

AIX 5L Version 5.1



# Installation Guide



AIX 5L Version 5.1



# Installation Guide

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Before using the information in this book, read the general information in “Appendix E. Notices” on page 101.

This edition applies to AIX 5L Version 5.1 and to all subsequent releases of this product until otherwise indicated in new editions.

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## About This Book

This book describes different ways to install AIX 5.1 of the operating system. This guide also describes how to use the applications available for configuring your system and installing additional software.

The information in this book can also be found on the *documentation CD*. This online documentation is designed for use with an HTML 3.2 web browser.

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## Who Should Use This Book

This Installation Guide is intended for customers installing AIX 5.1 on *standalone systems*. A standalone system is a machine that can boot (start up) by itself. It may or may not be on a network. If the machine is on a network, it does not need the assistance of a server to boot.

If you want to manage the installation and configuration of *diskless*, *dataless*, or standalone systems from a network installation server, refer to the *AIX 5L Version 5.1 Network Installation Management Guide and Reference*. Diskless and dataless systems cannot boot (start up) by themselves. They must use a remote server system to boot from the network. Diskless and dataless systems may have disk drives installed, but they do not boot from them.

---

## Highlighting

The following highlighting conventions are used in this book:

<b>Bold</b>	Identifies commands, subroutines, keywords, files, structures, directories, and other items whose names are predefined by the system. Also identifies graphical objects such as buttons, labels, and icons that the user selects.
<i>Italics</i>	Identifies parameters whose actual names or values are to be supplied by the user.
Monospace	Identifies examples of specific data values, examples of text similar to what you might see displayed, examples of portions of program code similar to what you might write as a programmer, messages from the system, or information you should actually type.

---

## Viewing README Files

The Base Operating System (BOS) includes a README file that contains information not included in other documentation. Each software product may also have its own README file with new information specific to that product. After you install BOS, view these files to learn important changes before using your system.

Use the following procedure to view the README files for Base Operating System (BOS) software and optional software products:

1. Log in as root user if you have not already done so.
2. Enter the following command at the system prompt:

```
cd /usr/lpp
```

3. Type:

```
ls */*README*
```

The system lists README files for each software product installed on your system.

4. To view a README file for a specific software product, use the following command:

```
pg xxx/README
```

In this example, xxx is the directory name associated with a particular software product.

Press Enter when the copyright screen appears. Press the following keys or key combinations to scroll through the README file:

<b>To page down</b>	Press Enter key.
<b>To page up</b>	Type the minus (-) key, then press the Enter key.
<b>To move forward x pages</b>	Type the plus (+) key and number of pages, then press the Enter key.  For example, to move forward five pages, type +5 and press the Enter key.
<b>To move backward x pages</b>	Type the minus (-) key and number of pages, then press the Enter key.  For example, to move backward five pages, type -5 and press Enter.

Type q at the : (colon) prompt to exit the README file.

---

## ISO 9000

ISO 9000 registered quality systems were used in the development and manufacturing of this product.

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## Related Publications

The following publications contain additional information related to the installation and management of AIX 5.1:

- *AIX 5L Version 5.1 System Management Guide: Operating System and Devices*
- *AIX 5L Version 5.1 System Management Guide: Communications and Networks*
- *AIX 5L Version 5.1 Network Installation Management Guide and Reference*
- *AIX 5L Version 5.1 Commands Reference*
- *AIX 5L Version 5.1 Files Reference*
- *AIX 5L Version 5.1 General Programming Concepts: Writing and Debugging Programs*
- *AIX 5L Version 5.1 System User's Guide: Operating System and Devices*
- *AIX 5L Version 5.1 System User's Guide: Communications and Networks*

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- RS/6000

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## Chapter 1. Installing the Base Operating System

This chapter provides an overview of the necessary steps to complete an installation of the AIX 5.1 Base Operating System (BOS).

There are three methods for installing the BOS:

- **New and Complete Overwrite**

Use this method to install AIX 5.1 on a new machine or to completely overwrite the BOS that exists on your system.

- **Preservation**

Use this method to replace an earlier version of the BOS but retain the root volume group, the user-created logical volumes, and the **/home** file system. It overwrites the **/usr**, **var**, **tmp**, and **/** (root) file systems. Product (application) files and configuration data are lost.

- **Migration**

Use this method to upgrade from AIX 4.3 or earlier versions of the BOS to AIX 5.1. This method preserves all file systems except **/tmp**, including the root volume group, logical volumes, and system configuration files.

**Note:** The installation procedure contained in this chapter pertains only to a new or preservation installation. For migration instructions, refer to “Migrating to AIX 5.1” on page 10.

The BOS installation program first installs the run-time **bos** image, then installs the appropriate filesets, depending on whether you are installing from a graphical or an ASCII system. The installation program automatically installs required message filesets and devices filesets, according to the language you choose and the hardware configuration of the installed machine.

Use the following steps to install AIX 5.1 on a new machine, to completely overwrite the BOS on an existing machine, or to install AIX 5.1 while preserving the user structure of an existing BOS.

---

## Electronic License Agreements

Beginning with AIX 5.1, software license agreements are shipped and displayed electronically, saving paper and allowing for electronic software distribution in the future. If a product has an electronic license agreement, it must be accepted before software installation can continue. In the case of initial BOS installation, you can view and accept or reject license agreements in a license agreement dialog after the installation has occurred, but before they the system is available for use as part of Configuration Assistant (graphical consoles) or Installation Assistant (ASCII consoles).

If a customized **bosinst.data** file is used (usually for unattended installations), the **ACCEPT\_LICENSES** field in the **control\_flow** stanza can be used to accept the license agreements so users are not prompted at reboot time. When performing a “push” install using NIM, the licenses must be accepted, either from the choices made when initializing the install or in a customized **bosinst.data** file, before the install can continue.

For additional software package installations, the installation cannot occur unless the appropriate license agreements are accepted. This option, as well as options to preview licenses, is offered in both installation interfaces. When using the **installp** command, use the **-Y** flag to accept licenses and the **-E** flag to view license agreement files on the media.

The Base Operating System (BOS) has a license agreement, but not all software packages do. When you agree to the license agreement for BOS installation, you are also accepting all license agreements for any

software installed automatically with the BOS. Some software, such as GNOME or KDE desktops, can be optionally installed during BOS installation; the appropriate licensing information for such software is displayed separately.

For more information on license manipulation, refer to the **inulag** command description in the *AIX 5L Version 5.1 Commands Reference*.

---

## Step 1. Completing the Prerequisites

Before starting the installation, complete the following prerequisites:

- All requisite hardware, including any external devices (such as tape drives, CD-ROM or DVD-ROM drives), must be physically connected. If you need further information, refer to the hardware documentation that accompanied your system.
- The installation media must be loaded in the boot device.
- The system you are installing *must be* set to boot from the device in which the installation media is loaded. On machines with system keys, turn the key to the **Service** position. For machines that do not have system keys, refer to the hardware documentation that came with your system to set the boot device.
- Other users who have access to your system must be logged off before you begin the installation.
- The machine on which you are installing must have 64 MB of memory. Machines with less than 64 MB of memory might not be able to boot from the installation media.
- There must be adequate disk space available for AIX 5.1. See the *AIX 5.1 Release Notes* for disk space requirements.
- If the system you are installing is currently running, create or locate a backup of the system. For instructions on how to create a system backup, refer to the Installation Guide for the version of the operating system currently installed on your system.
- If the system you are installing must communicate with other systems and access their resources, determine the following information for this host: network interface, IP address, hostname, and route to the network. If you do not know this information, contact the system administrator for this host.

---

## Step 2. Preparing Your System for Installation

Prepare for a preservation or complete-overwrite installation by doing the following:

1. Verify that your system is shut down. If your machine is currently running, you must power it off now by following these steps:
  - a. Log in as the root user.
  - b. Type the following command:

```
shutdown -F
```
  - c. If your system does not automatically power off, place the power switch in the Off (0) position.

**Attention:** You *must not* turn on the system unit until instructed to do so in “Step 4. Booting from Your Installation Media” on page 3.

2. Turn on all attached external devices. These include:
  - Terminals
  - CD-ROM or DVD-ROM drives
  - Tape drives
  - Monitors
  - External disk drives

Turning on the external devices first is necessary so the system unit can identify each peripheral device during the startup (boot) process.

---

### Step 3. Setting Up with an ASCII Terminal

If you are using a graphical terminal, skip directly to “Step 4. Booting from Your Installation Media”. If you are using an ASCII terminal, use the criteria listed below and your terminal reference documentation to set the communications, keyboard, and display options. The following settings are typical, but your terminal might have different option names and settings than those listed here.

**Note:** If your terminal is an IBM 3151, 3161, or 3164, press the Ctrl+Setup keys to display the Setup Menu and follow the onscreen instructions to set these options.

Communication Options	
Option	Setting
Line Speed (baud rate)	9600
Word Length (bits per character)	8
Parity	no (none)
Number of Stop Bits	1
Interface	RS-232C (or RS-422A)
Line Control	IPRTS

Keyboard and Display Options	
Option	Setting
Screen	normal
Row and Column	24x80
Scroll	jump
Auto LF (line feed)	off
Line Wrap	on
Forcing Insert	line (or both)
Tab	field
Operating Mode	echo
Turnaround Character	CR
Enter	return
Return	new line
New Line	CR
Send	page
Insert Character	space

---

### Step 4. Booting from Your Installation Media

1. Turn the system unit power switch from Off (O) to On (I). The system begins booting from the installation media.
2. If you have more than one console, each might display a screen that directs you to press a key to identify your system console. A different key is specified for each console displaying this screen. If this

screen displays, press the specified key *only* on the device to be used as the system console. (The system console is the keyboard and display device used for installation and system administration.) Press a key on one console *only*.

A screen displays, asking you to select a language to be used for installation instructions.

3. Select the language you prefer to use for installation instructions.
4. When the Welcome screen displays, type 2 in the **Choice** field and press Enter. Go to “Step 5. Verifying or Changing the Installation Settings” for instructions to verify or change installation settings.

**Note:** Although you can start the installation now with the default settings, it is recommended that you first verify your installation settings.

---

## Step 5. Verifying or Changing the Installation Settings

Verify the default installation settings from the Installation and Settings screen. If the installation and system settings are correct, type 0 in the **Choice** field and press Enter. Then go to “Step 6. Finishing the BOS Installation” on page 6.

**Attention:** *Do not* select the 0 option on the Installation and Settings screen until you have either verified the default settings or changed them to the correct settings, as the 0 choice immediately begins the installation.

To change the installation settings, use the following procedure:

1. Select the installation method (new, preservation, or migration) that is appropriate to your system environment.
  - a. Type 1 in the **Choice** field to select the **System Settings** option.
  - b. When the Change Method of Installation screen displays, type the number of your choice in the **Choice** field and press Enter.

**Note:** Available installation methods depend on whether your system has a previous version of AIX installed.

If you only want to install the next maintenance level of AIX, see “Installing Optional Software Products and Service Updates” on page 18. You can also use the following SMIT fast path to update existing filesets:

```
smit update_all
```

- c. When the Change Disk(s) screen displays, you can change the destination disk for the installation. If you selected the preservation or migration method of installation, the screen only lists disks containing a **rootvg**.
  - If the default shown is correct, type 0 in the **Choice** field and press Enter.
  - To change the destination disk, use the following procedure:
    - 1) Type the number for each disk you choose in the **Choice** field. *Do not* press Enter until you have finished selecting all disks. If you need to deselect a disk, type its number a second time.

**Note:** You can also specify a supplemental disk by typing 66 and pressing the Enter key for the **Disks not known to Base Operating System Installation** option. This option opens a new menu that prompts for a device support media for the supplemental disk. The device-support media is only needed when the device cannot configure with the generic SCSI or bus-attached device drivers. BOS installation configures the system for the disk and then returns to the Change Disk screen.

- 2) When you have finished selecting the disks, type 0 in the **Choice** field and press Enter. The Installation and Settings screen displays with the selected disks listed under System Settings.
- For AIX 5.1 complete-overwrite installations on Itanium-based platforms only:  
When the Select Disk(s) for Manual Partitioning screen displays, select the disks you want to manually partition. After you have finished selecting all your disks from the Change Disk(s) screen and pressed Enter, these disks are displayed on the Manual Partitioning screen. By default, none of the disks are initially selected, meaning they are auto-partitioned. If the default shown is correct, type **0** in the Choice field (to auto-partition all disks) and press **Enter**.  
To manually partition a disk, use the following procedure:
  - 1) Type the number for each disk to be manually partitioned in the Choice field. If you need to deselect a disk, type its number a second time.
  - 2) When you have finished selecting the disks, type **0** in the Choice field and press **Enter**.
  - 3) The **efdisk** utility is then launched for each of the disks you selected. The utility allows you to manually partition that disk. Refer to the *AIX 5L Version 5.1 Commands Reference* for instructions on using the **efdisk** utility.
  - 4) After you have exited the **efdisk** utility and manually partitioned all your disks, the Installation and Settings screen displays with the selected disks listed under System Settings.
2. Change the primary language environment, if needed. Use the following steps to change the primary language used by this installation.

**Note:** Changes to the primary language environment do not take effect until after BOS is installed and your system is rebooted.

- a. Type 2 in the **Choice** field on the Installation and Settings screen to select the **Primary Language Environment Settings** option.
- b. Select the appropriate set of cultural convention, language, and keyboard options. Most of the options are a predefined combination, however, you can define your own combination of options.
  - To choose a predefined Primary Language Environment, type that number in the **Choice** field and press Enter.
  - To configure your own primary language environment:
    - 1) Select **MORE CHOICES**.
    - 2) Page through the choices and select the **Create Your Own Combination** option.
    - 3) When the Set Primary Cultural Convention screen displays, type the number in the **Choice** field that corresponds to the cultural convention of your choice and press Enter.
    - 4) When the Set Primary Language screen displays, type the number in the **Choice** field that corresponds to your choice for the primary language and press Enter.
    - 5) When the Set Keyboard screen displays, type the number in the **Choice** field that corresponds to the keyboard attached to the system, and press Enter.
3. To set Advanced Options, type 3 and press Enter. The available options and their defaults are:

**1 Installation Package Set (Default)** (ASCII consoles) or

**1 Desktop (CDE)** (graphical consoles)

For ASCII systems, you can choose a Minimal or a Default installation. The Default program set might prompt for additional CD volumes during a BOS installation. When prompted, if you do not want to continue the installation or you do not have additional volumes, type **q** and press Enter to continue the installation process. The system at this point should have enough of the BOS loaded to be usable.

For graphical systems, if you do not choose a desktop (if you select NONE), a minimal configuration is installed including X11, Java, perl, SMIT, and the Web-based System Manager. If you choose CDE, Gnome, or KDE, the desktop and documentation service libraries are also installed. If you choose Gnome or KDE, the interface prompts you for the Toolbox for Linux Applications CD. If this CD is not available, you can type **q** to continue the installation without it.

Type 1 and press Enter to toggle between choices.



**Notes:**

- a. Migration installations use the Default configuration and update currently installed filesets to the new level.
- b. If you install the Minimal installation, a bundle is created, **Default\_Config.bnd**, that can be used to upgrade your installation to the Default installation.

**2 Enable Trusted Computing Base**

The TCB is the part of the system that is responsible for enforcing the information security policies of the system. All of the computer's hardware is included in the TCB, but a person administering the system should be concerned primarily with the software components of the TCB. If you install the Trusted Computing Base option, you enable the trusted path, trusted shell, and system integrity checking (**tcback** command). These features can *only* be enabled during BOS installation.

The choices are **yes** and **no**. To enable the Trusted Computing Base, type 2 and press Enter. The default is **no**.

**3 Enable 64-bit Kernel Support**

To toggle the choice between **no** (the Default) and **yes**, type 3 and press Enter. This option is effective only on 64-bit Common Hardware Reference Platform (CHRP) systems. If you choose **no**, the 64-bit kernel is still installed, but it is not linked to the running **/unix**. If you choose **yes**, the 64-bit kernel is installed and begins running when your system reboots. If you choose **yes** and are installing with the New and Complete Overwrite method, the file systems are created with JFS2 (Journaled File System 2), instead of JFS.

**Note:** If you want the 64-bit kernel to be the running kernel, but do not want JFS2 filesystems, then select **no**. After the install completes, use the following commands to switch to the 64-bit kernel:

```
ln -fs /usr/lib/boot/unix_64 /unix
ln -fs /usr/lib/boot/unix_64 /usr/lib/boot/unix
bosboot -ad/dev/ipldevice
```

Reboot your system afterwards.

---

**Step 6. Finishing the BOS Installation**

After prompting for confirmation on the installation settings, the actual installation process begins, as follows:

1. If your machine has a system key, turn the system key to the **Normal** position when you are prompted.
2. The Installing Base Operating System screen displays with the status of your installation.

For AIX 5.1 installations on Itanium-based platforms only, a message displays that lets you install extended hardware drivers. The extended hardware drivers CD contains additional hardware drivers not contained on the AIX product media. If you have not installed any extended hardware drivers and want to do so at this time, follow the instructions in the message. To continue without installing extended hardware drivers, simply press Enter. If you do not press any key within three minutes, the installation process continues.

After the base run-time environment is installed, status information displays about other software that is being installed.

3. The system automatically reboots.
4. After the system has restarted, you are prompted to configure your installation. "Chapter 3. Configuring the Operating System" on page 15 provides information on the configuration process.

**Note:** If the system being installed has 4GB or more of memory and you have performed an overwrite install, then a dedicated dump device might be created for you. If so, the device name is **/dev/lg\_dumplv**, and its size is based on the following formula:



4>=	RAM < 12	size of dump device= 1 GB
12>=	RAM < 24	size of dump device= 2 GB
24>=	RAM < 48	size of dump device= 3 GB
	RAM >= 48	size of dump device= 4 GB



---

## Chapter 2. Migration Installation

*Migration* is the default installation method to move from AIX 3.2 or any version of AIX Version 4 of the operating system to AIX 5.1.

**Note:** If you only want to install the next maintenance level of the operating system, see “Chapter 4. Optional Software Products and Service Updates” on page 17, or use the **smit update\_all** SMIT fast path to update the filesets currently installed.

During a migration, the installation process determines which optional software products are installed on the existing version of the operating system. Components from previous releases that have been replaced by new software in AIX 5.1 are installed at the AIX 5.1 level.

When migrating from AIX 3.2, the following occurs:

- All files in **/usr/lib/drivers**, **/usr/lib/microcode**, **/usr/lib/methods** and **/dev** are removed from the system, so software support for non-device drivers must be reinstalled. Non-device software products remain on the system, but they should function correctly if they are among those files described in “Binary Compatibility Between Earlier Versions and AIX 5.1”.
- The following software products are removed from the system:
  - AIXwindows Interface Composer
  - Remote Customer Services
  - AIXwindows Development Environment
  - Display PostScript functionality from AIXwindows Run-Time Environment Extensions
  - Performance Tools functionality from Extended Commands
  - OpenGL and graPHIGS

In most cases, user configuration files from the previous version of a product are saved when the new version is installed during a Migration installation.

---

### Binary Compatibility Between Earlier Versions and AIX 5.1

After a migration installation, you might notice filesets on the system in the **OBSOLETE** state. Obsolete filesets were installed by earlier versions of the operating system, but they remain on the current system because the migration only replaced some, but not all, of the files they contain. These filesets remain necessary for systems running mixed levels of the operating system.

During a migration installation, the following filesets are automatically included:

- Base operating system commands
- Base operating system libraries
- Base operating system curses/termcap
- Base operating system networking
- Base operating system directories/files (symlinks)
- Messages
- X11R3
- X11R4
- X11 fonts

All operating system applications based on AIX 3.2 and those intended for use with POWER family, POWER2, and POWER-based models run compatibly on AIX 5.1 without recompilation for those same models. The only exceptions to this statement are applications using:

- Unsupported self-loadable kernel extensions
- Certain High Function Terminal (HFT) control interfaces
- X11R3 input device interfaces
- CIO LAN device driver interface
- SCSI device configuration methods (IHVs)
- nlist subroutine interface
- DCE threads
- Applications compiled using POWER2 or POWER-based compiler options, but executed on models other than POWER2 or POWER-based.

**Note:** Any program that must run in all environments (POWER family, POWER2, and POWER-based models 601 and higher) must be compiled using the common mode of the compiler. Programs compiled to exploit POWER2 technology must be run on POWER2 processors. Existing code need not be recompiled to run.

Applications created on a system using AIX 5.1 might not function reliably on a system using AIX Version 3. Applications must have been created using the operating system's shared libraries for these statements to apply.

A system using AIX 3.2 can operate as a server system for client machines using AIX 5.1 with the following exceptions:

- Network installation of AIX 5.1 clients
- Service SNA or X.25 to AIX 5.1 clients
- Service HCON to AIX 5.1 clients
- Service CGE extensions of PEX and PEX-PHIGS
- Use of AIX 5.1 client installation formats.

Font servers might be required on the AIX 5.1 clients to reliably handle AIXwindows between server and client.

A system using AIX 5.1 might operate as a server system for client machines using AIX 3.2 or later versions as long as the necessary compatibility options are installed. All statements about binary compatibility apply in this case. AIX 5.1 applications might not execute reliably on AIX Version 3 systems using remote network mounts of AIX 5.1 file system.

---

## Migrating to AIX 5.1

Use the following steps to migrate your current version of the operating system to the AIX 5.1 BOS:

- "Step 1. Completing the Prerequisites"
- "Step 2. Preparing Your System for Installation" on page 2
- "Step 3. Booting from Your Installation Media" on page 11
- "Step 4. Finishing the BOS Migration" on page 12

### Step 1. Completing the Prerequisites

Before starting the migration, complete the following prerequisites:

- All requisite hardware, including any external devices (such as tape drives or CD/DVD-ROM drives), must be physically connected. If you need further information, refer to the hardware documentation that accompanied your system.

- Before migrating your BOS to AIX 5.1, ensure that the root user has a primary authentication method of **SYSTEM**. You can check this condition by typing the following command:

```
lsuser -a auth1 root
```

Change the value, if needed, by typing the following command:

```
chuser auth1=SYSTEM root
```

- Other users who have access to your system must be logged off before you begin the installation.
- The machine on which you are installing must have 64MB of memory. Machines with less than 64MB of memory might not be able to boot from the installation media.
- There must be adequate disk space available for AIX 5.1. See the *AIX 5.1 Release Notes* for disk space requirements.
- If the system you are installing is currently running, create or locate a backup of the system. For instructions on how to create a system backup, refer to the Installation Guide for the version of the operating system currently installed on your system.
- If the system you are installing must communicate with other systems and access their resources, determine the following information for this host: network interface, IP address, hostname, and route to the network. If you do not know this information, contact the system administrator for this host.

## Step 2. Preparing Your System for Installation

Prepare for migrating to the AIX 5.1 BOS by doing the following:

1. Verify that your system is shut down. If your machine is currently running, you must power it off now by following these steps:
  - a. Log in as the root user.
  - b. Type the following command:

```
shutdown -F
```
  - c. If your system does not automatically power off, place the power switch in the Off (0) position.  
**Attention:** You *must not* turn on the system unit until instructed to do so in “Step 3. Booting from Your Installation Media”.
2. Turn the system key (if present) to the Service position.
3. Turn on all attached external devices. These include:
  - Terminals
  - CD-ROM or DVD-ROM drives
  - Tape drives
  - Monitors
  - External disk drives

Turning on the external devices first is necessary so the system unit can identify each peripheral device during the startup (boot) process.

## Step 3. Booting from Your Installation Media

**Note:** If you are using an ASCII console that was not defined in your previous system, complete “Step 3. Setting Up with an ASCII Terminal” on page 3 before proceeding.

The following steps migrate your current version of the operating system to AIX 5.1.

1. Turn the system unit power switch from Off (0) to On (|). The system begins booting from the installation media.
2. The three-digit LED should display c31 after several minutes.

If you have more than one console, each might display a screen that directs you to press a key to identify your system console. A different key is specified for each console displaying this screen. If this screen displays, press the specified key *only* on the device to be used as the system console. (The system console is the keyboard and display device used for installation and system administration.) Press a key on one console *only*.

A screen displays asking you to select a language to be used for installation instructions.

3. Select the language you prefer to use for installation instructions.
4. When the Welcome screen displays, either begin the migration immediately or verify the installation and system settings. If you want to change any settings, follow the procedure in “Step 5. Verifying or Changing the Installation Settings” on page 4.

**Notes:**

- You should not have to change settings simply to select the migration installation method. If a previous version of the operating system exists, the installation method defaults to migration.
- The available installation methods vary, depending on the version of the operating system that is currently installed (before migration).
- If you only want to install the next maintenance level of AIX, see “Installing Optional Software Products and Service Updates” on page 18. You can also use the following SMIT fast path to update existing filesets:

```
smit update_all
```

## Step 4. Finishing the BOS Migration

After prompting for confirmation, the installation process begins. If the system key is present and is not already in the Normal position, turn the system key to the Normal position when you are prompted with the following message:

Turn the system key to the NORMAL position.

The Installing Base Operating System screen displays.

As the installation progresses, the numbers increment in the fields that show percentage complete and elapsed time to indicate the installation status. After the base run-time environment is installed, status information displays about other software that is being installed. After the BOS installation is complete, the system automatically reboots.

After the system has restarted, you are prompted to configure your installation of the BOS. Go to “Chapter 3. Configuring the Operating System” on page 15 for information on the configuration process.

**Note:** If there is not enough space to migrate all of the usually migrated software, a collection of software called a Migration Bundle will be available when you install additional software later. You must create additional disk space on the machine on which you want to install, and then you can run **smit update\_all**. to complete the installation, during which the Migration Bundle will be installed.

If you are not doing the installation from a graphics console, a Graphics\_Startup bundle is created. Refer to “Installing Optional Software Products and Service Updates” on page 18 for more information about installing software bundles and for information on migrating or installing optional software products. “Maintaining Optional Software Products and Service Updates” on page 22 describes how to remove software from the system to free up disk space.

---

## Migrating Network Software

Consider the following when you are migrating network software:

## Migrating TCP/IP from AIX 3.2

Configuration files are saved in **/lpp/save.config/etc**. The file from the previous release is named **filename.old**, and the shipped file is named **filename.new**. For example, when **/etc/rc.tcpip** is migrated:

<b>/etc/rc.tcpip</b>	is upgraded and your configuration information is saved.
<b>/lpp/save.config/etc/rc.tcpip.old</b>	is the original <b>rc.tcpip</b> file (with your configuration changes).
<b>/lpp/save.config/etc/rc.tcpip.new</b>	is the version shipped with AIX 5.1 (without your configuration changes).

The following files are migrated:

- **/etc/rc.net**
- **/etc/rc.bsdnet**
- **/etc/services**

All the previously defined services are retained. The AIX 5.1 **/etc/services** file contains all the defined services from the Request for Comment (RFC) and Internet Engineering Task Force (IETF) standards document. Where a conflict exists between a service you have previously defined and a globally defined service (from an RFC), your service is retained and the official one is commented out.

In most cases, your TCP/IP configuration migrates successfully. If you have made substantial changes to any of the following files, check that everything you changed still works correctly after migration is complete.

- **/etc/inetd.conf**
- **/etc/rc.tcpip**
- **/etc/bootptab**
- **/etc/3270.keys**
- **/etc/3270keys.hft**

## Migrating NFS and NIS from AIX 3.2

The **/etc/rc.nfs** and **/var/yp/Makefile** files are not migrated. The old files are saved in **/lpp/save.config/etc/rc.nfs** and **/lpp/save.config/var/yp/Makefile**. You must configure your Network Information Service (NIS) domain name before an NIS client will work.

For NIS servers, the NIS databases are unchanged. You must reconfigure the NIS domain and restore any changes you previously made to **rc.nfs** and the **Makefile** because **rc.nfs** and **Makefile** are replaced. The old files are saved in **/lpp/save.config** with their corresponding path names. The user and group information is retained because the **passwd** and **group** files are not changed in a migration installation.





---

## Chapter 3. Configuring the Operating System

This chapter provides information concerning the tasks you might need to perform after installing the BOS (Base Operating System). Complete all configuration tasks that apply to your newly installed system. Two configuration tools are available to assist you. Depending on which type of console you are using, one of the following usually begins automatically after installation:

- “Configuration Assistant” for graphical consoles
- “Installation Assistant” on page 16 for ASCII consoles

### Notes:

- If your system was installed by a network installation server, the Configuration Assistant or Installation Assistant does not display when the BOS installation program completes.  
If your system was installed using a system backup image, or if your BOS installation was customized, or if you selected Migration Installation from AIX 4.2 or later, the Configuration Assistant or Installation Assistant might not display when the BOS installation program completes.
- The Configuration Assistant and the Installation Assistant do not contain the tasks needed to configure your machine as a server. If you need to configure your system for a specific resource, refer to the documentation pertaining to that resource.
- If your terminal type is not set, the first menu displayed by the ASCII Installation Assistant requires you to enter your terminal type (tty). If you enter a terminal type that is not valid, this menu redisplay until a valid type is entered.  
If you enter a valid terminal type that does not match your terminal, the next screen displayed might be unreadable. In this case, press the break key sequence to return to the Set Terminal Type screen. For most terminal types, the break key sequence is Ctrl-C.

---

## Configuration Assistant

On a system with a graphical interface, the newly installed BOS reboots and the Configuration Assistant starts to guide you through the configuration tasks. For example, much of the processing on a system uses the date and time-of-day information, requiring the system have the date and time set correctly.

If there are outstanding software license agreements that must be accepted before you can continue to use the machine, the Configuration Assistant prompts you to view and accept these agreements.

The Configuration Assistant guides you through the following configuration tasks:

- Setting the system date and time for your time zone.
- Setting a root user account password to restrict access to system resources.
- Checking the system storage and paging space needed to install and use additional software applications (and increasing them, if necessary).
- Setting up your system to communicate with other systems and access their resources. Contact your system and network administrators for the correct information for this installation.

**Note:** If you need to configure your machine as an NFS server, refer to NFS Installation and Configuration in the *AIX 5L Version 5.1 System Management Guide: Communications and Networks*.

- Configuring Web-based System Manager to run in a Web browser (applet mode).
- Installing online documentation and the Documentation Library Service, which lets users conduct searches of online documentation. (It is highly recommended that you complete this configuration task, because some applications depend on the Documentation Library Service to conduct searches of their online manuals and helps.) Also, this configuration task optionally helps install a Web browser, Web server, and the associated documentation.

The graphical interface for the Configuration Assistant provides step-by-step instructions for completing each configuration task. The tasks are presented to you in a logical sequence. Complete all configuration tasks before you use your system.

When you exit the Configuration Assistant, the guide asks you whether you want to start Configuration Assistant again the next time you restart the operating system. After exiting the Configuration Assistant, users can begin logging in to and using AIX 5.1.

If you need to access the Configuration Assistant later, type `configassist` on the command line.

---

## Installation Assistant

On a system with an ASCII interface, the newly installed BOS reboots and starts the Installation Assistant to guide you through completing configuration tasks. You must have root user authority to use the Installation Assistant. To access the Installation Assistant later, type `install_assist` on the command line. You can also access it from a graphical system through the SMIT **smit assist** fast path.

If there are outstanding software license agreements that must be accepted before you can continue to use the machine, the Installation Assistant prompts you to view and accept these agreements.

The Installation Assistant guides you through the following configuration tasks:

- Setting the system date and time for your time zone.
- Setting a root user account password to restrict access to system resources.
- Confirming or changing the device you use to install additional software. The device can be a CD-ROM, tape drive, or a local or remote directory.
- Checking the system storage and paging space needed to install and use additional software applications.

**Attention:** You might not have enough paging space if you terminate the Installation Assistant without completing this configuration task and exiting, using the **Exit** choice.

- Setting your system to communicate with other systems and access their resources. Contact your system and network administrators for the correct information for your system.
- Changing the primary language environment or adding a secondary language environment.
- Creating user accounts.
- Configuring your printer and adding print queues for local printers and remote print servers.
- Importing any existing volume groups.
- Installing additional software and adding license passwords, if required, to enable the software to run.
- Backing up the system.
- Exiting Installation Assistant and logging in to the system.

---

## Where Do I Go Next?

To learn about late-breaking information that might include information on the configuration process and installed software, refer to README files. For information on how to view README files, see “Viewing README Files” on page vii.

If you are installing from CD/DVD-ROM, or would like more information on installing optional software, refer to “Installing Optional Software Products and Service Updates” on page 18.

---

## Chapter 4. Optional Software Products and Service Updates

After the Base Operating System (BOS) is installed, you might want to install optional software or service updates.

Optionally installable software includes:

- **Optional Software Products:** Software that is not automatically installed on your system when you install the Base Operating System (BOS). Software products include those shipped with the operating system and those purchased separately. The BOS is divided into subsystems that can be individually updated, such as **bos.rte.install**. Any update that begins with **bos.rte** updates a BOS subsystem.

**Note:** If you are installing the Kerberos package or the DCE server software, see “Appendix D. Installing Kerberos Version 5” on page 97 for important configuration information.

- **Service Updates:** Software that corrects a defect in the BOS or in an optional software product. Service updates are organized by filesets. This type of update always changes part of a fileset.

Software products can be divided into the following categories:

<b>Licensed Program</b>	A licensed program (also known as a <i>product</i> ) is a complete software product including all packages associated with that licensed program. For example, <b>bos</b> (the Base Operating System) is a licensed program.
<b>Package</b>	A group of separately installable units that provide a set of related functions. For example, <b>bos.net</b> is a package.
<b>Fileset</b>	An individually installable option. Filesets provide a specific function. An example of a fileset is <b>bos.net.nfs.client 5.1</b> . For more information on fileset packaging, see “Fileset Installation Packaging” on page 87.
<b>Fileset Update</b>	An individually installable update. Fileset updates either enhance or correct a defect in a previously installed fileset.
<b>Bundle</b>	A collection of packages, products, or individual filesets that suit a specific purpose, such as providing personal productivity software or software for a client machine in a network environment. A set of bundles is provided with BOS that contain a specific set of optional software. For more information on bundle packaging, see “Bundle Packaging” on page 87.

A product can be composed of several packages, which in turn can be composed of different filesets. A product might be installed in its entirety, or only certain packages or filesets for the product might be installed. Software products are subdivided in this way, because many software products are large and have many pieces that can be used independently. Dividing a product into separately installable filesets allows you to install only those filesets you need.

You can install all the filesets included in a package or the entire product, or you can install only *selected* filesets, especially if you have limited hard disk space on your system.

---

### Software Product Identification

The product name and level number identify a software product. The format for a software product level in AIX 5.1 is:

*versionnumber.releasenumber.modificationlevel.fixlevel*

Each field in the software product identification is defined as follows:

- The *versionnumber* field consists of 1 to 2 digits that identify the version number.
- The *releasenumber* field consists of 1 to 2 digits that identify the release number.
- The *modificationlevel* field consists of 1 to 4 digits that identify the modification level.

- The *fixlevel* field consists of 1 to 4 digits that identify the fix level.

For example, 04.01.0000.0000 is a software product level number, and 04.01.0001.0032 is a software product update level. It is not necessary to include the leading zeroes in the version, release, modification level, and fix level fields of the level. Level 04.01.0000.0000 can also be written as 4.1.0.0.

---

## Software Licensing

There are two types of software licensing that can be implemented in the software purchase: run-time licensing and acceptance of software license agreements. Normally, software requiring run-time licenses is only selected for installation when you have a license to use that software. Although the Web-based System Manager and System Management Interface Tool (SMIT) allow you to install licensed software even if you do not own a license, you might be prevented from using the newly installed software until you have obtained the appropriate license.

Accepting software license agreements requires that the license agreement be accepted as part of the installation process. If software installed as part of your Base Operating System installation requires accepting a software license agreement, you cannot exit the Configuration Assistant (or the Installation Assistant for non-graphical consoles) until the license agreement has been accepted. You can view as well as accept the license agreement. The BOS installation can be customized to automatically accept software licenses. Refer to “Chapter 8. Customized BOS Installations” on page 55 for more information.

For optional software installation, you can preview the license agreements on the installation media using the **smit license\_on\_media** fast path or the **installp -EI** command. During the installation process, there is a menu item you can select to accept the software license, or you can use the **installp** command with the **-Y** flag. To view accepted license agreements on a system, you can use the SMIT **smit installed\_license** fast path or the **lsipp -E** command. To view licenses using the Web-based System Manager, type **wsm** to start the application, and select **Software**. When a product is uninstalled, the license agreement acceptance is changed to the inactive state. If the product is reinstalled, you will not be prompted to reaccept the license agreement.

After completing the prerequisites in this section, your next step is deciding whether to install software with the Web-based System Manager or with SMIT. Descriptions of both applications are included in this chapter.

Before you install optional software and service updates, refer to the specific instructions that accompany your installation media. If you ever need to reinstall your system, refer to the installation media instructions.

**Note:** For information about developing software products that are installed using the **installp** command, refer to *Packaging Software for Installation in AIX 5L Version 5.1 General Programming Concepts: Writing and Debugging Programs*.

---

## Installing Optional Software Products and Service Updates

If either of the following conditions apply to you, go to the referenced item. Otherwise, continue with the procedures in this chapter.

- If you need to commit updates or remove previously installed software, go to “Maintaining Optional Software Products and Service Updates” on page 22.
- If you are using a network installation server, refer to *AIX 5L Version 5.1 Network Installation Management Guide and Reference*.

## Step 1. Completing the Prerequisites

Before installing optional software or service updates, complete the following prerequisites:

- You must be logged in to the system as the root user.
- AIX 5.1 BOS must be installed on your system. If the BOS is not yet installed on your system, go to “Chapter 1. Installing the Base Operating System” on page 1, or if you are installing over a network, refer to the *AIX 5L Version 5.1 Network Installation Management Guide and Reference*.
- Either insert the media that contains the optional software or service updates into the appropriate drive or know the local or routed path to the software.
- If you are installing service updates and do not have a current backup of your system, use the procedures in “Chapter 6. Creating System Backups” on page 37. To create a system backup, you must have the backup fileset (**bos.sysmgt.sysbr**) installed on your system.
- If system files have been modified, it is a good idea to back them up separately before updates are applied, because the update process might replace configuration files.

In SMIT, you can set the **DETAILED Output** field to **yes** to list the files being restored during an install.

In Web-based System Manager, expand the **Software** container and choose **Installed Software**. From the **Software** menu, select **New Software (Install/Update)** → **Install Additional Software** → **Advanced Method**. In the resulting screen, choose the source drive and click on **Advanced**. In the resulting dialog, click beside **Show detailed messages**.

You can also use the **installp** command with the verbose option (**-V2**) to show which files have been updated.

- If you are installing from CD-ROM or DVD-ROM and currently have a mounted *documentation CD* in the same CD/DVD-ROM drive that you want to install from, run the following commands in the sequence shown:

```
unlinkbasecd  
umount /info cd
```

- Press the eject button on the CD/DVD-ROM drive for at least two seconds to eject the documentation CD/DVD-ROM.

## Step 2. Completing the Installation

Optional software products and service updates can be installed using system management tools that come with the operating system. The following sections provide a brief description of the procedures:

- Web-based System Manager “Installing Optional Software Products or Service Updates with Web-based System Manager”
- System Management Interface Tool (SMIT) “Installing Optional Software and Service Updates Using SMIT” on page 20

### Installing Optional Software Products or Service Updates with Web-based System Manager

The graphical interface provides access to Web-based System Manager options for installing the following:

- Optional software “Installing Optional Software” on page 20
- Service updates “Installing Service Updates” on page 20
- Software bundles “Installing Software Bundles” on page 20

The Web-based System Manager allows you to install software as well as to change the system’s default install settings and specify other options. By default, the Web-based System Manager *applies* and *commits* any software updates you are installing. However, you can change this default setting and have only the software updates applied.

**Note:** Base software applications are always committed. If a previous version of the software is installed, it cannot be saved.

### ***Installing Optional Software:***

1. Start the Web-based System Manager by typing **wsm** on the command line.
2. Expand the machine name.
3. Expand **Software** in the Navigation area.
4. Select **Overview and Tasks**.
5. Select **Install Software**.

### ***Installing Service Updates:***

1. Start the Web-based System Manager by typing **wsm** on the command line.
2. Expand the machine name.
3. Expand **Software** in the Navigation area.
4. Select **Overview and Tasks**.
5. Select **Update Software to the Latest Level**.

### ***Installing Software Bundles:***

1. Start the Web-based System Manager by typing **wsm** on the command line.
2. Expand the machine name.
3. Expand **Software** in the Navigation area.
4. Select **Installed Software**.
5. From the **Software** menu, select **New Software (Install/Update) —> Install Bundles (Easy)**.

## **Installing Optional Software and Service Updates Using SMIT**

The following installation paths are available in SMIT:

### **Install Software**

Install or update software from the latest levels of software available on the media. To shorten the list of software displayed, message and locale software are omitted from the list. To use this option, type `smit install_all` on the command line.

### **Update Installed Software to Latest Level**

Update all currently installed software to the latest level available on the installation media. To use this option, type `smit update_all` on the command line.

### **Install Software Bundle**

Install complete bundles of software simply by specifying the input device and which bundle you are installing. You can also preview a bundle installation to see what software will be installed and how much space is required in the file system to install the bundle. To use this option, type `smit install_bundle` on the command line.

### **Update Software by Fix**

Install a specific fix for a problem. This menu allows you to list all service fixes on the media and select a fix to install. You can also preview the installation to see what software will be updated and how much space is required in the file system to apply the fix. To use this option, type `smit update_by_fix` on the command line.

### **Install and Update from ALL Available Software**

Install or update software from all software available on the media. To use this option, type `smit install_all` on the command line.

**Note:** If a problem occurs during the installation of optional software that causes the installation process to halt abnormally, you might have to complete a *cleanup* procedure to remove the partially installed software from the system before attempting to reinstall it. If the system instructs you to do a cleanup, go to “Cleaning Up Optional Software Products and Service Updates” on page 24.



## Completing the SMIT Installation and Reading the Status Messages

This section describes the system activity and actions that you must take after the installation process has begun.

1. When you press Enter to start the installation, the COMMAND STATUS screen displays. A series of messages display as the installation proceeds. The amount of time that the installation takes varies depending on your system and the software you are installing and updating.

**Note:** The system might prompt you to insert the volume of the installation media with a message similar to the following:

```
Mount volume 2 on /dev/cd0.  
Press the Enter key to continue.
```

When this message displays, insert the specified media and press Enter.

When the installation finishes, the **Command: status** field on the COMMAND STATUS screen changes to **OK** or **failed**. **OK** indicates that the installation ran to completion, although some filesets may not have installed successfully. The **failed** status means that there was a problem with the installation. Although a preview installation always finishes with an **OK** status, always check the summaries.

For information about error messages, refer to “Acting on System and Error Messages” on page 75.

2. When the installation halts or finishes, the screen returns to the top of the list of messages that display during installation. You can review the message list as described in the next step, or you can exit SMIT and review the **smit.log** file (**/smit.log** or **/home/user\_id/smit.log**).
3. Review the message list for error messages on software products or service updates that may not have been successfully installed. Use the following procedure to correct any errors in the installation:
  - a. Look at the pre- and post-installation summaries at the end of the message list to see whether any installation failure occurred.
  - b. Use the message list to determine problems and which software products or service updates were involved. For example, space limits might have been exceeded or the requisites might not have been met for some software. The system lists how much extra space is needed and which requisite software products or service updates to install.
  - c. Any product that is marked as **FAILED**, **BROKEN**, or **CANCELLED** can be reinstalled after the condition that caused the failure has been corrected. You do not need to reinstall any service update or software product that was marked as **SUCCESS** in the Installp Summary report. If you need to perform the installation again, change installation settings as appropriate. For example, if requisites were missing, set **AUTOMATICALLY install requisite software?** to **yes**. If there was not enough space to complete the installation, set **EXTEND file systems if space needed?** to **yes**.  
If you need to install again and you have multivolume media, insert volume 1. Press F3 to return to the previous screen, then restart the installation. See “Acting on System and Error Messages” on page 75 for information about **bosboot** command errors that may occur while the installation program is running, and about recovery procedures for these errors.
  - d. If the installation was interrupted (for example, a power failure), you might need to use the cleanup procedure before continuing. Press F10 to exit SMIT, and refer to “Cleaning Up Optional Software Products and Service Updates” on page 24.
  - e. If the software has been installed successfully, and you have no other software to install, go to Step 4.

If you have additional software to install from a different installation media, remove the media that is in that drive and insert the new media.

Press F3 to return to the previous screen and continue installing the software product or service update.

4. Press F10 to exit SMIT.
5. Remove all installation media from the drives.
6. Reboot your system when you are directed by typing:

```
shutdown -Fr
```

---

## Maintaining Optional Software Products and Service Updates

During and after installation, four major maintenance actions can be taken with optional software products and service updates. Optional software and service updates can be:

- Applied “Apply Action (Service Updates Only)”
- Committed “Commit Action (Service Updates Only)”
- Rejected “Reject Action (Service Updates Only)” on page 23
- Removed “Remove Action (Software Products Only)” on page 23.

Whether a particular action can be taken depends on whether the action is being applied to the entire software product, or only to a service update that has had a previous action taken on it.

You can perform these actions using either the Web-based System Manager or the System Management Interface Tool (SMIT) or by using commands directly from the command line. The following sections briefly describe how to do each action using Web-based System Manager, SMIT, or a command. Both Web-based System Manager and SMIT provide online help to guide you through each process.

### Apply Action (Service Updates Only)

When installing a service update, it can be left in the *applied* state. In this state, the former version of that software product is saved in the `/usr/lpp/PackageName` directory. Service Updates in the applied state allow you to restore the former version of the software without having to reinstall it.

Only service updates can be placed in the applied state. In contrast, after you install an entire software product, the product is left in the *committed* state. Software products in the committed state do not save the previous version of the software, because two versions of the same software product cannot be installed at the same time.

#### To apply a service update using Web-based System Manager:

1. Start the Web-based System Manager by typing `wsm` on the command line.
2. Expand the machine name.
3. Expand **Software**.
4. Select **Overview and Tasks**.
5. Select **Update Software to the Latest Level**.

#### To apply a service update using SMIT:

Type `smit update_by_fix` on the command line.

#### To apply a service update from the command line:

Use the `installp -a` command to only apply the update.

### Commit Action (Service Updates Only)

Committing a service update removes the previous version of a product from the system, which conserves disk space. After a software product or update has been committed, it cannot be deleted from the system except by removing the entire software product (the base level product and all of its updates) or by force-installing it back to a previous level. You must have the base level of the fileset available on media to do a force-installation.



Although applying and committing a service update are considered separate actions, both can be accomplished while installing the update. In fact, the default action under Web-based System Manager and SMIT is to both apply and commit the service update during installation. This default can be changed to just apply the update.

**To commit a service update using Web-based System Manager:**

1. Start the Web-based System Manager by typing **wsm** on the command line.
2. Expand the machine name.
3. Expand the **Software** container.
4. Select **Installed Software**.
5. From the **Software** menu, choose **Software Utilities** → **Commit Applied Updates**.

You can list all service updates in the applied state by selecting **List Installed Software** → **Updates in Applied State** from the Software menu.

**To commit a service update using SMIT:**

Type `smit commit` on the command line.

You can list all service updates in the applied state by typing `smit list_installed` on the command line.

**To commit a service update from the command line:**

Use the `installp -c` command to commit applied updates.

You can list all service updates in the applied state by typing `installp -s` on the command line.

## Reject Action (Service Updates Only)

When you reject an applied service update, the update files are removed from the system and the previous version of the software is restored. Only service updates in the applied state can be rejected. You can use the Web-based System Manager or SMIT to reject applied service updates.

**To reject a service update using Web-based System Manager:**

1. Start the Web-based System Manager by typing **wsm** on the command line.
2. Expand the machine name.
3. Expand the **Software** container.
4. Select **Installed Software**.
5. From the **Software** menu, choose **Software Utilities** → **Reject Applied Updates**.

**To reject a service update using SMIT:**

Type `smit reject` on the command line.

**To reject a service update from the command line:**

Use the `installp -r` command to reject an applied update.

## Remove Action (Software Products Only)

When you remove a software product, that product's files are removed from the system and the Software Vital Product Data information is changed to indicate that the product is removed. The remove process also attempts to restore the system's configuration to its previous state, although this is dependent on the product and might not always be complete. After a product is removed, no version of that product remains running on the system.

Use the Web-based System Manager or SMIT to remove software products. In either application, if you set the **Remove dependent software?** field to **yes**, any requisite software (software that is dependent on the product you are removing) is also removed, unless it is required by other software on your system.

**To remove a software product using Web-based System Manager:**

1. Start the Web-based System Manager by typing **wsm** on the command line.
2. Expand the machine name.
3. Expand the **Software** container.
4. Select **Installed Software**.
5. Select the software product you want to remove.
6. From the **Selected** menu, choose **Remove Software**.

**To remove a software product using SMIT:**

Type `smit remove_fast` on the command line.

**To remove a software product from the command line:**

Use the `installp -u` command to remove the product.

---

## Cleaning Up Optional Software Products and Service Updates

**Note:** This procedure applies only to the update or installation of optional software products. If your AIX 5.1 BOS installation was unsuccessful, see “Accessing a System That Does Not Boot” on page 71 for more information.

This section describes how to clean up software products and service updates after an interrupted installation. The cleanup procedure attempts to delete items that were partially installed or left in an incomplete state. For example, after an update is interrupted, the `lspp -l` command might report the update status as **applying** rather than **applied**.

The cleanup procedure attempts to revert the update to its previous state. For example, when cleaning up an update that was interrupted in the **committing** state, the cleanup procedure attempts to return the update to its **applied** state.

If the interruption occurs during the initial state of an installation, then the cleanup procedure attempts to delete the installation entirely and restore the previous version of the product (if there is one). When the previous version is restored, it becomes the active version. When the previous version cannot be restored, the software is listed by the `lspp -l` command as *BROKEN*.

When the product is deleted or *BROKEN*, you can attempt to reinstall the software. Any product in the *BROKEN* state cannot be cleaned up; it can only be reinstalled or removed.

The system automatically initiates a cleanup when an installation fails or is interrupted. Normally, you must initiate a cleanup procedure if the system shuts down or loses power during an installation or if the installation process terminates abnormally. Occasionally, you are prompted to reboot (restart) the system after running the cleanup procedure.

**To initiate a cleanup procedure using Web-based System Manager:**

1. Start the Web-based System Manager by typing **wsm** on the command line.
2. Expand the machine name.
3. Expand the **Software** container.
4. Select **Installed Software**.
5. From the **Software** menu, choose **Troubleshooting** → **Cleanup Failed or Interrupted Installation**.

**To initiate a cleanup procedure using SMIT:**

1. Type `smit maintain_software` on the command line.
2. Select **Clean Up After Failed or Interrupted Installation**.

**To initiate a cleanup procedure from the command line:**

Type `installp -C` on the command line.

If you get a message indicating that no products were found that could be cleaned up, you may have executed the cleanup procedure when it was not needed. Try your installation again.

If you get a message indicating that you need to clean up a failed installation, contact your point of sale for assistance.

---

**Where Do I Go Next?**

At this point, you might want to do the following:

- Read the README files that were shipped with the operating system. Any additional software you installed also might have associated README files with late-breaking news. For information on how to view README files, refer to “Viewing README Files” on page vii.
- Go to “Chapter 5. Documentation Library Service and Online Documentation” on page 27 and read the introductory material. This chapter guides you through installing the Documentation Library Service or the operating system’s online documentation.
- Create a new backup of your system. Go to “Chapter 6. Creating System Backups” on page 37.



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## Chapter 5. Documentation Library Service and Online Documentation

This chapter provides information for the following topics:

- “Chapter 5. Documentation Library Service and Online Documentation”
- “Installing the Online Documentation” on page 35

### Notes:

- Even if you do not want to install the operating system documentation, you should install and configure the documentation library service, because other applications might depend on this service to provide their online documentation.
- This chapter covers the first-time installation and configuration of the library service. If you already have the service configured and you want to change the configuration, see *Changing the Configuration of the Documentation Library Service in the AIX 5L Version 5.1 System Management Concepts: Operating System and Devices*.

---

## Using the Documentation Library Service

The Documentation Library Service allows you to navigate, read, and search registered HTML-formatted documents through your Web browser. The library service presents documents in an expandable-tree format, through which you can easily navigate by clicking on associated buttons. You can click to view a selected document. You can also search for specific information in one book, a selection of books, or the entire installed library.

The library service produces two types of Graphical User Interfaces (GUIs), a global GUI and an application GUI. The global GUI shows you all HTML documents on the document server that are registered with the global GUI. Global views may contain documents from many different applications. Access the global library application by typing **docsearch** on the command line or by clicking the **Documentation Library** icon in the Help subpanel under the CDE Desktop front panel.

The application GUI is launched when you click on a link inside a menu or document of an application. The resulting display shows library pages that contain online information for that application. For example, the **Search** link in the Web-based System Manager Help menu calls a library page that only displays the documentation for Web-based System Manager.

The components of the Documentation Library Service are installed along with the BOS (Base Operating System). After installation, the service may need to be configured.

**Note:** If you ordered a preinstalled system from the factory, the complete library service might have already been installed and configured at the factory.

If you are not sure whether the Documentation Library Service is installed and configured on your system, go to “Testing the Documentation Library Service”.

If you need to install or configure the library service, go to “Configuring the Documentation Library Service” on page 28.

## Testing the Documentation Library Service

If you are not sure whether the library service is installed and configured, type `docsearch` on the command line.

One of the following occurs:

- **The library service appears, without error messages, and the search form appears at the top of the page.** This search form contains one or more fields for entering words that you want to search for. A listing of documents is visible in at least one of the views. When you open a document, you can read its contents. The search function completes successfully.
  - **The library service appears functional but you cannot read the documents properly.** Go to “Configuring the Documentation Library Service”.
  - **The library service appears functional but the search fails.** Go to Problem Determination in the *AIX 5L Version 5.1 System Management Concepts: Operating System and Devices*.
- **You see the message There are no documents installed for this view.** The library service might be installed correctly, but the service cannot find any installed documents that are registered for the current view. Try clicking on the other views to see if they contain documents. When you find a view with documents, try reading and searching the documents.

You cannot fully test the library service until all appropriate documentation has been installed and registered. The operating system and all applications that use the library service register themselves during document installation. To install the operating system online documentation, see “Installing the Online Documentation” on page 35. Ensure any application documentation is correctly installed. After you have done this, retest the library functions.

- **You see the message Search is not enabled.** The service has not been fully installed and configured. Go to “Configuring the Documentation Library Service”.
- **You see the message Search is not supported in this language.** The search engine cannot support searches in the language used by this installation of the operating system. This is not an error. The search function is not compatible with all languages supported by the operating system. This message always displays when you are using a language that the search function cannot support.
 

If documents are visible in one of the Views, try reading the documents. If your documents display correctly and you can open them for reading, then no further configuration of the library service is necessary. If no documents are available in any view, the documentation has not been installed and registered. The operating system and all applications that use the library service register themselves during document installation. To install the operating system online documentation, see “Installing the Online Documentation” on page 35. Ensure any application documentation is correctly installed. After you have done this, retest the library functions.
- **You see a message similar to Cannot find or execute ds\_form.** The exact wording of this message varies, but it means the library service is not installed and configured correctly. Go to “Configuring the Documentation Library Service”.
- **No browser appears.** The library service is not installed and configured correctly. Go to “Configuring the Documentation Library Service”.

## Configuring the Documentation Library Service

You can set up a machine either as a documentation server or as a documentation client system. When users on a client request a search form or an HTML document, the request is sent to the Web server on a documentation server, which then sends back the requested object. When searches are performed, they are done on the server and the results are then sent back to the user on the client.

A documentation server has the following software installed:

- Documentation library service server and client software
- Library service search engine
- Documents
- Document search indexes - for searchable documents. If an application package is using the library service, these indexes are installed automatically when the documents are installed, or the system administrator may manually create indexes for locally written documents. Documents written in certain languages cannot be searched and do not have indexes.
- Web server software

A client needs only the Documentation Library Service client software and a Web browser installed.

If you have a standalone machine, both the server and client software are installed. Instead of going to a remote server, requests from users on a standalone machine go to the Web server software on that same computer. A documentation server on a network can also be made standalone in the sense that you can configure its Web server software to accept only requests from users logged in to the documentation server.

If you have a console that supports a graphical user interface and are running in the X-Windows System, you can use the Configuration Assistant to install and configure the library service. Otherwise, you can use commands to install and configure manually. It is highly recommended that you use the Configuration Assistant because it automatically performs some steps for you and is easier to use.

To use the Configuration Assistant, see “Using Configuration Assistant for the Documentation Library Service”.

To use the manual method, see “Manually Installing and Configuring the Documentation Library Service”.

## Using Configuration Assistant for the Documentation Library Service

The Configuration Assistant helps you configure this system as a documentation server or as a client that gets its documents from a remote documentation server.

**Note:** HTTP Web server software must be installed on this computer before you can install documents and register them with the Documentation Library Service. The Configuration Assistant can automatically install the Lite NetQuestion Web server software or the IBM HTTP Server software. Both options are shipped with the operating system.

If you want to use different Web server software, that software must have been installed and configured before you launch the Configuration Assistant. You must also know the full pathnames of the Web server’s HTML documents home directory and the CGI-BIN directory.

This machine does not need Web server software if you are configuring it as a client that obtains its documents from a remote documentation server.

To launch the Configuration Assistant, make sure you are logged in to the system as the root user, and enter the **configassist** command

When the Configuration Assistant opens, press the **Next** button. Then select **Configure Online Documentation and Search**. The Configuration Assistant guides you through installation and configuration.

After you have finished, use the same procedure as shown in 3 on page 30 to add language support.

## Manually Installing and Configuring the Documentation Library Service

This section describes how to install and configure the Documentation Library Service using the system management tools.

The following sections describe the procedures for “Installing the Server” and “Installing the Client” on page 33.

### Installing the Server

Use this procedure if you want to configure this machine as a documentation server, where you will install your online documentation. A server can be networked to serve remote clients, or it can be standalone to serve only its own users.

To create a documentation search server, complete the following steps:

1. **Install the Web server and browser software, if needed.**

Web server software must be installed. You can use any Web server software that can run CGI (Common Gateway Interface) programs. The Lite NetQuestion Web server is automatically installed with the base operating system, but it can serve only local users, not remote users.

To serve both local and remote users, the IBM HTTP Server software can be installed from a CD shipped with AIX 5.1. Or, if you prefer, you can install a different Web server.

To verify what is already installed, type `smit list_installed` on the command line.

A Web browser that can display forms must be installed. (The Netscape browser is on the AIX 5.1 Netscape Products CD.)

2. **Configure and start Web server software.**

Unless you are using the automatically installed Lite NetQuestion server, you must configure your Web server software to perform correctly with your system. Consult the documentation that came with your Web server software to configure and start your Web server software. Write down the full path names of the Web server directories where the server starts looking for HTML documents and CGI programs. If you are using one of the following Web servers, and you installed to the default location, you do not need to know the directory name:

- IBM HTTP Server
- IBM Internet Connection Server

Other Web servers might not automatically create the HTML and CGI directories. If yours does not, you must create these directories before you continue.

You must also configure your Web server software's permissions to allow access from the users and remote computers who should use this computer as their documentation search server.

3. **Configure the Documentation Library Service for additional languages, if needed.**

You might want this documentation server to be able to serve documents that are written in a different language than the one used by the operating system installed on this machine. If this is the case, you must install additional language support filesets for the other languages you want to serve.

For example, assume that you are using English when you are installing the base operating system and you want users to be able to access documents in both English and Spanish from the documentation server. The English messages will be automatically installed because that is the language in use during the operating system installation. So, you only need to manually install the Spanish language support package.

There are two ways to install the library service package for another language:

- After you install the base operating system and the Documentation Library Service, you can install the operating system locale (language environment) for the language you want to add. Installing a language's locale installs the available support for all applications that are currently installed on your system.

To install or update an entire locale, type `smit m1e_add_lang` on the command line. Use the online help if you need additional explanation.

- If the locale for the desired language has been installed before the **bos.docsearch** package was installed, you can install only the Documentation Library Service messages.

**To install library service messages using Web-based System Manager:**

- a. Start the Web-based System Manager by typing **wsm** on the command line.
- b. Expand the machine name.
- c. Expand **System Environment** in the Navigation area.
- d. Select **Settings**.
- e. Select **Cultural** then **Available Resources**.



- f. When the dialog appears, use either the pull-down menu or select **Add** and install the language. Always install the Common messages. If you have the desktop installed on your system, also install the CDE messages. For example, assume that your server is configured for English when you are installing and you want to be able to serve both English and Spanish documents from the documentation server. The English messages are automatically installed. Therefore, you only need to manually select Spanish.

The message filesets are not inside the docsearch package; instead, they are stored in the BOS messages packages (**bos.msg.locale**, where locale=desired language) and are named:

- **bos.msg.locale.docsearch.client.com** DocSearch CDE Action - *locale*
- **bos.msg.locale.docsearch.client.Dt** DocSearch Common Messages - *locale*

- g. After you have added all of the filesets you want to install into the window, click on the **OK** button.
- h. A message dialog displays, showing the status of the installation. If the process completes with no problems, a **Success** message displays.

#### To install library service support using SMIT:

- a. From the command line, type `smit install_all`.
- b. Always install the Common messages. If you have the desktop installed on your system, also install the CDE messages. For example, assume that your server is configured for English when you are installing and you want to be able to serve both English and Spanish documents from the documentation server. The English messages are automatically installed. Therefore, you only need to manually select Spanish.

The message filesets are not inside the **bos.docsearch** package; they are stored in the BOS messages packages (**bos.msg.locale**, where *locale* is the desired language) and are named:

- **bos.msg.locale.docsearch.client.com** DocSearch CDE Action - *locale*
- **bos.msg.locale.docsearch.client.Dt** DocSearch Common Messages - *locale*

In the dialog box that displays, type in the location of the filesets you want to install in the **INPUT device / directory for software** field, or click on the **List** button for a list of the available devices and directories.

- c. When the next dialog displays, enter the fileset names you want to install. If you want to install more than one fileset at this time, separate each fileset name with a space. If you do not know the exact name of the fileset you want to install, or want to browse the available languages, click on the **List** button. Highlight the packages you want to install from the list.
- d. Click on **OK**.

#### 4. Configure the Documentation Library Service.

To configure the Documentation Library Service using Web-based System Manager:

- a. As root user, start the Web-based System Manager by typing **wsm** on the command line.
- b. Expand the machine name.
- c. Expand **System Environment** in the Navigation area.
- d. From the **System Environment** menu, choose **Settings** → **Documentation Server**.
- e. In the Browser command field, type the name of the command that launches the Web browser with a URL. This selection will be the default Web browser for all users of this computer.
  - If you are using the Netscape browser, type `netscape` in the Browser field and continue with the next step.
  - If you are using another browser, you must include any necessary flags that include a URL in the launch command. For example, if launching your Web browser to a specific site requires a **-u** flag, and your launch command looks similar to the following:

```
YourWebBrowser -u http://www.w3.org
```

Your entry in the Browser field would be:

*YourWebBrowser -u*

You do not include the URL itself in the Browser field entry.

**Note:** Many browsers (for example, Netscape) do not require a flag.

- f. Click **OK**.
- g. Select **Settings** → **Documentation Server** again.
- h. Select **Local server**.
- i. Under the **Location of document and CGI programs on local server**, select your Web server software. If the name of your Web server software is not listed, select **Other**, then type the full path names of the CGI directory and the Documents directory. If you selected your Web server from the listing, continue with the next step.

**Note:** If you installed any of the listed Web servers in any location other than the default, or if you have set up servers to use nonstandard locations for their CGI-BIN and HTML directories, you must select **Other**.

- j. In the Server port field, type in the port number that the Web server software is using. The standard port is 80. If you are not certain of the actual port number, set it to 80. If you are using the Lite NetQuestion Web server, the port number must be set to 49213.
- k. Optionally, you can change the Default Documentation Language from this same screen. This is the language users see when they launch the library using the **docsearch** command or the library icon in the Help subpanel of the CDE desktop front panel.
- l. Click **OK** to complete the configuration.

To configure the Documentation Library Service using SMIT:

- a. On the server, change to root user. On a command line, type `smit web_configure`.
- b. Select **Change/Show Default Browser**. In the **\*Default browser LAUNCH COMMAND** field, type the command that sets the default browser for all users on this computer. Include any flags that are required when a URL is included in the command. If you want to have the default browser to open to a specific URL, also add the URL after the command to open the browser. For example, if you want your browser to open with the [www.ibm.com/servers/aix/library](http://www.ibm.com/servers/aix/library) page, type the following in the **\*Default browser LAUNCH COMMAND** field:

*YourWebBrowser flag* `http://www.ibm.com/servers/aix/library`

**Note:** Many browsers (for example, Netscape) do not require a flag.

- c. Return to the Web configuration main menu. Select **Change Documentation and Search Server**.
- d. On the Documentation Search Server LOCATION screen, click on **List** and select **local - this computer** for server location. Click **OK**.
- e. On the Web Server SOFTWARE screen, click on **List** and select the Web server software that you are using.

**Note:** If you installed any of the listed Web servers in any location other than the default, or if you have set up servers to use nonstandard locations for their CGI-BIN and HTML directories, you must select **Other**.

- f. On the next screen, type in the full path names of the CGI directory and the Documents directory. If you selected a listed Web server that is installed in its default location, the correct path names should be already displayed.

If you set up your Web server to use a port other than the standard port 80, enter that port number. Leave it set to 80 if you are not sure of the port number. If you are using Lite NetQuestion, the port number must be set to 49213.

- g. Click **OK**. When the configuration is completed, a Documentation server configuration completed! message displays in the results panel.

- h. Optionally, you can change the Default Documentation Language from this same screen. This is the language users see when they launch the library using the **docsearch** command or the library icon in the Help subpanel of the CDE desktop front panel.
- i. Click **OK** to complete the configuration.

The documentation search functions on this server should now be ready to use. Any users logged in to this system before configuration finished must log off and then log back in to use the search functions.

## 5. Install/register your documentation.

Before any document can be searched using the Documentation Library Service, it must have an existing index that is registered with the library service. Some applications, such as Web-based System Manager, ship prebuilt documents inside their install package. When the application is installed, the indexes are automatically registered. Indexes for all operating system documentation are registered during installation.

You can create indexes for your own HTML documents and register them with the library service so they can be searched online. For information about creating and registering indexes, see *AIX 5L Version 5.1 General Programming Concepts: Writing and Debugging Programs*.

## Installing the Client

Use this procedure if you want to set up a client of a remote documentation library server. When users on this computer want to read or search online documentation, the request is sent to a remote documentation library server, where the request is handled and the results then sent back to a Web browser on this client.

**Note:** The search function is not supported in all languages.

To create a documentation library client, complete the following steps:

### 1. Install the client software.

First, check the list of software that is installed on your system by typing **smit list\_installed** on the command line. If the following software is not already installed on your client system, install it now:

- A Web browser that can display HTML forms. (The Netscape browser is on the base operating system Netscape Products CD.)
- The Documentation Library Service package (**bos.docsearch**). This package is installed by default with the base operating system. If it has been removed from your system, you only need to install the following filesets of the package:
  - **Docsearch Client** fileset
  - **Docsearch Client - CDE Desktop Icons and Actions** fileset (if you are using the CDE Desktop).
  - **Docsearch Support** filesets. When you install the base operating system, it automatically installs support for the language used by this system. However, if you want to be able to use the library service in other languages, you must also install the docsearch support filesets for those languages. The support filesets are stored in the BOS messages packages (**bos.msg locale**) and are named **DocSearch CDE Action - language** and **DocSearch Common Messages - language**. **You do not need to install the CDE message set if you are not using the CDE desktop.**

**Note:** You must also have the BOS locale (language environment) installed for any language you want to use. If you install the locale *after* the Documentation Library Service is installed on your system, the messages for that language are also automatically installed. However, if the locale was installed *before* the library service (for example, you are updating the operating system), you must manually install the library service messages.

For instructions on adding language support, use the same procedure as shown in *Installing the Server*, step 3 on page 30

## 2. Configure the Documentation Library Service.

To configure the Documentation Library Service using Web-based System Manager:

- a. As root user, start the Web-based System Manager by typing **wsm** on the command line.
- b. Expand the machine name.
- c. Expand **System Environment** in the Navigation area.
- d. From the **System Environment** menu, choose **Settings** → **Documentation Server**.
- e. In the Browser command field, type the name of the command that launches the Web browser with a URL. This selection will be the default Web browser for all users of this computer.

- If you are using the Netscape browser, type **netscape** in the Browser field and continue with the next step.
- If you are using another browser, you must include any necessary flags that include a URL in the launch command. For example, if launching your Web browser to a specific site requires a **-u** flag, and your launch command looks similar to the following:

```
YourWebBrowser -u http://www.w3.org
```

Your entry in the Browser field would be:

```
YourWebBrowser -u
```

You do not include the URL itself in the Browser field entry.

**Note:** Many browsers (for example, Netscape) do not require a flag.

- f. Click **OK**.
- g. Select **Settings** → **Documentation Server** again.
- h. Select **Remote server**.
- i. Type the name of the documentation server into the **Computer name** field. This documentation server contains the documents that you want this client to be able to search.
- j. In the Server port field, type in the port number the Web server software is using. The standard port is 80.
- k. Click **OK** to complete the configuration.
- l. Close the Web-based System Manager.

To configure the Documentation Library Service using SMIT:

- a. On the client, change to root user. On a command line, type **smit web\_configure**.
- b. Select **Change/Show Default Browser**. In the **\*Default browser LAUNCH COMMAND** field, type the command that sets the default browser for all users on this computer. Include any flags that are required when a URL is included in the command. If you want to have the default browser to open to a specific URL, also add the URL after the command to open the browser. For example, if you want your browser to open with the **www.ibm.com/servers/aix/library** page, type the following in the **\*Default browser LAUNCH COMMAND** field:

```
YourWebBrowser flag http://www.ibm.com/servers/aix/library
```

**Note:** Many browsers (for example, Netscape) do not require a flag.

- c. Return to the Web configuration main menu. Select **Change Documentation and Search Server**.
- d. On the Documentation Search Server LOCATION screen, click on **List** and select **Remote computer** for server location. Click **OK**.
- e. On the next screen, enter the name of the remote documentation search server you want the client to send its search requests to in the **NAME of remote documentation server** field. You can type a name or an IP address.

If the Web server on the remote server is set to use some port other than the standard port 80, enter that port number.

- f. Click **OK** to configure your client system. When it is finished, a Documentation server configuration completed! message displays at the bottom of the results panel.

The documentation search functions on this client are now ready to use. Any users logged in to this client before configuration finished must log off and then log back in to use the search functions.

---

## Installing the Online Documentation

**Note:** It is not necessary to install the operating system's online documentation onto your server. You can access all of the documentation through the Internet at the following URL:

<http://www.ibm.com/servers/aix/library>

However, if you use the Documentation Library Service to search any online documentation, it only searches the registered documentation that is installed. It does not search the documentation at the above Web site.

## Documentation CD

The following types of documentation are located on the *documentation CD*:

- User guides
- System management guides
- Application programmer guides
- All commands reference volumes
- Files reference
- Technical reference volumes used by application programmers

The operating system and related products documentation on this CD is designed for use with an HTML 3.2 Web browser, such as the Netscape browser that is shipped with the operating system.

**Note:** The *documentation CD* can be either installed or mounted. If you mount the CD, the entire CD is mounted. You cannot install part of the CD and mount the remainder.

While mounting the CD saves on the amount of hard disk space used, it requires the CD be kept in the CD-ROM drive at all times. Also, searching the documentation from the CD-ROM drive can be significantly slower (in some cases, up to ten times slower) than searching the information if it is installed on a hard disk.

You can use either the Web-based System Manager or System Management Interface Tool (SMIT) to install the documentation. Both tools create a temporary mount point for the CD. Also, you can install the entire CD or only selected documentation. Some documentation might have been previously installed with the operating system or other licensed products. Run the **lsipp** command to determine which packages and filesets are already installed on your system.

The first time that you access the documentation CD, do the following steps. You can use the SMIT help panels can guide you through the process.

1. **Create a CD file system.**

On the command line, type `smit crcdrfs`. In the MOUNT POINT field, type `/infocd`.

2. **Mount the CD file system.**

On the command line, type `smit mountfs`. Mount the CD as Read Only.

**Note:** If the CD is ejected from the system while it is still mounted, the connection is broken and you cannot access the information. To remove the CD from the system, run the **unlink** script. Then unmount the file system using the **unmount** command before ejecting the CD. To access the CD again, remount the CD file system.

### 3. Run the link script.

Type the following two commands:

```
cd /infocd
./linkbasecd
```

**Note:** You must have root user authority or be a member of the **system** group to perform these tasks.

When you need to unmount the CD, use the following commands:

```
cd /infocd
./unlinkbasecd
umount /infocd
```

## Removing Book Links

To save disk space, your system administrator might have installed only selected documentation. Therefore, installed documentation might contain links to uninstalled books. If you click on a link to an uninstalled book, an error message displays.

It is possible to remove unavailable links by running the **resolve\_links** command with root authority. This command determines which books are installed, and then removes links to uninstalled documentation.

**Note:** Thousands of pages of documentation are searched through and modified by the **resolve\_links** command, so it may run for a long period of time. You can still access online documentation while the **resolve\_links** command is running.

---

## Where Do I Go Next?

At this point, you might want to do one or more of the following tasks before using your system:

- Review README files for late-breaking news. For information on how to view README files, refer to “Viewing README Files” on page vii.
- Create a new backup of your system. See “Chapter 6. Creating System Backups” on page 37.
- View the online documentation.
- Begin configuring and using the document search application. See “Using the Documentation Library Service” on page 27.

---

## Chapter 6. Creating System Backups

This chapter describes how to create and verify a bootable backup copy, or *mksysb image*, of your root volume group and how to make separate backup copies of user volume groups. References to CD in this chapter also apply to DVD.

---

### Introduction

The *root volume group* is a hard disk or group of disks that contains:

- Startup files
- Operating system BOS
- System configuration information
- Optional software products

A *user volume group*, also called the *nonroot volume group*, typically contains data files and application software.

A system backup does the following:

- Contains a working copy of your system. In the event your system data becomes corrupted, you can use this information to restore your system to working order.
- Allows you to transfer installed and configured software from one system to others. You can use the Web-based System Manager or SMIT to make a backup image of the root volume group or user volume groups.

A backup transfers the following configurations from the source system to the target system:

- **rootvg** volume group information
- Paging space information
- Logical volume information
- Placement of logical partitions (if creating map files has been selected in the Web-based System Manager or SMIT).

**Note:** The use of map files is not recommended if you plan to reinstall the backup to target systems other than the source system, or the disk configuration of the source system is to be changed before reinstalling the backup.

Using the Web-based System Manager or the SMIT backup menu lets you preserve configuration information, thus avoiding some of the configuring tasks normally required after restoring a system backup.

A backup preserves the configuration if:

- The target system has the same hardware configuration as the source system.

AND

- The target disk has enough space to hold the backup image.

The Web-based System Manager and SMIT both use the **mksysb** command to create a backup image, stored either on CD, on tape, or in a file. If you choose CD or tape, the backup program by default writes a *boot image*, which makes the medium suitable for installing. (For AIX 5.1, the Web-based System Manager interface does not support backups to DVD.) For more information, see “Creating System Backups on CD-ROM” on page 40.



---

## Prerequisites for Creating Backups

Before creating system backups, complete the following prerequisites:

- Be sure you are logged in as root user.
- If you plan to use a backup image for installing other differently configured target systems, you must create the image *before* configuring the source system, or set the RECOVER\_DEVICES variable to no in the **bosinst.data** file. Refer to “Chapter 8. Customized BOS Installations” on page 55 for more information about the **bosinst.data** file.
- Consider altering passwords and network addresses if you use a backup to make master copies of a source system. Copying passwords from the source to a target system can create security problems. Also, if network addresses are copied to a target system, duplicate addresses can disrupt network communications.
- Mount all file systems you want to back up. The **mksysb** command only backs up mounted JFS (Journaled File Systems) in the **rootvg**. Refer to the **mount** command for details.

**Note:** The **mksysb** command does not back up file systems mounted across an NFS network.

- Unmount any local directories that are mounted over another local directory.  
This backup procedure backs up files twice if a local directory is mounted over another local directory in the same file system. For example, if you mount **/tmp** over **/usr/tmp**, the files in the **/tmp** directory are then backed up twice. This duplication might exceed the number of files a file system can hold, which can cause a future installation of the backup image to fail.
- Use the **/etc/exclude.rootvg** file to list files you do not want backed up.
- Make at least 8.8 MB of free disk space available in the **/tmp** directory. The **mksysb** command requires this working space for the duration of the backup.

Use the **df** command, which reports in units of 512-byte blocks, to determine the free space in the **/tmp** directory. Use the **chfs** command to change the size of the file system, if necessary.

For example, the following command adds 12 MB of disk space to the **/tmp** directory of a system with 4 MB partitions:

```
chfs -a size=+24000 /tmp
```

- All hardware must already be installed, including external devices, such as tape and CD-ROM drives.
- The **bos.sysmgt.sysbr** fileset in the BOS System Management Tools and Applications software package must be installed. The **bos.sysmgt.sysbr** fileset is automatically installed in AIX 5.1. Enter the following command to determine if the **bos.sysmgt.sysbr** fileset is installed on your system:

```
ls1pp -l bos.sysmgt.sysbr
```

If your system has the **bos.sysmgt.sysbr** fileset installed, continue with either “Creating a Root Volume Group Backup to Tape or File” or “Creating a User Volume Group Backup” on page 45.

If the **ls1pp** command does not list the **bos.sysmgt.sysbr** fileset, install it before continuing with the backup procedure. Refer to “Chapter 4. Optional Software Products and Service Updates” on page 17 for instructions, or enter the following command:

```
installp -agqXd device bos.sysmgt.sysbr
```

where *device* is the location of the software; for example, **/dev/cd0** for CD-ROM drive.

---

## Creating a Root Volume Group Backup to Tape or File

You can use either the Web-based System Manager or SMIT to create a system backup. These backups can be stored to CD, DVD, tape, or in a file. Booting from tape is not supported on Itanium-based platforms.

CD/DVD instructions are slightly different. See “Creating System Backups on CD-ROM” on page 40.



### To create a root volume group backup:

- Use the Web-based System Manager **Backup and Restore** application and select **Back up the system**.

OR

- Use the following SMIT procedure:

1. Enter the **smit mksysb** fast path.

2. In the Back Up the System menu, make the following selections:

- Select which medium you want to use in the **Backup DEVICE or File** field. If you want to create a bootable backup, the medium must be tape or CD. See “Creating System Backups on CD-ROM” on page 40 for more information. Then, follow the appropriate step below:

**TAPE** Press the F4 key to list available devices and highlight the device name.

**FILE** Enter a full path and file name in the entry field.

- If you want to create map files, select **yes** in the **Create Map Files?** field.

Map files match the physical partitions on a drive to its logical partitions. When installing from a backup image, the BOS installation program uses map files to position the logical volumes on the target drive in the same partitions they were on in the source system. If you do not create map files, the installation program relies on the logical volume manager (LVM) to determine placement for the logical volumes. For more information, see *Using Map Files for Precise Allocation in AIX 5L Version 5.1 System Management Concepts: Operating System and Devices*.

**Note:** If you plan to reinstall the backup to target systems other than the source system, or if the disk configuration of the source system might change before reinstalling the backup, do not create map files.

- To exclude certain files from the backup, select **yes** in the **Exclude Files** field, then create an **/etc/exclude.rootvg** file with an ASCII editor, and enter the file names that you do not want included in your system backup image. You can use patterns for the file names that conform to the pattern matching conventions of the **grep** command. For example, to exclude all the contents of the directory called **scratch**, put the following line in the exclude file:

```
/scratch/
```

For another example, exclude the contents of the directory called **/tmp** and avoid excluding any other directories that have **/tmp** in the pathname by adding the following line to the exclude file:

```
^./tmp/
```

**Note:** All files are backed up relative to the current working directory. This directory is represented by a **.** (dot character). To exclude any file or directory for which it is important to have the search match the string at the beginning of the line, use a **^** (caret character) as the first character in the search string, followed by a **.** (dot character), and then followed by the filename or directory to be excluded.

If the filename or directory being excluded is a substring of another filename or directory, use **^.** (caret character followed by dot character) to indicate that the search should begin at the beginning of the line and/or use **\$** (dollar sign character) to indicate that the search should end at the end of the line.

- To list each file as it is backed up, select **yes** in the **List files as they are backed up?** field. Otherwise, you see a percentage-completed progress message while the backup is created.
- If you modified the **image.data** file and do not want a new one created, select **no** for **Generate new /image.data file?**. (The **image.data** file contains information about the sizes of all the file systems and logical volumes in your rootvg.)
- If you are creating a bootable tape and you want to expand the system **/tmp** file system (if required by the backup program), select **yes** for **EXPAND /tmp if needed?**.

- If the tape drive you are using provides packing (or compression), set the **Disable software packing of backup?** field to yes.
  - If you chose tape as the backup medium, either leave the default in the **Number of BLOCKS to write in a single output** field or enter a different number.
  - If you chose file as the backup medium, press Enter. If you chose tape as the backup medium, insert the first blank backup tape into the drive and press Enter.
3. The COMMAND STATUS screen displays, showing status messages while the system makes the backup image.

If you chose tape as the backup medium, the system might prompt you to insert the next tape during the backup by displaying a message similar to the following:

```
Mount next Volume on /dev/rmt0 and press Enter.
```

If this message displays, remove the tape and label it, including the BOS version number. Then insert another tape and press Enter.

When the backup process finishes, the **COMMAND:** field changes to **OK**.

4. Press F10 to exit SMIT when the backup completes.
5. If you chose tape as the backup medium, remove the last tape and label it. Write-protect the backup tapes.
6. Record any backed-up root and user passwords. Remember that these passwords become active if you use the backup to either restore this system or install another system.

You have created the backup of your root volume group (rootvg). If you created bootable tapes, you can use these tapes to start your system if for some reason you cannot boot from hard disks.

---

## Creating System Backups on CD-ROM

Creating a backup CD/DVD is similar to making a backup tape for your personal use, but with some noticeable differences.

**Note:** For information about CD/DVD-R/DVD-RAM drives and CD/DVD-R creation software, refer to the following README file:

```
/usr/lpp/bos.sysmgmt/mkcd.README.txt
```

The Web-based System Manager and SMIT both use the **mkcd** command, which calls the **mksysb** or **savevg** command, if needed. For system backups, the CDs can be created as:

- Non-bootable CDs
- Generic CDs (bootable on any target system)
- Personal CDs (bootable only on the source system)

Notes:

- Only CHRP systems support booting from DVD.
- Web-based System Manager does not support backups to DVD.
- POWER-based platform backups and Itanium-based platform backups are not interchangeable. For example, generic CD produced on a POWER-based platform cannot be used to install or recover an Itanium-based platform.

## Personal and Generic backup CDs

There are two types of backup CDs that can be created. The first is called a *personal* backup CD, which is similar to a backup tape. A personal backup CD can only boot and install the machine on which it was created.

The second type of CD is a *generic* backup CD. A generic backup CD created on one POWER-based machine can boot any other POWER-based machine. It contains three boot images and all the device and kernel packages necessary to install any system. The **mksysb** image that is stored on the CD does not require that all the devices be installed in it, because the installation process installs the needed devices for that machine from the packages on the CD. A generic backup CD can be used to install (clone) a large number of machines in a customer's environment, which is particularly convenient when each machine in the system environment needs to have the same image installed, but all machines might not have the same hardware configuration.

Web-based System Manager and SMIT interfaces are available for the **mkcd** command. Online help can guide you through the required steps.

Another option available with the **mkcd** command is the ability to create a **savevg** CD. This CD has a copy of a non-rootvg volume group on it, and is useful for volume groups that contain user data. The **mkcd** command currently supports saving one volume group at a time to a CD. A new **-L** flag allows the creation of DVD sized images. However, if your **rootvg** image and **savevg** image are small enough to fit on one CD, you can save them both by taking advantage of the **-I** (stacklist) and **-z** (customization\_script) flags. The **-I** flag gives a list of images to copy to the CD. The **-z** flag lets you create a script to restore **savevg** backups. For example, if you make a copy of a non-rootvg volume group ahead of time, and then write a script that calls the **restvg** command, then your non-rootvg would be restored to hdisk2 at the end of the installation of **rootvg**, as shown by the following command:

```
restvg -d /SPOT/usr/sys/inst.images/savevg_image hdisk2
```

This procedure is recommended *only* if you know you want to restore the non-rootvg volume group every time you install. Otherwise, you might just want to store it on the CD/DVD, then use **restvg** to restore it after reboot. The **restvg** command can restore from CD if the name of the image is **savevg\_image**. If you save the non-rootvg backup on a CD with a different filename, you can insert that CD and use the full path to the filename as the device for the **restvg** command.

## Hardware and Software Requirements

You must obtain the hardware and software necessary to create a CD/DVD. The command for this process, **mkcd**, requires that you already have the software to create a CD or DVD-ROM file system in Rock Ridge format and to *burn* or write the CD. Hardware and software that has been tested with this command includes:

Software	Hardware
GNU and Free Software Foundation, Inc. cdrecord version 1.8a5 mkisofs version 1.5	Yamaha CRW4416SX Ricoh MP6201SE 6XR-2X Panasonic Cw-7502-B
GNU and Free Software Foundation, Inc. readcd version 1.9 mkisofs version 1.13	Matsushita LF-D291 DVD-RAM
Jodian Systems and Software, Inc. CDWrite version 1.3 mkcdimg version 2.0	Yamaha CRW4416SX Ricoh MP6201SE 6XR-2X Panasonic Cw-7502-B
Young Minds, Inc. MakeDisc version 1.3-Beta2	CD Studio Turbo Studio DVD-R

**Note:** For more information about CD/DVD-R/DVD-RAM drives and CD/DVD-R creation software, refer to the following README file:

```
/usr/lpp/bos.sysmgt/mkcd.README.txt
```

## Using the mkcd Command

**Note:** For information on using the **mkcd** command with Itanium-based platforms, refer to the following README file:

`/usr/lpp/bos.sysmgmt/mkcd.README.txt`

To run the **mkcd** command, you need extra working space. A separate file system or directory is required for each of the following:

- Storing a **mksysb** or **savevg** image
- Storing the CD/DVD file system contents
- Storing the CD/DVD images before they are recorded

The **mkcd** command creates the following file systems if they are not already present or if alternative file systems or directories have not been specified:

**/mkcd/mksysb\_images**

**/mkcd/cd\_fs**

**/mkcd/cd\_images**

The space used in these file systems is only temporary (unless the **-R** or **-S** flag is specified to save the images). If the **mkcd** command creates the file systems, it also removes them. Each file system or directory might require over 645 megabytes (up to 4.38 GB for DVD). The **/mkcd/cd\_fs** directory needs 645 megabytes (up to 4.38 GB for DVD). The **/mkcd/mksysb\_images** directory's space requirement depends on the size of the **mksysb** image that is to be created. The **mkcd** process attempts to calculate this space and verify that adequate space is available before starting the **mksysb** image. The **/mkcd/cd\_image** directory needs at least 645 megabytes (up to 4.38 GB for DVD) of space. If the **-R** or **-S** flags are used to specify not removing the images and there are multiple volumes required, then more space must be provided.

If you do not have space on your machine, you might want to use NFS to mount some space from another server system, however, the file systems must be writeable. You can create a **/mkcd** file system that is very large (1.5 gig for CD or 9 GB for DVDs) and then create subdirectories for **cd\_fs**, **mksysb\_images**, and **cd\_images** under **/mkcd**. Then **/mkcd** can be mounted onto the clients when they want to create a backup CD/DVD for their systems. When creating very large backups (larger than 2 GB) for DVD with the **mkcd** command, the file system must be large-file enabled and the **ulimit** values must be set to unlimited.

## Creating a Root Volume Group Backup on CD/DVD-ROM

**To create a root volume group backup:**

- Use the Web-based System Manager **Backup and Restore** application and select **System backup to writable CD**. This method lets you create generic or personal system backups on CD-ROM media.  
OR
- Use the following SMIT procedure:
  1. Enter the **smit mkcd** command. The system asks whether you are using an existing **mksysb** image.
  2. Enter the name of the CD-R device. (This can be left blank if **Create the CD now?** field is set to no.)
  3. If you are creating a **mksysb** image, you must select the image-creation options. The options are as follows:
    - **Create map files?**
    - **Exclude files?**

Refer to steps 3 and 4 of “Creating a Generic Backup CD/DVD Using SMIT” on page 44. The **mkcd** command always calls the **mksysb** command with the flags to extend **/tmp**, to create an **image.data** file, and to use software packing for the backup.

4. Enter the file system/directory in which to store the **mksysb** image. This can be a file system you created in the rootvg, in another volume group, or in NFS mounted file systems. If left blank, the **mkcd** command creates the file system and removes it when the command completes.
5. In the next two fields, you can enter the file systems and directories where the CD/DVD file system and CD/DVD images are to be stored. These can be file systems you created in the rootvg, in another volume group, or in NFS mounted file systems. If these fields are left blank, the **mkcd** command creates these file systems, and removes them when the command completes, unless you specify differently in later steps in this procedure.
6. If you did not enter any information in the file systems' fields, you can select to have the **mkcd** command either create these file systems in the rootvg, or in another volume group. If the default of rootvg is chosen and a **mksysb** image is being created, the **mkcd** command adds the file systems to the exclude file and calls the **mksysb** command with the exclude files option **-e**.
7. Do you want the CD/DVD to be bootable? If you select **yes**, this CD is written to be bootable only on the source system on which it was created. If you select **no**, you must boot from a product CD at the same version/release/maintenance level, and then select to install the system backup from the system backup CD.
8. If you change the **Remove final images after creating CD?** field to **no**, then the file system for the CD images (that you specified earlier in this procedure) remains after the CD has been recorded.
9. If you change the **Create the CD now?** field to **no**, then the file system for the CD images (that you specified earlier in this procedure) remains. The settings you selected in this procedure remain valid, but the CD is not created at this time.
10. If you intend to use an Install bundle file, enter the full path name to the bundle file. The **mkcd** command copies the file into the CD file system. You must have the bundle file already specified in the **BUNDLES** field, either in the **bosinst.data** file of the **mksysb** image or in a user-specified **bosinst.data** file. When this option is used to have the bundle file placed on the CD, then the location in the **BUNDLES** field of the **bosinst.data** file must be as follows:  
*../usr/sys/inst.data/user\_bundles/bundle\_file\_name*
11. Additional packages can be placed on the CD by entering the name of the file that contains the packages list in the **File with list of packages to copy to CD** field. The format of this file should be one package name per line.  

If you are planning to install one or more bundles after the **mksysb** image is restored, follow the directions in the previous step to specify the bundle file. Then you can use this option to have packages listed in the bundle available on the CD. If this option is used, you must also specify the location of installation images in the next step.
12. Enter the location of installation images that are to be copied to the CD file system (if any) in the **Location of packages to copy to CD** field. This field is required if additional packages are to be placed on the CD (see the previous step). The location can be a directory or CD device.
13. You can specify the full path name to a customization script in the **Customization script** field. If given, the **mkcd** command copies the script to the CD file system. You must have the **CUSTOMIZATION\_FILE** field already set in the **bosinst.data** file in the **mksysb** image or else use a user-specified **bosinst.data** file with the **CUSTOMIZATION\_FILE** field set. The **mkcd** command copies this file to the **RAM** file system. Therefore, the path in the **CUSTOMIZATION\_FILE** field must be as follows:  
*../filename*
14. You can use your own **bosinst.data** file, rather than the one in the **mksysb** image, by entering the full path name of your **bosinst.data** file in the **User supplied bosinst.data file** field.
15. To turn on debugging for the **mkcd** command, set **Debug output?** to **yes**. The debug output goes to the **smit.log**.

16. You can use your own **image.data** file, rather than the **image.data** file in the **mksysb** image, by entering the full path name of your **image.data** file for the **User supplied image.data file** field.

## Creating a Generic Backup CD/DVD Using SMIT

To use SMIT for creating a generic backup CD/DVD, follow these steps:

1. Enter the **smit mkcdgeneric** command.
2. Enter the name of the CD-R device. This can be left blank if the **Create the CD now?** field is set to **no**.
3. Enter the full path name of the **mksysb** image. You can use only previously created **mksysb** images. This path does not create a **mksysb** image for you.
4. Enter the location of the installation images that are to be copied to the CD file system in the **Location of packages to copy to CD** field. This field is required to copy devices and kernel packages to the *generic* CD. Additional software packages can be copied onto the *generic* CD, if a list of packages is provided in a later step of this procedure. The location can be either a directory or a CD device.
5. In the next two fields, enter the file systems and directories where the CD file system and CD images are to be stored. These can be file systems you created in the rootvg, in another volume group, or in NFS-mounted file systems. If these fields are left blank, the **mkcd** command creates these file systems, and removes them when the command completes, unless you specify differently in later steps in this procedure.
6. If you left the file systems' fields blank, you can select to have the **mkcd** command either create these file systems in the rootvg, or in another volume group.
7. If you change the **Remove final images after creating CD?** field to **no**, then the file system for the CD images (that you specified earlier in this procedure) remains after the CD has been recorded.
8. If you change the **Create the CD now?** field to **no**, then the file system for the CD images (that you specified earlier in this procedure) remains. The settings you selected in this procedure remain valid, but the CD is not created at this time.
9. If you intend to use an Install bundle file, enter the full path name to the bundle file. The **mkcd** command copies the file into the CD file system. You must have the bundle file already specified in one of the following: the **bosinst.data** file, the **BUNDLES** field in the **mksysb** image, or a user-specified **bosinst.data** file that has the **BUNDLES** field set appropriately. When this option is used to have the bundle file placed on the CD, then the location in the **BUNDLES** field of the **bosinst.data** file must be as follows:  

```
./usr/sys/inst.data/user_bundles/bundle_file_name
```
10. Additional packages can be placed on the CD by entering the name of the file that contains the packages list in the **File with list of packages to copy to CD** field. The format of this file should be one package name per line.  

If you are planning to install one or more bundles after the **mksysb** image is restored, follow the directions in the previous step to specify the bundle file. Then you can use this option to have packages listed in the bundle available on the CD. If this option is used, you must also specify the location of installation images in the next step.
11. You can specify the full path name to a customization script in the **Customization script** field. If given, the **mkcd** command copies the script to the CD file system. You must have the **CUSTOMIZATION\_FILE** field already set in the **bosinst.data** file in the **mksysb** image or else use a user-specified **bosinst.data** file with the **CUSTOMIZATION\_FILE** field set. The **mkcd** command copies this file to the **RAM** file system. Therefore, the path in the **CUSTOMIZATION\_FILE** field must be:  

```
./filename
```
12. You can use your own **bosinst.data** file, rather than the one in the **mksysb** image, by entering the full path name of your **bosinst.data** file in the **User supplied bosinst.data file** field.
13. To turn on debugging for the **mkcd** command, set **Debug output?** to **yes**. The debug output goes to the **smit.log**.



14. You can use your own **image.data** file, rather than the **image.data** file in the **mksysb** image, by entering the full path name of your **image.data** file for the **User supplied image.data file** field.

---

## Creating a User Volume Group Backup

Use either Web-based System Manager or SMIT to back up user volume groups. In AIX 4.3.3 and later versions, you can back up a user volume group to CD.

### Creating a User Volume Group Backup Using Web-based System Manager

Use Web-based System Manager and select **System backup to writable CD**. This method creates a non-bootable CD that contains only a volume group backup image of a user volume group.

### Creating a User Volume Group Backup Using SMIT

To back up a user volume group to tape or file using SMIT, type **smit savevg** on the command line. Back up a user volume group to CD by typing **smit savevgcd** on the command line.

When the Save a Volume Group screen displays, use the steps for backing up the root volume group as a guide for backing up user volume groups. There is one exception to this procedure. If you want to exclude files in a user volume group from the backup image, create a file named **/etc/exclude.volume\_group\_name**, where *volume\_group\_name* is the name of the volume group you want to backup.

Next, edit the **/etc/exclude.volume\_group\_name** file and enter the patterns of file names that you do not want included in your backup image. The patterns in this file are input to the pattern-matching conventions of the **grep** command to determine which files are excluded from the back up.

---

## Verifying a System Backup

To list the contents of a **mksysb** image on tape or CD, you can use either Web-based System Manager (type **wsm** on the command line, then choose the Backup and Restore application) or SMIT (type **smit lsmksysb** on the command line). The listing verifies most of the information on the tape or CD, but does not verify that the backup media can be booted for installations. The only way to verify that the boot image(s) on a **mksysb** tape or CD function properly is by booting from the media. To verify all the boot images on a *generic* CD, try to boot from the CD on each different platform on which you are installing the backup.





---

## Chapter 7. Installing System Backups

This chapter describes how to install the Base Operating System (BOS) from a backup image of a previously installed system. You can use a system backup to restore a corrupted operating system. But installing a system from a backup can also reduce, or even eliminate, repetitive installation and configuration tasks. For example, you can use a backup to transfer optional software installed on the *source* system (the machine from which you created the backup copy), in addition to the basic operating system. Also, the backup image can transfer many user configuration settings to the *target* system (a different machine on which you are installing the system backup).

The procedure you use to install from a system backup depends on whether you are installing on the source or target system and which interface you want to use:

- “Cloning a System Backup” on page 48 contains the procedure to install a system backup on a target machine to propagate a consistent operating system, optional software, and configuration settings.
- “Installing a System Backup on the Source Machine” on page 49 contains the Web-based System Manager and SMIT procedures to reinstall an operating system onto the same machine from which you created the backup.

You can install a system from a backup image that is stored on tape or CD, or in a file. If you want to install a backup stored in a directory on your network installation server, refer to *AIX 5L Version 5.1 Network Installation Management Guide and Reference*.

The procedures to install from backup operate either in prompted or nonprompted mode, depending on conditions set in the **/bosinst.data** file and on compatibility between the backup image and the installed machine. See “Chapter 8. Customized BOS Installations” on page 55 for information on how to modify the **bosinst.data** file to preset installation parameters when you create a system backup.

When installing the backup image, the system checks whether the target system has enough disk space to create all the logical volumes stored on the backup. If there is enough space, the entire backup is recovered. Otherwise, the installation halts and the system prompts you to choose additional destination hard disks.

File systems are created on the target system at the same size as they were on the source system, unless the backup image was created with **SHRINK** set to **yes** in the **image.data** file or you set it to **yes** in the BOS Install menus. An exception is the **/tmp** directory, which can be increased to allocate enough space for the **bosboot** command. For information about setting variables, refer to the **image.data** file in *AIX 5L Version 5.1 Files Reference*.

After installing the backup image, the installation program reconfigures the Object Data Manager (ODM) on the target system. If the target system does not have exactly the same hardware configuration as the source system, the program might modify device attributes in the following target system files:

- All files in **/etc/objrepos** beginning with *Cu*
- All files in the **/dev** directory

The installation program automatically installs only the device support required for the hardware configuration of the source system. A target system that requires different device support or a different kernel can be installed with the source system’s **mksysb** image on tape or on a personal backup CD or DVD, by booting from a product CD and then using the **mksysb** media to install the system. Any additional device support required on the target system is automatically installed after the **mksysb** image is restored. For further information, refer to “Cloning a System Backup” on page 48.

Additional devices needed for the target system can also be installed on the source system before making the **mksysb** image. To install additional device support on the source system, use the Web-based System

Manager or SMIT. In Web-based System Manager, expand **Devices** then choose **Overview and Tasks** and select the **Install additional device drivers or software** wizard. In SMIT, use the Install Software menu option (**smit install\_all** fast path).

- If there is sufficient disk space on the source and target systems, install all device support. After installing the target system, you can selectively remove the device support not needed by the target.
- If there is limited disk space on the source and target systems, selectively install the device support required for the target machines.

---

## Cloning a System Backup

With a **mksysb** image, you can clone one system image onto multiple target systems. The target systems might not contain the same hardware devices or adapters, require the same kernel (uniprocessor or microprocessor), or be the same hardware platform (**rs6k**, **rspc**, or **chrp**) as the source system. If you are installing a **mksysb** on a target system, use the procedure “Cloning Your System”.

To create a backup CD or DVD that can be installed on any POWER-based machine running the operating system (a generic backup CD), refer to “Creating System Backups on CD-ROM” on page 40.

## Cloning Your System

Use this procedure to install a **mksysb** image on a target system it was not created on. Be sure to boot from the product media appropriate for your system and at the same maintenance level of BOS as the installed source system that the **mksysb** was made on. For example, use BOS AIX 5.1 media with a **mksysb** from a BOS AIX 5.1 system. Use this procedure when installing a backup tape to a different system, or if installing a personal backup CD to a different system. It is not necessary when you are installing with generic backup CDs.

After booting from the system backup media, complete the following steps when the Welcome to the Base Operating System Installation and Maintenance screen displays.

1. Select the **Start Maintenance Mode for System Recovery** option.
2. Select the **Install from a System Backup** option.
3. Select the drive containing the backup tape or CD, insert the media for that device, and press Enter to continue.

The system reads the media and begins the installation.

You are then prompted for the BOS installation language, and the Welcome screen displays. Continue with the Prompted Installation, as cloning is not supported in nonprompted installations.

4. If you are cloning from the product CD to restore a backup tape, do not remove the CD from the CD-ROM drive. If you are restoring from a backup CD, you might be prompted to remove the CD. You are then prompted again for the BOS install language, and the Welcome screen displays. Continue with the Prompted Installation process.

### Notes:

- a. Booting from tape is not supported on some rspc platform systems. When a backup tape has been created on one of these systems, the **mksysb** command displays a message indicating that the system does not support tape boot. To determine what your platform system is, enter the following command:

```
bootinfo -p
```

- b. If you are cloning from a product tape to restore a backup tape, or if you are cloning from a product CD to restore from a backup CD, create a diskette that contains a **.bosinst.data** file with **SWITCH\_TO\_PRODUCT\_TAPE=yes** in the **control\_flow** stanza if this was not set when creating the **mksysb** image.

If **SWITCH\_TO\_PRODUCT\_TAPE** is set to **yes**, the system prompts you to remove the **mksysb** media and insert the product media after the **mksysb** image has been restored.

After the **mksysb** installation completes, the installation program automatically installs additional devices and the kernel (uniprocessor or microprocessor) on your system using the original product media you booted from. Information is saved in BOS installation log files. To view BOS installation log files, type `cd /var/adm/ras` and view the **devinst.log** file in this directory.

If the source system does not have the correct passwords and network information, you can make modifications on the target system now. Also, some products (such as graPHIGS) ship device-specific files. If your graphics adapter is different on the target system, verify that the device-specific filesets for graphics-related LPPs are installed.

**Attention:** If the system you have cloned is using OpenGL or graPHIGS, there might be some device filesets from these LPPs that must be installed after a clone. OpenGL and graPHIGS have graphics adapter-specific filesets, so if you cloned onto a system with a different graphics adapter, you must create a bundle as follows:

```
echo OpenGL.OpenGL_X.dev > /usr/sys/inst.data/user_bundles/graphic_dev.bnd
echo PEX_PHIGS.dev >> /usr/sys/inst.data/user_bundles/graphic_dev.bnd
```

Next, type `smitty install_bundle` on the command line to install this bundle. If any new filesets are installed, you can reboot your system before using OpenGL and graPHIGS. Otherwise, you might experience performance problems with these applications.

The above procedure is required because the OpenGL and graPHIGS LPPs are on a separate media, and therefore the normal cloning procedure cannot automatically install any missing device filesets.

The Network Installation Management (NIM) **mksysb** installation also supports cloning. If you are using NIM and you have OpenGL and graPHIGS in your **lpp\_source**, you can create a separate bundle as described above and allocate it when you install the **mksysb** image. The device filesets are installed automatically.

---

## Installing a System Backup on the Source Machine

You can use Web-based System Manager or SMIT to restore an operating system onto the same machine from which you created the backup. For either interface, the following conditions must be met before beginning the procedure:

- All hardware must already be installed, including external devices, such as tape and CD/DVD-ROM drives.
- Obtain the system key for the lock (if present) on your system unit.
- Obtain your system backup image from one of the following sources:

<b>CD/DVD</b>	BOS CDs, created in one of the following ways: <ul style="list-style-type: none"><li>• Using the Web-based System Manager <b>Backup and Restore</b> application. Select <b>System backup to writable CD</b>.</li><li>• Using the SMIT Back Up This System to CD menu.</li><li>• From the command line, using the <b>mkcd</b> command.</li></ul>
<b>Tape</b>	BOS tapes, created in one of the following ways: <ul style="list-style-type: none"><li>• Using the Web-based System Manager <b>Backup and Restore</b> application. Select <b>Back up the system</b>.</li><li>• Using the SMIT Back Up the System to Tape/File menu.</li><li>• From the command line, using the <b>mksysb -i Target</b> command.</li></ul>
<b>Network</b>	The path to your backup image file. Refer to <i>AIX Version 4.3 Network Installation Management Guide and Reference</i> for information about installing a backup across a network.

**Note:** Before you begin, select the tape or CD/DVD-ROM drive as the primary boot device. For additional information, refer to the section in your hardware documentation that deals with system management services.

#### To use Web-based System Manager:

1. Start the Web-based System Manager by typing **wsm** on the command line as root user.
2. Expand **Software** in the Navigation Area, select **Overview and Tasks**, then select **Reinstall Operating System**.
3. Choose the installation device:
  - Network  
If you choose this option, your machine must either be a configured NIM client, or have access to a NIM environment. If your machine is not a NIM client, the Reinstall Base Operating System wizard leads you through the process. For more information on setting up a NIM environment, see Basic NIM Operations and Configuration in the *AIX Version 4.3 Network Installation Management Guide and Reference*.
  - Tape or CD/DVD-ROM
4. Choose **Install a system backup image (mksysb)** as the installation type:
5. Follow the wizard prompts to complete the procedure.

#### To use SMIT:

1. Verify that your system is shut down. If your machine is currently running, you must power it off now by following these steps:
  - a. Log in as the root user.
  - b. Enter the following command:

```
shutdown -F
```
  - c. If your system does not automatically power off, place the power switch in the Off (0) position.
2. Turn the system key (if present) to the Service position.
3. Turn on all attached external devices. These include:
  - terminals
  - CD/DVD-ROM drives
  - tape drives
  - monitors
  - external disk drives

Turning on the external devices first is necessary so that the system unit can identify them during the startup (boot) process.

**Attention:** You *must not* turn on the system unit until Step 6.

4. Load the installation media into the tape or CD/DVD-ROM drive.  
You might find that on certain tape drive units, the tape drive door does not open while the system is turned off. If you have this problem, use the following procedure:
  - a. Turn on the system unit.
  - b. Insert the boot installation tape (insert Volume 1 if you received more than one volume).
  - c. Turn off the system unit and wait for 30 seconds.
5. If you are not using an ASCII terminal, skip to Step 6. If you are using an ASCII terminal, set the options using the criteria listed below to set the communications, keyboard, and display options.

**Note:** If your terminal is an IBM 3151, 3161, or 3164, press the Ctrl+Setup keys to display the Setup Menu and follow the onscreen instructions to set these options. If you are using some

other ASCII terminal, refer to the appropriate documents for information about how to set these options. Some terminals have different option names and settings than those listed here.

Communication Options	
Option	Setting
Line Speed (baud rate)	9600
Word Length (bits per character)	8
Parity	no (none)
Number of Stop Bits	1
Interface	RS-232C (or RS-422A)
Line Control	IPRTS

Keyboard and Display Options	
Option	Setting
Screen	normal
Row and Column	24x80
Scroll	jump
Auto LF (line feed)	off
Line Wrap	on
Forcing Insert	line (or both)
Tab	field
Operating Mode	echo
Turnaround Character	CR
Enter	return
Return	new line
New Line	CR
Send	page
Insert Character	space

- Turn the system unit power switch from Off (0) to On (I). The system begins booting from the backup media. If your system is booting from tape, it is normal for the tape to move back and forth. After several minutes, the three-digit LED should display c31.

**Note:** You can boot from production media (tape or CD) if your backup media fails to boot. The initial Welcome screen includes an option to enter a maintenance mode in which you can continue the installation from your backup media. Refer to “Troubleshooting an Installation from a System Backup” on page 65 for more information.

If you have more than one console, each terminal and directly attached display device (or console) might display a screen that directs you to press a key to identify your system console. A different key is specified for each terminal displaying this screen. If this screen is displayed, then press the specified key *only* on the device to be used as the system console. (The system console is the keyboard and display device used for installation and system administration.) Press a key on only one console.

**Note:** If the **bosinst.data** file lists a valid display device for the **CONSOLE** variable, you do not manually choose a system console. Read “Chapter 8. Customized BOS Installations” on page 55 for more information about the **bosinst.data** file.

7. The type of installation that begins is determined by the settings of the **PROMPT** field in the **control\_flow** stanza of the **bosinst.data** file. Use the following criteria to determine the type of installation you will be using:

PROMPT = no	Nonprompted Installation. This installation method is used if the backup image is configured to install automatically, without having to respond to the installation program. Go to step 8.
PROMPT = yes	Prompted Installation. This installation method is used if you need to use menu prompts to install the backup image. Also, use this installation method if a nonprompted installation halts and the Welcome to Base Operating System Installation and Maintenance screen displays. Go to step 9.

8. A successful nonprompted installation requires no further instructions because the installation is automatic.

**Note:** If the backup image holds source system configuration information that is incompatible with the target system, the nonprompted installation stops and a prompted installation begins.

The Installing Base Operating System screen displays before the installation starts. The nonprompted installation pauses for approximately five seconds before beginning. During this short pause, if you decide to interrupt the automatic installation and start a prompted session, you only need to type 000 (three zeros) at the terminal and continue the installation in prompted mode.

The system reboots automatically if the system key (if present) is in the Normal position. Otherwise, you must manually reboot the system when directed by turning the system key to Normal and pressing the Enter key.

To complete your installation of the backup image, review the information in the section titled “Where Do I Go Next?” on page 53.

9. The Welcome to the Base Operating System Installation and Maintenance screen displays.

**Note:** You can view Help information at each screen of this installation process by typing 88.

Choose the **Change/Show Installation Settings and Install** option.

10. The System Backup Installation and Settings displays. This screen shows current settings for the system. An ellipsis follows the disk listed in the first line if there is more than one disk selected.
11. Either accept the settings or change them. For more information on using map files, see “Chapter 6. Creating System Backups” on page 37.  
To accept the settings and begin the installation, skip to step 16.  
To change the settings, continue with step 12.
12. Type 1 in the System Backup Installation and Settings screen to specify disks where you want to install the backup image. The Change Disk(s) Where You Want to Install screen displays. This screen lists all available disks on which you can install the system backup image. Three greater-than signs (>>>) mark each selected disk.  
Type the number and press Enter for each disk you choose. Type the number of a selected disk to deselect it. You can select more than one disk.

**Note:** You can also specify a supplemental disk by typing 66 and pressing the Enter key for the **Disks not known to Base Operating System Installation** option. This option opens a new menu that prompts for a device support media for the supplemental disk. BOS installation configures the system for the disk and then returns to the Change Disk(s) Where You Want to Install screen.



13. After you have finished selecting disks, press the Enter key.  
The screen that displays after you press the Enter key is dependent on the availability of map files for *all* of the selected disks. The criteria for this is as follows:
  - If one or more selected disks have no maps, BOS installation returns directly to the System Backup Installation and Settings screen. Skip to step 15.
  - If all selected disks have maps, the Change Use Maps Status screen displays, where you choose whether to use maps for installation. Continue with step 14.

To preserve the placement of files during a future restoration of the backup, you can create map files before backing up a system. Map files, stored in the `/tmp/vgdata/rootvg` directory, match the physical partitions on a drive to its logical partitions. Create map files either with the SMIT Backup the System menu, using Web-based System Manager, or using the `-m` option when you run the `mksysb` command.

For more information about map files, see *Using Map Files for Precise Allocation in AIX 5L Version 5.1 System Management Concepts: Operating System and Devices*.

14. Type either 1 or 2 in the Change Use Maps Status screen to specify whether the installation program is to use maps.  
When you complete this choice, BOS installation returns to the System Backup Installation and Settings screen.
15. Decide whether BOS installation is to shrink file systems on the disks where you install the system. When you choose this option, the logical volumes and file systems within a volume group are re-created to the minimum size required to contain the data. This reduces wasted free space in a file system.  
File systems on your backup image might be larger than required for the installed files. Press the 2 key to toggle the **Shrink File Systems** option between **Yes** and **No** in the System Backup Installation and Settings screen. The default setting is **No**.

**Note:** Shrinking the file system disables the use of maps.

16. Type 0 to accept the settings in the System Backup Installation and Settings screen.  
The Installing Base Operating System screen displays the rate of completion and duration.  
The Please turn the system key to the NORMAL Position message displays on this screen if the key is not already in the Normal position. Because the installation continues regardless of the key position, you can turn the key at any time while the screen is showing.  
An untitled screen temporarily replaces the Installing Base Operating System screen if you specified a supplemental disk in step 12 on page 52. When this screen displays, it prompts you to place the device-support media in the drive and press the Enter key. BOS installation reconfigures the supplemental disk, then returns to the Installing Base Operating System screen.  
The system reboots automatically when the installation completes.  
The reboot is automatic if the system key (if present) is in the Normal position. Otherwise, a new screen directs you, at the end of the installation, to turn the key to **Normal** and press Enter. The system reboots, in this case, when you press the Enter key.

## Where Do I Go Next?

In new installations on graphical systems, a post-installation program, *Configuration Assistant*, starts automatically when BOS installation reboots the system. For ASCII systems, the post-installation configuration program is *Installation Assistant*. Whether this configuration program starts following your backup installation depends on settings in your backup image:

- If the `bosinst.data` file in your backup image specifies a customization script, Configuration Assistant (or Installation Assistant for ASCII) does not start. The script, which takes the place of the Configuration Assistant or Installation Assistant, configures your system before the BOS installation program reboots.

- If the system on which your backup image was made has not been configured with the Configuration Assistant (or Installation Assistant for ASCII), the Configuration Assistant (or Installation Assistant for ASCII) starts immediately following the BOS installation reboot.
- If the system on which your backup image was made has already been configured with the Configuration Assistant (or Installation Assistant for ASCII), the system prompt appears immediately following the BOS installation reboot. Configuration Assistant (or Installation Assistant for ASCII) does not start.

Go to “Chapter 3. Configuring the Operating System” on page 15 to configure the installed machine with optional software, network communications, user accounts, and other settings.

If the Configuration Assistant (or Installation Assistant for ASCII) does not start automatically, and you do not want to configure the machine, the installation from backup is complete.



---

## Chapter 8. Customized BOS Installations

This chapter describes how to customize subsequent installations of the BOS after the operating system has been installed. Customizing an installation requires you to edit the **bosinst.data** file and use it with your installation media.

---

### Introduction to Customized BOS Installations

The first time you install, the Base Operating System (BOS) installation program presents menus from which you must choose setup options. This initial installation also automatically starts a post-installation configuration program, either the graphical Configuration Assistant or the ASCII Installation Assistant. Refer to “Chapter 3. Configuring the Operating System” on page 15 for more information about Configuration Assistant and Installation Assistant.

For subsequent installations, you can change many aspects of the default BOS install program by editing the **bosinst.data** file. For example, you can specify no prompts to install the BOS without menus. You can also customize a BOS installation to bypass Configuration Assistant or Installation Assistant and start your own configuration script. Also, the **bosinst.data** file can be used to replicate one set of installation settings on other machines. For example, system administrators can create a **bosinst.data** file with settings that can be used to install all the machines they support that have the same configuration. For AIX 4.3.3 and later versions of the operating system, you can use the Web-based System Manager Reinstall Base Operating System wizard to install systems from product or backup media. This application lets you customize your installation by answering prompts before installation and creates a **bosinst.data** file appropriate for the type of installation wanted.

If you run your own configuration script from a **bosinst.data** file or from the Network Installation Manager (NIM), the environment that is in place at the time the script is run is a *single-user environment*. This environment is not available as a multi-user environment, and thus, there are limits to what can be run from a configuration script. The **/etc/init** is not running, so no process management can take place. All available memory cannot be made available because the RAM file system still exists, so devices that require large amounts of memory to run might fail to configure. In addition, signal handling is not available.

Because of the single-user environment, use the following guidelines for configuration scripts:

- Base devices can be configured, but devices that require daemons or more complex configuration should be started at reboot time by adding the necessary code to the end of the **/etc/firstboot** script.
- Daemons should not be started.
- Items such as NIS configuration, which uses system resource controller (SRC) commands, and so on, should be done by creating a separate entry in **/etc/inittab** and running a configuration script at reboot time.
- No action should be taken that requires more than 32MB of paging space unless the paging space is implicitly increased.

#### Notes:

1. Another installation file, **image.data**, can also be modified and used during BOS installation. The **image.data** file contains information describing the root volume group image created during the BOS installation process. This information includes the sizes, names, maps, and mount points of logical volumes and file systems in the root volume group. The installation program also takes input from the **image.data** file regarding defaults for the machine being installed. See *AIX 5L Version 5.1 Files Reference* for a description of the **image.data** file. The procedure for using the **bosinst.data** file to customize BOS installation can also be used for the **image.data** file. The modified files can be used together to override BOS installation defaults.

2. You can also use the instructions in this chapter to create a supplemental diskette containing a modified **preserve.list** file, which is used during a Preservation Installation. For more information about a preservation installation, see “Chapter 1. Installing the Base Operating System” on page 1.

The **bosinst.data** file directs the actions of the BOS installation program. The file resides in the **/var/adm/ras** directory on the installed machine only, and it is not accessible on the commercial tape or the CD on which you received AIX 5.1.

The **bosinst.data** file contains stanzas with variables set to default values. Each variable is on a new line, in the *Variable=Value* form. A blank line separates each stanza. The information in these stanzas informs the installation program about such things as the method and type of installation, the disks in the machine, and the language used. By editing the file with an ASCII text editor, you can substitute new values for the default variables.

---

## Customizing and Using a bosinst.data File

You must install the Base Operating System (BOS) before you can access and modify the default **bosinst.data** file. The Web-based System Manager **Reinstall Base Operating System** wizard can be used to prepare your next installation and in customizing the **bosinst.data** file. This file may also be retrieved and edited like any other ASCII file. If you are editing the **bosinst.data** file, use one of the following procedures:

- “Create and Use a Backup Tape”
- “Create and Use a Client File” on page 57
- “Create and Use a Supplementary Diskette” on page 57

Refer to “Appendix B. bosinst.data File Stanza Descriptions” on page 89 and “Appendix C. bosinst.data File Examples” on page 95 for information about the contents of the file and examples of edited files. You may verify the contents of your modified **bosinst.data** file by using the **bicheck** command.

If you are customizing the **/bosinst.data** file so that it becomes part of a system backup (mksysb), note that with AIX 4.3.3 and later, the **mksysb** command always updates the **target\_disk\_data** stanzas to reflect the current disks in the **rootvg**. If you do not want this update to occur you must create the file **/save\_bosinst.data\_file**. The existence of this file is checked by the **mksysb** command, before the **target\_disk\_data** stanzas are updated.

### Create and Use a Backup Tape

To create and use a backup tape, use the following steps:

1. Customize the **bosinst.data** file:
  - a. Use the **cd** command to change your directory to the **/var/adm/ras** directory.
  - b. Copy the **/var/adm/ras/bosinst.data** file to a new name, such as **bosinst.data.orig**. This step preserves the original **bosinst.data** file.
  - c. Edit the **bosinst.data** file with an ASCII editor.
  - d. Verify the contents of the edited **bosinst.data** file using the **bicheck** command:

```
/usr/lpp/bosinst/bicheck filename
```
  - e. Copy the edited file to the root directory:

```
cp /var/adm/ras/bosinst.data /bosinst.data
```
  - f. If you do not want the **target\_disk\_data** file updated to reflect the current **rootvg**, create the file **/save\_bosinst.data\_file** by using the following command:

```
touch /save_bosinst.data_file
```

2. Create a backup image of the system using one of the following: the Web-based System Manager Backups application, SMIT, or **mksysb** command. Refer to “Chapter 6. Creating System Backups” on page 37 for more information.

BOS installations from this backup behave according to your customized **bosinst.data** file.

## Create and Use a Client File

Create one customized **bosinst.data** file for each client and, using the Network Installation Manager (NIM), define the files as NIM resources. Refer to *AIX 5L Version 5.1 Network Installation Management Guide and Reference* for more information about how to use the **bosinst.data** file as a resource in network installations.

## Create and Use a Supplementary Diskette

Use this procedure to create the supplementary diskette and use it in future installations:

1. Customize the **bosinst.data** file:
  - a. Use the **cd** command to change your directory to the **/var/adm/ras** directory.
  - b. Copy the **/var/adm/ras/bosinst.data** file to a new name, such as **bosinst.data.orig**. This step preserves the original **bosinst.data** file.
  - c. Edit the **bosinst.data** file with an ASCII editor.
  - d. Create an ASCII file consisting of one word:

```
data
```

- e. Save the new ASCII file, naming it **signature**.
2. Create the diskette and use it for installation:
    - a. Back up the edited **bosinst.data** file and the new **signature** file to diskette with the following command:

```
ls ./bosinst.data ./signature | backup -iqv
```

OR

If you create a bundle file named **mybundle**, back up the edited **bosinst.data** file, the new **signature** file, and the bundle file to diskette with the following command:

```
ls ./bosinst.data ./signature ./mybundle | backup -iqv
```

- b. Put the diskette in the diskette drive of the target machine you are installing.
- c. Boot the target machine from the installation media (tape, CD/DVD-ROM, or network) and install the operating system.

The BOS installation program uses the diskette file, rather than the default **bosinst.data** file shipped with the installation media.



---

## Chapter 9. Alternate Disk Installation

Alternate disk installation lets you install the operating system while it is still up and running, which reduces installation or upgrade downtime considerably. It also allows large facilities to better manage an upgrade because systems can be installed over a longer period of time. While the systems are still running at the previous version, the switch to the newer version can happen at the same time.

Alternate disk installation can be used in one of two ways:

- Installing a **mksysb** image on another disk “Alternate mksysb Disk Installation”
- Cloning the current running **rootvg** to an alternate disk “Alternate Disk rootvg Cloning” on page 60.

Both of these methods can become important in environments where downtime is critical.

---

### Alternate mksysb Disk Installation

Alternate **mksysb** installation involves installing a **mksysb** image that has already been created from a system, onto an alternate disk of the target system. The alternate disk or disks cannot contain a volume group, so in this case, the associated volume group is **altinst\_rootvg**. See “Phased Alternate Disk Installation” on page 60 for additional information. The **mksysb** image (AIX 4.3 or later) is created on a system that either was the same hardware configuration as the target system, or had all the device and kernel support installed for a different machine type or platform, and/or different devices. The installed device and kernel support would be as follows:

- **devices.\***
- **bos.mp**
- **bos.up**
- **bos.mp64**, if necessary

When the **alt\_disk\_install** command is run, the **image.data** file from the **mksysb** image is used by default (unless a customized **image.data** is given) to create the logical volumes and file systems. The prefix **alt\_** is added to the logical volume names, and the file systems are created with a prefix of **/alt\_inst**. For example, **hd2** would be created as **alt\_hd2**, and its file system, **/usr**, would be created as **/alt\_inst/usr**. These names are changed back to their original names at the end of the alternate disk installation process.

The **mksysb** image is then restored into the alternate file system. A prepopulated boot image is then copied to the boot logical volume of the **altinst\_rootvg**, and the boot record of the boot disk is modified to allow booting from the disk.

At this point, a script can be run to allow for any customization before the system is rebooted. The alternate file systems are still mounted as **/alt\_inst/real\_file\_system** (for example: **/alt\_inst/usr**, **/alt\_inst/home**). **Files can be accessed at this point, but nothing can be installed into the alternate file system because the kernels and libraries of the mksysb image do not match those of the running system.**

After the optional script is run, the file systems are unmounted, and the logical volume and file system names are changed to match the **image.data** file’s names (for example, **alt\_inst\_hd6** is changed to **hd6** in the volume group descriptor area). The logical volumes are exported from the Object Data Manager (ODM), but the **altinst\_rootvg** is only varied off. It is left in the ODM as a placeholder so the disk is not accidentally overwritten. The default action of **alt\_disk\_install** is to set the bootlist so that the next time the system boots, it boots from this newly installed volume group. This default action can be turned off. If specified, the system reboots at this point, and the system reboots from the new **rootvg**. The boot process proceeds to a certain point, with the new **rootvg**’s file systems mounted, and the **bosboot** command is called to rebuild a “normal” boot logical volume. The system then reboots.

After the system has booted from the new **rootvg**, the previous version of the **rootvg** does not appear in logical volume manager (LVM) listings, unless the **alt\_disk\_install** version is AIX 4.3.2 or later.

**Note:** If you are using **alt\_disk\_install** AIX 4.3.2 or later, after rebooting from the new alternate disk, the former **rootvg** volume group is contained in an **lspv** listing as **old\_rootvg**, and includes all disk(s) in the original **rootvg**. This former **rootvg** volume group is set to not varyon at reboot and should *only* be removed with the **-X** flag. For example:

```
alt_disk_install -X old_rootvg
```

If a return to the original **rootvg** is necessary, the **bootlist** command is used to change the bootlist to reboot from the original **rootvg**.

**Note:** If you are using **alt\_disk\_install** AIX 4.3.2 or later, and it is unclear which disk is the boot disk for a specific volume group, use the **-q** flag to determine the boot disk. This flag can be useful when a volume group is comprised of multiple disks and a change in the bootlist is necessary.

---

## Alternate Disk rootvg Cloning

Cloning the **rootvg** to an alternate disk has many advantages. One advantage is having an online backup available, in case of disaster. Keeping an online backup requires an extra disk or disks to be available on the system. Another benefit of **rootvg** cloning occurs when applying new maintenance levels or updates. A copy of the **rootvg** is made to an alternate disk, then updates are applied to that copy. The system runs uninterrupted during this time. When it is rebooted, the system boots from the newly updated **rootvg** for testing. If updates cause problems, the **old\_rootvg** can be retrieved by resetting the bootlist and then rebooting.

By default, when the **alt\_disk\_install** command is called, it creates an **image.data** file based on the current **rootvg**'s configuration. A customized **image.data** file can be used. An alternate **rootvg** (**altinst\_rootvg**) is then created, and the logical volumes and file systems are then created with the **alt\_inst** prefix. A backup file list is then generated from the **rootvg**, and if an **exclude.list** file is given, those files are excluded from the list. The final list is then copied to the **altinst\_rootvg**'s file systems.

At this point, if specified, the **installp** command installs updates, fixes, or new filesets into the alternate file system. Next, the **bosboot** command creates a boot logical volume on the alternate boot disk.

If a customization script is specified, it runs at this point. The file systems are then unmounted, and the logical volumes and file systems are renamed. The logical volume definitions are exported from the system to avoid confusion with identical ODM names, but the **altinst\_rootvg** definition is left as an ODM placeholder.

By default, the bootlist is set to the new cloned **rootvg** for the next reboot.

## Phased Alternate Disk Installation

For AIX 4.3.1 and later, alternate disk installation can be performed in stages. The installation itself is broken down into three phases. The default is to perform all three phases in the same invocation. The phases are as follows:

- |                |   |
|----------------|---|
| <b>Phase 1</b> | Creates the <b>altinst_rootvg</b> volume group, the <b>alt_</b> logical volumes, and the <b>/alt_inst</b> file systems. Also restores the <b>mksysb</b> or <b>rootvg</b> data.  |
| <b>Phase 2</b> | Runs any specified customization script. For cloning only, installs updates, new filesets, fixes, or bundles. Also copies a <b>resolv.conf</b> file (if specified) and necessary files to remain a NIM client (if specified).                     |
| <b>Phase 3</b> | Unmounts the <b>/alt_inst</b> file systems, renames the file systems and logical volumes, removes the <b>alt_</b> logical volume names from ODM, and varies off the <b>altinst_rootvg</b> . It also sets the bootlist and reboots (if specified). |

As an alternative to running all three phases, the phases can be completed by one of the following methods:

- Each phase separately
- Phases 1 and 2 together
- Phases 2 and 3 together (Phase 2 can be run multiple times before Phase 3 is run.)

You must run Phase 3 to obtain a usable **rootvg**. Running Phases 1 and 2 leave the **/alt\_inst** file systems mounted. Any time during the phase process and before rebooting, the **altinst\_rootvg** can be removed, and disk cleanup occurs using the following command:

```
alt_disk_install -X
```

---

## Data Access Between the Original rootvg and the New Alternate Disk

If you are using the **alt\_disk\_install** command for AIX 4.3.2 or later, you can initiate data access between the original rootvg and the new alternate disk. A volume group "wake-up" can be accomplished, on the non-booted volume group. The "wake-up" puts the volume group in a **post alt\_disk\_install** Phase 1 state. For example, the **/alt\_inst** file system is then mounted.

The volume group that experiences the "wake-up" is renamed **altinst\_rootvg**.

When data access is no longer needed, the volume group can be "put to sleep."

### Notes:

1. The running operating system's version must be greater than or equal to the version of the volume group that undergoes the "wake-up." This might mean that it is necessary to boot from the **altinst\_rootvg** and "wake-up" the **old\_rootvg**. For example, an alternate disk is created from an **alt\_disk\_install** AIX 5.1 mkysyb, on a AIX 4.3.0 system. It is then necessary to boot from the AIX 5.1 alternate disk and "wake-up" the AIX 4.3.0 **old\_rootvg** volume group to access data between the two volume groups.

This limitation is caused by a journaled file system (JFS) log entry incompatibility. It is possible to "wake-up" a volume group that contains a more recent version, but the volume group cannot have ever been the system **rootvg**. If this was true, the volume group would have made JFS log entries that could not be interpreted by an older version **rootvg**, when the volume group was experiencing a "wake-up."

The **alt\_disk\_install** command does not allow a "wake-up" to occur on a volume group with a more recent version, unless the **FORCE** environment variable is set to **yes**.

2. The volume group that experiences a "wake-up" *must* be put to sleep before it can be booted and used as the **rootvg**.

**Attention:** If a **FORCE** "wake-up" is attempted on a volume group that contains a more recent version of the running operating system, and the "waking" volume group has been a system **rootvg**, errors occur.

---

## Filesets to Install

An alternate disk installation uses the following filesets:

**bos.alt\_disk\_install.boot\_images**  
**bos.alt\_disk\_install.rte**

Must be installed for alternate disk **mkysyb** installations.  
Must be installed for **rootvg** cloning and alternate disk **mkysyb** installations.



---

## Installing to an Alternate Disk using Web-based System Manager

The graphical interface provides access to Web-based System Manager options for installing a **mksysb** to an alternate disk and for cloning a rootvg to the alternate disk. At any time during the following procedures, you can view extended help by selecting **Contents** from the Help menu.

To install a mksysb to an alternate disk:

1. Start the Web-based System Manager by typing **wsm** on the command line.
2. Select the **Software** container.
3. From the pulldown, select **Alternate Disk Install—>Install Mksysb on an Alternate Disk**.

To clone the rootvg to an alternate disk:

1. Start the Web-based System Manager by typing **wsm** on the command line.
2. Select the **Software** container.
3. From the pulldown, select **Alternate Disk Install—>Clone the Rootvg to an Alternate Disk**.

---

## Running Alternate Disk Installation Using SMIT

To run alternate disk **mksysb** install:

1. At the system prompt, type the **smit alt\_mksysb** fast path.
2. Type or select values in the entry fields. Press Enter after making all desired changes.

To run alternate disk **rootvg** cloning:

1. At the system prompt, type the **smit alt\_clone** fast path.
2. Type or select values in the entry fields. Press Enter after making all desired changes.

---

## Examples

1. To clone the **rootvg** running 4.1.4.0 to hdisk1 and update that clone with the latest maintenance level 4.1.5.0 that is on cd0, run the following command:

```
alt_disk_install -C -b update_all -l /dev/cd0 hdisk1
```

In SMIT, use the **smit alt\_clone** fast path and select **hdisk1** from the listing for Target Disk(s) to install, select the **update\_all** bundle from the listings in the **Bundle to Install** field, and **/dev/cd0** from the listing in the **Directory or Device with images** field.

2. To clone the **rootvg** running 4.2.0 to hdisk3, then update to the latest fixes which are mounted from another system on /421fixes, and run a customized script named **/tmp/finish\_alt\_install**, run the following command:

```
alt_disk_install -C -b update_all -l /421fixes \  
-s /tmp/finish_alt_install hdisk3
```

In SMIT, use the **smit alt\_clone** fast path and select **hdisk3** from the listing for Target Disk(s) to install, select the **update\_all** bundle from the listings in the **Bundle to Install** field, type **/421fixes** in the **Directory or Device with images** field, and type **/tmp/finish\_alt\_install** in the **Customization script** field.

3. To install a AIX 4.3 **mksysb** tape that was created from a machine with the same hardware configuration as the target, to hdisk1, run the following command:

```
alt_disk_install -d /dev/rmt0 hdisk1
```

In SMIT, use the **smit alt\_mksysb** fast path and select **hdisk1** from the listing for **Target Disk(s)** to install field and select **/dev/rmt0** from the listing for **Device** or image name field.



- To install a AIX 4.3 **mksysb** image that is NFS mounted on file system **/mksysbs** to the alternate disk **hdisk2** using a customized **image.data** file and an exclude file containing **^./tmp/**, type the following command:

```
alt_disk_install -d /mksysbs/my_43P_mksysb -i /mksysbs/my_43p_image.data \  
-e /mksysbs/my_exclude_file hdisk2
```

Using the **^./tmp/** pattern does not backup files in the **/tmp** directory, but does backup files in **/var/tmp**.

**Note:** All files are backed up relative to the current directory. This directory is represented by a **.** (dot character). If it is important that the search match the string at the beginning of the line when excluding a file or directory, it is necessary to use a **^.** (caret followed by a dot character) as the first part of the search string, followed by the filename or directory to be excluded. The form is as follows:

```
^./filename
```

If the filename or directory being excluded is a substring of another filename or directory, use a **^.** (caret followed by a dot character) for the search to start at the beginning of the line and the **\$** (dollar symbol) to have the search finish at the end of the line.

In SMIT, use the **smit alt\_mksysb** fast path and select **hdisk2** in the Target Disk(s) to install field. Next, type **/mksysbs/my\_43P\_mksysb** in the **Device** or image name field, **/mksysbs/my\_43p\_image.data** in the **image.data** file field, and **/mksysbs/my\_exclude\_file** in the **Exclude** list field.

- To "wake-up" an original rootvg, after booting from the new alternate disk, run the following command:

```
alt_disk_install -W hdisk0
```

The following example illustrates the displayed output you might see when running the command discussed above:

```
# lspv  
hdisk0      000040445043d9f3   old_rootvg  
hdisk1      00076443210a72ea   rootvg  
  
# alt_disk_install -W hdisk0  
  
# lspv  
hdisk0      000040445043d9f3   altinst_rootvg  
hdisk1      00076443210a72ea   rootvg
```

At this point, the **altinst\_rootvg** volume group is varied-on and the **/alt\_inst** file systems are mounted.

- To "put-to-sleep" a volume group that had experienced a "wake-up" type the following command:

```
alt_disk_install -S
```

The following example illustrates the displayed output you might see when running the command discussed above:

```
# lspv  
hdisk0      000040445043d9f3   altinst_rootvg  
hdisk1      00076443210a72ea   rootvg  
  
# alt_disk_install -S  
  
# lspv  
hdisk0      000040445043d9f3   altinst_rootvg  
hdisk1      00076443210a72ea   rootvg
```

The **altinst\_rootvg** is no longer varied on and the **/alt\_inst** file systems are no longer mounted. If necessary for the **altinst\_rootvg** volume group name to be changed back to **old\_rootvg**, do this task with the **-v** flag.



---

## Chapter 10. Troubleshooting

This chapter provides problem-determination tactics and solutions for installation and configuration problems. Topics include:

- “Troubleshooting an Installation from a System Backup”
- “Troubleshooting a Migration Installation” on page 67
- “Troubleshooting an Alternate Disk Installation” on page 69
- “Troubleshooting After an Installation” on page 70
- “Creating Bootable Tapes” on page 70
- “Accessing a System That Does Not Boot” on page 71
- “Troubleshooting a Full /usr File System” on page 73
- “Viewing BOS Installation Logs” on page 74
- “Using the snap Problem Determination Tool” on page 74
- “Acting on System and Error Messages” on page 75.

---

### Troubleshooting an Installation from a System Backup

This section describes solutions for common problems when installing from a system image created with the **mksysb** command.

The section discusses the following topics:

- “Bootup Failure”
- “Problems with mksysb Image Configuration on System Backup Tapes” on page 66
- “Source and Target Differences” on page 67
- “Suggestions for Reported Problems with mksysb Backup Installations” on page 67

### Bootup Failure

If a backup tape fails to boot, you can still install by using a **mksysb** image stored on the tape.

Boot the machine from the product media (Volume 1 if there is more than one volume), then install the backup from Maintenance mode. Refer to “Chapter 1. Installing the Base Operating System” on page 1 for instructions on booting. Follow the instructions to the point when the Welcome to the Base Operating System Installation and Maintenance screen displays.

#### Booting from the Product CD-ROM

Complete the following steps when the Welcome screen is displayed:

1. Choose the **Start Maintenance Mode for System Recovery** option.
2. Choose the **Install from a System Backup** option.
3. Choose the drive containing the backup tape.  
The system reads the tape and begins the installation.
4. Do not remove the CD from the CD-ROM drive.  
The system installs the kernel and device support required on the target system from the CD.
5. Return to step 9 on page 52 in *Installing a System Backup on the Source Machine* and continue the instructions for installing the backup.

**Note:** The **Use Maps** option is not supported in Maintenance Mode. 9 on page 52 includes a description of the use of maps on disks selected in the System Backup Installation and Settings screen.

## Booting from the Product Tape

Complete the following steps when the Welcome screen is displayed:

1. Create a diskette that contains a **./signature** file that contains the characters 'data' and a **./bosinst.data** file with **SWITCH\_TO\_PRODUCT\_TAPE = yes** in the **control\_flow** stanza. See "Chapter 8. Customized BOS Installations" on page 55 for information on creating these files.
2. Insert the diskette that you created in step 1 into the diskette drive.
3. Boot the system from Volume 1 of the product tape.
4. Choose the **Start Maintenance Mode for System Recovery** option when the Welcome screen is displayed.

The Maintenance screen displays.

5. Choose the **Install from a System Backup** option.
6. Remove the product tape from the tape drive and insert the **mksysb** tape.

The Choose Tape Drive screen displays.

7. Choose the drive containing the backup tape.  
The system reads the tape and begins the installation.

**Note:** The system prompts you to remove the **mksysb** tape and insert the product tape after the **mksysb** backup has been restored.

8. Return to Change/Show Installation Settings step 9 of *Installing a System Backup on the Source Machine* and continue the instructions.

**Note:** The **Use Maps** option is not supported in Maintenance Mode. 9 on page 52 includes a description of the use of maps on disks selected in the System Backup Installation and Settings screen.

## Problems with mksysb Image Configuration on System Backup Tapes

Bootable **mksysb** tapes are made up of four images: the boot image, the BOS Install/Maintenance image, the toc image and the system backup image. The system backup image is the actual backup of the files in the rootvg in all JFS-mounted file systems.

The first three images must be created with a tape **block\_size** value of 512. The **mksysb** command ensures that the block size is 512 when these images are created. There are no restrictions on the block size used for the fourth (system backup image) on the tape. The block size of the system, before it was temporarily set to 512, is used for the fourth image on the tape.

The value of the block size must be saved in the **/tapeblksize** file in the second image on the tape. The second and fourth images are stored in backup/restore format. Again, **mksysb** ensures the correctness of the tapes created using the **mksysb** command.

If there are problems with the **bosinst.data** file, the **image.data** file, or the **tapeblksize** file, they can be restored from the second image on the tape and checked. These files, as well as commands necessary for execution in the RAM filesystem (when running in maintenance mode after booting from the tape), are stored in the second image.

### Restoring a File from the Second Image or Tape

To restore a file from the second image follow these steps:

1. Be sure the tape block size is 512 by entering the following command:

```
# lsattr -E -l rmt0
```

If the block size is not correct, use the following command to set it to 512:

```
# chdev -l rmt0 -a block_size=512
```

2. Make sure the tape is rewound. If the tape is not rewound, enter the following command:

```
# tctl -f /dev/rmt0 rewind
```

3. Extract the necessary files by entering:

```
# restore -xvq -s2 -f /dev/rmt0.1 .filename
```

**Note:** The filename should be the full path, and always preceded with a `.` (dot character), such as `./tapeblksz`.

4. Rewind the tape by entering:

```
# tctl -f /dev/rmt0 rewind
```

5. Change the block size back to its original value, if necessary.

## Source and Target Differences

Consider the differences in the source and target systems when planning an installation from a **mksysb** backup.

The original system image made with the **mksysb** command might not match your present configuration. For example, if you changed devices after backing up your system, the original source image does not have the correct device drivers for the target system. Avoid system inequalities such as different communication adapters, TTY attributes, and printer attributes. If you are using the Common Desktop Environment (CDE) on the target system, make all configuration changes, then shut down and reboot the system before you start CDE.

When using a backup image to install additional systems, follow the procedure for “Cloning Your System” on page 48.

## Suggestions for Reported Problems with mksysb Backup Installations

The following troubleshooting tips apply to reported problems with installations from a **mksysb** image:

- Check that you have sufficient free blocks in the file systems to write temporary files.
- Check that each file system has at least 500 blocks free when the **mksysb** backup image is made. The system needs work space in each file system when installing from a **mksysb** backup image.
- Check that you are using the correct tape type for the density setting that you selected.
- Check that the tape is *not* write protected.
- Clean the tape drive at the recommended intervals and use only approved data-grade tapes (not video tapes for 8 mm).
- Check that 7206 4-mm Digital Audio Tape (DAT) tape drives are using only DAT tapes marked with the Dataphone Digital Services (DDS) symbol. Any other DAT tapes (for example, voice grade) cannot be used.
- Check the `/smit.log` file for any errors from SMIT.
- Check that your **mksysb** backup image contains an **image.data** file. If you create the **mksysb** backup image through Web-based System Manager or SMIT, it is done automatically. If you run **mksysb** from the command line, you must either run the **mkszfile** command first, or use the **-i** flag with the **mksysb** command.

---

## Troubleshooting a Migration Installation

The following sections offer solutions for problems that can occur during a migration installation.

## Boot Logical Volume Not Large Enough

If you receive errors indicating the boot logical volume is not large enough, see “Acting on System and Error Messages” on page 75.

## Not Enough Disk Space for Migration

At the beginning of a migration installation, the system verifies that there will be enough space to attempt the migration. If there is not enough disk space, a message is printed explaining how much is needed. You must now reboot the machine from the media containing your current version of AIX, and make more space available in the **rootvg** volume group. After you do this, attempt the migration again.

You can use the following options for adding additional disk space for the migration installation:

- Add another disk to the **rootvg** volume group using either the SMIT **smit extendvg** fast path or the **extendvg** command.
- Move any user data logical volumes from the **rootvg** volume group to another volume group. You can use either the SMIT **smit cplv** fast path or the **cplv** command to move individual logical volumes to another volume group's disk. It is a good idea to have only system logical volumes in the **rootvg**, and have user data logical volumes in other volume groups.

After you use the **cplv** command, you must remove the original logical volumes with the **rmlv** command. If the moved logical volume contains a file system, you must modify its corresponding entries in the **/etc/filesystems** file to reflect the new logical volume name.

For more detailed information about manipulating logical volumes and volume groups, refer to Logical Volumes in *AIX 5L Version 5.1 System Management Guide: Operating System and Devices*.

- Remove unneeded logical volumes (and file systems) from the **rootvg**. Run the **lsvg -l rootvg** command to see all the logical volumes in the **rootvg** volume group. The only logical volumes that must be in the **rootvg** are: hd2, hd3, hd4, hd5, hd6, hd8, and hd9var. The hd1 (**/home**) logical volume can reside in another volume group if necessary.

The hd7 (system dump) logical volume is no longer needed in AIX Version 4 because the paging space logical volume (hd6) is used. The migration code automatically removes this logical volume if space is needed, but you can remove it ahead of time with the following commands:

```
sysdumpdev -P -p /dev/hd6  
rmlv -f hd7
```

- If you cannot find extra space in your **rootvg**, you may have to do a *preservation* installation instead of a migration installation to AIX 4.3. A preservation installation saves all the “non-system” logical volumes and file systems (for example, **/home**), but removes and re-creates the following logical volumes: hd2, hd3, hd4, hd5 and hd9var.

If you do a preservation installation, you must reinstall any applications that were installed in your **rootvg** after the preservation installation has completed. You must also reconfigure devices, as well as re-create users and groups. See “Chapter 1. Installing the Base Operating System” on page 1 for more information on a preservation installation.

After you have released enough space, reboot from your installation media, and try the migration installation again. You must have at least 8MB of free disk space to complete the migration installation.

If there is insufficient space to complete the migration installation during the BOS installation process, a message similar to the following is displayed at the end of the installation:

```
An error occurred while migrating packages.
```

```
Some packages have not been installed.
```

```
Please see /var/adm/ras/devinst.log for details or perform an overwrite or  
preservation install.
```

If space limitations prevent the migration of all software that is usually automatically migrated, the installation program attempts to install the software that is usually installed for a Preservation or Overwrite installation. If there is still not enough disk space available, the minimum set of software required to support the use of the system is installed.

If there is not enough space to migrate all of the usually migrated software, a collection of software called a Migration Bundle will be available when you install additional software later. If the minimum set of software is installed, or if the installation is not performed from a graphics console, a Graphics\_Startup Bundle is created. Before installing either of these bundles, create additional disk space on the machine you want to install. Refer to “Chapter 4. Optional Software Products and Service Updates” on page 17 for more information about installing software bundles and migrating or installing optional software products. “Maintaining Optional Software Products and Service Updates” on page 22 describes how to remove software from the system to release disk space.

## Renaming Devices

If you migrate a system from AIX 3.2 to AIX 4.3, you may have to rename some of the devices. The AIX Version 4 database must be built from scratch when the system is rebooted because the device configuration database in AIX Version 3 is not compatible with AIX Version 4 database. In this case, the devices are named as they are found, and there may be some cases where these names do not match the names in AIX Version 3.

---

## Troubleshooting an Alternate Disk Installation

If you receive either of the following two error messages, see “Acting on System and Error Messages” on page 75,

- 0505-113 alt\_disk\_install: No target disk name provided.
- 0505-117 alt\_disk\_install: Error restoring image.data file from mksysb image.

## Other Problems

**Symptom:** You are trying to install the **bos.alt\_disk\_install.rte** fileset on a AIX 4.1 system, and the **installp** command is giving an error that requisites are not being met, but it does not indicate what the requisites are.

This problem is a AIX 4.1 **installp** limitation in not reporting the requisites. The **bos.alt\_disk\_install.rte** requires the **bos.sysmgmt.sysbr** (the **mksysb** fileset) to be installed at the same level as the running system. Therefore, if you are attempting to install on a AIX 4.1.5 system, then **bos.sysmgmt.sysbr 4.1.5.0** should also be installed.

**Symptom:** You have run the **alt\_disk\_install** command or used the SMIT menus to either clone or install a **mksysb** image on an alternate disk. However, you now want to remove the definition so you can use the disk to run the **alt\_disk\_install** command again or use the disk for another purpose.

**Action:** *Do not run **exportvg**.* The **exportvg** examines the logical volumes on the disk (now called by their rootvg names: **hd1**, **hd2**, **hd3**, and so on) and tries to remove their corresponding entries from the **/etc/filesystems** file. This action removes the real file system stanzas from your running system and causes boot problems if you reboot with the missing stanzas.

Use the **alt\_disk\_install -X** command to remove the **altinst\_rootvg** name from the database. This removes only the ODM information from the CuDv database, so the **lspv** command shows the disk(s) as no longer belonging to **altinst\_rootvg**. It also resets your bootlist to the boot disk on which the hd5 boot logical volume resides. You can still boot from the **altinst\_rootvg**, because the volume group, logical volume, and file system information remain on the disk. However, you must set your bootlist to the **altinst\_rootvg** boot disk.

---

## Troubleshooting After an Installation

If your system was installed by a network installation server, Configuration Assistant or Installation Assistant will not display when the BOS installation program completes.

Configuration Assistant and Installation Assistant do not contain the tasks needed to configure your machine as a server. If you need to configure your system for a specific resource, refer to the documentation pertaining to that resource.

If your terminal type is not set, the first menu displayed by the ASCII Installation Assistant requires you to enter your terminal type (tty). If you enter a terminal type that is not valid, this menu redisplay until a valid type is entered.

If you enter a valid terminal type that does not match your terminal, the next screen displayed may be unreadable. In this case, press the break key sequence to return to the Set Terminal Type screen. For most terminal types, the break key sequence is Ctrl-C.

---

## Creating Bootable Tapes

Following is the procedure for creating a bootable tape, which you might use to maintain your AIX 5.1 Base Operating System (BOS). The tape works only with a copy of BOS that is the same version as the BOS used to create them.

1. To create the **/bosinst.data** file, type:

```
cp /var/adm/ras/bosinst.data /bosinst.data
```

OR

```
cp /usr/lpp/bosinst/bosinst.template /bosinst.data
```

2. To create the **/image.data** file, type:

```
mkszfile
```

**Note:** This file is created by the **mksysb** command.

3. Insert a tape in the drive.
4. Make sure the Tape Device Block size is set to 512.

To check the Tape Device Block size, type:

```
tctl -f /dev/rmtTapeDriveName status
```

where *rmtTapeDriveName* is the name of the tape drive you are using (for example, rmt0).

To change the Tape Device Block size, type:

```
chdev -l rmtTapeDriveName -a block_size=512
```

5. Make sure the tape is rewound. To rewind the tape, type:

```
tctl -f/dev/rmtTapeDriveName rewind
```

6. To create the boot image on the tape, type:

```
bosboot -ad /dev/rmtTapeDriveName.1
```

7. To create the BOS Install/Maintenance image on the tape, type:

```
mkinsttape /dev/rmtTapeDriveName.1
```

8. If the Tape Device Block size was changed in step 4, be sure to set it back to its previous size. To change the Tape Device Block size, type:

```
chdev -l rmtTapeDriveName -a block_size=BlockSize
```

where *BlockSize* is the previous Tape Device Block size.



---

## Accessing a System That Does Not Boot

This section describes how to access a system that will not boot from the hard disk. Read “Troubleshooting an Installation from a System Backup” on page 65 for instructions if a **mksysb** backup tape fails to boot.

This procedure enables you to get a system prompt so that you can attempt to recover data from the system or perform corrective action that will enable the system to boot from the hard disk.

### Notes:

1. This procedure is intended only for experienced users who have knowledge of how to boot or recover data from a system that is unable to boot from the hard disk. Most users should not attempt this procedure but instead should follow local problem-reporting procedures.
2. This procedure is not intended for users who have just completed a New Installation, because the system will not contain data that needs to be recovered. If you are unable to boot from the hard disk after completing a New Installation, follow your local problem-reporting procedures.

The following steps summarize the procedure for accessing a system that will not boot.

1. Boot the system from Volume 1 of the BOS CD-ROM or a bootable tape “Creating Bootable Tapes” on page 70.
2. Select maintenance options.
3. Recover data or perform corrective action using the system prompt.

## Prerequisites

Confirm the following prerequisites have been met before continuing with the procedure:

- Your system cannot be booted from the hard disk.
- All hardware is installed.
- AIX 5.1 Base Operating System (BOS) is installed.
- Your system unit is set to Off.
- You have the system key for the key lock (if present) on your system unit.

## Accessing the System

Use this procedure if you are unable to boot from the hard disk. The beginning of this procedure is similar to the one you used to install the Base Operating System. You will, however, use the maintenance screens instead of the installation screens to complete this procedure. The maintenance screen illustrations in this procedure are provided as examples only. The actual online screens may be somewhat different in appearance.

1. Turn the system key (if present) to the Service position.
2. Turn on all attached external devices, such as terminals, CD-ROM drives, tape drives, monitors, and external disk drives *before* turning on the system unit. Do not turn on the system unit until step 5. Turning on the external devices first is necessary so that the system unit can identify them during the startup (boot) process.
  - If you are booting from a network device, refer to *AIX 5L Version 5.1 Network Installation Management Guide and Reference*.
  - If you are not booting from a network device, go to step 3.
3. Insert Volume 1 of the installation media into the tape or CD-ROM drive. Some CD-ROM drives have a removable disc caddy, while others have a sliding drawer. If the CD-ROM drive on your system has a sliding drawer, place the CD-ROM in the drawer and push the drawer in. If the CD-ROM drive on your system does not have a sliding drawer, insert the CD-ROM into the disc caddy and then insert the caddy into the CD-ROM drive.

**Notes:**

- a. You may find that on specific hardware, the tape drive door will not open while the system unit is turned off. If you have trouble opening the tape drive door during installation, use the following procedure:
    - 1) Turn the system unit on.
    - 2) Insert the BOS tape (insert Volume 1 if you received more than one volume).
    - 3) Turn the system unit off and wait 30 seconds.
  - b. On some models that have a door to the tape drive, there may be a waiting period of up to three minutes before the tape drive door opens after you have pressed the button to open the tape drive. Some models also require that the button for the tape drive door be held in the pressed position for a few seconds before the tape drive door will open.
  - c. On some models, the eject button must be pressed for at least 2 seconds to eject a CD-ROM that is already in the disc caddy.
4. If you are not using an ASCII terminal, skip to step 5. If you are using an ASCII terminal, set the communications options as follows:
- Line Speed (baud rate) = 9600
  - Word Length (bits per character) = 8
  - Parity = no (none)
  - Number of Stop Bits = 1
  - Interface = RS-232C (or RS-422A)
  - Line Control = IPRTS

Set the keyboard and display options as follows:

- Screen = Normal
- Row and Column = 24x80
- Scroll = jump
- Auto LF (line feed) = off
- Line Wrap = on
- Forcing Insert = line (or both)
- Tab = field
- Operating Mode = echo
- Turnaround Character = CR
- Enter = return
- Return = new line
- New Line = CR
- Send = page
- Insert Character = space

**Note:** If your terminal is an IBM 3151, 3161, or 3164, press the Ctrl+Setup keys to display the Setup Menu and follow the onscreen instructions to set these options. If you are using some other ASCII terminal, refer to the appropriate documentation for information about how to set these options. Some terminals have different option names and settings than those listed here.

5. Turn the system unit power switch to the On position. The system begins booting from the installation media. If your system is booting from tape, it is normal for the tape to move back and forth. After several minutes, c31 is displayed in the LED.

If you have more than one console, each terminal and directly attached display device (or console) might display a screen that directs you to press a key to identify your system console. A different key is specified for each terminal displaying this screen. If this screen is displayed, then press the

specified key on the device to be used as the system console. The system console is the keyboard and display device used for installation and system administration. Press a key on only one console.

6. Type 3 to select **Start Maintenance Mode for System Recovery** from the Welcome to the Base Operating System Installation and Maintenance screen when it displays.

**Note:** If you customized the **bosinst.data** file in your installation media to specify a nonprompted installation, the installation and maintenance screens are not displayed. The system instead reboots from the installation media using the settings already defined in the **bosinst.data** file. To access the installation and maintenance screens, override the nonprompted mode. You can do this when three zeros are displayed on the screen. When you observe the three zeros, type 000 (zeros) and press Enter at the terminal.

You can select 88 to display help on this or any subsequent screen.

After you have selected the **Start Maintenance Mode for System Recovery** option, the Maintenance screen displays.

7. Select option 1, **Access a Root Volume Group**, from the Maintenance screen. The Warning screen displays.
8. Read the information displayed on the Warning screen. When you are ready to continue, type 0 and press Enter. The Access a Root Volume Group screen displays.
9. Select the option for the root volume group whose logical volume information you want to display. The Access a Root Volume Group screen lists all of the volume groups (root and otherwise) on your system. After entering your selection, the Volume Group Information screen displays.

**Note:** Reviewing the disk and location code information on the Volume Group Information screen enables you to determine whether the volume group you selected was the root volume group. You can return to the Access a Root Volume Group screen if the choice you made was not the root volume group. If you have not chosen a root volume group, you cannot continue beyond the Volume Group Information screen.

10. Select one of the options from the Volume Group Information screen and press Enter. Each option does the following:

- |                  |   |
|------------------|---|
| <b>Choice 1</b>  | <b>Access this volume group and start a shell.</b> Selecting this choice imports and activates the volume group and mounts the file systems for this root volume group before providing you with a shell and a system prompt.                             |
| <b>Choice 2</b>  | <b>Access this volume group and start a shell before mounting file systems.</b> Selecting this choice imports and activates the volume group and provides you with a shell and system prompt before mounting the file systems for this root volume group. |
| <b>Choice 99</b> | Typing 99 returns you to the Access a Root Volume Group screen.   |

After you select either choice 1 or 2, a shell and system prompt display.

11. Take appropriate measures to recover data or take action (such as using the **bosboot** command) to enable the system to boot normally.

---

## Troubleshooting a Full /usr File System

To release space in a full **/usr** file system, complete one or more of the following tasks:

- Type **installp -c all** to commit all updates and release space in the **/usr** file system.
- If the system is not a Network Installation Management (NIM) system serving a Shared Product Object Tree (SPOT), enter **/usr/lib/instl/inurid -r** to remove client information for **root** file system installations. For information about NIM and SPOTs, see *AIX 5L Version 5.1 Network Installation Management Guide and Reference*.

- Remove software that you do not need. See “Maintaining Optional Software Products and Service Updates” on page 22.

---

## Viewing BOS Installation Logs

Information saved in BOS installation log files may help you determine the cause of installation problems. To view BOS installation log files, type `cd /var/adm/ras` and view the files in this directory. One example is the **devinst.log**, which is a text file that can be viewed with any text editor or paged.

## Viewing Logs with SMIT

To view some logs in the **/var/adm/ras** directory, you can use the following SMIT fast path:

```
smit alog_show
```

The resulting list contains all logs that are viewable with the **alog** command. Select from the list by pressing the F4 key.

## Viewing Logs with the alog Command

To run a command to view some logs in the **/var/adm/ras** directory, type:

```
alog -o -f bosinstlog
```

---

## Using the snap Problem Determination Tool

The **snap** command assists you in compiling system configuration information quickly and easily. After this information is compiled, you can view it and compress it for downloading to diskette or tape or for remote transmission. You may be asked by support specialists to execute the **snap** command to help them accurately identify your system problem.

**Note:** If you intend to use a tape to send a **snap** image to IBM for software support, the tape must be in one of the following formats:

- 8mm, 2.3 Gb capacity
- 8mm, 5.0 Gb capacity
- 4mm, 4.0 Gb capacity

Using other formats will prevent or delay IBM software support from being able to examine the contents.

## Disk Space Requirements

Approximately 8 MB of temporary disk space is required when executing *all* of the **snap** options on an average system. If only one or two options are chosen, the disk space required will be substantially less, depending on the option. The program automatically checks for free space in the **/tmp/ibmsupt** directory or the directory specified with the **-d** flag. If there is not enough space, you must expand the file system. You can suppress this check for free space by using the **-N** option.

## Output Directory

The default directory for the output from the **snap** command is **/tmp/ibmsupt**. If you want to name an optional directory, use the **-d** option with the path of your output directory. Each execution of the **snap** command appends to previously created files.

## Execution Permissions

You must have root authority to execute this command.

## Cleanup

Use the cleanup option, **-r**, to remove the information saved by the **snap** command and to retrieve disk space.

## Options

The main options of the **snap** command are:

- a** Gathers information for all of the groups.
- c** Creates a **pax** image of all files in the **/tmp/ibmsupt** directory tree (or other output directory).  
  
**Note:** Other information that is not gathered by the **snap** command can be copied to the **snap** directory tree before executing the **pax** command. For example, you might be asked by the support specialist to provide a test case that demonstrates the problem. Copy the test case to the **/tmp/ibmsupt** directory. When the **-c** option of the **snap** command is executed, the test case will be included.
- D** Gathers dump and **/unix** information (the dump device is assumed to be **/dev/hd7**).
- g** Gathers the output of the **lspp -L** command. Support specialists use the output to re-create your operating system environment if other problem determination techniques fail. The output is stored in **/tmp/ibmsupt/general/lspp.L**. Also, the **-g** flag gathers general system information and outputs it to the **/tmp/ibmsupt/general/general.snap** file.
- o** Creates a **pax** file and downloads it to removable media.
- v** Displays the output of the commands executed by the **snap** command.

Before executing the **snap -c** or **snap -o** commands, copy any additional information required by the Support Center to the **/tmp/ibmsupt/testcase** directory (or an alternate directory).

The **snap -c** and **snap -o** commands are mutually exclusive. Do not execute both during the same problem-determination session. Use the **snap -c** command to transmit information electronically. Use the **snap -o** command to transmit information on a removable output device.

## To View the Usage Instructions

For instructions on how to gather information on selected groups (kernel, printer, SNA, NFS, TCP/IP, security, async, language, and file system), enter the **snap** command (with no options) at the system prompt.

## Recovery

If you think a command started by the **snap** command is suspended due to an inaccessible server, first press Ctrl+C. Then enter one of the following:

- Enter** For no action; return to current operation.
- s** To attempt to kill current operation.
- q** To quit **snap**.

---

## Acting on System and Error Messages

This section lists messages that can appear during the installation of AIX 5.1. Information about most messages is provided in the following format:

<b>System Message</b>	The system message is displayed in <b>bold</b> type.
<b>Explanation</b>	Describes what is likely to have caused the system message to be displayed.
<b>System Action</b>	Describes what the system does after the message is displayed.

<b>User Action</b>	Suggests a possible resolution to the problem suggested by the system message.
--------------------	--

**Note:** Multiple messages can have the same explanation, system action, and user action.

**0516-404 allocp: Not enough resources available to fulfill allocation. Either not enough free partitions or not enough physical volumes to keep strictness. Try again with different allocation characteristics.**

**0516-788: extendlv: Unable to extend logical volume**

**0503-008 installp: There is not enough free disk space in file system /usr (506935 more 512-byte blocks are required.) An attempt to extend this file system was unsuccessful. Make more space available, then retry this operation.**

<b>Explanation</b>	There is not enough space to complete the installation.
<b>System Action</b>	The installation cannot begin until the problem is resolved.
<b>User Action</b>	<p>You have several options:</p> <ul style="list-style-type: none"> <li>• Select fewer filesets than the number originally selected for installation.</li> <li>OR</li> <li>• Extend the root volume group to another disk. Type: <code>extendlv rootvg hdiskNumber</code>, where <i>Number</i> is the number of the specified disk.</li> <li>OR</li> <li>• Remove user-defined file systems to release space in the <b>rootvg</b> file system.</li> <li>OR</li> <li>• Follow the instructions in “Troubleshooting a Full /usr File System” on page 73.</li> </ul>

**BOS Install: After saving all the data from the previous system into /tmp, it was discovered that there will not be enough free space in /tmp to make the boot image. Please reboot in normal mode and increase the size of /tmp or reduce the number of files to save as listed in the /etc/preserve.list file.**

<b>Explanation</b>	During a preservation installation, files listed in the <b>/etc/preserve.list</b> file were copied to the <b>/tmp</b> file. After doing so, there was not enough room in <b>/tmp</b> to create the boot image.
<b>System Action</b>	Installation cannot continue.
<b>User Action</b>	Reboot in normal mode and increase the size of <b>/tmp</b> or reduce the number of files to be saved.

**BOS Install: You chose to create logical volumes mapped exactly as they were on the previous disks, but there are no map files specified in the image.data file.**

<b>Explanation</b>	On system backup restore, <b>EXACT_FIT = yes</b> was specified in the <b>image.data</b> file, but no map files were specified in the <b>image.data</b> file.
<b>System Action</b>	Nonprompted mode is terminated. The user is prompted.
<b>User Action</b>	<p>Run the <b>mkszfile</b> command with the <b>-m</b> option before creating the system backup tape.</p> <p>OR</p> <p>Do not specify <b>EXACT_FIT = yes</b> in the <b>image.data</b> file.</p>

**The boot logical volume (hd5) must be at least 8 megabytes. The system you are installing has a boot logical volume smaller than this, and the system does not have enough free contiguous**

physical partitions on *diskname* to increase the size of the boot logical volume. Please reboot in normal mode and correct this problem, or restart the installation and choose an overwrite install. Use the `lspv -M diskname` command to see the current allocation map of the disk.

OR

**Error: No space available to create a larger boot logical volume. In order to proceed with this installation the size of the boot logical volume (hd5) must be increased to 8 MB. At this time there are not *N* contiguous physical partitions available on the boot disk (*diskname*) for recreating the larger boot logical volume. You must free up this space by removing or relocating one or more logical volumes or file systems from *diskname*. Use `lspv -M diskname` to see its current partition allocation map.**

<b>Explanation</b>	Starting with AIX 4.3.3 the boot logical volume ( <b>blv</b> ), logical volume hd5, must be greater than 4 megabytes. If your system had disks less than 4 gigabytes in size in the root volume group, or was originally installed with a version of AIX earlier than AIX 4.3.2 your boot logical volume may only be 4 megabytes. You might experience this failure during preservation or migration installations. Overwrite installations create the boot logical volume with a minimum size of 8 megabytes. If free partitions contiguous to hd5 are available or if another location on the disk contains hd5 is identified, the installation process increases the size of hd5 and continues. Only the disk that currently contains the boot logical volume is checked for additional partitions in order to increase the size of the boot logical volume. Other disks in the rootvg are not checked.
<b>System Action</b>	You will be prompted to reboot in normal mode from the existing rootvg and increase the boot logical volume, or restart the installation and choose an overwrite install.
<b>User Action</b>	<p>Only a system administrator with root authority should attempt to increase the boot logical volume. To increase the boot logical volume, follow the process described below:</p> <p>If you received this error then your partition size is less than 8 megabytes, and you need to increase the number of partitions in hd5 (boot logical volume). You can check your partition size with the command:</p> <pre># lsvg rootvg</pre> <ul style="list-style-type: none"> <li>• Look for the field: PP SIZE: You can obtain the current number of partitions in hd5 with the following command: <pre># lslv hd5</pre></li> <li>• Look for the field: LPs: Your boot logical volume must contain enough partitions such that: <ul style="list-style-type: none"> <li>– PP SIZE multiplied by LPs is greater than or equal to 8.</li> <li>– The partitions for the boot logical volume must be contiguous.</li> </ul> </li> </ul> <p>If there were free partitions available next to hd5 or at some other location on the disk that contains hd5, the installation process would have increased the size of hd5, and continued.</p> <p>To view the current allocation map (free and used partitions) of a disk, use the command: <pre># lspv -M diskname</pre></p>



<p><b>User Action, continued</b></p>	<p>If there are not enough contiguous free partitions, you must increase the size of the boot logical volume (hd5) using one of the options described below, and rerun the installation. The options for increasing the boot logical volume size are as follows:</p> <ul style="list-style-type: none"> <li>• If a user-created logical volume or file system follows hd5 on the disk (check the allocation map), and has free partitions, you can back up, remove, re-create, and restore the logical volume.</li> <li>• If there is another disk in the rootvg, that has enough contiguous free partitions, then you could move hd5 to the other disk with the following steps:             <ol style="list-style-type: none"> <li>1. Verify that the disk you plan to move hd5 to is bootable by using the command:                 <pre>bosinfo -B <i>diskname</i></pre> <ul style="list-style-type: none"> <li>– If 1 is returned, the disk is bootable.</li> <li>– If 0 is returned, the disk is not bootable.</li> </ul> </li> <li>2. Find the free contiguous partitions you need on the other disk by viewing the allocation map with the command:                 <pre>lspv -M <i>diskname</i></pre> </li> <li>3. Create a map file to use when re-creating hd5. For example, if you want to re-create hd5 on hdisk2, on partitions 88 and 89, use the command:                 <pre>echo "hdisk2:88-89" &gt; <i>your_MAP_file</i></pre> </li> <li>4. Remove the existing hd5:                 <pre>rmlv -f hd5</pre> </li> <li>5. Create the new hd5:                 <pre>mklv -y hd5 -t boot -m <i>your_MAP_file</i> rootvg 2</pre> <p>The 2 represents the number of partitions and can vary as needed.</p> <p><b>Note:</b> If the <b>mklv</b> command moves hd5 to a new location, you must run the following command:</p> <pre>echo ":C:C:C"   /usr/lpp/bosinst/blvset -d /dev/<i>hdiskN</i></pre> <p>Where <i>C</i> is the message, locale, and keyboard (respectively) and <i>hdiskN</i> is the disk that contains hd5.</p> </li> <li>6. Run the <b>mkboot</b> command to clear the boot record from the disk that previously contained hd5 (boot logical volume). For example, if hd5 was previously on hdisk0, use the command:                 <pre>mkboot -d /dev/hdisk0 -c</pre> </li> <li>7. Use the <b>bosboot</b> command to re-create the boot image and boot record on the new disk. For example, if hd5 was re-created on hdisk2, use the command:                 <pre>bosboot -a -d /dev/hdisk2</pre> </li> </ol> </li> </ul>
--------------------------------------	--



<b>User Action, continued</b>	<p>8. Change the bootlist of your system to boot from the new disk. To see the current bootlist, use the command:</p> <pre>bootlist -m normal -o</pre> <p>OR</p> <p>If your previous hd5 was on hdisk0, the output might be:</p> <pre>hdisk0</pre> <p>To change the bootlist to use hdisk2 use the command:</p> <pre>bootlist -m normal hdisk2</pre> <p>If there were additional items in your bootlist, add them after hdisk2, with spaces separating each item.</p> <p>9. Reboot your system if there were no errors.</p> <p>10. If you encountered this error when installing a <b>mksysb</b> on a system other than the system it was created on (cloning), then you might be able to use a customized <b>image.data</b> file to increase the size of hd5.</p> <p>The <b>vg_data</b> stanza contains the size of the physical partitions in the <b>PPSIZE</b> field. Use this information to determine how many partitions are needed for hd5. The <b>lv_data</b> stanza for hd5 contains the fields for the number of logical partitions (<b>LPs</b>), the number of physical partitions (<b>PP</b>), and the minimum number of logical partitions required for the logical volume (<b>LV_MIN_LPS</b>). These fields must be set to the number of partitions needed.</p> <p>See “Create and Use a Supplementary Diskette” on page 57 for information on putting an <b>image.data</b> file on diskette as well as a <b>bosinst.data</b> file.</p> <p>If the source machine had no free partitions, and the target machine has the same disk size, then you might need to install using the shrink option, as well as the customized <b>image.data</b> file.</p>
-------------------------------	---

### BOS Install: Could not create boot image.

<b>Explanation</b>	The <b>bosboot</b> command failed.
<b>System Action</b>	The boot image was not created.
<b>User Action</b>	Check the <b>/var/adm/ras/bosinst.log</b> file for errors ( <b>alog -o -f bosinst.log   pg</b> ). This log is updated by appending, so make sure you check the last entry.

### The bosinst.data file does not specify any bootable disks.

<b>Explanation</b>	The <b>bosinst.data</b> file does not specify any bootable disks.
<b>System Action</b>	Nonprompted mode is terminated. The user is prompted.
<b>User Action</b>	When the system prompts, select bootable disks to install on.  OR  Add a bootable disk to the <b>bosinst.data</b> file <b>target_disk_data</b> stanzas.

### The bosinst.data file specified doing a migration install, but there is no existing root volume group of level 3.2, 4.1, 4.2, or 4.3.

<b>Explanation</b>	A BOS installation method of <b>migration</b> was specified in the <b>bosinst.data</b> file, but the existing volume group is at level 3.1 or 5.1.
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<b>System Action</b>	This error only occurs during a nonprompted BOS installation. The installation menus are displayed.
<b>User Action</b>	Respond to the menu prompts to complete the installation.

**The bosinst.data file specified doing either a migration or a preservation install, but there is no existing root volume group.**

<b>Explanation</b>	A BOS installation method of <b>migrate</b> or <b>preserve</b> was specified in the <b>bosinst.data</b> file, but no root volume group was found.
<b>System Action</b>	This error only occurs during a nonprompted BOS installation. The installation menus are displayed.
<b>User Action</b>	Respond to the menu prompts to complete the installation.

**The data file did not specify enough disk space to contain the operating system.**

<b>Explanation</b>	Nonprompted mode was specified, and there were not enough disks specified in the <b>bosinst.data</b> file to hold the operating system.
<b>System Action</b>	Nonprompted mode is terminated. The user is prompted.
<b>User Action</b>	When the system prompts, select disks to install on.  OR  Add more <b>target_disk_data</b> stanzas to <b>bosinst.data</b> file.

**Duplicate lv\_data stanzas specified in the image.data file. The installation cannot continue because data may be lost.**

<b>Explanation</b>	An <b>lv_data</b> stanza was duplicated in the <b>image.data</b> file.
<b>System Action</b>	Installation cannot continue.
<b>User Action</b>	Correct the problem and try the installation again.

**Duplicate fs\_data stanzas specified in the image.data file. The installation cannot continue because data may be lost.**

<b>Explanation</b>	An <b>fs_data</b> stanza was duplicated in the <b>image.data</b> file.
<b>System Action</b>	Installation cannot continue.
<b>User Action</b>	Correct the problem and try the installation again.

**The following disks failed the preliminary diagnostic tests: <disk name>**

**bosset: No hard disks can be accessed.**

<b>Explanation</b>	The listed disks failed pretest.
<b>System Action</b>	The system initiated a diagnostic pretest on the specified disk.
<b>User Action</b>	Run full diagnostics on the specified disks.

**Disks specified in bosinst.data do not define a root volume group.**

<b>Explanation</b>	Nonprompted mode was specified. The install method was set to <b>preserve</b> or <b>migrate</b> , and the disks specified in <b>bosinst.data</b> do not define a root volume group.
<b>System Action</b>	Nonprompted mode is terminated. The user is prompted.
<b>User Action</b>	When the system prompts, select a root volume group to install on.  OR  Specify disks in the <b>bosinst.data</b> file that define a root volume group.

**Encountered an unrecoverable error.**

<b>Explanation</b>	The menus subsystem encountered an unrecoverable error.
<b>System Action</b>	The menu is restarted.
<b>User Action</b>	None

**The image.data file contains no vg\_data stanza for rootvg. The installation cannot continue.**

<b>Explanation</b>	The <b>image.data</b> file is incomplete.
<b>System Action</b>	Installation cannot continue.
<b>User Action</b>	Use the default <b>image.data</b> file supplied with product media.

**image.data has invalid logical volume data. Cannot continue.**

<b>Explanation</b>	The system could not parse the logical volume data stanzas in the <b>image.data</b> file.
<b>System Action</b>	Installation cannot continue.
<b>User Action</b>	Use the default <b>image.data</b> file supplied with product media.

**image.data has invalid file system data. Cannot continue.**

<b>Explanation</b>	The system detected invalid file system data stanzas in the <b>image.data</b> file.
<b>System Action</b>	Installation cannot continue.
<b>User Action</b>	Use the default <b>image.data</b> file supplied with product media.

**0516-366 putlvodm: Volume group rootvg is locked. Try again.**

**0516-788: extendlv: Unable to extend logical volume.**

<b>Explanation</b>	You interrupted the installation of your optional software.
<b>System Action</b>	When an installation is interrupted, the system sometimes locks the root volume group.
<b>User Action</b>	Unlock the root volume group. Then attempt the installation procedure again.  To unlock a root volume group: 1. Log in with root authority. 2. Type <code>chvg -u rootvg</code> 3. Type <code>smit_install</code> and attempt to install your optional software products again.

**installp: An error occurred during bosboot processing.**

Please correct the problem and rerun.

0301-52 bosboot: not enough file space to create: /tmp/disk.image.

OR

0301-152 bosboot: not enough file space to create: /tmp/unix.

<b>Explanation</b>	The <b>bosboot</b> command was unable to finish processing because of insufficient space in <b>/tmp</b> .
<b>System Action</b>	The bosboot process is interrupted. The error message, the amount of disk space required, and the available disk space are displayed. The disk space required indicates the number of 1024KB blocks required.
<b>User Action</b>	<p>Release space in the <b>/tmp</b> file system or extend the <b>/tmp</b> file system. Continue or restart the installation process.</p> <p>To resize the <b>/tmp</b> file system and complete the installation, do the following:</p> <ol style="list-style-type: none"><li>1. Note the error message preceding this one. Either the message bosboot verification starting or bosboot process starting will precede this message.</li><li>2. Change directories to <b>/tmp</b>. List the files and determine which files can be deleted. If there is sufficient space available, go to step 6. If you need to expand <b>/tmp</b>, continue with this procedure.</li><li>3. Type <code>smit chfs</code></li><li>4. Select the <b>/tmp</b> file system from the displayed list.</li><li>5. Add the additional block space required. The <b>smit chfs</b> command requires disk space to be defined in 512KB blocks. Double the required disk space displayed in the system message.</li><li>6. If the message <code>installp: An error occurred during bosboot processing was displayed after the message bosboot verification starting</code>, rerun the installation procedure. OR If the message <code>installp: An error occurred during bosboot processing was displayed after the message bosboot process starting</code>, enter <code>installp -C</code>.</li><li>7. Continue the installation process.</li></ol>

**installp: An error occurred during bosboot processing.**

Please correct the problem and rerun.

301-155 bosboot: Invalid or no boot device specified.

<b>Explanation</b>	A device specified with the <b>bosboot -d</b> command is not valid. The <b>bosboot</b> command was unable to finish processing because it could not locate the required boot device. The <b>installp</b> command calls the <b>bosboot</b> command with <b>/dev/ipldevice</b> . If this error does occur, it is probably because <b>/dev/ipldevice</b> does not exist. <b>/dev/ipldevice</b> is a link to the boot disk.
<b>System Action</b>	The bosboot process is interrupted.

<b>User Action</b>	<p>Determine if the link to the boot device is missing or incorrect, correct the error and complete the installation process.</p> <p>To identify the boot device and complete the installation:</p> <ol style="list-style-type: none"> <li>To identify the boot disk, enter <code>lslv -m hd5</code>. The boot disk name displays.</li> <li>Create a link between the boot device indicated and the <code>/dev/ipldevice</code> file. Enter:  <pre>ln /dev/boot_device_name /dev/ipldevice</pre> <p>(An example of <code>boot_device_name</code> is <code>rhdisk0</code>.)</p> </li> <li>If the message <code>installp: An error occurred during bosboot processing</code> was displayed after the message <code>bosboot verification starting</code>, rerun the installation procedure.</li> </ol> <p>OR</p> <p>If the message <code>installp: An error occurred during bosboot processing</code> was displayed after the message <code>bosboot process starting</code>, enter <code>installp -C</code>. Continue the installation process.</p>
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### Invalid table of contents.

<b>Explanation</b>	The installation of the operating system from a stacked tape (a bootable tape with multiple software images) was unable to verify the validity of the tape TOC. A valid TOC has a numeric string in the following format: <code>single_digit_number 12_digit_number single_digit_number</code> as the first entry in the TOC. For example, <code>1 042309235291 1</code> is a valid TOC header. The TOC records the tape position of installable images. Without a valid TOC, the installation process cannot locate and install installable images.
<b>System Action</b>	The installation process returns to the System Settings menu.
<b>User Action</b>	Re-create your tape with a valid table of contents, or contact your point of sale for assistance.

### Missing image.data file. The tape does not contain a valid install image.

<b>Explanation</b>	The system could not find an <code>image.data</code> file.
<b>System Action</b>	Installation cannot continue.
<b>User Action</b>	The most likely cause of this error is the tape is bad. Try a different tape.

**0512-0016 mksysb: Attempt to create a bootable tape failed: bosboot -d /dev/device -a failed with return code xxx.**

OR

**0512-0016 mksysb: Attempt to create a bootable tape failed: mkinsttape /dev/device failed with return code xxx.**

<b>Explanation</b>	<p>The <code>xxx</code> return code indicates the error:</p> <p><b>5 OR 1</b> Not enough space in one or more of three file systems:</p> <ul style="list-style-type: none"> <li>• <code>/</code> must have at least 500 1KB blocks.</li> <li>• <code>/tmp</code> must have at least 7400 1KB blocks.</li> <li>• <code>/usr</code> must have at least 4000 1KB blocks.</li> </ul> <p><b>11</b> Defective tape.</p> <p><b>42 OR 45</b> Either the <code>/usr/lib/boot/unix</code> file is corrupted (may be 0 length) or the link to <code>/unix</code> is missing.</p> <p><b>48</b> Cannot write to the tape drive or cannot read <code>/dev/blv</code>. This is probably caused by an incorrect density setting for the tape drive. It could also be caused by either a hardware problem with the tape drive or by dirty heads on the drive.</p>
<b>System Action</b>	The <code>mksysb</code> command failed to make a bootable tape.
<b>User Action</b>	<p>The return code <code>xxx</code> indicates the action required:</p> <p><b>5 OR 1</b> Check the <code>/</code>, <code>/tmp</code>, and <code>/usr</code> file systems and create more space as required.</p> <p><b>11</b> Replace the defective tape.</p> <p><b>42 OR 45</b> Either restore the <code>/usr/lib/boot/unix</code> file from the original tape or create the missing link.</p> <p><b>48</b> Check the tape drive settings and clean the heads.</p>

**There are no disks available on this system.**

<b>Explanation</b>	No hard disks are configured on the system. Consequently, the only functioning menu option is the maintenance option.
<b>System Action</b>	Installation cannot begin until the problem is resolved.

<b>User Action</b>	<p>You have several options:</p> <ul style="list-style-type: none"> <li>• Select <b>Maintenance</b> (option 3) from the Welcome to Base Operating System Install Menu, and select the <b>Limited Function Maintenance Shell</b>. Verify that no disks were configured by entering the following command:  <pre>lsdev -Cc disk</pre></li> </ul> <p>To determine if there were configuration errors, enter the command:  <pre>cfgmgr -v 2&gt;1   tee /tmp/cfgmgr.out</pre></p> <p>You can use the <b>cat</b> command to view <b>/tmp/cfgmgr.out</b>, and look specifically for errors in configuration of disks. The file can be copied to diskette media using either the <b>dd</b> or <b>pax</b> commands, and moved to a running system for ease of viewing.</p> <p>OR</p> <ul style="list-style-type: none"> <li>• Turn off the system and check the following on systems with SCSI devices: <ul style="list-style-type: none"> <li>– Check all SCSI devices to ensure that all SCSI addresses are unique.</li> <li>– Make sure the SCSI cards are properly terminated.</li> <li>– If external SCSI devices are in use, make sure that the SCSI chain is terminated and that the devices are turned on.</li> <li>– Check the SCSI cabling and connections.</li> <li>– Reboot and attempt the installation again.</li> </ul> </li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Turn off the system and check the following on systems with IDE devices: <ul style="list-style-type: none"> <li>– Check all IDE devices to ensure that all IDE master and slave settings are unique per controller. If only one IDE device is connected to a controller, it must be set to master. If an ATA device (disk) and an ATAPI device (CD-ROM or tape) are connected to the same controller, the ATA device must be set to the master device and the ATAPI device must be set as the slave device.</li> <li>– Check the IDE cabling and connections.</li> <li>– Reboot and attempt the installation again.</li> </ul> </li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Boot from the diagnostics and check the hard disks.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Follow your local problem-reporting procedures.</li> </ul>
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**There are no disks on this system which can be booted.**

<b>Explanation</b>	The system could not find any bootable disks on the system.
<b>System Action</b>	Installation cannot continue.
<b>User Action</b>	Some third-party disks are not bootable. If a disk should be bootable but is not, run diagnostics.

**You chose to install only onto disks in the existing root volume group and those not in any volume group. There are not enough of those disks to contain the mksysb image.**

<b>Explanation</b>	The EXISTING_SYSTEM_OVERWRITE field in <b>bosinst.data</b> was set to <b>yes</b> , and prompt was set to <b>no</b> , and there were not enough disks on the system that contained the root volume group or contained no volume group.
<b>System Action</b>	Nonprompted mode is terminated. The user is prompted.

<b>User Action</b>	<p>Use <b>target_disk_data</b> stanzas to specify the disks to install on, set SHRINK to yes in the image.data file, or at the BOS Install prompt set the EXISTING_SYSTEM_OVERWRITE in the <b>bosinst.data</b> file to <b>any</b>. This allows any disks to be used for the install.</p> <p style="text-align: center;"><b>Attention:</b> If EXISTING_SYSTEM_OVERWRITE is set to <b>any</b>, user volume groups might be overwritten.</p> <p>OR</p> <p>When the system prompts, select disks on which to install or select to shrink the file systems.</p>
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**You chose to install only onto disks which are not contained in a volume group, but there are not enough of those disks to contain the mksysb image.**

<b>Explanation</b>	The EXISTING_SYSTEM_OVERWRITE field in <b>bosinst.data</b> was set to <b>no</b> , and prompt was set to <b>no</b> , and there were not enough disks on the system that contained a volume group.
<b>System Action</b>	Nonprompted mode is terminated. The user is prompted.
<b>User Action</b>	<p>If you want the system to select the disk to install on, use the <b>target_disk_data</b> stanzas to specify the target disks and set the appropriate setting for EXISTING_SYSTEM_OVERWRITE, leave EXISTING_SYSTEM_OVERWRITE blank in the <b>bosinst.data</b> file , or set SHRINK to yes in the <b>image.data</b> file and retry the installation.</p> <p>OR</p> <p>When the system prompts, select disks on which to install.</p>

**0505-113 alt\_disk\_install: No target disk name provided.**

<b>Explanation</b>	<p>This message is displayed in three situations:</p> <ol style="list-style-type: none"> <li>1. You did not enter a target disk.</li> <li>2. The disk that was specified as the target disk has a volume group already associated with it. Running the <b>lspv</b> command should show the word None by disks that do not have a volume group associated with them, which is what the <b>alt_disk_install</b> command checks.</li> <li>3. The target disk (or disks) specified are not bootable. <b>alt_disk_install</b> runs <b>bootinfo -B disk_name</b> on each disk specified in the target disk list. If any one bootinfo -B command returns a 0, then the disk is not bootable, and it cannot be used as a target disk for alt_disk_install.</li> </ol>
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**0505-117 alt\_disk\_install: Error restoring image.data file from mksysb image.**

<b>Explanation</b>	<p>This message is displayed when you are trying to install a <b>mksysb</b> image from tape.</p> <p>The <b>alt_disk_install</b> command first checks the second image on the tape for a <b>.tapeblksz</b> file, which contains the block size in which the <b>mksysb</b> image was created. The <b>mksysb</b> command creates this file and puts it in the second image on the tape. The first three images of a <b>mksysb</b> tape are always created at a 512byte block size. The <b>mksysb</b> image (the fourth image on the tape) can be created at another block size.</p> <p>If the <b>alt_disk_install</b> command cannot restore the <b>.tapeblksz</b> file from the second image, then the block size will remain what it was when the <b>alt_disk_install</b> command was started. It will attempt to restore the <b>.image.data</b> file from the <b>mksysb</b> image. If this block size does not match the block size in which the <b>mksysb</b> image was created, then the restore fails, and the <b>alt_disk_install</b> produces this error.</p>
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## Appendix A. Additional Software Product Packaging Concepts

This appendix discusses concepts regarding additional software product packaging.

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### Fileset Installation Packaging

The installation packaging of each fileset in a product can be divided into three parts. These parts include the `usr`, `root`, and `share` parts. Although this can add further complexity to the understanding of the packaging, this parceling of a software product is necessary for the product to be used by diskless and dataless clients in AIX 5.1. Because they are parceled, a product can be installed on one machine (called the *server*) and then be used remotely by other machines on a network (called the *clients*).

**Note:** The `usr` and `root` parts of a product are packaged in the same installable package.

<b>usr part</b>	<p>The <code>usr</code> part of a software product contains the part of the product that can be shared by machines that have the same hardware architecture. Most of the software that is part of a product usually falls into this category.</p> <p>In a standard system, the <code>usr</code> parts of products are stored in the <code>/usr</code> file tree. For example, the <code>ls</code> command would be in the <code>/usr/bin/ls</code> file.</p>
<b>root part</b>	<p>Every product has a <code>usr</code> part. The <code>root</code> part of a software product contains the part of the product that cannot be shared. The <code>root</code> part of a product is optional because many products may not have any files that need to be specific to each individual machine.</p> <p>In a client/server environment, these are the files for which there must be a unique copy for each client of a server. Most of the <code>root</code> software is associated with the configuration of the machine or product.</p> <p>In a standard system, the <code>root</code> parts of a product are stored in the <code>root (/)</code> file tree. The <code>/etc/objrepos</code> directory contains the <code>root</code> part of an installable software product's vital product data (VPD).</p>
<b>share part</b>	<p>The <code>share</code> part of a software product contains the part of the product that can be shared among machines, even if they have different hardware architectures, which can include nonexecutable text or data files. For example, the <code>share</code> part of a product might contain documentation written in ASCII text or data files containing special fonts.</p> <p>The <code>share</code> part of a product is optional because many products might not have any files that can be shared among different hardware platforms. The <code>share</code> part of a product is always packaged in a separately installable package.</p> <p>In a standard system, the <code>share</code> parts of products are usually stored in the <code>/usr/share</code> file tree. For example, a dictionary database might be stored in the <code>/usr/share/dict/words</code> file.</p>

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### Bundle Packaging

The Web-based System Manager and the SMIT Install application look for bundles in `/usr/sys/inst.data/sys_bundles` and in `/usr/sys/inst.data/user_bundles`. The `sys_bundles` location is typically reserved for system-defined bundles (those which come with AIX). Users can create their own bundle files in the `user_bundles` directory.

The bundle definition file name must end in `.bnd`, because the AIX installation interfaces that process bundles recognize only bundle files that end in `.bnd`. Use any editor to create bundle files, which can contain comments and fileset names. Lines beginning with the pound sign (`#`) are recognized as comments and are ignored by the bundle processing code. When you have completed your list of filesets, save the file and make sure the file has the appropriate read permission. Invoking a bundle installation interface displays your bundle without the `.bnd` extension.

The following are examples of the predefined bundles:

- *Client Bundle*. A collection of commonly installed software packages for single-user machines running AIX in a standalone or networked client environment. This bundle minimizes disk utilization by only installing software required for a single-user machine rather than installing server code and the other software available on the installation media.
- *Server Bundle*. A collection of software packages for machines running AIX in a multiuser standalone or networked environment. This bundle emphasizes functionality over disk utilization.
- *Application Development Bundle*. A collection of software packages used for developing application programs.
- *Hardware Diagnostic Bundle*. A collection of software packages that provides hardware diagnostic tools.
- *Graphics\_Startup Bundle*. A collection of software packages that provides support of graphical environments. Graphical support may be automatically installed on some systems during BOS installation.
- *Migration Bundle*. This bundle is created when there was not enough disk space available to complete a Migration Installation during the BOS installation process. The bundle consists of a collection of software packages that must be installed to complete your migration. You must install this bundle to complete the Migration Installation. Install the bundle using the **smit update\_all** fast path.

You may also need to install the *Graphics\_Startup Bundle*.

**Note:** Some system bundles might refer to installation images that are spread across multiple media. If you see errors indicating that filesets could not be found on the media you are using, insert the media containing the missing filesets and retry the bundle installation. For example, the *Client Bundle* might contain a web browser package that exists on another media. Refer to the bundle files on the system for information about the location of images that are not on the AIX 5.1 media. The information is located in the following directory:

```
/usr/sys/inst.data/sys_bundles
```

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## Appendix B. bosinst.data File Stanza Descriptions

This appendix describes the contents of the **bosinst.data** file. Two example files follow the stanza descriptions. (See “Appendix C. bosinst.data File Examples” on page 95.)

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### control\_flow Stanza

The control\_flow stanza contains variables that control the way the installation program works:

#### CONSOLE

Specifies the full path name of the device you want to use as the console. This value is blank in the default **bosinst.data** file because the file specifies a prompted installation, which requires you to press a key to identify your console. (Instructions for which key to press are displayed on the screen.) If you change the **PROMPT** variable to **no**, you must specify a console here.

#### INSTALL\_METHOD

Specifies a method of installation: **migrate**, **preserve**, or **new and complete overwrite**. The default value is initially blank. The installation program assigns a value, depending on which version of AIX was previously installed. See “Chapter 1. Installing the Base Operating System” on page 1 for more information.

The default method of installation is **migrate** if a previous version of the operating system is on the machine. If no previous version exists, the default method is **new and complete overwrite**.

#### PROMPT

Specifies whether the installation program uses menus from which you make choices. The possible values are **yes** (default) and **no**.

**Note:** You must fill in values for all variables in the locale stanza if you set the **PROMPT** variable to **no**. Similarly, if **PROMPT** equals **no**, you must supply values for all variables in the control\_flow stanza, with two exceptions: the **ERROR\_EXIT** and **CUSTOMIZATION\_FILE** variables, which are optional.

**Attention:** Fill in values for all variables in the target\_disk\_data stanza if you set the **PROMPT** variable to **no**. The BOS installation program assigns target disks for blank variables. You can lose data if the installation program assigns a disk where you store data.

#### EXISTING\_SYSTEM\_OVERWRITE

Confirms that the installation program overwrites existing volume groups. This variable is applicable only for a nonprompted overwrite installation. The possible values are **no** (default), **yes**, and **any**.

**no** (Default) Only disks that are not part of a volume group can be used for the installation.

**yes** Disks that contain the root volume group is used first, and if additional disks are needed for the installation, then disks that contain no volume groups are used.

**any** Any disks can be used for the installation.

When the installation is nonprompted and the target\_disk\_data stanza is empty, the installation process uses the value of the EXISTING\_SYSTEM\_OVERWRITE field to determine the disks to install on. An error message informs you if there are not enough disks matching the criteria needed to complete the installation.

<b>INSTALL_X_IF_ADAPTER</b>	<p>Installs AIXwindows. The possible values are:</p> <p><b>yes</b> (Default) Install AIXwindows if the selected console is a graphics terminal</p> <p><b>no</b> Do not install AIXwindows</p> <p><b>all</b> Always install AIXwindows.</p>
<b>RUN_STARTUP</b>	<p>Starts the Configuration Assistant on first boot after the BOS installation completes, if the system has a graphical interface. Starts Installation Assistant if the machine has an ASCII interface. The possible values are <b>yes</b> (default) and <b>no</b>. The <b>no</b> value is valid only when ACCEPT_LICENSES is set to <b>yes</b>.</p>
<b>RM_INST_ROOTS</b>	<p>Removes all files and directories in the <b>/usr/lpp*/inst_roots</b> directories. The possible values are <b>no</b> (default) and <b>yes</b>.</p> <p>The <b>/usr/lpp/bos/inst_roots</b> directories must remain if the machine is used as a network server. To save disk space, set this value to <b>yes</b> if the machine is not a network server.</p>
<b>ERROR_EXIT</b>	<p>Starts an executable program if an error occurs in the installation program. The default value is blank, which signals BOS installation to use a command that is shipped on the installation media. The command starts an error message routine when the installation program halts because of an error. As an alternative to the default, you can enter the path name of your own script or command for a customized error routine.</p>
<b>CUSTOMIZATION_FILE</b>	<p>Specifies the path name of a customization file you create. The default value is blank. The customization file is a script that starts immediately after the installation program concludes.</p>
<b>TCB</b>	<p>Specifies whether you want to install the Trusted Computing Base (TCB). When you install the TCB, the trusted path, the trusted shell, and system integrity checking are installed. The TCB must be installed and initialized when the operating system is installed. The TCB cannot be installed later. By not installing the TCB, installation time is reduced. The possible values are <b>no</b> (default) and <b>yes</b>.</p>
<b>INSTALL_TYPE</b>	<p>Specifies what software to install on the machine. The values are <b>full</b> (full-function configuration), <b>client</b> (client configuration), and <b>personal</b> (personal workstation configuration). The <b>full</b> configuration includes all the software in <b>client</b> and <b>personal</b>. Change <b>full</b> to <b>client</b> or <b>personal</b> if you want to install one of these subsets of the full-function configuration.</p> <p>The default setting is <b>full</b>.</p>

## BUNDLES

Specifies what software bundles to install. Type the full path name of each bundle file. Be sure there is sufficient disk space and paging space on the target machine for the software you specify in the **BUNDLES** variable.

This list of bundle file names is limited to 139 bytes. If your list of bundle file names is longer than 139 bytes, use the **cat** command to combine the bundle files into a single custom bundle file and enter the name of your custom bundle file in this field.

If you are installing from CD-ROM or using a network installation server, specify the full path name of each bundle file as follows:

```
/SPOT/usr/sys/inst.data/sys_bundles/BundleFileName
```

If you are installing from tape, to specify system-defined bundles on the product media, use the full path name of each bundle file as follows:

```
/usr/sys/inst.data/sys_bundles/BundleFileName
```

If you are using a **bosinst.data** diskette to define your own bundle files, specify the full path name of each bundle file as follows:

```
././DirectoryName/BundleFileName. For example, if you put a bundle file named mybundle in the root directory, the full path name would be ././mybundle.
```

If you are using Preservation Installation, create bundle files before you start the installation. Create the files in **/home** and specify the full path name of each bundle file as follows:

```
/home/BundleFileName
```

## SWITCH\_TO\_PRODUCT\_TAPE

Allows you to boot from a product tape, then switch to a **mksysb** tape to install. You can then switch back to the product tape at the end of the installation if you need to install additional device filesets for support on the target machine. This procedure is usually used for cloning systems. The possible values are **no** (default) and **yes**.

Normally, you would boot from a CD-ROM (to ensure that you have the correct device support and boot image) then tell BOS installation to install from the **mksysb** tape. At the end of the installation, BOS installation automatically verifies that all device support is installed on the system and installs additional device support from the CD-ROM.

If you are booting from a product tape and switching to a **mksysb** tape, BOS installation does not automatically assume you want to do cloning and does not prompt you for the product tape again. If you want a prompt for the product tape to verify all the device support is installed, you must set this variable to **yes** in your **bosinst.data** file.

## RECOVER\_DEVICES

Specifies whether to reconfigure the devices. For **mksysb** installations, the ODM configuration database is saved in the image. The device names and attributes are automatically extracted from the database, and the BOS installation program attempts to recreate the devices the same way they were on the machine the **mksysb** was created on. This is normally what you would do for regular **mksysb** restores on the same system. However, for cloning, you may not want these devices configured this way, especially for network configuration. The possible values are **yes** (default) and **no** if you do not want device reconfiguration.

## BOSINST\_DEBUG

Specifies whether to show debug output during BOS installation. The value **yes** sends **set -x** debug output to the screen during BOS installation. The possible values are **no** (default) and **yes**.

**ACCEPT\_LICENSES**

Specifies whether to accept software license agreements during the BOS installation. The default is **no**. To automatically accept them, set this value to **yes**. When the software licenses agreements are not accepted during BOS installation, Configuration Assistant or Installation Assistant prompts you to view and accept them. During a BOS installation, if this value is blank, the default of **no** is assumed.

For **mksysb** installations, when **ACCEPT\_LICENSES** is **no**, the user is forced to re-accept the licenses before continuing to use the system. When **ACCEPT\_LICENSES** is set to **yes**, the licenses are automatically accepted for the user. If blank, the state of the licenses is unchanged from when the **mksysb** was created.

**INSTALL\_64BIT\_KERNEL**

Specifies whether to enable the 64-bit kernel and JFS2 filesystems. If **yes**, and the target system is a 64-bit CHRP system, the 64-bit kernel becomes the running kernel and the filesystems are created as JFS2 filesystems instead of JFS. This field is only effective on installations using the New and Complete Overwrite method.

**INSTALL\_CONFIGURATION**

Specifies Default or Minimal installations. This field applies only to an installation from an ASCII console. If Minimal, the Web-based System Manager, Java, perl, and X11 filesets required by the Web-based System Manager are not installed.

**DESKTOP**

Specifies the desktop to be installed. Choices include CDE (the default), NONE, GNOME, and KDE. If you choose GNOME or KDE, you will install open-source software.

## target\_disk\_data Stanza

The `target_disk_data` stanza contains variables for disks in the machine where the program is to install BOS. The default `bosinst.data` file has one `target_disk_data` stanza, but you can add new stanzas to install BOS on multiple disks, one stanza for each disk.

There can be multiple `target_disk_data` stanzas. They define the disks that are to contain the root volume group. Only one field (**PVID**, **CONNECTION**, **LOCATION**, **SIZE\_MB**, **HDISKNAME**) must be non-null for BOS installation to choose a disk. The order of precedence is **PVID** (Physical Volume ID), then **CONNECTION** (parent attribute//connwhere attribute), then **LOCATION**, then **SIZE\_MB**, and then **HDISKNAME**.

- If **PVID** is set, BOS installation checks to see if a disk matches the value. If so, other attributes are ignored.
- If **PVID** is empty and **CONNECTION** is set, then BOS installation checks to see if the parent and connwhere attributes (separated by "//") match a disk. If they do, other attributes are ignored.
- If either **PVID** or **CONNECTION** is set, and neither value matches a disk on the target system, and no other attributes are set, then an error message is generated, and a disk must be explicitly selected.
- If other attributes are specified, then processing occurs as described below:
  - If **LOCATION** is set, BOS installation ignores **SIZE\_MB** and **HDISKNAME**.
  - If **LOCATION** is not set and **SIZE\_MB** is, BOS installation selects disks based on **SIZE\_MB** and ignores **HDISKNAME**.
  - If **LOCATION** and **SIZE\_MB** are both empty, BOS installation chooses the disk specified in **HDISKNAME**.
  - If all fields are empty, BOS installation chooses a disk for you.

**Attention:** If `prompt=no`, do not leave the `target_disk_data` stanzas empty, unless you do not care which disk BOS installation overwrites. This is because the algorithm that determines the default disk for the installation is not always predictable.

The **SIZE\_MB** field can contain either a size or the word `largest`. If a size is listed, BOS installation does a "best-fit" on the disks. If the word `largest` is in that field, BOS installation selects the largest disk. If there is more than one `target_disk_data` stanza, BOS installation selects the two "largest" disks, and so on.

<b>PVID</b>	Specifies the 16-digit physical volume identifier for the disk.
<b>CONNECTION</b>	Specifies the combination of the <b>parent</b> attribute and the <b>connwhere</b> attribute associated with a disk. The parent and connwhere values are separated by two slashes ( <code>//</code> ). If the <b>parent</b> value is <code>scsi0</code> and the <b>connwhere</b> value is <code>0,1</code> , then the <b>CONNECTION</b> value is <code>scsi0//0,1</code> . An example of the <b>CONNECTION</b> value for a SSA disk would be <code>ssar//000629CCC07300D</code> . In the example, the <b>parent</b> attribute is represented by <code>ssar</code> and the <b>ConnectionLocation</b> (15-character unique identity) of the disk drive <code>000629CCC07300D</code> is used for the <b>connwhere</b> attribute.
<b>SIZE_MB</b>	Specifies the formatted size of the disk, in megabytes, where the program is to install BOS. The default value is blank. You can specify the size of your target disk by typing the number of megabytes available on the formatted disk. Also, you can type <code>largest</code> if you want to use the largest disk (that has not already been selected) found by the installation program.
<b>LOCATION</b>	Specifies a location code for the disk where the program is to install BOS. The default value is blank. If you do not specify a value, the installation program assigns a value based on the next two variables. "Vital Product Data and Location Codes" in <i>Diagnostic Information for Micro Channel Bus Systems</i> provides information about the format of location codes.
<b>HDISKNAME</b>	Specifies the path name of the target disk. The default value is blank. To name a target disk, use the <code>hdiskname</code> format, where <code>hdiskname</code> is the device name of your disk (for example, <code>hdisk0</code> ).

## locale Stanza

The locale stanza contains variables for the primary language the installed machine is to use. Refer to Understanding Locale in *AIX 5L Version 5.1 System Management Concepts: Operating System and Devices*, which provides information about locales and the format to use when editing variables.

<b>BOSINST_LANG</b>	Specifies the language that the installation program uses for prompts, menus, and error messages. The default value is blank.
<b>CULTURAL_CONVENTION</b>	Specifies the primary locale to install. The default value is blank.
<b>MESSAGES</b>	Specifies the locale for message catalogs to install. The default value is blank.
<b>KEYBOARD</b>	Specifies the keyboard map to install. The default value is blank.

## large\_dumplv Stanza

The optional **large\_dumplv** stanza specifies characteristics used if a dedicated dump device is to be created on the systems. A dedicated dump device is only created for systems with 4GB or more of memory:

<b>DUMPDEVICE</b>	Specifies the name of the dedicated dump device.
<b>SIZEGB</b>	Specifies the size of the dedicated dump device in gigabytes.

If the stanza is not present, the dedicated dump device is created when required. A dedicated dump device is created in machines with at least 4 Gigabytes of real memory during an overwrite install. By default, the name of the dedicated dump device is **lg\_dumplv** and its size is determined by the following formula:

4>= RAM < 12	size of dump device= 1 GB
12>= RAM < 24	size of dump device= 2 GB
24>= RAM < 48	size of dump device= 3 GB
RAM >= 48	size of dump device= 4 GB



---

## dump Stanza

The dump stanza specifies system dump characteristics.

<b>PRIMARY</b>	Specifies the primary dump device to be set by <b>sysdumpdev -P -p <i>device</i></b> .
<b>SECONDARY</b>	Specifies the secondary dump device to be set by <b>sysdumpdev -P -s <i>device</i></b> .
<b>COPYDIR</b>	Specifies the directory to which the dump is copied at system boot.
<b>FORCECOPY</b>	Specifies whether the system boots into menus that allow copy of the dump to external media if the copy fails.
<b>ALWAYS_ALLOW</b>	Specifies whether the key mode switch can be ignored when a dump is requested.

If the stanza is not present in the **bosinst.data** file, then no additional dump device handling occurs beyond what is already in place. Checking on the values of the fields is limited; if the device specified for a dump device is not valid, then any error processing comes from the **sysdumpdev** command and is sent to the console and stored in the BOS installation log.

- If **FORCECOPY** is specified and no **COPYDIR** is specified, then the value field of the autocopydump attribute from **/etc/objrepos/SWservAt** is retrieved and used for the **sysdumpdev -[dID] *copydir* operation**.
- If only the **COPYDIR** is specified without **FORCECOPY** being specified, then **forcecopy** defaults to yes. The **sysdumpdev -d (FORCECOPY = no)** or **sysdumpdev -D (FORCECOPY = yes)** is used to set the copy directory.
- If **ALWAYS\_ALLOW=yes**, then run **sysdumpdev -K**. Otherwise, run **sysdumpdev -k**.
- If any values other than yes and no are specified for **FORCECOPY** or **ALWAYS\_ALLOW**, then the default actions occur, and processing continues.
- If no value is specified for a particular dump field, then no analogous **sysdumpdev** operation is performed. This leaves the system values in the appropriate state, even for a migration or system backup image installation. If a **COPYDIR** is specified but **FORCECOPY** is not specified, then the value of the forcecopydump attribute is retrieved from **/etc/objrepos/SWservAt** to determine the correct form of **sysdumpdev** to invoke.



---

## Appendix C. bosinst.data File Examples

These example **bosinst.data** files show edits you might make for the following kinds of installations:

- “mksysb Backup Restoration”
- “Nonprompted Installation”

**Note:** The depicted values illustrate formatting only and do not apply to your installation.

---

### mksysb Backup Restoration

```
control_flow:
  CONSOLE=
  INSTALL_METHOD = overwrite
  PROMPT = yes
  EXISTING_SYSTEM_OVERWRITE = yes
  INSTALL_X_IF_ADAPTER = no
  RUN_STARTUP = no
  RM_INST_ROOTS = no
  ERROR_EXIT =
  CUSTOMIZATION_FILE =
  TCB =
  INSTALL_TYPE = full
  BUNDLES =
  SWITCH_TO_PRODUCT_TAPE = no
  RECOVER_DEVICES = yes
  BOSINST_DEBUG = no
  ACCEPT_LICENSES =
  INSTALL_64BIT_KERNEL =
  INSTALL_CONFIGURATION =
  DESKTOP = CDE
```

```
target_disk_data:
  LOCATION = 00-00-0S-00
  SIZE_MB =
  HDISKNAME =
```

```
target_disk_data:
  LOCATION = 00-00-0S-01
  SIZE_MB =
  HDISKNAME =
```

```
locale
  BOSINST_LANG = en_US
  CULTURAL_CONVENTION = en_US
  MESSAGES = en_US
  KEYBOARD = en_US
```

---

### Nonprompted Installation

**Note:** The following example includes automatic acceptance of Software License Agreements.

```
control_flow:
  CONSOLE = /dev/lft0
  INSTALL_METHOD = preserve
  PROMPT = no
  EXISTING_SYSTEM_OVERWRITE = yes
  INSTALL_X_IF_ADAPTER = yes
  RUN_STARTUP = yes
  RM_INST_ROOTS = no
```

```
ERROR_EXIT =  
CUSTOMIZATION_FILE =  
TCB =  
INSTALL_TYPE = full  
BUNDLES =  
SWITCH_TO_PRODUCT_TAPE = no  
RECOVER_DEVICES = yes  
BOSINST_DEBUG = no  
ACCEPT_LICENSES = yes  
INSTALL_64BIT_KERNEL =  
INSTALL_CONFIGURATION =  
DESKTOP = CDE
```

```
target_disk_data:  
  LOCATION =  
  SIZE_MB = largest  
  HDISKNAME =
```

```
locale  
  BOSINST_LANG = da_DK  
  CULTURAL_CONVENTION = da_DK  
  MESSAGES = C  
  KEYBOARD = da_DK
```

---

## Appendix D. Installing Kerberos Version 5

To install the Kerberos V5 package, do the following:

- For client software, install fileset **bos.security.krb5.client**
- For server software, install fileset **bos.security.krb5.server**
- For the full package, install **bos.security.krb5**

To avoid namespace collisions between DCE and Kerberos commands (that is, between the **klist**, **kinit**, and **kdestroy** commands), the Kerberos commands are installed in the **/usr/krb5/bin** and **/usr/krb5/sbin** directories. You can add these directories to your PATH definition. Otherwise, to execute the Kerberos commands, you must specify fully qualified command pathnames.

---

### Configuring the Kerberos V5 KDC and kadmin Servers

#### Notes:

1. It is not recommended that both DCE and Kerberos server software be installed on the same physical system. If you must do so, then the normal (default) operational internet port numbers must be changed for either the DCE clients/server or for the Kerberos clients/server. In either case, such a change can affect interoperability with existing DCE and Kerberos deployments in your environment.
2. Kerberos V5 is set up to reject ticket requests from any host whose clock is not within the specified maximum clock skew of the Kerberos Domain Controller (KDC). The default value for maximum clock skew is 300 seconds (five minutes). Kerberos requires that some form of time synchronization is configured between the servers and the clients.

It is recommended that you use **xntpd** or **timed** for time synchronization. One method for time synchronization is to use the **timed** daemon as follows:

- a. Set up the KDC server as a time server by starting the **timed** daemon.

```
# timed -M
```

- b. Start the the **timed** daemon on each Kerberos client.

```
# timed -t
```

To configure the Kerberos KDC and kadmin servers, run the **mkkrb5srv** command. For normal use of Kerberos integrated with existing security functionality, use the **mkkrb5srv** command with the following parameters:

```
mkkrb5srv -r realm -s server -d domain
```

#### Example:

For example, to configure Kerberos for realm UD3A, server sundial, and domain austin.ibm.com, type the following:

```
mkkrb5srv -r UD3A.AUSTIN.IBM.COM -s sundial.austin.ibm.com \  
-d austin.ibm.com
```

**Note:** Wait a few minutes for **kadmind** and **krb5kdc** to start from **/etc/inittab**.

The command goes through the following sequence:

1. Create the **/etc/krb5/krb5.conf** file. Values for realm name, Kerberos admin server, and domain name are set as specified on the command line. Also updates the paths for **default\_keytab\_name**, **kdc**, and **kadmin** log files.

2. Create the `/var/krb5/krb5kdc/kdc.conf` file. This command sets the value for `kdc_ports`. Paths for database name, `admin_keytab`, `acl_file`, `dict_file`, `key_stash_file`. Values for `kadmin_port`, `max_life`, `max_renewable_life`, `master_key_type`, and `supported_enctypes`.
3. Create the `/var/krb5/krb5kdc/kadm5.acl` file. Sets up the access control for admin, root, and host principals.
4. Create the database and one admin principal. You are asked to set a Kerberos master key and to name and set the password for a Kerberos administrative principal identity. It is critical that the master key and administrative principal identity and password are securely stored away for disaster-recovery purposes.

If you have problems, see “Sample Runs” on page 99 or “Error Messages and Recovery Actions” on page 99.

---

## Configuring the Kerberos V5 Clients

After installation is complete, it is transparent to normal users that the Kerberos technology is in use. The login process to the operating system remains unchanged. However, there is a side benefit that users have Kerberos ticket-granting tickets (TGTs) associated with their running processes. To configure systems to use Kerberos as the primary means of user authentication, run the `mkkrb5clnt` command with the following parameters:

```
mkkrb5clnt -c KDC -r realm -s admin server -d domain -A \
           -i database -K -T
```

### Example:

```
mkkrb5clnt -c sundial.austin.ibm.com -r UD3A.AUSTIN.IBM.COM \
           -s sundial.austin.ibm.com -d austin.ibm.com \
           -A -i files -K -T
```

The above command causes the following actions:

Create `/etc/krb5/krb5.conf` file. Values for realm name, Kerberos admin server, and domain name are set as specified on the command line. Also updates the paths for `default_keytab_name`, `kdc`, and `kadmin` log files.

Because the `-i` flag was specified, configure fully integrated login. The database entered is the location where Kerberos principals are stored.

With the `-K` flag specified, configure the Kerberos as the default authentication scheme. This allows the users to get authenticated with Kerberos at login time.

The `-A` flag adds an entry in the Kerberos Database to make root an admin user for Kerberos.

The `-T` flag acquires the server admin TGT-based admin ticket.

If a system is installed that resides in a different DNS domain than the KDC, the following additional actions must be performed.

1. Edit the `/etc/krb5/krb5.conf` file and add another entry after [domain realm].
2. Map the different domain to your realm.

For example, if you want to include a machine `trojan.pok.ibm.com` in your realm UD3A, the `/etc/krb5/krb5.conf` would include the following additional entry:

```
[domain realm]
.pok.ibm.com = UD3A.AUSTIN.IBM.COM
```

---

## Error Messages and Recovery Actions

Errors that can occur when using the **mkkrb5srv** command include the following:

- If the **krb5.conf**, **kdc.conf**, or **kadm5.acl** files already exists, this command does not modify the values. You receive a warning message that the file already exists. Any of the configuration values can be changed by editing the **krb5.conf**, **kdc.conf**, or **kadm5.acl** file.
- If you mistype and no database is created, remove the configuration files created and rerun the command.
- If there is inconsistency between the database and configuration values, remove the database in **/var/krb5/krb5kdc/\*** and rerun the command.
- Make sure **kadmind** and **krb5kdc** are started on your machine. Use the **ps** command to verify that the daemons are running. Check the log file if these daemons have not started.

Errors that can occur when using the **mkkrb5clnt** command include the following:

- Incorrect values for **krb5.conf** can be fixed by editing the **/etc/krb5/krb5.conf** file.
- Incorrect values for the **-i** flag can be fixed by editing the **/usr/lib/security/methods.cfg** file.

---

## Files Created

The **mkkrb5srv** command creates:

- **/etc/krb5/krb5.conf**
- **/var/krb5/krb5kdc/kadm5.acl**
- **/var/krb5/krb5kdc/kdc.conf**

The **mkkrb5clnt** command creates:

- **/etc/krb5/krb5.conf**

---

## Sample Runs

The following is an example of the **mkkrb5srv** command:

```
Fileset                Level State      Description
-----
Path: /usr/lib/objrepos
  bos.security.krb5.server  5.1   COMMITTED  Network Authentication Privacy
                               Services Server

Path: /etc/objrepos
  bos.security.krb5.server  5.1   COMMITTED  Network Authentication Privacy
                               Services Server

Creating /etc/krb5/krb5.conf
Creating /var/krb5/krb5kdc/kadm5.acl
Creating /var/krb5/krb5kdc/kdc.conf
Initializing database
'/var/krb5/krb5kdc/principal' for realm
'UD3A.AUSTIN.IBM.COM'
master key name 'K/M@UD3A.AUSTIN.IBM.COM'
You will be prompted for the database Master Password.
It is important that you NOT FORGET this password.
Enter KDC database master key:
Re-enter KDC database master key to verify:
Authenticating as principal root/admin@UD3A.AUSTIN.IBM.COM with
password.
WARNING: no policy specified for admin/admin@UD3A.AUSTIN.IBM.COM;
defaulting to
no policy
Enter password for principal "admin/admin@UD3A.AUSTIN.IBM.COM":
```

```
Re-enter password for principal "admin/admin@UD3A.AUSTIN.IBM.COM":
Principal "admin/admin@UD3A.AUSTIN.IBM.COM" created.
Authenticating as principal root/admin@UD3A.AUSTIN.IBM.COM with
password.
```

The following is an example of the **mkkrb5clnt** command:

```
Creating /etc/krb5/krb5.conf
Password for admin/admin@UD3A.AUSTIN.IBM.COM:
Configuring fully integrated login
Authenticating as principal admin/admin with existing credentials.
WARNING: no policy specified for host/diana@UD3A.AUSTIN.IBM.COM; defaulting to no policy
Principal "host/diana@UD3A.AUSTIN.IBM.COM" created.
```

```
Administration credentials NOT DESTROYED.
Authenticating as principal admin/admin with existing credentials.
```

```
Administration credentials NOT DESTROYED.
Authenticating as principal admin/admin with existing credentials.
Principal "kadmin/admin@UD3A.AUSTIN.IBM.COM" modified.
```

```
Administration credentials NOT DESTROYED.
Configuring Kerberos as the default authentication scheme
```

```
Making root a Kerberos administrator
Authenticating as principal admin/admin with existing credentials.
WARNING: no policy specified for root/diana@UD3A.AUSTIN.IBM.COM; defaulting to no policy
Enter password for principal "root/diana":
Re-enter password for principal "root/diana":
Principal "root/diana@UD3A.AUSTIN.IBM.COM" created.
```

```
Administration credentials NOT DESTROYED.
```

```
Cleaning administrator credentials and exiting.
```

---

## Appendix E. Notices

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---

## Glossary

**/usr file system.** Contains files and programs necessary for operating the machine.

**/tmp file system.** A shared storage location for files.

**/var file system.** Contains files that are variable on a per-client basis, such as spool and mail files.

**/ file system.** The root file system; contains files that contain machine-specific configuration data.

**APAR.** Authorized program analysis report. A report of a problem caused by a suspected defect in a current, unaltered release of a program.

**applet.** A program, intended for delivery over the Internet, which can be included in an HTML page, just as an image can be included.

**apply.** When a service update is installed or *applied*, it enters the applied state and becomes the currently active version of the software. When an update is in the applied state, the previous version of the update is stored in a special save directory. This allows you to restore the previous version, if necessary, without having to reinstall it. Software that has been applied to the system can be either *committed* or *rejected*. The **installp -s** command can be used to get a list of applied products and updates that are available to be either committed or rejected. See also *commit* on page 103 and *reject* on page 106.

**Base Operating System (BOS).** The collection of programs that controls the resources and the operations of the computer system.

**boot device.** The device that assigns the fixed disk within the root volume group (rootvg) that contains the startup (boot) image.

**bosinst.data.** The file that controls the actions of the BOS installation program.

**bundle.** A collection of software products available for installation.

**CD-ROM.** High-capacity, read-only memory in the form of an optically read compact disc.

**clean up.** The clean-up procedure instructs the system to attempt to remove software products

that were partially installed. The system also attempts to revert to the previous version of the removed product. If the system successfully reverts to the previous version, it becomes the currently active version. If this cannot be done, then the software product is marked as broken. After the clean up procedure is complete, you can attempt to install the software again.

**client.** In a distributed file system environment, a system that is dependent on a server to provide it with programs or access to programs.

**commit.** When you commit software updates, you are making a commitment to that version of the software product. When you commit a product update, the saved files from all previous versions of the software product are removed from the system, thereby making it impossible to return to a previous version of the software product. Software updates can be committed at the time of installation by using either the Web-based System Manager or SMIT interface (or by using the **-ac** flags with the **installp** command). Note that committing already applied software does not change the currently active version of the software product. It merely removes saved files for the previous version of the software product. Once you commit a new version of a product update, you must force reinstall the base level of the software product and reapply the latest level of updates desired. Compare to *apply* on page 103 and contrast with *reject* on page 106 and *remove* on page 107.

**complete overwrite installation.** An installation method that completely overwrites an existing version of the Base Operating System that is installed on your system. This procedure might impair recovery of data or destroy all existing data on your hard drives. Be sure to back up your system before doing a complete overwrite installation.

**Configuration Assistant.** A graphical interface application used to perform post-installation system configuration tasks.

**configure.** To describe to a system the devices, optional features, and program products installed on a system.

**console device.** During the installation of the Base Operating System (BOS), the system console is the display device at the system on which you are installing the software.

**corequisite.** A product or update that must be installed concurrently with another specified product or update.

**daemon.** A program that runs unattended in the background to perform a standard service. Some daemons trigger automatically to perform their task and others operate on a timed or periodic basis.

**dataless.** A workstation without local file systems or local boot images that accesses some of its resources remotely. Dataless clients use a local disk used for paging and dump devices.

**dependent.** A software product that requires another product or update to be installed *before* or *at the same time* it is installed. Contrast with *prerequisite* (page 106).

**destination disk.** The disk to which you are installing.

**directory.** A type of file containing the names and controlling information for other files or other directories.

**diskless.** A workstation without local file systems or local boot images that accesses some of its resources remotely. Diskless clients boot remotely from a diskless server and use the server for remote paging.

**display.** A computer output screen on which visual information is displayed.

**display device.** See *display* (page 104).

**Easy Install.** An application used to install optional software or service updates in the form of software bundles.

**environment.** (1.) The settings for shell variables and paths that are set when the user logs in. These variables can be modified later by the user. (2.) A named collection of logical and physical resources used to support the performance of a function.

**environment variable.** (1.) A variable that describes the operating environment of the

process. Common environment variables describe the home directory, command search path, the terminal in use, and the current time zone (the **HOME**, **PATH**, **TERM**, and **TZ** variables, respectively). (2.) A variable that is included in the current software environment and is therefore available to any called program that requests it.

**file.** The collection of related data that is stored and retrieved by an assigned name. Contrast with *special file* (page 107).

**file system.** The collection of files and file management structures on a physical or logical mass storage device, such as a diskette or minidisk.

**file tree.** The complete directory and file structure of a particular node, starting at the root directory. A file tree contains all local and remote mounts performed on directories and files.

**fileset.** An individually installable option or update. Options provide specific function and updates correct an error in, or enhance, a previously installed option.

**fixed disk.** (1.) A flat, circular, nonremovable plate with a magnetizable surface layer on which data can be stored by magnetic recording. A rigid magnetic disk used in a fixed-disk drive. (2.) The term fixed disk is also used loosely in the industry for boards and cartridges containing microchips or bubble memory that simulate the operations of a fixed-disk drive.

**full path name.** The name of any directory or file expressed as a string of directories and files beginning with the root directory. See also *path name* (page 106).

**graphical user interface.** A type of computer interface consisting of a visual metaphor of a real-world scene, often a desktop. Within that scene are icons, representing actual objects, that the user can access and manipulate with a pointing device.

**hard disk.** See *fixed disk* (page 104).

**hardware.** The physical equipment of computing and computer-directed activities. The physical components of a computer system. Contrast with *software* (page 107).

**host.** (1.) The primary or controlling computer in a communications network. (2.) A computer attached to a network.

**host name.** The Internet address of a machine in the network. Also known as the host ID.

**HTML.** HyperText Markup Language is the tagging language that a web browser uses to interpret and display documents.

**hypertext.** A way of presenting information online with connections between one piece of information and another. These connections are called hypertext links. Thousands of these hypertext links enable you to explore additional or related information throughout the online documentation. See also *hypertext link* (page 105).

**hypertext link.** A connection between one piece of information and another. See also *hypertext* (page 105).

**icon.** A picture or graphical representation of an object on a display screen to which a user can point to with a device, such as a mouse, to select a particular operation or perform a certain action.

**initial program load (IPL).** (1.) The initialization procedure that causes an operating system to commence operation. (2.) The process by which a configuration image is loaded into storage at the beginning of a work day or after a system malfunction. (3.) The process of loading system programs and preparing a system to run jobs.

**input device.** The device that is the source of the software you are installing. The input device can be a tape drive, CD-ROM drive, diskette drive, or a directory.

**Installation Assistant.** An application used to perform system configuration tasks.

**installation image.** An installation image contains a copy of the software you are installing in backup format, as well as copies of other files the system needs to install the software product.

**Internet address.** The numbering system used in TCP/IP internetwork communications to specify a particular network or a particular host on that network with which to communicate. Internet addresses are commonly denoted in dotted decimal form.

**IPL.** See *initial program load* (page 105).

**license password.** The key that allows a software product to be used. A string encoded with license information for a software product.

**locale.** A subset of a user's environment that defines conventions for a specified culture, such as time formatting, numeric formatting, monetary formatting, and character classification, conversion, and collation.

**logical partition (LP).** (1.) One to three physical partitions (copies). The number of logical partitions within a logical volume is variable. (2.) A fixed-size portion of a logical volume. A logical partition is the same size as the physical partitions in its volume group. Unless the logical volume of which it is a part is mirrored, each logical partition corresponds to, and its contents are stored on, a single physical partition. See also *logical volume* (page 105).

**logical volume (LV).** A collection of physical partitions organized into logical partitions all contained in a single volume group. Logical volumes are expandable and can span several physical volumes in a volume group. See also *logical partition* (page 105), *volume group* (page 107), and *migration installation*. (page 105)

**maintenance level update.** The service updates that are necessary to upgrade the Base Operating System (BOS) or an optional software product to the current release level. See also *service update* (page 107).

**migration installation.** An installation method for upgrading AIX 3.2 or later to the current release while preserving the existing root volume group. This method preserves the /usr, /tmp, /var, and / (root) file systems, as well as the root volume group, logical volumes, and system configuration files. Migration is the default installation method for any machine that is running AIX 3.2 or later. See also *root volume group* (page 107) and *logical volume* (page 105).

**monitor.** (1.) A device that observes and verifies operations of a data processing system. (2.) Synonym for *display*.

**mount.** To make a file system accessible.

**name server.** A host that provides name resolution for a network. Name servers translate

symbolic names assigned to networks and hosts into the efficient Internet addresses used by machines.

**Network File System (NFS).** A distributed file system that enables users to access files and directories located on remote computers and treat those files and directories as if they were local. NFS is independent of machine types, operating systems, and network architectures through the use of remote procedure calls (RPC).

**Network Installation Management (NIM).** An environment that provides installation and configuration of software within a network interface.

**new installation.** An installation method used when the fixed disk or disks you are installing BOS onto are empty. A fixed disk is considered empty if it does not contain any data or if it contains data not in a volume group.

**NIM.** See *Network Installation Management* (page 106).

**Object Data Manager (ODM).** A data manager intended for the storage of system data. The ODM is used for many system management functions. Information used in many commands and SMIT functions is stored and maintained in the ODM as objects with associated characteristics.

**option.** An installable unit of a software package. Software product options are separately installable units that can operate independently from other options of that software package.

**optional software.** Also referred to as *optional software products*. Software that is *not* automatically installed on your system when you install the Base Operating System (BOS). Optional software can be products packaged and sold with BOS. Optional software can also be separately purchased software products that are specially ordered and not sold as part of BOS. In either case, BOS must be installed on your system before you can install optional software.

**package.** An installable unit of a software product. Software product packages are separately installable units that can operate independently from other packages of that software product.

**paging.** (1.) The action of transferring instructions, data, or both between real storage and external

page storage. (2.) Moving data between memory and a mass storage device as the data is needed.

**path name.** A file name specifying all directories leading to the file. See also *full path name* (page 104).

**physical volume.** The portion of a single unit of storage accessible to a single read/write mechanism; for example, a drum, a disk pack, or part of a disk storage module.

**preinstalled.** Software that is installed by the manufacturer and ready to use.

**prerequisite.** A software product or a service update that must be installed *before* another software product or service update is installed. If you attempt to install software products or service updates without the required prerequisite software, a system message displays the names of required prerequisite software. Contrast with *dependent* (page 104).

**preservation installation.** An installation method used when a previous version of the Base Operating System (BOS) is installed on your system and you want to preserve the user data in the root volume group. However, this method overwrites the */usr*, */tmp*, */var*, and */* (root) file systems, so any user data in these directories is lost. System configuration must be done after doing a preservation installation.

**Preventive Maintenance Package (PMP).** A maintenance level update for your system. A PMP includes updates for the Base Operating System (BOS) and for each optional software product that is installed on your system.

**primary language.** The primary locale you want your system to use for screen information.

**Problem Management Record (PMR).** A number assigned by a support center to a reported problem.

**product.** A software product is made up of software packages that are separately installable.

**reboot.** To reinitialize the execution of a program by repeating the initial program load (IPL) operation.

**reject.** To cause portions of applied updates from becoming permanent parts of the product, based

on the results of a test period. When you reject an applied service update, the update's files are deleted and the software vital product data (SWVPD) information is changed to indicate that the update is no longer on the system. The previous version of the software, if there is one, is restored and becomes the active version of the software. Contrast with *apply* (page 103) and *commit* (page 103).

**remove.** For a software option, the deletion of the option and all of its applied or committed updates from the system. The software vital product data (SWVPD) information is changed to indicate that the option has been removed from the system. Depending on the option, system configuration information is also cleaned up, although this is not always complete. If a previous version, release, or level of the option is on the system, the system does not restore the previous version. Only an option with its updates can be removed. Updates cannot be removed by themselves. See also *commit* (page 103).

**requisite.** A software product or a service update that must be installed with another software product or service update. If you attempt to install software products or service updates without the required software, a system message displays the names of required software.

**root user authority.** The unrestricted ability to access and modify any part of the operating system, usually associated with the user who manages the system.

**root volume group (rootvg).** A volume group containing the Base Operating System (BOS). See also *migration installation*. (page 105)

**server.** On a network, the computer that contains the data or provides the facilities to be accessed by other computers on the network.

**service update.** Software that corrects a defect in or adds new function to the Base Operating System (BOS) or to an optional software product. See also *maintenance level update* (page 105).

**SMIT.** See *System Management Interface Tool* (page 107).

**software.** Programs, procedures, rules, and any associated documentation pertaining to the operation of a system. Contrast with *hardware* (page 104).

**source.** A system, a program within a system, or a device that makes a request to a target. Contrast with *target* (page 107).

**special file.** Used in the operating system to provide an interface to input/output devices. There is at least one special file for each device connected to the computer. Contrast with *directory* (page 104) and *file* (page 104).

**stacked tape.** A bootable tape with multiple software images.

**System Management Interface Tool (SMIT).** A set of menu-driven services that facilitates the performance of such system tasks as software installation and configuration, device configuration and management, problem determination, and storage management. SMIT is provided in both a character-based curses interface and an AIXwindows-based graphical user interface.

**target.** A system, a program within a system, or a device that interprets, rejects, or satisfies, and replies to requests received from a source. Contrast with *source* (page 107).

**Transmission Control Protocol/Internet Protocol (TCP/IP).** A communications subsystem that allows you to set up local area and wide area networks.

**Universal Coordinated Time (UCT).** The new standard term for worldwide time-telling that has the same meaning as Greenwich Mean Time.

**update.** See *service update* (page 107).

**upgrade.** Software that fixes a defect in a previously released software product.

**verify.** The verify procedure instructs the system to verify the software you are installing. The system confirms that your software files are the correct length and contain the correct number of digits and characters. If any errors are reported, it might be necessary to install the software product again. The verification process can add a significant amount of time to the installation process.

**volume group (VG).** A set of one or more physical volumes from which space can be allocated to one or more logical volumes. A collection of 1 to 32 physical volumes (read-write

fixed-disk drives) of varying size and type. See also *logical volume* (page 105).

**Web-based System Manager.** A graphical user interface (GUI) tool for managing systems. Based on the OO (Object Oriented) model, Web-based System Manager enables users to perform administration tasks by manipulating icons representing objects in the system, as an alternative to learning and remembering complex commands.



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