Installing and Configuring Device Drivers for NEXTSTEP for Intel-based Computers

This document explains how to install and configure device drivers for NEXTSTEP for Intel-based computers.

Be sure you are familiar with all of this information before you attempt to install and configure a NEXTSTEP device driver.   An overview follows the Table of Contents.

Note: contains important reference information.
Caution: the operation may allow damage to software or files.
Warning: the operation may allow damage to hardware.

If you are unfamiliar with installing and configuring NEXTSTEP device drivers, read section G: NEXTSTEP Device Driver Essential Concepts   as well as section   H: References and Trademark Information.

Table of Contents

Overview: Getting, Installing, Configuring Device Drivers

The process of installing and configuring a device driver involves
the following tasks:

1. Be sure you have everything you need: the hardware and the
    device driver.
2. If your computer supports PCI, PCMCIA, or Plug and Play
    and your device is on an expansion card, install the expansion
    card according to section
    F: Installing Expansion Cards.
3. If the device driver is compressed, follow the steps in section

A: Decompressing a **.compressed** File to a **.pkg** File.
4. Install the device driver according to instructions in section
B: Installing a Device Driver from a **.pkg** file.
5. Configure the device driver according to instructions in section
C: Configuring a Device Driver.
6. If your computer supports the ISA bus without Plug and Play and your device is on an expansion card, power off your computer and install the expansion card according to instructions in section
F: Installing Expansion Cards.

If you're installing NEXTSTEP on a computer, you'll need device drivers for your hard disk (and for your network card if you're installing NEXTSTEP over a network).   Refer to the section E: Boot Drivers: Important for Installation.

Installing a video driver presents a problem that you need the video to read the display.   To install a video driver, you should reconfigure your computer to run as default VGA.   Refer to the section D: Display Driver Information.

Decompressing a   .compressed   File to a   .pkg   File

If you get a device driver from NeXTanswers, it will most likely be in the form of a compressed file.   A compressed file has a   **.compressed** extension and a distinctive icon.   On a computer running NEXTSTEP:

1.   Use WorkspaceManager to check the file icon or extension to be sure it is in compressed format (it will have a **.compressed** extension).
2.   Select the file.
3.   Double-click the file and WorkspaceManager will decompress the file (you can also choose File from the Workspace menu, then choose decompress from the File menu).   If the file contains a device driver from NeXTanswers, its filename will probably include the word Driver and have the **.pkg** extension.

Installing a Device Driver from a   .pkg   File

If you have a computer already running NEXTSTEP, you may want to add a new device driver or replace an existing device driver with an upgrade.   On a computer running NEXTSTEP:

Note: If you plan to install and configure a display driver, be sure you

understand the contents of the section   D: Display Drivers: Important Information   in this document.

Note: If you plan to install and configure a boot driver, be sure you understand the contents of the section   E: Boot Drivers: Important Information   in this document.

1.   If you received a   **.pkg**   file in NeXTmail or another electronic source, place a copy of the file in a folder you can access when you log in as root, then log in as root.
     If you received the   **.pkg**   file on a floppy disk, log in as root, then insert the disk in the floppy disk drive and choose Check for Disks from the Workspace Manager application's Disk menu. When the disk icon appears in the File Viewer, open it.
     Note: Only the superuser, root, can install the device driver. If you're not sure how to log in as root, see your system administrator.
2.   Double-click the   **.pkg**   file to open it in the Installer application.
3.   Click the Install button in the Installer package window. When the panel asks you to confirm that you want to install software for Intel-based computers, click Install.   If a panel warns you you're about to overwrite existing files, click Continue.
4.   When installation is complete, choose Quit from Installer's menu.

Note: At this point, the device driver is installed as a file with a **.config** extension in the **/usr/Devices** directory, and you can use Configure to configure it for your system.
Note: If you have installed an upgrade to a previous device driver, *move* the old device driver to a backup directory.
5. If you created a copy of the **.pkg** file in step 1 of this section, drag the copy to the recycler.
6. Choose Log Out from the Workspace menu, then click the Restart button in the login window.

Configuring a Device Driver

Once you have installed device drivers in the **/usr/Devices** directory, use Configure to configure the device drivers in your system. Refer to Configure's help to learn about using Configure.
Note: Be sure you understand how to work with Display and Boot device drivers before you try to configure them.

1. Boot up NEXTSTEP, log in as root, and start up the Configure application by double-clicking Configure.app (it's in **/NextAdmin**).
Note: Don't just click on a device driver icon in Workspace; it will bring up Configure in a confused state. Always start up

Configure and use its panels to select device drivers.
Note: Use Configure's help to see specifics about the device driver you're configuring.
2.   Click the appropriate icon at the top of Configure's Summary window.   If the name of the device driver you want is in the list of devices that appears in the window, and if an appropriate device is already installed in your computer, choose Quit from the Configure menu.   Your system is configured.
3.   If you're planning to use one device driver in place of an older one named in the list, select the older device driver's name, and click Remove.
4.   Click Add in the window.   In the Add Devices panel that opens, select the radio button labeled Show Drivers for Detected Devices.   Select the name of the device driver you want to configure from the list, and click Add.   If the device driver you want doesn't appear, select the radio button Show All Drivers.
5.   Configure the device driver.   Look in Configure's Help for important information about the device driver.
Note: Configure's Help may not show information for all drivers.
Note: A device driver for ISA bus computers may require that you set particular DMA, IRQ, or port settings.
Note: A device driver for EISA and PCI bus computers may automatically detect the presence of a device if it's installed. If so, the device driver may also automatically configure itself

for that device.   Check Configure's help to confirm.
Note: You may want to turn additional features on or off,
depending upon your computer's requirements.   See Configure's
Help for this information.

6.   Click Done, and then click Save.
7.   Choose Quit from the Configure menu.
Note: You must restart your computer after installing and
configuring the device driver.   The next time you start up your
computer, it will use the new driver.

Display Drivers: Important Information

This section explains how to change display devices and device
drivers, assuming you have a NEXTSTEP system running and that
the expansion card with the replacement display device has the
capability to run in VGA mode.

Warning: Some vendors claim that you can use their display
adapters at display modes with resolutions and refresh rates that
exceed what their RAMDACs can support. You can permanently
damage your display adapter and computer by doing this.   Also, be
sure to select a video mode that is an exact match to that which

the display monitor supports.   While mismatching modes may appear to work, the long-term effects may burn in permanent fishbone or bar patterns in the display.   Read the owner's guide that comes with your display adapter or contact its manufacturer to ensure that your adapter's RAMDAC can support the display mode you set in Configure.

Note: NeXT designs and tests its display adapter device drivers using very high frequency displays that can support display modes with very high resolutions and non-interlaced refresh rates, such as the NEC 5FG, NEC 6FG, and Nokia Multigraph 445X.   Read the owner's guide that comes with your display to ensure it can support the display mode you set in Configure.

Instructions for Replacing a Display Expansion Card and Configuring Its Device Driver:

Note: If your system provides an on-board display adapter subsystem, you can ignore these instructions.
Caution: Your display is essential to using your computer.   Be careful in changing display devices and device drivers.   If you disable the display altogether, you may have a tough time re-enabling it.

1. Boot up NEXTSTEP, log in as root, and start up the Configure application by double-clicking Configure.app (it's in **/NextAdmin**).
2. Click the Display icon at the top of Configure's Summary window. The name of your current device driver appears as the only name in the list at the top of Configure's Display Devices window.
   Note: If the current adapter is the Default VGA Adapter, then skip to step 6. If the existing adapter is anything other than Default VGA Adapter, then continue with the following steps.
3. If the existing adapter is anything other than Default VGA adapter, select the device driver's name, and click Remove.
4. Click Add in the window. In the Add Display Devices panel that opens, select the Default VGA Adapter, and click Add.
5. Click Done, and then click Save.
6. Choose Quit from the Configure menu.
7. Log out, turn off your computer, replace the existing display adapter with the display adapter you wish to use. You can then start up the computer and log in again as root.
8. Boot up NEXTSTEP, log in as root, and start up the Configure application by double-clicking Configure.app (it's in **/NextAdmin**).
9. Click the Display icon at the top of Configure's Summary window. The name Default VGA Adapter appears in the list; select its name, and click Remove.
10. Click Add in the window, select the name of the Display device driver that matches your display device, and click Add.

11. Configure the device driver.   There may be DMA, IRQ, or port settings to select.
    Note: Video device drivers support a variety of display modes; see Configure's Help for specific modes your driver supports. Refer to appropriate documentation for the display adapter and your display monitor.   Be sure to match modes exactly.
    Note: In addition to video modes, there may be other features you may want to turn on or off, depending upon your computer's requirements.   See Configure's Help for this information.
12. Click Done, and then click Save.
13. Choose Quit from the Configure menu.
    Note: You must restart your computer after installing and configuring the device driver.   The next time you start up your computer, it will use the new driver.

Boot Drivers: Important for Installation

A "boot driver" is a device driver that is required to start up your computer with NEXTSTEP.   Without it, you cannot run NEXTSTEP.

For example, the device driver for your hard disk controller is a boot driver; your computer won't start up if this device driver is missing

or misconfigured.   Similarly, if your computer depends upon the network for part of the system your network adapter uses a boot driver.   If its device driver is unavailable, your computer won't start up.

When you're installing NEXTSTEP, you'll be prompted to select boot drivers.

Instructions for Installing with Boot Drivers

Be sure to refer to the *Installing and Configuring NEXTSTEP Release 3.3 for Intel Processors and NeXT Computers* manual.

Note: You must have access to a computer running NEXTSTEP unless you are installing NEXTSTEP using a CD-ROM with a boot floppy and a driver floppy (you won't be able to run Configure to get the needed driver).

1.   Find out what boot devices your computer has and identify the proper device drivers for them.
2.   You'll need a boot floppy, and you should make a formatted floppy diskette that has the required device drivers on it.
     Note: Be sure the device drivers are loadable (with **.config** extensions), and write down their names on paper: you'll

have to type their names in at the   boot: prompt, later.
3.   Insert the boot floppy and turn the power on.
4.   The booter will prompt you for boot drivers.   At the
      boot: prompt type in the names of your boot
      drivers (usually the hard disk driver and the network driver).
      Note: During the boot process, if you encounter an error
      message, abort the boot process.   Reboot the computer using
      the NEXTSTEP Installation Floppy, and at
      the   boot: prompt enter   config=sd()Default   if you're using a
      SCSI disk (or enter   config=hd()Default   if you're using an IDE
      disk) to install NEXTSTEP in its default configuration.
      Afterward you can configure device drivers for your computer's
      particular devices.
      Caution: If your system suffers boot failure, you'll need
      expert help.

Installing Expansion Cards

Always refer to the technical reference manual that comes with
the expansion card.   It contains information that you should read
before installing or altering the device on the card.

If the device is on an expansion card and your computer has an EISA, PCI, PCMCIA, or Plug and Play bus

1.   Install the expansion card in the computer.
2.   Power on, boot up, and log in as root.
3.   Decompress, install, and configure the device driver as explained in sections A:, B:, and C: of this document.

If the device is on an expansion card that plugs into an ISA bus and requires mechanical adjustment (DIP switches or jumpers) to match resources, you should install the expansion card as the last step.

1.   Power on, boot up, and log in as root.
2.   Decompress, install, and configure the device driver as explained in sections A:, B:, and C: of this document; be sure to note any special resource settings.
3.   Quit Configure, log out, and power off.
4.   Adjust the mechanical settings on the expansion card to match the settings you chose in Configure's inspector panel.

NEXTSTEP Device Driver Essential Concepts and Terms

This section provides an overview of devices, NEXTSTEP device drivers, and basic concepts of getting and using device drivers.

Devices.

A device is an electronic or electro-mechanical part of a computer system that performs a particular function, generally that of storing or moving data.   Examples of devices include hard disk controllers, video display controllers, keyboards, network interface adapters, and so on.

Some devices are integrated into the electronics of the computer's system board (on-board devices); other devices are integrated onto expansion cards that are plugged into the system.

Every device must have a device driver in order to function.

Device Drivers.

A device driver is a software program designed to control a device.

The process of incorporating a device driver includes "installing" it into the NEXTSTEP filesystem as well as "configuring" it for runtime.

Each release of NEXTSTEP includes a set of device drivers for currently NeXT Certified and NEXTSTEP Compatible computers. These device drivers are pre-installed in the NEXTSTEP filesystem. As you install a release of NEXTSTEP, you must be sure the proper device drivers are configured for the devices in your computer.   (See the *Installing and Configuring NEXTSTEP Release 3.3* manual for more information.)

As manufacturers upgrade computers and expansion cards, NeXT upgrades the corresponding device drivers.   If you choose to use a computer or device that has been upgraded, you may have to get a newly upgraded device driver.   The NEXTSTEP Hardware Compatibility Guide lists recent upgrades, and NeXTanswers provides overview documents for upgraded device drivers.

If you get new device drivers, you will have to incorporate them into your system.

Getting Device Drivers.

Generally you get an upgraded device driver through email as a compressed file.   The result is generally a file with a   **.pkg**   extension. See section A: Decompressing a   **.compress**   File to a   **.pkg**   File.

You may get an upgraded device driver on a floppy disk. If so, it is likely to have a **.config** extension.

Installing Device Drivers.

The goal of installing a device driver is to ensure that the device driver file is in its proper form, with a **.config** extension, and that it is located in the **/usr/Devices** directory.

If you have a device driver with a **.pkg** extension, use the Install application to install it in the /usr/Devices directory. The **.pkg** file will remain, and you should probably move it or delete it.

See section B: Installing a Device Driver from a **.pkg** File.

If you have a device driver already in its proper form (with a **.config** extension), then copy it to the **/usr/Devices** directory.

Once a device driver is installed in your computer, you can select it for use with the Configure application.

You can install or upgrade NEXTSTEP across a network.

See the NetInstallHelper and RemoteUpgrade files in
/NetLibrary/Documentation/NextAdmin/ReleaseNotes   for
instructions.

Configuring Device Drivers.

Device drivers need certain computer resources in order to manage
the hardware devices they control.   Often these system resources are
in the form of Interrupt lines, Direct Memory Access channels (DMA),
I/O ports, and certain system memory regions.   These resources are
limited, and the configuration process assigns system resources
according to the claims of device drivers.

If you want to use a device driver, you must use the Configure
application to configure the device driver.   See section C: Configuring
a Device Driver.   Be sure to read Configure's help to understand
how to use Configure.   Look for specific information for each device
driver at the end of Configure's Help.

Tips

You may have device drivers installed that you are not using (and
therefore that you have not configured).

NEXTSTEP Release 3.3, Configure's help facility may present specific information for a device driver you are configuring.   Open Configure and scroll to the bottom of help to check for information concerning the device driver you want to configure.

Caution: Don't double-click a   **.config**   file to bring up the Configure application.

You can decompress and install device drivers on one NEXTSTEP computer, then copy them onto a floppy disk or send them across a network for use on another NEXTSTEP computer.

If your system seems hopelessly befuddled after you have tried to configure a device driver, log out and shut down as gracefully as you can, then reboot and enter config=Default at the   boot: prompt.

If you have installed an upgrade of NEXTSTEP itself, you should be sure to get rid of any device drivers left over from the previous version.

References and Trademark Information

For information about logging in and out, the Workspace Manager application, and the Installer application, see the NEXTSTEP User's Guide.

For information about the Configure application, read Configure's Help.

For information about installation and configuration, see Installing and Configuring NEXTSTEP Release 3.3 for Intel Processors and NeXT Computers as well as the NetInstallHelper and RemoteUpgrade files in **/NetLibrary/Documentation/NextAdmin/ReleaseNotes**.

For information concerning compatibility issues and bugs, refer to NeXTanswers.

For detailed information about configuring NEXTSTEP and understanding computer system buses, see the Summer/Fall '94 issue of *In Focus*, available from NeXTanswers.

If you notice anomolies or bugs, please contact bug_next@next.com.

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