NetBoot

Start up multiple Mac systems from a server-based image.

Features

Standardized desktop configurations
- Configure multiple clients with the same operating system and applications[1]
- Define customized configurations for multiple workgroups, hosting up to 25 disk images per server
- Replicate server configurations for deployment in compute farms and data centers
- Boot client systems "disklessly," with no reliance on the local hard drive

Simplified client administration
- Deploy new systems in minutes with automatic discovery of NetBoot images
- Update an entire workgroup by updating a single disk image
- Restore compromised systems instantly
- Deploy network-based diagnostic and repair utilities

System imaging
- Intuitive workflow-based image editor
- Customizable workflows
- Command-line image creation

Integration with enterprise infrastructure
- Host startup disk images on Mac OS X Server or other enterprise NFS or HTTP servers
- Deploy disk images across multiple subnets
- Deploy redundant NetBoot images on multiple servers for maximum availability and performance

The NetBoot service in Mac OS X Server makes managing a group of computers as easy as managing a single Mac. By enabling client systems to boot from a single server-based disk image, instead of from their internal hard drive, you can create a standard configuration and use it on all of the desktop systems in a department or classroom—or host multiple images customized for different workgroups. You can even create server configurations and run all of your servers from one image. Updating the disk image on the NetBoot server updates all of these systems automatically the next time they are restarted.

Every time you restart a NetBoot-enabled computer, it is automatically restored to its original state. The system reads the startup disk image from the server, and all software and system settings return to the configuration in the NetBoot image. This enables you to deploy new systems or repurpose existing ones with unprecedented efficiency. It also means you can quickly recover from user alteration, tampering, and network-borne viruses, providing added protection for your network. At the same time, NetBoot improves usability by giving users a consistent computing experience across Mac systems anywhere on the network.

NetBoot at a Glance
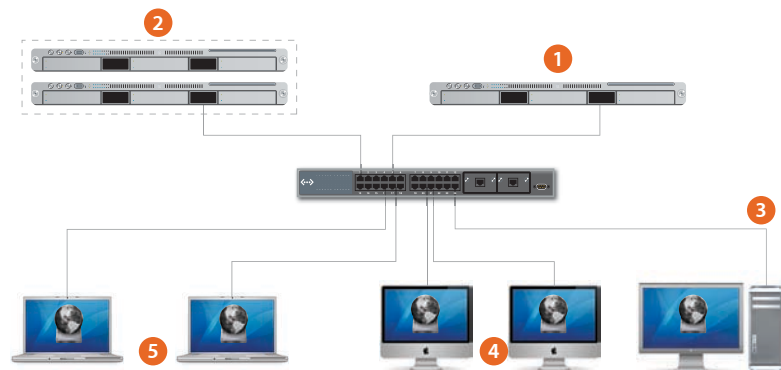
1. The administrator creates a startup disk image, which resides on the network server.

2. The image can also be stored on a remote NFS file server.

3. The image can be served via NFS or HTTP.

4. The local hard drive is not required to update the system image.

5. Multiple Mac OS X systems on your network can boot from the server-based image.[1]

Why NetBoot?

The NetBoot service in Mac OS X Server is a proven technology that enables
businesses and institutions to streamline the support of Mac clients and reduce
system administration costs. The ability to deploy a standard desktop configuration
across multiple systems and to protect them from alteration makes NetBoot ideal
for computing environments such as classrooms, computer labs, kiosks, and
computational clusters.

- **Classrooms and computer labs.** NetBoot makes it easy to configure multiple,
identical desktop systems and repurpose them quickly. With NetBoot enabled on
all desktop systems, students can log in on any computer and access their home
directories from the network. NetBoot also allows you to reconfigure systems for
a different class simply by rebooting from a different image.

- **Kiosks and libraries.** NetBoot enables you to set up protected computing environ-
ments for customers or visitors. For example, you can configure an information
station with an Internet browser that connects only to your company website or a
visitor kiosk that only runs a database for collecting feedback. If a system is altered,
a simple restart restores it to its original condition.

- **Computational clusters.** NetBoot is a powerful solution for data centers and
computational clusters with identically configured web or application servers.
Similarly purposed systems can boot from a single NetBoot image maintained on
a network-based storage device. NetBoot is also useful for servers hosting scalable
services, such as web and application servers or computational clusters, which can
be "scaled out" by adding systems running identical copies of the service.

Customized software suites
Since Mac OS X Server can host up to 25 NetBoot disk images, you can support
multiple workgroups, each with its own custom software suite. You can also perform
"rolling upgrades," testing a new software update on select systems while maintaining
current software on the rest of the network. Or use NetBoot to instantly repurpose a
server—for example, from a web server to an application server—by restarting from
a different image.

Diskless NetBoot
Mac computers can now boot "disklessly"—entirely from a network-based disk
image—without needing to read from or write to the computer's hard drive. In
combination with Workgroup Manager, Apple's built-in client management tool,
diskless NetBoot simplifies administration of controlled computing environments such
as libraries, kiosks, and testing centers. You can use Workgroup Manager to manage
system settings and even prevent users from viewing or modifying a computer's hard
drive, ensuring a tightly managed computing experience on NetBoot-enabled systems.
This is useful, for example, in schools deploying "digital bluebook" solutions for student
testing. It's also an ideal solution for environments, such as some government agencies,
where security is a paramount concern. You can prevent data from being stored, even
temporarily, on the computer's local drive, so sensitive information cannot be compro-
mised by subsequent users once a person logs off or the system is shut down.

Network-based home directories
In addition to hosting server-based startup disks, you can host users' entire home directories on the server. Network home directories give users the convenience of instant access to their personal computing environment—complete with their own documents, applications, and system preferences—from any Mac on the network.

System troubleshooting and repairs
NetBoot can also be used to host hard drive diagnostic and repair utilities. When using diskless NetBoot, the client system runs independently of its hard drive, making it possible to diagnose and fix problems on client hard drives without needing to cart around a collection of discs or an external hard drive. This is also useful for supporting MacBook and MacBook Pro systems—just plug them into the network and boot them from the server-based diagnostic tools. Once repairs are complete, portable systems can be disconnected from the network.

System Image Utility

The new System Image Utility in Mac OS X Server v10.5 Leopard includes an assistant that simplifies the creation of NetBoot images. Just select the type of image you want to create—NetBoot or NetInstall—and click Continue. System Image Utility takes care of the rest.

Creating a custom disk image
The new System Image Utility leverages the power of Automator, giving you an intuitive interface for creating custom disk images. Choose from a preloaded library of actions that allows you to specify settings, additional software packages, and installation procedures—then save them as a workflow that builds the image.

The power of Automator
The System Image Utility displays these workflow actions for creating custom images. Administrators can extend the functionality of the System Image Utility by creating their own actions.
• Customize Package Selection
• Define Image Source
• Add Packages and Post-Install Scripts
• Add User Account
• Apply System Configuration Settings
• Create an Image
• Filter Clients by MAC address
• Filter Computer Models
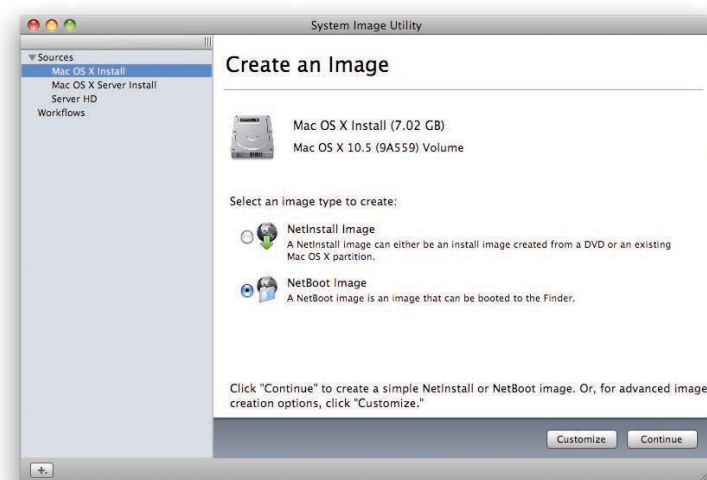
Start by defining your source, such as a Mac OS X Install Disc, and customize it with additional software packages and scripts from other applications—just by dragging them into the Workflow pane. Once you've specified the system, complete with user preferences, click Run to apply the workflow. This creates a disk image with a clean installation of the operating system, which you can test from a single computer before deploying it across the entire network.

Apple Remote Desktop 3
By adding the remote control capabilities of Apple Remote Desktop 3 (sold separately), you can specify the NetBoot startup disk for multiple Mac systems on your network— and restart them remotely. With just a few clicks and without leaving your desk, you can set up or update computers for an entire classroom, lab, or office at once. There is no need to walk around and configure each system individually.

Updating existing images
Once you've saved your workflow, it's easy to reuse it for maintenance and upgrade. For example, if you want to update Mac OS X from v10.5.2 to v10.5.3 on your NetBoot image, you don't need to rebuild the entire disk image. Just select the original workflow and specify the v10.5.3 disk as the source—leaving the rest of the workflow intact. For an operating system update or application upgrade that comes as a package installer, you can simply drag the package into the Workflows pane of System Image Utility. Click Run, and System Image Utility builds a new image with the updated operating system.


Hosting a NetBoot Disk Image
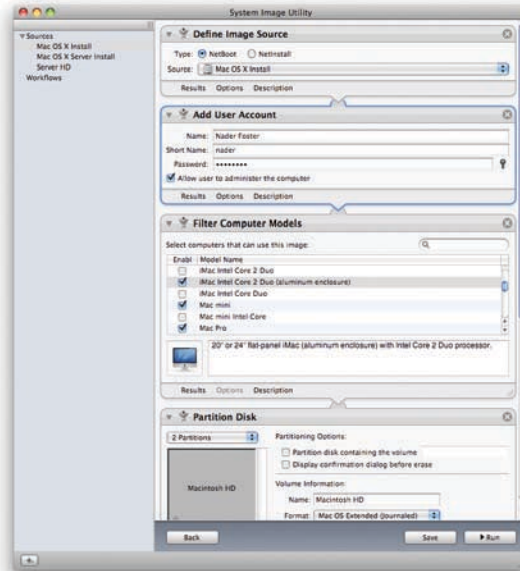
NFS or HTTP serving?
With Mac OS X Server, you can define how NetBoot disk images are served. NFS continues to be the default and the preferred method. HTTP is an alternative that allows you to serve disk images without having to reconfigure your firewall to allow NFS traffic.

Once you've created a NetBoot disk image, use the Server Admin application in Mac OS X Server to configure and turn on the NetBoot service. This makes the selected NetBoot disk image available as a startup disk to Mac systems on your network. A built-in filtering feature gives you the option to control access to a NetBoot disk based on client computer hardware addresses. Mac OS X Server can host up to 25 different disk images, enabling you to support multiple workgroups, each with its own configuration.
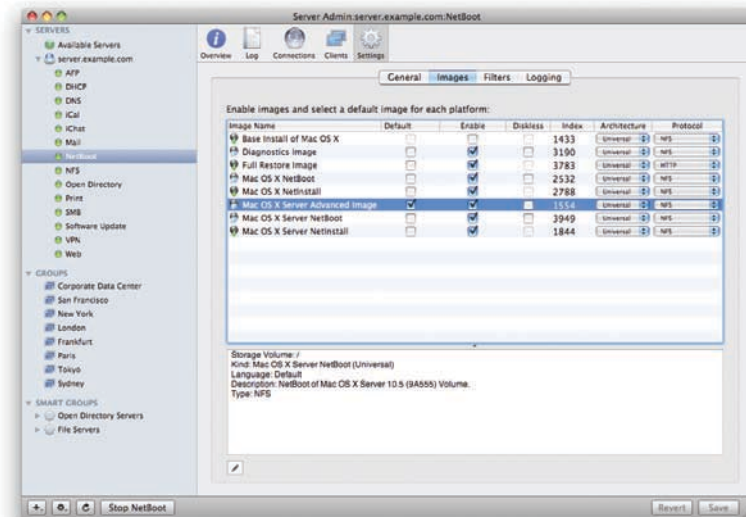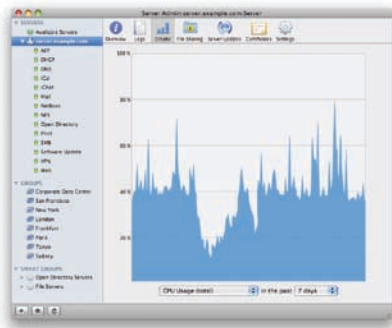
Remote service monitoring
Mac OS X Server provides comprehensive tools for remotely managing and monitoring network services. Using Server Admin, you can view NetBoot activity logs and lists of client systems that have started up from the server. You can also graph server CPU usage, network throughput, and performance of network services.

To provide responsive and reliable service, you can set up redundant NetBoot servers in your network infrastructure. If a server becomes unavailable, your NetBoot clients will automatically locate and associate themselves with another available server. A load-balancing feature enhances performance by starting up clients from the server with the fewest connected NetBoot clients.

Starting up client systems from the network
Ordinarily, when a desktop computer starts up, it looks to its own hard drive for the required startup resources. With NetBoot enabled, a client computer looks to the server for a NetBoot startup disk. You can set computers to start up from a specific NetBoot image by changing the Startup Disk preference in Mac OS X. You need to set the desktop preference only once; any subsequent changes you make to the disk image take effect the next time the computer starts up.
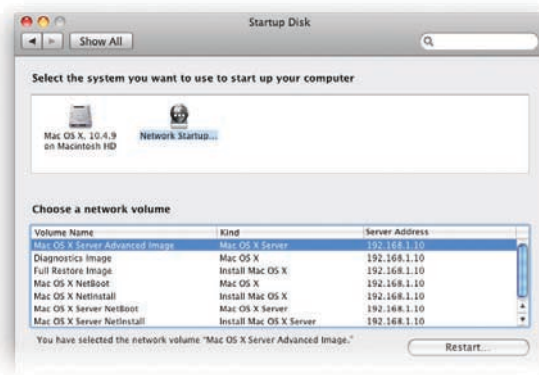
Setting Up New Computers

Mac OS X systems can automatically discover boot images on the server using an extension to the BootP and DHCP protocols called Boot Server Discovery Protocol (BSDP). This enables you to take a new computer out of the box and configure it to your specifications in minutes. Just plug in the power cord and Ethernet cable and hold down the "n" key when you turn it on. NetBoot in Mac OS X Server takes care of the rest. The system boots, connects to the network, finds the default NetBoot disk image, and starts up fully configured.

Apple Server Solutions

NetBoot is one of the innovative client management solutions built into Mac OS X Server, Apple's UNIX server operating system. Combining the latest open source technologies with Mac ease of use, Mac OS X Server unleashes the power of Xserve, Apple's rack-optimized server hardware. With phenomenal performance, massive storage capacity, high-bandwidth I/O, and integrated remote management tools, Xserve running Mac OS X Server is the ideal solution for education, small businesses, and enterprises alike.

For More Information

For more information about Mac OS X Server, Xserve, and other Apple server solutions, visit www.apple.com/server.