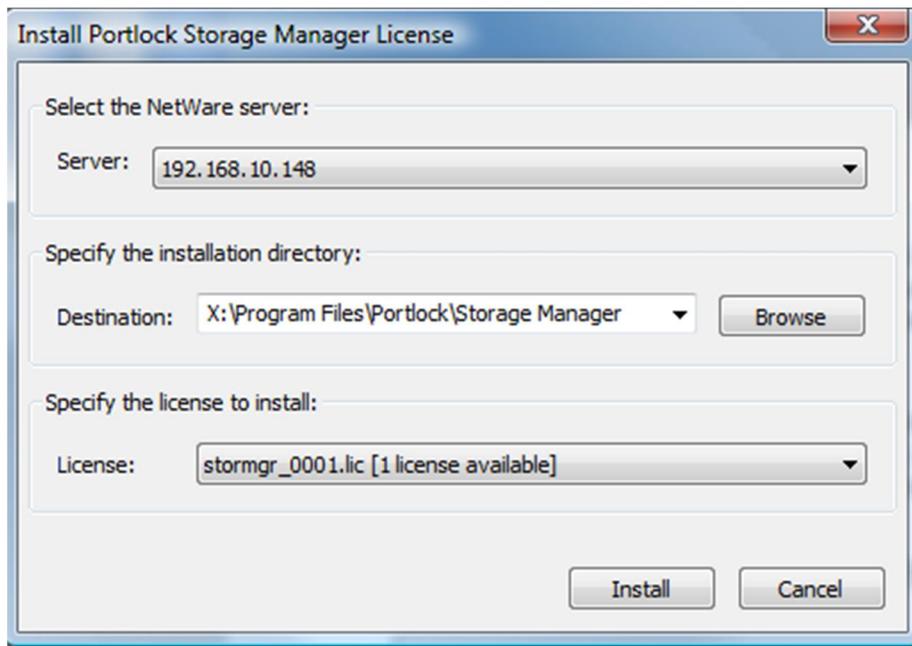
Note: Portlock License Manager supports injecting a license into the Portlock Boot CD ISO Image prior to burning to optical media. Look for the "Inject" button on the toolbar.

Note: Portlock License Manager also supports installing new versions of Portlock Storage Manager to an existing Portlock Boot CD starting with Portlock Boot CD version 5.14. Under "Boot CDs" right-click on the remote system, select "Install / Update Portlock Storage Manager". This command optionally installs your license at the same time you install a new version of Portlock Storage Manager.

To image a remote system right-click on the remote system under "Boot CDs", select "Image System". This starts the Portlock Image Wizard which will step thru creating a script that will then be launched on the remote system.

After reviewing this screen, click Next.
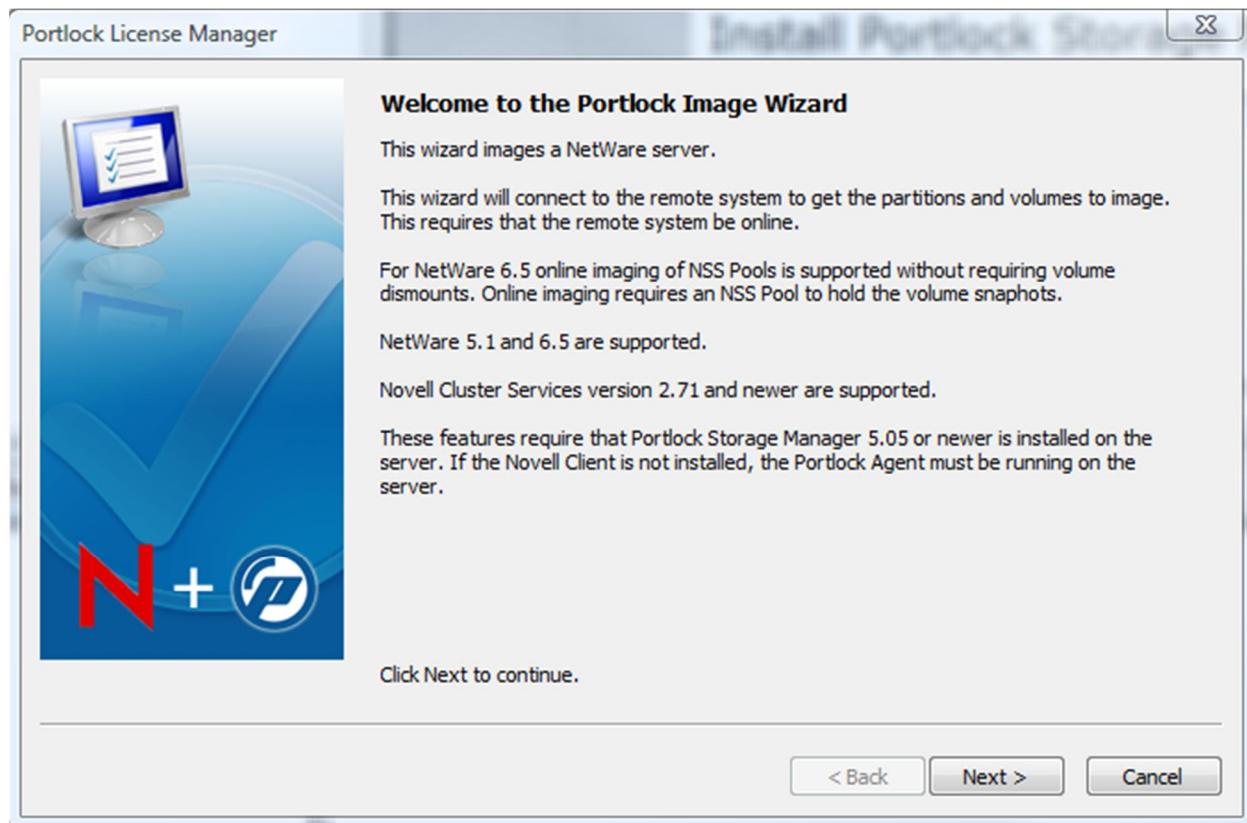
This screen shows the TCP/IP address of the remote system. When the next button is clicked, Portlock License Manager will connect to the remote system and launch Portlock Storage Manager. Portlock Storage Manager will create a list of storage objects on the system and send this information back to Portlock License Manager.
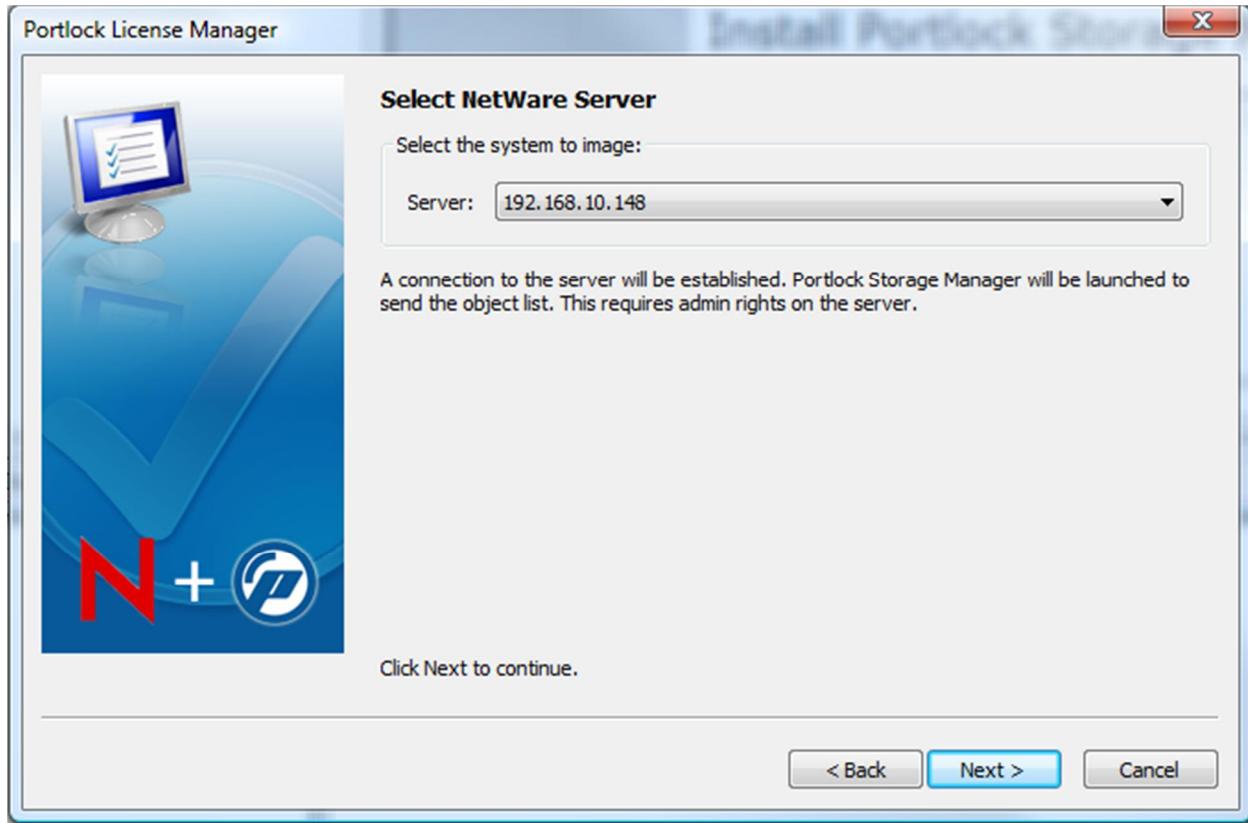
This screen displays options to select the NetWare server version. An attempt will be made to determine the correct version that is installed on the remote system. It is very important to select the correct version as this information is embedded in the image file and is used by the restore command.
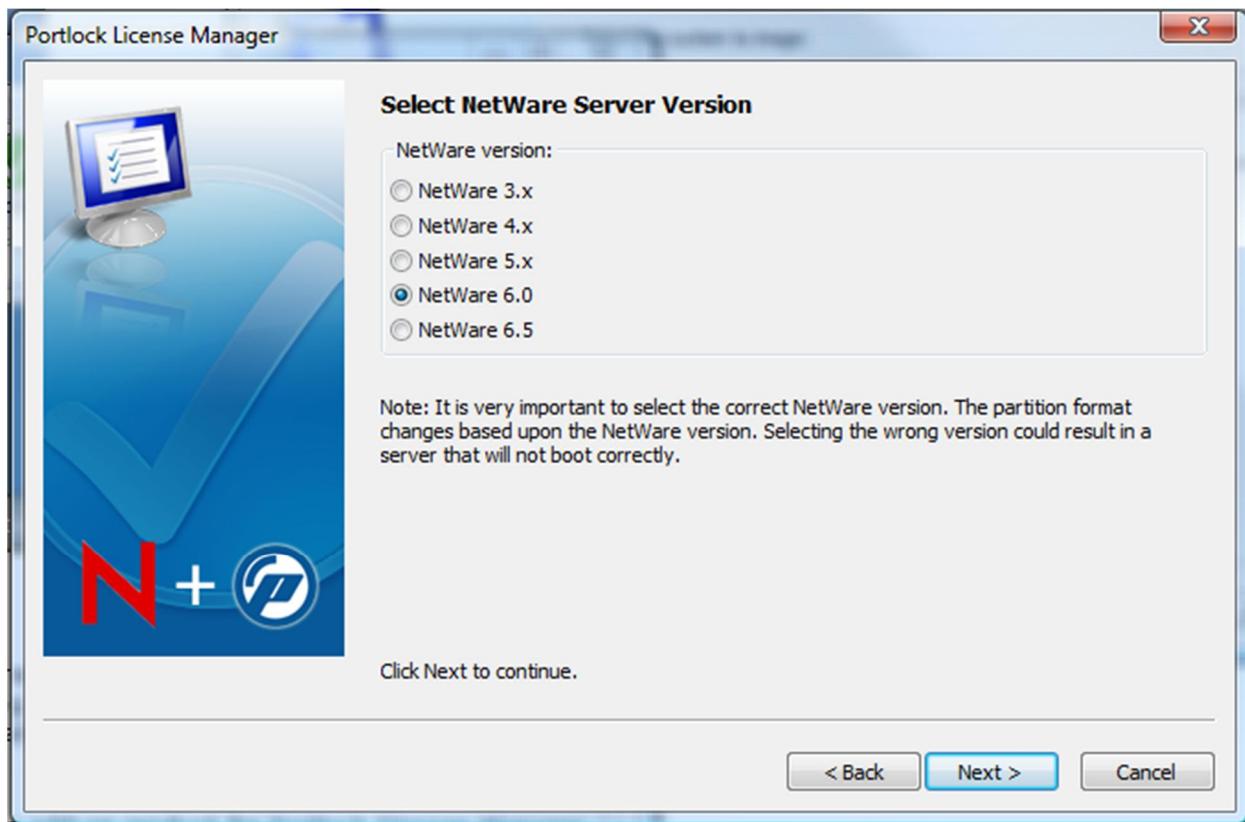
This screen displays options for the image command. After setting the desired options click Next.

- Name. This is the name of the script.
- Enable image compression. This option enables or disables compression of the data created by the image command.
- Calculate crc32 values for image data. This option enables crc32 checksum information to be added to the data created by the image command. During an image restore, the data will be verified against the saved crc32 values.
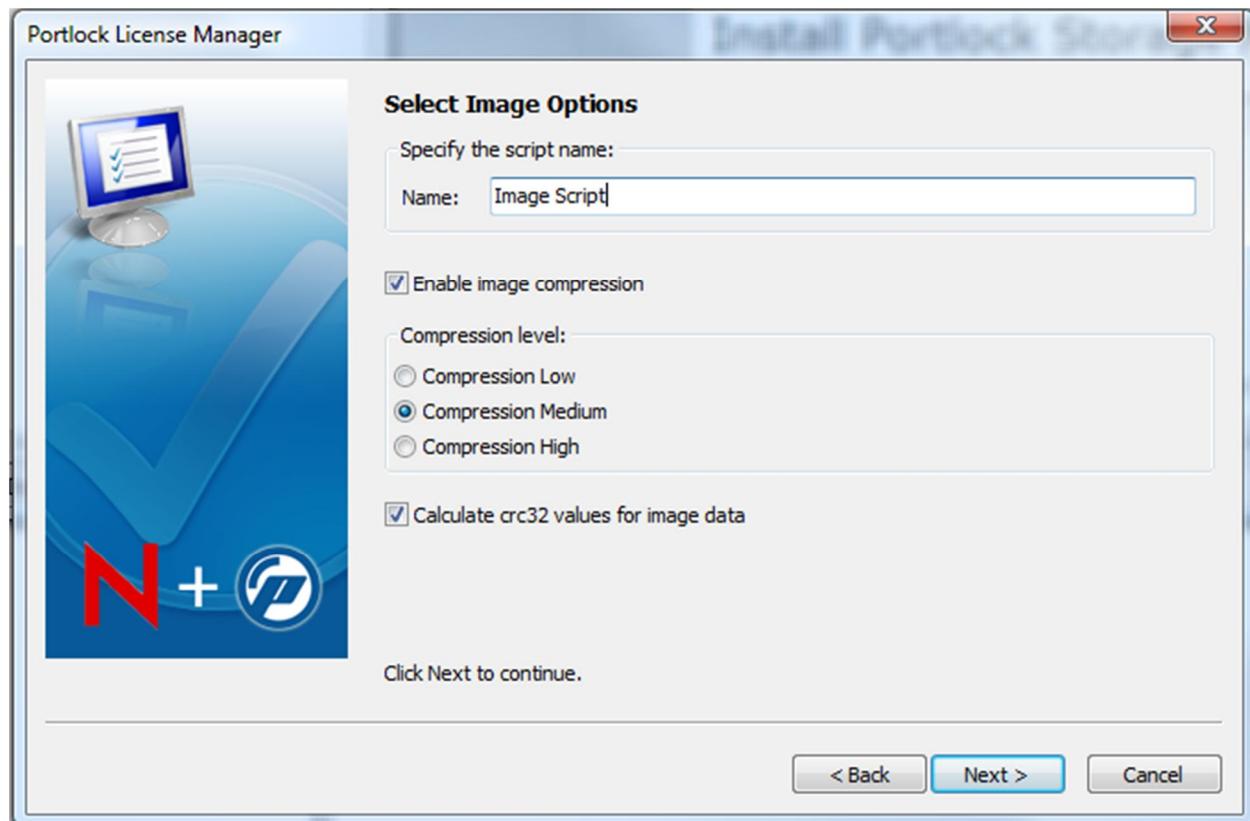
This screen displays options for selecting where to store the image. In this example FTP is used. Portlock Storage Manager will then image the NetWare server and send the image data to an FTP server.
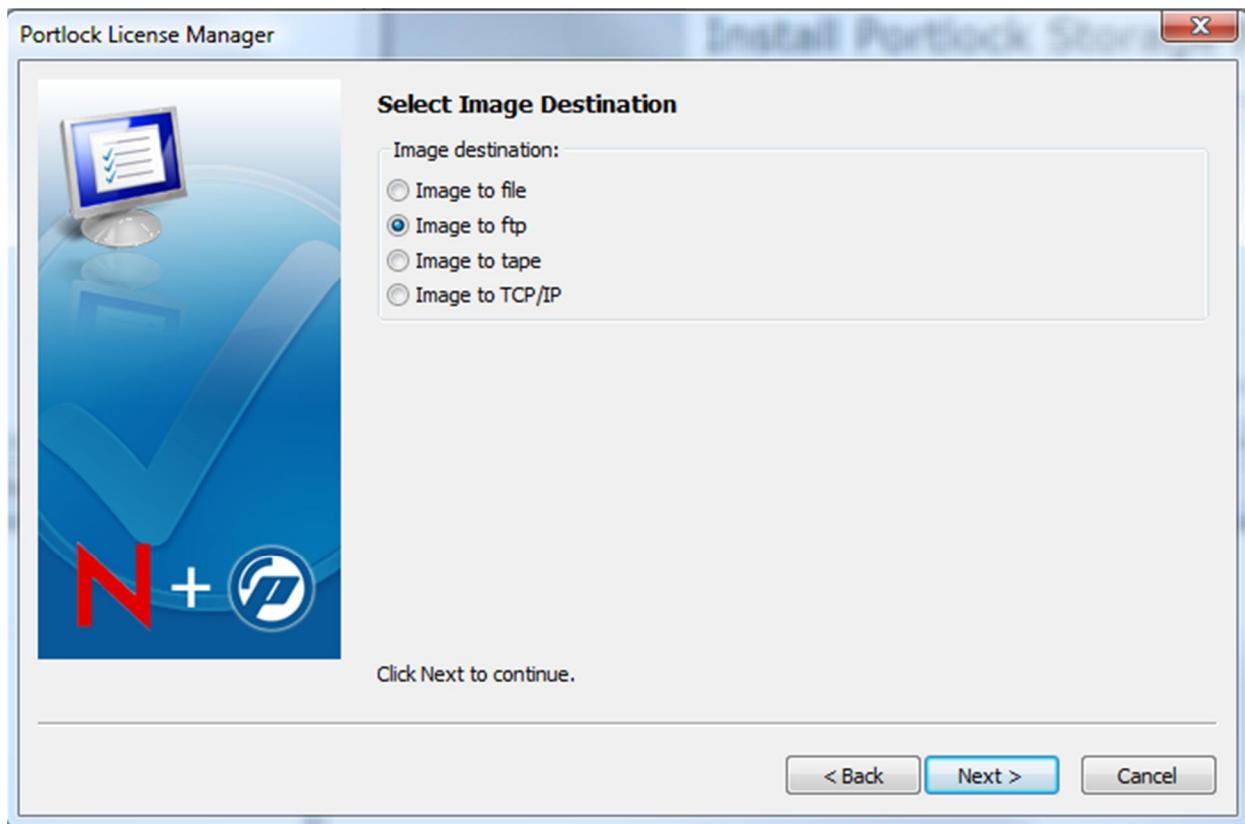
This screen shows the options for FTP. In this example Portlock Storage Manager will connect to the FTP server with the TCP/IP address 192.168.10.199. Portlock Storage Manager will negotiate SSL with the FTP server and then login. All commands and data between Portlock Storage Manager and the FTP server will be encrypted. This example also enables image file spanning with file auto name. When the Next button is clicked, a connection will be made to the FTP server and the user's credentials will be verified.
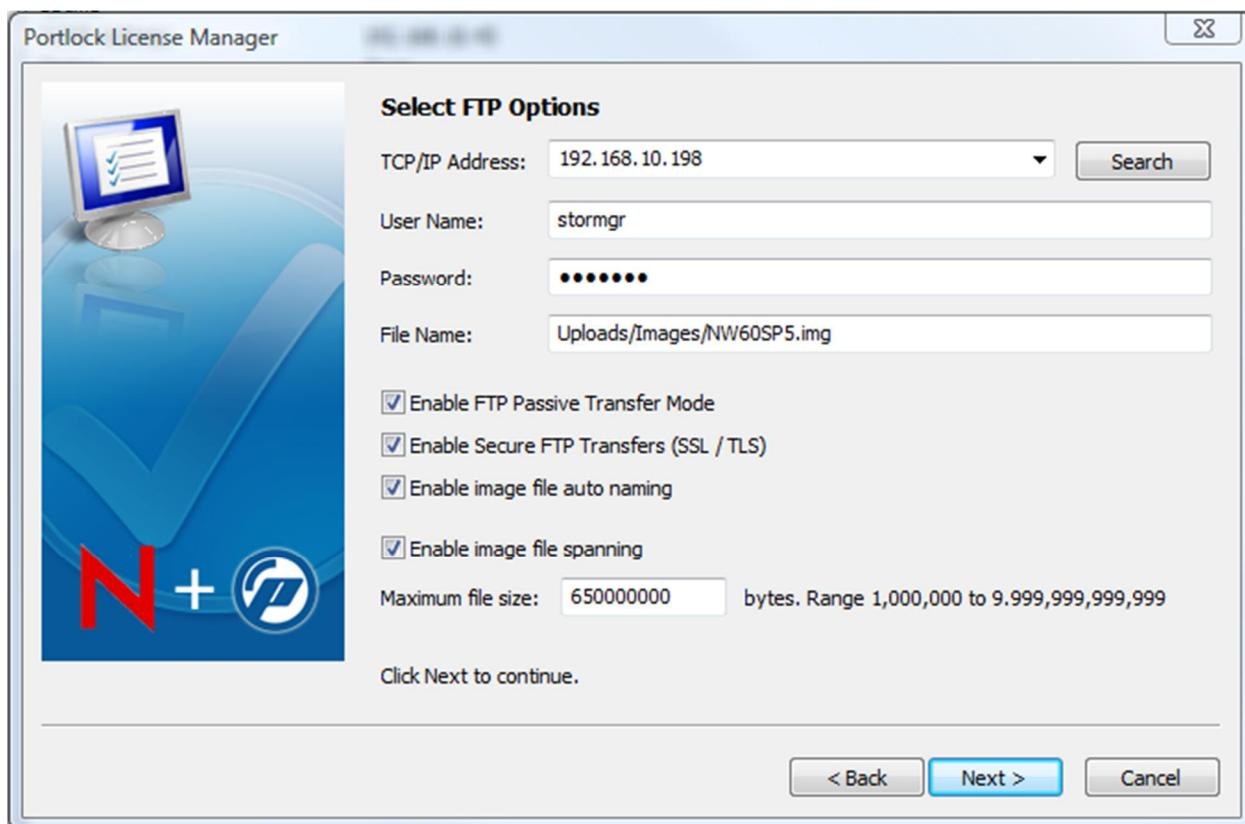

There are several options that can be selected:

- TCP/IP Address. This is the TCP/IP address of the TCP server. A hostname can also be entered.
- Search. Clicking this button will begin a background search for FTP servers. The button title will then change to Refresh. Once the scan completes click Refresh button to reload the list of FTP servers.
- User Name. This is the user name assigned to you by the FTP server admin.
- Password. This is the password assigned to your user name.
- File Name: This is the full path name to the file that will be created on the FTP server. Use the file extension ".img". If image spanning is enabled, sequential files will be created after the first file is complete starting with the new file extension ".001", ".002", etc.
- Enable FTP Passive Transfer Mode. The FTP protocol supports passive mode so that port 20 does not need to be opened in a firewall. When passive mode is enabled, Portlock Storage Manager

will open the data channel and connect to the FTP server. If passive mode is not enabled, the FTP server will connect back to Portlock Storage Manager on port 20.

- Enable Secure FTP Transfers (SSL / TLS). Enable this to encrypt command and data transfers. The login phase will be encrypted so that clear text passwords cannot be "snooped".
- Enable image file auto naming. Select this to prevent being prompted for a file name for each file when image file spanning is enabled.
- Enable image file spanning. Some systems have file size limits because of file system limitations. You might plan to write the image files to another media such as DVD. If this option is enabled, enter a number in the maximum file size field.

Portlock License Manager

Image Items

Status	Name	Type	Size
☑ Image	DRDOS	FAT16	203 MB
☑ Image	SYS	NetWare NSS Pool [Local + Active]	4,005 MB
☑ Image	USERS	NetWare NSS Pool [Local + Active]	8,191 MB

Click Next to continue.

[< Back]   [Next >]   [Cancel]
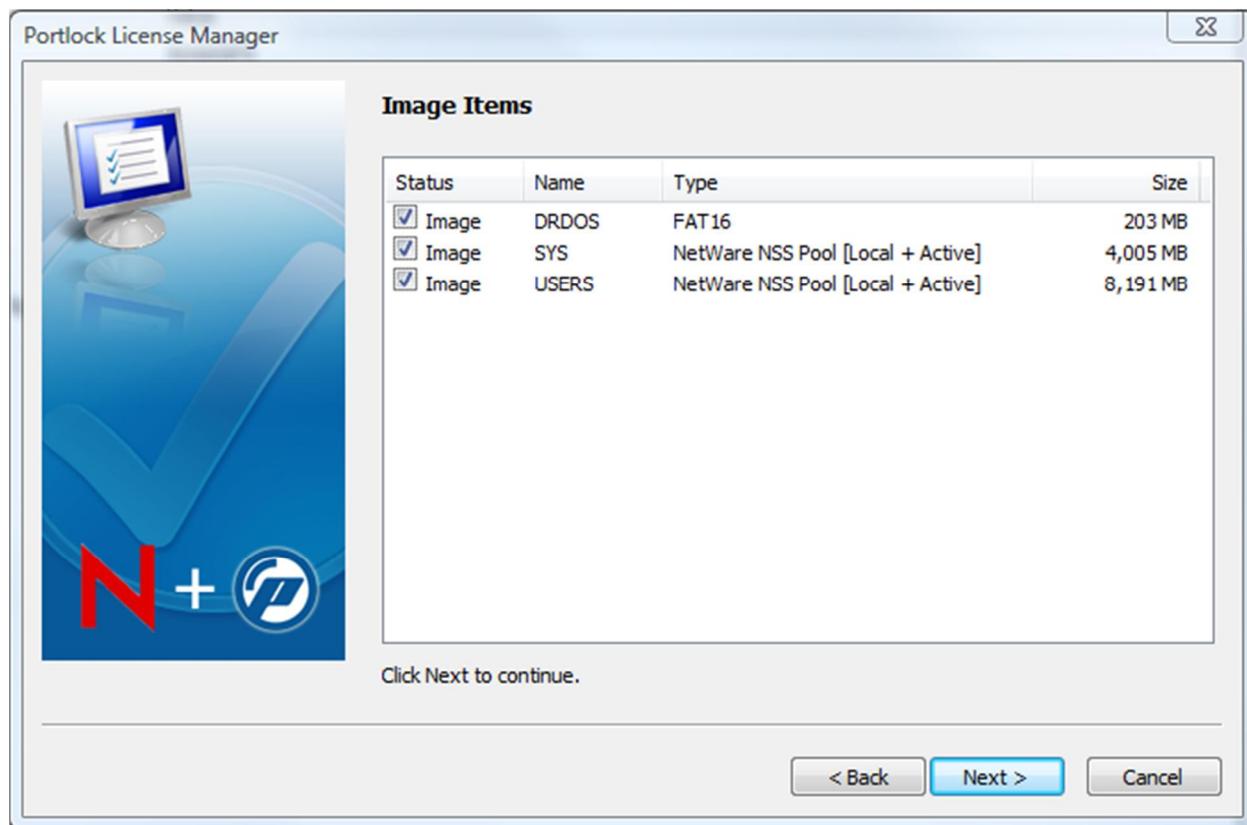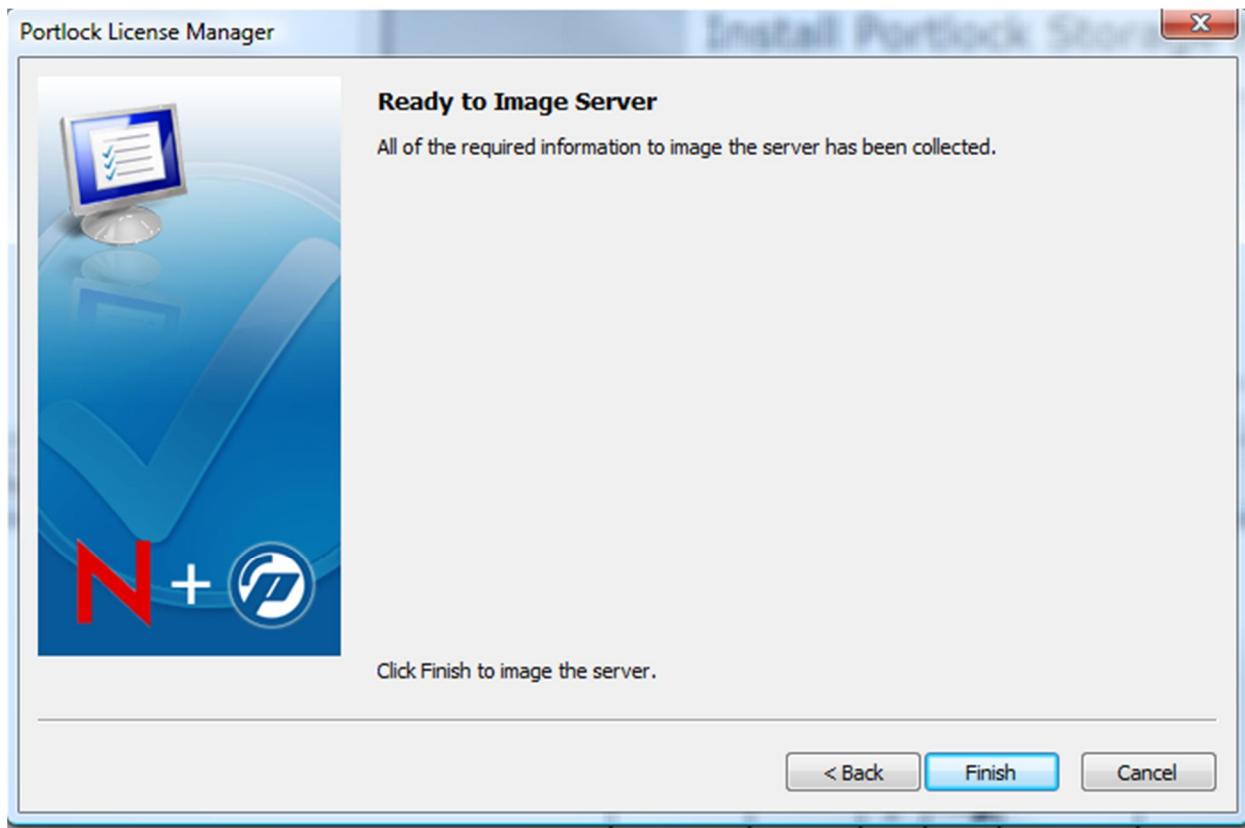
When you click next the following steps will occur:

- Portlock License Manager will open a connection to the remote system.
- Portlock License Manager will copy the script to the remote system with the destination file name "x:/script.txt".
- Portlock Storage Manager will then be launched with the option "-script=x:/script.txt".
- Portlock Storage Manager will connect to the FTP server, negotiate options and login.
- Portlock Storage Manager will then image the remote system using the commands in the script. The image data will be transferred to the FTP server over TCP/IP.

The script that is created for this example has the following content. Refer to other sections of this document for details on each line of this script.

```
%Author%          Portlock License Manager Wizard
%Date%            Wednesday, April 12, 2010 2:29:46 PM
%Description%     This script was generated by the Portlock License Manager wizard
%Version%         1.0.0
#
-script
-os=6             # This command is for the Portlock Boot CD. Ignored under NetWare.
```

```
-servername=192.168.10.148     # This command is for the Portlock Boot CD. Ignored under
NetWare.
-compression=5
-crc32=1
-imageftp=192.168.10.199,stormgr,password,Upload/Images/NW60SP5.img
-pasv=1
-ftp_port=21
-ssl_ftp=1
-autoname=1
-spansize=1000000
-image_dos="DRDOS"
-image_pool=SYS
-image_pool=USERS
```

Note: Once Portlock Storage Manager is launched, Portlock License Manager does not monitor the status of the image command for destinations other than Portlock License Manager. You can however monitor the remote system in the list view window which has a VNC window to the remote system or by starting an RCONIP viewer.
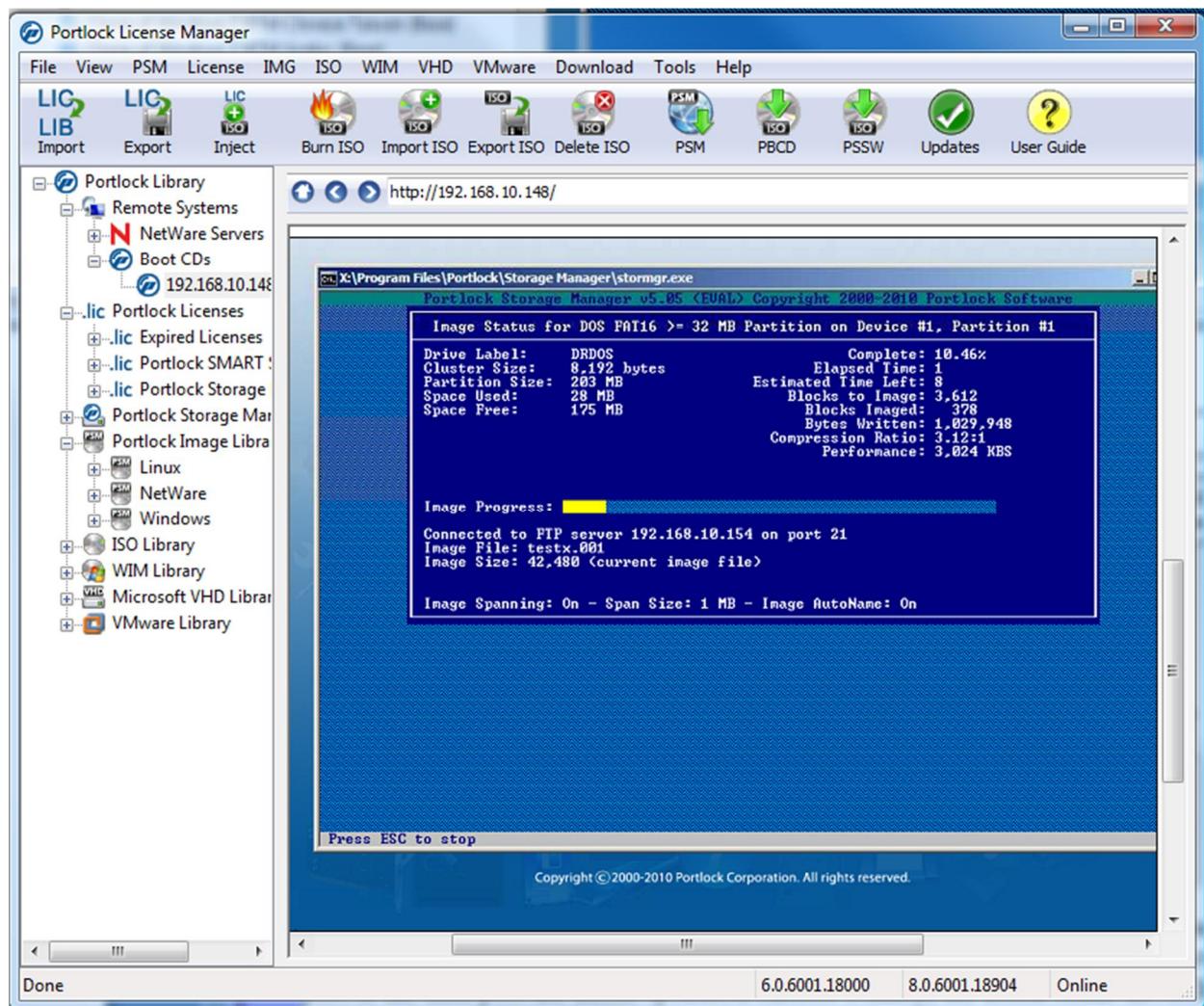
Appendix F. Changing the Storage Location for Portlock Images

Introduction.

Portlock License Manager uses a tree architecture for storing Portlock Images. By default Portlock Images are stored under "Portlock Image Library\NetWare\Server-Name\Image-Date\Image-Name.img". This same principal is used for most storage objects. When an item is selected in the tree view, the list view will display the base path for storage.
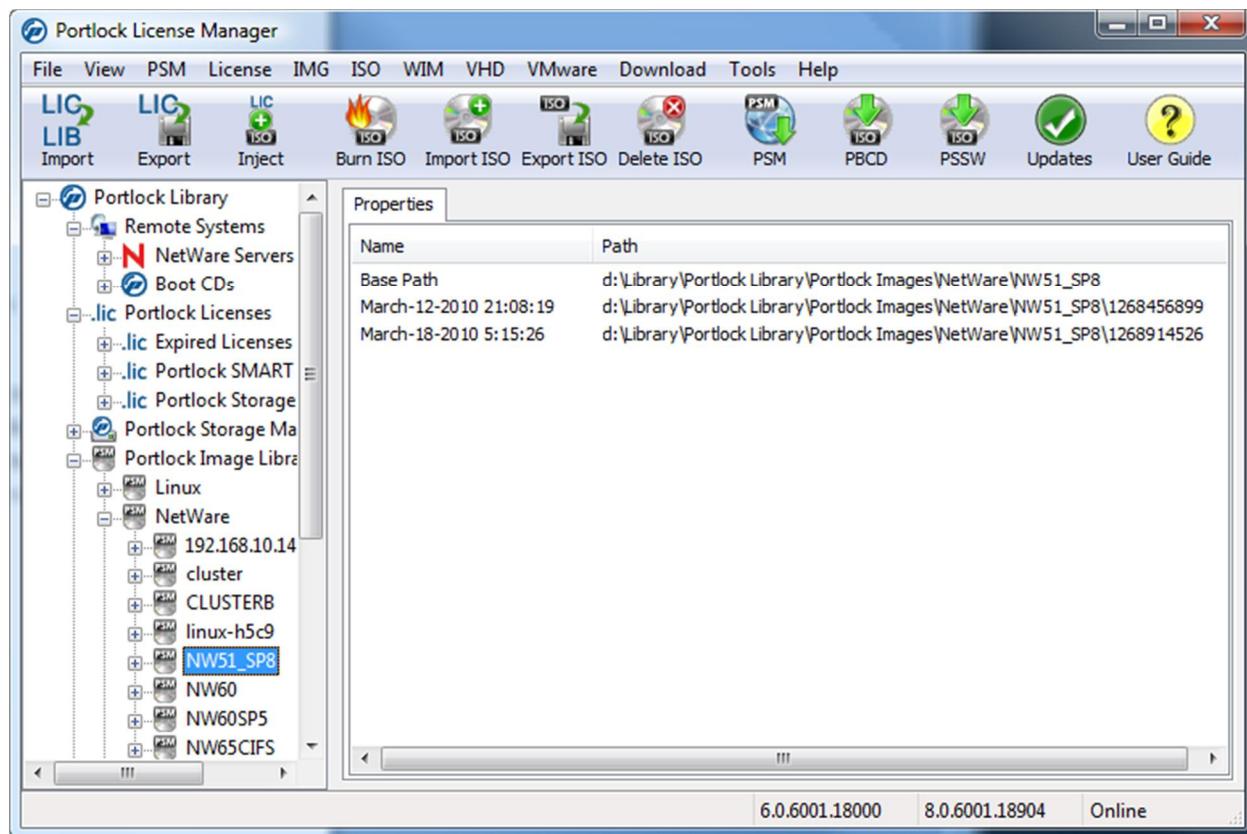
Most objects in the tree support a right-click menu command "Change Base Directory". Use this command to change where objects are stored. For example, to change where Portlock Storage Manager stores all Portlock images for the server NW51_SP8, right-click on NW51_SP8 (refer to the screenshot above) and select "Change Base Directory" (refer to the screenshot below). A dialog box will appear with the current base directory for this server. Change the path to the desired location.

Changing the base directory for an object will also move any current storage objects to the new location.

To change the base directory for all NetWare servers, right-click on "Portlock Image Library\NetWare" and select "Change Base Directory". To change the Base Directory for everything, right-click on "Portlock Library".

Expand
Create Portlock Image Library
Delete Portlock Image Library
Rename Portlock Image Library
Change Base Directory
Import Portlock Image
Open Folder in Windows Explorer
Share Folder
Properties

[End of Document]