

2 *Setting Up a NetInfo Network*

Connecting your NeXT computers in a network allows users to share files, exchange mail, and log into any computer attached to the network. Setting up a simple network is a straightforward process. For the purposes of this discussion, a simple network is one with no more than about 20 computers that doesn't include any other types of systems.

This chapter covers the procedures necessary to set up a simple network, share files across that network, and create network-wide user accounts. Although the procedures in this chapter are geared toward a simple network, they're also used for more complex networks. If your network is large or includes multiple types of computers, refer to Chapter 10, *Configuring a Large Network*,^o or Chapter 11, *NeXT Computers in a Mixed Network*^o before beginning. In addition, Chapter 3, *NetInfo Networking*,^o Chapter 4, *Setting Up the Network File System*,^o and Chapter 5, *Managing User Accounts and User Groups*,^o may apply, depending on your situation.

Making a Plan

Before you jump in and start building your network, it's a good idea to have a plan. Such a plan will help make sure that all the components of your network are properly configured. It's much easier to set up a network correctly than it is to modify an existing network. If you haven't yet read Chapter 1, now would be a good time to do so.

As you make your plan, here are some things you need to decide:

1. Choose the computer that will be the *master NetInfo server*. A server is a program that provides resources to

other programs (a program that uses resources provided by a server is called a *client*). The computer that runs the program is called a server as well. The resource provided can include disk space, a printer, or administrative information—such as the current time, or information about users and other computers. The master NetInfo server is the authoritative server of administrative information.

The computer you select for this purpose should have extra memory and disk space and it needs to be available at all times. Consider placing the master server in a secure location.

2. Choose a host name for each of the computers. Host names should be 8 characters or less, all lowercase, and contain only characters, numerals, hyphens (-), and underbars (_). These restrictions aren't absolute requirements, but choosing host names within these limits will make sure that they work in all situations.
3. Determine the Internet address for your network. In order for the computers on your network to communicate via the Internet to computers at other sites, each must be assigned a unique Internet address.

See Appendix C, “Internet Addressing,” for details about having a set of addresses assigned to you. Even if you aren't planning to connect to the Internet now, it's highly recommended that you register your network anyway. That way, you won't need to change all the addresses if you later decide to connect to the Internet. If you're absolutely certain your network will never be connected to the outside world, you can just use the default addresses provided by the various applications.

4. Choose a computer that will provide clone NetInfo service. A *clone server* is a server of administrative information that holds a read-only copy of the master database. It's always a good idea to have at least one clone server so that your network will continue to function even if the master server becomes unavailable. Having a clone server can also help reduce the load on the master server by providing another source for administrative data. It's common practice to combine a clone NetInfo server with some kind of file serving (see the next step).
5. Decide what kind of file service you'll be using and which systems will provide them. Make sure that any computers used for file serving have plenty of disk space (and probably additional memory as well).

The four kinds of file serving to consider are:

- Home directory—A home directory server provides access across the network to a directory that holds home directories for user accounts. More than one computer can be a home directory server. All directories that are made available in this way are listed as possible home directories in UserManager (see “Adding Users” later in this chapter).

- ApplicationÐYou can save disk space by putting software applications in a central directory and making that directory available across the network. This directory will show up on each computer as **/LocalApps**.
- General purposeÐYou may want to make other directories available across the network so that users can share them. For example, you might want to set up a directory to hold files related to a specific project.
- MailÐA mail server provides a directory that stores incoming mail for the network. In addition to storing files, a mail server also handles distribution of messages. It's important for a mail server to have extra memory as well as sufficient disk space.

Note: If you'll be using an external disk drive for file services, install and configure the drive before adding the computer to the network. See Chapter 7, ^aAttaching Peripherals.^o

6. Determine the physical layout for your network. Decide where each piece of equipment will go, and what kind of physical access should be allowed.

For example, you might decide to keep dedicated file servers in a locked room. If you want, you can assemble the computers and network now, but leave the computers powered off. Otherwise, you can assemble the computers as you go.

7. Decide which accounts your users will need, and whether they should be network accounts or local accounts. In most cases, you should probably use network accounts rather than local accounts. Network accounts allow users to log into any computer on the network; local accounts restrict each user to a specific computer. See ^aAdding Users^o later in this chapter.

Setting Up the Master NetInfo Server

The first computer you need to set up is the computer that will be the source of administrative data for all of the computers on the network. This computer will serve a network-wide NetInfo database, which will be used to store information about client computers, users, and other servers. (For more details about NetInfo, see Chapter 3.)

1. Make sure the computer you've chosen to be the master server is *not* attached to the network, then power it on.

2. You *must* have a password assigned to the **root** account. If you've already assigned one, log in using any valid account. If not, follow these steps to assign passwords:
 - a. If this is the first time you've turned on this computer, choose a language and keyboard when prompted.
 - b. Use the Preferences application to assign a password to the **me** account (for more information, see the *User's Guide*).
 - c. Log out, then log back in as **root** (since **root** doesn't have a password, you won't need to enter one in the login window).
 - d. Assign a password to **root** using the Preferences application.
3. Start up SimpleNetworkStarter, located in **/NextAdmin**.
4. If you're not logged in as **root**, you're prompted for the **root** password.

F0.tiff ,

Enter the **root** password and click Login. The main window appears.

F2.tiff ,

5. Click the button labeled ^aBe a server...^o in the top section of this window. This sets the default configuration and enables the switches in the bottom section of the window.

F1.tiff ,

6. Enter the host name you've chosen for this computer in the Hostname field of the center section (see ^aMaking a Plan^o earlier in this chapter).
7. Enter the appropriate Internet address in the IP Address text field of section 2. This address should end in ^a1.^o For example, if your network has been assigned network number 192.42.172, you should enter 192.42.172.1 in this field. See ^aMaking a Plan^o earlier in this chapter, and Appendix C, ^aInternet Addressing.^o

F4.tiff ,

The Other Options button is used to modify information specific to large networks or networks that include different types of computers. If your network falls into either of these categories, see Chapter 10 or 11 for more information. For a simple network, you can ignore this button.

Setting Options

You are now ready to set the appropriate options in section 3 of the window. Notice that all switches are checked automatically, so your task is to turn *off* any features you don't want to use.

1. Ignore the first switch in section 3, labeled ^aServe the shared administrative data as the master.^o Because you're setting up the master server, this switch is dimmed and already checked. You can't change this switch for the master server.
2. Leave the switch checked that's labeled ^aLimit access to network administrative data to the local network^o if you want to increase the security of the data you've stored in the network-wide database. With this switch checked, the data in the NetInfo database is only available to the computers making up this network. If you have a large network made up of subnets, see Chapter 10, ^aConfiguring a Large Network.^o
3. Leave the switch checked that's labeled ^aAutomatically add new NeXT computers to the network as clients^o if you want new computers to be added to the network simply by attaching them and powering them on. If you click the switch to turn it off, you'll have to add new computers ^aby hand^o with HostManager. See Chapter 3 for details.
4. Leave the switch checked that's labeled ^aRequire a password to add a new computer to the network^o if you've elected to use automatic host addition and you want to make the process more secure. With this feature turned on, you'll be prompted for a password whenever you add a new computer to the network. (You'll set this password during the configuration process.) If you click the switch to turn this feature off, anyone can add a computer to the network without knowing a password.
5. Leave the switch checked that's labeled ^aMake the time the same on all networked NeXT computers^o if you want all computers to get their time from the master server. This feature makes sure that the time is

synchronized for all computers. This is important if you share any files across the network, to make sure that file modification and access times are kept consistent between computers. Turning this feature off means that each computer will set time independently.

6. Leave the last of the switches checked if you want this computer to be the network post office. With this switch checked, the master server will also be the mail server for the network. Turn this feature off if you'll be using some other computer for this purpose. On larger networks, it's better to have the post office on a different computer than the master administrative database. On small networks, the load is small enough to make combining these services reasonable and practical.

Setting Up File Services

Now that you've set all the network options, you can determine which file sharing services will be provided by the master server. Consider carefully whether you want your master NetInfo server to provide any file services. In general, it's not a good idea to combine a master administrative server with a file server because the processing requirements can degrade performance. On very small networks (fewer than about 10 computers), this shouldn't be a problem.

1. Leave the switch labeled Home Folders checked if you want this computer to serve a directory used to hold home directories. By default, SimpleNetworkStarter will create a directory named **/Users** for this purpose.

If you want to use some other directory to hold home directories, select the directory in the File Viewer and drag the icon into the well. Once you've completed building the network, the directory chosen here will appear on all computers on the network as **/Net/hostname/directory**, where *hostname* is the host name of the server, and *directory* is the directory chosen. This directory will also appear as one of the choices for home directories in the UserManager application. See ^aAdding Users^o later in this chapter.

If you don't want this computer to serve home directories, click the switch so that the check disappears and an ^aX^o appears in the well.

2. Leave the switch labeled /LocalApps checked if you want this computer to serve a shared **/LocalApps** directory. (A shared **/LocalApps** directory is used to provide a central location for applications.) By default, a directory named **/LocalApps** will be created and used for this purpose.

If you want some other directory used here, select it in the File Viewer and drag the icon into the well. Once

the network installation is complete, this directory will appear on all computers as **/LocalApps**.

If you don't want this computer to share applications, click the switch so that the check disappears and an ^aX^o appears in the well.

3. Click the switch labeled General Purpose if you want this computer to provide some other shared directory (such as a directory containing project files). By default, a directory named **/General** will be created for you.

If you want some other directory to be used instead, select the directory in the File Viewer and drag its icon into the well. Once the network configuration is complete, this directory will show up as **/Net/hostname/directory**, where *hostname* is the host name of the server and *directory* is the name of the directory chosen.

If you don't want to serve a general purpose directory, leave the switch unchecked.

Building the Network

Now you can start building your network.

1. Review the selections you've made and make sure they're what you want.
2. Click the button labeled Build The Network to begin the process of configuring the network.
3. If you're configuring this computer as a home directory server and it doesn't have enough disk space for any home directories, an error panel appears. Click Abort, then either make room on the disk by removing files or configure the server without home directory service.

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4. If you're configuring this computer as a home directory server, a panel appears saying how many users the computer has disk space for. Click OK to continue.

F5.tiff ,

5. If the computer doesn't have enough memory for the types of services you've chosen, a panel appears saying so. If you see such a panel, consider adding RAM to avoid possible problems with performance. Click OK to continue.

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6. If you've already modified any of the system files (such as the **sendmail** configuration files), you see a warning panel.

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You should only see this panel on an existing NeXT computer that has been upgraded to a new software release, and then only if you've modified any of the traditional UNIX database files. If you do see this panel, make a note of the files listed, because you may need to replace the information in them once the configuration is complete. Click OK to continue.

7. If you haven't set a password for the **root** account on this computer, you're required to set one. Enter the password twice, as prompted.

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The application now creates a network-wide NetInfo database, which will be used to store administrative data for all network computers to share. As this is happening, you see a panel telling of this. (For more information about NetInfo, see Chapter 3.)

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8. If you've chosen to use a password for adding computers to the network, you're prompted to set one. Enter the password twice, as prompted.

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9. When the panel appears asking you to attach the computer to the network, do so. Once attached, click OK.

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Once the database is created, network services are started. When all of the services have been started, you're returned to the main window.

Setting Up Other Servers

With the shared administrative server configured, it's time to configure the rest of the servers.

Note: If you haven't chosen to use automatic host addition, you'll need to add the other servers with HostManager. See Chapter 3, *NetInfo Networking*,^o for details.

1. Connect the next server to the network. Do this *before* you start it up; otherwise, it won't be correctly added to the network.
2. Turn on the computer. In a few moments, a window appears with the following message:

```
Network doesn't recognize computer.  
Enter host name:
```

Enter the host name you've chosen for the computer and press Return.

3. Next, you're asked if you want to add the host to the network.

```
Add computer to the network [y/n]?
```

Type **y** and press Return.

4. If you're using a password for automatic host addition, you're prompted for it.

```
Enter network password:
```

Enter the network password and press Return.

If you see any messages other than those discussed here, see the ^aTroubleshooting^o section later in this chapter.

5. If necessary, set the language and keyboard. If you haven't done so yet, add passwords for the **me** and **root** accounts.
6. Start up SimpleNetworkStarter.
7. Click the button labeled ^aBe a server.^o This will enable some of the switches in the bottom section of the window.

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Note: Don't change the values in the Host Name and IP address fields. If you do, you'll get an error message when you try to configure the server.

8. If you want this computer to be a clone server of the network NetInfo database, leave the switch labeled ^aServe the shared...^o checked. Otherwise, click the switch to uncheck it.

Note: It's a good idea to set up at least one clone server for your network.

9. If you'll be using this computer as the post office, click the appropriate check box. If some other computer on the network is already providing this service, this option won't be available.
10. If you'll be using this computer as a file server, set it up using the appropriate check box and directory well. See the previous section for details.
11. Click the button labeled Build The Network. A User Authentication panel appears.

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12. Enter the password of the **root** account on the master server and click Login.
13. Repeat these procedures for each additional server.
14. Although it's not always necessary, it's a good idea to reboot all the servers. Start with the master server, then

turn on each of the other servers one at a time.

Adding Other Hosts

You can now add the remaining computers to the network. Follow these procedures for each computer.

Note: If you haven't chosen to use automatic host addition, you'll need to add the other hosts with HostManager. See Chapter 3, "NetInfo Networking," for details.

1. Attach the computer to the network, then turn it on.
2. When you're prompted for the host name, enter the one you've chosen.
3. The configuration server asks if you want to add the host to the network. Type **y** and press Return.
4. If you're using a password for automatic host addition, you're prompted for it. Enter the network password and press Return.

If you see any other messages, see the "Troubleshooting" section later in this chapter.

5. If necessary, choose a language and keyboard. If you haven't yet, set passwords for the **me** and **root** accounts.
6. If you want to secure the local administrative data, do the following:
 - a. Start up SimpleNetworkStarter.
 - b. Click the button labeled "Be a client machine..."
 - c. Click Configure this Host.

By accepting the default settings, the local NetInfo database for this computer will only be available to the local computer.

7. Repeat for each client.

You now have a complete NetInfo network.

Testing the Network

After completing the configuration of your network, it's a good idea to test things and make sure everything is functioning properly. If you encounter any problems performing these steps, see the ^aTroubleshooting^o section at the end of this chapter.

1. Verify that **/LocalApps** is being shared:
 - a. Put a file in **/LocalApps** on the server.
 - b. Log into various hosts and check the File Viewer to make sure that the file shows up in **/LocalApps**.
 - c. Remove the file.
2. Verify that a general purpose server is functioning, just as you would an application server:
 - a. Create a file in the directory being served.
 - b. Log into a few computers and check that the file and directory appear in the File Viewer. The directory will appear as **/Net/hostname/directory**, where *hostname* is the host name of the file server, and *directory* is the name of the directory being shared.
 - c. Remove the test file.
3. To test a home directory server, first make sure the directory is accessible across the network:
 - a. Create a file in the directory being served.
 - b. Log into a few computers and check the File Viewer to make sure the test file appears in the browser. The file should show up as **/Net/hostname/directory/file**, where *hostname* is the host name of the file server, *directory* is the name of the directory being shared (if you used the default directory, it will be named **Users**), and *file* is the name of the test file.
 - c. Remove the test file.

The second half of testing a home directory server is to verify that UserManager recognizes the directory as a valid place for user accounts. See ^aAdding Users^o later in this chapter.

4. To test the mail server, send a few mail messages and verify that the mail is received. This is easier if you add a couple of network accounts, then send mail between them. Be sure to send and receive on various computers, including the mail server.

If you want to test mail before you've added accounts, you can send a message from **me** to **root**.

Adding Users

Now you're ready to add new users. This section details how to add a network user account.

1. Log into the computer that is acting as the home directory server. If you have more than one home directory server, log into the appropriate one. You can only create home directories with UserManager while logged into the computer that holds the directory.

Note: If you want to be able to add users from a computer other than the home directory server, you'll need to use NFSManager to grant **root** access to the home directory across the network. See Chapter 4, ^aSetting Up the Network File System,^o and Chapter 5, ^aManaging User Accounts and User Groups,^o for details.

2. Start up UserManager, located in **/NextAdmin**.
3. If you're not logged in as **root**, you're prompted for the **root** password. Enter the **root** password and click Login.

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4. Choose New User from the User Record menu. The User Type panel appears.

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5. Click Network. The Select NetInfo Domain panel appears. (If you choose Local in the User Type panel, you go directly to the New User window.)

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6. Click ^{a/o} in the left column, to indicate that the user account should be available from any computer on the network, then click OK. The New User window appears.

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7. Complete the New User window as follows:

- a. Enter the user's full name in the text field of the same name. You're free to use uppercase characters, lowercase characters, and spaces in this field.
- b. Enter the account name in the Username field. This is the name the user will log in with. Each account name must be unique, contain no more than 8 characters, be all lowercase, and contain no spaces. A common convention at sites with many users is to use a person's first initial and last name as their account name (**tsmith**, for example). At smaller sites, first names are usually sufficient (**tom**, for instance).
- c. Enter a password into the Password field. For security reasons, what you type is not displayed. A password must be no more than 8 characters and contain no spaces. A combination of uppercase and lowercase letters with numerals and other characters will make the password harder to guess, and therefore more secure.

Note: If you decide not to assign a password at this time, make sure that each user adds a password *immediately*. An account without a password can be used by anyone.

- d. Select the home directory from the pop-up list by pressing the Home Directory button and dragging to the appropriate directory. The pop-up list will include all the home directory servers you set up with SimpleNetworkStarter. The user's home directory will be created under the directory chosen from this list. For example, if you're creating the user account **tom**, and you select **/Net/mktg/Users** from the Home Directory pop-up list, the home directory will be **/Net/mktg/Users/tom**.

Note: If the Home Directory pop-up list doesn't contain all the directories you expect, see the

^aTroubleshooting^o section later in this chapter.

- e. If necessary, change the language choice for this user by pressing the Language button and dragging to the appropriate choice.

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- 8. Choose Save from the User Record menu.
- 9. If you assigned a password to this user, a panel appears asking you to verify that password. Enter the password, then click OK.

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- 10. A panel appears asking you to verify the components of the new user account. Note that several values were assigned by default (for more information on these fields, see Chapter 5, ^aManaging User Accounts and User Groups^o). Review the values and click Yes if they're correct. (If they're not, click No. Correct the fields in the New User window, then choose Save again.)

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- 11. The next panel informs you that the user's home directory doesn't exist, and asks if it should be created. Click Yes.

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After a few moments, the New User window returns.

- 12. Repeat these steps to create additional accounts. There's no need to choose New User again; just begin entering information into the New User window.

For more information about user accounts, see Chapter 5, ^aManaging User Accounts and User Groups.^o

Maintenance Planning

Now that you have a functional network with user accounts, you might think you're all done. However, this is only the beginning. You now have to maintain the network you so carefully constructed. It's a good idea to put together a plan detailing how you'll keep your network in top form. Things to consider include:

- How and when file backups will be performed
- How space conflicts will be resolved when the file servers run out of disk space (probably sooner than you expect)
- How the network will be reconstructed in the case of a major catastrophe
- Which person will be responsible and which procedure will be followed when network troubles arise

It's also a good idea to maintain a written log of activities. For example, you might want to track information about backups, adding or deleting users, installing new equipment, and troubleshooting sessions.

Troubleshooting

If you have problems with any of the procedures in this chapter, use this section to help solve them.

Multiple Client Computers Can't Access a Shared Directory

- Server isn't turned on or isn't bootedÐTurn the server on and/or boot it.
- Server is having software problems (is frozen or has crashed)ÐReboot the server.
- External disk has become disconnected or turned offÐTurn off the server, reconnect and/or turn on the external disk, then reboot the server.

- Directory isn't properly configured◊Use SimpleNetworkStarter or NFSManager to verify that the directory is being shared correctly.

One or More Computers Aren't Communicating with the Network

- Client computer isn't attached to the network◊Attach the computer and reboot it.
- None of the NetInfo servers on the network are turned on◊Turn on the servers.
- Client computer was allowed to boot without a network◊Reboot the client. (If the network server is slow to respond, a prompt appears during the boot process asking if it's OK to continue without the network connection. Pressing Control-c in response to this prompt will disable the connection to the network-wide administrative database.)

Mail Messages Aren't Being Delivered Properly

- Two users are logged in using *local* accounts with the same name (**me**, for example)◊Make sure users log in with their network accounts; eliminate duplicate local accounts; and make sure only one person is using a given local account. Whoever has the Mail application that fetches the soonest after the mail is delivered will get the mail.
- The directory **/usr/spool/mail** isn't mounted properly◊Use NFSManager to verify that this directory is being shared correctly (see Chapter 4, "Setting Up the Network File System," and Chapter 6, "Managing Electronic Mail," for details).

For more complete mail troubleshooting tips, see Appendix D, "The **sendmail** Program."

Unexpected Messages Appear During Automatic Host Addition

- `Name recognized. New CPU board or ROM chip [y/n]?`

Indicates that the configuration server already has a host entry for the host name you entered, but that computer isn't currently running on the network. Answer **no** (or **n**). You'll be prompted for another host name.

- `Host name already in use.`

Indicates that the host name you entered is the name of a computer currently running on the network. After a

brief delay, you'll be prompted for a different host name.

- `Incorrect password.`

You entered the network password incorrectly. You'll be returned to the beginning of the configuration process, where you'll need to enter the host name again.

- `Server error: no available IP address`

The configuration server has no more addresses available to assign. The range of assignable addresses will need to be modified on the configuration server, as described in Chapter 3. Once additional addresses are available, you can add the new host.

Recovering from Catastrophic Failure

Under extreme (and rare) circumstances, it may be necessary to return a computer to its original state (before it was configured with SimpleNetworkStarter). For example, if your computer crashes during configuration, SimpleNetworkStarter may not be able to recover properly. If you find yourself with a hopelessly garbled network, follow the procedures for recovery in the ^aTroubleshooting^o section in Chapter 3.