

AIX Version 6.1



# Release Notes



AIX Version 6.1



# Release Notes

**Note**

Before using this information and the product it supports, read the information in Appendix C, "Notices," on page 45.

**Sixth Edition (October 2009)**

**© Copyright International Business Machines Corporation 2007, 2009.**

US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

---

# Contents

<b>Chapter 1. Read this before installation</b> . . . . .	1
Installation tips . . . . .	1
Software License Agreements . . . . .	1
Software Maintenance Agreement . . . . .	1
Service . . . . .	1
Fixes and problem-solving databases . . . . .	1
Security Advisories . . . . .	2
<b>Chapter 2. System requirements</b> . . . . .	3
Required hardware . . . . .	3
Firmware . . . . .	3
Some AIX systems might not boot from CD-ROM . . . . .	3
Minimum firmware levels required for AIX 6.1 . . . . .	3
Firmware upgrade required to support an alternate boot device . . . . .	4
I/O devices IPL limitation . . . . .	4
Memory requirements . . . . .	6
Host Ethernet Adapter memory requirements . . . . .	6
IBM Tivoli Directory Server memory requirements . . . . .	6
Paging space requirements . . . . .	6
Disk requirements . . . . .	7
Disk capacity . . . . .	7
<b>Chapter 3. Installation, migration, upgrade, and configuration information</b> . . . . .	9
Installation . . . . .	9
Installing AIX Version 6.1 . . . . .	9
IBM Systems Director Common Agent . . . . .	10
Disk format requirement . . . . .	11
Creating a bootable CD . . . . .	11
Base Operating System installation options . . . . .	11
Installing AIX using the media device to install a partition with an HMC . . . . .	11
Secure by Default installation . . . . .	14
AIX Toolbox Media and NIM lpp_sources . . . . .	14
Software bundles requires additional CDs . . . . .	14
Network Installation Management . . . . .	15
CSM Server . . . . .	15
IBM 32-bit SDK for AIX, Java 2 Technology Edition, Version 5 . . . . .	16
IBM Tivoli Directory Server . . . . .	16
Other installation information . . . . .	16
Troubleshooting problems with installation from mkysb backup . . . . .	17
Migration . . . . .	17
Maximum size of boot image increased . . . . .	17
System migrated to AIX 5.3 (or later) might experience double boot . . . . .	17
Replacements for the vmtune and schedtune commands . . . . .	18
xIC runtime software . . . . .	18
KDE desktop . . . . .	18
Thin Servers . . . . .	18
pmtoolkit fileset . . . . .	18
SNMPv3 . . . . .	19
Kerberos . . . . .	19
Multipath I/O (MPIO) . . . . .	19
Configuration . . . . .	23
AIX Version 6.1 with Technology Level 6100-04 maximum N-Way support . . . . .	23

<b>Chapter 4. Limitations and restrictions.</b>	25
Limitation when creating a WPAR on a system with the Director agent installed	25
console special file limitation	25
clogin command limitation	25
Workload Partitions not supported on thin servers	25
NPIV support of DS4000 storage products	25
WPAR parameters must be in English ASCII text	25
Installing applications in a WPAR environment	25
System software cannot be directly managed in a non-shared /usr Workload Partition	26
SNMPv3	26
AIO has been removed from the ODM	26
Using a USB optical device with VIOS	26
Performing an internal or external snapshot of a JFS2 filesystem	26
Host Ethernet Adapter limitation	26
Xterm with locale support limitations	27
InfiniBand EEH limitation	27
<b>Chapter 5. AIX Information Center</b>	29
<b>Appendix A. What's new</b>	31
New and enhanced functionality in AIX Version 6.1 with Technology Level 6100-04	31
System Management	31
Virtualization	31
Security	31
RAS features and customization	31
New and enhanced functionality in AIX Version 6.1	31
Virtualization	31
Security	35
System management	36
RAS features and customization	38
Networks	39
JFS2 sync tunables	39
Xterm with locale support	40
Additional information	40
The devices.artic960 fileset	40
The devices.pci.14108c00 fileset	41
Error log labels for Fibre Channel adapters have changed in AIX 6.1	41
AIXLink/X.25 LPP	41
USB flash drive support	41
iSCSI Boot Support and IPv6 Support	42
Lightweight Infrastructure	42
<b>Appendix B. Listing of filesets on the AIX media</b>	43
AIX for POWER Version 6.1 CD set	43
<b>Appendix C. Notices</b>	45
Trademarks	46

---

## Chapter 1. Read this before installation

**Note:** This software may contain errors that could result in critical business impact. It is highly recommended that you install the latest available fixes prior to using this software. Fixes can be obtained from IBM System p support at the following Web site:

<http://www-933.ibm.com/eserver/support/fixes/fixcentral>

These Release Notes support AIX Version 6.1 with the recommended 6100–04 Technology Level package.

The AIX Version 6.1 Release Notes include information that helps you install AIX Version 6.1. To view the most current version of the Release Notes, go to the online Release Notes in the AIX® Information Center at the following Web site:

<http://publib14.boulder.ibm.com/infocenter/systems/aix/topic/com.ibm.aix.resources/61relnotes.htm>

---

### Installation tips

The latest installation hints and tips are available from the IBM® Subscription Service for UNIX® servers at: <http://www14.software.ibm.com/webapp/set2/subscriptions/pqvcmd>

These tips might contain information that are critical for successful installation of this software.

---

### Software License Agreements

There are instances where the Software License Agreements (SLA) might not be displayed correctly. In this event, the License Agreements can be viewed in all languages at the following Web site:

<http://www.ibm.com/software/sla/slabd.nsf>

---

### Software Maintenance Agreement

In AIX Version 6.1, a separate Software Maintenance Agreement (SWMA) acceptance window displays during installation immediately after the license acceptance window. The response to the SWMA acceptance (accept or decline) is stored on the system, and either response allows the installation to proceed, unlike license acceptance which requires an accept to proceed.

The SWMA acceptance window is displayed during a New Overwrite or Preservation installation from base CD media.

For base CD media New Overwrite or Preservation installations, if a non-prompted installation is desired, the **ACCEPT\_SWMA** field in the control\_flow stanza of the **bosinst.data** file should be set to yes (to accept the SMWA terms) or no (to decline the SWMA terms). The **ACCEPT\_SWMA** field is set to blank by default.

For NIM installations, if licenses have been accepted either from the choices made when initializing the installation, or using the **ACCEPT\_LICENSES** field in a customized **bosinst.data** file, then this will constitute SWMA acceptance.

---

### Service

#### Fixes and problem-solving databases

You can download AIX fixes and search technical databases (including "APARS" and "Tips for AIX administrators"), from the following IBM eServer™ Support Web site:

<http://www-933.ibm.com/eserver/support/fixes/fixcentral>

---

## Security Advisories

Security subscription services are available at the following My Notifications Web site:

<https://www.ibm.com/systems/support/myview/subscription/css.wss/folders?methodName=listMyFolders>

After you subscribe to the System p® AIX security advisories, you will receive the advisories by email as soon as they are published. You can also view AIX security advisories at the following Web site:

<http://www14.software.ibm.com/webapp/set2/subscriptions/pqvcmd>



---

## Chapter 2. System requirements

Review the following information to determine the minimum and recommended system requirements needed to run AIX Version 6.1.

---

### Required hardware

Only 64-bit Common Hardware Reference Platform (CHRP) machines running selected PowerPC® 970, POWER4™, POWER5™, and POWER6™ processors that implement the POWER® architecture Platform Requirements (PAPR) are supported.

To see if you have a supported machine, log into the machine as the root user, and run the following command:

```
prtconf | grep 'Processor Type'
```

**Note:** RS64, POWER3™, and 604 processors, 32-bit kernel, 32-bit kernel extensions, and 32-bit device drivers are no longer supported.

---

### Firmware

#### Some AIX systems might not boot from CD-ROM

Some AIX systems might not boot from CD-ROM because of firmware issues. To determine if your system will be affected by this problem, perform the following steps before you migrate or install a running AIX 4.3, AIX 5.1, or AIX 5.2 system:

1. At the command prompt, type the following:

```
lscfg -vl cd*
```

2. Examine the data that is returned.

If *Part Number* is 04N2964 and *ROS Level and ID* is less than or equal to 1\_04 (for example, 1\_02, 1\_01, or 1\_00), contact your local service representative. Tell your service representative that your system requires the CD-ROM firmware upgrade that is described in RETAIN® TIP H1332.

If the data returned does not match the data described in the preceding paragraph, your system is not affected by this problem.

#### Minimum firmware levels required for AIX 6.1

The following table shows minimum system firmware levels required before installing or upgrading your system to AIX 6.1.

Model Number	Product Name	Minimum Firmware Level
7028-6C4	pSeries® 630 Model 6C4	3R041029
7028-6E4	pSeries 630 Model 6E4	3R041029
7029-6C3	pSeries 615 Model 6C3	3F041029
7029-6E3	pSeries 615 Model 6E3	3F041029
7038-6M2	pSeries 650 Model 6M2	3K041029
7039-651	pSeries 655 Model 651	3J041029
7040-671	pSeries 670 Model 671	3H041029
7040-681	pSeries 690 Model 681	3H041029
9114-275	IntelliStation® POWER Model 275	3F041029

Firmware updates are available at the following Web site:

<http://www14.software.ibm.com/webapp/set2/firmware/gjsn>

If you experience problems booting your POWER4 system after updating AIX or firmware, to verify and correct the value of the real-base firmware variable, perform the following steps:

1. Go to the open firmware prompt when the system is booting by typing 8 when a beep is heard or the banner displays. If applicable, the HMC can also be used to set to boot to the SMS menu. From the SMS menu, type 0 and go to the open firmware prompt.
2. At the open firmware prompt, type:

```
printenv real-base
```

The following is a sample display:

```
----- Partition: common ----- Signature: 0x70 -----  
real-base                2000000                c00000
```

The value following real-base must be c00000. If any value other than c00000 displays, run the following command:

```
setenv real-base c00000
```

3. After updating the real-base variable, reboot your system using the power switch.

## Firmware upgrade required to support an alternate boot device

The requirement of upgrading firmware when installing or booting AIX 6.1 in the scenarios described in this section applies only to the systems listed in the table included at the end of this section.

### Installation

Some systems might encounter installation problems when you are installing AIX 6.1 on a system that is currently installed with a earlier version of AIX or when you are installing an earlier version of AIX on a system currently installed with AIX 6.1.

A firmware upgrade is required to support the following installation scenarios:

1. When an installation device is specified using the SMS menus or the Open Firmware command-line *and* the specified device is not the first available device in the AIX bootlist.

**Note:** SMS menus differ, depending on the system. On some systems, the installation device is specified under the Multiboot menus. On other systems, the installation device is specified under the Select Boot Options menus.

2. When the F5 key is selected during boot, which is the fast path to install from the CD device, *and* the CD device is not the first available device in the AIX bootlist.

No firmware upgrade is required if no installation device is specified in the SMS menus or the Open Firmware prompt *or* if the specified installation device is the first available device in the AIX bootlist.

## I/O devices IPL limitation

Because of a firmware memory size limitation, only I/O devices in the first 144 I/O slots assigned to a logical partition or single system image partition can be used as an IPL (boot) source.

You can use the HMC to identify which devices are in the first 144 I/O slots by doing the following:

1. Select Partition Properties>Hardware>I/O.
2. Click the Bus column to sort the I/O devices in ascending order.

The first 144 I/O devices in the sorted list are in the bootable adapter slots.

If you are using a partition or single-system image partition with more than 144 assigned I/O slots, the following scenarios and their results and resolutions are possible.

Table 1. Scenarios for partitions with more than 144 assigned I/O slots

Scenario	Result	Resolution
Attempting to boot from a device beyond the first 144 I/O slots for installation or diagnostic purposes.	The device is not selectable as a boot source from the SMS menus.	Use a device in the first 144 I/O slots.
Booting from a device in the first 144 I/O slots, and then attempt to select a target installation device in a slot beyond the first 144 I/O slots.	The boot will succeed to the installation menus, but devices beyond the first 144 I/O slots will not be listed as bootable installation targets in the AIX menus.	Select a device that is available and marked as bootable.
Using an MPIO configuration where one adapter is in the first 144 I/O slots and another adapter is in a slot beyond the first 144 I/O slots. Both adapters are present at boot time.	The boot will succeed to the installation menus, and the device will be listed as bootable in AIX installation menus. The installation will proceed, but it will fail with the <b>bootlist</b> command failure "unable to set bootpath for all paths."	Use a device in the first 144 I/O slots for all paths.
Using DLPAR to add an adapter in a slot beyond the first 144 I/O slots, and then attempting to run the <b>alt_disk_install</b> command for the newly added device.	The device will not be listed as bootable.	Use a device in the first 144 I/O slots.
Using DLPAR to add an adapter in a slot beyond the first 144 I/O slots, and using the <b>bootlist</b> command to add the device as a bootable device (for example, by dynamically adding a redundant path to a current boot device or setting up for a network boot). Then removing the original adapter and rebooting.	The <b>bootlist</b> command succeeds, but the boot fails from the specified device, and AIX will not receive control.	Use a device in the first 144 I/O slots.
Using DLPAR to add an adapter whose probe order will make it displace a current bootable device, and then rebooting.	The boot fails, and AIX will not receive control.	Move the boot device to one of the first 144 I/O slots or remove the previously added device.
Selecting a device in a slot beyond the first 144 I/O slots as a dump device for a firmware-assisted dump.	The <b>sysdumpdev</b> command does not allow devices in slots beyond the first 144 I/O slots to be selected as firmware-assisted dump storage devices. An error occurs during the firmware-assisted dump configuration, and a traditional AIX dump automatically becomes available.	Use a device in the first 144 I/O slots for firmware-assisted dumps.
Using DLPAR to add an adapter whose probe order will make it displace a currently valid firmware-assisted dump target device, and then rebooting after the dump.	The firmware-assisted dump process fails during the boot process and displays an error message. The traditional AIX dump still runs to retrieve the dump image.	Avoid displacing the selected firmware-assisted dump target device or reconfiguring the <b>sysdumpdev</b> command for the firmware-assisted dump target device selection, and specify a device within the first 144 I/O slots.

Table 1. Scenarios for partitions with more than 144 assigned I/O slots (continued)

Scenario	Result	Resolution
Using DLPAR to add an adapter whose probe order will make it displace a currently valid firmware-assisted dump target device, and then rebooting.	The <b>sysdumpdev</b> command does not allow devices in slots beyond the first 144 I/O slots to be selected as firmware-assisted dump storage devices. An error occurs during the firmware-assisted dump configuration, and a traditional AIX dump automatically becomes available.	Use a device in the first 144 I/O slots for firmware-assisted dumps.

---

## Memory requirements

AIX Version 6.1 minimum current memory requirements vary, based on the configuration.

A general rule for a minimum current memory requirement for AIX 6.1 is 512 MB. A smaller minimum current memory requirement may support a configuration with a very small number of devices or a small maximum memory configuration.

AIX 6.1 requires the minimum current memory requirement to increase as the maximum memory configuration or the number of devices scales upward, or both. Larger maximum memory configurations or additional devices scale up the minimum current memory requirement. If the minimum memory requirement is not increased along with the maximum memory configuration, the partition hangs during the initial program load (IPL).

## Host Ethernet Adapter memory requirements

Configurations containing a Host Ethernet Adapter (HEA) require more memory than the 512 MB minimum. Each logical HEA port that is configured requires an additional 102 MB of memory. The minimum memory requirement for configurations with one or more HEA ports configured, where  $n$  is the number of HEA ports, is  $512\text{MB} + n \times 102\text{MB}$ .

## IBM Tivoli Directory Server memory requirements

IBM Tivoli® Directory Server Version 6.1 requires a minimum of 256 MB RAM for the Client and a minimum of 512 MB of RAM (1 GB or more is strongly recommended) for the Server. IBM Tivoli Directory Server (including the Client and the Server) requires about 160 MB of disk space.

IBM Tivoli Directory Server includes the DB2 Universal Database™ for AIX Version 9.1 Restricted Enterprise Server Edition. No previous versions of DB2® are supported. If you already have DB2 installed, you need approximately 45 MB of disk space to create the empty database and start the server. DB2 requires between 300 MB and 500 MB of disk space. Disk space required for data storage is dependent upon the number and size of database entries.

Your machine must be running on 64-bit hardware.

Your machine must be running a 64-bit kernel.

---

## Paging space requirements

AIX Version 6.1 creates a 512 MB paging space (in the **/dev/hd6** directory) for all new and complete overwrite installations.

---

## Disk requirements

AIX Version 6.1 with the recommended 6100–04 Technology Level requires a minimum of 4 GB of physical disk space for a default installation, which includes all devices, the Graphics bundle, and the System Management Client bundle.

The following measurements provide information about disk usage when you install AIX 6100–04.

Disk requirements for AIX Version 6.1 with the recommended 6100–04 Technology Level	
Location	Allocated (Used)
/	192 MB (167 MB)
/usr	1936 MB (1804 MB)
/var	368 MB (240 MB)
/tmp	128 MB (14 MB)
/admin	128 MB (1 MB)
/opt	368 MB (199 MB)
/var/adm/ras/livedump	256 MB (1 MB)

### Notes:

1. If the **/tmp** directory has less than 56 MB, it is increased to 56 MB during a migration installation so that the AIX Version 6.1 boot image is successfully created at the end of the migration.
2. The boot logical volume is required to be 24 MB with the AIX 6.1 with 6100-04. The pre-migration script in the `usr/lpp/bos` directory on your media or in your AIX 6.1 with 6100-04 NIM SPOT will check if you have adequate room. During the migration, `hd5` will be increased if necessary. The logical partitions must be contiguous and within the first 4 GB of the disk.

During a migration installation, if **/opt** exists only as a directory and has less than 3 MB of data, then a new **/dev/hd10opt** logical volume and **/opt** file system are created, and the data that existed in the **/opt** directory is moved to the new **/opt** file system.

If there is more than 3 MB of data in the **/opt** directory, then the new logical volume and file system are not created.

If any existing file system has a mount point in the **/opt** directory, or a mount point of **/opt** itself, the new logical volume and file system are not created.

---

## Disk capacity

SAS RAID controller arrays (`hdisk`) are supported that have capacities that exceed 2 TB (up to the RAID array capacity limitation of the SAS RAID controller).

For additional information about SAS RAID controllers, see the SAS RAID controller for AIX Web page.

For disks other than SAS RAID controller arrays, the maximum supported capacity of a disk is 2 TB.

For information about AIX capacity limitations for logical storage, see the Limitations for logical storage management Web page.



---

## Chapter 3. Installation, migration, upgrade, and configuration information

---

### Installation

This section contains information about installing AIX 6.1 that supplements the information contained in *AIX Version 6.1 Installation and migration*. The installation guide is available online in the AIX Information Center.

To order these installation guides, contact your point of sale, or in the U.S., call IBM Customer Publication Support at 1-800-879-2755. Give the order number of the book you want to order.

To obtain AIX Version 6.1 installation hints and tips, visit the Subscription Service at the following Web site:  
<http://www14.software.ibm.com/webapp/set2/subscriptions/pqvcmd>

### Installing AIX Version 6.1

The following methods can be used to install AIX Version 6.1:

- Complete overwrite installation
- Preservation installation
- Migration installation

**Note:** After you install or migrate a system to AIX Version 6.1, you can install a lower level of AIX by restoring a system backup or by performing a new and complete overwrite with base media. Preservation installations from AIX Version 6.1 to a lower level of AIX are not supported.

If AIX 6.1 with 6100-00 through 6100-03 is installed on your system, you can use the Update CD (recommended) or the base media to update to AIX 6.1 with 6100-04. To verify the level, run the **oslevel -r** command. To perform the update, run the **smitty update\_all** command.

**Attention:** Using the Update CD is recommended for updates. If you use the base media to update, some ODM settings (such as SRC subsystems settings) might be lost.

#### Notes:

1. Because only the base installation images are on the media, you cannot reject the software and return to the previous level if you use the product media to update to AIX 6.1 with 6100-04.
2. The minimum size of the boot logical volume is 24 MB. If your current boot logical volume is 16 MB or less, the installation process tries to increase it. However, partitions in a boot logical volume must be contiguous, and within the first 4 GB on the disk. If your system does not have free space that meets these requirements, a message will indicate that there is not enough space to expand **hd5** (the boot logical volume).
3. The minimum current memory required for AIX Version 6.1 installation from physical media is 384 MB. The minimum current memory required for AIX Version 6.1 installation using NIM is 512 MB.

To install AIX Version 6.1, boot your system from the product media, and follow the instructions in the *Installation and migration* in the AIX Information Center. Booting from DVD media is supported only on 64-bit systems.

Beginning with AIX 6.1 with the 6100-03 Technology Level, a new file system (**/var/adm/ras/livedump**) that saves the **livedump** output is created during base-operating-system installations. You can change the **livedump** file system attributes by using the optional **livedump** stanza in a customized **bosinst.data** file.

## IBM Systems Director Common Agent

Beginning with AIX 6.1 with the 6100–03 Technology Level, when you do an overwrite or a preservation operating-system installation and you use the default options (which include the System Management Client Software bundle), the IBM Systems Director Common Agent 6.1.0.3 is installed on your system.

When the AIX system is rebooted, the Director agent and the prerequisite processes for it, like the Pegasus CIM server, are automatically enabled. If you do not want to install or enable the Director agent, see the following information for the steps needed to stop, disable, and uninstall the Director agent.

To stop the Director agent, run the following commands:

```
/opt/ibm/director/agent/runtime/agent/bin/endpoint.sh stop
stopsrc -s platform_agent
```

To start the Director agent, run the following commands:

```
startsrc -s platform_agent
/opt/ibm/director/agent/runtime/agent/bin/endpoint.sh start
```

To permanently disable the Director agent, do the following:

1. Comment out the following lines in **/etc/inittab** file:

```
platform_agent:2:once:/usr/bin/startsrc -s platform_agent >/dev/null 2>&1
```

**Note:** Comment out the following line only if you do not need the **cimserver** command to run other applications.

```
cimservices:2:once:/usr/bin/startsrc -s cimsys >/dev/null 2>&1
```

2. Run the following command:

```
/opt/ibm/director/agent/runtime/agent/bin/endpoint.sh stop
```

3. Run the following command:

```
/opt/ibm/director/agent/runtime/nonstop/bin/installnonstop.sh -uninstallservice
```

To permanently uninstall the Director agent components and leave the filesets that might be used by other applications, run the following command:

```
/opt/ibm/director/bin/diruninstall
```

To uninstall the filesets that remain after you run the **diruninstall** command (if they are not required for other applications), do the following:

- To uninstall the CAS agent, run the following command:

```
installp -u cas.agent
```

- To uninstall Tivoli Guid, run the following command:

```
installp -u tivoli.tivguid
```

- To uninstall SMIS CIM providers, run the following command:

```
installp -u sysmgt.cim.smisproviders*
```

- To uninstall the remaining CIM providers, run the following command:

```
installp -u sysmgt.cim.providers*
```

- To uninstall the Pegasus CIM server, run the following command:

```
installp -u sysmgt.cimserver.pegasus
```

For more information about IBM Systems Director 6.1, see the IBM Systems Director V6.1 Web page.

For additional Power systems information about IBM Systems Director 6.1, see the IBM Systems Director Best Practices Redwiki Web page.



## Disk format requirement

You cannot install AIX on an improperly formatted SCSI disk. AIX requires the disk to be formatted to a sector size supported by the attached SCSI controller. All AIX SCSI controllers support 512 byte sector SCSI disks. The 522 byte sector SCSI disks are only supported when they are attached to SCSI RAID controllers. If the disk has been formatted for SCSI RAID, but is not attached to a SCSI RAID controller, the disk might not configure. If the disk does configure, it might be unreadable in the AIX environment. In some instances, the certify function and the format function in AIX diagnostics can be used to reformat the disk for the attached SCSI controller.

## Creating a bootable CD

It is recommended that you create a CD that can be used to boot and perform maintenance on your system that matches your current level of AIX.

To create a bootable CD, run the following commands (where *cdx* is an attached CD writer). The **bosinst.data** file must be set for a prompted install (PROMPT = yes).

```
cd /var/adm/ras
ls ./bosinst.data ./image.data | backup -ivqf/tmp/fakemksysb
mkcd -m /tmp/fakemksysb -d /dev/cdx
```

OR

```
mkcd -m /tmp/fakemksysb -S
```

will create a CD image that can be transferred to a system with a CD writer.

**Note:** The final **mkcd** command in the previous example makes an image that can be transferred to another system (AIX or non-AIX) for burning.

## Base Operating System installation options

The information in this section supplements the "Installation Options" chapter of the *Installation and migration* in the AIX Information Center.

In the Base Operating System installation menus, if there are more than 50 disks on the system, the disks are ordinarily grouped by adapter. However, for some types of disks, the grouping is slightly different:

### SCSI disks

Disks may be grouped by adapter or SCSI bus

### IBM TotalStorage® DS4000®

Disks are grouped by disk array controller (DAC)

In each case, the user can select the adapter, SCSI bus, or DAC by name and see the associated disks. The physical location of the adapter, SCSI bus, or DAC is also displayed.

## Installing AIX using the media device to install a partition with an HMC

The instructions for installing AIX using the media device to install a partition with an HMC have been changed to:

1. Activate the partition, as follows:
  - a. Insert the *AIX Volume 1* CD or DVD into the media device of the managed system.
  - b. Select the checkbox that corresponds to the partition you want installed.
  - c. In the Operations menu in the lower window pane, select **Activate**.
  - d. In the **Activate** window, click **Advanced**.
  - e. For the Boot mode, select **SMS**.
  - f. Click **OK**. Ensure that the appropriate partition profile is highlighted.

- g. Select the Open a terminal window or console session checkbox, and then click **OK**.
- 2. In the SMS menu on the vterm, do the following:

- a. Press Enter to select **5. Select Boot Options**.

```
PowerPC Firmware
Version SF220_001
SMS 1.5 (c) Copyright IBM Corp. 2000, 2003 All rights reserved.
```

-----  
Main Menu

- 1. Select Language
- 2. Setup Remote IPL (Initial Program Load)
- 3. Change SCSI Settings
- 4. Select Console
- 5. Select Boot Options

-----  
Navigation Keys:

X = eXit System Management Services

-----  
Type the number of the menu item and press Enter or select Navigation Key: **5**

- b. Press Enter to select **2. Select Boot Devices**.
- c. Press Enter to select **1. Select 1st Boot Device**.
- d. Press Enter to select **3. CD/DVD**.
- e. Select the media type that corresponds to the media device and press Enter.
- f. Select the device number that corresponds to the media device and press Enter. The media device is now the first device in the Current<sup>®</sup> Boot Sequence list.
- g. Press the ESC key until you return to the Configure Boot Device Order menu.
- h. Press the x key to exit the SMS menu. Confirm that you want to exit SMS.
- 3. Boot from the *AIX Volume 1* CD or DVD, as follows:
  - a. Select console and press Enter.
  - b. Select language for BOS Installation menus, and press Enter to open the Welcome to Base Operating System Installation and Maintenance menu.
  - c. Type 2 to select **Change/Show Installation Settings and Install** in the **Choice** field and press Enter.

```
Welcome to Base Operating System
Installation and Maintenance
```

Type the number of your choice and press Enter. Choice is indicated by >>>.

```
1 Start Install Now with Default Settings
2 Change/Show Installation Settings and Install
3 Start Maintenance Mode for System Recovery

88 Help ?
99 Previous Menu
>>> Choice [1]: 2
```

- 4. Verify or Change BOS Installation Settings, as follows:
  - a. Type 1 in the **Choice** field to select the **System Settings** option.
  - b. Type 1 for New and Complete Overwrite in the **Choice** field and press Enter.

**Note:** The installation methods available depend on whether your disk has a previous version of AIX installed.

- c. When the Change Disk(s) screen displays, you can change the destination disk for the installation. If the default shown is correct, type 0 in the **Choice** field and press Enter. To change the destination disk, do the following:
  - 1) Type the number for each disk you choose in the **Choice** field and press Enter. Do not press Enter a final time until you have finished selecting all disks. If you must deselect a disk, type its number a second time and press Enter.
  - 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.
- d. If needed, change the primary language environment. Use the following steps to change the primary language used by this installation to select the language and cultural convention you want to use.

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

- 1) Type 2 in the **Choice** field on the Installation and Settings screen to select the **Primary Language Environment® Settings** option.
  - 2) 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, do the following:
      - a) Select **MORE CHOICES**.
      - b) Select **Create Your Own Combination**.
      - c) 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.
      - d) 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.
      - e) 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.
  - e. After you have made all of your selections, verify that the selections are correct. Press Enter to confirm your selections and to begin the BOS installation. The system automatically reboots after installation is complete.
5. Complete the BOS Installation, as follows:
- a. Type vt100 as the terminal type.

```

Set Terminal Type
The terminal is not properly initialized. Please enter a terminal type
and press Enter. Some terminal types are not supported in
non-English languages.

```

```

ibm3101      tvi912      vt330
ibm3151      tvi920      vt340
ibm3161      tvi925      wyse30
ibm3162      tvi950      wyse50
ibm3163      vs100       wyse60
ibm3164      vt100       wyse100
ibmpc        vt320       wyse350
lft          sun

```

```

+-----Messages-----
| If the next screen is unreadable, press Break (Ctrl-c)
| to return to this screen.
88 Help ?
99 Exit
>>> Choice []: vt100

```

- b. In the License Agreement menu, select **Accept License Agreements**.
- c. Select **yes** to ACCEPT Installed License Agreements.
- d. Press F10 (or Esc+0) to exit the License Agreement menu.
- e. In the Installation Assistant main menu, select **Set Date and Time**.

Installation Assistant

Move cursor to desired item and press Enter.

```

Set Date and Time
Set root Password
Configure Network Communications
Install Software Applications
Using SMIT (information only)

```

```

F1=Help          F2=Refresh      F3=Cancel      F8=Image
F9=Shell         F10=Exit       Enter=Do

```

- f. Set the correct date, time, and time zone. Press the F3 (or Esc+3) key to return to the Installation Assistant main menu.
- g. Select **Set root Password**. Set a root password for the partition.
- h. Select **Configure Network Communications**.
- i. Select **TCP/IP Startup**.
- j. Select from the Available Network Interfaces and press Enter.
- k. Enter the appropriate network information in the Minimum Configuration and Startup menu and press Enter. Use the F3 (or Esc+3) key to return to the Installation Assistant main menu.
- l. Exit the Installation Assistant by pressing F10 (or Esc+0).
- m. The vterm window displays a login prompt.

## Secure by Default installation

A CD or DVD installation of AIX 6.1 with the Secure by Default (SbD) option prompts for the Expansion Pack CDs after the base operating system is installed. This step is necessary to install SSH and SSL packages for secure remote system accessibility. If this step is skipped, the system will not be network accessible because SbD erases binaries that use clear text passwords (for example, **telnet**, and **ftp**-similar binaries). If the SbD installation option is selected through NIM, the system administrator should ensure that the NIM **lpp\_source** has the openssh and openssl images in place.

## AIX Toolbox Media and NIM lpp\_sources

When a Network Install Manager **lpp\_source** is used for base system installs, do not copy the contents of the *AIX Toolbox for Linux® Applications* CD into the **lpp\_source**. This results in multiple copies of **cdrecord** and **mkisofs** software installing during base installation. Neither **cdrecord** or **mkisofs** installs if multiple copies are present.

## Software bundles requires additional CDs

If you create a Network Installation Management (NIM) **lpp\_source** with CD media, only the software from volume 1 (minimal install) is added. To add the software from the Graphics and System Management Client bundles, complete the following steps:

1. Type the **smitty nim\_update\_add** command. The **Add Software to an lpp\_source** menu is displayed.
2. Select the Graphics bundle for INSTALLP BUNDLE containing packages to add. Verify that the answer to the Process multiple volumes question is yes.
3. Select the SystemMgmtClient bundle for INSTALLP BUNDLE containing packages to add. Verify that the answer for the Process multiple volumes question is yes.

**Note:** When creating an lpp\_source from a prior release of AIX, and copying the **Graphics.bnd** software to the lpp\_source, restore the **Graphics.bnd** appropriate to the release you are creating the resources to, and make it into a NIM resource. You can get the bundle from the **bos** image in the lpp\_source:

```
# cd /tmp
# restore -xvqf <lpp_source_path>/bos ./usr/sys/inst.data/sys_bundles/Graphics.bnd
```

This command restores in **/tmp/usr/sys/inst.data/sys\_bundles**. Copy it to the location of your choice, and create a new NIM bundle resource, `smitty nim_mkres`.

## Network Installation Management

Network Installation Management (NIM) includes a readme file that is installed with the NIM Master **bos.sysmgt.nim.master** fileset. The path name of the file is **/usr/lpp/bos.sysmgt/nim/README**. The readme file contains additional information about the AIX Version 6.1 NIM product and includes the following topics:

- Restrictions on SPOT Creation for Releases Prior to 5.3 (New LPP\_SOURCE Directory Structure)
- Web-based System Manager NIM May Have Problems Installing SW on Client Machines
- Restrictions on Customize Operation for RPM Packages
- Steps Necessary For Adding GNOME -or- KDE Desktop Support

When Live Partition Mobility (LPM) is used to migrate a machine (that is, move a machine from one physical server to another) and the machine is defined as a NIM client, the NIM administrator must update the cupid attribute for the NIM client to reflect the new hardware value after the LPM migration completes. To update the cupid attribute, do the following:

1. On the NIM client, acquire the new cupid ID by running the following command:

```
uname -a
```

2. On the NIM master, run the following command:

```
nim -o change -a cupid+<cupid> <client>
```

## CSM Server

Before you install the CSM Server, you must read the *Software Planning and Installation Guide* for specific procedural steps to use when you are installing CSM. Installation of this product is not possible if you do not use the documented procedures in this book.

The CSM Server requires three **installp** filesets that are shipped on the base media and one open-source **rpm** fileset. These filesets must be installed prior to installing the CSM Server software and its dependent packages, the CSM Distributed Command Execution Manager (DCEM) GUI and the CSM DCEM Web-based System Manager application. The required filesets are:

- tcl (installp)
- tk (installp)
- expect (installp)
- conserver (rpm)

**Note:** The **tcl**, **tk**, and **expect** filesets are installed by default. To verify that these filesets are installed, run the **lsipp** command.

As the root user, do the following to install the rpm fileset and the CSM Server:

1. Install the **rpm** fileset by using the SMIT Install Software (type **smitty install\_latest** at the AIX command line).
  - a. Press F4, and select **/dev/cd0** (CD Drive) as the **INPUT device / directory for software**.

- b. Press F4, and select (by pressing F7) **conserver** as the **SOFTWARE to install** value, or press F4 and select all of the software packages that you want.
  - c. To accept the software license agreements, press the Tab key to change no to yes as the **ACCEPT new license agreements** value, and then press Enter.
  - d. Press Enter again to confirm that you want to continue the installation process.
  - e. Review the installation results, and press F3 to return to the installation panel, or press F10 to return to the AIX command line.
2. Install the CSM Server and its dependent software using SMIT Install Software (type **smitty install\_latest** at the AIX command line).
    - a. Press F4, and select (by pressing F7 for each package) **csm.server**, **csm.gui.dcem**, and **csm.gui.websm** as the **SOFTWARE to install** values, or press F4 and select all of the software packages you want.
    - b. To accept the software license agreements, press the Tab key to change no to yes as the **ACCEPT new license agreements** value, and then press Enter.
    - c. Press Enter again to confirm that you want to continue the installation process.
    - d. Review the installation results, and press F3 to return to the installation panel, or press F10 to return to the AIX command line.

## IBM 32-bit SDK for AIX, Java 2 Technology Edition, Version 5

IBM 32-bit SDK for AIX, Java™ 2 Technology Edition, Version 5 is released in Java5.x filesets. To obtain the latest update, do the following:

1. Go to the following developerWorks® Web site: <http://www.ibm.com/developerworks/java/jdk/aix/>.
2. Select the Downloads, User Guides, and Service information link.
3. Select the Fix Info link from the Java 5 32-bit column.

## IBM Tivoli Directory Server

You can install and use IBM Tivoli Directory Server only in association with your licensed use of AIX operating system functions. You must purchase a full-use license through Passport Advantage® for any other use of the IBM Tivoli Directory Server such as authentication and AIX user registry. The Passport Advantage package includes a White Pages application. The Passport Advantage license entitles you to use and to receive support for the IBM Tivoli Directory Server Proxy server and the White Pages application.

## Other installation information

### Installation packaging formats

AIX Version 6.1 supports the following installation-packaging formats:

- **installp**, AIX system installation command and packaging format
- **RPM**, a Linux installation command and packaging format
- **ISMP**, InstallShield Multi-Platform packaging format

With the **geninstall** command, you can list and install packages from media that contains installation images packaged in any of the listed formats. The **geninstall** and **gencopy** commands recognize the non-**installp** installation formats and either call the appropriate installers or copy the images, respectively.

The AIX Version 6.1 product media contains **installp** packages and **RPM** packages that are installed during a BOS installation. The **installp** packages are located in the following path, where *mount\_point* is the mount point:

```
/mount_point/installp/ppc
```

The **RPM** packages are located in the following path, where *mount\_point* is the mount point:

`/mount_point/RPMS/ppc`

If you have media that contains ISMP packages for AIX 6.1, the ISMP packages are located in the following path, where `mount_point` is the mount point:

`/mount_point/ismppc`

The **installp**, **bffcreate**, **geninstall**, **gencopy** and **nim** commands recognize this media structure.

For more information about software packaging, see the Software Product Packaging Concepts section in the *Installation and migration* in the AIX Information Center.

## Troubleshooting problems with installation from mksysb backup

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.

**Note:** Depending on the type of data or files in the file system, you might need additional blocks free. For example, if the file system has a lot of small files, an extra 4 KB is automatically allocated to allow for metadata expansion.

---

## Migration

When you migrate from AIX 5.3 to AIX 6.1, you can avoid the risk of down-leveling fixes previously installed on your AIX 5.3 system by migrating to the latest available Technology Level of AIX 6.1. If you are using a NIM `lpp_source` created with a prior level base media and later levels of updates added, you should initially create the `lpp_source` with the base media at the same release date or later than the level of AIX 5.3 that you are migrating from. The last 4 digits of the output of the **oslevel -s** command represent the year and week of the service pack currently installed (YYWW).

**Note:** Installing any new level of AIX requires more disk space than previous levels. Read the Disk Requirements in Chapter 2 for the disk requirements for a basic installation and ensure that you have free space in the file systems, or that you have free partitions in the rootvg. Migrating will require slightly more free space than a basic installation.

## Maximum size of boot image increased

For AIX Version 6.1, the maximum size of the boot image has changed from the previous value used for AIX 5.2 (and earlier releases) value of 11,984 KB (12 MB minus 16 KB) to 31,984 KB (32 MB minus 16 KB). The size of the boot logical volume has increased from 16 MB to 20 MB.

## System migrated to AIX 5.3 (or later) might experience double boot

When booting AIX Version 5.3 (or later) on a system that has previously been running an earlier release of AIX, you may notice that the system automatically reboots and restarts the boot process. This is how the firmware processes changed information in the boot image.

This reboot also occurs if the process is reversed. A system previously running AIX 5.3 (or later) that is booting a release of AIX prior to 5.3 goes through the same process. This "double boot" occurs only once; if the stored value does not change, then the second boot does not occur.

If you install AIX 5.3 (or later) and continue to use only that version, this double boot occurs once, and it occurs only if your system was running a pre-AIX 5.3 release before you boot AIX 5.3 (or later). Systems that are preinstalled with AIX 5.3 (or later) and use only that version do not experience the "double boot."



## Replacements for the vmtune and schedtune commands

When you migrate a system from a previous version of AIX to AIX Version 5.2, AIX Version 5.3, or AIX Version 6.1, it is automatically set to run in compatibility mode (pre520tune mode). Compatibility scripts that replace the **vmtune** and **schedtune** commands are included with AIX 5.2, which means that the previous behavior of the tuning commands is preserved to a large extent after a migration.

However, when you migrate to AIX 5.3, the pre520tune compatibility mode applies only to settings that were configured with the **no** and **nfso** commands because the **vmtune** and **schedtune** commands are no longer included. The compatibility mode is meant to be a temporary help in the migration to the new tuning framework and should normally not be used with releases after AIX 5.2.

## xlC runtime software

When you migrate from an AIX 5L operating system to an AIX 6.1 operating system, the **xlC.aix50.rte** file set is replaced by the **xlC.aix61.rte** fileset. If you upgraded the **xlC.aix50.rte** fileset after you installed your system, the migration may replace your upgraded version with a downlevel version. Before you migrate to an AIX 6.1 operating system, save the level of your **xlC.aix50.rte** fileset. After the migration is complete, compare your saved level of the **xlC.aix50.rte** fileset with the **xlC.aix61.rte** fileset. If the changes that you made to your level of the **xlC.aix50.rte** fileset are not in the **xlC.aix61.rte** fileset, upgrade the **xlC.aix61.rte** fileset.

## KDE desktop

If the CDE and KDE desktops are both installed on a system migrated from AIX 5.x to AIX 6.1, the KDE desktop might not start from the CDE login. To fix this problem, remove the following CDE startup information from the **/etc/inittab** file:

```
dt:2:wait:/etc/rc.dt
```

**Note:** You must have root user authority to remove this CDE startup information.

Do not delete the following KDE entry from the **/etc/inittab** file:

```
kdm:2:once:/opt/freeware/kde/bin/kdm
```

## Thin Servers

If you migrate any previous version of the AIX Common Operating System Image (COSI) and associated AIX Thin Servers to the AIX 6.1 with 6100-04 version, it is recommended that you delete any dump device associated with the migrated Thin Servers and re-create the Thin Servers.

Additionally, you must install the **devices.tmiscsw.rte** fileset on the NIM master for the AIX 6.1 with 6100-04 Thin Server to create a dump device.

## pmtoolkit fileset

The Performance Monitoring API is contained in the **bos.pmapi** fileset. A beta version of the same code was made available to selected customers, and also through alphaWorks®, under the name *pmtoolkit*.

When you are migrating from AIX with the beta fileset installed, you must uninstall the **pmtoolkit** fileset and reboot the machine before you install the **bos.pmapi** fileset. If you do not, the machine will fail to boot when you attempt to load the **pmtoolkit** fileset's kernel extension.

Verify that the **pmtoolkit** fileset is installed by typing the following at the command line:

```
lslpp -l pmtoolkit
```

- If you get the following output:

```
lslpp: 0504-132 Fileset pmtoolkit not installed
```

you can safely install the **bos.pmapi** fileset.



- If you get the following output:

Fileset	Level	State	Description
-----			
Path: /usr/lib/objrepos			
pmtoolkit	1.3.1.6	COMMITTED	Performance Monitor Toolkit 1.3.1

complete the following steps:

1. Run the following command:  

```
installp -u pmtoolkit
```
2. Reboot the machine. After the machine reboots, you can safely install the **bos.pmapi** fileset.

## SNMPv3

After you migrate to AIX 6.1 from pre-AIX 5.2 systems, the non-encrypted version of SNMPv3 will run by default. If you have your own community, trap, or smux entries in your **/etc/snmpd.conf** file, those must be manually migrated to the **/etc/snmpdv3.conf** file. For instructions on how to migrate this information, see "Network Management" in *Networks and communication management* in the AIX Information Center.

## Kerberos

All of the secure remote commands use the Kerberos Version 5 library and the GSSAPI library provided by IBM Network Authentication Service Version 1.4 that is located on the *AIX Version 6.1 Expansion Pack* CD. However, you must install the **krb5.client.rte** fileset that is located on the AIX Version 6.1 Expansion Pack CD.

If you are migrating to AIX 6.1 with CD or DVD media, and have Kerberos Version 5 installed, the installation scripts will prompt you to install the **krb5.client.rte** fileset from the Expansion Pack. If you are migrating your operating system using NIM resources, add **krb5** to your **lpp\_source**. The secure remote commands support Kerberos clients and servers from both Native Kerberos 5 and DCE.

For more information, see "Understanding the Secure Rcmds" in *Managing Communications and Networks* in the AIX Information Center.

## Multipath I/O (MPIO)

In AIX Version 6.1, the DS4K products are configured as Multipath I/O (MPIO) devices by default.

A DS4K product using the FCPARRAY driver may be migrated to the MPIO driver by using the following instructions, or all DS4K devices may be migrated by uninstalling the **devices.fcp.disk.array.rte** package and then running the **cfgmgr** command or rebooting.

The DS3K products are always configured as MPIO devices. There is no FCPARRAY support for these devices. The MPIO support for these devices removes the limitation of connecting only one adapter to each DS3/4K controller port.

## Instructions to convert DS4000 disks from FCPARRAY to MPIO

The MPIO driver has been enhanced to support most DS4000 models. The MPIO driver allows more than two paths to be configured to the device, and this simplifies zoning and improves performance. For the DS4000 to operate correctly in an MPIO configuration, the following steps must be performed.

The following AIX releases and minimum service packs can be used to convert DS4000 disks from FCPARRAY to MPIO:

- AIX 5.2 with the 5200-10 Technology Level and the 5200-10-04 Service Pack
- AIX 5.3 with the 5300-06 Technology Level and the 5300-06-05 Service Pack
- AIX 5.3 with the 5300-07 Technology Level and the 5300-07-02 Service Pack

- AIX 6.1 with the 6100-00 Technology Level and the 6100-00-02 Service Pack

The following DS4000 models are supported by AIX MPIO:

- 1722-600 = DS4300 = FAStT 600
- 1742-900 = DS4500 = FAStT 900
- 1814 = DS4700/DS4200
- 1815 = DS4800

To convert DS4000 disks from FCPARRAY to MPIO, do the following:

1. Change the NVSRAM settings on DS4000 storage used in the SAN (or direct attach) by doing the following:

**Note:** If this step was previously performed, go to step 2. However, if DS4000 firmware was updated, this step must be performed again.

- a. From the main Enterprise Management screen, highlight the subsystem you want to change.
- b. From the Tools menu, select Execute Script to open a Script Editor window.
- c. Enter the following:
 

```
set controller [a] HostNVSRAMBYTE [0x06,0x27] = 0;
set controller [b] HostNVSRAMBYTE [0x06,0x27] = 0;
```
- d. From the Tools menu, use the Script Editor to select Verify & Execute.
- e. Wait for the script to complete.

**Attention:** Do not cancel the script operation.

When the script completes, exit the Storage Manager.

2. Install the MPIO\_DS3\_4K APAR/iFIX that is appropriate for the AIX release on the server, and then reboot the AIX server.
3. Determine the DS4000 model or models that you are using on your AIX host by running the following commands, where X is the hdisk number for the DS4000 Array Disk type:

```
lsdev -Cc disk | grep DS4K
lscfg -v1 hdiskX
```

For example:

```
# lsdev -Cc disk
hdisk2 Available 0C-08-02 DS4K Disk Array Device

# lscfg -v1 hdisk2
hdisk2 U787A.001.DPM0WY4-P1-C5-T1-W200800A0B81326B7L3000000000000 1742-900 (900) Disk Array Device

Manufacturer.....IBM
Machine Type and Model.....1742-900
ROS Level and ID.....30393134
Serial Number.....
Device Specific.(Z0).....0000053245004032
Device Specific.(Z1).....
```

4. Use the following table and the Machine Type and Model output from step 3 to determine your DS4000 Array Disk type.

Table 2. DS4000 Array Disk Cross Reference

Machine Type-Model	Array Disk	Storage Server
1722-600	DS4300	FAStT 600
1742-900	DS4500	FAStT 900
1814	DS4700/DS4200	
1815	DS4800	

5. Check the AIX systems driver support and state by running the following command:

```
# 'manage_disk_drivers'
```

The output from this command displays the DS4000 devices that are supported by MPIO and RDAC, and indicates if they are currently configured for MPIO or RDAC enablement.

For example:

```
# manage_disk_drivers
1: DS4300: currently RDAC/fcparray; supported: RDAC/fcparray, MPIO
2: DS4500: currently RDAC/fcparray; supported: RDAC/fcparray, MPIO
3: DS4700/DS4200: currently RDAC/fcparray; supported: RDAC/fcparray, MPIO
4: DS4800: currently RDAC/fcparray; supported: RDAC/fcparray, MPIO
```

**Note:** If the AIX system has more than one type of DS4XXX models attached, run the **manage\_disk\_drivers** command for each model type.

In the example in step 3 on page 20, hdisk2 is a DS4500. In the example in step 5, DS4500 is currently enabled for RDAC/fcparray.

To change the driver that manages the DS4000, run the following commands in order, where *X* in the first command is the number of the array disk stanza from the output of the **manage\_disk\_drivers** command. For example: for DS4700, enter `# manage_disk_drivers - c 3`; for DS4800, enter `# manage_disk_drivers - c 4`, etc.

```
# manage_disk_drivers - c X
```

To verify the change, answer Y when prompted.

```
# bosboot -a
# shutdown -Fr
```

6. After the server reboots, all of the hdisk devices that were converted will be configured under the MPIO driver. All of the hdisks that are connected to DS4000 should be displayed as MPIO Other DS4K Array Device as indicated by the **lsdev -Cc disk** output.
7. To verify that hdisks are mapped to the appropriate LUNs on DS4000, run the **mpio\_get\_config -A** command. This command is similar to the **fget\_config** command for the RDAC driver. The **mpio\_get\_config** command is for informational purposes only; you cannot change the LUN ownership using this command.

## Instructions to convert DS4000 disk driver from MPIO to FCPARRAY

The following AIX releases and minimum service packs can be used to convert the DS4000 driver from MPIO to FCPARRAY:

- AIX 5.2 with the 5200-10 Technology Level and the 5200-10-04 Service Pack
- AIX 5.3 with the 5300-06 Technology Level and the 5300-06-05 Service Pack
- AIX 5.3 with the 5300-07 Technology Level and the 5300-07-02 Service Pack
- AIX 6.1 with the 6100-00 Technology Level and the 6100-00-02 Service Pack

To convert the DS4000 driver from MPIO to FCPARRAY, do the following:

1. Install the MPIO\_DS3\_4K APAR/iFIX that is appropriate for the AIX release on the server.
2. Change the NVSRAM settings on DS4000 storage used in the SAN (or direct attach) by doing the following:

**Note:** If this step was previously performed, go to step 3 on page 22. However, if DS4000 firmware was updated, this step must be performed again.

- a. From the main Enterprise Management screen, highlight the subsystem you want to change.
- b. From the Tools menu, select Execute Script to open a Script Editor window.
- c. Enter the following:

```
set controller [a] HostNVSRAMBYTE [0x06,0x27] = 0;
set controller [b] HostNVSRAMBYTE [0x06,0x27] = 0;
```

- d. From the Tools menu, use the Script Editor to select Verify & Execute.

e. Wait for the script to complete.

**Attention:** Do not cancel the script operation.

When the script completes, exit the Storage Manager.

- To migrate from MPIO to RDAC, there must be no more than two connections between the server and the storage (one per controller). Verify that this requirement is met by verifying that there is a separate zone for each HBA and controller pair. Refer to the RDAC documentation for valid configuration details.
- After the installation completes successfully, reboot the system.
- Determine the DS4000 model or models that you are using on your AIX host by running the following command where *X* is the hdisk number for the DS4000 Array Disk type:

```
lsdev -Cc disk | grep DS4K
lscfg -vl hdiskX
```

For example:

```
# lsdev -Cc disk
hdisk2 Available 0C-08-02 DS4K Disk Array Device
```

```
# lscfg -vl hdisk2
hdisk2 U787A.001.DPM0WY4-P1-C5-T1-W200800A0B81326B7L3000000000000 1742-900 (900) Disk Array Device
```

```
Manufacturer.....IBM
Machine Type and Model.....1742-900
ROS Level and ID.....30393134
Serial Number.....
Device Specific.(Z0).....0000053245004032
Device Specific.(Z1).....
```

- Use the following table and the Machine Type and Model output from step 5 to determine your DS4000 Array Disk type.

Table 3. DS4000 Array Disk Cross Reference

Machine Type-Model	Array Disk	Storage Server
1722-600	DS4300	FAStT 600
1742-900	DS4500	FAStT 900
1814	DS4700/DS4200	
1815	DS4800	

- Check the AIX systems driver support and state by running the following command:

```
# 'manage_disk_drivers'
```

The output from this command displays the DS4000 devices that are supported by MPIO and RDAC, and indicates if they are currently configured for MPIO or RDAC enablement.

For example:

```
# manage_disk_drivers
1: DS4300: currently RDAC/fcpararray; supported: RDAC/fcpararray, MPIO
2: DS4500: currently RDAC/fcpararray; supported: RDAC/fcpararray, MPIO
3: DS4700/DS4200: currently RDAC/fcpararray; supported: RDAC/fcpararray, MPIO
4: DS4800: currently RDAC/fcpararray; supported: RDAC/fcpararray, MPIO
```

**Note:** If the AIX system has more than one type of DS4XXX models attached, run the **manage\_disk\_drivers** command for each model type.

In the example in step 5, hdisk2 is a DS4500. In the example in step 7, DS4500 is currently enabled for RDAC/fcpararray.

To change the driver that manages the DS4000, run the following commands in order, where *X* in the first command is the number of the array disk stanza from the output of the **manage\_disk\_drivers** command. For example: for DS4700, you would enter # **manage\_disk\_drivers - c 3**; for DS4800, you would enter # **manage\_disk\_drivers - c 4**, etc.

```
# manage_disk_drivers - c X
```

To verify the change, answer Y when prompted

```
# bosboot -a  
# shutdown -Fr
```

8. After the server reboots, all of the hdisk devices that were converted will be configured under the RDAC driver.

## IBM Blade Center Issues

To ensure that the storage devices are properly configured on the IBM Blade Center, change the **init\_link** setting on the Fibre Channel adapter from arbitrated loop to point to point.

Enter the following commands to change the **init\_link** setting on the Fibre Channel adapter:

```
chdev -l fcsX -ainit_link=pt2pt -P  
bosboot -aD  
cfgmgr
```

---

## Configuration

### AIX Version 6.1 with Technology Level 6100-04 maximum N-Way support

AIX Version 6.1 with Technology Level 6100-04 supports a maximum of 64 processor cores and a maximum of 128 logical processors. The logical processors correspond to the total number of Simultaneous Multithreading (SMT) threads. This means that the maximum supported configuration is 64-core POWER5 or POWER6 in SMT2 mode (2 threads per core).

You can use the **prtconf** command to view processor characteristics, and the **smtctl** command to view and manage SMT thread settings.



---

## Chapter 4. Limitations and restrictions

This section lists restrictions and limitations applying to AIX Version 6.1.

---

### Limitation when creating a WPAR on a system with the Director agent installed

The **syncwpar** command might fail when you create a WPAR on a system with the Director agent installed. To avoid this problem, run the following command before you create the WPAR:

```
swvpdmgr -p DirectorCommonAgent
```

---

### console special file limitation

The EIO errors are restricted in some cases when the connection to the console is lost. The EIO errors that result from the console write function are restricted because the streams file is marked when a tty that is connected to a modem is disconnected. All of the writes to the console are redirected to where the console points, and any writes to the file descriptor are returned with EIO errors. These EIO errors continue until a process reopens the console.

---

### clogin command limitation

When you run the **clogin** command, some programs will not function properly, especially those programs that are in multibyte locales. Use the **clogin** command only for emergency system maintenance.

---

### Workload Partitions not supported on thin servers

Workload Partitions (WPARs) are not supported on thin servers (diskless and dataless systems that are not capable of booting and running without the assistance of servers on a network).

---

### NPIV support of DS4000 storage products

Some models of the DS4000 product family can be configured using the FCPARRAY or MPIO driver:

- If the device is configured using the MPIO driver, there are no restrictions.
- If the device is configured using the FCPARRAY driver, then the following restriction applies:
  - If the device has the reservation policy attribute set to any value other than `no_reserve`, the LPARs that the device is attached to will fail LPAR migration operations.

---

### WPAR parameters must be in English ASCII text

WPAR input parameters must be in English ASCII text. This includes the following WPAR variables:

- WPAR name
- WPAR password
- WPAR paths
- WPAR application
- WPAR hostname

---

### Installing applications in a WPAR environment

The WPAR documentation describes how to install applications in a WPAR environment using various applications such as Apache, DB2 and WAS. These examples are not intended to imply that they are the supported versions or configurations of these applications.

---

## System software cannot be directly managed in a non-shared /usr Workload Partition

If a WPAR is configured to have writable, non-shared **/usr** and **/opt** filesystems, the AIX system software within that WPAR cannot be directly managed from within the WPAR. Operations that are prevented on system software include **apply**, **commit**, **deinstall**, and **reject**. If it is necessary to modify system software within a non-shared WPAR, use the **/usr/sbin/swvpdmgr -w <fileset\_names>** command to allow those filesets to be directly managed within the Workload Partition.

---

## SNMPv3

In AIX Version 6.1, due to the security concern that the "public" community name configured in the **/etc/snmpdv3.conf** file is able to query a lot of Management Information Base (MIB) information on the system, the default behavior has been changed to restrict the "public" community name to view this information.

---

## AIO has been removed from the ODM

For each Asynchronous I/O (AIO) function there is a Legacy and a POSIX definition. In AIX Version 6.1, both POSIX and Legacy extensions are loaded at boot time. Do not run the **mkdev -l [aio0 | posix\_aio0]** command to load the extension because it will fail on AIX Version 6.1. AIO attributes have been removed from the Object Data Manager (ODM) and can no longer be queried with the **lsattr** command or changed with the **chdev** command. All of the tunables have been removed from the ODM and are managed by the **ioo** command.

---

## Using a USB optical device with VIOS

When you switch USB optical devices away from a Virtual I/O Server platform, then switch them back, the client partitions cannot use the optical devices until you delete the virtual optical devices, as well as the real optical devices. Run the **cfgmgr** command to make the optical devices available.

---

## Performing an internal or external snapshot of a JFS2 filesystem

The **snapshot** command fails in the following instances:

- The **snapshot** command fails with a Not owner error if you are trying to create an internal snapshot and the filesystem already has an external snapshot and vice versa. In this instance, the **fscntl** system call returns -1 and the **errno** parameter has the EPERM value.
- The **snapshot** command fails with a Not owner error if trying to create an internal or an external snapshot and the filesystem is HSM enabled. In this instance, the **fscntl** system call returns -1 and the **errno** parameter has a EPERM value.
- The **chfs** command fails with a A system call received a parameter that is not valid error if trying to enable HSM for a filesystem that has an internal or an external snapshot. In this instance, the **finfo** system call returns -1 and the **errno** parameter has a EINVAL value.
- The **snapshot** command fails with a No space left on device error when trying to create an internal snapshot and the snapshot limit is exceeded. In this instance, the **fscntl** system call returns -1 and the **errno** parameter has a ENOSPC value.

---

## Host Ethernet Adapter limitation

AIX Dynamic Logical Partitioning (DLPAR) of Integrated Virtual Ethernet (IVE), also known as Host Ethernet Adapter (HEA), is not supported in AIX 5.3 with the 5300-06 Technology Level and AIX 5.2 with the 5200-10 Technology Level. Support for this feature is enabled in AIX 5.3 with the 5300-07 Technology Level and AIX 6.1 with the 6100-00 Technology Level and later releases.



---

## Xterm with locale support limitations

Xterm, the terminal emulator for the X Window System, is enabled for locale support, except for bidirectional locales. This emulator requires ISO 10646-1 encoded fonts to display results. These fixed-width fonts are shipped with AIX CDs. Install the **X11.fnt.xorg.misc-misc** fileset to properly display locale text. The fixed-width fonts are limited to two sizes: default and large.

All Latin languages, Japanese, and Korean languages are supported. The Chinese language is not supported.

**Note:** Japanese support is provided only for JISX0201 and JISX0208 characters.

Messages from the **xterm** application are not displayed in locale-specific languages.

---

## InfiniBand EEH limitation

The 4X IB Dual Port DDR Exp CD, CFF/PCIE adapter (feature 8258) does not support full EEH recovery. If you get a bus error (MXIB\_EEH\_HARDWARE\_ERROR in the error log), you might have to manually perform the recovery steps. These steps may include manually reconfiguring the adapter or replacing the adapter. To manually reconfigure the adapter, do the following:

1. Unconfigure the adapter by using the **rmdev** command (for example, `rmdev -l iba0`).
2. Configure the adapter by using the **mkdev** command.

### Notes:

1. If the adapter instance is busy (a program or kernel extension has called open on the adapter), you might not be able to unconfigure the adapter. If you cannot unconfigure the adapter, reboot the system.
2. If the bus error (MXIB\_EEH\_HARDWARE\_ERROR) is present after a successful manual recovery, replace the adapter.



---

## Chapter 5. AIX Information Center

The AIX Information Center is provided on the Web at <http://publib14.boulder.ibm.com/infocenter/systems/aix>. The AIX Information Center can be installed from or be viewed directly from the DVD on any AIX or Microsoft® Windows® systems that are capable of reading a DVD.

If you require a translated version of the documentation and cannot access the Web site or use a DVD, then you might be able to download a copy of the DVD contents from the "Entitled Software Service" site under the terms of your AIX Software Maintenance Agreement if electronic download is offered in your country.

Information about using the electronic software delivery site is provided by going to the Web site at <https://www-05.ibm.com/servers/eserver/ess/ProtectedServlet.wss> and clicking **Help**. The electronic install image is provided in a **tar.gz** format. After downloading the compressed tar image, decompress, unpack, and run **install\_aix** to start the installation wizard.

**Note:** It is recommended that you restart your system after the AIX Information Center is installed. On AIX systems, exit the installation wizard after the installation of the documentation for each language. On AIX systems, to set the default browser, type the following command:

```
chwebconfig -b <browser location>
```



---

## Appendix A. What's new

---

### New and enhanced functionality in AIX Version 6.1 with Technology Level 6100-04

#### System Management

AIX Version 6.1 includes new improvements to the manageability of the AIX operating system. These enhancements include:

- AIX Runtime Expert profile-based performance management.
- Multi-system topas collect and report performance information from multiple separate systems.
- Performance Management for Power Systems agent support with topas (also with the AIX 5L Technology Level 5300–11).
- PerformanceAide integrated with topas.
- Enhanced concurrent maintenance for LVM and NFS.
- Thin server paging over TCP/IP.
- Multiple server monitoring with topas.
- JFS to JFS2 conversion on migration.
- ssh included on the base AIX installation media.

#### Virtualization

AIX Version 6.1 includes significant new capabilities for virtualization including:

- Live Application Mobility with SAN device support in Workload Partitions.
- Root volumes for WPARs.
- WPAR support for the VxFS file system.

#### Security

AIX Version 6.1 includes significant new enhancements to its security features. These enhancements include:

- Cryptographic framework.
- Centralized key management for Encrypting file systems stored in LDAP.
- Trusted Execution centralized policy control in LDAP.

#### RAS features and customization

AIX Version 6.1 includes significant new enhancements to its RAS features. These enhancements include:

- probevue support for Java.
- First Failure Data Capture additional component coverage.

---

### New and enhanced functionality in AIX Version 6.1

AIX Version 6.1 delivers support for the System p POWER6 based offerings.

#### Virtualization

AIX Version 6.1 includes significant new capabilities for virtualization including:

- **WPARs**  
WPARs provide a virtualized operating system environment within a single instance of the AIX operating system. WPARs secure and isolate the environment for the processes and signals that are used by enterprise applications. WPARs complement other AIX virtualization technologies. WPARs can improve

efficiency by reducing the number of system images to maintain, providing easy setup and management, and high system utilization through server consolidation. There are two type of WPARs supported:

- System WPARs are autonomous virtual system environments with their own private file systems, users and groups, resource controls, login, network space, and administrative domain. A system WPAR shares the kernel with the global AIX environment in which it runs, and can share or have its own copies of the system **/usr** and **/opt** file systems.
- Application WPARs provide an environment for isolation of applications and their resources. The WPAR application inherits all resources and execution environments from the global environment.

The following new capabilities are available for workload partitions:

- Independent network routing provides support for firewalls between WPARs and enables the secure use of WPARs for network edge and backend processing in a single AIX instance.
- Workload partitions support IPv6 networks.
- Name-mapped interfaces are now supported. The global administrator can create virtual names for physical interfaces (such as prodnet for en0) to facilitate Live Application Mobility.
- NIM supports WPAR creation and backup, and starting WPARs from NIM.
- Resource controls for number of PTYs, Large Pages, IPCs, and Pinned Memory are supported.
- Workload Partitions
  - SAN devices are now supported in WPARs, and WPAR administrators can directly manage their own storage. This capability allows SAN devices to be defined by a global administrator as a configuration option for WPARs. After the devices are defined, the WPAR administrator can independently create and manage JFS2 filesystems on those SAN devices.

**Note:** Live Application Mobility (the relocation of a WPAR between AIX instances without restarting the workloads running in the WPAR) is only supported with NFS filesystems.

- Active Memory™ Sharing support
  - AIX 6.1 with Technology Level 6100-03 supports the Active Memory Sharing feature of PowerVM™ Enterprise Edition. This feature provides greater flexibility for consolidating workloads onto Power Systems servers.

#### • **Application Mobility**

Application Mobility is a new capability that allows a client to relocate a running WPAR from one system to another, without requiring the workload running in the WPAR to be restarted. Application Mobility is intended for use within a data center and requires the use of the new Licensed Program Product, the IBM AIX Workload Partitions Managers (WPAR Manager). Both System and Application WPARs can be relocated with the WPAR manager.

The following new capabilities are available for application mobility:

- Faster Live Application Mobility supports the resumption of application execution within seconds of starting the relocation to a new system (requires PowerVM WPAR Manager for AIX Version 1.2).
- Static (inactive) application mobility supports increased flexibility to relocate workloads between systems with different levels of AIX 6 or between different processor families (requires PowerVM WPAR Manager for AIX Version 1.2).
- Live Application Mobility supports I/O Completion Port applications (requires PowerVM WPAR Manager for AIX Version 1.2)

## **Enterprise Storage Management**

AIX Version 6.1 includes new improvements to Enterprise Storage Management. These enhancements include:

- **NFS Support for Workload Partitions**

When mounting NFS file systems from within a system, WPAR performs the same as a regular NFS mount (Versions 2, 3, and 4 supported). Statistics (`nfsstat`) and tunables (`nfsd`) commands from within a WPAR are specific to that WPAR. NFS mounts from within a mobile WPAR are relocated with the WPAR.

- **JFS2 Integrated Snapshots**

JFS2 has provided support for snapshots in external logical volumes since AIX Version 5.2. In AIX Version 6.1, snapshots are created in the same storage device as the file system. This new feature allows:

- Ease of management by removing management of separate logical volumes for snapshots. The snapshot resides in the same host storage object as the primary file system. These snapshots are referred to as internal snapshots to contrast with the snapshots in separate logical volumes, which are now referred to as external snapshots.
  - The number of snapshot generations per file system has been increased to 64. This increase provides better support for real world environments where snapshots are taken at weekly, daily and hourly intervals compared to the external snapshot limit of 15.
  - The new integrated snapshot facility provides superior ease of use. Since the snapshot is in the primary file system, earlier versions of files can be accessed by non-privileged users without requiring a separate mount of the snapshot. This new facility also allows NFS client access to snapshot data for exported file systems.
- Thread support enhancements add support for thread local storage, thread I/O Prioritization, unique thread identifiers to enable the next generation of database technology.
  - PowerHA™ asynchronous Global disk mirroring is supported, a key requirement for Disaster Recovery data protection.

## WPAR storage devices

System WPARs can import one or more storage devices. Non-rootvg volume groups, logical volumes, and file systems can be created and managed on imported storage devices within the WPAR.

A storage device is deployed to a WPAR in the following phases:

1. Use the **mkwpar** or **chwp** command to allocate a device to a WPAR.
2. The device is automatically exported to the WPAR when the WPAR starts.
3. The device is automatically imported when the WPAR is booted with the **cfgmgr** command.

After the device is exported to a WPAR, the device state is listed as `Defined` and it is not available in the Global environment until it is unexported by using either the **chwp** command or the **stopwpar** command.

**Supported storage devices:** The disk drives that are supported in a WPAR include any FibreChannel disk drive that is supported by AIX 6 and uses the **scsidisk** device driver with the AIX MPIO (default PCM) multipath software. These include the following:

- IBM System Storage DS3400
- IBM System Storage DS4200
- IBM TotalStorage DS4300 (FAStT600)
- IBM TotalStorage DS4500 (FAStT900)
- IBM System Storage DS4700
- IBM System Storage DS4800
- IBM System Storage DS5100
- IBM System Storage DS5300
- IBM XIV Storage System

The tape drives that are supported in a WPAR are any FibreChannel tape drives that are supported by AIX 6 and use the **sctape** device driver.

**Note:** The **atape** device driver is not supported.

**Allocating a device:** A device can be allocated to a WPAR when the WPAR is created or it can be added to WPAR in a later operation. For a device to be allocated to a WPAR, it must be in the available state or defined state in the Global environment.

To query the device state, run the following command:

```
lsdev -l <device>
```

To create a system WPAR and allocate the hdisk3 storage device, run the following command:

```
mkwpar -D devname=hdisk3 -n mywpar1
```

To allocate a storage device to an existing WPAR, run the following command:

```
chwpar -D devname=hdisk4 mywpar1
```

When you allocate a storage device to an active WPAR, the device is exported to the WPAR unless it was previously exported. To import the newly allocated device into the WPAR, invoke the **cfgmgr** command within the WPAR.

The **-D** flag for the **mkwpar** and **chwpar** commands supports a new attribute, **devid**. The **devid** attribute can be used if the unique device identifier for the storage device is known. The **devid** and **devname** attributes cannot be specified together. The **devtype** attribute has been updated to accept three additional device types: **disk**, **tape** and **cdrom**.

A storage device can be allocated to more than one WPAR. However, the device can be exported to only one WPAR at a time. The device is exported to the WPAR that starts first. After a device has been exported to a WPAR, the extended state of the device is listed as **Exported**. To see the extended state of a device, run the following **lsdev** command with the new **-x** flag:

```
lsdev -x -l hdisk1
```

A message similar to the following is displayed:

```
hdisk1 Exported 01-08-02 MPIIO Other DS4K Array Disk
```

**Deallocating a device:** To deallocate a storage device from an existing WPAR, enter the following command.

```
chwpar -K -D devname=hdisk3 mywpar1
```

When a storage device is deallocated from an inactive WPAR, the device is removed from the configuration file. When a storage device is deallocated from an active WPAR, the **chwpar** command attempts to unconfigure the device. If the device is being used, the unconfiguration operation fails and the command to remove the device from the WPAR also fails. When the command is successful, the device in the WPAR changes from the available state to the defined state.

**Configuring a device in a WPAR:** Each storage device that is configured in the WPAR has an ODM entry in the WPAR. Each storage device also has a virtualized parent device. Configuration of the parent devices and management of the paths to the actual devices are not allowed in the WPAR. The following commands are used to configure and manage the Global environment and the devices in the WPAR:

- **mkdev**
- **chdev**
- **rmdev**
- **lsdev**



- **cfgmgr**
- **lsattr**
- **lspath**

**Managing file systems for a device:** When a device is configured in the WPAR, commands that are used to create and manage volume groups, logical volumes, and file systems operate in the same way as they do in the Global environment. To create and modify volume groups, use the following commands:

- **mkvg**
- **importvg**
- **extendvg**

To create and modify logical volumes, use the following commands:

- **mklv**
- **chlv**

To create and modify file systems, use the following commands:

- **mkfs**
- **chfs**

**Limitations:** The following limitations apply to WPAR storage devices.

- A storage device can be exported to only one active WPAR.
- The JFS2 file system must be used for disk storage devices.
- A WPAR that contains a storage device cannot be made checkpointable in AIX 6.1 with Technology Level 6100-03.
- To use the WPAR storage device feature, the wio.common and wio.fcp packages must be installed.
- Allocating storage devices to WPARs that were created prior to AIX Version 6.1 with Technology Level 6100-03 is not supported.

## Security

AIX Version 6.1 includes significant new enhancements to its security features. These enhancements include:

- **Role Based Access Control**

Role Based Access Control (RBAC) is designed to improve security and manageability by allowing administrators to delegate system administrative duties to non-root users. RBAC in AIX has been enhanced to provide very fine granular authorizations that identify the privileged operation that they control. These authorizations can be used to create the required roles necessary and assign those roles to the users required to manage the system.

- **Trusted AIX**

Trusted AIX extends the security capabilities of AIX by supplying integrated multi-level security. Trusted AIX is implemented as an installation option that provides the highest levels of label-based security to meet critical government and private industry security requirements.

- **Encrypting Filesystem**

The IBM Journaled Filesystem Extended (JFS2) provides for greater data security with the addition of a new capability to encrypt the data in a file system. Clients can select from a number of different encryption algorithms. The encrypted data can be based up in encrypted format, reducing the risk of data being compromised if backup media is lost or stolen. The JFS2 encrypting file system can also prevent the compromise of data even to root-level users.

- **Trusted Execution**

Trusted Execution provides an advanced mechanism for checking and maintaining system integrity. A signature (SHA256/RSA) database for important system files is created automatically as part of the

regular AIX installation. The Trusted Execution tool can be used to check the integrity of the system against the database. An administrator can define policies such as monitoring the loads of files listed in the database and not allowing execution/loads if hashes do not match.

- **Secure by Default**

The AIX Version 6.1 installation offers a new option, Secure by Default, that installs only the minimal number of services to provide the maximum amount of security. The Secure by Default option works particularly well when used in conjunction with the AIX Security Expert to only enable the system resources required for the system's intended purpose.

- **Digital certificate authentication for RADIUS**

The AIX RADIUS server fully supports the EAP-TLS protocol for implementing digital certificate authentication in wireless networks. This strong mutual authentication protocol is used for securing access to wireless and wired networks.

- **TCP traffic regulation**

TCP Traffic Regulation provides AIX and VIOS systems with flexible denial-of-service attack mitigation of TCP sockets. Policies created by a system administrator can be configured to set maximum limitations and control source IP diversity of incoming TCP connections to a network port or a range of ports. The system automatically ensures that resources are shared across multiple remote IP addresses that are attempting to connect through TCP to a port.

- **Version 2.20 of the PKCS #11 standard**

The PKCS #11 subsystem has been implemented using the following components:

- An API shared object (/usr/lib/pkcs11/ibm\_pks11.so) is provided as a generic interface to the device driver in which PKCS #11 support is implemented. This tiered design allows you to use new PKCS #11 devices when they come available without recompiling existing applications.
  - A PKCS #11 device driver that provides the same capabilities to applications as those provided to other kernel components such as EFS or IPsec.
- Systems Director platform supports IBM Systems Director Console for AIX tasks.
  - Other manageability enhancements include the following:
    - Concurrent kernel updates manageability and coverage improvements.
    - Improved/new function for commands such as fcstat, topasout, and svmon.
    - Common Information Model (CIM) instrumentation for devices.
    - Performance tools enhancements for workload partitions.
    - The nmon functionality has been integrated into the topas infrastructure, including the ability to use nmon analyzer to process topas historical data.

## System management

AIX Version 6.1 includes new improvements to the manageability of the AIX operating system. These enhancements include:

- NFSv4 support for the Network Installation Manager (NIM)
- Graphical Installation

The AIX Graphical Installer provides a simplified, easy-to-use version of the AIX installer. Users are presented with a graphical user interface to start a system installation instead of the existing text-based installation menu. The Graphical installer is limited to users that boot DVD media on a system that does not have an existing operating system on its disks. If the installation code finds a root volume group on a disk, the traditional BOS menus are presented.

- New graphical systems console, the IBM Systems Director Console for AIX

The Systems Director Console for AIX provides a responsive Web access to common systems management tools such as the Systems Management Interface Tool (SMIT) and offers integration into the IBM Systems Director.

- Systems Director platform supports IBM Systems Director Console for AIX tasks.

- Other manageability enhancements include the following:
  - Concurrent kernel updates manageability and coverage improvements.
  - Improved/new function for commands such as fcstat, topasout, and svmon.
  - Common Information Model (CIM) instrumentation for devices.
  - Performance tools enhancements for workload partitions.
  - The nmon functionality has been integrated into the topas infrastructure, including the ability to use nmon analyzer to process topas historical data.
- IBM Systems Director Agent is now included as part of AIX 6.1 with Technology Level 6100-03 installation media and is installed and enabled by default.

## **dscrctl Command**

### **Purpose**

Allows the system administrator to read the current settings for the hardware streams mechanism and to set a system wide value for the Data Stream Control Register (DSCR). The Data Streams Control Register is privileged. It can be read or written only by the operating system.

For more information on the Data Stream Control facilities, refer to the POWER Instruction Set Architecture V2.05 publicly available from <http://www.power.org>.

### **Syntax**

To query the characteristics of the hardware streams on the system:

```
dscrctl -q
```

To set the operating system default prefetch depth on the system temporarily (that is, for the current session) or permanently (that is, after each reboot):

```
dscrctl [-n] [-b] -s <dscr_value>
```

To cancel a permanent setting of the operating system default prefetch depth at boot time:

```
dscrctl -c
```

### **Description**

The **dscrctl -q** subcommand queries and displays the number of hardware streams, and the platform and operating system default prefetch depth. Any user can run this subcommand.

The **dscrctl -s** subcommand sets the operating system default prefetch depth. It requires root authority to run. This default can be changed either for the current session (-n), at boot time (-b) or both (-n -b).

The **dscrctl -c** option cancels the setting of the operating system default prefetch depth at boot time. This option removes the **dscrctl** command from the **/etc/inittab** file and thus takes effect after the next reboot.

### **Flags**

- q** Query: Display the number of hardware streams supported by the platform and the values of the firmware and operating system default prefetch depth.
- c** Cancel: Cancels a permanent setting of the system default prefetch depth at boot time by removing the **dscrctl** command from the **/etc/inittab** file.
- n** Now: Used in conjunction with the -s flag, changes the runtime value of the operating system default prefetch depth. The change is not persistent across boot.
- b** Boot: Used in conjunction with the -s flag, makes change persistent across boots by adding a **dscrctl** command to the **/etc/inittab** file.

### **-s dscr\_value**

Set: Defines the value for the new operating system default prefetch depth. The value is treated as a decimal number unless it starts with 0x in which case it is treated as hexadecimal.

### **Examples**

1. Set the value of the operating system default prefetch depth to 13 for the current session:

```
# dscrctl -n -s 13
```

2. Display the current settings for the hardware streams mechanism:

```
# dscrctl -q
Current DSCR settings:
number_of_streams = 16
platform_default_pd = 0x5 (DPFD_DEEP)
os_default_pd = 0xd (DSCR_SSE | DPFD_DEEP)
#
```

### **Related information**

#### **/etc/inittab**

## **RAS features and customization**

AIX Version 6.1 introduces new RAS (Reliability, Availability, and Serviceability) features and improves functionality. Features that can potentially cause measurable performance impact are installed and enabled at a level that is intended to optimize RAS versus performance trade-offs. The features can be separately enabled or disabled to match the memory consumption and performance needs of a given installation. This can be done from the Problem Determination menu in SMIT (fastpath: **smitty problem**). Key features that can be enabled, disabled, and otherwise customized from this menu include the following:

- **System Dump**

Beginning with AIX Version 6.1 with the 6100-01 Technology Level, an iSCSI device can be configured as a dump device for firmware-assisted system dumps if the dump logical volume is on the iSCSI boot disk.

A more reliable system dump, called a firmware-assisted or firmware-assisted system dump, is introduced. It minimizes the role of the failing AIX instance in collecting serviceability data. Firmware-assisted system dump is only enabled on POWER6 partitions with at least 4 GB of memory. When enabled, the system dump reserves a scratch area of partition memory, the size of which depends on several factors, including maximum partition memory. In general, the scratch area is between 128 MB and 256 MB in size. Firmware-assisted system dump is only enabled if the adapter firmware associated with the dump device has the necessary support.

Most devices are supported, but may require an adapter firmware update. Firmware-assisted system dump includes a non-default mode that supports a full memory dump. When this mode is enabled, the size of the dump device might need to be increased to reflect the larger size of the dump. The default firmware-assisted system dump mode is for a selective memory dump whose contents and size are similar to the traditional AIX system dump.

Beginning with AIX Version 6.1, all types of system dumps are compressed. The ability to disable dump compression is removed.

- **Advanced First Failure Data Capture features**

The Advanced First Failure Data Capture features include default-on memory traces and run-time error-checking capabilities. The default memory consumption associated with these features is similar to what is used in AIX 5.3. Additional run-time error checking and tracing are added to selected AIX subsystems.

- **Kernel Recovery**

AIX Version 6.1 introduces a recovery framework that allows AIX to continue running after selected errors that would have caused a partition outage in AIX 5.3. When enabled, this framework introduces a new 4 KB stack per thread, as well as a new 64 KB stack per processor.

- **Component and Live Dump**

AIX Version 6.1 introduces a live dump capability that allows a selective dump of kernel memory to occur without requiring a partition reboot or application outage. By default, the live dump capability reserves 64 MB or 1/64 of the partition's real memory, whichever is less. By default, live dumps are written to the `/var/adm/ras/livedump` directory. These and other attributes can be customized.

- **ProbeVue**

AIX Version 6.1 introduces a programmable dynamic trace capability called ProbeVue. ProbeVue provides several tunables to customize its memory usage and performance characteristics. Consult the `/usr/lpp/bos.sysmgt/probevue.README.txt` readme file for the latest information on ProbeVue usage and restrictions.

- **Kernel Storage Protection Keys**

AIX Version 6.1 introduces support for POWER6 Virtual Storage Protection Keys by the AIX kernel and kernel extensions. Storage keys protect against erroneous accesses and memory overlays by segmenting portions of the address space. The performance impact of storage keys depends on the workload, based on factors such as how much time is spent in kernel mode and the frequency of addressability changes while in kernel mode. When enabled, kernel storage keys require an additional 4 KB stack per thread, as well as an additional 44 KB stack per processor.

- ProbeVue supports dynamic tracing support for C++ programs
- Additional support for Power6 Storage Keys.
- Code development and debugging capabilities of the ProbeVue dynamic-tracing facility are extended to applications written in C++.

## Networks

TCP/IP Version 6 is updated to support the latest standards for TCP/IP V6. NIM support for IPV6 provides AIX installation and image management on this next generation internet protocol.

## JFS2 sync tunables

JFS2 sync tunables provide ways to limit the number of pages that are written to a file during sync operations. When there is heavy random I/O activity to a large file during a sync operation, all reads and writes from user programs to that file are blocked. When there are a large number of "dirty pages" in the file, the time required to complete the writes to disk can be lengthy.

**Note:** These tunables should only be used if application response is noticeably delayed when a sync occurs. The optimum setting for these tunables is dependent on memory size and I/O bandwidth. If tuning is required, start with a neutral setting of 256 for both tunables.

The following are definitions for JFS2 sync tunables:

### **j2\_syncPageCount**

Limits the number of modified pages that are scheduled to be written by a sync operation in one pass for a file. When this tunable is set, the file system will write the specified number of pages without blocking I/O to the rest of the file. The sync call will iterate on the write operation until all modified pages have been written.

### **j2\_syncPageLimit**

Overrides **j2\_syncPageCount** when a threshold is reached to ensure that the sync completes.

JFS2 sync tunables are manipulated with the **ioo** command, and they can also be managed with **smit** or **wsm**.

## Hints for sync tunable settings:

`j2_syncPageCount`  
Default: 0  
Range: 0-65536  
Type: Dynamic  
Unit: 4KB pages

When you are running an application that uses file system caching and does large numbers of random writes, you might need to adjust this setting to avoid lengthy application delays during sync operations. The recommended values are in the range of 256 to 1024. The default value of zero gives the normal sync behavior of writing all “dirty pages” in a single call. Small values for this tunable result in longer sync times and shorter delays in application response time. Larger values have the opposite effects.

`j2_syncPageLimit`  
Default: 16  
Range: 1-65536  
Type: Dynamic  
Unit: Numeric

Set this tunable when **j2\_syncPageCount** is set, and increase it if the effect of the **j2\_syncPageCount** change does not reduce application response times. The recommended values are in the range of 1 to 8000. The **j2\_syncPageLimit** setting has no effect if the **j2\_syncPageCount** setting is 0.

## Xterm with locale support

Xterm, the terminal emulator for the X Window System, is enabled for locale support. For more information about Xterm, see “Xterm with locale support limitations” on page 27.

The following fonts are added for X Servers and X Font Servers:

- Misc-misc bitmap fonts
- Bigelow and Holmes true type fonts
- Helvetica Linotype true type fonts

---

## Additional information

### The `devices.artic960` fileset

The `devices.artic960` fileset provides support for the IBM ARTIC960Hx 4-Port Selectable PCI Adapter (FC 2947). This includes EEH support and 64-bit support for the FC 2947 adapter. If an additional fileset is installed to access the IBM ARTIC960 FC 2947 adapter, full EEH and 64-bit support depends on the ability of the additional fileset to support EEH and 64-bit.

Included with the `devices.artic960` fileset are the following filesets:

- `devices.artic960.rte`, IBM ARTIC960 Runtime Support
- `devices.artic960.unicode`, IBM ARTIC960 Adapter Software
- `devices.artic960.diag`, IBM ARTIC960 Adapter Diagnostics

When a PCI I/O error occurs on an IBM PCI ARTIC960 adapter, the adapter slot becomes frozen and the IBM ARTIC960 adapter can be reset. Following an EEH error, the adapter software needs to be downloaded to the adapter again.

To determine if an EEH error occurred on an IBM ARTIC960 adapter, inspection of the error log is necessary. A temporary EEH error on an IBM ARTIC960 adapter is logged as a temporary EEH error followed by I/O errors specific to the IBM ARTIC960 adapter. Recovery from a temporary EEH error is accomplished by removing and making the IBM ARTIC960 device driver using the `rmdev` and `mkdev` command. This process loads the necessary adapter software onto the adapter.



If the error log shows a permanent EEH error, it is necessary to use the hot plug manager to remove and make the adapter again.

The **devices.artic960** fileset does not support interprocess communication through mailboxes on AIX Version 6.1.

## The **devices.pci.14108c00** fileset

The **devices.pci.14108c00** fileset provides support for SDLC and bi-synchronous protocols on the IBM ARTIC960Hx 4-Port Selectable PCI Adapter (FC 2947). When combined with the installation of the **devices.artic960** fileset, Enhanced Error Handling (EEH) support is provided. Either 32-bit or 64-bit kernel mode is supported. 32-bit applications are supported.

## Error log labels for Fibre Channel adapters have changed in AIX 6.1

The error log templates are in the **devices.common.IBM.fc.rte** fileset. The **devices.pci.df1000f7.com** driver fileset that references the error log templates has changed. The following changes were made in the error logs:

- Errors previously logged using the `FCS_ERRn` template label (where *n* is between 0 and 10, inclusive) are now logged using the `FCA_ERRn` template label (where *n* is between 0 and 15, inclusive).
- Errors previously logged using the `FSCSI_ERRn` template label (where *n* is between 0 and 10, inclusive) are now logged under the `FCP_ERRn` template label (where *n* is between 0 and 15, inclusive).

The new templates also provide 1024 bytes of detailed data where as the previous templates had only 228 bytes.

## AIXLink/X.25 LPP

AIXLink/X.25 LPP Version 2.1 is supported on AIX Version 6.1.

## USB flash drive support

Beginning with AIX 5L Version 5.3 with the 5300-08 Technology Level and AIX 6.1 with the 6100-02 Technology Level, USB flash drives are supported. To use these devices, install the following device package:

```
devices.usbif.08025002
```

The following USB flash drives are supported for use with AIX 5.3 with 5300-09 and AIX 6.1 with 6100-02:

- Lenovo USB2.0 Essential Memory Key, part number 41U4944
- Kingston 4GB DataTraveler, USB2.0
- SanDisk 4GB Cruzer Micro Flash Drive, USB2.0

**Note:** The AIX USB-host controller supports only USB1.1 on AIX 5.3 with 5300-09 and AIX 6.1 with 6100-02. All of the supported flash drives function with USB1.1.

These flash drives are configured with logical names such as `flashdrive0` and `flashdrive1`, and they present both raw and block special files. For example, the raw special file for `flashdrive0` is `/dev/rflashdrive0`, and the block special file is `/dev/flashdrive0`.

Only the ISO file system (read-only ISO9660) is supported on these drives. However, you can create a system backup on the drives by using the **tar** command, **cpio** command or the backup or restore archives. You can also use the **dd** command to add ISO images to the drives. These images can be used in read-only environments.

To make a flash drive available to AIX users, a root user must connect the drive to a system USB port and run the following command:

```
cfgmgr -l usb0
```

**Note:** Use caution when you remove the flash drives from ports. If the drives are not properly closed or unmounted before you remove them, data on the drives can be corrupted.

After you remove the drives, they remain in the available state in the ODM until the root user runs the following command:

```
rmdev -l flashdrive<n>
```

When a drive is in the available state, you can reconnect it to the system, and it can be remounted or reopened. If a drive is disconnected from a system USB port while it is still open to a user, that drive will not be reusable until the user closes and reopens it. AIX 5.3 with 5300-09 and AIX 6.1 with 6100-02 do not include plug-and-play support for USB flash drives.

## iSCSI Boot Support and IPv6 Support

AIX supports booting from an iSCSI attached disk when running on POWER6 or later processors and using the iSCSI software initiator and IPv4. An iSCSI boot does not support IPv6. An iSCSI boot is supported on Power Blade systems using either the iSCSI software initiator or the iSCSI TOE daughter card using IPv4.

The iSCSI TOE PCI adapter and the iSCSI TOE blade daughter card support only IPv4 for both boot and data disks.

When you are booting the iSCSI software initiator, ensure that the Ethernet network is configured so that the link comes up without delay. After the Ethernet link is enabled, the AIX iSCSI software initiator will attempt to contact the iSCSI target for approximately 30 seconds before declaring that the boot disk cannot be found and indicating "554 Unknown Boot Disk". Some Ethernet protocols, such as spanning tree protocols, might prevent the link from coming up in 30 seconds and will cause boot failures. Such protocols must be disabled or overridden on the Ethernet switch if they prevent the Ethernet link from coming up in less than 30 seconds.

## Lightweight Infrastructure

The following AIX components rely on and incorporate Lightweight Infrastructure (LWI) v7.1:

- Electronic Service Agent™ (eSA)
- IBM Systems Director Console for AIX
- Common Agent Services (CAS) Agent

For information about licensing LWI v7.1, see the Program-unique Terms section of the AIX license information documentation.



---

## Appendix B. Listing of filesets on the AIX media

---

### AIX for POWER Version 6.1 CD set

The AIX for POWER Version 6.1 CD set consists of nine CDs with the following software groupings. During normal software installation with the CD device (such as `/dev/cd0`), you are prompted for the CD volume. Corresponding language filesets (messages and locales) are also installed by default to match the environment of your system.

- **Volume 1:** Contains the minimal Base Operating System (BOS) software installed on every system, as well as all devices and both kernels, and the English message catalogs. To install a system with only "Volume 1" from the BOS menu, set Desktop to NONE, change the default for Graphics bundle to No, and change the default for System Management Client bundle to No.
- **Volume 2:** Contains software to install the Graphics bundle, and to set the Desktop to CDE. System management software, X11 software and Java software are on this CD and on Volume 3.
- **Volume 3:** Contains system management software, printer software, as well as additional RSCT software. Information center man pages, in English, are available on this CD.
- **Volume 4:** Contains additional system management software, such as Director, Pegasus CIM Server and Providers, Common Agent Services Agent, Tivoli GUID, OpenSSL, additional CSM software, the conserver RPM image (required by csm.server), Fortran, OpenSSH, and RSCT LAPI.
- **Volume 5:** Contains pieces of Open\_GL, PEX\_PHIGS, LDAP, and DB2 software that comes with AIX.
- **Volume 6:** Contains software for installing AIX in other languages. Messages, help text, and locales for German, French, Italian and Japanese are included.
- **Volume 7:** Contains software for installing AIX in other languages. Messages, help text, and locales for Catalan, Czech, Spanish, Hungarian, Polish, Brazilian Portuguese, Russian, and Slovakian are included.
- **Volume 8:** Contains software for installing AIX in other languages. Messages, help text, and locales for Korean, Simplified Chinese, and Traditional Chinese are included.
- **Volume 9:** Contains software to support bidirectional and complex text languages, including Arabic, Hebrew, Thai, Vietnamese, Hindi, Tamil, Telugu, Gujarati, Marathi, Kannada, Malayalam, Welch, Maltese, Azerbaijani-Latin, Urdu (India), and Urdu (Pakistan). Chinese language support for Hong Kong and Singapore is also included. Additional translated information center man pages are included on this CD.



---

## Appendix C. Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing  
IBM Corporation  
North Castle Drive  
Armonk, NY 10504-1785  
U.S.A.

**The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law:** INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Corporation  
Dept. LRAS/Bldg. 003  
11400 Burnet Road  
Austin, TX 78758-3498  
U.S.A.

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

IBM World Trade Asia Corporation  
Licensing  
2-31 Roppongi 3-chome, Minato-ku  
Tokyo 106, Japan

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

---

## Trademarks

IBM, the IBM logo, and [ibm.com](http://ibm.com) are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Web at [www.ibm.com/legal/copytrade.shtml](http://www.ibm.com/legal/copytrade.shtml)

Java and all Java-based trademarks and logos are registered trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Linux is a trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Other company, product, or service names may be trademarks or service marks of others.





Printed in U.S.A.

SC23-6629-05

