Getting Started with OES 11 and Virtualized NetWare

Open Enterprise Server 11 SP2

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Novell

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Contents

About This Guide

This guide helps you get started with OES 11 SP2.

Before installing OES 11 SP2 in a production environment, we recommend you become familiar with the following additional documentation.

- *OES 11 SP2: Readme*
- *OES 11 SP2: Planning and Implementation Guide*
- *OES 11 SP2: Installation Guide*

Guide Purposes

This guide is designed to help you with your transition from NetWare to OES 11 SP2 by helping you to get acquainted with basic OES services.

The information and instructions it contains help you to do the following:

- Install an OES 11 SP2 server into a new eDirectory tree named EXAMPLE_TREE
- Install selected OES 11 SP2 components on the server
- Install an OES 11 SP2 virtual machine host server, create a virtual machine (VM) on the server, and install NetWare 6.5 SP8 on the VM
- Create seven different user types, at least one of which should closely align with the users on your network
- Perform simple tasks to get acquainted with basic OES 11 SP2 services on a Windows 7 (or Windows XP) workstation.

Work through the Guide Sequentially

The sections in this guide are designed to be accessed sequentially, thus guiding you through the main tasks of setting up an OES 11 SP2 environment that you can then explore further as desired.

If You Want to Use This Guide as a Reference

If you want to install additional OES 11 SP2 servers, create a different tree structure than the one specified in this guide, or diverge from the instructions presented, you can still use these instructions as a basic outline for setting up OES 11 SP2 services in a getting-started lab environment. However, be aware that any divergence from the instructions presented or the order they are presented in, can cause ripple effects through the rest of the guide. If you need to diverge, refer to the information found in the following guides for assistance:

- *OES 11 SP2: Planning and Implementation Guide*
- *OES 11 SP2: Installation Guide*
- *OES 11 SP2: Linux Tips for NetWare Administrators*
- *NW65 SP8: Installation Guide*

Feedback

We want to hear your comments and suggestions about this manual and the other documentation included with OES 11 SP2. Please use the User Comments feature at the bottom of each page of the online documentation.

Documentation Conventions

In this documentation, a greater-than symbol (>) is used to separate actions within a step and items within a cross-reference path.

1 Installing the OES 11 SP2 Server in Your Getting-Started Lab

Use the instructions in this section to install Novell Open Enterprise Server 11 SP2 (OES 11 SP2) in your getting-started lab.

1.1 Getting-Started Lab Setup Requirements

For the tasks and exercises described in this guide, you need the following:

❒ A server-class computer with the following:

Component	Minimum	Recommended
Processor	Intel EM64T, AMD K8 (Athlon64) or higher processor	
RAM	1 GB	2 GB
Display adapter	Super VGA	VESA 1.2-compliant, high resolution
Display monitor	Compatible with adapter	
CD/DVD drive	Support for the ElTorito specification	
Hard drive (All data will be erased)	40 GB	
Network card	Ethernet 100 Mbps	

Component	Minimum	Recommended
IP address	◆ IP address on the getting-started lab subnet. For example, 192.168.1.100. ◆ Subnet mask. For example, 255.255.255.0. ◆ Default gateway. For example, 192.168.1.1.	
Mouse	Not required	USB or PS/2

- ❒ A network printer with an assigned static IP address and a connection to your getting-started lab network.
- ❒ A Windows workstation with
  - One of the following platforms installed:
    - Windows 7
    - Windows XP
  - An Ethernet 100 Mbps adapter
  - An IP address on the same subnet as the server
  - Mozilla Firefox browser installed. (This is optional, but Firefox is the assumed browser for most of the instructions in this guide)
  - A print driver installed on the workstation for the network printer listed above.
- ❒ (Optional for exploring Novell AFP and iPrint) An Apple Macintosh workstation with
  - Mac OS 10.4 or later installed

    Novell AFP supports earlier versions of Mac OS, but iPrint doesn't.
  - An Ethernet adapter
  - An IP address on the same subnet as the server
  - A print driver installed on the workstation for the network printer listed above.

1.2 Obtaining Installation Media

To complete the instructions in this guide, you need to download various ISO files, depending on your hardware.

- Section 1.2.1, "Downloading the ISO File," on page 10
- Section 1.2.2, "Creating the Installation Media," on page 11

1.2.1 Downloading the ISO File

1. Go to "Downloading OES 11 SP2 Software from the Novell Web Site" in the *OES 11 SP2: Planning and Implementation Guide*.
2. Complete all the steps in the section, except the instructions on deciding which files to download. The file you need for the exercises in this guide is
   - `OES11-SP2-addon_with_SLES11-SP3-x86_64-DVD.iso`

3 Be sure to print the pages as instructed, record the two activation codes, print and check the MD5 verification checksum, and so on.

4 After you have downloaded the file, continue with Creating the Installation Media.

1.2.2 Creating the Installation Media

To prepare physical installation media:

1 Go to "Preparing Physical Media for a New Server Installation or an Upgrade " in the *OES 11 SP2: Installation Guide* and use the instructions there to create media for installing your OES 11 SP2 server.

Continue with Installing the Server Software.

1.3 Double-Checking the Prerequisites

Before installing OES 11 SP2 on your server, you must complete the following tasks:

- ❒ Ensure that the server computer meets the requirements outlined in Section 1.1, "Getting-Started Lab Setup Requirements," on page 9.
- ❒ Prepare the software for installation as explained in Section 1.2, "Obtaining Installation Media," on page 10.

1.4 Installing the Server Software

WARNING: This procedure permanently erases any data currently on your server's hard drive.

1 Prepare the BIOS on your server machine so that it will boot from the CD-ROM drive first.

2 Insert the DVD you prepared in "Creating the Installation Media" on page 11 into your server and reboot the machine.

3 When the boot selection page appears, immediately press the Down-arrow key to select the *Installation* option, then press Enter.

If you don't respond before the machine starts booting from the hard disk, reboot the server and repeat this step.

4 After the boot process finishes, select a *Language* and *Keyboard Layout*, read and agree to the SLES 11 SP3 software license agreement, then click *Next*.

5 Read and agree to the software license agreement for OES 11 SP2, then click *Next*.

6 Verify that *New Installation* is selected, select the *Include Add-On Products from Separate Media* option, then click *Next*.

7 Make sure the *Yes, Run the Network Setup* option is selected and click *Next*.

8 Use the following table to navigate and configure your server.

Page Name	Action
Network Setup	1. (Conditional) If your server has multiple network cards, select the card the server will use during the install, then click *Next*. The page refreshes. 2. Select *Static Address Setup*. 3. In the *IP Address* field, type the IP address for the server. For example, 192.168.1.100 4. In the *Netmask* field, type the subnet mask for your network. For example, 255.255.255.0. 5. In the *Default Gateway IP* field, type the IP address of the gateway for your getting started lab subnet. For example 192.168.1.1. 6. In the *DNS Server IP* field, type the IP address of a primary DNS server for your network. 7. Click *OK*.
Add-On Product Installation	1. Confirm that *Novell Open Enterprise Server 11 SP2* is listed as an add-on product, then click *Next*.
Clock and Time Zone	1. Select the region and time zone for the server and click *Next*.
Server Base Scenario	1. Make sure that the Physical Machine option is selected, then click *Next*.
Installation Settings	1. Click *Partitioning*.

9 To ensure a clean install, use the following table to navigate the partitioning pages and prepare your system disk.

Page Name	Action
Preparing Hard Disk: Step 1	1. Select *Custom Partitioning (for experts)*. 2. Click *Next*.
Expert Partitioner	1. Double-click the device entry for the disk you are installing to. 2. Click *Expert* (just above the *Accept* button), click *Create New Partition Table*, then click *OK* > *Yes*. **WARNING:** This erases all data from the disk you are installing to. 3. Click *Add*.

Page Name	Action
Add Partition on *device_name*	1. With *Primary Partition* selected, click *Next*. 2. In the *Custom Size* field, type `200 MB`, then click *Next*. 3. In the *Mount Point* drop-down list, select */boot*, then click *Finish*. 4. Click *Add* > *Next*. 5. In the *Custom Size* field, type a size roughly twice the amount of RAM installed on the server. For example, if the server has 1 GB RAM installed, type `2048 MB`, then click *Next*. 6. In the *File system* drop-down list, select *Swap*, then click *Finish*. 7. Click *Add* > *Next*. 8. In the *Custom Size* field, type `10 GB`, then click *Next*. 9. In the *File system* drop-down list, make sure that / is selected, then click *Finish*. 10. Click *Accept*.

10 On the Installation Settings page, click *Software*.

Use the following table to navigate and configure the software pages:

Page Name	Action
Software Selection and System Tasks	1. Under *OES Services*, select (or confirm the selection of) the following: ◆ *Novell AFP* ◆ *Novell CIFS* ◆ *NetIQ eDirectory** ◆ *Novell iFolder* ◆ *Novell iManager* ◆ *Novell iPrint* ◆ *Novell NCP Server/Dynamic Storage Technology** ◆ *Novell NetStorage* ◆ *Novell Storage Services** Services marked with an asterisk (*) are selected when you click *Novell AFP*. Although they are not listed, *Novell Backup/Storage Management Services (SMS)*, *Novell Linux User Management*, and *Novell Remote Manager* are installed on every OES 11 SP2 server. 2. Click *OK*.
agfa fonts	1. Click *Accept*.
Installation Settings	1. Click *Install*.
Confirm Installation	1. Click *Install*.

11 If you are prompted for additional input during the configuration, accept the default actions.

12 Continue with Setting the Root Password and Updating the Server.

1.5 Setting the Root Password and Updating the Server

After the initial system configuration and system reboot, the installation needs a password for the `root` user. It also needs to update the system with the latest software.

1 Use the following table to navigate and complete the various configuration pages.

Page Name	Action
Password for the System Administrator “root”	1. Enter and confirm the `root` user password, then click *Next*.
Hostname and Domain Name	1. If your DHCP server is working correctly, the server hostname should appear in the *Host Name* field. If not, type the hostname for the IP address you are assigning to the server. For example, myserver. 2. In the *Domain Name* field, if the *DNS Domain Name* isn’t already populated for your network, type the domain name for the server. For example, mysite.company.example.com. 3. Deselect *Change Hostname via DHCP*. 4. Click *Next*.
Network Configuration	1. Click *Next*. You configured the network in Section 1.4, “Installing the Server Software,” on page 11.
Test Internet Connection	You will need to register your server on the Internet to download the latest patches, so you should test the Internet connection at this point to make sure that everything is configured correctly. 1. Select the option to test the connection. 2. Click *Next*.
Running Internet Connection Test	After a few moments, the *Test Status* should indicate *Success*. If it does not, you need to click *Back* and fix your network configuration and the connection to the Internet. It is essential that OES 11 SP2 servers always have the latest security and other critical patches downloaded and installed. 1. Click *Next*.
Novell Customer Center Configuration	1. Click *Next*. The server establishes a connection with the Novell Customer Center.
Manual Interaction Required	1. Click *Continue*.

Page Name	Action
Novell Customer Center System Registration	1. In the fields indicated, type and confirm the e-mail address to which you want administrative notifications sent. 2. In the *Activation code for SLES components* field, type the SLES activation code you noted or printed while downloading the image files. If this code is not entered, the server can't download updates and patches through the Novell patch channels. For the OES 11 SP2 release, downloading the SLES patches is critical for service configuration success. 3. In the *Activation code for OES components* field, type the OES 11 SP2 activation code you noted or printed while downloading the image files. If this code is not entered, the same patch channel restriction applies as for SLES. 4. Click *Submit*. Your registration information is sent to the Customer Center. This might take a couple of minutes to complete. 5. Click *Continue*. The update server is added to your system configuration. Again, this might take a few minutes.
Novell Customer Center Configuration pop-up	1. Click *OK*.
Online Update	Depending on the patches that are in the Update channels, you might need to run the update process more than once. 1. Select *Run Update*, then click *Next*. 2. Click *Accept*. 3. If you see one or more YaST pop-ups indicating that changes have been made to resolve dependencies, click *Continue*. If you see pop-ups indicating that you have selected patches that should be installed later, click Cancel. The update patches are downloaded and installed. 4. Click *Next* > *OK*. The system restarts. 5. Repeat from Step 2 until no more patches are selected for installation.
Network Services Configuration	1. Because the system reboots due to a kernel changes, you must type and confirm the root password, then click *OK*. 2. Click *Next*.

2 Continue with Configuring eDirectory and OES Services.

1.6 Configuring eDirectory and OES Services

For the exercises in this guide, you need specific eDirectory, NTP, and SLP configurations.

1 Use the following table to navigate and complete the eDirectory pages:

Page Name	Action
Novell Open Enterprise Server Configuration	1. Click *Next*.
Express Installation	1. In the *NTP Time Server* field, type the IP address or DNS name of the reliable, external Network Time Protocol (NTP) server you want the servers in your tree to use for time synchronization. 2. In the *eDirectory Tree Name* field, type `EXAMPLE_TREE`. 3. In the *FDN of the tree administrator* field, type `CN=admin.O=COMPANY`. In this guide, the Admin User object is named admin (all lowercase) to differentiate the name from the object itself (Admin User), which is a standard eDirectory object and is always capitalized in the documentation by convention. The eDirectory Admin User object can have any name you choose, although most administrators use “admin.” In this guide, all container objects, such as COMPANY, are created in uppercase so they are more easily distinguished in the illustrations and procedures. 4. In the *Admin Password* and *Verify Admin Password* fields, specify the password for the eDirectory Admin User. 5. Change the server context to `OU=SERVERS.OU=LAB.O=COMPANY`. 6. Click *Next*. 7. Click *Yes* to confirm that SLP is being configured for multicast at this time. Later in this guide you will configure this server as the SLP Directory Agent. For more information on SLP, see “SLP” in the *OES 11 SP2: Planning and Implementation Guide*.
Novell Open Enterprise Server Configuration	1. Click *Next*. The eDirectory and iManager configuration processes can take a few minutes or much longer depending on the server processor speed, etc. The other OES services should self-configure fairly quickly.
User Authentication Method	1. Click *Next*.
New Local User	The local `root` user was created during the SLES install. On OES servers, we recommend that all users except `root` be defined in eDirectory. Therefore, you don’t create additional local users. 1. Click *Next*.
Empty User Login	1. Click *Yes*.
Release Notes	1. Click *Next*. The official *OES 11 SP2: Readme* is published with the OES 11 SP2 Online Documentation.

2 Continue with Setting Up the Graphical User Interface.

1.7 Setting Up the Graphical User Interface

Although most Linux servers don't have a graphical user interface loaded, the getting-started lab server you are installing runs the GNOME interface by default.

When the Hardware Configuration page appears:

1. Review the Graphics Cards configuration to make sure your monitor was detected and that your color and resolution settings are the way you want them.

   If the settings are correct, skip to Step 3.
2. If the configuration is incomplete or wrong, click the blue links to configure your monitor, color, resolution, etc.
3. Click *Next*.
4. When the *Installation Completed* page appears, deselect *Clone This System for Autoyast*, then click *Finish*.
5. When the login splash page appears, continue with Setting Up the Server as an SLP Directory Agent.

1.8 Setting Up the Server as an SLP Directory Agent

For OES services to work, the server must have one of the following:

- **An eDirectory replica installed on the server.** This is not automatic after the third server installed in a tree because it is not recommended to have more than three to five replicas in the tree.

  This means that in a large network with many servers, most of the servers won't have replicas, which leaves only the OpenSLP option.
- **OpenSLP running on the server with eDirectory as a registered service.** This means that you should configure a network server (for example, the first server in the tree) as an SLP Directory Agent (DA), and then configure the other network servers that don't have an eDirectory replica to point to the DA server.

For the getting-started lab setup, you don't actually need a Directory Agent set up because each of the two getting-started lab servers (this server and the NetWare VM) has an eDirectory replica. However, it's important to understand the basics of setting up SLP on OES 11 SP2. For more information, see "SLP" in the *OES 11 SP2: Planning and Implementation Guide*.

1. Log in to the server as `root`.
2. Configure the server as an SLP DA server:
   - **2a** Click *Computer* > *Nauilus File Browser*.
   - **2b** In the left panel, double-click *File System*, then double-click the `etc` directory.
   - **2c** Scroll down to the `slp.conf` file, right-click the file, and select *Open with gedit*.
   - **2d** In `slp.conf`, find the following line:

     ```
     ;net.slp.useScopes = myScope1, myScope2, myScope3
     ```
   - **2e** Remove the semicolon (;) and change the line as follows:

     ```
     net.slp.useScopes = Directory
     ```
   - **2f** Find:

     ```
     ;net.slp.isDA = true
     ```

2g Remove the semicolon (;) so that it reads:

```
net.slp.isDA = true
```

2h Save and close the file and the file browser.

3 Configure the firewall on the DA server to allow SLP daemon traffic:

3a Click *Computer* > *YaST*, then click *Security and Users* > *Firewall*.

3b In the left navigation frame, click *Allowed Services*.

3c Click the *Services to Allow* drop-down list and select *Openslp server (SLP)*.

3d Click *Add* > *Next*.

3e Click *Finish*.

4 Restart OpenSLP and eDirectory:

4a Right-click the desktop and select *Open in Terminal*.

4b At the command prompt, enter the following command to restart the SLP daemon with the changed configuration:

```
rcslpd restart
```

4c Restart eDirectory by entering the following command:

```
rcndsd restart
```

This registers eDirectory as an SLP service.

5 Verify that OpenSLP is running as expected.

5a After eDirectory restarts, enter the following command:

```
slptool findsrvs service:ndap.novell
```

After a moment or two, the system should respond with a line that indicates EXAMPLE_TREE is being advertised as a service in SLP.

5b Close the terminal by entering the following command:

```
exit
```

6 Continue with Accessing iManager.

1.9 Accessing iManager

IMPORTANT: You must access iManager multiple times in this guide. If you get a Tomcat error in response to any launch requests, see Section A.2, "iManager Tomcat Error," on page 107.

NetIQ iManager is the main browser-based tool you use to manage eDirectory and your OES services.

To start iManager and prepare your browser for future sessions:

1 On your getting-started lab workstation, in your Web browser, open the OES 11 SP2 Welcome page by entering the following URL:

```
http://IP_or_DNS
```

where *IP_or_DNS* is the IP address or DNS name of your OES 11 SP2 server.

2 Click the *Management Services* tab.

3 On the Available Services page, click *iManager*.

You can also start iManager directly by including `/nps` after *`IP_or_DNS`* in the access URL. For example, enter `http://192.168.1.100/nps`.

4 You should receive a security alert, such as a warning that the connection is not trusted.

   Select the options to continue, such as *I Understand the Risks* > *Add Exception*.

5 Make sure that the option to permanently store the exception is selected if available, then confirm the exception.

6 Log in as the eDirectory Admin user:

   6a In the *Username* field, type `admin`.

   6b In the *Password* field, type the eDirectory Admin user password.

   6c In the *Tree* field, type `example_tree`.

   If SLP services are not working properly, you need to enter the IP address instead of the tree name.

   6d Click *Login*.

7 Do not close iManager. Continue with the next section, Configuring the Browser for the eDirectory CA.

1.10 Configuring the Browser for the eDirectory CA

If you didn't receive an offer to permanently store the security warning exception, you can configure your Web browser to trust the eDirectory-based certificate authority by completing the instructions in the next two sections. Otherwise, skip to Section 1.11, "Enabling Pop-Ups for iManager," on page 22.

1.10.1 Exporting the CA's Self-Signed Certificate

1 In iManager, click the *Roles and Tasks* icon  .

2 Click *Novell Certificate Server* > *Configure Certificate Authority*.

3 Click the *Certificates* tab, then select the check box for the *self-signed certificate*.

4 Click the *Export* sub-tab.

5 Deselect *Export Private Key*.

   The *Export Format* changes to DER.

6 Click *Next*.

7 Click *Save the Exported Certificate* and save the file to disk, noting the filename and location if indicated.

8 Click *Close* > *OK*.

9 Find the file you just saved. By default it is usually on the desktop for Windows XP and in the username/Downloads folder for Windows 7.

10 To configure Mozilla Firefox on Windows, continue with Importing the CA Certificate into Mozilla Firefox on Windows.

   Instructions for configuring other browsers are in "Eliminating Browser Certificate Errors" in the *OES 11 SP2: Planning and Implementation Guide*.

1.10.2 Importing the CA Certificate into Mozilla Firefox on Windows

1. In Firefox on the menu bar, click *Tools* > *Options*

   TIP: If the menu bar isn't visible, you can press F10 to toggle it on and off.

2. Select the *Advanced* tab.
3. Select the *Encryption* tab.
4. Click the *View Certificates* button.
5. Select the *Authorities* tab, then click *Import*.
6. Browse to the certificate file you downloaded in "Exporting the CA's Self-Signed Certificate" on page 21 and click *Open*.
7. Select *Trust this CA to identify Web sites*, then click *OK* > *OK* > *OK*.

   Firefox now trusts certificates from the servers in your getting-started lab's tree.
8. To verify success, close all instances of Firefox, then restart the browser and log in to iManager again.

   The certificate warning doesn't appear.

1.10.3 Importing the CA Certificate into Windows Explorer on Windows

1. In Internet Explorer, click *Tools* > *Internet Options*.

   TIP: If the menu bar isn't visible, you can press F10 to toggle it on and off.

2. Click the *Content* tab.
3. Click the *Certificates* button.
4. Select the *Trusted Root Certification Authorities* tab.
5. Click the *Import* button.
6. Click *Next*.
7. Browse to the certificate file you downloaded in "Exporting the CA's Self-Signed Certificate" on page 21 and click *Open*.
8. Click *Next*.
9. Click *Finish* > *Yes* > *OK* > *Close* > *OK*.

1.11 Enabling Pop-Ups for iManager

Some iManager plug-ins use pop-up dialog boxes that are blocked by most browsers. To use iManager, you must enable pop-ups that originate from the servers where iManager is running.

1.11.1 Firefox

1. On the Firefox menu bar, click *Tools* > *Options* > *Content*.
2. Disable all pop-up blocking by deselecting the *Block Popup Windows* option and clicking *OK*.

   or

Add the getting-started lab server to the list of exceptions by doing the following:

2a Click the *Exceptions* button.

2b In the *Address of Web Site* field, type the OES 11 SP2 getting-started lab server's IP address.

2c Click *Allow* > *Close*.

1.11.2 Internet Explorer

1 On the Command bar, click *Tools* > *Pop-up Blocker* > *Turn Off Pop-up Blocker*.

2 Click *Yes*.

Continue with Chapter 2, "Installing a NetWare Virtual Machine," on page 25.

2 Installing a NetWare Virtual Machine

Use the instructions in this section to install an Open Enterprise Server 11 SP2 (OES 11 SP2) virtual machine host server in your getting-started lab, create a virtual machine on the server, and install NetWare 6.5 SP8 on the virtual machine.

This section describes the following:

2.1 Virtualization Host Server Requirements

For the tasks and exercises described in this section, you need the following in addition to those listed in Section 1.1, "Getting-Started Lab Setup Requirements," on page 9.

❒ A server-class computer with the following:

Component	Minimum	Recommended
Computer	A server-class computer with an Intel EM64T, AMD K8 (Athlon64) or higher processor	
Memory	1 GB RAM	2 GB RAM
Video card and monitor	1024 X 768 resolution or higher with 256 colors	
CD/DVD drive	CD/DVD drive	
Hard drive	40 GB (All data will be erased)	
Network card	Ethernet 100 Mbps	
IP address	◆ IP address on the getting-started lab subnet. For example, 192.168.1.100. ◆ Subnet mask. For example, 255.255.255.0. ◆ Default gateway. For example, 192.168.1.1.	
Mouse	Not required	USB or PS/2

❒ Installation software.

If you need to download and prepare different media than you used for the first server, go to Section 1.2, “Obtaining Installation Media,” on page 10.

IMPORTANT: For installing the virtualized NetWare 6.5 SP8 guest server, you download the NetWare DVD ISO file to the VM host server desktop after the host server is installed and running.

2.2 Installing the Virtualization Host Server

Although it is possible to install NetWare 6.5 SP8 on a SUSE Linux Enterprise Server (SLES) server that has no OES services installed, we recommend that you install the basic OES 11 SP2 services on the host server to provide backup services through SMS and management services through Novell Remote Manager.

IMPORTANT: Virtualized NetWare in Xen is an OES product feature. Support of NetWare in a Xen virtual machine is available to only OES registered customers.

Complete the instructions in the following sections.

- Section 2.2.1, “Prerequisites,” on page 26
- Section 2.2.2, “Starting the Installation,” on page 26
- Section 2.2.3, “Setting the Root Password, Configuring the Network, and Updating the Server,” on page 29
- Section 2.2.4, “Configuring LDAP and OES Services,” on page 31
- Section 2.2.5, “Setting Up the Graphical User Interface,” on page 32
- Section 2.2.6, “Booting with the Xen Kernel,” on page 33

2.2.1 Prerequisites

Before installing OES 11 SP2 on your server, you must complete the following task:

❒ Ensure that the server computer meets the requirements outlined in Section 2.1, “Virtualization Host Server Requirements,” on page 25.

2.2.2 Starting the Installation

WARNING: This procedure permanently erases any data currently on your server’s hard drive.

1. Prepare the BIOS on your server machine so that it will boot from the CD-ROM drive first.
2. Insert the DVD you prepared in “Creating the Installation Media” on page 11 into your server and reboot the machine.
3. When the boot selection page appears, immediately press the Down-arrow key to select the Installation option, then press Enter.

   If you don’t respond before the machine starts booting from the hard disk, reboot and repeat this step.
4. After the boot process finishes, select a *Language* and *Keyboard Layout*.
5. Read and agree to the software license agreement, then click *Next*.
6. Read and agree to the OES 11 SP2 software license agreement, then click *Next*.

7 If prompted to insert additional media, click *Retry*.

8 Verify that *New Installation* is selected, select the *Include Add-On Products from Separate Media* option, then click *Next*.

9 Make sure the *Yes, Run the Network Setup* option is selected and click *Next*.

10 Use the following table to navigate and configure your server.

Page Name	Action
Network Setup	1. (Conditional) If your server has multiple network cards, select the card the server will use during the install, then click *Next*. The page refreshes. 2. Select *Static Address Setup*. 3. In the *IP Address* field, type the IP address for the server. For example, 192.168.1.100 4. In the *Netmask* field, type the subnet mask for your network. For example, 255.255.255.0. 5. In the *Default Gateway IP* field, type the IP address of the gateway for your getting started lab subnet. For example 192.168.1.1. 6. In the *DNS Server IP* field, type the IP address of a primary DNS server for your network. 7. Click *OK*.
Add-On Product Installation	1. Confirm that *Novell Open Enterprise Server 11 SP2* is listed as an add-on product, then click *Next*.
Clock and Time Zone	1. Select the region and time zone for the server and click *Next*.
Server Base Scenario	1. Make sure that the Physical Machine option is selected, then click *Next*.
Installation Settings	1. Click *Partitioning*.

11 To ensure a clean install, use the following table to navigate and configure the partitioning pages:

Page Name	Action
Preparing Hard Disk—Step 1	1. Select *Custom Partitioning (for experts)*. 2. Click *Next*.
Expert Partitioner	1. Double-click the device entry for the disk you are installing to. 2. Click *Expert* (just above the *Accept* button), click *Create New Partition Table*, then click *OK* > *Yes*. **WARNING:** This erases all data from the disk you are installing to. 3. Click *Add*.

Page Name	Action
Add Partition on *device_name*.	1. With *Primary Partition* selected, click *Next*. 2. In the *Custom Size* field, type `200 MB`, then click *Next*. 3. In the *Mount Point* drop-down list, select */boot*, then click *Finish*. 4. Click *Add* > *Next*. 5. In the *Custom Size* field, type a size roughly twice the amount of RAM installed on the server. For example, if the server has 1 GB RAM installed, type `2 GB`, then click *Next*. 6. In the *File system* drop-down list, select *Swap*, then click *Finish*. 7. Click *Add* > *Next*. 8. In the *Custom Size* field, type `10 GB`, then click *Next*. 9. In the *Mount Point* drop-down list, make sure that */* is selected, then click *Finish*. This is the partition where you install the VM host server. 10. Click *Add* > *Next*. 11. In the *Custom Size* field, type `25 GB`, then click *Next*. 12. In the *File System* drop-down list, select *Ext2*. Operating systems running in paravirtual mode should run their kernels on non-journaling file systems, such as Ext2. 13. In the *Mount Point* field, type `/vm`. 14. Click *Finish*. 15. Click *Accept*.

12 On the Installation Settings page, scroll down and click *Software*.

Use the following table to navigate and configure the software pages.

Page Name	Action
Software Selection and System Tasks	1. Under *Open Enterprise Services*, select *Novell Backup / Storage Management Services (SMS)*. Notice that *Novell Linux User Management* and *Novell Remote Manager* are also selected by default. These three are the only OES 11 SP2 services that are supported to run directly on a Xen virtualization host server. All OES 11 SP2 services are supported to run on Xen guest servers. 2. Under *Primary Functions*, select *Xen Virtual Machine Host Server* . 3. Click *OK*.
agfa fonts	1. Click *Accept*.
Installation Settings	1. Click *Install*.

Page Name	Action
Confirm Installation	1. Click *Install*. After the files are copied, the system configuration takes a few minutes to complete.

13 If you are prompted for additional input during the configuration, accept the default actions.

14 Continue with Setting the Root Password, Configuring the Network, and Updating the Server.

2.2.3 Setting the Root Password, Configuring the Network, and Updating the Server

After the initial system configuration and system reboot, the installation needs more information about the `root` user and the network.

1 Use the following table to navigate and complete the various configuration pages.

Page Name	Action
Password for the System Administrator “root”	1. Enter and confirm the `root` user password, then click *Next*.
Hostname and Domain Name	1. If your DHCP server is working correctly, the server hostname should appear in the *Host Name* field. If not, type the hostname for the IP address you are assigning to the server. For example, myvmhost. 2. In the *Domain Name* field, if the *DNS Domain Name* isn’t already populated for your network, type the domain name for the server. For example, mysite.company.example.com. 3. Deselect *Change Hostname via DHCP*. 4. Click *Next*.
Network Configuration	1. Click *Network Interfaces*.
Network Card Configuration Overview	1. If your server has multiple network cards, select the card the server will use. 2. Click *Edit*. 3. Select *No Link and IP Setup (Bonding Slaves)* and click *Next*.
Network Settings	1. Click the *Hostname/DNS* tab. 2. Make sure that the configuration information is accurate and complete. 3. Click the *Routing* tab. 4. Make sure that the *Default Gateway* IP address is correct. 5. Click *OK*.
Network Configuration	1. Click *Next*.
Test Internet Connection	You will need to register your server on the Internet to download the latest patches, so you should test the Internet connection at this point to make sure everything is configured correctly. 1. Select the option to test the connection. 2. Click *Next*.
Running Internet Connection Test	After a few moments, the *Test Status* should indicate *Success*. If it does not, you need to click *Back* and fix your network configuration and the connection to the Internet. It is essential that OES 11 SP2 servers always have the latest security and other critical patches downloaded and installed. 1. Click *Next*.
Novell Customer Center Configuration	1. Click *Next*. The server establishes a connection with the Novell Customer Center.
Manual Interaction Required	1. Click *Continue*.

Page Name	Action
Novell Customer Center System Registration	1. In the fields indicated, type and confirm the e-mail address to which you want administrative notifications sent. 2. In the *Activation code for SLES components* field, type the SLES activation code you noted or printed while downloading the image files. If this code is not entered, the server can't download updates and patches through the Novell patch channels. For the OES 11 SP2 release, downloading the SLES patches is critical for service configuration success. 3. In the *Activation code for OES components* field, type the OES 11 SP2 activation code you noted or printed while downloading the image files. If this code is not entered, the same patch channel restriction applies as for SLES. 4. Click *Submit*. Your registration information is sent to the Customer Center. This might take a couple of minutes to complete. 5. Click *Continue*. The update server is added to your system configuration. Again, this might take a few minutes.
Novell Customer Center Configuration pop-up	1. Click *OK*.
Online Update	Depending on the patches that are in the Update channels, you might need to run the update process more than once. 1. Select *Run Update*, then click *Next*. 2. Click *Accept*. Continue through any notifications that appear. The update patches are downloaded and installed. 3. When *Patch Installation Finished* displays below the Progress Log, Click *Next* > *OK*. If the kernel has been updated, the system restarts. 4. Repeat from Step 2 until the Network Services Configuration page displays.
Network Services Configuration	1. Because the system restarted due to a kernel changes, you must type and confirm the root password, then click *OK*. 2. Click *Next*.

2 Continue with Configuring LDAP and OES Services.

2.2.4 Configuring LDAP and OES Services

The VM host server is not created as an object in eDirectory, but it uses eDirectory LDAP for the OES 11 SP2 services installed on it.

1 Use the following table to navigate and complete the eDirectory pages:

Page Name	Action
Configured LDAP Servers	1. Type the eDirectory tree name (example_tree) and Admin name and context (cn=admin.o=company), and Admin password. 2. Click Add and add the OES lab server as the LDAP server. 3. Click *Next*.
Novell Open Enterprise Server Configuration	1. Click *Next*. The configuration settings are saved for the OES services you've installed.
User Authentication Method	1. Click *Next*.
New Local User	The `root` user was created during the SLES install. On OES servers (including virtualization host servers), we recommend that all users except `root` be defined in eDirectory. Therefore, you don't create additional local users. 1. Click *Next*.
Empty User Login	1. Click *Yes*.
Release Notes	1. Click *Next*. The official OES 11 SP2 Release Notes (http://www.novell.com/documentation/oes11/oes_readme/data/readme.html) are published with the OES 11 SP2 Online Documentation (http://www.novell.com/documentation/oes11/oes_readme/data/readme.html).

2 Continue with Setting Up the Graphical User Interface.

2.2.5 Setting Up the Graphical User Interface

When the Hardware Configuration page appears:

1 Review the Graphics Cards configuration to make sure your monitor was detected and that your color and resolution settings are the way you want them.

If the settings are correct, skip to Step 3.

2 (Conditional) If the configuration is incomplete or wrong, click the blue links to configure your monitor, color, resolution, etc.

3 Click *Next*.

4 When the *Installation Completed* page appears, deselect *Clone This System for Autoyast* and click *Finish*.

5 Continue with Booting with the Xen Kernel.

2.2.6 Booting with the Xen Kernel

By default, the OES 11 SP2 server doesn't load the Xen kernel required for hosting virtual machines. To configure the server to boot the Xen kernel by default:

1. Log in to the server as `root`.
2. On the desktop, click *Computer* > *YaST*.
3. Click *System* > *Boot Loader*.
4. Select the *XEN* option and click *Set as Default*.
5. Click *OK*.
6. Restart the server by clicking *Computer* > *Shutdown* > *Restart* and enter the `root` password.
7. Continue with Installing the NetWare 6.5 SP8 Virtual Machine.

2.3 Installing the NetWare 6.5 SP8 Virtual Machine

After preparing the virtualization host server, complete the following instructions. For complete information and instructions, see the Novell Virtualization Technology documentation Web site (http://www.novell.com/documentation/vmserver/index.html).

- Section 2.3.1, "Disabling the Alt+Esc Shortcut on the VM Host Server," on page 33
- Section 2.3.2, "Downloading the NetWare ISO File," on page 33
- Section 2.3.3, "Creating a Virtual Machine and Installing NetWare," on page 34

2.3.1 Disabling the Alt+Esc Shortcut on the VM Host Server

Alt+Esc is used on a NetWare server to switch between console screens, but on SLES 11 it moves between open windows. To provide the expected behavior for the virtualized NetWare server, you must disable the shortcut for SLES 11.

1. On the host server as the `root` user, click *Computer* > *Control Center*.
2. Click *Personal* > *Keyboard Shortcuts*.
3. Under the *Window Management* category, click *Move between windows immediately*, then press the Backspace key to disable the shortcut.
4. Click *Close*.
5. Close the Control Center.
6. Continue with Downloading the NetWare ISO File.

2.3.2 Downloading the NetWare ISO File

You install NetWare from the DVD `.iso` file copied to the server's hard drive.

1. On the host server, click *Computer* > *Firefox* and access the NetWare 6.5 SP8 e Media Kit on the Novell Download Web site (http://download.novell.com/Download?buildid=dpIR3H1ymhk~).
2. On the evaluation page, click *Proceed to Download*.
3. Log in using your Novell Account information.
4. Click the *Download* button for the `NW65SP8_OVL_DVD.iso` file.
5. Select *Save File* and click *OK*.

6 In the *Save in Folder* drop-down list, select *Desktop*, then click *Save*.

The file is saved to the desktop.

7 After the file downloads, verify its integrity.

7a Click *Computer* > *More Applications* > *System* > *GNOME Terminal*.

7b At the command prompt, enter `cd Desktop`.

The terminal opens in the `root` user's home directory (`/root`). The desktop is contained in a subfolder of `/root` named `Desktop`.

7c Check the MD5 checksum value of the downloaded image file by entering:

```
md5sum NW65SP8_OVL_DVD.iso
```

7d Compare the displayed value against the value listed on the evaluation download page.

If the values don't match, you must download the file again until you get a matching checksum.

7e Close the terminal by entering `exit`.

7f You can also close the browser and the download dialog box.

8 Continue with Creating a Virtual Machine and Installing NetWare.

2.3.3 Creating a Virtual Machine and Installing NetWare

1 On the desktop, click *Computer* > *YaST*.

2 Select *Virtualization* > *Virtual Machine Manager*.

Notice that one virtual machine, *Domain-0* (the OES 11 SP2 virtual machine host server) is already running.

3 Use the information in the following table to create a second virtual machine and start the NetWare installation.

Page Name	Action
Virtual Machine Manager	1. In the list of virtual machines, right-click the *localhost* entry. 2. Select *New*. The Create a Virtual Machine Wizard launches.
Create a Virtual Machine	1. Click *Forward*.
Install an Operating System?	1. Click *Forward*.
Type of Operating System	1. Click the expand icon next to *NetWare*, then select *Novell Open Enterprise Server 2 (NetWare)*. 2. Click *Forward*.
Summary	1. Click *Name of Virtual Machine*.
Name of Virtual Machine	1. In the *Name* field, type `LAB_NW_VM`. It is easier to know which VM you are managing if it reflects the name of the server it contains. 2. Click *Apply*.
Summary	1. Click *Hardware*.

Page Name	Action
Hardware	1. If your server has more than 1 GB memory installed, increase the initial memory allocated to the VM by clicking the arrows. For example, if your server has 2 GB memory installed, you can easily increase the initial memory amount to 1024 MB. 2. Click *Apply*.
Summary	1. Click *Disks*.
Disks	Initially, a 10 GB file is specified for the partitions/volumes on the virtual server. By default, this is a sparse file, meaning that although 10 GB is allocated, the size of the file on the disk will only be as large as the actual data it contains. Sparse files conserve disk space, but they have a negative impact on performance. The NetWare install allocates 500 MB for a DOS partition and 8 GB for the SYS: volume. The default disk size of 10 GB leaves about 1.5 GB for other partitions, which isn't very much, although it is sufficient for the exercises in this guide. However, you allocated 25 GB for the /vm mount point on the server, so let's allocate all of that to this virtual machine. 1. With the default *Hard Disk* selected, click *Edit*. 2. Modify the path in the *Server* field to be `file:/vm/LAB_NW_VM/disk0` This creates the virtual machine files on the Ext2 `/vm` partition you created during the installation. 3. In the *Size* field, replace 10.0 with 23.3 (the actual available disk space on the Ext2 partition). 4. Deselect *Create Sparse Image File*. This dedicates all of the available physical disk space on the Ext2 partition to the VM file and improves performance of the Virtual NetWare server. 5. Click *OK*. 6. Click *CD-ROM*. 7. Click *Browse*, then navigate to and select the `NW65SP8_OVL_DVD.iso` file you downloaded to the desktop. 8. Click *Open*. 9. Click *OK*. 10. Click *Apply*.
Summary	1. Click *OK*. The virtual machine is created and the NetWare installation starts. This can take a few minutes or longer, depending on processor speed, memory, etc. Most of the time is required to prepare the relatively large VM file. However, after the file is prepared, the VM will run much more efficiently than if it were using a sparse file.

4 After the NetWare installation starts, use the following table to navigate the pages listed in the left column:

IMPORTANT: Some of the instructions that follow assume you have a mouse attached to the server. If not, as you install, use the Tab key to select the options indicated, then press Enter to continue.

Page Name	Action
NetWare Installation	1. Click inside the installation window to set the mouse pointer. 2. Use the arrow keys to select a language, then press Enter. 3. Modify the Regional Settings if desired, then select *Continue* and press Enter. 4. Press F10 twice to accept the license agreements. 5. Press the Down-arrow key to select *Continue*, then press Enter. 6. Press Enter to ◆ Create an 8 GB SYS: volume. ◆ Begin copying files for the installation. As the files copy, notice the *Run*, *Pause*, and *Shutdown* options above the window displaying the installation. After the server is installed, they are activated, and you can then use them to manage the state of the virtual machine.
Choose a Pattern	1. Click *Next*.
Components	1. Select ◆ *Apache 2 Web Server and Tomcat 4 Servlet Container* ◆ *Tomcat 5 Servlet Container* ◆ *Novell iManager 2.7.2* 2. Click *Next*.
Novell iManager 2.7.2	1. Click *Yes* to install the plug-ins.
Summary	1. Click *Copy Files*.
Server Properties	1. Type `LAB_NW` for the server name. 2. Click *Next*.
Protocols	1. Click *IP*. The installation process accesses the server. 2. Click the first *IP Address* field, then type the IP address of the server. For example, 192.168.1.130. 3. Type the subnet mask for the address. For example, 255.255.255.0. 4. Type the router (gateway) address for the subnet. For example, 192.168.1.1. 5. Click *Advanced*.

Page Name	Action
Advanced	1. Click the *SLP* tab. 2. In the *DA Server 1* field, type the IP address of the SLP Directory Agent (DA), which is the first OES 11 SP2 server you installed in the getting-started lab. For example, 192.168.1.100. 3. In the *SLP Scope List* field, type `Directory`. 4. Click *OK*.
Protocols	1. Click *Next*.
Domain Name Service	1. Type the DNS hostname associated with the IP address you just entered. In contrast to OES servers, this can be different than the name used in eDirectory. Of course, you can choose to use the DNS name for NetWare servers in eDirectory in your production network. In this guide, however, the eDirectory server name is assumed to be LAB_NW. 2. Type the domain name. 3. Type at least one DNS name server IP address. For example, 192.168.1.50. 4. Click *Next*
Time Zone	1. Click the correct time zone for your area. 2. Click *Advanced*.
Time Synchronization	1. Leave the protocol set to *Timesync*. 2. Click *Use Configured Sources*. 3. In the *Time Source 1* field, type the IP address of the same reliable time source you specified for the OES 11 SP2 getting-started lab server (not the VM host server). 4. Select *NTP*. 5. Click *OK*. 6. Click *Next*.
eDirectory Installation	1. Click *Next*.
eDirectory Information	1. Click the *Tree* icon. 2. Browse to and select *EXAMPLE_TREE*. 3. Click *OK*. 4. Click the browse icon to the right of the *Context for Server Object* field. 5. Browse to and select *SERVERS* (in *COMPANY* > *LAB*). 6. Click *OK*. 7. Click *Next*.
eDirectory Login	1. Click the browse icon to the right of the *Name* field. 2. Browse to and select *admin* (in COMPANY). 3. Click *OK*. 4. Type the Admin user's password. 5. Click *OK*.

Page Name	Action
NDS/eDirectory Patch Detection	The warning doesn't apply because you are installing into an eDirectory 8.8 tree. 1. Click *OK*. The system checks time synchronization, extends the eDirectory schema, and installs an eDirectory replica on the virtualized NetWare server.
eDirectory Summary	1. Click *Next*.
Licenses	In this page you install the license included with NetWare 6.5 SP8. The software license doesn't expire, but your evaluation period expires 90 days after you install the server. At that point you should either uninstall NetWare or purchase the OES 11 SP2 product. For more information, see "NetWare 6.5 SP8 Includes MLA License Files" in the *NW 6.5 SP8: Licensing Services Administration Guide*. 1. Click the *Browse* icon to the right of the *License Location* field. 2. In the *Select a License* dialog box, click the expansion dots to the left of *NW65OS* and then the dot to the left of *LICENSE*. 3. Click the `NLF` file that appears in the right frame. 4. Click *OK*. 5. Click *Next*.
MLA License Certificate Context	1. Change the *NDS Context* for the license file to `O=COMPANY`. This makes this license available to any additional NetWare 6.5 servers you might choose to install in a different context in the tree, including any physical NetWare servers you install. 2. Click *Next*.
NetIQ Modular Authentication Service	1. Click *Next*. It takes a few minutes for the installation to configure your OES services. If you want to learn more about various OES services (most of which we have not installed), you can read the information pages as the configuration process runs. You can install more services later if you want to experiment further.
Reset Your Server Now?	1. Click *Yes*.

5 Close the Virtual Machine Manager windows by clicking the X on the upper right corner, or by right-clicking the title bar and selecting *Close*. The NetWare server continues to run.

For Xen best practices and other management tips, see "Administration and Best Practices (http://www.suse.com/documentation/sles11/book_xen/data/part_2_book_book_xen.html)" in the *Virtualization with Xen Guide* (http://www.suse.com/documentation/sles11/book_xen/?page=/documentation/sles11/book_xen/data/book_xen.html) guide.

6 Continue with Chapter 3, "eDirectory, Users and Groups, and Identity Services," on page 39.

3 eDirectory, Users and Groups, and Identity Services

NetIQ eDirectory is the central, key component of Novell Open Enterprise Server (OES). It provides the following:

- Centralized identity management
- The underlying infrastructure for managing your network servers and the services they provide
- Secure access to network services both within the firewall and from the Web

At this point you have created a new eDirectory tree named EXAMPLE_TREE that you are using to learn about OES. As you work with the tree and the objects it contains, you will begin to better understand the role eDirectory plays.

This section discusses the following:

3.1 Using the eDirectory Information in This Guide

Before you install OES in a production environment, it is critical that you and your organization take time to plan and design your tree.

However, the instructions in this guide require no planning on your part. In fact, most of the eDirectory objects needed for the exercises in this guide were created in Chapter 1, "Installing the OES 11 SP2 Server in Your Getting-Started Lab," on page 9.

The information that follows introduces eDirectory.

If you are already familiar with eDirectory and want to skip the planning introduction, we recommend that you do the following:

1. View the eDirectory tree structure used in this guide (Figure 3-1 on page 40).
2. Skip to Section 3.3, "Updating the iManager Plug-in Modules," on page 43.

3.2 An Introduction to eDirectory Planning

If you want an efficient and intuitive eDirectory design, you and your organization need to base it on two things:

- The layout of your network
- The structure of your organization

You and your team should carefully think through the issues and design considerations discussed in "Designing Your NetIQ eDirectory Network" in the *NetIQ eDirectory 8.8 SP8 Administration Guide*.

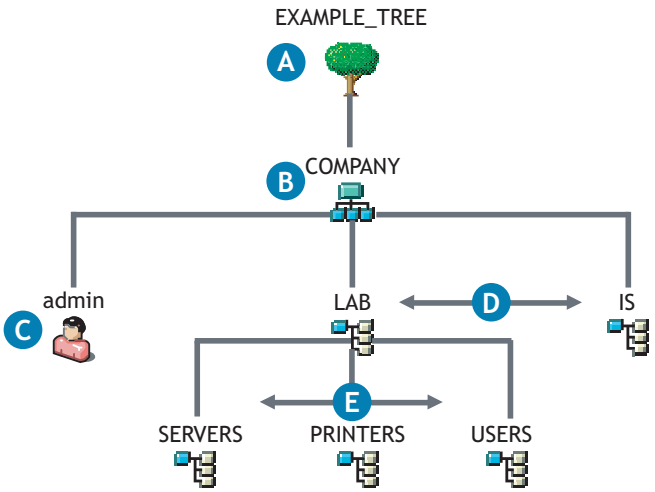
- Section 3.2.1, "Your Getting-started Lab's eDirectory Tree," on page 40
- Section 3.2.2, "Your Current Getting-started Lab Tree," on page 41
- Section 3.2.3, "Expanding Your Getting-started Lab Tree," on page 42

3.2.1 Your Getting-started Lab's eDirectory Tree

Figure 3-1 illustrates an eDirectory tree like the one you will use in the getting-started lab exercises found in this guide. It also illustrates and explains the basic elements you should consider when designing an eDirectory tree.

NOTE: The IS Organizational Unit object is included for explanatory purposes and is not created in this guide.

Figure 3-1 *Your Getting-started Lab's eDirectory Tree*



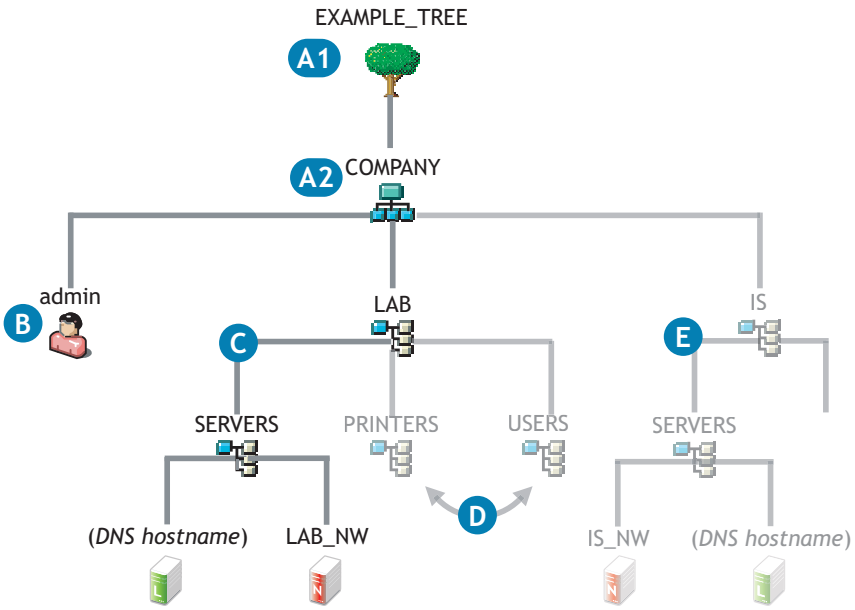
Reference Letter	Explanation
A	The Tree object is the top container object in the tree. It usually contains an Organization object (specified in the install by using o=company) that represents your company or organization.

Reference Letter	Explanation
B	The Organization object is normally the first (and often the only) container object under the Tree object. It is typically named after your organization. Small organizations keep object management simple by having all other objects, such as users, printers, and servers, directly under the Organization object. Organizations that are large enough to have departments or other organizational units usually decide to have their tree structure reflect their organizational structure. As shown in this getting-started lab example, these organizations create Organizational Unit objects (specified during the install by using ou=*name*) that reflect their departments, divisions, geographical locations, etc., as is logical for their organization. Sometimes large organizations create multiple Organization objects below the Tree object to represent separate business units or subsidiaries.
C	Every tree requires an Admin User object. You will log in as Admin to create or import other User objects and to create the rest of your tree structure.
D	This example shows two Organizational Unit objects at the department level (LAB and IS).
E	This example also illustrates how Organizational Unit objects can be nested to provide a complex hierarchy if it is necessary to manage the organization.

3.2.2 Your Current Getting-started Lab Tree

The eDirectory tree you have created by installing OES 11 SP2 in your getting-started lab is illustrated by the darker objects in Figure 3-2. The objects that are dimmed are for explanatory purposes and do not exist in your current tree. When you finish with this guide, the upper level organization of your tree will look more like Figure 3-1, except that the IS Organizational Unit shown in that illustration will not be created.

Figure 3-2 *Your Current Getting-started Lab Tree*



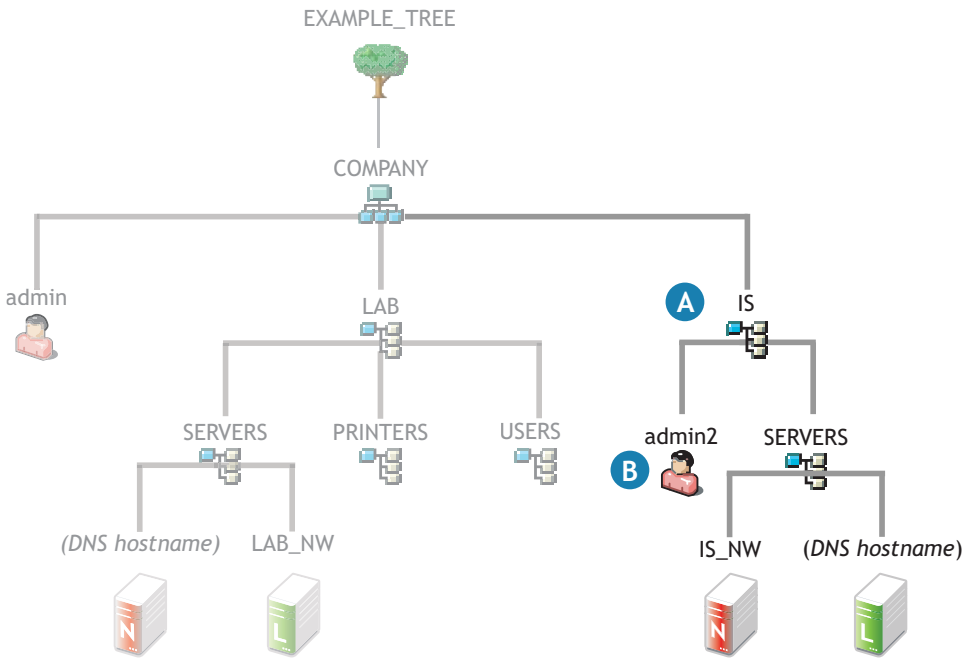
Reference Letter	Explanation
A	The OES installation process requires that you specify names for the following objects: • **A1:** A Tree object • **A2:** An Organization object
B	One of the first objects you specify during an initial installation is the Admin user.
C	The OES installation process can also create Organizational Unit (OU) objects to define a context for the OES 11 SP2 Server object.
D	All other OU objects that you have planned for your tree must be created after the installation finishes. For example, you will create the PRINTERS and USERS OU objects later in this guide.
E	The exception to D is that subsequent installations can create additional contexts to contain other OES servers that you install into the tree. For example, you could create a SERVERS OU under the IS OU as illustrated.

3.2.3 Expanding Your Getting-started Lab Tree

The instructions in this guide cover only the installation of an OES 11 SP2 and a virtualized NetWare 6.5 SP8 server in the tree.

If you were to decide to install additional servers in the tree, the processes you would follow could involve some additional planning tasks, as illustrated in Figure 3-3.

Figure 3-3 *An Expanded Tree*



Reference Letter	Explanation
A	During subsequent installations into the same tree, you can create new Organizational Unit objects to provide a context for other OES 11 SP2 servers being installed.
B	If you want to specify other Admin users in the OES 11 SP2 installation parameters, you can do this during the installation. Note, however, that such an Admin would probably not be granted rights to the entire tree, only to the objects under the IS OU. Admin objects like this are often referred to as sub-container admins.

3.3 Updating the iManager Plug-in Modules

1. At your Windows workstation, log in to iManager on the OES 11 SP2 getting-started lab server, using the eDirectory Admin user account and password. For more information, see the steps in Section 1.9, "Accessing iManager," on page 20.

   If you receive a Tomcat error, see Section A.2, "iManager Tomcat Error," on page 107.

2. Click the *Configure* icon  .
3. In the *Configure* pane, click *Plug-in Installation* > *Available Novell Plug-in Modules*.

   A list shows the plug-ins on novell.com that have been updated or created since OES 11 SP2 was initially released.
4. Click the check box in the header row.

   All of the available plug-in modules are selected.
5. Click *Install*.
6. Agree to the license agreement and click *OK*.
7. When the plug-in installation process concludes, click *Close*.

   You can safely ignore plug-in installation errors in connection with the exercises in this guide. If you have concerns about the errors for production servers, contact Novell support or visit the Novell Support Web page (http://support.novell.com).
8. Do not close iManager. Continue with the next section, Creating a Context for Your Users and Groups.

3.4 Creating a Context for Your Users and Groups

All OES services require that you create User objects to represent the users on your system. The Linux User Management component for OES servers requires that you also create a Group object that you can assign the users to.

If you reviewed Section 3.2, "An Introduction to eDirectory Planning," on page 40, you might have noticed an Organizational Unit object named USERS in Figure 3-2 and Figure 3-3. It is helpful to have at least one Organization Unit object to contain user-related objects, such as User objects and Group objects.

To create an Organizational Unit container object named USERS in the LAB Organizational Unit object:

1. In iManager, click the *View Objects* icon  .
2. In the left pane, click the *Browse* tab.
3. Click the down-arrow next to the *COMPANY* Organization object.
4. Click *LAB*, then select *Create Object* from the drop-down list.
5. From the *Available Object Classes* list, select *Organizational Unit*, then click *OK*.
6. In the *Organizational Unit name* field, type `USERS`.
7. Click *OK* > *OK*.
8. Do not close iManager. Continue with the next section, Assigning a Password Policy to Your Users.

3.5 Assigning a Password Policy to Your Users

In "Configuring eDirectory and OES Services" on page 17 you created a common proxy user, and a universal password policy named Common Proxy Policy.

In order for the users you create to use some of the OES services you have installed, such as Novell CIFS, you must associate the Common Proxy Policy with those users. The simplest method for doing this is to associate the policy with the USERS container created in Section 3.4, "Creating a Context for Your Users and Groups," on page 43.

NOTE: The Common Proxy Policy is associated with the server's parent container (SERVERS) by default. If your users were in the same container as the server or in a subcontainer of it, then the following steps would not be needed. However, the USERS container is a sibling to the SERVERS container in the tree created in this guide.

---

1. In iManager, click the *Roles and Tasks* icon  .
2. Click *Passwords* > *Password Policies*.
3. Click the *Common Proxy Policy* link.
4. Click the *Policy Assignment* tab.
5. Click the *Browse* icon next to the *Assign To* field.
6. In the *Contents* pane, browse to the *LAB* Organizational Unit and click the down-arrow next to it.
7. Select the *USERS* Organizational Unit object, then click *OK*.
8. Click *Apply* > *OK*.
9. Do not close iManager. Continue with the next section, Creating NCP and NSS Volumes for Home Directories.

3.6 Creating NCP and NSS Volumes for Home Directories

For the exercises in the guide, you need home directories for the users you create.

When you create NCP and NSS volumes before creating users, you can then create home directories at the same time as you create the user objects. For that reason, it makes sense to set up the volumes prior to user object creation.

3.6.1 Home Directories on OES

On OES, home and other data directories can reside in three possible volume types, each of which is presented in this guide. The volume types are:

- **Linux POSIX volumes:** Your OES 11 SP2 getting-started lab server already contains a / (root) partition with an empty `/home` directory (the default location for home directories on Linux servers).
- **NCP volumes that point to Linux POSIX volumes:** Your OES 11 SP2 server has NCP Server installed so you can create NCP volumes that point to the Linux POSIX file systems.
- **Novell Storage Services (NSS) volumes:** Your OES 11 SP2 server has unformatted disk space available for NSS volumes. (NSS is the native file system on NetWare.)

There are important differences between the home directories in each of these locations and in the configuration steps required to create them and set the needed file/directory trustee assignments, etc.

The Linux POSIX /home Directory

For the exercises in this guide, you create POSIX home directories for two users. This lets you explore the differences between directories created through POSIX and directories created through NCP. Both directory types exist on the same physical disk space and are displayed as POSIX home directories, but only the NCP directories appear in NCP interfaces.

Creating an NCP Volume on the OES 11 SP2 Server

OES lets you create NCP volumes that point to directories on the Linux POSIX partitions of your server. For the exercises in this guide, you create an NCP volume that points to the `/home` directory on your server. NCP volumes support the Novell File and Directory Trustee Rights model when files are accessed through an NCP client.

NCP volumes on Linux POSIX file systems differ from NSS volumes; NCP volumes do not support NSS file attributes, such as Delete Inhibit. For more information, see "Directory and File Attributes" in the *OES 11 SP2: NCP Server for Linux Administration Guide*.

1. Log into your server as `root` and click *Computer* > *Gnome Terminal*.
2. Create an NCP volume in NCPCON that points to the /home directory by entering the following commands:

   ```
   ncpcon create volume home_ncp /home
   ```

3. Type `exit` and press Enter to close the terminal window.

Creating an NSS Pool and Volume on the OES 11 SP2 Server

OES supports NSS volumes. NSS is a fast-mounting, journaled file system for OES and NetWare. It is the only file system in the industry that is integrated with identity management. NSS volumes support the Novell File and Directory Trustee Rights model and also NSS file attributes. For more information, see "The Traditional Novell Access Control Model" in the *OES 11 SP2: Planning and Implementation Guide*.

NSS volumes can span partitions and even hard disks. For a graphical overview of NSS volumes, see Section A.1, "NSS Partitions, Pools, and Volumes," on page 105.

1. On your getting-started lab workstation in iManager, click the *Roles and Tasks* icon  .
2. Click *Storage* > *Pools*.
3. Click the *Browse* icon  next to the *Server* field,
4. Browse to and select your OES 11 SP2 getting-started lab server object (in *COMPANY* > *LAB* > *SERVERS*).
5. Click *New*.
6. Name the pool `pool_lx` and click *Next*.
7. Click the box next to the system disk in your server (sda, hda, etc.).
8. By default, all of the free space on the disk should be automatically entered in the *Used Size* field, and the amount should match the *Free Size (MB)* displayed to the right of the system disk. If the *Used Size* field is blank, type the free space amount.
9. Click *Finish*.

   POOL_LX is listed as an available pool. Notice that the NSS pool name is uppercase, even though you typed lowercase. All NCP and NSS volumes, are created and displayed in uppercase to give a visual distinction from the Linux POSIX lowercase norm, to prevent visual confusion of letters and numbers (vol1 vs. VOL1), and because names are case insensitive on NSS.
10. After the pool appears in the list, continue in the *Storage* task by clicking *Volumes* in the left frame.
11. Click *New*.
12. In the *Name* field, type `home_nss`, then click *Next*.
13. Click the box next to *POOL_LX*, then click *Next*.

14 Scroll down to *File Information* > *Lookup Namespace*

Long should be selected by default.

This setting avoids having the NCP server spend cycles doing Long namespace lookups.

15 Click *Finish*.

HOME_NSS is listed as an available volume.

16 Continue with the next section, Home Directories on NetWare 6.5.

3.6.2 Home Directories on NetWare 6.5

The default file system for NetWare 6.5 is NSS, which is an NCP volume by definition.

NetWare servers don't contain a HOME volume (partition) by default, but it is standard practice among NetWare administrators to create a HOME volume for their network users' private directories.

Creating a HOME_NW Volume on the NetWare 6.5 SP8 Server

Your NetWare virtual machine has disk space still available for another NSS pool and volume on disk 0, which is the 25 GB file you created for the VM in Section 2.3.3, "Creating a Virtual Machine and Installing NetWare," on page 34.

1 In iManager, click the *Roles and Tasks* icon  .

You can manage storage on the NetWare LAB_NW_VM server even though you are running iManager on your OES 11 SP2 getting-started lab server. This demonstrates one advantage of the tight integration of OES services with eDirectory.

2 Click *Storage* > *Pools*.

3 Click the *Browse* icon  next to the *Server* field,

4 Browse to and select the LAB_NW server object (in *COMPANY* > *LAB* > *SERVERS*).

Notice that a pool named *SYS* already exists. This pool contains the default volumes and files created with the NetWare server, including a volume that is also named `SYS`.

5 Click *New*.

6 Name the pool `pool_nw` and click *Next*.

7 Click the box next to the XenHD device in your virtual machine.

This "device" is the 25 GB file that you created for the virtual machine. The file currently contains all the virtualized NetWare server's partitions and files.

8 By default, all of the free space on the disk should be automatically entered in the *Used Size* field, and the amount should match the *Free Size (MB)* displayed to the right of the system disk. If the *Used Size* field is blank, type in the free space amount.

9 Click *Finish*.

POOL_NW is listed as an available pool.

10 In the left frame, click *Volumes*.

11 Click *New*.

12 In the *Name* field, type `home_nw`, then click *Next*.

13 Click the box next to *POOL_NW*, then click *Next*.

14 Click *Finish*.

3.6.3 Summary of Getting-started Lab Home Directories and Purposes

Your getting-started lab servers now have four *home* directory access points in three physical locations (the first two share the same physical partition):

- **/home:** This is the default home directory on SLES 11 servers. The underlying file system is Ext3. On SLES 11 servers, home directories are normally created on `/home` by users logging in to the server for the first time.

  Home directories on OES servers are normally created on NCP or NSS volumes. However, they can be created manually on `/home`. User and Group ownership must be manually adjusted because the directories belong initially to the `root` user that creates them.
- **HOME_NCP:** This is an NCP volume mount point that points to and shares disk space with the `/home` directory mentioned above. In this guide, it illustrates the functionality of the NCP server, the Novell File and Directory Trustee Model, and Novell Client access to a Linux POSIX volume. (The underlying file system is Ext3.) Home directories on NCP volumes are easily created when users are created in iManager. POSIX permissions to home directories created in iManager must be adjusted before users can access the directories through non-NCP applications. This is because when the directories are created, the directory owner in POSIX is initially the eDirectory Admin User who created the users in eDirectory and their home directories on the Linux file system (NCP volume).
- **HOME_NSS:** This is an NSS volume on the OES server. It illustrates the functionality of the NCP server, the Novell File and Directory Trustee Model, and NSS file attributes. Because NSS volumes are also NCP volumes by default, home directories are easily created at user-creation time in iManager. POSIX permissions do not apply to NSS volumes. However, NSS can interface with POSIX permissions for applications and access methods that require them. Trustee assignments (ownership) are automatically assigned to the eDirectory username or user when the home directory is created.
- **HOME_NW:** This is an NSS volume on your virtualized NetWare server. It illustrates the functionality of the NCP server, the Novell File and Directory Trustee Model, and NSS file attributes on a NetWare server. Trustee assignments (ownership) are automatically assigned to the eDirectory user when the home directory is created.

3.7 Creating Users

For the getting-started lab exercises, you need to create the users shown in Table 3-1.

IMPORTANT: There are seven users, each representing a different user type you might need on your network.

The unusual user names are designed to communicate the volume type where their home directory is located (linux/POSIX, NCP, or NSS [including NetWare]) and whether they are enabled for Linux user management (LUM) explained in eDirectory Linux Access (LUM). The exercises that follow in this guide explore the implications of these on file and service access.

Each name includes “edir” to indicate that eDirectory users have access to the traditional Novell file services highlighted in this guide:

- Novell AFP (Macintosh networking)
- Novell CIFS (Windows networking)
- Novell iFolder 3.9
- NetStorage

The steps for creating users begin after Table 3-1.

Table 3-1 *Users to Create*

Username	First Name	Last Name	Home Directory Volume	What This User Demonstrates
linux1_lum-edir	Linux1	Lum-edir	`/home`	You manually create this user's home directory in the server's `/home` directory. If LUM is configured to allow login or sshd access, this user can access the OES 11 SP2 server as though it is a local user.
linux2_lum-edir	Linux2	Lum-edir	`/home`	You manually create this user's home directory in the server's `/home` directory. If LUM is configured to allow login or sshd access, this user can access the OES 11 SP2 server as though it is a local user. The difference between this user and the linux1 user is that its home directory is not adjusted for privacy but has the default POSIX permissions.
ncp_edir	Ncp	Edir	*DNSname*_HOME_NCP	This user's home directory is created by specifying the HOME_NCP volume at user-creation time in iManager. When the instructions in this section are complete, the user has access to only the traditional Novell services: AFP, CIFS, iFolder, and NetStorage.
ncp_lum-edir	Ncp	Lum-edir	*DNSname*_HOME_NCP	This user's home directory is created by specifying the HOME_NCP volume at user-creation time in iManager. When the instructions in this section are complete, the user has potential access to the server as a local user, in addition to traditional Novell service access.
nss_edir	Nss	Edir	*DNSname*_HOME_NSS	This user's home directory is created by specifying the HOME_NSS volume at user-creation time in iManager. The user has access to only the traditional Novell services: AFP, CIFS, iFolder, and NetStorage.

Username	First Name	Last Name	Home Directory Volume	What This User Demonstrates
nss_lum-edir	Nss	Lum-edir	*DNSname*_HOME_NSS	This user's home directory is created by specifying the HOME_NSS volume at user-creation time in iManager. In additional to traditional Novell services access, the user has access to the server as a local user.
nw_edir	Nw	Edir	LAB_NW_HOME_NW	This user represents the traditional NetWare user in eDirectory. This user's home directory is created by specifying the HOME_NW (NSS) volume at user-creation time in iManager. The user has access to only the traditional Novell services: AFP, CIFS, iFolder, and NetStorage. However, you could also LUM-enable the user (and the other non-LUM users as well) to verify that full OES services are potentially available to all eDirectory users.

1. In iManager, in the left pane, click *Users* > *Create User*.
2. In the *Username* field, type a username from Table 3-1.

   For the first user, this is linux1_lum-edir.
3. Type the first name and last name for the user as shown in Table 3-1.
4. Click the *Browse* icon  next to the *Context* field.
5. For the first user, browse to the *USERS* object (*COMPANY* > *LAB* > *USERS*), then click the object.

   For subsequent users, click the *Object History* icon  and select the *USERS* object's fully distinguished name (FDN).
6. Type the same password in both the *Password* and *Retype Password* fields.

   None of the exercises require unique passwords, so for simplicity, we recommend that you use the same password for each user.
7. Do not select *Set Simple Password*.

   This is not required for OES because Universal Password is used.
8. If the Home Directory Volume cell in the table shows `/home`, skip to Step 9.

   For the other users, select the *Create Home Directory* option and browse to the NCP or NSS volume indicated. (Volumes are in the SERVERS OU.)

   The home directories for the linux* users are created later.
9. Click *OK*.

10 Click *Repeat Task* to repeat the process until the other users listed in Table 3-1 on page 49 are created.

11 Do not close iManager. Continue with the next section, A Note about Identity Manager 4.0.2 Bundle Edition.

3.8 A Note about Identity Manager 4.0.2 Bundle Edition

If your organization has more than one directory service that stores user information, you should consider implementing the Novell Identity Manager 4.0.2 Bundle Edition included with Novell Open Enterprise Server.

The Identity Manager 4.0.2 Bundle Edition provides licensed synchronization of information (including passwords) held in NT Domains, Active Directory Domains, and eDirectory trees.

Not only can you import User objects into eDirectory rather than creating them as you have in this section, but you can use Identity Manager to keep all the user data (including passwords that are stored in your different databases) synchronized.

When data from one system changes, Identity Manager detects and propagates these changes to other connected systems based on the business policies you define.

For more information, see "Using the Identity Manager 4.0.2 Bundle Edition" in the *OES 11 SP2: Planning and Implementation Guide*.

Continue with Chapter 4, "eDirectory Linux Access (LUM)," on page 53.

4 eDirectory Linux Access (LUM)

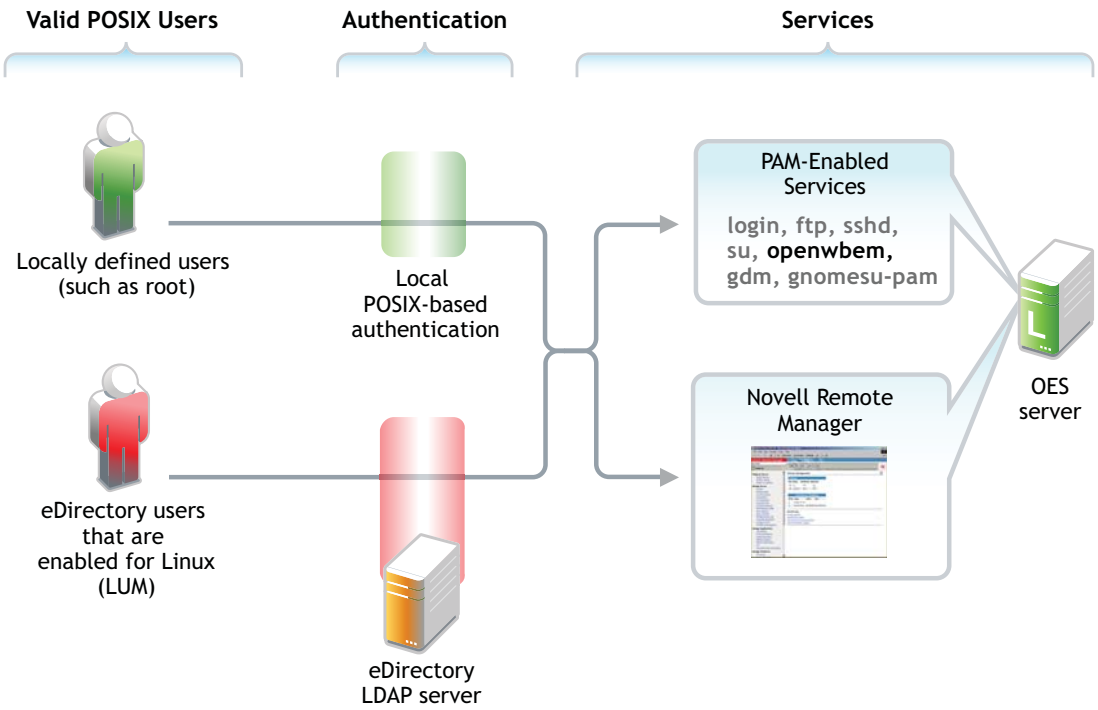
Novell Linux User Management (LUM) is a key component of Novell Open Enterprise Server (OES) and lets you require users who are accessing PAM-enabled services, such as FTP or SSH, on the OES 11 SP2 server to authenticate through eDirectory.

This section discusses the following:

4.1 Overview of Linux User Management

Figure 4-1 illustrates how LUM works with PAM-enabled services. For more detailed information, see "Linux User Management: Access to Linux for eDirectory Users" in the *OES 11 SP2: Planning and Implementation Guide*. As illustrated, SFCB is the only PAM-enabled service that is active by default.

Figure 4-1 *Linux User Management on OES*



The user-creation steps you completed earlier in this guide (Section 3.7, "Creating Users," on page 48) created three LUM users with limited rights as local users on the OES 11 SP2 server.

4.2 Creating Group Objects

To simplify user management, you should create one or more groups and associate users with those groups. Groups let you manage multiple users at the same time.

Some actions can only be performed at the group level. For example, enabling users for LUM requires making them members of a group that is enabled for LUM.

For the exercises in this guide, you will create two groups:

- **LUMUsers:** This group is used to LUM-enable some of the users you have created. Having the group lets us explore how LUM works and directly experience the SSH security precautions that are built into OES.
- **AllUsers:** This group is for all of the eDirectory user objects, including those that are LUM-enabled and those that have only traditional Novell services access.

IMPORTANT: Creating a group named users seems logical to many eDirectory administrators.

Unfortunately, all SLES 11 servers already have a system-created local group named users, and creating a duplicate group in eDirectory causes problems.

For more information, see "Avoiding POSIX and eDirectory Duplications" in the *OES 11 SP2: Planning and Implementation Guide*.

To create the required group objects:

1. In iManager > *Roles and Tasks*, click *Groups* > *Create Group*.
2. In the *Group Name* field, type `LUMUsers`.

   The name contains uppercase and lowercase letters simply to illustrate that case is preserved in object names. Some administrators use mixed case to improve readability.
3. Click the *Browse* icon next to the *Context* field.
4. Browse to the USERS container object.
5. Click *OK* > *Modify*.
6. Click the *Members* tab.
7. Click the *Browse* icon next to the *Member* field.
8. Browse to the USERS container and click the down-arrow next to it
9. Select the following User objects:
   - linux1_lum-edir
   - linux2_lum-edir
   - ncp_lum-edir
   - nss_lum-edir
10. Click *OK* > *Apply* > *OK*.
11. Click *Create Group*.
12. In the *Group Name* field, type `AllUsers`.
13. Click the *Object History* icon and select the USERS object's fully distinguished name (FDN).

14 Click *OK* > *Modify*.

15 Click the *Members* tab.

16 Click the *Browse* icon  next to the *Members* field.

17 Shift-click *linux1_lum-edir*, drag the mouse down to select all the users, then click *nw_edir*.

All of the users are added to the list.

18 Click *OK* > *Apply* > *OK*.

19 Do not close iManager. Continue with the next section, Enabling the LUMUsers Group for Linux User Management (LUM).

4.3 Enabling the LUMUsers Group for Linux User Management (LUM)

IMPORTANT: LUM-enabling users is an important part of these getting-started lab exercises. However, in a production environment you should avoid LUM-enabling users until you fully understand the potential security issues. For more information, see "SSH Services on OES 11 SP2" in the *OES 11 SP2: Planning and Implementation Guide*.

If you want eDirectory users to access PAM-enabled services such as login or sshd (SSH), on an OES server, you must LUM-enable the users.

1 In the *Roles and Tasks* list, click *Linux User Management* > *Enable Groups for Linux*.

2 Click the *Browse* icon  next to the *Group Name* field.

3 Click *LUMUsers* > *OK*.

4 Make sure the *Linux-Enable All Users in These Groups* option is selected, then click *Next* twice.

5 Click the *Browse* icon  next to the *Unux Workstation Name* field.

6 Click the up-arrow  .

7 Click the down-arrow  next to *SERVERS*.

8 Click the *UNIX Workstation* object for the OES 11 SP2 getting-started lab server, then click *OK*.

IMPORTANT: Make sure you select the UNIX Workstation object for the getting-started lab server in COMPANY > LAB > SERVERS and not the one for the VM host server that is in COMPANY.

9 Click the *Browse* icon  next to the *Unix Config Object* field.

10 Click the up-arrow  . twice

11 Click the *UNIX Config* object.

12 Click *Next* > *Finish* > *OK*.

LUM-enabled access to OES servers is enabled on an individual server basis. If you install additional OES 11 SP2 servers that require LUM access, they must also be added to a LUM-enabled group.

The LUMUsers group and its users are now recognized by the OES 11 SP2 server as local users.

13 Do not close iManager. Continue with the next section, Allowing SSH Access.

4.4 Allowing SSH Access

To illustrate how LUM-enabled services work, we will briefly experiment with SSH access for eDirectory LUM-enabled users. In Section 10.2.4, "SSH and NetStorage Administration," on page 86, you will see that SSH access is required for a key NetStorage administration feature.

Complete the steps in the following sections:

- Section 4.4.1, "Allowing SSH Access Through the Firewall," on page 56
- Section 4.4.2, "Adding SSH as an Allowed Service in LUM," on page 56
- Section 4.4.3, "Verifying SSH Access," on page 56

4.4.1 Allowing SSH Access Through the Firewall

1. On the OES 11 SP2 getting-started lab server, click *Computer* > *YaST*, then click *Security and Users* > *Firewall*.
2. In the left navigation frame, click *Allowed Services*.
3. In the *Services to Allow* drop-down list, select *Secure Shell Server*.
4. Click *Add* > *Next* > *Finish*.

   The firewall is now configured to allow SSH connections with the server.
5. Continue with Adding SSH as an Allowed Service in LUM.

4.4.2 Adding SSH as an Allowed Service in LUM

1. In YaST in the *Open Enterprise Server* group, click *OES Install and Configuration*.
2. Click *Accept*.
3. When the Novell Open Enterprise Server Configuration page has loaded, click the *Disabled* link under *Linux User Management*.

   The option changes to *Enabled* and the configuration settings appear.
4. Click *Linux User Management*.
5. Type the eDirectory Admin password in the appropriate field, then click *OK* > *Next*.
6. In the list of allowed services, click *sshd*.
7. Click *Next* > *Next* > *Finish*, then close YaST.
8. Continue with Verifying SSH Access.

4.4.3 Verifying SSH Access

The LUMUsers group in eDirectory now has SSH as an allowed service. To verify this:

1. On the getting-started lab workstation, in the iManager *Roles and Tasks* list, click *Directory Administration* > *Modify Object*.
2. Click the *Browse* icon  next to the *Object Name* field.
3. Browse to and select the *LUMUsers* group object (in *COMPANY* > *LAB* > *USERS*), then click *OK*.
4. Click the *Linux Profile* tab, click the *General* sub-tab, then select the UNIX Workstation object.
5. Click the *Linux Services* sub-tab.
6. Notice that sshd (the SSH daemon) is listed as a LUM-Enabled service, then click *OK*.

7 (Optional) If you want to verify that SSH access works, install an SSH client on the workstation and attach to the getting-started lab server through one of the LUM-enabled users. Be aware, however, that this creates a POSIX home directory for the user in `/home` and might require adjustments to procedures in the next section, Creating a Home Directory for the linux* Users.

8 Continue with Creating a Home Directory for the linux* Users.

4.5 Creating a Home Directory for the linux* Users

The NetStorage exercises in this guide involve users' home directories and specific files they will copy to those directories. However, neither of the linux* users currently has a home directory.

There are two standard ways to create home directories on Linux servers. The first way is for a user to log in to the server as a local user (or for OES, as a LUM-enabled user). For example, opening an SSH session creates a home directory.

Because it is unlikely that you want your users to have direct physical access to a production server, we will use the second way, which is to create the directory manually, assign the user and group to the directory, and then modify access permissions.

There are two methods you can use to do this.

- Section 4.5.1, "Using the File Browser," on page 57
- Section 4.5.2, "Using Terminal Commands," on page 58

4.5.1 Using the File Browser

To create home directories for your linux* users using the graphical interface, do the following:

1 As the root user, open a terminal prompt and enter the following command:

```
namconfig cache_refresh
```

This refreshes the LUM cache and is required for Linux-enabled users and groups to display in the GUI unless a few hours have elapsed since you created them. The default cache refresh rate in OES 11 SP2 is 8 hours.

2 As the `root` user on the server's desktop, click *Computer* > *Nautilus*.

3 In the left panel, double-click *File System*, then double-click the `home` folder.

4 If you see home directories for only the ncp_* users that were created in iManager on the `HOME_NCP` volume, continue with Step 5.

If you see a home directory for one of the linux* users, that means you used it to experiment with SSH access in Step 7 on page 57, thus creating a home directory for the user. In that case, adjust the steps that follow as required.

5 Right-click the white space in the right panel and select *Create Folder*.

6 Type `linux1_lum-edir` as the folder name, then right-click the folder and select *Properties*.

7 Click the *Permissions* tab.

8 Click the *Owner* drop-down list, then use the Up-arrow and Down-arrow keys to navigate to and select the *linux1_lum-edir* user.

Notice that the users that you created who are not enabled for LUM are not listed.

9 Click the *Group* drop-down list, navigate to and select *LUMUsers*, then press Enter.

Neither this group nor the user you selected exist locally. However, because they are LUM-enabled, the server recognizes them as though they do.

The next three lines (Owner, Group, Others) indicate access permissions for the directory owner (linux1_lum-edir), the assigned group (LUMUsers), and everyone else (others).

Notice that both Group and Others have permission to *Read* (open) the contents of the folder and *Execute* (browse its contents). This is not what NetWare administrators and users expect because home directories are private on NetWare servers.

10 Make this directory private by setting the *Folder Access* permissions for *Group* and *Others* to *None*.

For more information about directory privacy and aligning access on Linux servers to match what NetWare administrators are accustomed to, see "Aligning NCP and POSIX File Access Rights" in the *OES 11 SP2: Planning and Implementation Guide*.

11 Click *Close*.

12 Right-click the white space in the right panel and select *Create Folder*.

13 Type `linux2_lum-edir` as the folder name, then right-click the folder and select *Properties*.

14 Click the *Permissions* tab.

15 Change the file owner to linux2_lum-edir and the file group to LUMUsers by using the drop-down lists.

16 Adjust the permissions for this directory by selecting *Change and Delete Files* in the Group *Folder Access* drop-down list. This gives full rights to the user's home directory for anyone in the LUMUsers group, which is obviously not something you would normally do.

Later in the guide we will use this to contrast default POSIX file permissions with the Novell File and Directory Security Model.

17 In the Others *Folder Access* drop-down list, select *None*.

18 Click *Close*.

19 Continue with Novell CIFS.

4.5.2 Using Terminal Commands

Creating home directories for the linux* users, assigning ownership of the directories, and granting access permissions involves three terminal commands:

- **mkdir:** Use this command to make POSIX directories.
- **chown:** Use this command to change user, group, and other ownership of a directory. For more information, see "Managing Access Rights" in the *OES 11 SP2: Planning and Implementation Guide*.
- **chmod:** Use this command to change access permissions. For more information, see "Managing Access Rights" in the *OES 11 SP2: Planning and Implementation Guide*

Do the following:

1 As the `root` user, open a terminal prompt by clicking *Computer* > *Gnome Terminal*.

2 Create a home directory for the linux1_lum-edir user by entering the following command:

```
mkdir /home/linux1_lum-edir
```

3 Assign the linux1_lum-edir user and the LUMUser group as the owners of the `linux1_lum-edir` directory.

```
chown -R linux1_lum-edir:LUMUsers /home/linux1_lum-edir
```

Neither this group nor the user you specified exist locally. However, because they are LUM-enabled, the server recognizes them as though they do.

By default, both the LUMUsers group and other users on the system have permission to *Read* (open) the contents of the folder and *Execute* (browse its contents). This is not what NetWare administrators and users expect because home directories are private on NetWare servers.

4 Assign all access privileges to the user owner of the `linux1_lum-edir` directory, and no privileges to the group owner or to other users on the system.

```
chmod 700 /home/linux1_lum-edir
```

5 Now create a home directory for the linux2_lum-edir user.

```
mkdir /home/linux2_lum-edir
```

6 Assign the linux2_lum-edir user and the LUMUser group as the owners of the `linux2_lum-edir` directory.

```
chown -R linux2_lum-edir:LUMUsers /home/linux2_lum-edir
```

7 Adjust the permissions for this directory by enabling the Read, Write and Execute rights for the group. This gives full rights to the user's home directory for anyone in the LUMUsers group, which is obviously not something that you would normally do.

```
chmod 775 /home/linux2_lum-edir
```

By default, the permissions are set to 755. This command adds the Write right for the group. For more information, see "Aligning NCP and POSIX File Access Rights" in the *OES 11 SP2: Planning and Implementation Guide*.

Later in the guide we will use this to contrast default POSIX file permissions with the Novell File and Directory Security Model.

5 Novell CIFS

Novell CIFS lets Windows users access NSS volumes on Novell Open Enterprise Server 11 SP2 servers exactly as they would access a Windows file server. For a comparison to Novell Samba, see "Comparing Your CIFS File Service Options" in the *OES 11 SP2: Planning and Implementation Guide*.

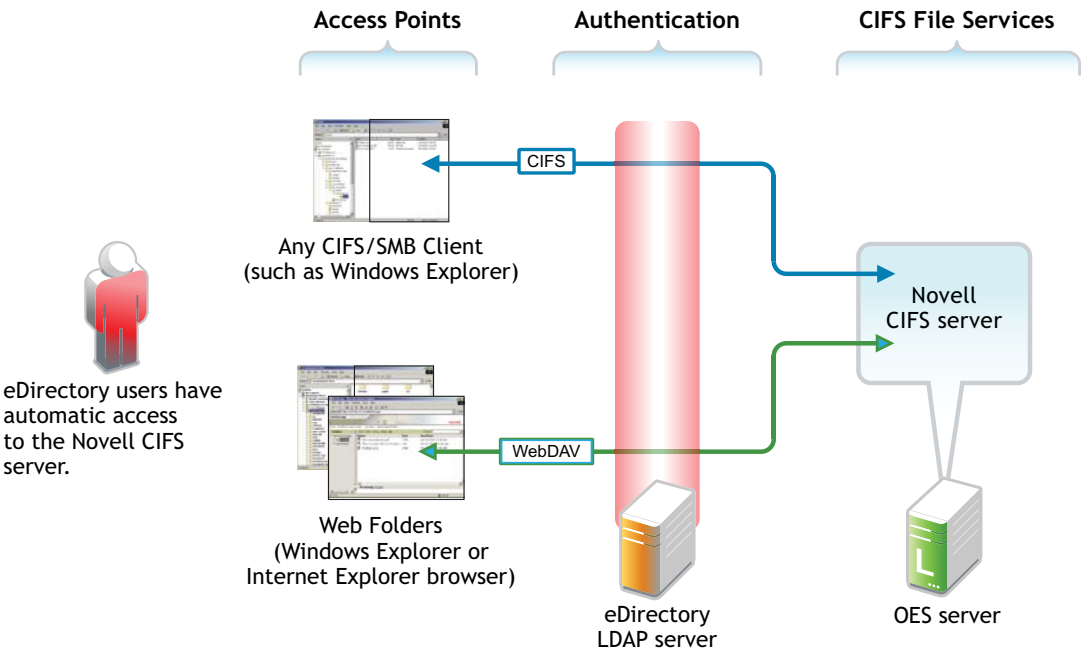
This section discusses the following:

5.1 Overview of Novell CIFS

Figure 5-1 illustrates the file services available through Novell CIFS in OES.

More Information on Novell CIFS file services in OES 11 SP2 is found in "Novell CIFS Implementation and Maintenance" in the *OES 11 SP2: Planning and Implementation Guide*.

Figure 5-1 *Novell CIFS*



IMPORTANT: If you plan to use Novell CIFS in conjunction with Novell AFP and/or NCP file services, be sure to read "Cross-Protocol File Locking Might Need To Be Reconfigured if AFP or CIFS Is Functioning on an NCP Server" in the *OES 11 SP2: Planning and Implementation Guide*.

5.2 Setting the Search Context

By default, the search context for CIFS users is set to the container where the OES 11 SP2 server is installed. The assigned proxy user searches in this context for users seeking access to the CIFS file service. You must set a context that points to the USERS container where your User objects are located.

1. In iManager > *Roles and Tasks*, click *File Protocols* > *CIFS*.
2. Click the *Browse* icon next to the *Server* field, then browse to and select the OES 11 SP2 getting-started lab server.
3. Click the *Context* tab.
4. Select the entry that points to the *SERVERS* container, then click *Remove*.

   In the tree you created, there are no users in the SERVERS container.
5. Click *Add*.
6. Browse to and select the *USERS* container, then click *OK*.
7. Continue with Making Novell CIFS Shares Available to CIFS Users.

5.3 Making Novell CIFS Shares Available to CIFS Users

By default, all NSS volumes hosted on an OES server have shares associated with them. If you need a share to point to a subdirectory on an NSS volume, then you must create a new share. See "Adding a New CIFS Share" in the *OES 11 SP2: Novell CIFS for Linux Administration Guide*.

If a volume is created while the Novell CIFS service is running, the service must be restarted to discover the volume.

1. Click the *Shares* tab.
2. If the *HOME_NSS* share is listed, skip to Novell CIFS Users' Access Rights.

   If not, continue with Step 3.
3. Click the *General* tab, then click *Stop*. The service status changes to *Stopped*.
4. Click the *Start* sub-tab. The service status changes to *Running*.
5. Click the *Shares* tab.

   The HOME_NSS share is listed.

5.4 Novell CIFS Users' Access Rights

As illustrated in Figure 5-1, all eDirectory users have automatic access to the Novell CIFS file service, assuming that the service is configured correctly.

However, access to the CIFS file service does not equate to access to the NSS file system and the folders and files it contains. It is the Novell File and Directory Trustee Rights model that provides this access and that also ensures that users can see only those files and folders to which they have access rights.

Continue with Chapter 6, “Novell AFP,” on page 65.

6 Novell AFP

Novell AFP lets Macintosh users access NSS volumes on Novell Open Enterprise Server 11 SP2 servers using AFP networking, exactly as they would Macintosh file servers.

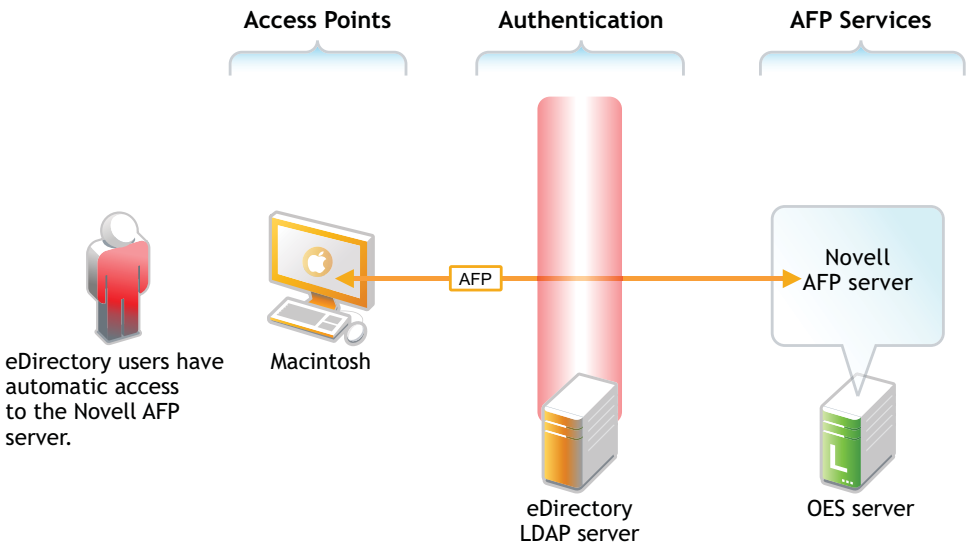
This section discusses the following:

6.1 Overview

Figure 6-1 illustrates the file services available through Novell AFP in OES.

More Information on Novell AFP file services in OES 11 SP2 is found in "Novell AFP Implementation and Maintenance" in the *OES 11 SP2: Planning and Implementation Guide*.

Figure 6-1 *Novell AFP*



The exercises in this guide have you access the OES 11 SP2 server by using native Macintosh functionality.

IMPORTANT: If you plan to use Novell AFP in conjunction with Novell CIFS and/or NCP file services, be sure to read "Cross-Protocol File Locking Might Need To Be Reconfigured if AFP or CIFS Is Functioning on an NCP Server" in the *OES 11 SP2: Planning and Implementation Guide*.

6.2 Setting the Search Context

By default, the search context for AFP users is set to the container where the OES 11 SP2 server is installed. AFP searches in this context for users seeking access to the AFP file service. You must set a context that points to the USERS container where your User objects are located.

1. In iManager > *Roles and Tasks*, click *File Protocols* > *AFP*.
2. Click the *Browse* icon next to the *Server* field, then browse to and select the OES 11 SP2 getting-started lab server.
3. Click the *Context* tab.
4. Select the entry that points to the *SERVERS* container and click *Remove*.
5. Click *Add*.
6. Browse to and select the *USERS* container, then click *OK*.
7. Continue with Making NSS Volumes Available to AFP Users.

6.3 Making NSS Volumes Available to AFP Users

1. Click the *Volume* tab, then click *Add*.
2. Click the *Browse* icon  next to the *Volume* field.
3. In the Object Selector, click the down-arrow  next to the *servername*_HOME_NSS volume, then click the link to the volume.
4. In the *Shared Volume Name* field, type `AFP_Home_NSS` and click *OK*.

6.4 Novell AFP Users Access Rights

As illustrated in Figure 6-1, eDirectory users can access any NSS volume where they are granted Novell trustee rights. For example, if AFP users have a system-created home directory on the HOME_NSS volume, they can see that directory.

However, if they don't have Novell trustee rights, they cannot access the volume. This is different than for CIFS users.

As with CIFS users, the Novell File and Directory Trustee Rights model ensures that users can see only those files and folders to which they have access rights.

Continue with Chapter 7, "NetWare CIFS and AFP Access," on page 67

7 NetWare CIFS and AFP Access

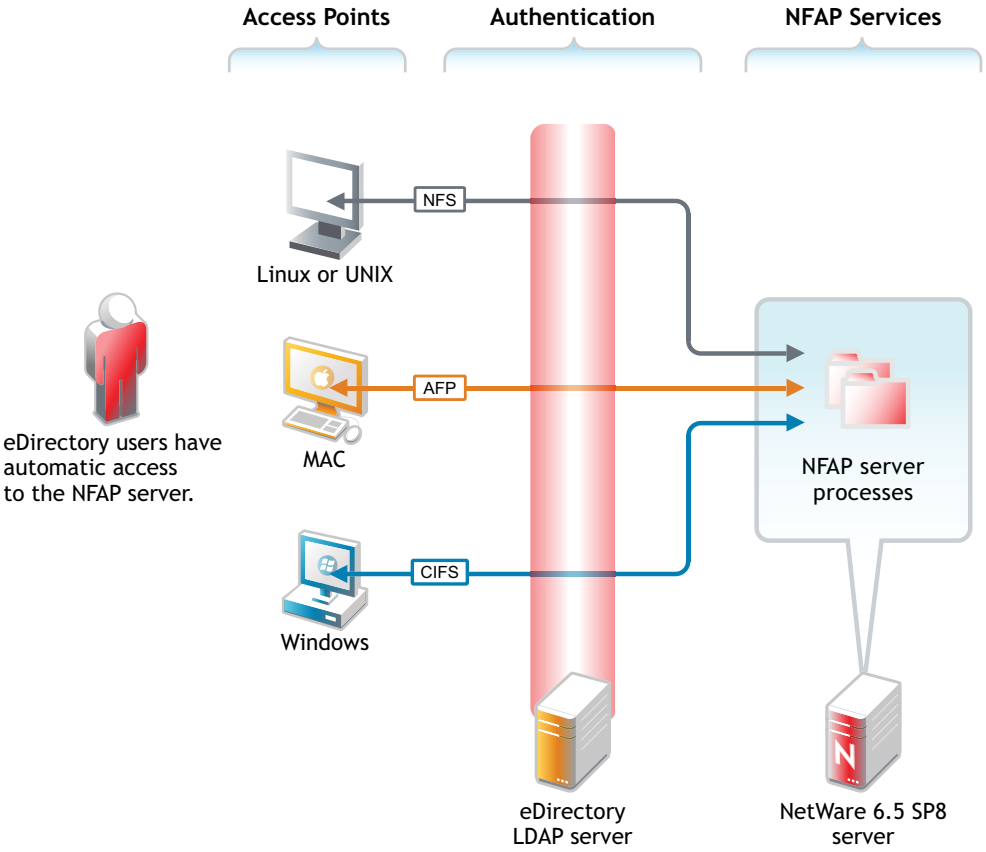
NetWare 6.5 SP8 supports native file access methods from Linux, Macintosh, UNIX, and Windows workstations to NSS volumes on NetWare servers. (Access to NetWare Traditional File System volumes is not supported.)

This section discusses the following:

7.1 Overview

Figure 5-1 illustrates the native File Access Protocol (NFAP) support services that are enabled by installing NetWare 6.5. A more detailed overview of NFAP file services on OES is found in "Native File Access Protocols" in the *NW 6.5 SP8: Planning and Implementation Guide*.

Figure 7-1 *Native File Access Support on NetWare 6.5*



The exercises in this guide have you access the NetWare server by using native Windows functionality.

If you want to also experiment with Linux, UNIX, or Macintosh workstations, refer to the information in "Native File Access Protocols Implementation and Maintenance" in the *NW 6.5 SP8: Planning and Implementation Guide* after completing all the sections in this guide.

7.2 Enabling NFAP Services on the LAB_NW Server

When you created the nw_edir user in iManager, you also created a home directory for the user on the HOME_NW NSS volume on the virtualized NetWare server LAB_NW.

By default, all NSS volumes on NetWare servers are available for CIFS and AFP access. To configure CIFS access, you must complete two tasks:

- Section 7.2.1, "Creating a Share for the HOME_NW Volume," on page 68
- Section 7.2.2, "Specifying a Search Context," on page 68

7.2.1 Creating a Share for the HOME_NW Volume

NetWare CIFS requires that you specify the shares that users can access.

1. In iManager > *Roles and Tasks*, click *File Protocols* > *CIFS*.
2. Click the *Browse* icon next to the *Server* field, then browse to and select the LAB_NW server.
3. Click the *Shares* tab, then click the *Add* sub-tab.
4. In the *Share Name* field, type `home_nw`.

   This is the name used to attach to the share.
5. Click the *Browse* icon next to the *Volume* field.
6. In the Object Selector, click the down-arrow next to the LAB_NW_HOME_NW volume, then click the link to the volume.
7. Click *OK* > *OK*.

7.2.2 Specifying a Search Context

You must specify a search context that NetWare can use to find users needing CIFS access.

1. Log into your VM host server as `root` and click *Computer* > *YaST* > *Virtualization* > *Virtual Machine Manager*.
2. Double-click the *LAB_NW_VM* virtual machine.
3. On the NetWare GUI, click the File Browser (folder) icon once to activate the mouse pointer and once to select the browser.
4. Double-click the `SYS:` volume.
5. Double-click the `ETC` folder.
6. Scroll down and double-click the `cifsctxs.cfg` file.

   Notice that the search context is set to the SERVERS container. User searches occur only in the contexts specified in this file. Subcontainers are not searched.
7. Edit the file, replacing `SERVERS` with `USERS`, so that the line reads

```
OU=USERS.OU=LAB.O=COMPANY
```

8. Save the file, close the editor, and close the file browser.
9. Click the *Server Console* (computer) icon.
10. Stop and then start the CIFS service by entering the following commands:

    ```
    CIFSSTOP
    ```

    ```
    CIFSSTRT
    ```

11. Close both of the Virtual Machine Manager windows.
12. Continue with Chapter 8, “iFolder 3.9,” on page 71.

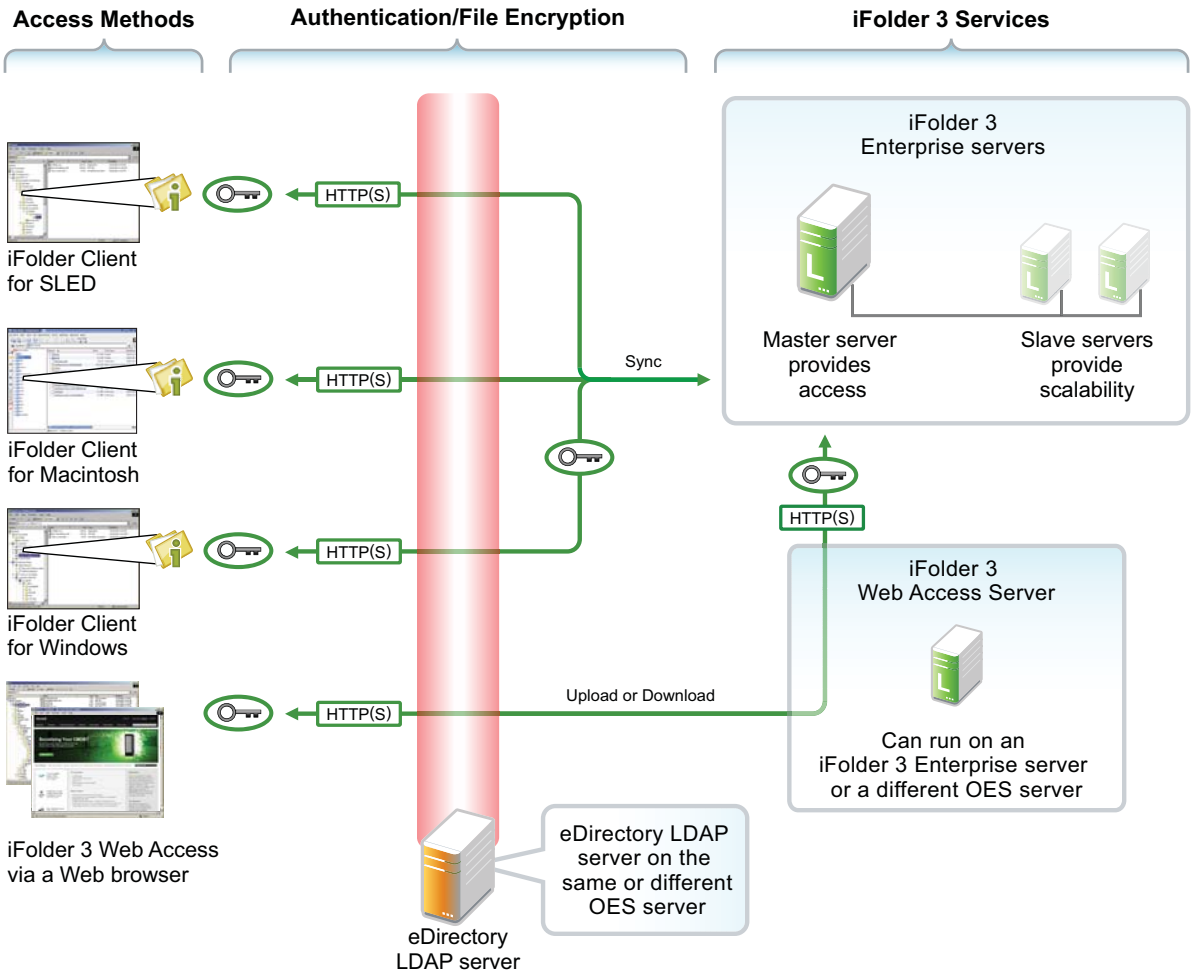
8 iFolder 3.9

As a key file service component of Novell Open Enterprise Server (OES), Novell iFolder 3.9 provides a repository on one or more OES 11 SP2 servers that stores master copies of locally accessible files.

8.1 Overview of iFolder

Figure 8-1 illustrates the file services that are enabled by completing the steps in the sections that follow. More detailed information on iFolder file services on OES 11 SP2 is found in “Novell iFolder 3.9.22” in the *OES 11 SP2: Planning and Implementation Guide*.

Figure 8-1 *iFolder File Services on OES*



8.2 Installing the iFolder Client

NOTE: Although the exercises in this guide focus on Windows, the iFolder client is also available for Linux and Macintosh. For more information, see "Getting Started" the *Novell iFolder 3.9.2 Cross-Platform User Guide*.

The iFolder client is required for two tasks:

- Automatically synchronizing local iFolder files with the files on the iFolder 3.9 enterprise server.
- Sharing iFolders with other users.

IMPORTANT: To install the client, the workstation must have an active Internet connection.

To install the iFolder client:

1. Log in to the workstation as a Windows administrative user.
2. In your browser, access your OES 11 SP2 server's welcome pages by entering the following URL:

`http://IP_or_DNS`

where *IP_or_DNS* is the IP address or full DNS name of your getting-started lab server.

For example: `myserver.company.example.com`

3 On the OES 11 SP2 Welcome Page in the left panel, click the *Client Software* tab.

4 Under *Available Downloads*, click the iFolder Client for Windows link that is appropriate for your workstation (32-bit or 64-bit).

5 Save the file.

6 Open the downloaded file and install the client.

The installation process includes several steps. For the installation to succeed, you must agree, accept, and answer Yes to the various prompts, including the unknown publisher alert and the Microsoft .NET installation (if prompted). Accept all the defaults.

7 If you install Microsoft .NET, you might be prompted to restart the workstation. If prompted, click the *Restart* button, then after the workstation restarts, log in as the Windows administrative user.

8 Click through the dialog boxes, accepting the defaults until the process is finished. Then click *Finish* > *Yes* to restart the workstation.

9 After the workstation restarts, log in as an administrative user.

10 If needed, cancel the iFolder Account Creation Wizard by right-clicking the iFolder icon in the system tray and selecting Exit, then continue with Creating Corresponding Windows Users.

8.3 Creating Corresponding Windows Users

Some OES services, such as Novell iFolder, interact seamlessly with Windows users that have the same username and password as the eDirectory users.

For the exercises in this guide, you must now create Windows user accounts for the users listed in Table 3-1 on page 49 and assign each user the same password you specified for the corresponding eDirectory account.

1 On the Windows workstation, log in as an Administrator user.

2 Access the Control Panel and select *User Accounts and Family Safety* > *Add or Remove User Accounts* (Windows 7) or *User Accounts* (Windows XP).

3 Create a user account for each user in Table 3-1 on page 49, specifying that the account is a computer administrator.

4 Select the user after creating it, and then create the same password for the user that you specified in Step 6 on page 50.

5 Repeat from Step 3 for each additional user, then continue with Refreshing the List of iFolder Users.

8.4 Refreshing the List of iFolder Users

All eDirectory users are enabled for access to iFolder 3.9 by default. However, the iFolder 3.9 Administration utility must be synchronized with eDirectory. By default this happens every 24 hours.

1 Open your browser and log in to iManager as admin.

If you receive a Tomcat error, see Section A.2, “iManager Tomcat Error,” on page 107.

2 In Roles and Tasks, click *iFolder 3.9* > *Launch iFolder Admin Console*.

3 In the *iFolder Server* field, type the IP address of the OES 11 SP2 getting-started lab server.

4 Select the *Authenticate Using Current iManager Credentials* option.

5 Click *OK*.

The *Users* tab shows the users that are recognized by the iFolder server as having iFolder service access. Because the LDAP search context doesn't include the USERS container, the eDirectory users you have added don't appear in the list.

6 Click the *Servers* tab.

7 Click the blue link for the OES 11 SP2 getting-started lab server.

8 In the *LDAP Details* section, click the *Edit* button.

9 In the *LDAP Admin DN* field, type cn=admin,o=company.

Notice that the delimeter is a comma (,), not a period (.).

10 In the *LDAP Admin Password* field, type the Admin user password.

11 In the *LDAP Contexts* field, change `SERVERS` to `USERS`, then click *OK*.

This changes the search context to the USERS directory.

12 In the *LDAP Details* section, click the blue *Sync Now* link.

Notice that the default synchronization interval is 1440 minutes (24 hours).

13 Click the *Users* tab.

Notice that the users you have created are added to the list.

14 Close the iFolder Administration console, then continue with Configuring iFolder Accounts and Creating iFolders.

8.5 Configuring iFolder Accounts and Creating iFolders

Before users can create iFolders, they must set up an iFolder account on the workstation.

You should have already created a Windows user account for each eDirectory user as instructed in Section 8.3, "Creating Corresponding Windows Users," on page 73. You will now configure an iFolder for linux1_lum-edir and invite the ncp_edir and nw_edir users to share the iFolder. Although you can create accounts for the other users, there are no exercises in this guide that involve them having iFolder accounts.

1 Log off as the administrative user, then log in to the Windows workstation as the linux1_lum-edir user that you created in Section 8.3, "Creating Corresponding Windows Users," on page 73.

2 After the login process finishes, you should be prompted to set up an iFolder account. Click *Next*.

If you are not prompted to set up an account, right-click the iFolder icon on the toolbar, select *Accounts*, then click *New*. (You might need to configure the toolbar to display the iFolder icon.)

3 In the *Server Address* field, type the IP address or DNS hostname of your OES 11 SP2 server, then click *Next*.

4 Type the linux1_lum-edir for the username, then type the password you assigned to the user.

5 Select *Remember password on this computer*, then click *Next* > *Connect*.

6 If prompted, accept the certificate by clicking *Yes*.

7 When prompted to create a default iFolder, deselect *Create Default Folder*, click *Next*, click *Finish*, and then close the iFolder information window.

8 Right-click the desktop, then click *New* and create a new folder named `linux1_lum-edir_IF3`.

9 After creating the folder, right-click it, then click *Convert to an iFolder*.

10 Click *OK*.

11 In the message that points out how iFolder folder icons look different, select *Do Not Show This Message Again*, then click *Close*.

12 Right-click the iFolder, then select *iFolder* > *Share with*.

13 In the iFolder Properties dialog box, click *Add*.

14 In the iFolder Users column, select *Ncp Edir*, then click *Add>>*.

Ncp Edir is added to the *Selected Users* column.

15 Add *Nw Edir* to the *Selected Users* column as well.

16 Click *OK*.

17 Change the access rights for *Ncp Edir* from *Read Only* to *Read/Write*.

17a Click *Ncp Edir*.

17b Click *Rights*.

17c Select *Read/Write*.

17d Click *OK*.

18 Click *Apply* > *OK*.

The two users are configured to access Linux1 Lum-edir's iFolder.

19 Log off the workstation.

20 Continue with Chapter 9, "iPrint," on page 77.

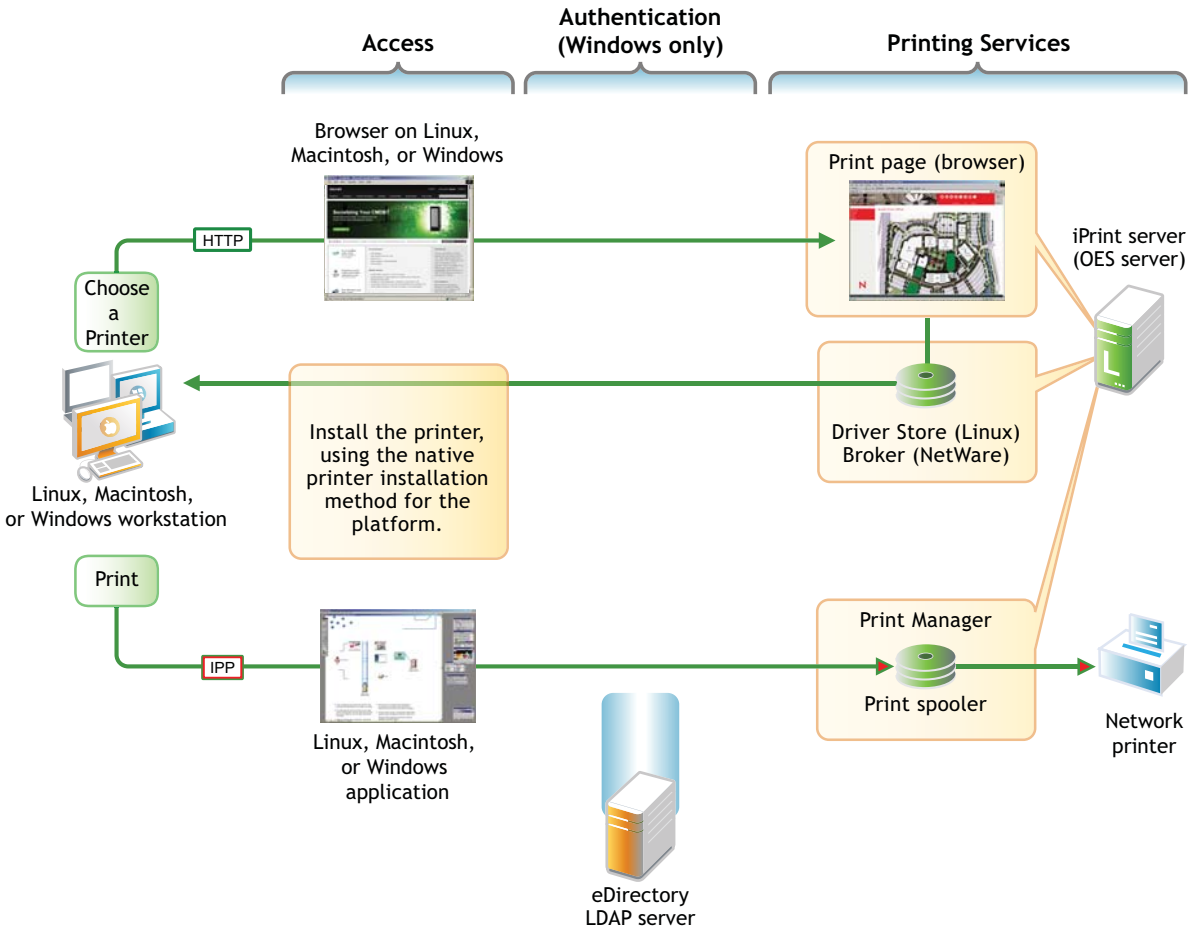
9 iPrint

As the print services component of Novell Open Enterprise Server (OES), Novell iPrint provides a powerful and easy-to-implement printing solution that lets your network users print from any Linux, Macintosh, or Windows workstation to any network printer.

9.1 Overview of iPrint

Figure 9-1 illustrates the printing services that are enabled by completing the steps in the sections that follow. More detailed information on iPrint services in OES 11 SP2 is found in “iPrint Functionality” in the *OES 11 SP2: Planning and Implementation Guide*.

Figure 9-1 *iPrint on OES*



9.2 Creating an eDirectory Context for Printers

System administrators often create one or more container objects just for network printers. Obviously, this is an optional organizational preference issue. Whether you choose to follow this convention or not, the printers themselves can be placed in the most convenient and accessible locations for your network users.

1. Log in to the getting-started lab Windows workstation as a Windows user with Administrator privileges.
2. If it appears, cancel the iFolder wizard.
3. Start iManager and log in as the Admin user.

   If you receive a Tomcat error, see Section A.2, “iManager Tomcat Error,” on page 107.
4. Click the *View Objects* icon .
5. Click the *Browse* tab.
6. In the left pane, click the down-arrow next to the COMPANY Organization object.
7. Click *LAB*, then select *Create Object* from the drop-down list.
8. From the *Available Object Classes* list, select *Organizational Unit*, then click *OK*.

9 In the *Organizational Unit Name* field, type `PRINTERS`.

10 Click *OK* twice.

9.3 Creating a Print Driver Store

iPrint stores print driver files by workstation type for each of your network printers in a driver store in eDirectory.

1 In iManager, click the *Roles and Tasks* icon  .

2 Click *iPrint* > *Create Driver Store*.

3 In the *Driver Store Name* field, type `Print_Drivers`.

4 Click the *Browse* icon  next to the *Container Name* field.

5 Click the down-arrow  next to LAB, then click the PRINTERS Organizational Unit object.

6 In the *Target Server* field, type the DNS name or the IP address of the server that will host the driver store.

7 Click the *Browse* icon  next to the *eDir Server name* field.

8 Click the down-arrow  next to LAB, click the down-arrow  next to SERVERS, then click your OES 11 SP2 getting-started lab server.

9 Click *OK* twice.

10 Continue with Section 9.4, "Creating a Print Manager Object," on page 79.

9.4 Creating a Print Manager Object

The iPrint Manager is represented by and managed through a Print Manager object in eDirectory. It is a daemon that runs on the OES 11 SP2 server, and it must be running when you create Print objects. After printing is set up, the iPrint Manager receives print job requests and forwards them to printers when the printers are ready.

1 Continuing from Step 9 in the previous section, click *iPrint* > *Create Print Manager*.

2 In the *Manager Name* field, type the following:

```
iPrint_Manager
```

3 Click the *Browse* icon  next to the *Container Name* field.

4 Click the down-arrow  next to LAB, then click PRINTERS.

5 Click the *Browse* icon  next to the *eDir Server name* field.

6 Click the down-arrow  next to LAB, click the down-arrow  next to SERVERS, then click your OES 11 SP2 getting-started lab server.

7 Click the *Browse* icon  next to the *Driver Store name* field.

8 Click the down-arrow  next to LAB, click the down-arrow  next to PRINTERS, then click *Print_Drivers*.

9 In one of the *iPrint Service* fields, type either the full DNS name of your getting-started lab server or its IP address, depending on the option you select.

10 Click *OK* twice.

9.5 Adding Printer Drivers to the Driver Store from Windows

You can load printer drivers to the Driver Store by using driver files. However, because most Windows workstations have an extensive list of printer drivers available on the system, the simplest way to add drivers for a Windows platform is to upload them directly. For information on adding drivers by using driver files, see "Managing Printer Drivers" in the *OES 11 SP2: iPrint Linux Administration Guide*.

Complete the following steps once for each of the Windows platforms (7, XP, etc.) that you have in your getting-started lab:

IMPORTANT: This procedure requires Internet Explorer 6 or later.

---

1. Open Internet Explorer 6 or later on the workstation and enter the following URL in the Address field:

   `http://IP_or_DNS/ipp`

   where *IP_or_DNS* is the IP address or DNS name of your OES 11 SP2 server.
2. Click the *Install iPrint client* link.
3. Click *Run* (or the corresponding options for your platform) and install the client.
4. Answer yes to any security warnings, then click *Next* and follow any prompts.
5. After the client installs, click *Finish*.
6. Close the browser, then open it again using the *Run as Administrator* option if available.
7. Start iManager (http://*server*/nps) and log in as the Admin user.

   If you receive a Tomcat error, see Section A.2, "iManager Tomcat Error," on page 107.
8. If you are running Internet Explorer 6, skip to Step 12.

   or

   For Internet Explorer 7 or later, you must configure the pop-up blocker. Continue with Step 9.
9. Right-click above the iManager panel and make sure the *Menu Bar* option is selected.
10. In the Menu Bar, click *Tools* > *Pop-Up Blocker* > *Pop-Up Blocker Settings*.
11. In the *Address of Website to Allow* field, type the IP address of the OES 11 SP2 getting-started lab server, then click *Add* > *Close*.
12. Click *iPrint* > *Manage Driver Store*.
13. Click the *Browse* icon  next to the *iPrint Driver Store Name* field.
14. Browse to the Printers container (*COMPANY* > *LAB* > *PRINTERS*), then click the *Print_Drivers* object.
15. Click *OK*.
16. Click the *Drivers* tab.
17. If you are running Internet Explorer 6, skip to Step 21.

    or

    If you are running Internet Explorer 7 or later and have not previously approved the iPrint ActiveX plug-in to run, an Information Bar might appear directly above the iManager pane.
18. If no Information Bar appears directly above the iManager pane, skip to Step 21.
19. Click the Information Bar and select *Run ActiveX Control*, then click *Run* > *Retry*.
20. Repeat from Step 12.

21 In the *Drivers Platform* drop-down list, select the workstation type you are running.

You can add drivers from the system only for the workstation type you are running.

22 Click *Add from System*, and then *OK* any alerts that appear.

TIP: Although not practical for the step-by-step guided approach used in this guide, the *Add from File* is a more useful option for most administrators because it lets them install print drivers for multiple platforms from a single workstation. For more information see, "Managing Printer Drivers" in the *OES 11 SP2: iPrint Linux Administration Guide*.

---

23 In the dialog box for adding a printer, select the correct driver for the printer you plan to use for the getting-started lab test.

24 Click *OK*.

25 (Optional) To test multiple printers, repeat Step 22 through Step 24 for each printer you want to test.

26 When you are finished, click *Apply* > *OK*.

9.6 Creating iPrint Printer Objects

You can create iPrint Printer objects for all your printers that have drivers in the Driver Store and an IP address or DNS name.

1 In iManager, click the *Roles and Tasks* icon .

2 Click *iPrint* > *Create Printer*.

3 In the *Printer Name* field, type a name for your printer.

4 Click the *Browse* icon next to the *Container Name* field.

5 Click the down-arrow next to LAB, then click PRINTERS.

6 Click the *Browse* icon next to the *Print Manager Name* field.

7 Click the down-arrow next to LAB, click the down-arrow next to PRINTERS, then click *iPrint_Manager*.

8 Type the DNS name or IP address of the printer in the field indicated.

9 Type a location so users know where to find the printer.

10 (Optional) Type a description.

11 Click *Next*.

12 Select the printer driver by using the drop-down list for the Windows platform of your getting-started lab workstation.

13 Click *Next*.

14 Select the default driver for your workstation type, then click *Next*.

15 Click *OK*.

16 Close iManager.

17 Continue with Chapter 10, "NetStorage," on page 83.

10 NetStorage

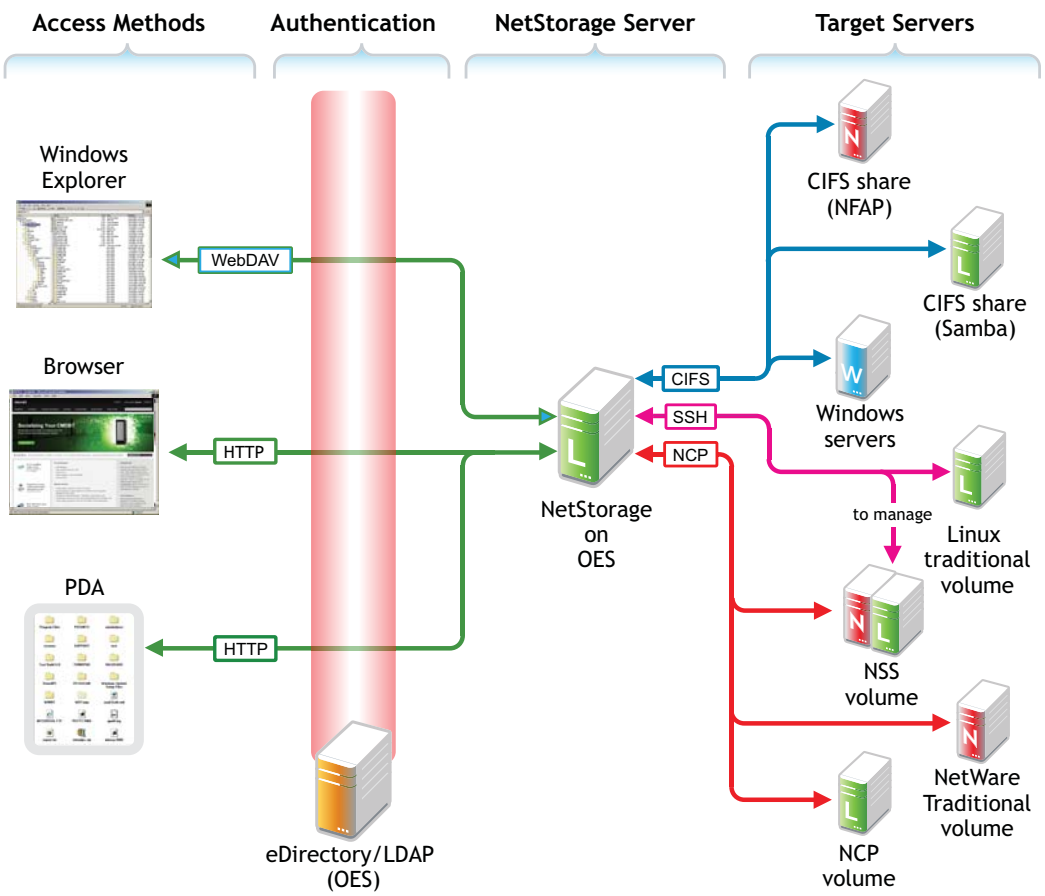
As a versatile file services component of Novell Open Enterprise Server (OES), NetStorage provides Web-based access to and management of any files on OES servers, except the iFolder 3 files, which are accessed through the iFolder Web Access Server instead.

10.1 Overview of NetStorage

Figure 10-1 on page 83 illustrates the NetStorage file services that are enabled by default.

More detailed information on NetStorage file services on OES is found in "NetStorage" in the *OES 11 SP2: Planning and Implementation Guide*.

Figure 10-1 *NetStorage on OES*



10.2 Making Directories Accessible Through NetStorage

NetStorage makes files on OES servers available on the Internet. Directories can be made available as organizational needs dictate. For the exercises in this guide, we will focus on user home directories.

10.2.1 NCP Users Have Automatic Access to Their Home Directories

For users who have a home directory specified in eDirectory (on an NCP or NSS volume), access to that home directory is automatic.

By default, when users log in to NetStorage, they see a storage location named Home@*TREE_NAME*. This means that the ncp_*, the nss_* users, and the nw_edir user each see their home directories when they log into NetStorage.

The label that users see is configurable in the *File Access (NetStorage)* iManager plug-in by using the *NetWare Storage Provider* task. You can also specify home directories in additional trees if users log in to multiple trees. For more information, see "NetWare Storage Provider" in the *OES 11 SP2: NetStorage Administration Guide for Linux*.

TIP: The first time you access the *NetWare Storage Provider* task in iManager, the configuration is blank and the column headings are collapsed. To display the configuration, click *Set Defaults*, click another task, then click *NetWare Storage Provider* again. All of the columns are displayed.

To make other directories on an OES server available through NetStorage, including non-NCP/NSS home directories, you must create a Storage Location Object that points to the directory and then add the object to a Storage Location List as explained in the following sections.

10.2.2 Creating a Storage Location Object in iManager

A Storage Location object specifies an access protocol and points to a directory on either the NetStorage server itself or another accessible server. After object creation, users with rights to the directory can access storage location objects through NetStorage.

For connections to Storage Location objects, NetStorage supports both CIFS and SSH as alternatives to NCP (the default NetStorage protocol). Although they are used in this guide, SSH storage locations should only be used after certain security issues are understood and dealt with. (For more information, see "SSH Security Considerations" in the *OES 11 SP2: Planning and Implementation Guide*.)

Because the linux*_lum-edir users' home directories are on a Linux traditional volume, there is no default access and you must create a Storage Location object for them to use.

Because the CIFS protocol on your getting-started lab server uses Novell CIFS, and because Novell CIFS provides access to only NSS volumes, the Storage Location object must use SSH.

To create an SSH Storage Location object:

1. Start iManager by entering the following URL in a browser Address field:

```
http://IP_or_DNS/nps
```

where *IP_or_DNS* is the IP address or DNS name of your OES 11 SP2 server.

If you receive a Tomcat error, see Section A.2, "iManager Tomcat Error," on page 107.

2 Log in to iManager as the Admin user.

3 Click the *Roles and Tasks* icon  .

4 Click *File Access (NetStorage)* > *New Storage Location*.

5 In the *Object Name* field, type

`StorLoc_hostname`

where *hostname* is the name of your getting-started lab server. This is the name of the Storage Location object in eDirectory (for example, StorLoc_myserver).

6 In the *Display Name* field, type

`Linux_Home_Directories`

This is the name that users see in the NetStorage directory access list.

7 In the *Directory Location* field, type

`ssh://IP_or_DNS_Name/home`

where *IP_or_DNS_Name* is the IP address or full DNS name of your getting-started lab server (for example, ssh://myserver.mysite.company.example.com/home).

IMPORTANT: Protocol designators, such as ssh and cifs, are case-sensitive on OES servers. Make sure you don't type the common uppercase (SSH or CIFS) out of habit.

---

8 Click the *Browse* icon  next to the *Context* field.

9 Browse to and select the SERVERS Organizational Unit object.

The new Storage Location object will be created in the SERVERS organizational unit object.

10 Click *Create* > *OK*.

10.2.3 Adding the Object to a Storage Location List

Storage Location Lists are required for granting access for users, groups, or containers (Organizational Unit objects) to Storage Location objects.

1 In the list of tasks below File Access (NetStorage), click *Assign Storage Location to Object*.

2 Click the *Browse* icon  next to the *Object* field.

This field contains the user, group, or OU object that is granted access to the Storage Location object.

3 Click *USERS* > *OK*.

4 Click the *Browse* icon  next to the *Storage Location Objects* field.

5 Click the down-arrow  next to *SERVERS*.

6 Click the StorLoc_*hostname* object for your getting-started lab server, then click *OK*.

You could add multiple Storage Location objects to the list if needed, but we are only adding one.

7 Click *OK* twice.

10.2.4 SSH and NetStorage Administration

Many network administrators prefer to use SSH for remote server administration. NetStorage includes a special SSH-based Storage Location object named NSS_Volumes that lets eDirectory Admin users administer NSS volumes on OES through NetStorage. Admin users can assign trustees, administer NSS file and directory attributes, restrict directory size, and so on.

As a general security precaution, SSH services are not enabled by default on OES 11 SP2 servers. However, you enabled SSH services through the firewall in Section 4.4, "Allowing SSH Access," on page 56, and then you enabled SSH as a LUM-enabled service, thus giving SSH access to LUM-enabled users.

The eDirectory Admin user has SSH access because it is a LUM-enabled user by default. This means that the Admin user can use SSH for remote server administration and it can administer the server's NSS volumes through NetStorage.

NOTE: Unlike home directory access, which automatically connects all users in the tree with their NCP or NSS home directories no matter which server the directories are on, default administrative access is limited to the nssvolumes Storage Location object located in COMPANY. To provide administrative access to the HOME_NW volume on the LAB_NW NetWare server, you would need to create an NCP Storage Location object that points to that volume.

Continue with Chapter 11, "Getting Acquainted with OES," on page 87.

11 Getting Acquainted with OES

After you have installed Novell Open Enterprise Server (OES) and completed the configuration instructions located in the preceding sections, your OES 11 SP2 server is ready for getting-started lab use.

The instructions and information in this section acquaint you with the basic services available in OES. More detailed service overviews are available in the *OES 11 SP2: Planning and Implementation Guide*. For comprehensive documentation for each service, see the administration guides and other documentation listed on the OES 11 documentation Web site (http://www.novell.com/documentation/oes11).

This section guides you through the following tasks:

11.1 Preparing Files for the Getting-started Lab Exercises

You will use four small text files in the exercises that follow.

1. Log in to the Windows workstation as a Windows user with Administrator privileges.
2. Access this page in the online documentation.
3. Right-click each of the following links, select *Save Link (or Save Target) As*, and save the file to the desktop.
   - MyPrivateFile.txt (http://www.novell.com/documentation/oes11/download/MyPrivateFile.txt)
   - PublicInformation.txt (http://www.novell.com/documentation/oes11/download/PublicInformation.txt)

- TeamProjectReadOnly.txt (http://www.novell.com/documentation/oes11/download/TeamProjectReadOnly.txt)
- TeamProjectWrite.txt (http://www.novell.com/documentation/oes11/download/TeamProjectWrite.txt)

4 If you are working on Windows 7, move the downloaded files to the *Libraries* > *Documents* > *Public Documents* folder on the workstation.

Or

If you are working on Windows XP, move the downloaded files to *My Computer* > *Shared Documents*.

5 Log off Windows.

6 Continue with the next section, Exercises for linux1_lum-edir.

11.2 Exercises for linux1_lum-edir

11.2.1 What linux1_lum-edir Can Do

This user has the following service access:

Table 11-1 *linux1_lum-edir Service Access*

Service	Details	Explored for This User in This Guide
Novell iFolder 3.9	Can create and share its own iFolders and accept invitations from others to share their iFolders.	Yes. This was done previously in Section 8.5, "Configuring iFolder Accounts and Creating iFolders," on page 74.
Novell AFP	Can access any NSS directories to which it has rights. Access rights to directories are governed by the NSS file system, allowing the user to only see and do what it has rights for.	See Section 11.10, "Macintosh Exercises and Novell AFP," on page 103.
Novell CIFS	Can access any NSS directories to which it has rights. Access rights to directories are governed by the NSS file system, allowing the user to only see and do what it has rights for.	No
NetStorage	Can access NetStorage because of the Storage Location Object created in Section 10.2.2, "Creating a Storage Location Object in iManager," on page 84. NetStorage provides this user with access to its home directory, which it would otherwise not have.	Yes, to demonstrate file copying and deleting. Also to show that the `linux2_lum-edir` directory is publicly available, and not private as a NetWare administrator would expect it to be. In fact, the directory can also be written to by any member of the LUMUsers group because of the action you took in Step 15 on page 58.

Service	Details	Explored for This User in This Guide
iPrint	Can install and use the printer made available in Chapter 9, “iPrint,” on page 77.	No

11.2.2 Using NetStorage

1. Log in to the Windows workstation as the linux1_lum-edir user.
2. Close the iFolder window.
3. Open your browser and log into NetStorage by using the following URL:

`http://IP or DNS/netstorage`

   where *IP or DNS* is your OES 11 SP2 server’s IP address or DNS name.

4. Type `linux1_lum-edir` as the *User Name*, type the associated password in the *Password* field, then click *OK*.
5. In the left navigation frame, click the `Linux_Home_Directories` storage location you created in Section 10.2.2, “Creating a Storage Location Object in iManager,” on page 84.
6. Click the `linux1_lum-edir` directory to show its contents.

   For the following exercises, you need to copy the exercise files that you downloaded in Preparing Files for the Getting-started Lab Exercises to the `linux1_lum-edir` directory. However, NetStorage doesn’t support dragging and copying files. Instead you upload files you want to store in NetStorage from the workstation to the server. By the same token, you download files that you want to work with from the server to the workstation.
7. Click *File* > *Upload*.

   Depending on your workstation and browser version, the Upload dialog box might display behind the NetStorage window. If you don’t see the box, try moving the window to see if it’s hiding the box.
8. If prompted, disable the pop-up blocker and click *File* > *Upload* again if necessary to open the Upload File dialog box.
9. Click the *Browse* button.
10. If you are using Windows 7, browse to *Libraries* > *Documents*. Select the first file and click *Open*.

    If you are using Windows XP, browse to the `Shared Documents` folder where you copied the four files in Step 3 on page 87, select the first file and click *Open*.
11. Using the plus (+) sign next to *Browse* to add files to be uploaded, repeat the process of browsing, selecting, and opening the other three files.

    The first files you select might scroll up and off the display, but they are still selected for uploading.
12. Click the *Upload* button.

    All four files are copied to the `linux1_lum-edir` directory.
13. Select the `linux2_lum-edir`, `ncp_edir`, and `ncp_lum-edir` folders in turn and attempt to copy (upload) the first file to each folder.

    Because you assigned the LUMUsers group full access rights to the linux2_lum-edir user’s home directory (Step 15 on page 58), the first copy attempt succeeds. linux1_lum-edir is a member of the LUMUsers group. But the other attempts fail because the linux1_lum-edir user doesn’t have the necessary rights to either of the ncp* users’ folders.
14. Open the `linux1_lum-edir` folder, then select `MyPrivateFile.txt`.

15 Click *File* > *Delete* > *OK*.

The file is deleted.

16 Click *View* > *Show Deleted Files*.

The deleted file is not listed because this feature relies on the Salvage and Purge functionality that is available only on NSS volumes, and the underlying file system for the `/home` directory we are working with is Ext3, not NSS.

For more information on using NetStorage, see the *OES 11 SP2: NetStorage Administration Guide for Linux*.

17 Continue with the next section, Exercises for linux2_lum-edir.

11.3 Exercises for linux2_lum-edir

11.3.1 What linux2_lum-edir Can Do

This user has the following service access:

Table 11-2 *linux2_lum-edir Service Access*

Service	Details	Explored for This User in This Guide
iFolder 3.9	Can create and share its own iFolders and accept invitations from others to share their iFolders.	No
Novell AFP	Can access any NSS directories to which it has rights. Access rights to directories are governed by the NSS file system, allowing the user to only see and do what it has rights for.	See Section 11.10, "Macintosh Exercises and Novell AFP," on page 103.
Novell CIFS	Can access any NSS directories to which it has rights. Access rights to directories are governed by the NSS file system, allowing the user to only see and do what it has rights for.	No
NetStorage	Can access NetStorage because of the Storage Location Object created in Section 10.2.2, "Creating a Storage Location Object in iManager," on page 84. Otherwise, this user would not have access to its home directory because it was created manually as a POSIX directory rather than being specified in iManager.	Yes
iPrint	Can install and use the printer made available in Chapter 9, "iPrint," on page 77.	Yes

11.3.2 Using NetStorage

1. Log in to the Windows workstation as the linux2_lum-edir user.
2. When the iFolder wizard launches, click *Cancel*.
3. Open your browser. If you are running Windows 7, use the `Run as Administrator` option.
4. Log into NetStorage by using the following URL:

`http://IP or DNS/netstorage`

where *IP or DNS* is your OES 11 SP2 server's IP address or DNS name.

5. Type `linux2_lum-edir` as the *User Name*, type the associated password in the *Password* field, then click *OK*.
6. In the left navigation frame, click the `Linux_Home_Directories` storage location you created in Section 10.2.2, "Creating a Storage Location Object in iManager," on page 84.
7. In the left navigation frame, click *linux2_lum-edir*.
8. Right-click the file in the right frame and notice that you can move, copy, download, delete, and rename the file through the NetStorage interface.
9. Select Properties.

   Notice that the file is owned by the linux1_lum-edir user who copied it to this folder.
10. Close the Properties window, right click the file again, and select *Delete*.
11. Click *OK*.

    The file is deleted.

    Although the file was owned by the linux1_lum-edir user who copied it to the folder, linux2_lum-edir can delete the file because it has all rights to the folder.

    For a brief overview of what the different POSIX rights allow on directories and files, see "Linux (POSIX) File System Access Rights" in the *OES 11 SP2: Planning and Implementation Guide*.
12. Click *File* > *Upload*.

    Again, if you don't see the box, try moving the NetStorage Window.
13. Click the *Browse* button, browse to the `Documents` folder, select the first file, and click *Open*.
14. Using the plus (+) sign next to *Browse* to add files to be uploaded, repeat the process of browsing, selecting, and opening the other three files.

    The first files you select might scroll up and off the display, but they are still selected for uploading.
15. Click the *Upload* button.

    All four files should now be copied to the `linux2_lum-edir` directory.

For more information on using NetStorage, see the *OES 11 SP2: NetStorage Administration Guide for Linux*.

11.3.3 Using iPrint

1. In the browser, access the iPrint page by using the following URL:

`http://IP or DNS/ipp`

where *IP or DNS* is your OES 11 SP2 server's IP address or DNS name.

IMPORTANT: If you are using Windows 7, you will need to run the browser as the administrator user.

2. (Conditional) If you have not previously installed the iPrint client on the workstation, click the *Install iPrint Client* link and install the client now.
3. Click the link for the printer you created in Section 9.6, "Creating iPrint Printer Objects," on page 81.

   You might need to click the *Refresh* button to see the printers.
4. Answer the prompts to install the printer for the linux2_lum-edir user.
5. Access the Printers property page.

   On Windows 7 click *Start* > *Devices and Printers*.

   On Windows XP click *Start* > *Settings* > *Printers*.
6. Right-click the printer, then click *Printer Properties*.
7. Click *Print Test Page* > *OK* > *OK*.

   A test page should print at your printer.

   For more information on various iPrint capabilities, see "Customizing iPrint" in the *OES 11 SP2: iPrint Linux Administration Guide*.
8. Continue with the next section, Exercises for ncp_lum-edir.

11.4 Exercises for ncp_lum-edir

11.4.1 What ncp_lum-edir Can Do

This user has the following service access:

Table 11-3 *ncp_lum-edir Service Access*

Service	Details	Explored for This User in This Guide
iFolder 3.9	Can create and share its own iFolders and accept invitations from others to share their iFolders.	No
Novell AFP	Can access any NSS directories to which it has rights. Access rights to directories are governed by the NSS file system, allowing the user to only see and do what it has rights for.	See Section 11.10, "Macintosh Exercises and Novell AFP," on page 103.
Novell CIFS	Can access any NSS directories to which it has rights. Access rights to directories are governed by the NSS file system, allowing the user to only see and do what it has rights for.	No

Service	Details	Explored for This User in This Guide
NetStorage	Can access its home directory through NetStorage because all home directories created through iManager and stored as attributes in eDirectory are exposed through the HOME@EXAMPLE_TREE default storage location.	Yes
iPrint	Can install and use the printer made available in Chapter 9, “iPrint,” on page 77.	No

11.4.2 Using NetStorage

1. Log in to the Windows workstation as the ncp_lum-edir user.
2. When the iFolder wizard launches, click *Cancel*.
3. Open your browser and log into NetStorage by using the following URL:

`http://IP or DNS/netstorage`

   where *IP or DNS* is your OES 11 SP2 server’s IP address or DNS name.

4. Type `ncp_lum-edir` as the *User Name*, type the associated password in the *Password* field, then click *OK*.
5. Click the `HOME@EXAMPLE_TREE` storage location.

   Unlike the `Linux_Home_Directories` storage location, this directly opens the home directory.
6. Click *File* > *Upload*, browse to the `Documents` folder, and upload one of the text files.

   The file appears in the folder.
7. Click the `ncp_lum-edir` folder in the `Linux_Home_Directories` storage location.

   Notice that the folder appears to be empty.

   This is because the ncp_lum-edir home directory was created with the user object in iManager by the eDirectory Admin user. As part of the directory’s creation, the ncp_lum-edir user was assigned Novell trustee full-access rights to it. And because access to HOME@EXAMPLE_TREE provides NCP-based access to the directory, the user is recognized as the directory owner through that storage location.

   However, the Linux_Home_Directories storage location provides SSH-based according to the directory’s POSIX attributes. From the POSIX perspective, the eDirectory Admin user created the directory and is, therefore, its owner. The only POSIX rights that ncp_lum-edir has are because it is a member of the LUMUsers group. That is why it can see only the directory and not its content when accessing it through SSH.
8. Click the `linux2_lum-edir` folder in the `Linux_Home_Directories` storage location.

   Notice that the four files uploaded by the user in Step 12 on page 91 are listed.

   This is because the ncp_lum-edir user is a member of the LUMUsers group, and that group has all rights to linux2_lum-edir’s home directory as assigned in Step 16 on page 58.

For more information on using NetStorage, see the *OES 11 SP2: NetStorage Administration Guide for Linux*.

11.5 Exercises for ncp_edir

11.5.1 What ncp_edir Can Do

This user has the following service access:

Table 11-4 *ncp_edir Service Access*

Service	Details	Explored for This User in This Guide
iFolder 3.9	Can create and share its own iFolders and accept invitations from others to share their iFolders.	Yes
Novell AFP	Can access any NSS directories to which it has rights. Access rights to directories are governed by the NSS file system, allowing the user to only see and do what it has rights for.	See Section 11.10, “Macintosh Exercises and Novell AFP,” on page 103.
Novell CIFS	Can access any NSS directories to which it has rights. Access rights to directories are governed by the NSS file system, allowing the user to only see and do what it has rights for.	No
NetStorage	Can access its home directory through NetStorage because all home directories created through iManager and stored as attributes in eDirectory are exposed through the HOME@EXAMPLE_TREE default storage location.	Yes
iPrint	Can install and use the printer made available in Chapter 9, “iPrint,” on page 77.	No

11.5.2 Using iFolder

Setting Up iFolder

ncp_edir has full access to all iFolder user functionality, but for the purposes of this guide we will only accept the invitation that was extended by linux1_lum-edir and briefly explore what is available through that invitation.

1. At the Windows workstation, log in as ncp_edir.
2. After the iFolder Account Creation Wizard launches, click *Next*.
3. In the *Server Address* field, type the IP address or DNS name of the OES 11 SP2 getting-started lab server, then click *Next*.
4. Type the username and password for ncp_edir, select *Remember password on This Computer*, then click *Next*.
5. Click *Connect*.
6. If prompted, accept the certificate by clicking *Yes*.
7. Deselect *Create Default iFolder*, then click *Next*.
8. Click *Finish*.
9. Right-click in the iFolder dialog box and select *Refresh*, then click *linux1_lum-edir_IF3*.

   Remember that this is the iFolder that linux1_lum-edir shared with the ncp_edir user.
10. In the icon row at the top, click *Download*.
11. Click *OK*.

    The iFolder is created on the desktop.
12. Double-click the iFolder on the desktop to open it in Windows Explorer.
13. Navigate to the `Documents` folder, then drag and copy (using the Ctrl key) the four files to the `linux1_lum-edir_IF3` folder.

    You can do this because ncp_edir has default Read/Write permissions to the shared iFolder.

    Make sure you copy (by pressing the Ctrl key) rather than moving the files from the Shared Documents folder. Otherwise, the files will be moved and won't be available to other users who log in.
14. Continue with the next section, "Observing File Synchronization."

Observing File Synchronization

To understand more about how iFolder works, it is helpful to observe the file synchronization processes in action.

1. On the desktop in the taskbar, right-click the iFolder icon and select *Synchronization Log*.

   The iFolder Synchronization Log opens.
2. Right-click the iFolder icon again and select *Preferences*.
3. Change the *Synchronization* interval to 1 minute and click *Apply*.

   Normally you would not want to synchronize this often, but for our current purposes it helps to expedite log activity.
4. Delete the `MyPrivateFile.txt` file from the `linux1_lum-edir` iFolder on the desktop.

   Within a couple of minutes the change is synchronized with the iFolder server. Notice that there are various synchronization operations involved to ensure that all changes are tracked in order and coordinated among the various iFolders on the server and affected workstations.
5. Continue with the next section, "Using iFolder Web Access."

Using iFolder Web Access

NOTE: By default, interaction with an iFolder 3.9 server is encrypted through SSL 3.0.

Users can access their iFolders through most browsers that support SSL 3.0.

1 Open your browser and enter the following URL:

`https://IP_or_DNS_name/ifolder`

where *IP_or_DNS_name* is the IP address or complete DNS name of your OES 11 SP2 server.

2 If prompted, accept the certificate.

3 Log in as ncp_edir.

4 Click the *linux1_lum-edir_IF3* link and observe the following:

- The files you copied to the iFolder are available in the browser.
- By clicking a file link, you can automatically download and open the file, or you can save it to your desktop. After downloading and modifying a file, you can upload it and replace the original on the iFolder server.
- Using the links above the files, you can create new folders, upload files, and delete a selected file from the server.

  Changes made to iFolders on the server through browser connections are synchronized with the corresponding iFolders on workstation desktops the next time users log in.

5 Close the browser.

6 Continue with the next section, "Using NetStorage."

11.5.3 Using NetStorage

1 Using your browser, log into NetStorage by using the following URL:

`http://IP or DNS/netstorage`

where *IP or DNS* is your OES 11 SP2 server's IP address or DNS name.

2 Type `ncp_edir.USERS.LAB.COMPANY` as the *User Name* and the associated password in the *Password* field, then click *OK*.

"Contextless Login Does Not Work For Users Who Are Not LUM-Enabled or Whose Context Is Not in the Search Context List" in the *OES 11 SP2: Domain Services for Windows Administration Guide*.

3 In the left navigation frame, click *Home@EXAMPLE_TREE*.

4 Click *File* > *Upload*.

If you are prompted, enable pop-ups and repeat this step.

5 Click the *Browse* button and navigate to the *Shared Documents* folder, then select the first file and click *Open*.

6 Click the *Plus* sign (+) by the *Browse* button to add another field. Then click *Browse*, select the next file, and repeat this step until all four files are selected.

7 Click *Upload*.

8 Log in to the OES 11 SP2 server as the `root` user and click *Computer* > *Nautilus*.

9 Double-click *File System* > *home* > *ncp_edir*.

10 Verify that the files you copied in NetStorage are on the server.

11 Right-click a file, select *Properties*, then click the *Permissions* tab and observe the following:

- The *File Owner* is `root`.
- The *File Group* is `root`.
- *Group* and *Others* have no rights, reflecting the fact that the file is on an NCP volume.

Generally speaking, these POSIX permissions do not cause any problems. They do not affect NetStorage functionality for the user in this configuration because `Home@EXAMPLE_TREE` is an NCP storage location object; NCP file and directory trustee assignments govern access, not POSIX permissions. If the user accesses the files through a Novell Client, NCP assignments govern.

12 On the getting-started lab workstation, in the left navigation bar, click the *Linux_Home_Directories* storage location.

After a few moments, a message displays indicating that NetStorage cannot access the location. This is because the ncp_edir user is not LUM-enabled and therefore has no SSH access to the server.

13 Continue with the next section, Exercises for nss_edir.

11.6 Exercises for nss_edir

11.6.1 What nss_edir Can Do

This user has the following service access:

Table 11-5 *nss_edir Service Access*

Service	Details	Explored for This User in This Guide
iFolder 3.9	Can create and share its own iFolders and accept invitations from others to share their iFolders.	No
Novell AFP	Can access any NSS directories to which it has rights. Access rights to directories are governed by the NSS file system, allowing the user to only see and do what it has rights for.	See Section 11.10, "Macintosh Exercises and Novell AFP," on page 103.
Novell CIFS	Can access any NSS directory to which it has rights. Access rights to directories are governed by the NSS file system, allowing the user to only see and do what it has rights for.	Yes
NetStorage	Can access its home directory through NetStorage because all home directories created through iManager and stored as attributes in eDirectory are exposed through the HOME@EXAMPLE_TREE default storage location.	Yes

Service	Details	Explored for This User in This Guide
iPrint	Can install and use the printer made available in Chapter 9, “iPrint,” on page 77.	No

11.6.2 Using NetStorage

1. Log in to the Windows workstation as the nss_edir user.
2. When the iFolder wizard launches, click *Cancel*.
3. On the Windows workstation in your browser, log into NetStorage by using the following URL:

`http://IP or DNS/netstorage`

   where *IP or DNS* is your OES 11 SP2 server's IP address or DNS name.

4. Type `nss_edir.USERS.LAB.COMPANY` as the *User Name*, type the associated password in the *Password* field, then click *OK*.
5. In the left navigation frame, click *Home@EXAMPLE_TREE*.

   This share point links directly to the NSS home directory for the user that is specified in eDirectory.
6. Click *File* > *Upload*.

   If needed, allow the pop-up and repeat this step.
7. Click the *Browse* button and navigate to the *Shared Documents* folder, then select the first file and click *OK*.
8. Click the *Plus* sign (+) by the *Browse* button to add another field. Then click *Browse*, select the next file, and repeat this step until all four files are selected.
9. Click *Upload*.
10. Select `MyPrivateFile.txt`, then click *File* > *Rename* and rename the file to `junk.txt`.
11. Upload `MyPrivateFile.txt` again.
12. Right-click `junk.txt` and select *Delete*, then click *OK*.

    The file is removed from the list, but because this is an NSS volume with Salvage enabled, the file is not gone from the NSS file system.
13. Click *View* > *Show Deleted Files*.
14. Select `junk.txt`, then click *File* > *Undelete*.

    In Internet Explorer 8 you must allow the Windows script to run and repeat this step.
15. Click *OK*.

    Notice that the file is still displayed as a deleted file.

    This is because NSS cannot track POSIX ownership of files for users that are not LUM-enabled. For more information, see “OES Services That Do Not Require LUM-Enabled Access But Have Some LUM Requirements” in the *OES 11 SP2: Planning and Implementation Guide*.

    If nss_edir were using the Novell Client, the file could be salvaged through the client, but because we are not exploring the Novell Client in this guide, this is a good place to look at a few of the administrative features for NSS volumes that are available to eDirectory Admin users through NetStorage.
16. Continue with the next section, Administrative Tasks Available in NetStorage.

11.7 Administrative Tasks Available in NetStorage

11.7.1 Recovering the junk.txt File

1. Log in to NetStorage as the eDirectory Admin user and browse to the `nss_edir` home directory in the left frame.
2. Click *View* > *Show Deleted Files*.
3. Select `junk.txt`.
4. Click *File* > *Undelete*, then click *OK*.

   In Internet Explorer 8 you must allow the Windows script to run and repeat this step.
5. Click *View* > *Refresh*.

   You might have to refresh the Windows to see the deleted file.

   The file has been fully recovered.

11.7.2 Setting Rights to TeamProjectReadOnly.txt

1. Right-click `TeamProjectReadOnly.txt` and select *Properties*.
2. Click *Novell Rights*.

   This displays the Novell File Trustee assignments for the file.
3. Click the *Browse* icon next to the blank field under the *Trustees* list.
4. Click *EXAMPLE_TREE* > *COMPANY* > *LAB* > *USERS* > *AllUsers*.
5. Click the plus sign, then click the *Novell Rights* tab again.

   TIP: The first time you attempt this, you might get an error screen. In that case, right-click Back and try again. The next attempt should succeed.

   The AllUsers group members are now trustees of the `TeamProjectReadOnly.txt` file in the `nss_edir` home directory.

   Notice the check boxes to the right of the AllUsers group, indicating that the group has Read and File Scan rights to the file.
6. Click *Apply* > *Close*.
7. Continue with Setting Rights to TeamProjectWrite.txt.

11.7.3 Setting Rights to TeamProjectWrite.txt

1. If the previous file is still selected, deselect it.

   Right-click options are only available on single files and are prevented if multiple files are selected.
2. Right-click `TeamProjectWrite.txt` and select *Properties*.
3. Select *Rename Inhibit*, select *Delete Inhibit*, then click *Apply*.

The NSS file system is now set to prevent the file from being renamed or deleted by anyone, including nss_edir.

4. Click *Novell Rights*.
5. Click the *Browse* icon next to the blank field.
6. Click *EXAMPLE_TREE* > *COMPANY* > *LAB* > *USERS* > *LUMUsers*.
7. Click the plus sign (+), then click the *Novell Rightsnww* tab again.

   The LUMUsers group members are now trustees of the `TeamProjectWrite.txt` file in the `nss_edir` home directory.

   Notice the check boxes to the right of the LUMUsers group, indicating that the group has Read and File Scan rights to the file.
8. Assign the group the Write right by selecting the check box to the right of the first one that is checked (the Read check box).
9. Click *Apply* > *Close*.
10. Continue with the next section, Exercises for nss_lum-edir.

11.8 Exercises for nss_lum-edir

11.8.1 What nss_lum-edir Can Do

This user has the following service access:

Table 11-6 *nss_lum-edir Service Access*

Service	Details	Explored for This User in This Guide
iFolder 3.9	Can create and share its own iFolders and accept invitations from others to share their iFolders.	No
Novell AFP	Can access any NSS directories to which it has rights. Access rights to directories are governed by the NSS file system, allowing the user to only see and do what it has rights for.	See Section 11.10, "Macintosh Exercises and Novell AFP," on page 103.
Novell CIFS	Can access any NSS directory to which it has rights. Access rights to directories are governed by the NSS file system, allowing the user to only see and do what it has rights for.	Yes
NetStorage	Can access its home directory through NetStorage because all home directories created through iManager are stored as attributes in eDirectory are made available through the HOME@EXAMPLE_TREE default storage location.	No

Service	Details	Explored for This User in This Guide
iPrint	Can install and use the printer made available in Chapter 9, “iPrint,” on page 77.	No

11.8.2 Using Novell CIFS File Services

1. Log in to the Windows workstation as the nss_lum-edir user.
2. When the iFolder wizard launches, click *Cancel*.
3. On Windows 7, click *Start* > *Computer* > *Map Network Drive*.

   On Windows XP, open Windows Explorer or My Computer and click *Tools* > *Map Network Drive*.
4. Click the *Drive* drop-down list and select an unused drive letter.
5. In the *Folder* field, type the following:

`\\IP_or_DNS\home_nss`.

   where *IP_or_DNS* is the IP address or full DNS name of the OES 11 SP2 server.
6. Click *Finish*.

   The system maps the drive and opens at the root of the `HOME_NSS` volume.

   Normally, only the `nss_lum-edir` home directory would appear. However, because we granted group rights to two files in the `nss_edir` home directory, it also appears.
7. Open the `nss_edir` home directory and notice that the two files are displayed, but the other files in `nss_edir` are not.

   This illustrates the granular access capabilities of NCP file services.
8. Open the `TeamProjectReadOnly.txt` file in a text editor, such as Notepad. Then change the file contents and try to save the changes.

   You are prevented from doing anything except reading the file, including saving the file with a different name.
9. Open the `TeamProjectWrite.txt` file in the text editor. Then change the file contents and save the file.
10. Close the file and reopen it in the editor.

    Your changes were saved because of the rights you have to the file.
11. Close the file and try to delete it.

    Some versions of Windows XP wrongly report that the file has been deleted. However, if you close the drive and reopen it, you will see that it is still there. See “Windows XP SP2 Wrongly Reports File Deletion.”
12. Continue with the next section, Exercises for nw_edir.

11.9 Exercises for nw_edir

11.9.1 What nw_edir Can Do

This user has the following service access:

Table 11-7 *nw_edir Service Access*

Service	Details	Explored for This User in This Guide
iFolder 3.9	Can create and share its own iFolders and accept invitations from others to share their iFolders.	No
NetWare AFP	Can access any NSS directories to which it has rights. Access rights to directories are governed by the NSS file system, allowing the user to only see and do what it has rights for.	No
NetWare CIFS	Because its home directory is on the virtualized NetWare server, this user has automatic CIFS/SMB access to the directory (assuming the configuration steps in Section 7.2, "Enabling NFAP Services on the LAB_NW Server," on page 68 are completed.)	Yes
NetStorage	Can access its home directory through NetStorage because all home directories created through iManager are stored as attributes in eDirectory are made available through the HOME@EXAMPLE_TREE default storage location.	No
iPrint	Can install and use the printer made available in Chapter 9, "iPrint," on page 77.	No

11.9.2 Using NetWare CIFS File Services

1. Log in to the Windows workstation as the nw_edir user.
2. When the iFolder wizard launches, click *Cancel*.
3. Open Windows Explorer or My Computer and click *Tools* > *Map Network Drive*.
4. Click the *Drive* drop-down list and select an unused drive letter.
5. In the *Folder* field, type the following:

`\\IP_or_DNS\home_nw`

where *IP_or_DNS* is the IP address or full DNS name of the LAB_NW server.

TIP: After doing so many exercises involving the OES 11 SP2 Getting-started Lab server, it is easy to use the wrong IP address or DNS name. Make sure you are accessing your virtualized NetWare server.

6. Click *Finish*.

   The system maps the drive and opens at the root of the `HOME_NW` volume.
7. Navigate to the `Shared Documents` folder, then drag and copy the four files to the `nw_edir folder`.
8. Continue with the next section, Macintosh Exercises and Novell AFP.

11.10 Macintosh Exercises and Novell AFP

Most of the exercises you have performed in this guide can also be performed on a Macintosh workstation, so we will not repeat them.

OES 11 SP2 includes iPrint and iFolder clients for the Mac, and NetStorage and iFolder Web services work equally well on most browsers, including those on mobile devices.

Novell CIFS even works well with the Macintosh file sharing functionality.

To explore Novell AFP on your getting-started lab's Macintosh workstation, do the following:

1. While logged into the workstation, click the Finder, then click *Go* > *Connect to Server*.
2. In the Connect to Server dialog box, type the OES 11 SP2 server's IP address or DNS name, then click *Connect*.
3. Type an nss* user's name and password and click *Connect*.

   You should see the folders on the HOME_NSS volume to which the user has access rights.

11.11 What's Next

Your getting-started lab is now set up and ready to use for building your experience with OES 11 SP2.

The exercises in this guide have highlighted only a few major points and features. There are numerous additional things worth exploration.

After you complete the exercises in this guide, we recommend that you do the following:

1. Think about the needs of your organization and how the various OES 11 SP2 product components can help you address those needs.
2. Think about your network users and their file and print service needs. Match them against the different user types created in this guide. Then take the opportunity to do some hands-on exploring of the access capabilities and limitations for the matching users. For example, set up and experiment with the privacy and collaboration capabilities for each user through both NCP and POSIX.
3. Begin planning your organization's eDirectory tree and the rollout of OES 11 SP2 services to your organization.

As you plan for, work with, and install OES 11 SP2, be sure to consult the other OES 11 SP2 product documentation mentioned in "If You Want to Use This Guide as a Reference" on page 8.

A Supplementary Information

This section contains supplementary explanations and instructions.

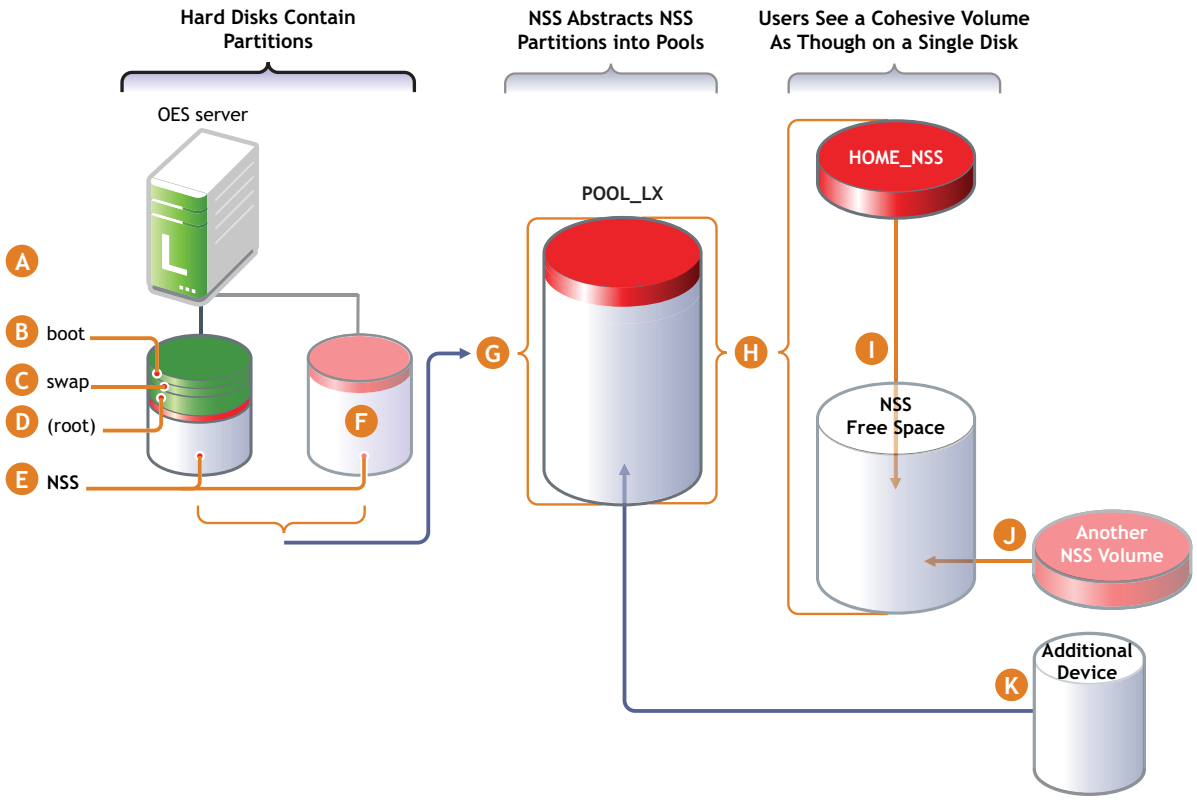
A.1 NSS Partitions, Pools, and Volumes

For a complete discussion about NSS, refer to the *OES 11 SP2: NSS File System Administration Guide for Linux*.

This section presents the following:

- A quick overview of the three Linux partitions on your getting-started lab server
- A general overview of NSS partitions and the mechanisms that let you create NSS volumes on them

Figure A-1 *Partitions, Pools, and Volumes*



Reference Letter	Explanation
A	Partitions are physical sections on a hard disk that are managed by a file system. The most common file systems on Linux servers today are Ext3, Reiser, and XFS.
B	The boot partition on your getting-started lab server is managed by the Ext3 file system. The files and configuration data it contains start the server.
C	The swap partition is managed by a file system that swaps information between memory and the disk, thus augmenting the RAM installed in the server.
D	The / (root) partition on your server is managed by Ext3 and stores all the getting-started lab server's system and data files, including OES services, eDirectory, and so on.
E	OES servers can also include NSS partitions. These are similar to Linux partitions in that they occupy physical disk space, but they are also significantly different in a number of ways. 1. You create the Linux partitions shown in this illustration during OES 11 SP2 installation. You always create NSS partitions after the OES installation is completed. 2. You create Linux partitions by allocating an amount of disk space to the partition and assigning it a mount point, such as /boot, /home, or / (root). You create NSS partitions by creating an NSS pool (see G) and assigning space on the server's storage devices (physical or logical disks) to the pool. The space you assign to a given pool from a specific disk is designated on that disk as an NSS partition. 3. On Linux, files are stored on a partition. On NSS, files are stored in an NSS volume—a logical mechanism that can span multiple NSS partitions and also the devices that contain them. 4. On Linux, a partition is allocated a set amount of disk space on a single device. The amount of disk space that can be used is limited by the size of the partition. NSS volumes are not bound by individual partition or device sizes. Rather, they take disk space from their assigned NSS pool as needed.
F	1. Additional disk space can be dynamically added to NSS pools as needed, and NSS volumes can grow dynamically in return as long as there is free space available in the pool, unless the volume size has been restricted by an eDirectory Admin user. **IMPORTANT:** The illustration shows the NSS pool spanning NSS partitions on both the server's primary hard disk and a second hard disk, which could be added later. The NSS pool contains an NSS volume (HOME_NSS in this case) that contains the NSS volume data (illustrated in red). The NSS pool also has free space that is not yet allocated to a volume (illustrated in white). Free space and volume data aren't necessarily distributed across all partitions, or distributed evenly as the graphic might imply. The NSS file system manages what each partition contains, independent of any administrative controls.

Reference Letter	Explanation
G	The NSS file system logically combines multiple partitions to form pools of space (up to 8 TB in size) that can span multiple devices. In the illustration, POOL_LX contains two NSS partitions that are created from the unformatted space on both hard disks when the pool is created. In some ways, NSS pools are like pools of water. The space from each partition is logically “poured” into an NSS pool and made available to the pool’s assigned volumes, such as HOME_NSS. Neither the volume nor the users with rights to access it know which physical partitions contain the disk space actually being used. Of course, the NSS file system continues to track each partition below the surface, but from a logical standpoint, all of the disk space assigned to a pool is one continuous source of disk space.
H	The sole purpose of NSS pools is to provide storage space from which you can form one or more NSS volumes. Your getting-started lab server contains a single NSS pool named POOL_LX with a single NSS volume named HOME_NSS. The pool’s free space is unallocated until used.
I	The instructions for creating the HOME_NSS volume leave the option set to have the volume grow to the pool size. As additional space is needed, the HOME_NSS volume automatically expands into the free space shown.
J	Free space in the pool is not reserved for the HOME_NSS volume; instead, space is allocated to HOME_NSS as needed. You can optionally add other volumes to the same pool and, in a sense, “overbook” the pool’s free space.
K	You can also grow the pool as needed by adding more NSS partitions to the pool.

A.2 iManager Tomcat Error

If you experience a Tomcat error when attempting to access iManager 2.7, the likely cause is a corrupted browser cookie. Clearing the browser cookies should solve the problem.

1. In Firefox, click *Tools* > *Clear Private Data*.
2. Select *Cookies*.
3. Deselect the other options.
4. Click *Clear Private Data Now*.