



# Global Information Assurance Certification Paper

Copyright SANS Institute  
Author Retains Full Rights

This paper is taken from the GIAC directory of certified professionals. Reposting is not permitted without express written permission.

<b><u>PREFACE</u></b>	<b>3</b>
<b><u>BUSINESS REQUIREMENTS:</u></b>	<b>4</b>
<b><u>SOFTWARE INVENTORY:</u></b>	<b>5</b>
<a href="#"><u>Freeware packages</u></a>	5
<a href="#"><u>From SourceForge.net</u></a>	5
<a href="#"><u>From source</u></a>	5
<a href="#"><u>From IBM.com</u></a>	5
<a href="#"><u>OS Fixes</u></a>	6
<b><u>Network:</u></b>	<b>7</b>
<a href="#"><u>Network Topology</u></a>	7
<a href="#"><u>Policies</u></a>	7
<a href="#"><u>Disallowed Services</u></a>	7
<a href="#"><u>Customer Applications</u></a>	8
<a href="#"><u>Unused Services</u></a>	8
<a href="#"><u>Service Machine IP Addresses and local DNS shortname</u></a>	8
<a href="#"><u>Administration network IPs</u></a>	8
<a href="#"><u>Internet facing IPs</u></a>	8
<b><u>Strength Weakness Threat Analysis</u></b>	<b>8</b>
<a href="#"><u>Topology</u></a>	8
<a href="#"><u>Host Security</u></a>	9
<a href="#"><u>Conclusion</u></a>	9
<b><u>SUPPORT REQUIREMENTS:</u></b>	<b>10</b>
<a href="#"><u>Vendor support</u></a>	10
<a href="#"><u>Mailing Lists</u></a>	10
<b><u>ACCOUNT POLICIES:</u></b>	<b>11</b>
<a href="#"><u>Corporate policy for user accounts on UNIX systems:</u></a>	11
<a href="#"><u>Corporate policy for Well known system accounts</u></a>	12
<b><u>HARDENING BASE OPERATING SYSTEM</u></b>	<b>14</b>
<a href="#"><u>1.0 Boot Configuration</u></a>	14
<a href="#"><u>Service Processor</u></a>	14
<a href="#"><u>1.1 Using SMS to install a freshcopy of AIX</u></a>	17
<a href="#"><u>1.1.0.1 Set Strong Root Password</u></a>	18
<a href="#"><u>1.1.1 Set system date &amp; time</u></a>	18
<a href="#"><u>1.1.2 Enter system hostname</u></a>	18

<a href="#"><u>1.1.3 Setup network interfaces</u></a>	19
<a href="#"><u>1.1.4 Layout of the disks</u></a>	19
<a href="#"><u>1.1.5 Basic Syslog Configuration</u></a>	20
<a href="#"><u>2.0 Patching Base Operating System</u></a>	21
<a href="#"><u>2.0.1 Set Root UMASK</u></a>	21
<a href="#"><u>2.1 Install AIX Maintenance Levels (ML)</u></a>	21
<a href="#"><u>2.2 Apply Recent APAR or Interim Patch files</u></a>	22
<a href="#"><u>Checkpoint Scan One Port Scan</u></a>	23
<a href="#"><u>SuperScan:</u></a>	23
<a href="#"><u>2.4 Disable non Required Services in Inittab</u></a>	23
<a href="#"><u>2.5 Establish NTP service</u></a>	25
<a href="#"><u>2.6 Cleanup TCP Services</u></a>	25
<a href="#"><u>2.7 Audit Trails</u></a>	28
<a href="#"><u>2.8 Tighten User and File Policies</u></a>	28
<a href="#"><u>2.8.1 Harden Account</u></a>	28
<a href="#"><u>2.8.1.2 Ensure that all files have a valid owner, group, and file permissions</u></a>	29
<a href="#"><u>2.8.1.3 Remove sensitive files</u></a>	29
<a href="#"><u>2.8.2 Create /etc/ftpusers</u></a>	30
<a href="#"><u>2.8.3 Disallow remote logins for system accounts</u></a>	30
<a href="#"><u>2.8.4 Restrict Scheduled Activity to Root</u></a>	30
<a href="#"><u>2.9 Login Banners</u></a>	31
<a href="#"><u>3.0 Support applications</u></a>	32
<a href="#"><u>3.1 Install GCC compiler</u></a>	32
<a href="#"><u>3.2 Installation of Sudo</u></a>	33
<a href="#"><u>3.3 Install TCP wrappers</u></a>	34
<a href="#"><u>3.4 ZLIB installation</u></a>	36
<a href="#"><u>3.5 OpenSSL installation</u></a>	36
<a href="#"><u>3.6 OpenSSH installation</u></a>	36
<a href="#"><u>3.6 Configure Openssh Daemon and TCP wrappers</u></a>	37
<a href="#"><u>4.0 Ongoing Administration</u></a>	40
<a href="#"><u>4.1 System Backups</u></a>	40
<a href="#"><u>4.2 Ongoing System maintenance</u></a>	40
<a href="#"><u>Checkpoint Two Pre-Production Port Scan</u></a>	41
<a href="#"><u>SuperScan:</u></a>	42
<a href="#"><u>5.0 Install User Applications</u></a>	43
<a href="#"><u>5.0.1 Setup WebSM utility</u></a>	43
<a href="#"><u>Policy for Web-based System Management</u></a>	44
<a href="#"><u>5.2 Set Web Server administration password</u></a>	44
<a href="#"><u>5.3 Set Web Server Directory Stanzas</u></a>	45
<a href="#"><u>5.3.1 Set Local Server Settings</u></a>	45
<a href="#"><u>5.4 Setup the Web-Based System Management Application</u></a>	45
<a href="#"><u>5.5 Verify Authority and Capability of the tool from remote users</u></a>	46
<a href="#"><u>5.6 Further Security Steps</u></a>	46
<a href="#"><u>Checkpoint Three Production Scan</u></a>	47
<a href="#"><u>Simple Port Scan: SuperScan</u></a>	47

<a href="#"><u>Comprehensive Scan: Nessus</u></a>	48
<a href="#"><u>6.0 Production Status</u></a>	51
<b><a href="#"><u>References</u></a></b>	<b>52</b>
<a href="#"><u>IBM Product Service Guides and Reference Books</u></a>	52
<a href="#"><u>Apache Security</u></a>	52
<b><a href="#"><u>Websites</u></a></b>	<b>53</b>
<a href="#"><u>Vendor Websites</u></a>	53
<a href="#"><u>Freeware Websites</u></a>	53
<a href="#"><u>Websites for Source Code or Open Source Code used :</u></a>	53
<a href="#"><u>Example Warning Banners</u></a>	54
<b><a href="#"><u>Appendix A: Figures</u></a></b>	<b>55</b>
<b><a href="#"><u>APPENDIX B: INSTALL TRACE</u></a></b>	<b>62</b>

## **PREFACE**

Where ever possible the AIX<sup>1</sup> sections attempt to parallel to its “counterpart” in the SANS Institute's Step by Step deployment guides for Solaris v2.0<sup>2</sup> as a kind of signpost.

The format is < ref Solaris N.N.N.N> . Signposts are only given as the start of a particular hardening aspect for AIX.

These are only provided as my attempt to provide myself coherent and uniform hardening guidelines in the heterogeneous environment I am charged with securing.

The references are only included to give non or new AIX administrators a “pointer” to hopefully familiar SANS recommendations and no maintenance support is implied for them to be synched to current versions of those documents. I believe that cross platform consistency of hardening techniques assists Administrators and Auditors alike; draw apples to apples conclusions on the security profile of a system.

Reference to published IBM Redbooks and Redpapers are given as AIX specific signpost to more information on certain subjects.

## **Santa Clause 2002 project**

### **BUSINESS REQUIREMENTS:**

Construct and harden a system in the North Pole DMZ that would provide a place to begin testing a dSlashcode v2<sup>3</sup> experimental site for the Company's field researchers.

The Server is to be configured securely and with the aim to utilize Web management features to assist the IT operations team transition their skills from Microsoft NT to UNIX based devices. Management requests a friendlier interface than the command prompt.

While Open Source Software is going to be used the customer is conforming to corporate guidelines for hardware and OS. The hardware and OS that is to be used is a IBM entry level server running AIX 5L as the base operating.

This should offer the best compromise between established support with a vendor and giving the research team a cutting edge communications tool set.

### **TECHNICAL REQUIREMENTS:**

Equipment Inventory  
IBM 7043P 260 AIX 5L Operating system  
Single Power Processor  
512 MB RAM, 25 GB Disk, DDS3 Tape Drive  
4.0 GB Disk for AIX OS and well known applications  
9.0 GB Disk for User Data and applications  
10/100 Ethernet Adapter  
10/100 Integrated Ethernet Adapter  
Service console via direct attached terminal

Location:

Colocated [XXXXXX] North Data center floor 9 Grid A31 R19 top shelf

## SOFTWARE INVENTORY:

All software documented here will be officially tracked for patches.

### Freeware packages

<http://www.bull.de/pub/>

Package Name	Version	Co / Prerequisites	Notes
zlib	zlib-1.1.3.2	Prerequisite for OpenSSL	

### From SourceForge.net

<http://www.sourceforge.net>

Package Name	Version	Co / prerequisites	Notes
Slashcode	V2	Prerequisite MySQL Prerequisite Perl	Monitor <a href="http://www.slashcode.org">http://www.slashcode.org</a> for patches and alerts

### From source

Openssh	Latest		From <a href="http://www.openssh.org">www.openssh.org</a>
OpenSSL	Latest	Prerequisite for Openssh	From <a href="http://www.openssl.org">www.openssl.org</a>
TCP wrappers	7.6.1		Used for IDS and Security From <a href="ftp://ftp.porcupine.org/pub/security/index.html">ftp://ftp.porcupine.org/pub/security/index.html</a>
Sudo	1.6.3p7		<a href="http://www.courtesan.com/sudo/">http://www.courtesan.com/sudo/</a>

### From IBM.com

Package Name	Version	CO/prerequisites	Notes
AIX	5.1L		Base Operating system
AIX Toolbox for Linux			<a href="http://www-1.ibm.com/servers/aix/products/aixos/linux/download.html">http://www-1.ibm.com/servers/aix/products/aixos/linux/download.html</a>

* MySQL	3.23.43	Pre-Req for Slashcode	
* Perl	5.6.1	Pre-Req for Slashcode	
*make (gnu)	make-3.79.1-3.aix4.3.ppc.rpm make-3.79.1-3.src.rpm		Required for local maintenance of opensource code
*gcc suite	GNUPro-2.9.aix43.010414-6.src.rpm  gcc-2.9.aix43.010414-5.aix5.1.ppc.rpm		Required for local maintenance of opensource code
IBM HTTP Server	latest	Pre Requisite for Web-System Managment	Required for Web-System Management Utility
Java Runtime	Java 1.3.0	Pre Requisite for Web-System Managment	Required for Web-System Management Utility
X11	Latest version of X11.adt.lib X11.base.rte X11.motif.lib X11.motif.mwm and their supporting files	Pre Requisite for Java and Web-Based System management	Required for Web-System Management Utility

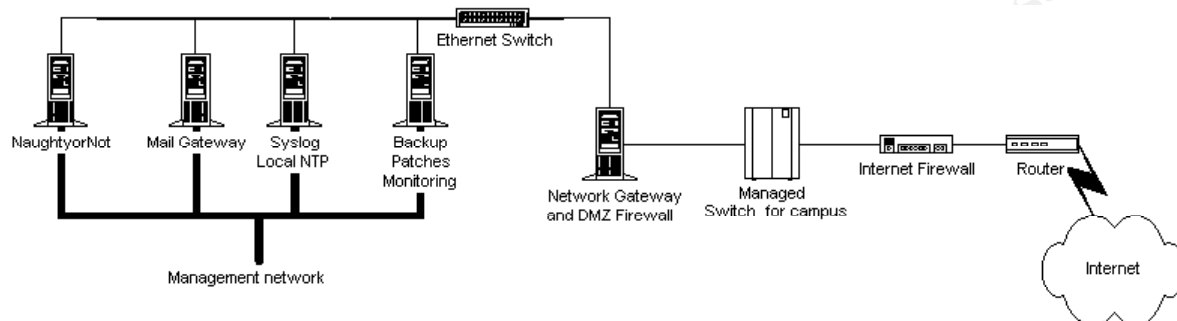
## OS Fixes

<ftp://aix.software.ibm.com/aix/fixes>

\*Open Source tools will likely need to be patched and upgraded outside the Vendor supplied versions.

## Network:

### Network Topology



The example lab environment:

The naughtyornot host is configured for a private ethernet segment firewalled from a larger ethernet network that attaches to the Corporate Internet gateway. Network packet level of security is out of scope of this paper.

The machine will be loaded on a “secured” special purpose “build” network prior to locating in into the production network.

## Policies

Allowed Services Policy

Secure Shell (SSH)

Network Time Protocol (NTP) must initiate outbound

Port 80 and 443 for all public Web applications

Sendmail must be configured to run as client and not accept mail

Web System Management & Associated Facilities will be available to only Operations Staff management networks

TCP wrapper banners are not required for this system as Message of the Day (MOTD) is the mechanism for warnings.

## Disallowed Services

Anonymous FTP and FTP to non-user or UNIX system accounts. FTP sessions must be logged by the system

Printing and Print Spooling

Sendmail as Daemon

NFS

Telnet

RSH & related commands not integrated with ssh  
Remote root login over TCP/IP

### **Customer Applications**

MySQL<sup>4</sup> is allowed with latest patches  
Slashcode is allowed with the latest patches

### **Unused Services**

Trusted Computing Base (TCB) will not be installed on the system as the TCB model was deemed too much administration overhead for the role of the server. The access control lists (ACL) and Secure Access Key (SAK) features were not required as most of the processing is at the web level and normal system logging is adequate for the remaining shell level work that may occur.

### **Service Machine IP Addresses and local DNS shortname**

Syslog Server 10.0.0.201 santapeek2002.com  
Network Time Protocol (NTP) Server 10.0.0.201 santatime2002.com  
Mail Gateway 10.0.0.203 santamail2002.com  
Patches & Backup 10.0.0.204 santafix2002.com

### **Administration network IPs**

192.168.0.100 naughtyornot.santa2002.com  
192.168.0.110 This is the administration team's approved entry point to this system

### **Internet facing IPs**

10.0.0.100 naughtyornice.santa2002.com

## **Strength Weakness Threat Analysis**

### **Topology**

Connection to the Internet is via a Demilitarized Zone (DMZ) Gateway/Firewall which then passes traffic to the campus network switch to be routed over VLAN to the external firewall and into the world. Switched traffic reduces possibility of packet sniffing.

Secondary connection is to the DMZ administration network. The DMZ network is self contained and is audited for compliance on a bi-annual basis. DMZ is designed so that a violation of their network will not impact Corporate Internal Networks. Threat is of a DMZ Host to DMZ Host or DMZ Host to Internet nature.

DMZ Firewall Policies (egress and ingress) are to protect that segment from all traffic unapproved in the DMZ. Monitoring is required to detect any internal Distributed Denial of

Service (DDOS) and Code Red type of infections within the DMZ.

Internet Firewall Policies (egress and ingress) are to protect that segment from all traffic unapproved in the Corporation. Active monitoring is required for inbound packet traffic for DDOS and other types of attacks. Active monitoring is now required for all outbound packets for DDOS, unapproved IRC and Code Red type of infections.

## **Host Security**

Host Security is required to protect peer resources within the DMZ. This is to prevent a “crack” in the local perimeter that an intruder can exploit DMZ or Internet.

Although the system is in an experimental lab, fundamental security measures are to put into place.

The hardening steps in this document are deemed adequate for the environment of this resource.

Overall inbound threat exposure is Medium. Local Threat exposure is greater due to inclusion of compiler on system. Steps must be demonstrated that Policy is enforced and access has been limited to this resource on a regular basis. The use of special use system accounts and keeping the file offline may lead to potential transgression of policy as users may find such measures cumbersome. It is questionable if they will always “lock back up” when they are done --- in a consistent and secure manner. The security team recommends the installation of a fully protected “sandbox” if the experimental project goes forward to Beta or Customer Production Status removing the exposure of the compiler to a safe and secured environment.

The use of Web Base System Management is new to the Corporation. While anticipated to reduce cost of production support the analysis of security risk to business justification of the additional hardening and maintenance of the network and host system security has yet to be determined.

Vital System logs are sent to syslog server to minimize log tampering or deletion.

Host “Health Checking” is conducted monthly by Corporate Policy.

Periodic Scans for network vulnerability are conducted and Failing-Grade results reported to Management.

Internal Host security is checked monthly by scripts and applications maintained by the security department for compliance to Patches, Account Policies, File permissions, etc. Failing-Grade results reported to Management.

## **Conclusion**

Experimental Lab and Host meets or exceeds minimal security requirements for design and use. Management compliance reports will be monitored on an ongoing basis by the security team.

## SUPPORT REQUIREMENTS:

**GOAL:** Effective Support for Least Cost

### Vendor support

IBM AIX

<http://techsupport.services.ibm.com/>

Subscribe to the proper mailing lists to ensure that you have adequate inbound communications for fixes, improvements, etc. for the software and possibly hardware

IBM Maintains a List Server for AIX support

<http://techsupport.services.ibm.com/server/listserv>

### Mailing Lists

Recommend the following mailing lists be tracked

List	Description
43_maintenance	AIX 5.1 maintenance strategy
New_AIXV4_Fixes	New AIX version 4 updates - updated weekly
Security_APARs	AIX security related updates
CERT	Often a re-send of CERT advisories for current year
ERS	AIX related ERS alerts for current year

## ACCOUNT POLICIES:

### Corporate policy for user accounts on UNIX systems:

Each UID is unique to an individual as its based on an employee serial number algorithm. Within each account's comment field is information which is used to properly perform a quarterly as well as yearly validation of the user ID against the employee payroll database. It too is updated on a quarterly basis.

User Accounts are classified as those in the group staff; or those no knowing the Root account password or have privilege via sudoers

There is a minimal set of “characteristics” for normal user accounts which are granted shell access.

Restrict the default permissions for creating files, by a default mask.

*# chuser umask="77" accountname*

Set Basic Login Properties per Company IT Security Policy

Loginretries="5"

Pwdwarntime="14"

Minage="0"

maxage="26"

Minalpha="1"

minother="2"

mindiff="3"

maxrepeats="2"

minlen="8"

histexpire="26"

histsize="4"

The basic corporate policy for service and system account IDS on UNIX systems:

Each UID is unique and traceable to an individual as its based on an employee roll or responsibility

No remote logins to the account if its an service account without written approval by IT Security

For all accounts the comment field information is restricted and should contain only the minimal amount of information when used for e-mail.

System Shell time-outs are to be established for the root account and all administrator shell accounts in the shell profile of each.

TIMEOUT=300

# 300 seconds is equivalent to 5 minutes

TMOUT=300

### Corporate policy for Well known system accounts

AIX v4.3 as shipped on the CD provides several default UID values in /etc/passwd

```
root:!0:0:::/usr/bin/ksh
daemon:!1:1::/etc:
bin:!2:2::/bin:
sys:!3:3::/usr/sys:
adm:!4:4::/var/adm:
uucp:!5:5::/usr/lib/uucp:
guest:!100:100::/home/guest:
nobody:!4294967294:4294967294::/
lpd:!9:4294967294::/
```

AIX 5.+ adds the following to the list

```
lp:*:11:11::/var/spool/lp:/bin/false
invscout:*:200:1::/var/adm/invscout:/usr/bin/ksh
nuucp:*:6:5:uucp login user:/var/spool/uucppublic:/usr/sbin/uucp/uucico
snapp:*:177:1:snapp login user:/usr/sbin/snapp:/usr/sbin/snappd
imnadm:*:188:188::/home/imnadm:/usr/bin/ksh
```

UID values for the above IDs must not be changed or duplicated in another ID

All well known system accounts above must be listed in /etc/ftpaccess and have remote logins disabled

Accounts should follow the usage guidelines below

- root is the master system account
- Daemon, bin, sys, adm are accounts for system services.
- uucp, nuucp, guest, nobody, lpd, lp, snapp, imnadm are service accounts required for the proper function of Facilities and Services to users.
- uucp is a hold over from early UNIX. While often no longer used for machine to machine communication it is often used for intra process communications on the local host.
- nuucp is equivalent to uucp
- guest is a hold over from early UNIX to allowing remote users access the device with or without authentication and perform a restricted set of things that could be done on the system. Guest is to be locked out.
- nobody is required for the NFS (Network File System) facility. NFS has a system for file and access security control adjunct to the use of /etc/password and is a topic onto itself.
- lpd and lp are the line print daemons which is the equivalent to windows printer file sharing. lpd and lp are optional but are often disabled instead of deleted.
- Invscout and snapp are new in AIX 5L and are used for gathering inventory and performance data by tools like Tivoli, Netview and native AIX utilities. Removal of these not recommended. Lockout is recommended.
- imnadm is associated with the IBM Documentation system. Web based documentation require this ID to exist for indexing.

# **HARDENING BASE OPERATING SYSTEM**

## **1.0 Boot Configuration**

< ref Solaris 2.11.1 >

### **Service Processor**

Accessed by direct attached terminal or Modem. Refer to the hardware manual for details.

In the Service Processor administrators may set the "System name" if service personal need a facility at a very low level to confirm the identity of a powered down system.

Most models of IBM RS6000 servers and Pseries class and higher end workstations offer a password feature at this level, refer to the service manual. Newer models are coming with tiered levels for privileged (admin) and general user (technicians ).

Document in a secure location the passwords used in the Service Processor; as they are rarely used and quickly forgotten due to the uptime on the equipment.

Numerous other features can be configured based on the age and model of the equipment. Some devices can be setup with dial-in or phone home for system problems. If enabled thoroughly test the authentication features.

The lowest level Power on, System Hang detection / Restart and boot policies are set in the service processor.

Power on Passwords are just that, a password that must be entered for power up to occur.

Triple check and test how the passwords assist or interfere with normal shutdowns, reboots or unexpected events interact with the boot polices. There is nothing that can ruin a good day like a server waiting for a password to startup after that rare reboot.

Lowest level hardware debug and environmental devices (fans) information is found here.

Administrators often overlook keeping the service processor firmware current. Update to the latest firmware code.

### **Service Processor Firmware**

**SP Level: px010921**

**EPROM: 19990201**

**FLASH: 20010921**

**Copyright 2000, IBM Corporation**

**10.0.0.100**

### **MAIN MENU**

1. Service Processor Setup Menu
2. System Power Control Menu
3. System Information Menu
4. Language Selection Menu
5. Call-In/Call-Out Setup Menu

**6. Set System Name**

**99. Exit from Menus**

**5. Call-In/Call-Out Setup Menu**

**1> 6**

**The current system name is "10.0.0.100"**

**Enter new system name: 10.0.0.100**

**Service Processor Firmware**

**SP Level: px010921**

**EPROM: 19990201**

**FLASH: 20010921**

**Copyright 2000, IBM Corporation**

**10.0.0.100**

**MAIN MENU**

- 1. Service Processor Setup Menu**
- 2. System Power Control Menu**
- 3. System Information Menu**
- 4. Language Selection Menu**
- 5. Call-In/Call-Out Setup Menu**
- 6. Set System Name**
- 99. Exit from Menus**

**1> 2**

**SYSTEM POWER CONTROL MENU**

**1. Enable/Disable Unattended Start Mode:**

**Currently Disabled**

**2. Ring Indicate Power-On Menu**

**3. Reboot/Restart Policy Setup Menu**

**4. Power-On System**

**5. Power-Off System**

**6. Enable/Disable Fast System Boot:**

**Currently Enabled**

**98. Return to Previous Menu**

**99. Exit from Menus**

**WARNING: POWERING SYSTEM WILL EXIT MENUS!**  
**Enter "Y" to continue, any other key to abort.y**  
**System Powering On.**

**E206**

**< NOTE diagnostic hardware debug codes have been redacted >**

[illegible]

**memory    keyboard    network    scsi    speaker**

The next level in the bootstrap is the System Management Services (SMS).

SMS supports either a GUI or ASCII interface. Access requires a device attached to the graphics card or is available via an direct attached ASCII terminal.

System Management Services is entered by pressing F1 (GUI) or 1 (ASCII term) at the above POST message

Here more lower configuration options can be modified such as with what device the system should boot from, boot preferences, their sequence (called multi-boot), and display more low level hardware information.

If a privileged user password is entered in the Service Processor it is required to access this level.

© SANS Institute 2000 - 2005, Author retains full rights.

## 1.1 Using SMS to install a freshcopy of AIX

< ref Solaris 1.1.1>

< ref Solaris 1.2.1>

< ref Solaris 1.2.3>

A sample trace of this install is included in Appendix B.

The important thing here is that I have chosen the most minimal installation possible with a complete overwrite of the existing OS.

AIX defaults<sup>5</sup> to a general install and must be changed to a minimal install via the Advanced Options. If the device has an existing 5.1 OS the install defaults to preservation and Migration if 4.3 was present. You need to change these to get the “cleanest” possible install.

### Advanced Options

Either type 0 and press Enter to install with current settings, or type the number of the setting you want to change and press Enter.

1 Installation Package Set..... Minimal

2 Enable Trusted Computing Base..... No

3 Enable 64-bit Kernel and JFS2..... No

### Installation and Settings

Either type 0 and press Enter to install with current settings, or type the number of the setting you want to change and press Enter.

1 System Settings:

Method of Installation.....New and Complete Overwrite

Disk Where You Want to Install.....hdisk0

2 Primary Language Environment Settings (AFTER Install):

Cultural Convention.....English (United States)

Language .....English (United States)

Keyboard .....English (United States)

Keyboard Type.....Default

3 Advanced Options

>>> 0 Install with the current settings listed above.

```
+-----+
88 Help ?      | WARNING: Base Operating System Installation will
89 Previous Menu | destroy or impair recovery of ALL data on the
                | destination disk hdisk0.
>>> Choice [0]: 3
```

© SANS Institute 2000 - 2005, Author retains full rights.

### 1.1.0.1 Set Strong Root Password

After the software installs AIX reboots and brings up the minimal install for the first time. The first boot menu provides for assisting administrators in configuring the system. It is where the root password is defined on fresh systems -- just follow the menus and use a strong root password.

Base services and Networking can also be supplied at this point. However we will just set the root password at this point and keep the box "off-the-air." Networking information is easily added later as well as hostname.

Once the system fully boots the user is presented the console command prompt.

The system at this point is going to be hardened at the ASCII terminal with the AIX smitty facility.

Fast paths are given for brevity

### 1.1.1 Set system date & time

< ref Solaris 1.1.7-1.1.8>

The OS is up and running so set the time first thing to ensure that system logging is coherent from now on.

```
# smitty chtz_date
```

If the TZ value was modified smit will warn of a required system boot else manually check the date now.

```
# date
```

Now at this point the base system license count may be set as that too requires a reboot

We Set the license values rather low as the number of "actual shell logins" to the server is to be very low so I've set the number of licenses to a "fixed" number of 10.

```
# chlicense -u 10 off
```

```
# shutdown -Fr
```

When the system comes back up continue with configuring the system.

### 1.1.2 Enter system hostname

< ref Solaris 1.1.2>

```
# smitty mkhostname
```

This device will be called naughtyornot.santa2002.com

### 1.1.3 Setup network interfaces

< ref Solaris 1.1.3 -1.1.6>

# *smitty chinnet*

# *ifconfig -a*

```
en0: flags=4e080863<BROADCAST,NOTRAILERS,RUNNING,SIMPLEX,MULTICAST,GROUPRT,64BIT,PSEG>
    inet 10.0.0.100 netmask 0xffffffff broadcast 10.0.0.255
lo0: flags=e08084b<UP,BROADCAST,LOOPBACK,RUNNING,SIMPLEX,MULTICAST,GROUPRT,64BIT>
    inet 127.0.0.1 netmask 0xff000000 broadcast 127.255.255.255
    inet6 ::1/0
```

### 1.1.4 Layout of the disks

< ref Solaris 1.2.4>

< ref Solaris 2.5>

I do modify initial Volume Groups and filesystems post install. As reference here is what AIX did as default on a 4GB disk.

# *df*

Filesystem	512-blocks	Free	%Used	Used	%Used	Mounted on
/dev/hd4	16384	5648	66%	908	23%	/
/dev/hd2	540672	28008	95%	10596	16%	/usr
/dev/hd9var	32768	25800	22%	246	7%	/var
/dev/hd3	49152	47520	4%	23	1%	/tmp
/dev/hd1	16384	15776	4%	18	1%	/home
/proc	-	-	-	-	-	/proc
/dev/hd10opt	49152	35328	29%	303	5%	/opt

Even though we have space on the primary disk hdisk0 to add more packages I setup a single Volume Group on the remaining disk hdisk1 called data\_vg. Volume Group<sup>6</sup> management is out of scope of this paper.

# *smitty vg*

Inside data\_vg were created the following standard JFS volume. AIX 5L now supports JFS2 as but the solution was not going to benefit from JFS2<sup>7</sup> for the most part.

# *smitty jfs*

Logical Volume creation and management is out of scope of this paper<sup>8</sup> only security related points are documented here.

Create the two required file systems for user applications to separate them from AIX system files.

/opt/db

/usr/local/slash

Create two more file systems for easier system maintenance

/usr/sys/inst.images

this is where AIX support recommends to keep update files very similar to SUNs patches directory. Really helps to control expansion of /usr during system upgrades

For system logs create their own filesystem to prevent needless expansion of /var

and name it /var/adm/logs

General storage of freeware packages for reinstall or staging open source packages for the development team, etc.

/freeware

The Compiler will be place into its own file system for management of access and upgrades  
/opt/freeware/GNUPro

Even though shell home account activity is expected to be very low traffic, /home was replaced with separate file system in the data\_vg volume group

The following filesystems were marked as NOSUID at mount time via

```
# chfs -a options='nosuid' /freeware
```

```
# chfs -a options='nosuid' /home
```

Disk accountting services were enabled on /home via

```
# chfs -t " `locale yesstr | awk -F: '{print $1}' ` " /home
```

The following filesystems was marked as not to be mounted at boot time via

```
# chfs -A " `locale nostr | awk -F: '{print $1}' ` " /freeware
```

```
# chfs -A " `locale nostr | awk -F: '{print $1}' ` " /opt/freeware/GNUPro
```

\*\*\* Note to non-AIX familiar administrators there are numerous AIX specific system commands, chfs being one, where argument flags are case sensitive. It would be easier for beginners to use smit for these operations as it is menu driven. I've included the command strings as I was building a hardening script for my group at the time and is a bit faster than screen shots while writing this paper. \*\*\*

### 1.1.5 Basic Syslog Configuration

At this point I also begin logging as the default syslog configuration in AIX is to do none

The following were added to /etc/syslog.conf

Reference the AIX 5L differences Guide<sup>9</sup> or the header comments in /etc/syslog for file rotation syntax and capabilities.

```

auth, mark.info /var/adm/logs/syslog rotate size 100k files 4
local2.debug /var/adm/logs/syslog rotate size 100k files 4
auth.debug /var/adm/logs/syslog rotate size 100k files 4
daemon.debug /var/adm/logs/syslog rotate size 100k files 4
mail.debug /var/adm/logs/messages rotate time 1d
#log FTP transfers with daemon.info
daemon.info /var/adm/logs/messages rotate time 1d
auth.debug @loghost

```

The loghost is added to /etc/hosts  
 Syslog Server 10.0.0.201 santapeek2002.com

Each file was then created with the touch command ie touch /var/adm/logs/messages

Protect /var/adm/logs with simple file level protection measures

```

# chmod 600 /var/adm/logs
# chown root.sys /var/adm/logs

```

Syslog is restarted by  
*# refresh -s syslogd*

At this point I've chosen to "checksum" the system for future reference prior to patching.

```

# cd /home
# mkdir root
# cd root
# mkdir SANS
# cd SANS
# mkdir Virgin_INSTALL
# mkdir Virgin_INSTALL/etc
# cp -R /etc/* /home/root/SANS/Virgin_INSTALL/etc
# find / -ls > /home/root/SANS/Virgin_INSTALL/011101_all_files_min_install.rpt
# find / -type file -exec cksum {} \; > \
/home/root/SANS/Virgin_INSTALL/011101_all_files_min_install_cksum.rpt

```

It was decided the system would not be locked down further until full patching has been completed.

## 2.0 Patching Base Operating System

### 2.0.1 Set Root UMASK

The root account is now locked down for file permissions on creating new files as AIX gives it a default UMASK of 022. This is to prevent possible "User Error" creeping to the hardening process in as all files up till now are vendor created or modified for the majority.

```
# chuser umask="77" root
```

## 2.1 Install AIX Maintenance Levels (ML)

<ref Solaris 1.5>

The current maintenance level published is ML 01 available by anonymous ftp at:  
<ftp://ftp.software.ibm.com/aix/fixes/5L/ml/510001/510001.tar.gz>

```
# smitty update_all
```

Pick the filesystem where the ML was downloaded and uncompressed and un tar'ed

```
# reboot
```

```
# instfix -ik |grep -i ml
```

**instfix: A flag requires a parameter: k**

**All filesets for 5.0.0.0\_AIX\_ML were found.**

**All filesets for 5.1.0.0\_AIX\_ML were found.**

**All filesets for 5.1.0.0\_AIX\_ML were found.**

**All filesets for 5100-01\_AIX\_ML were found.**

## 2.2 Apply Recent APAR or Interim Patch files

Order recent updates via the Vendor website. Choose all the files in each category. Request CO-Requisites and prerequisites to be sent as well. This should get everything you need to update fully to the latest.

<http://techsupport.services.ibm.com/server/aix.latest5L>

Download instructions will be sent to the e-mail address given in the order. Place these into /usr/sys/inst.images as recommended. Rebuild the .toc file per instructions

```
# cd /usr/sys/inst.images/installp
```

```
# rm .toc; inutoc
```

```
# smitty update_all
```

Pick the filesystem, in this case /usr/sys/inst.images, where the recent updates was downloaded and uncompressed and un tar'ed

It is typically better to keep these files on system so as to ease device upgrades and software upgrades. However ensure they are protected adequately.

```
# chmod -R 600 /usr/sys/inst.images/*
```

```
# chown -R root.sys /usr/sys/inst.images/*
```

```
# reboot
```

```
# instfix -ik |grep -i ml
```

**instfix: A flag requires a parameter: k**

**All filesets for 5.0.0.0\_AIX\_ML were found.**

**All filesets for 5.1.0.0\_AIX\_ML were found.**

**All filesets for 5.1.0.0\_AIX\_ML were found.**

**All filesets for 5100-01\_AIX\_ML were found.**

© SANS Institute 2000 - 2005, Author retains full rights.

## Checkpoint Scan One Port Scan

Also at this point a default "All Ports Scan" of the box from the Windows application SuperScan, written by robin.keir@foundstone.com of <http://www.foundstone.com>, yielded the following report. SuperScan v3.0 was chosen as it was simple representative of the many freeware or shareware scanners available on the Microsoft platform.

### SuperScan:

```
* + 10.0.0.100
  |__ 13 Daytime
      |__ Fri Nov 2 14:28:01 2001..
  |__ 21 File Transfer Protocol [Control]
      |__ 220 naughtyornot.boulder.ibm.com FTP server (Version 4.1 Tue May 29
11:57:21 CDT 2001) ready...
  |__ 23 Telnet
      |__ ..%...
  |__ 25 Simple Mail Transfer
      |__ 220 naughtyornot.boulder.ibm.com ESMTP Sendmail AIX5.1/8.11.0/8.11.0;
Thu, 15 Nov 2001 10:40:06 -0600..
  |__ 37 Time
      |__ ...nh
  |__ 111 SUN Remote Procedure Call
  |__ 199 SMUX
  |__ 512 remote process execution;
  |__ 513 remote login a la telnet;
  |__ 514 cmd
  |__ 543 ?
  |__ 544 krcmd
```

## 2.4 Disable non Required Services in Inittab

< ref Solaris 2.1 and Solaris 2.2 >

### Shutdown/Powerfail:

This is used to only of useful if you are running UPS directly to the box. This is on hardened raised floor with a shared PDU backed up by battery. However AIX has hooked cooling fan alerts into this so this stays for now

```
powerfail::powerfail:/etc/rc.powerfail 2>&1 | alog -tboot > /dev/console # Power Failure
Detection
```

### NFS:

As a standalone server NFS and all rshell services are disallowed

```
rcnfs:23456789:wait:/etc/rc.nfs > /dev/console 2>&1 # Start NFS Daemons
```

### Print Services:

These are disallowed by policy as front line web enabled services must have documented business cases to allow printing.

```
piobe:2:wait:/usr/lib/lpd/pio/etc/pioinit >/dev/null 2>&1 # pb cleanup
qdaemon:23456789:wait:/usr/bin/startsrc -sqdaemon
writesrv:23456789:wait:/usr/bin/startsrc -swritesrv
Uprintfd:23456789:respawn:/usr/sbin/uprntfd
```

### RMC

We want to have remote monitoring and control of resources so leave this

```
ctrmc:2:once:/usr/bin/startsrc -s ctrmc > /dev/console 2>&1
```

### Power Management Daemon

This gives information on UPS and environmental conditions. While the Lab has Power Distribution Units to the racks & shelves, making the UPS redundant, the environmental information is required so this service will be allowed on.

```
pmd:2:wait:/usr/bin/pmd > /dev/console 2>&1 # Start PM daemon
```

### Web Based System Management Documentation

This starts the simple http daemon for system docs and the web tool it will be removed latter on when the full IBM HTTPD server is installed.

```
Httpdlite:23456789:once:/usr/IMNSearch/httpdlite/httpdlite -r
/etc/IMNSearch/httpdlite/httpdlite.conf & >/dev/console 2>&1
```

### System Hang detection

This is new in AIX 5L. Basically a facility to assist administrators detect & recover from a hung system. Most modern AIX servers have a built in watchdog that can trigger if a process hangs and can ensure the administrator can regain control of the OS and hardware.

```
shdaemon:2:off:/usr/sbin/shdaemon >/dev/console 2>&1 # High availability daemon
```

An administrators policy is advised to include a script or cron job to check these monthly with the lssrc facility and report if they are indeed running or not.

```
renfs
piobe
qdaemon
writesrv
wprintfd:
pmd
```

use the `rmitab` command to permanently remove the entry or manually comment these out of `/etc/inittab` with the colon character ":"

```
# rmitab qdaemon
# rmitab piobe
# rmitab writesrv
# rmitab uprintfd
# rmitab httpdlite
```

Comment out

```
:rcnfs:23456789:wait:/etc/rc.nfs > /dev/console 2>&1 # Start NFS Daemons
```

`/etc/inittab` is made root read/write; as root is the only legitimate modifier of this file

```
# chmod 600 /etc/inittab
```

## 2.5 Establish NTP service

It is important as this machine will have databases and logs will be sent off-box to a syslog server that this device has a reliable time source.

NTP time service via `xntpd`.

```
#stopsrc -s xntpd
```

`vi /etc/ntp.conf` with site specific information

```
#startsrc -s xntpd
```

To permanently start the service edit `/etc/rc.tcpip` and add

```
ntpdate 10.0.0.201
```

```
start /usr/sbin/xntpd "$src_running"
```

starting `ntpdate` before `xntpd` helps preventing clock skewing if the machine was really out of tolerance for the daemon to deal with the difference.

This server is an endpoint and will not broadcast time to anyone.

The datacenter provides only one source as a ticker. In investigating further that ticker does sync to at least 2 reliable sources from the Internet and 1 sources in the company as well.

## 2.6 Cleanup TCP Services

`/etc/rc.tcpip` is modified to remove the following services from starting at boot by adding a comment "#" to the front of the line

RPC Service Mapper.

```
# start /usr/sbin/portmap "$src_running"
```

The active portmap process is halted with the following commands

```
# stopsrc -s portmap
```

Simple Network Monitoring Protocol

```
start /usr/sbin/snmpd "$src_running"
```

```
start /usr/sbin/dpid2 "$src_running"
```

```
start /usr/sbin/hostmibd "$src_running"
```

dpid2 is a daemon that maps DPI onto SMUX

Many new applications like DB/2 have their own snmpd subagent which in turn talks to dpid2

hostmibd is a daemon that also supports SNMP subsystems

The Corporation uses this to check the health of the box from the Netview product. Modifications are made where it logs and the correct private community strings. The public string is adjusted per our policy as well.

```
# stopsrc -s snmpd
```

```
#mv /var/tmp/snmpd.log /var/adm/logs/snmpd.log
```

```
#chmod 640 /var/adm/logs/snmpd.log
```

```
#vi /etc/snmpd.conf
```

```
logging file=/var/adm/logs/snmpd.log enabled
```

```
# Your local community policies here
```

```
#startsrc -s snmpd
```

Sendmail is configured to stop acting as a listener and only transmit mail outbound.

```
# stopsrc -s sendmail
```

Edit with vi /etc/rc.tcpip The -bd option and srmstr options are removed to keep the process spawning as a daemon process. The mail will be resent every 15 minutes if the gateway was busy.

```
#qpi=30m
```

```
#start /usr/lib/sendmail "$src_running" "-bd -q${qpi}"
```

```
/usr/lib/sendmail -q15m
```

Sendmail.cf is configured with the smart relay information for the site. The DS field is updated  
DS: santamail2002.com

It was noticed that the first port scan that AIX's BSD derived syslog service had the daemon in listening mode on port 514. I checked with my local Gurus and give credit to James Schmidt for this advice to quickly turn syslog into an outbound only daemon with the following commands. These commands fully update AIX's Object Data Repository (ODM). Manipulating the flat files in inetd.conf was not enough to stop this behavior.

In the Lab environment only the Syslog host, santapeek2002.com is to listen for syslog messages from other devices.

```
# stopsrc -s syslogd
# chssys chssys -s syslogd -a '-r'
# startsrc -s syslogd
```

## 2.7 Audit Trails

AIX keeps tabs of the successful and unsuccessful use of the su command in /var/adm/sulog the system default.

Failed logins are determined by executing the privileged command

```
# who /etc/security/failedlogin
```

AIX 5.1 now has enhanced facilities for cron.<sup>10</sup>

The system default logging for cron is located in /var/adm/cron/log for both root and user cron traces.

## 2.8 Tighten User and File Policies

### 2.8.1 Harden Accounts

Change root's user maxage to 4 weeks. Administrators should change Root Password every month by Corporate Policy.

```
# chuser maxage=4 root
```

Disable remote login for root user

```
# chuser rlogin="false" root
```

Bring passwords strength to Account Policy compliance.

2.8.1.1 Harden General User Passwords, including root

```
# chsec -f/etc/security/user -s default -a pwdwarntime=14 -a loginretries=5 -a histexpire=26 -a
maxage=13 -a maxrepeats=2 -a minage=0 -a minalpha=1 -a mindiff=3 -a minother=2 -a
minlen=8 -a histsize=5
```

### 2.8.1.2 Ensure that all files have a valid owner, group, and file permissions

\*\*\*\* NOTE AIX 5L now has /proc and a /var/statmon areas. AIX 4.3 hardening scripts that do not take these areas into account may fail and may need to be modified. \*\*\*\*

Files without valid owners

```
#find / -nouser -type f -print -exec ls -l {} \; > /home/root/SANS/harden.suid.rpt  
#find / -nogroup -type f -print -exec ls -l {} \; > /home/root/SANS/harden.guid.rpt
```

Find world writeable files

```
#find / -perm -o+w -type f -print -exec ls -l {} \; > /home/root/SANS/harden.worldwrite.rpt
```

In this report I only found the below file that had world write. It contains the log of of what was displayed to the console upon boot. It is re-written by the sytem on ever boot.

```
#chmod o-w /var/adm/ras/conslog
```

Find world readable files

```
#find / -perm -o+r -type f -print -exec ls -l {} \; > /home/root/SANS/harden.worldwrite.rpt
```

\*\*\*\* NOTE The report that was generated on this system was large. Full manual review & testing is recommended prior to summarily locking down world readable files.\*\*\*\*

However starting candidates for removing world readable permissions are:

```
/opt/freeware  
/usr/sys/inst.images
```

Sensitive files in /etc

```
/etc/*.conf  
/etc/rc.*
```

Several sensitive directories in

```
/var
```

```
/etc/mail/sendmail.cf  
/etc/hosts.lpd
```

```
/home/username
```

### 2.8.1.3 Remove sensitive files

```
#rm /etc/hosts.equiv
```

### 2.8.2 Create /etc/ftpusers

Place system accounts into /etc/ftpusers with vi

```
root
daemon
bin
sys
adm
uucp
guest
nobody
lpd
lp
invscout
nuucp
snapp
imnadm
```

### 2.8.3 Disallow remote logins for system accounts

Disallow remote logins for accounts in /etc/ftpusers

```
for A in $(cat /etc/ftpusers)
do
    chuser rlogin="false" $A
done

Lock out and disable login these accounts
for A in $(cat /etc/ftpusers |grep -v "^root")
do
    chuser account_locked='true' $A
    chuser login='false' $A
done
```

### 2.8.4 Restrict Scheduled Activity to Root

Restrict cron and AT jobs to Root <sup>11</sup>

Per the online service guides

" If neither the cron.allow nor the cron.deny file exists, only someone with root user authority can submit a job with the crontab command."

However we will explicitly grant permission for cron and at

```
#rm /var/adm/cron.deny; rm /var/adm/at.deny
```

*# touch /var/adm/cron.allow; touch /var/adm/at.allow*  
with vi add root as the sole entry in these files

Checking periodically for the existence and verifying the contents of these file is recommended.

## 2.9 Login Banners

< ref Solaris 2.9>

The below is the Corporately Approved wording. Consult your Management and Legal department.

It has been slightly modified to look pretty in Microsoft WORD.

Other good starting points on warning banners can be found at U.S. Government sites such as <http://www.cio.anl.gov/warning.html>

*# mv /etc/motd /etc/motd.aix*

*#vi /etc/motd*

```
*****
*****
*
*
* Santa Claus 2002's internal systems must only be used for conducting Santa's business or *
* for purposes authorized by Elven management. Use is subject to audit at any          *
* time by Elven management.                                                           *
*
*
*
*****
*****
```

### 3.0 Support applications

\*\*\*\*\* CAUTION \*\*\*\*\*

Because of some packages we require for the purpose of this machine, the GNU C compiler will be natively installed on the device and secured as best as possible. For a much stronger security profile you should compile on a separate machine in a secured zone and move the compiled files to the production device. However due to the customer not having an extensive environment like that, this compromise was arranged.

The detailed install of GCC to the system is out of scope of this paper as its an RPM. However a moment is taken to restrict file ownership to a specialized ID that must be SU'd to as the compiler is off limits by policy to all other users except root and those in the yet to be created sudoers file.

\*\*\*\*\* CAUTION \*\*\*\*\*

#### 3.1 Install GCC compiler

The GCC compiler distribution from the IBM Linux Toolkit automatically installs into /opt/freeware/GNUPro. This was created as a separate filesystem to aid the administrator by keep it offline when the developers agree they do not need use of it.

Create the gccmaint service ID.

```
# mkuser gccmaint
```

Make a service group; -a means that only root can control who's in it

```
# mkgroup -a users='gccmaint' gccgroup
```

As the Corporate Policy for password rules is in place now; give gccmaint a temporary password for the developers. They will be forced to change it upon first SU to that account

```
# passwd gccmaint
```

Give it a homedirectory apart from normal users

```
# chuser home='/usr/local/gcchome' gccmain
```

No remote logins to this account

```
# chuser rlogin="false" gccmaint
```

Restrict the default permissions for creating files, remember this is a mask!

```
# chuser umask="777" gccmaint
```

Only Admins can use it

```
# chuser su='true' gccmaint
```

Restrict the compiler files and any in directory links to only gccmaint gccgroup

```
# cd /opt/freeware/GNUPro
```

```
# chown -hR gccmaint:gccgroup /opt/freeware/GNUPro/*
```

```
# chown -R gccmaint:gccgroup /opt/freeware/GNUPro/*  
# chmod 700 /opt/freeware/GNUPro/bin/*
```

**\*\*\*\* NOTE: he following were carried out under the gccmaint ID after the proper file ownerships were established giving that special ID access to the source files by the group and write permissions into the directories. \*\*\*\***

Staging and experimentation was needed with the developers to get everything setup.

However the exercise proved useful for future compiling as the Administrator didn't have to take the developer at his word that a certain permission was needed. The Developers learned that the administrator couldn't simply allow the /usr/ or /opt/ file trees to be updated without his change management process being invoked.

Administrators and developers were trained to modify provided Makefiles and create binaries in a drop-off staging area. The SA would then move into the system after developer testing rather than directly inserting them into the /usr/ file tree.

Most system level utilities like sudo and ssh assume root authority is installing them. Separating the duty between root and compiling may be beneficial to learn what files are being updated, etc.

It was best to update /etc/environment with the following path for general pathing to the utilities and associated libraries below

```
PATH=/usr/bin:/etc:/usr/sbin:/usr/local/bin:/usr/ucb:/usr/bin/X11
```

\*\*\*END NOTE \*\*\*

### 3.2 Installation of Sudo

Install sudo to allow for finer grain control of privileged shell access commands

-- the latest version from the sudo maintainer was used

The the following configuration option overrides are recommended.

enable a ticket for each terminal opened

--with-tty-tickets

enable a logout if the administrator is distracted from their terminal for longer than 10 minutes

--with-timeout=10

enable a logout if the administrator is distracted from their terminal for longer than 3 minutes when the user password is being requested

--with-password-timeout=3

disable root using the sudo for itself

--disable-root-sudo

```
# make
# make install
```

the files were moved from the drop off point into their respective places in the file tree

```
/usr/local/bin/sudo
/usr/local/sbin/visudo
/usr/local/man
/etc/sudoers
```

The Admin then setup /etc/sudoers via the sudovi utility.

Several example files are given at the source for sudo that should be tweaked at each deployment site.

Setup the device with Localized DNS preferences

< ref Solaris 1.3>

Edit /etc/hosts, /etc/resolv

### 3.3 Install TCP wrappers

< ref Solaris 3.1>

Compile TCP wrappers from raw source

```
# cd /freeware/raw_source/TCP wrappers_7.6
```

The Makefile was adjusted for AIX. Only sections updated are given

```
REAL_DAEMON_DIR=/usr/sbin
```

generic aix osf alpha dynix:

```
@make REAL_DAEMON_DIR=$(REAL_DAEMON_DIR) STYLE=$(STYLE) \
LIBS= RANLIB=ranlib ARFLAGS=rv AUX_OBJ=setenv.o CC=gcc \
NETGROUP=-DNETGROUP TLI= all
```

```
STYLE = -DPROCESS_OPTIONS    # Enable language extensions.
```

```
# make
```

chown root.sytem, chmod 500, and lastly copy the following files from the build directory to

```
/usr/local/bin
```

```
tcpd
```

```
tcpdmach
```

```
tcpdchk
```

```
try-from
```

```
safe_finger
```

next copy the libraries

```
# cp libwrap.a /usr/local/lib/
```

```
# cp tcpd.h /usr/local/include/
```

Next make the /etc/hosts.deny and /etc/host.allow for telnet and ftp and rlogin

192.168.0.100 is the administration team's approved entry point to this system

```
# vi /etc/hosts.allow
telnetd: 192.168.0.100 loopback
ftpd: 192.168.0.100 loopback
```

```
# vi /etc/hosts.deny
ALL: ALL
```

Now lock down /etc/inetd.conf .

AIX has the following original services, comment them out with “#”.

```
#ftp  stream tcp6  nowait root  /usr/sbin/ftpd  ftpd
#telnet stream tcp6  nowait root  /usr/sbin/telnetd telnetd -a
#shell stream tcp6  nowait root  /usr/sbin/rshd  rshd
#kshell stream tcp  nowait root  /usr/sbin/krshd  krshd
#login  stream tcp6  nowait root  /usr/sbin/rlogind rlogind
#klogin stream tcp  nowait root  /usr/sbin/krlogind krlogind
#exec  stream tcp6  nowait root  /usr/sbin/rexecd  rexecd
#ntalk  dgram  udp   wait  root  /usr/sbin/talkd  talkd
#daytime stream tcp  nowait root  internal
#time  stream tcp  nowait root  internal
#daytime dgram  udp   wait  root  internal
#time  dgram  udp   wait  root  internal
```

Add the following lines

```
ftp  stream tcp  nowait root  /usr/local/bin/tcpd  ftpd -l
telnet stream tcp  nowait root  /usr/local/bin/tcpd  telnetd
shell stream tcp  nowait root  /usr/local/bin/tcpd  rshd
login  stream tcp  nowait root  /usr/local/bin/tcpd  rlogind
finger stream tcp  nowait nobody /usr/local/bin/tcpd  fingerd
```

```
# refresh -s inetd
```

The -l on ftp will now log to the facility perviously setup in /etc/syslog.conf

TCP wrappers has a utility called tcpdchk that will demonstrate what wrapper rules are in effect and highlight any parsing errors in your allow and deny files

```
# ./usr/local/bin/tcpdchk-v
```

```
# ./tcpdchk -v
```

Using network configuration file: /etc/inetd.conf

>>> Rule /etc/hosts.allow line 1:

daemons: telnetd

clients: 192.168.0.100 loopback

access: granted

>>> Rule /etc/hosts.allow line 2:

daemons: ftpd

clients: 192.168.0.100 loopback

access: granted

>>> Rule /etc/hosts.deny line 1:

daemons: ALL

clients: ALL

access: denied

### 3.4 ZLIB installation

< ref Solaris 3.2>

Install Latest zlib.

This version was retrieved from <http://www.bull.de/pub/>

```
# cd /freeware/zlib/
```

```
# chmod 700 /freeware/zlib/zlib.exe
```

```
# ./zlib.exe
```

```
# smitty install
```

Pick the package in the menu and install.

### 3.5 OpenSSL installation

< ref Solaris 3.3>

Install OpenSSL latest from [www.openssl.org](http://www.openssl.org)

```
# cd /freeware/raw_src/openssl-0.9.6b
```

```
# ./config
```

```
# make
```

```
# make install
```

### 3.6 OpenSSH installation

< ref Solaris 3.4>

Install OpenSSH latest from [www.openssh.org](http://www.openssh.org)

openssh-3.0.2p1.tar.gz

I simply followed the instructions and did the

```
# ./configure --enable-X11_forwarding --disable-tcp-port-forwarding --with-TCP wrappers
```

```
# make
```

```
# make install
```

The options were chosen as they were because AIX often needs X11 for configuring IBM Software products like Web Sphere, Web-Based System Management and other products.

However there is not a business requirement for this device to serve as a tunnel for any other type of TCP traffic.

TCP wrappers support is enabled so SSH can also take advantage of the /etc/hosts.allow and /etc/hosts.deny Policies.

We cheated a bit here and with these defaults, the ssh files are placed into the /usr/local/..... file tree instead of going through a staging process.

Start sshd with some debugging turned on and do a few tests

```
# /usr/local/sbin/sshd -ddd -e
```

Ensure the box will accept external connections and initiate outbound connections before proceeding to wrapper sshd.

### 3.6 Configure Openssh Daemon and TCP wrappers

< ref Solaris 3.5>

< ref Solaris 3.5.3>

< ref Solaris 3.5.5>

< ref Solaris 3.5.6-3.5.7>

Add with vi the following stanza to /etc/hosts.allow

```
telnetd: 192.168.0.100 loopback
```

```
#sshd: loopback
```

```
sshd: 192.168.0.100 loopback
```

```
ftpd: 192.168.0.100 loopback
```

Also the following must be manually added to /etc/inetd.conf

```
ssh stream tcp nowait root /usr/local/bin/tcpd /usr/local/sbin/sshd -i
```

Adjust the /usr/local/etc/sshd\_config The server keybit strength was deemed adequate for this deployment. However the following keywords were modified to the values shows

```
# Limit connections to ssh v2 compliant clients
```

```
Protocol 2
```

```
#Become compliant to Account Policies for timeouts
```

```
LoginGraceTime 300
```

```
# Do not allow remote root logins
```

```
PermitRootLogin no
```

```
#allow X11 forwarding for secured X applications
```

```
X11Forwarding yes
```

Create a rc style startup file

```
# mkdir /etc/rc2.d
```

Then create a control start stop file named sshd\_control in that directory.

Make sure its rwx --- ---

```

#vi sshd_control
#!/bin/sh
PATH=/usr/bin:/bin

case $1 in
'start')
    if [ -f /usr/local/sbin/sshd -a -f /usr/local/etc/sshd_config ]; then
        /usr/local/sbin/sshd;
    fi
    ;;
'stop')
    pid=`/usr/bin/ps -e | /usr/bin/grep sshd | /usr/bin/sed -e 's/^ *//' -e 's/ .*//'`
    if test "$pid"
    then
        kill $pid
    fi
    ;;
*)
    echo "usage: /etc/rc2.d/sshd_control {start|stop}"
    ;;
esac

```

Edit /etc/rc.tcpip to start sshd as part of the boot process right after the normal TCPIP daemons start.

```

echo "Starting sshd daemon:"
/etc/rc2.d/sshd_control start

```

Ensuring proper behavior start the normal daemon

```

# /etc/rc2.d/sshd_control start

```

/etc/inetd.conf now has the following “active” content

```

# grep -v "^#" /etc/inetd.conf
telnet stream tcp nowait root /usr/local/bin/tcpd telnetd
ssh stream tcp nowait root /usr/local/bin/tcpd /usr/local/sbin/sshd -i
shell stream tcp nowait root /usr/local/bin/tcpd rshd
login stream tcp nowait root /usr/local/bin/tcpd rlogind
finger stream tcp nowait nobody /usr/local/bin/tcpd fingerd

```

The Corporation policies require secure shell in lieu of telnet when possible.

```

# vi /etc/hosts.allow

```

```

#telnetd: 192.168.1.100 loopback
sshd: 192.168.1.100 loopback

```

ftpd: 192.168.1.100 loopback

*# vi /etc/hosts.deny*

telnetd: ALL

ALL: ALL

Tcpd now logs all attempts to the wrapped ports to /var/adm/logs/messages.

Dec 19 10:12:22 naughtyornot sshd[9650]: refused connect from hohocam.boulder.ibm.com

Dec 19 10:12:22 naughtyornot rlogind[9660]: refused connect from hohocam.santa2002.com

Dec 19 10:13:33 naughtyornot telnetd[7978]: refused connect from hohocam.santa2002.com

Dec 19 10:14:13 naughtyornot rlogind[7980]: refused connect from hohocam.santa2002..com

Dec 19 10:14:30 naughtyornot rlogind[7982]: refused connect from hohocam. santa2002.com

Dec 19 10:14:50 naughtyornot ftpd[7984]: connect from hohocam.santa2002.com

Dec 19 10:43:21 naughtyornot telnetd[9536]: refused connect from hohocam.santa2002.com

Dec 19 10:43:31 naughtyornot ftpd[9538]: refused connect from hohocam.santa2002.com

Dec 19 10:43:42 naughtyornot rlogind[9540]: refused connect from hohocam.santa2002.com

## 4.0 Ongoing Administration

### 4.1 System Backups

< ref Solaris 4.1>

Generate a boot tape image of system. AIX has the ability to safely make a full recovery tape in multiuser mode if the root\_vg is quiet.

Make 2 backups, write-protect, label and safely store one tape off site or away from the device. Both tapes should be secured from tampering while in storage.

*# smitty mksysb*

At this point a reboot is in order to ensure the system configurations have been made properly and the system comes up correctly.

*# reboot*

### 4.2 Ongoing System maintenance

Apply Currently issued e-fixes

Verify/Install latest security fixes as needed.

Apply any other fixes

As of 12/18/01 the following are the AIX specific Computer Emergency Response Team (CERT)<sup>12</sup> advisories that have application to AIX environment that were released during the year of 2001. These are followed with the current IBM status for APAR (patch) or e-fix (untested patch or advisement on how to reduce or eliminate the vulnerability)

Check and compare if you need to update

CERT Advisory CA-2001-35 Recent Activity Against Secure Shell Daemons

CERT Advisory CA-2001-34 Buffer Overflow in System V Derived Login

CERT Advisory CA-2001-31 Buffer Overflow in CDE Subprocess Control Service

CERT Advisory CA-2001-30 Multiple Vulnerabilities in lpd

CERT Advisory CA-2001-27 Format String Vulnerability in CDE ToolTalk

CERT Advisory CA-2001-21 Buffer Overflow in telnetd

CERT Advisory CA-2001-02 Multiple Vulnerabilities in BIND

As of approximately 12/20/01 the following CERT advisories have been resolved as follows:

The advisory for "Recent Activity Against Secure Shell Daemons" has been Minimized exposure by running latest code that will accept only protocol 2 connections

Remote buffer overflow vulnerability in login 5.1: APAR #IY26221

IBM Vendor E-Fix applied.

Minimizing remote exposure via TCP wrappers disallowing telnet logins until APAR applied

Minimizing local exposure of SUID programs by monitoring system logs until APAR applied

Password checking flaw under integrated login AIX 5.1L: APAR #IY26302  
Applied Vendor APAR

Multiple Vulnerabilities in lpd AIX 5.1: APAR IY23041  
Minimized exposure by disabling lpd services  
Applied Vendor APAR

Format String Vulnerability in CDE ToolTalk AIX 5.1: APAR IY23846  
RPC services are disabled.

Multiple Vulnerabilities in BIND AIX 5.1: IY16182  
Applied APAR

As of approximately 12/20/01 the following Vendor advisories have been resolved as follows:

Root Shell Spawning Possible Via "diagrpt"  
Applied Vendor E-FIX

APAR installation can be verified by executing the following  
`# instfix -ik |grep APAR #`

Example:

```
# instfix -ik |grep IY26302
```

instfix: A flag requires a parameter: k

All filesets for IY26302 were found.

## Checkpoint Two Pre-Production Port Scan

At this point the "natural" process table is quite small

```
#ps -ef
```

UID	PID	PPID	C	STIME	TTY	TIME	CMD
root	1	0	0	10:08:55	-	0:00	/etc/init
root	2444	1	0	10:09:31	-	0:00	/usr/ccs/bin/shlap
root	3208	1	0	10:09:30	-	0:57	/usr/sbin/syncd 60
root	3404	1	0	10:09:39	-	0:00	/usr/sbin/sremstr
root	3646	1	0	10:09:31	-	0:00	/usr/lib/errdemon
root	4166	3404	0	10:09:43	-	0:00	/usr/sbin/syslogd -r
root	4428	1	0	10:09:59	-	0:00	/usr/sbin/cron
root	5178	3404	0	10:09:47	-	0:00	/usr/sbin/inetd
root	5418	3404	0	10:09:53	-	0:30	/usr/sbin/dpid2
root	5676	3404	0	10:09:57	-	0:02	/usr/sbin/hostmibd
root	5942	1	0	00:27:23	0	0:00	-ksh
root	6174	1	0	11:14:51	-	0:00	/usr/local/sbin/sshd

```

root 6480 5942 3 01:01:51 0 0:00 ps -ef
root 8256 1 0 10:10:00 - 0:00 /usr/bin/AIXPowerMgtDaemon
root 8772 3404 0 10:10:02 - 0:00 /usr/sbin/rsct/bin/rmcd -r -c
root 9036 1 0 10:10:03 - 0:00 /usr/lpp/diagnostics/bin/diagd
root 9452 3404 0 00:52:58 - 0:00 /usr/sbin/snmpd
root 10070 3404 0 10:10:05 - 0:00 /usr/sbin/rsct/bin/IBM.ERrmd
root 10580 3404 0 10:10:11 - 0:00 /usr/sbin/rsct/bin/IBM.AuditRmd
root 11474 3404 0 00:51:59 - 0:00 /usr/sbin/xntpd

```

### SuperScan:

The scan validates the disabling of non-required services in inittab and inetd.conf.

\* + 10.0.0.100

```

|___ 21 File Transfer Protocol [Control]
|___ 220 hulk.boulder.ibm.com FTP server (Version 4.1 Tue May 29 11:57:21
CDT 2001) ready...
|___ 22 SSH Remote Login Protocol
|___ SSH-2.0-OpenSSH_3.0.2p1.
|___ 23 Telnet
|___ 79 Finger
|___ 199 SMUX
|___ 513 remote login a la telnet;
|___ 514 cmd

```

TCP wrapper services will still be visible in a scan but the Administrator will now get advanced warnings on portscans to these common services.

SNMP services also show as active 199 SMUX

Syslog also still reports as being open on port 514.

The process table show that syslog is in non-listen mode

```

root 4166 3404 0 10:09:43 - 0:00 /usr/sbin/syslogd -r

```

It was decided to test further to ensure the state of the service.

Testing with the freeware utility Kiwi SyslogGen v2.0.0 from <http://www.kiwi-enterprises.com/><sup>13</sup>

KiwiSyslogGen is a very handy Windows utility for generating messages to nearly every conceivable Syslog facility and level of logging.

I was unable to successfully send any messages to the server from a Microsoft Windows Client as verified by examining /var/adm/logs/syslog or /var/adm/logs/messages.

## 5.0 Install User Applications

**\*\*\* NOTE: At this point the Web Server server is secured as if the WebSM is the only utility it will service. It is recommended that you extensively test when multi-purpose services are required of the Apache Server. \*\*\***

### 5.0.1 Setup WebSM utility

Background information and more screen shots can be located at the product homepage <http://www.ibm.com/servers/aix/os/wsm/51/index.html>

The installation WebSM utility involves manually loading several filesets from the Original CDs and Expansion Pack CD. Having the published patches available at installation time is also required for a secure install.

In addition to the WebSM files, X11 base filesets and Java are required as pre-requisites. For remote web based administration a webserver is required. The Apache derived IBM webserver provided off the expansion pack CD is adequate.

The example loads all the help and man pages as well.

Initial configuration the service requires X11 support at the client and minimal X11 filesets on the server.

The immsearch.rte.httpdlite bundle was removed prior to installing the following filesets.

#### JAVA Pre Requisites

##### Java Prequisites from Base OS CDs

- X11.adt.lib
- X11.base.rte
- X11.motif.lib
- X11.motif.mwm

#### Web-Based System Administration prerequisites

##### Java runtime From Base OS CDs or IBM Developerworks

- Java130.rte.bin
- Java130.rte.lib

#### IBM HTTPD Server packages (Apache) from AIX 5.1 Expansion Pack CD

- http\_server.admin
- http\_server.base.rte
- http\_server.base.source

http\_server.frca  
http\_server.html.en\_US  
http\_server.man.en\_US  
http\_server.modules.fcgi  
http\_server.modules.ldap  
http\_server.modules.mt  
http\_server.modules.snmp  
http\_server.ssl.128  
http\_server.ssl.core

Sys Management File Sets from APAR Patches delivered from vendor support site

sysmgt.help.en\_US.websm  
sysmgt.help.msg.en\_US.websm  
sysmgt.msg.en\_US.sguide.rte  
sysmgt.msg.en\_US.websm.apps  
sysmgt.sguide.rte  
sysmgt.websm.accessibility  
sysmgt.websm.apps  
sysmgt.websm.diag  
sysmgt.websm.diskarray.fc  
sysmgt.websm.framework  
sysmgt.websm.icons  
sysmgt.websm.rte  
sysmgt.websm.security-us  
sysmgt.websm.webaccess  
sysmgt.websm.apps  
sysmgt.websm.framework  
sysmgt.websm.rte  
sysmgt.websm.security

**\*\*\* NOTE: Once you install these packages redo the smitty update\_all steps. There were substantial updates when I did this. \*\*\***

### **Policy for Web-based System Management**

At this point a several policy decisions appeared to be needed. chrooting the experimental server and WebSM application was allowed to be forgone by written approval of our local security. However they wished us to narrow as much as possible the servers use by Internet Users, Non Trusted Local networks and workstations.

For a full production server it is recommended to chroot. Refer to online resources<sup>14</sup>

The following statement is entered into /etc/inittab to start the server on boot by the install  
ihshhttpd:2:wait:/usr/HTTPServer/bin/httpd > /dev/console 2>&1 # Start HTTP daemon

### **5.2 Set Web Server administration password**

Secure the administration password. As shipped the administration page can't be started without a password.

```
# cd/usr/HTTPServer/bin
# ./htpasswd -m ../conf/admin.passwd username
```

### 5.3 Set Web Server Directory Stanzas

```
edit /usr/HTTPServer/conf/admin.conf
adjust the <Directory> stanza directive to allow only authorized access
```

```
allow from 192.168.1.100
deny from all
```

```
edit /usr/HTTPServer/conf/httpd.conf
adjust the <Directory> stanza directive to allow only authorized access
```

```
allow from 192.168.1.100
deny from all
```

#### 5.3.1 Set Local Server Settings

```
The HTTPServer process is configured and started
Add to /usr/HTTPServer/etc/httpd.conf
ServerAdmin webadmin@10.0.0.110
ServerName naughtornot.santa2002.com
```

### 5.4 Setup the Web-Based System Management Application<sup>15</sup>

The following is inserted into /etc/inetd.conf by the install

```
wsmserver stream tcp nowait root /usr/websm/bin/wsmserver wsmserver -start
```

```
# /usr/websm/bin/wsmserver -enable
# /usr/HTTPServer/bin/apachectl start
```

The configassist tool is X11 based so the next is via a PC remote workstation with SSH Tunneled X-Windows support. Exceed 7.0 was used. Also ensure normal X server access is established with xhost and .Xauthority files.<sup>16</sup>

Reference Appendix A Figure 1.

```
# /usr/websm/bin/configassist
```

Select Configure a web server to run Web-based System Manager in a browser.  
Click on Next.

The installation found the existing HTTPServer in /usr/HTTPServer and its accompanying files and paths. I elected to keep the defaults .

At this point it then configured the server and gave the url  
<http://naughtyornot.santa2002.com/wsm.html>

as the page for entry into the management utility.

The next few screens asked for confirmation of changes and if configassist should run on next boot. I selected the default of saving but not having configassist restart on next boot.

After which I then started up my PC client and pointed Netscape 4.78 to [naughtyornot.santa2002.com/pc\\_client/pc\\_client.html](http://naughtyornot.santa2002.com/pc_client/pc_client.html) and installed the PC client software as I wanted some performance boots over remote Java calls. You have to Grant privilege so the Java files can be transferred locally to the PC. Reference Appenix A Figure 2.

### **5.5 Verify Authority and Capability of the tool from remote users**

Once done installing I tried logging in as root but it appears the prior lock down steps denying remote root login are passed to the application.

I then created a default staff shell login for testing and retried the application. Upon authenticated login I was presented with a management console. Various pieces are fenced off due to that IDs lack of system authority.

The screens that can be viewed with a normal system ID yield about the same information as a shell account. It appears to be suitable to our NT familiar Operations Team.  
Reference Appenix A Figures 3-7.

### **5.6 Further Security Steps**

Only the minimal measures have been documented here. Further secure steps could involve

Move the port:

The web based tool uses a Listening Port which can be moved to any port value. Moving the port involves modifying /etc/services. The using the default port was deemed adequate.

Use of of Certificate Authority:

The service can make use of a Certificate Authority. This was not available to me so was not performed.

Futher Apache Security Techniques:

Follow published industry practices<sup>17</sup> for securing Apache Server. The guidelines typically involve ensuring proper httpd.conf configuration, ensuring adequate file system permissions support protecting sensitive files in the ServerRoot and proper firewall policies.

File system protective measures:

I give a warning that the Web-Based System Management makes many world accessible files in the /usr/websm file structure as read and sometimes execute. This appears to be necessary to the proper function of the utility. "File-fixing" scripts may inadvertently disable this service.

### Checkpoint Three Production Scan

At this point the server is moved into the production network of the test lab and has the new production IP addresses assigned. Tests now include two sets scans of results yeilding a comprehensive scan.

There is a port & comprehensive scan which involves the Firewall Policy logic point of view.

Also scans were were conducted from within the DMZ firewall perimeter to view the "softness" of the target. In addition to a port scan a comprehensive scan is now included.

Thes reports are necessary for the administrator to gauge and measure their host's security. Murphy's law dictates the firewall policies will become mis-configured or somehow will be bypassed.

The DMZ results are listed here as they are the most AIX specific.

Production logs now show traces of such scans which are examined by applications at the syslog server. The syslog server logic looking for host patterns of bad logins, etc adds additional early warning detection in addition to network based sensors.

### Simple Port Scan: SuperScan

\* + 10.0.0.100

```
|__ 21 File Transfer Protocol [Control]
      |__ 220 hulk.boulder.ibm.com FTP server (Version 4.1 Tue May 29 11:57:21
CDT 2001) ready...500 ": command not understood...
|__ 22 SSH Remote Login Protocol
      |__ SSH-2.0-OpenSSH_3.0.2p1.
|__ 23 Telnet
|__ 79 Finger
|__ 80 World Wide Web HTTP
      |__ HTTP/1.1 200 OK..Date: Tue, 18 Dec 2001 08:27:47 GMT..Server:
IBM_HTTP_Server/1.3.12.2 Apache/1.3.12 (Unix)..Last-Modified: Fri
|__ 199 SMUX
|__ 513 remote login a la telnet;
|__ 514 cmd
```

## Comprehensive Scan: Nessus<sup>18</sup>

Nessus is an open source project for network based vulnerability scanners. Details and files can be located at <http://www.nessus.org>

### Nessus Scan Report

-----

#### SUMMARY

- Number of hosts which were alive during the test : 1
- Number of security holes found : 0
- Number of security warnings found : 2
- Number of security notes found : 4

#### TESTED HOSTS

10.0.0.100 (Security warnings found)

#### DETAILS

+ 10.0.0.100 :

. List of open ports :

- o ssh (22/tcp)
- o ftp (21/tcp)
- o telnet (23/tcp) (Security warnings found)
- o http (80/tcp) (Security notes found)
- o finger (79/tcp)
- o smux (199/tcp)
- o shell (514/tcp)
- o login (513/tcp)
- o rmc (657/tcp)
- o webserv (9090/tcp)
- o general/udp (Security notes found)
- o general/tcp (Security notes found)
- o general/icmp (Security warnings found)

. Warning found on port telnet (23/tcp)

The Telnet service is running.

This service is dangerous in the sense that it is not ciphered - that is, everyone can sniff the data that passes between the telnet client and the telnet server. This includes logins and passwords.

You should disable this service and use OpenSSH instead.  
([www.openssh.com](http://www.openssh.com))

Solution : Comment out the 'telnet' line in /etc/inetd.conf.

Risk factor : Low

CVE : CAN-1999-0619

. Information found on port telnet (23/tcp)

Remote telnet banner :

o-

. Information found on port http (80/tcp)

The remote web server type is :

IBM\_HTTP\_Server/1.3.12.2 Apache/1.3.12 (Unix)

We recommend that you configure your web server to return bogus versions, so that it makes the cracker job more difficult

. Information found on port general/udp

For your information, here is the traceroute to 10.0.0.100 :  
10.0.0.100

. Information found on port general/tcp

QueSO has found out that the remote host OS is  
\* FreeBSD, NetBSD, OpenBSD

CVE : CAN-1999-0454

. Warning found on port general/icmp

The remote host answers to an ICMP timestamp request. This allows an attacker to know the date which is set on your machine.

This may help him to defeat all your time based authentications protocols.

Solution : filter out the icmp timestamp

requests (13), and the outgoing icmp  
timestamp replies (14).

Risk factor : Low

CVE : CAN-1999-0524

---

This file was generated by the Nessus Security Scanner

Analysis of the Nessus scan resulted in a decision not perform any reconfiguration of the system.  
Nor were any vulnerabilities spotted that warranted Host, Network Topology, or Firewall  
Policy corrective measures to be taken.

© SANS Institute 2000 - 2005, Author retains full rights.

## 6.0 Production Status

Network scans for vulnerability are again conducted with the addition that the test now also includes the full Firewall logic as well as host integrity being verified.

The development team has begun to install and configure their experimental site via a change process when system resource are updated or modified.

The operation team has been quick to pick up the GUI interface and is now conducting backups and monitoring system resources like disk utilization and CPU system loads.

Regular monthly scans for system health and network vulnerability have been scheduled. The IT staff now generates better reports which used to include simple uptime to now include if patches have been applied in a timely fashion, the frequency and sources of system probes and a briefing from the Corporate Incident Response Coordinator.

The Senior Management team is now familiar and is requesting summaries from the updated monthly status reports to include in the overall reports on the health the business.

© SANS Institute 2000 - 2005, Author retains full rights.

## References

Nemeth , Evi, et al. UNIX System Administration Handbook : Upper Saddle River, NJ, USA, Prentice Hall PTR, 2001

Frisch, Aeleen. Essential System Administration : USA: O'Reilly & Associates, 1995

### IBM Product Service Guides and Reference Books

IBM Redbooks can be found online at  
<http://www.redbooks.ibm.com/>

IBM. AIX 5L Differences Guide Version 5.1 Edition, SG24-5765-01:  
Redbook, published June-7-2001, last updated October-1-2001

IBM. AIX 4.3 Elements of Security Effective and Efficient Implementation, SG24-5962-00:  
Redbook, published August-18-2000

IBM. Elements of Security: AIX 4.1, GG24-4433-00:  
Redbook, published September-29-1994

IBM. IBM Certification Study Guide AIX V4.3 System Support, SG24-5139-00:  
Redbook, published March-1-1999, last updated August-23-2001

IBM. IBM Certification Study Guide AIX V4.3 System Administration, SG24-5129-00:  
Redbook, published May-17-1999, last updated May-31-2001

### Apache Security

Coar, Ken. "Security and Apache: An Essential Primer: Maxwell's Demon and Hat Colour"  
<http://www.linuxplanet.com/linuxplanet/tutorials/1527/1/> (date of access 12-18-01)

"Apache tutorials," <http://httpd.apache.org/docs/misc/tutorials.html> (date of access 12-18-01)

## Websites

Explicit links in this document from tech support may change over time but were provided as a snapshot in time as of December 2001.

### Vendor Websites

IBM Products

<http://techsupport.services.ibm.com/server/>

<ftp://aix.software.ibm.com/aix/fixes>

<http://techsupport.services.ibm.com/server/listserv>

<http://techsupport.services.ibm.com/server/aix.latest5L>

<http://www-1.ibm.com/servers/aix/products/aixos/linux/download.html>

<http://www.ibm.com/servers/aix/os/wsm/51/index.html>

### Freeware Websites

AIX Freeware packages in .bff format

<http://www-frec.bull.com/>

Mirror <http://www.bull.de/pub/>

[robin.keir@foundstone.com](mailto:robin.keir@foundstone.com), SuperScan v3.0, <http://www.foundstone.com>

In the R&D Tools section under scanners or

<http://www.foundstone.com/rdlabs/proddesc/superscan.html>

Kiwi SysGen

<http://www.kiwi-enterprises.com/>

### Websites for Source Code or Open Source Code used :

Open secure shell, [http:// www.openssh.org](http://www.openssh.org)

Open Secure Sockets Layer, [http:// www.openssl.org](http://www.openssl.org)

Current maintainers of Slashcode: CaptTofu, Krow and pudge, Slashcode,  
<http://www.slashcode.org>

Sudo, current maintainer Todd C. Miller, <http://www.courtesan.com/sudo/> (date of last access 12/18/01)

SANS GCUX Practical V1.8

Joseph J. Foss

TCP wrappers, Wietse Zwietering, <http://ftp.porcupine.org/pub/security/index.html>

Nessus Vulnerability Port Scanner, <http://www.nessus.org>

### **Example Warning Banners**

U.S. Department of Energy Warning Banners

<http://www.cio.anl.gov/warning.html>

© SANS Institute 2000 - 2005, Author retains full rights.

## Appendix A: Figures

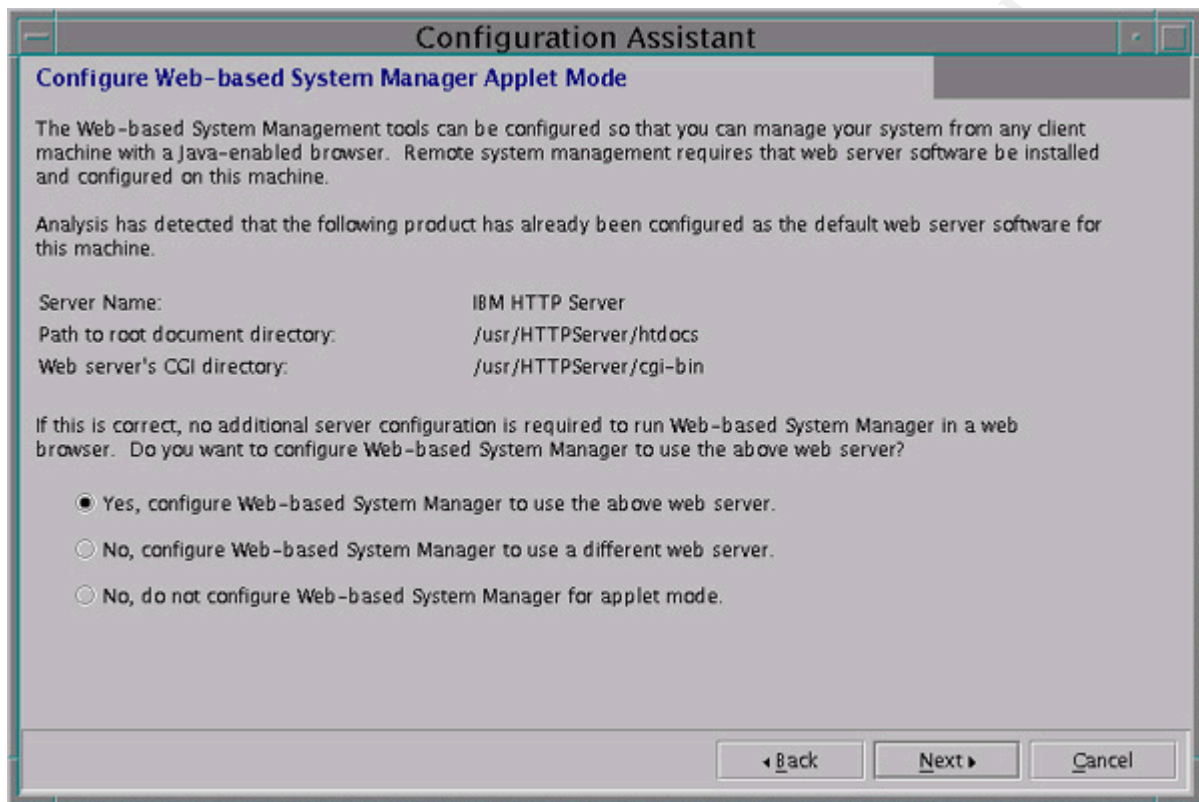


Figure 1. Configassist

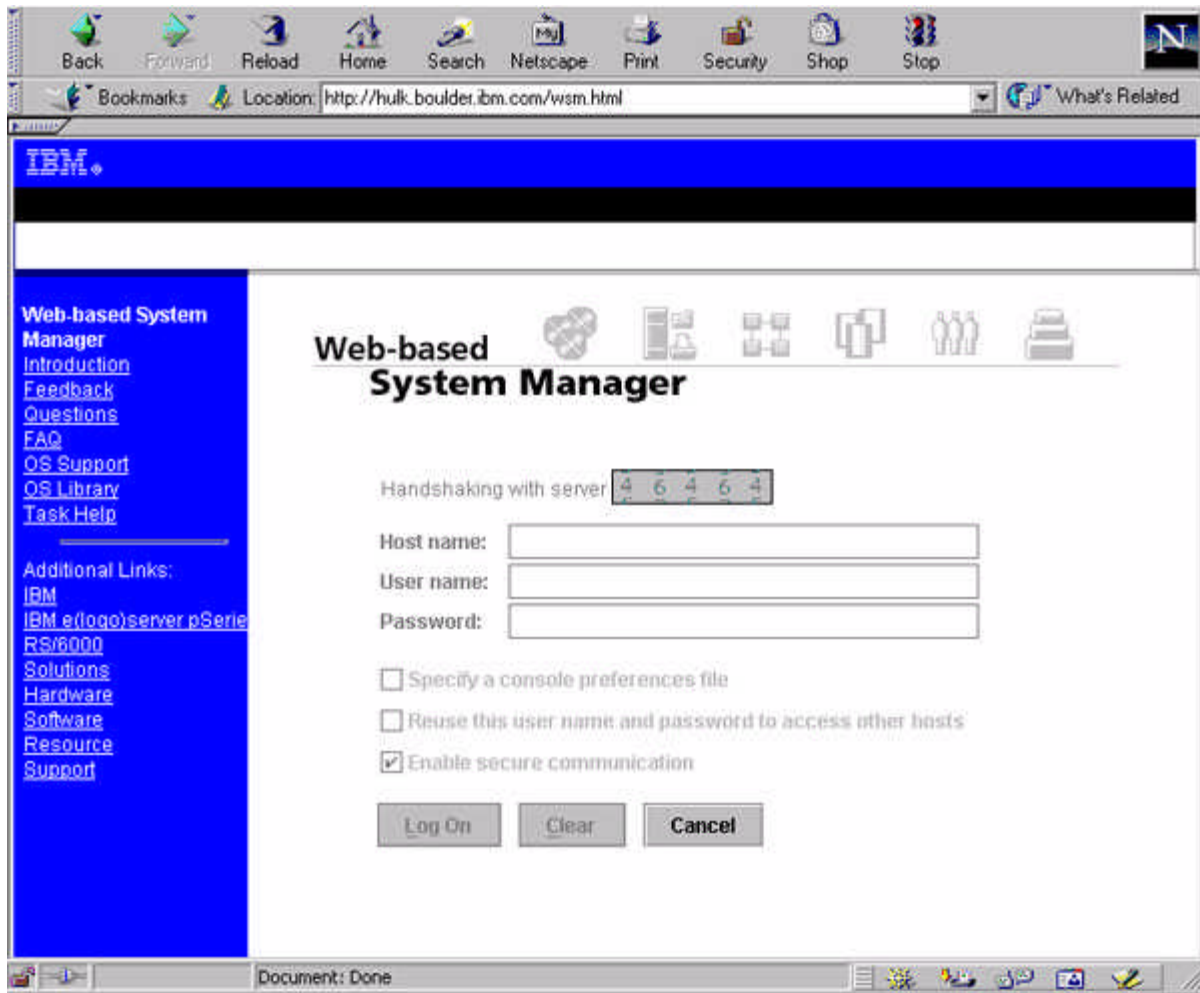


Figure 2. Web Based Login

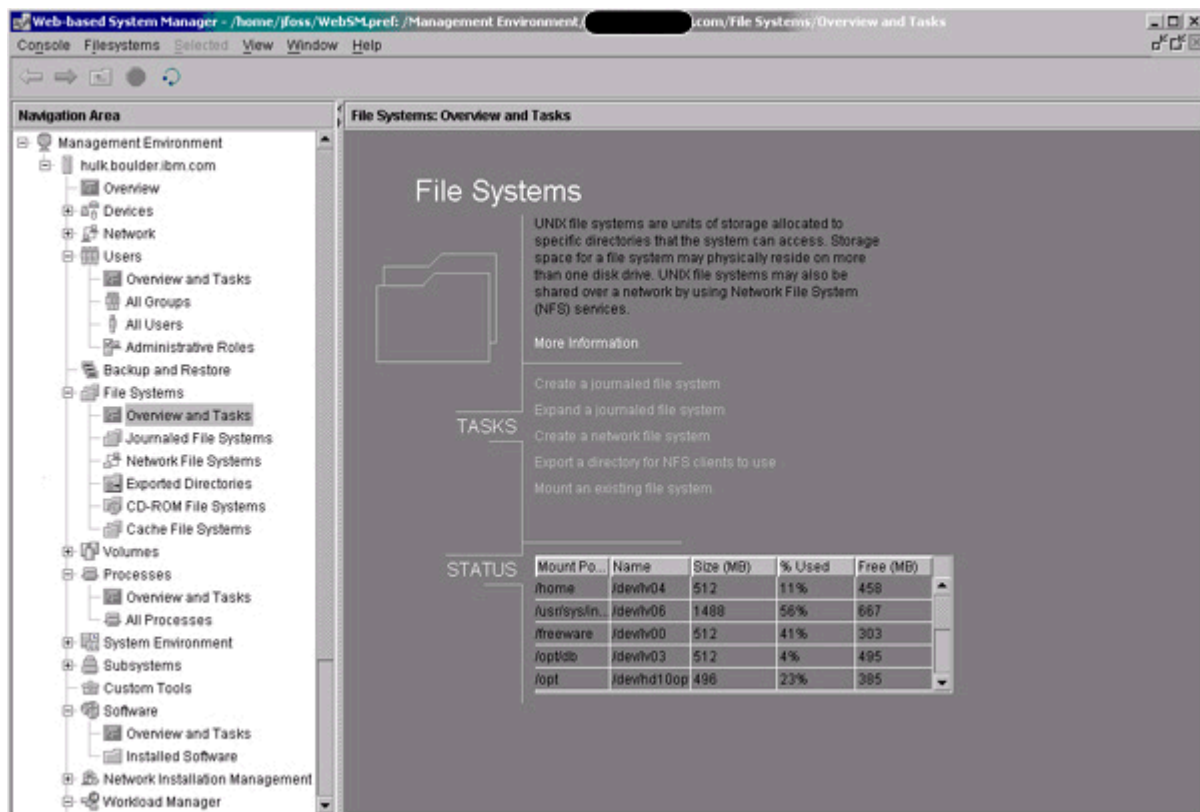


Figure 3. General Users Overall Perspective

List Top 10 processes by CPU usage							
Processes are listed from the highest CPU usage to the lower usage							
Command	Owner name	Process ID	Parent ID	Started	Current CPU	Total CPU	TTY
java	jfoss	12940	11498	09:11:03	9	00:00:28	-
syncd	root	3662	1	03:39:44	0	00:00:23	-
IBM.ERrmd	root	6470	3418	03:40:21	0	00:00:13	-
hostmibd	root	6192	3418	03:40:11	0	00:00:03	-
sshd	root	5226	1	03:39:54	0	00:00:02	-
java	root	11934	3418	09:11:50	0	00:00:02	-
sshd	root	6988	5226	07:46:54	0	00:00:01	-
rmcd	root	7484	3418	03:40:17	0	00:00:01	-
httpd	nobody	15034	11728	08:48:00	0	00:00:01	-
wsmexec	jfoss	11010	12940	09:20:03	4	00:00:00	-

Figure 4. General Users view of Process Table

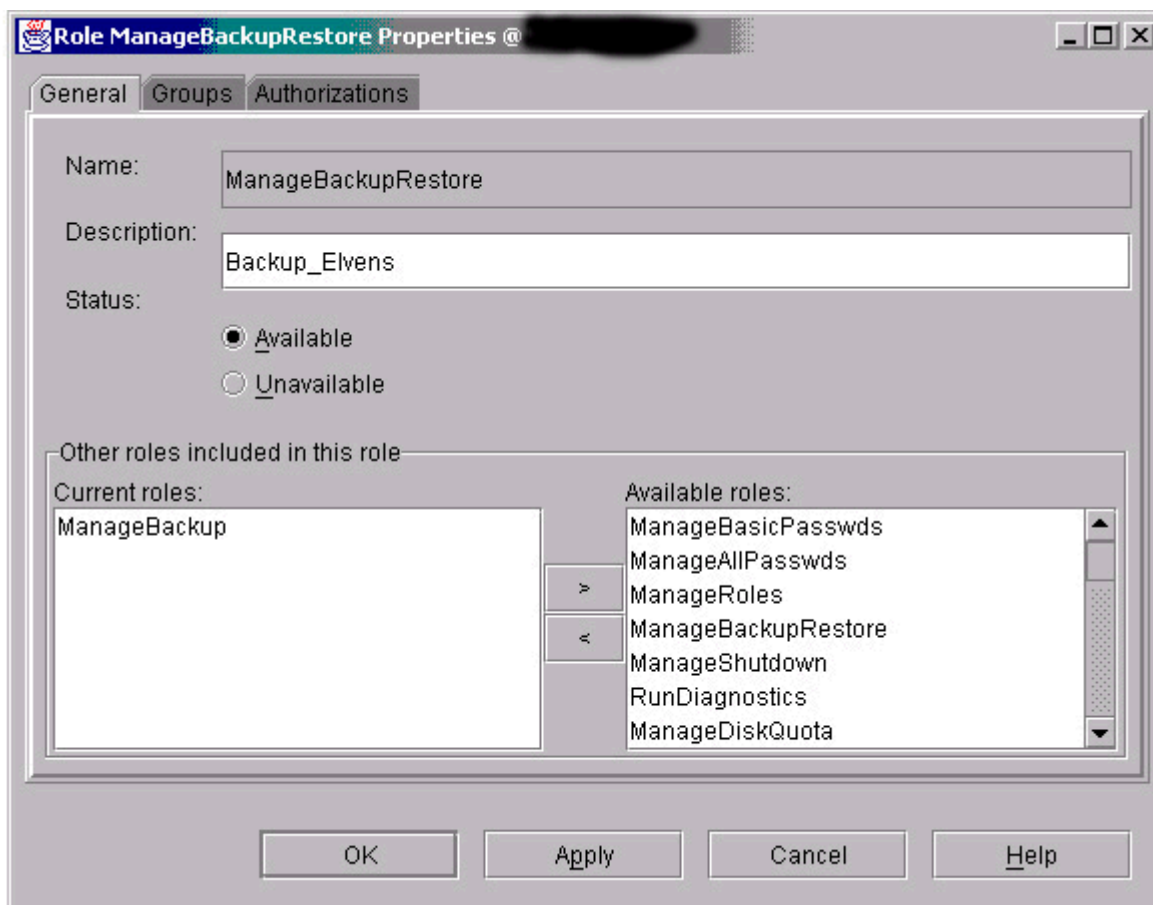


Figure 5. Delegation of Authority Facility General Tab

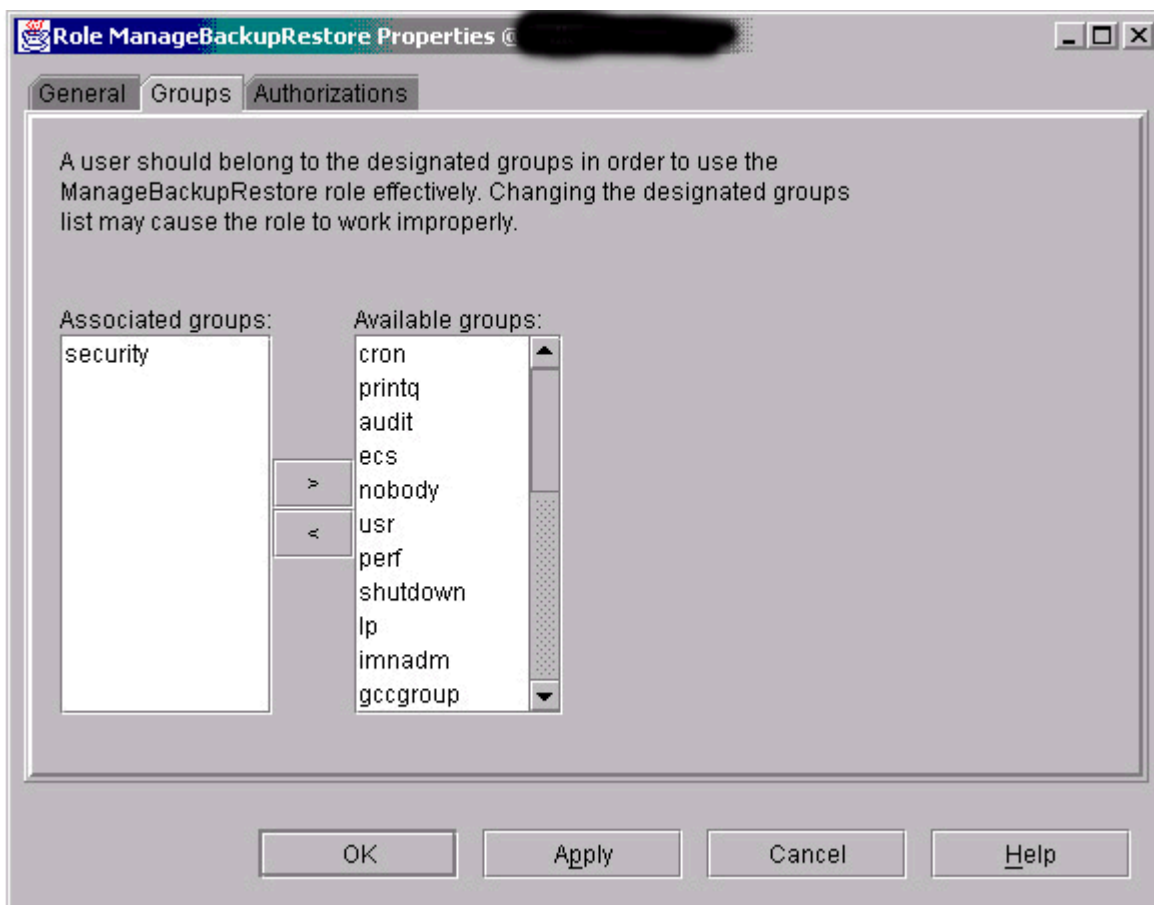


Figure 6. General Delegation of Authority Group Tab

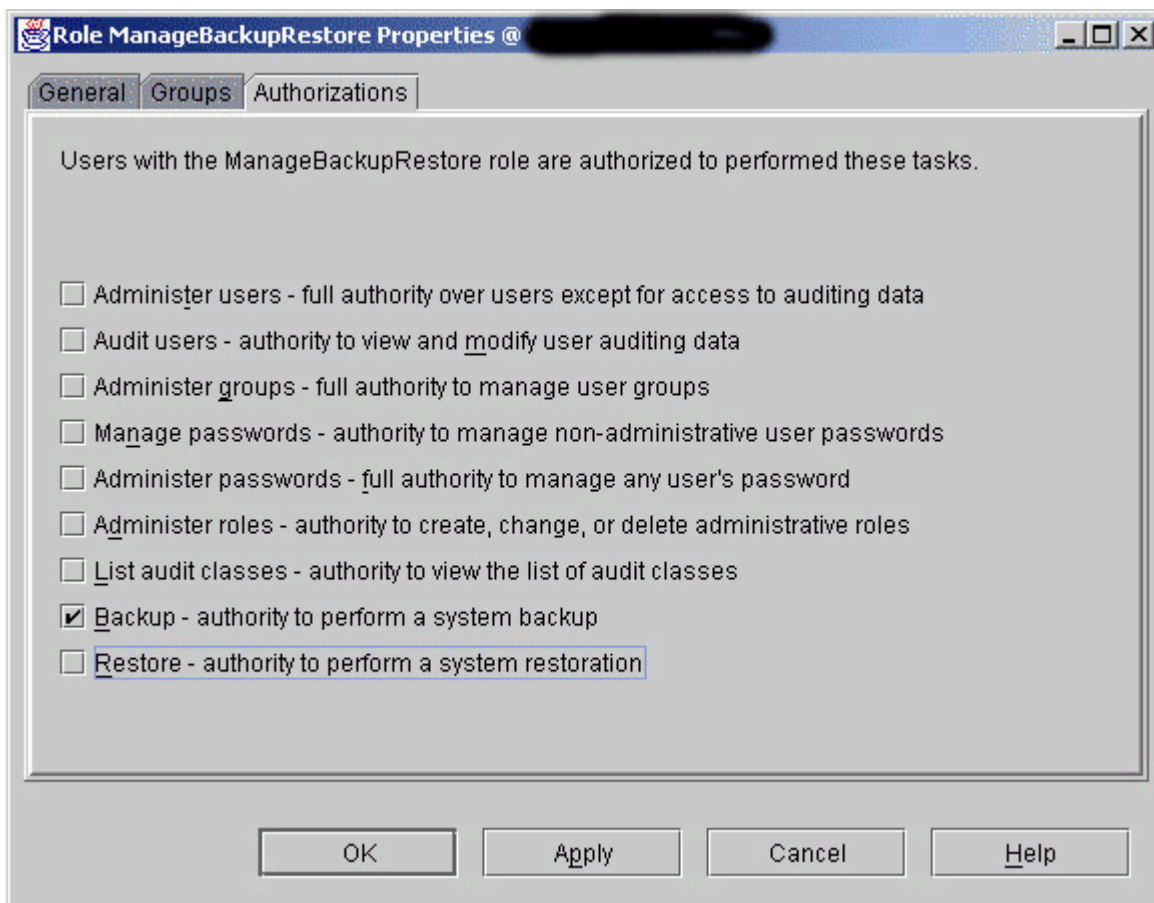


Figure 7. General Delegation of Authority Authorizations Tab

## APPENDIX B: INSTALL TRACE

Install Software

->1 AIX 5.1.0<-

```
-----
|X=Exit|
|-----|
```

====>

-----  
Welcome to AIX.  
boot image timestamp: 02:29 08/13  
The current time and date: 18:05:40 11/01/2001  
number of processors: 1 size of memory: 512Mb  
boot device: /pci@fef00000/scsi@c/sd@1:\ppc\chrp\bootfile.exe  
closing stdin and stdout...  
-----

AIX Version 5.1  
kmod\_load failed for psekbd

\*\*\*\*\* Please define the System Console. \*\*\*\*\*

Type a 1 and press Enter to use this terminal as the system console.  
Pour definir ce terminal comme console systeme, appuyez sur 1 puis sur Entree.  
Taste 1 und anschliessend die Eingabetaste druecken, um diese Datenstation als Systemkonsole zu verwenden.  
Premere il tasto 1 ed Invio per usare questo terminal come console.  
Escriba 1 y pulse Intro para utilizar esta terminal como consola del sistema.  
Escriuiu 1 i premeu Intro per utilitzar aquest terminal com a consola del sistema.  
Digite um 1 e pressione Enter para utilizar este terminal como console do sistema.

HARDWARE SYSTEM MICROCODE

Licensed Internal Code - Property of IBM

(C) Copyright IBM Corp. 1990, 1994.

All rights reserved.

US Government Users Restricted Rights -

Use, duplication or disclosure restricted

by GSA ADP Schedule Contract with IBM Corp.

>>> 1 Type 1 and press Enter to have English during install.  
2 Entreu 2 i premeu Intro per veure la instal·lació en català.  
3 Entrez 3 pour effectuer l'installation en français.  
4 Für Installation in deutscher Sprache 4 eingeben und die Eingabetaste drücken.  
5 Immettere 5 e premere Invio per l'installazione in italiano.

6 Digite 6 e pressione Enter para usar Português na instalação.  
7 Escriba 7 y pulse Intro para la instalación en español.

88 Help ?

>>> Choice [1]: 1

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

Installation and Settings

Either type 0 and press Enter to install with current settings, or type the number of the setting you want to change and press Enter.

- 1 System Settings:  
Method of Installation.....Preservation  
Disk Where You Want to Install.....hdisk0
- 2 Primary Language Environment Settings (AFTER Install):  
Cultural Convention.....English (United States)  
Language .....English (United States)  
Keyboard .....English (United States)  
Keyboard Type.....Default
- 3 Advanced Options

>>> 0 Install with the current settings listed above.

+-----  
88 Help ? | WARNING: Base Operating System  
Installation will  
99 Previous Menu | destroy or impair recovery of SOME  
data on the  
| destination disk hdisk0.  
>>> Choice [0]: 1

2 hdisk1 10-60-00-9,0 8678 other vg Yes

#### Change Method of Installation

Type the number of the installation method and press Enter.

1 New and Complete Overwrite

Overwrites EVERYTHING on the disk selected for installation.

Warning: Only use this method if the disk is totally empty or if there is nothing on the disk you want to preserve.

>>> 2 Preservation Install

Preserves SOME of the existing data on the disk selected for installation. Warning: This method overwrites the usr (/usr), variable (/var), temporary (/tmp), and root (/) file systems.

Other

product (applications) files and configuration data will be destroyed.

88 Help ?

99 Previous Menu

>>> Choice [2]: 1

#### Change Disk(s) Where You Want to Install

Type one or more numbers for the disk(s) to be used for installation and press

Enter. To cancel a choice, type the corresponding number and Press Enter.

At least one bootable disk must be selected. The current choice is indicated by >>>.

Name	Location Code	Size(MB)	VG Status	Bootable
------	---------------	----------	-----------	----------

>>> 1 hdisk0	10-60-00-8,0	4303	rootvg	Yes
2 hdisk1	10-60-00-9,0	8678	other vg	Yes

>>> 0 Continue with choices indicated above

66 Devices not known to Base Operating System Installation

77 Display More Disk Information

88 Help ?

99 Previous Menu

>>> Choice [0]: 1

#### Change Disk(s) Where You Want to Install

Type one or more numbers for the disk(s) to be used for installation and press

Enter. To cancel a choice, type the corresponding number and Press Enter.

At least one bootable disk must be selected. The current choice is indicated by >>>.

Name	Location Code	Size(MB)	VG Status	Bootable
------	---------------	----------	-----------	----------

1 hdisk0	10-60-00-8,0	4303	rootvg	Yes
----------	--------------	------	--------	-----

>>> 0 Continue with choices indicated above

66 Devices not known to Base Operating System Installation

77 Display More Disk Information

88 Help ?

99 Previous Menu

>>> Choice [0]: 1 1

#### Change Disk(s) Where You Want to Install

Type one or more numbers for the disk(s) to be used for installation and press

Enter. To cancel a choice, type the corresponding number and Press Enter.

At least one bootable disk must be selected. The current choice is indicated by >>>.

Name	Location Code	Size(MB)	VG Status	Bootable
------	---------------	----------	-----------	----------

>>> 1 hdisk0	10-60-00-8,0	4303	rootvg	Yes
2 hdisk1	10-60-00-9,0	8678	other vg	Yes

>>> 0 Continue with choices indicated above

66 Devices not known to Base Operating System Installation

77 Display More Disk Information

88 Help ?

99 Previous Menu

>>> Choice [0]: 0

#### Installation and Settings

Either type 0 and press Enter to install with current settings, or type the number of the setting you want to change and press Enter.

1 System Settings:

Method of Installation.....New and Complete Overwrite  
Disk Where You Want to Install.....hdisk0

2 Primary Language Environment Settings (AFTER Install):

Cultural Convention.....English (United States)  
Language .....English (United States)  
Keyboard .....English (United States)  
Keyboard Type.....Default

3 Advanced Options

>>> 0 Install with the current settings listed above.

+-----  
88 Help ? | WARNING: Base Operating System  
Installation will  
99 Previous Menu | destroy or impair recovery of ALL data  
on the | destination disk hdisk0.

>>> Choice [0]: 3

### Advanced Options

Either type 0 and press Enter to install with current settings, or type the number of the setting you want to change and press Enter.

- 1 Installation Package Set..... Default
- 2 Enable Trusted Computing Base..... No
- 3 Enable 64-bit Kernel and JFS2..... No

>>> 0 Install with the current settings listed above.

- 88 Help ?
- 99 Previous Menu

>>> Choice [0]: 9 1

### Advanced Options

Either type 0 and press Enter to install with current settings, or type the number of the setting you want to change and press Enter.

- 1 Installation Package Set..... Minimal
- 2 Enable Trusted Computing Base..... No
- 3 Enable 64-bit Kernel and JFS2..... No

>>> 0 Install with the current settings listed above.

- 88 Help ?
- 99 Previous Menu

>>> Choice [0]: 1

### Advanced Options

Either type 0 and press Enter to install with current settings, or type the number of the setting you want to change and press Enter.

- 1 Installation Package Set..... Default
- 2 Enable Trusted Computing Base..... No
- 3 Enable 64-bit Kernel and JFS2..... No

>>> 0 Install with the current settings listed above.

- 88 Help ?
- 99 Previous Menu

>>> Choice [0]: 1

### Advanced Options

Either type 0 and press Enter to install with current settings, or type the number of the setting you want to change and press Enter.

- 1 Installation Package Set..... Minimal

2 Enable Trusted Computing Base..... No

3 Enable 64-bit Kernel and JFS2..... No

>>> 0 Install with the current settings listed above.

- 88 Help ?
- 99 Previous Menu

>>> Choice [0]: 0

### Installation and Settings

Either type 0 and press Enter to install with current settings, or type the number of the setting you want to change and press Enter.

- 1 System Settings:
  - Method of Installation.....New and Complete Overwrite
  - Disk Where You Want to Install.....hdisk0
- 2 Primary Language Environment Settings (AFTER Install):
  - Cultural Convention.....English (United States)
  - Language .....English (United States)
  - Keyboard .....English (United States)
  - Keyboard Type.....Default
- 3 Advanced Options

>>> 0 Install with the current settings listed above.

88 Help ? | WARNING: Base Operating System  
Installation will  
99 Previous Menu | destroy or impair recovery of ALL data  
on the  
| destination disk hdisk0.

>>> Choice [0]: 2

### Set Primary Language Environment

Type the number for the Cultural Convention (such as date, time, and money), Language, and Keyboard for this system and press Enter, or type 109 and press Enter to create your own combination.

Cultural Convention	Language	Keyboard
1 C (POSIX)	C (POSIX)	C (POSIX)
2 Albanian	English (United States)	Albanian
3 Arabic (Bahrain)	English (United States)	Arabic (Bahrain)
4 Arabic (Egypt)	English (United States)	Arabic (Egypt)
5 Arabic (Jordan)	English (United States)	Arabic (Jordan)
6 Arabic (Kuwait)	English (United States)	Arabic (Kuwait)
7 Arabic (Lebanon)	English (United States)	Arabic (Lebanon)
8 Arabic (Oman)	English (United States)	Arabic (Oman)
9 Arabic (Qatar)	English (United States)	Arabic (Qatar)

>>> 10 MORE CHOICES...

- 88 Help ?
- 99 Previous Menu

>>> Choice [10]: 9 9

#### Installation and Settings

Either type 0 and press Enter to install with current settings, or type the number of the setting you want to change and press Enter.

1 System Settings:  
Method of Installation.....New and Complete Overwrite  
Disk Where You Want to Install.....hdisk0

2 Primary Language Environment Settings (AFTER Install):  
Cultural Convention.....English (United States)  
Language .....English (United States)  
Keyboard .....English (United States)  
Keyboard Type.....Default

3 Advanced Options

>>> 0 Install with the current settings listed above.

+-----  
88 Help ? | WARNING: Base Operating System  
Installation will  
99 Previous Menu | destroy or impair recovery of ALL data  
on the  
| destination disk hdisk0.  
>>> Choice [0]: 0

#### Installing Base Operating System

If you used the system key to select SERVICE mode,  
turn the system key to the NORMAL position any time before the  
installation ends.

Please wait...

Approximate Elapsed time  
% tasks complete (in minutes)

installp: APPLYING software for:  
bos.perf.perfstat 5.1.0.10

..... << Copyright notice for bos.perf>> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1993,  
2001.

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

..... << End of copyright notice for bos.perf>> . . .

Filesets processed: 1 of 18  
System Installation Time: 2 minutes Tasks Complete: 16%

installp: APPLYING software for:  
rsct.core.sr 2.2.0.10  
rsct.core.sec 2.2.0.10

..... << Copyright notice for rsct.core>> .....  
Licensed Materials - Property of IBM

5765E6110  
(C) Copyright International Business Machines Corp. 1985,  
2001.

All rights reserved.  
US Government Users Restricted Rights - Use, duplication or  
disclosure  
restricted by GSA ADP Schedule Contract with IBM Corp.  
..... << End of copyright notice for rsct.core>> . . .

Filesets processed: 3 of 18  
System Installation Time: 2 minutes Tasks Complete: 16%

installp: APPLYING software for:  
xlC.aix50.rte 5.0.2.2

..... << Copyright notice for xlC.aix50>> .....  
Licensed Materials - Property of IBM

5765E2600  
(C) Copyright International Business Machines Corp. 1999,  
2001.  
(C) Copyright AT&T 1984, 1985, 1986, 1987, 1988, 1989.  
(C) Copyright UNIX System Labs, Inc., a subsidiary of Novell,  
Inc. 1993.

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

..... << End of copyright notice for xlC.aix50>> . . .

Filesets processed: 4 of 18  
System Installation Time: 2 minutes Tasks Complete: 16%

installp: APPLYING software for:  
xlC.rte 5.0.2.1

..... << Copyright notice for xlC.rte>> .....  
Licensed Materials - Property of IBM

5765E2600  
(C) Copyright International Business Machines Corp. 1990,  
2001.  
(C) Copyright AT&T 1984, 1985, 1986, 1987, 1988, 1989.  
(C) Copyright UNIX System Labs, Inc., a subsidiary of Novell,  
Inc. 1993.

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

..... << End of copyright notice for xlC.rte>> . . .

Filesets processed: 5 of 18

System Installation Time: 2 minutes    Tasks Complete: 16%

installp: APPLYING software for:  
perl.rte 5.6.0.0

..... << Copyright notice for perl.rte >> .....  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1999,  
2001.

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

..... << End of copyright notice for perl.rte >> . . . .

Filesets processed: 6 of 18  
System Installation Time: 3 minutes    Tasks Complete: 16%

installp: APPLYING software for:  
devices.common.rspcbase.rte 5.1.0.0

..... << Copyright notice for devices.common.rspcbase >> .....  
..  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1991,  
2001.

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

..... << End of copyright notice for devices.common.rspcbase  
>>.....

Filesets processed: 7 of 18  
System Installation Time: 3 minutes    Tasks Complete: 16%

installp: APPLYING software for:  
devices.chrp.base.rte 5.1.0.10

..... << Copyright notice for devices.chrp.base >> .....  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1996,  
2001.

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

..... << End of copyright notice for devices.chrp.base >> . . . .

Filesets processed: 8 of 18

System Installation Time: 3 minutes    Tasks Complete: 16%

installp: APPLYING software for:  
bos.net.tcp.client 5.1.0.10

..... << Copyright notice for bos.net >> .....  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1985,  
2001.

(C) Copyright Advanced Graphics Engineering, 1990.  
(C) Copyright Eric P. Allman, 1983-1997.  
(C) Copyright The United States Army 1987.  
(C) Copyright AT&T 1984, 1985, 1986, 1987, 1988, 1989.  
(C) Copyright Keith Bostic, 1990-1996.  
(C) Copyright Gary S. Brown, 1986.  
(C) Copyright Regents of the University of California 1990,  
1993, 1994, 1995.  
(C) Copyright BULL 1996, 2001.  
(C) Copyright University of Southern California, 1993, 1994,  
1995

For more information on the RSVP program see  
<http://www.isi.edu/>.

The name of the University of Southern California may not be  
used to

endorse or promote products derived from this software  
without  
specific prior written permission.

All copies must contain all copyright and other proprietary  
notices

found in the Program as provided by USC. Title to the Program  
remains  
with USC.

THIS PROGRAM IS PROVIDED ON AN AS-IS BASIS  
WITHOUT ACCOMPANYING SERVICES  
FROM USC. USC MAKES NO REPRESENTATIONS OR  
WARRANTIES, EXPRESS OR IMPLIED.

BY WAY OF EXAMPLE, BUT NOT LIMITATION, USC  
MAKES NO REPRESENTATION OR  
WARRANTIES OF MERCHANTABILITY OR FITNESS FOR  
ANY PARTICULAR PURPOSE OR THAT

THE USE OF THE PROGRAM WILL NOT INFRINGE ANY  
PATENTS, COPYRIGHTS, TRADEMARKS

OR OTHER RIGHTS. USC SHALL NOT BE HELD LIABLE  
FOR ANY LIABILITY NOR FOR ANY

DIRECT, INDIRECT OR CONSEQUENTIAL DAMAGES  
WITH RESPECT TO ANY CLAIM BY

LICENSEE OR ANY THIRD PARTY ON ACCOUNT OF OR  
ARISING FROM THIS AGREEMENT

OR USE OF THE PROGRAM.

Other copyrights might apply to parts of this software and are  
so

noted when applicable.

(C) Copyright Carnegie Mellon, 1988.  
(C) Copyright Cornell University, 1995.  
(C) Copyright Check Point Software Technologies, 1999.  
(C) Copyright Cygnus Support, 1994.  
(C) Copyright CyberSAFE Corporation, 1994.  
(C) Copyright Digital Equipment Corporation, 1993.  
(C) Copyright of the EGPUP User Process, Paul Kirton and ISI  
1984.  
(C) Copyright Encore Computer Corporation, 1988-1989.  
(C) Copyright Dennis Ferguson, 1990.  
(C) Copyright The President and Fellows of Harvard University

1995, 1996.  
 (C) Copyright Hewlett-Packard Company, 1991.  
 (C) Copyright INRIA-CNRS-INPG 1996, 1997.  
 (C) Copyright Internet Software Consortium, 1994-1999.  
 (C) Copyright Regents of The University of Michigan, 1996-1997.  
 (C) Copyright Paul Milazzo 1984, 1985.  
 (C) Copyright Massachusetts Institute of Technology, 1987-1995.  
 (C) Copyright Open Computing Security Group, 1993.  
 (C) Copyright Open Software Foundation, Inc. 1990, 1993.  
 (C) Copyright RSA Data Security, Inc. 1990-1997.  
 (C) Copyright Margo Seltzer, 1990-1993.  
 (C) Copyright Sendmail, Inc. 1998-2000.  
 (C) Copyright Sleepycat Software, 1996-2000.  
 (C) Copyright Leland Stanford Junior University, 1988.  
 (C) Copyright Sun Microsystems, Inc. 1984, 1985, 1986, 1987, 1988, 1991.

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

..... << End of copyright notice for bos.net >> . . . .

0513-071 The inetd Subsystem has been added.  
 0513-071 The rwhod Subsystem has been added.  
 0513-071 The syslogd Subsystem has been added.  
 0513-071 The xntpd Subsystem has been added.  
 0513-071 The sendmail Subsystem has been added.  
 0513-071 The snmpd Subsystem has been added.  
 0513-071 The hostmibd Subsystem has been added.  
 0513-071 The dpid2 Subsystem has been added.  
 0513-071 The portmap Subsystem has been added.  
 0513-071 The dhcpcd Subsystem has been added.  
 0513-071 The ndpd-host Subsystem has been added.  
 0513-071 The ndpd-router Subsystem has been added.  
 0513-071 The tftpd Subsystem has been added.  
 0513-065 The ftp Subserver has been added.  
 0513-065 The uucp Subserver has been added.  
 0513-065 The telnet Subserver has been added.  
 0513-065 The shell Subserver has been added.  
 0513-065 The login Subserver has been added.  
 0513-065 The exec Subserver has been added.  
 0513-065 The finger Subserver has been added.  
 0513-065 The tftp Subserver has been added.  
 0513-065 The ntalk Subserver has been added.  
 0513-065 The echo Subserver has been added.  
 0513-065 The discard Subserver has been added.  
 0513-065 The chargen Subserver has been added.  
 0513-065 The daytime Subserver has been added.  
 0513-065 The time Subserver has been added.  
 0513-065 The comsat Subserver has been added.  
 0513-065 The bootps Subserver has been added.  
 0513-065 The systat Subserver has been added.  
 0513-065 The netstat Subserver has been added.  
 0513-065 The klogin Subserver has been added.  
 0513-065 The kshell Subserver has been added.

Filesets processed: 9 of 18  
 System Installation Time: 3 minutes Tasks Complete: 17%

installp: APPLYING software for:  
 bos.iconv.com 5.1.0.0  
 bos.iconv.ucs.com 5.1.0.0

..... << Copyright notice for bos.iconv >> . . . . .  
 Licensed Materials - Property of IBM

5765E6100  
 (C) Copyright International Business Machines Corp. 1991, 2001.

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

Licensed Materials - Property of IBM

5765E6100  
 (C) Copyright International Business Machines Corp. 1994, 2001.

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

..... << End of copyright notice for bos.iconv >> . . . .  
 Filesets processed: 11 of 18  
 System Installation Time: 4 minutes Tasks Complete: 17%

installp: APPLYING software for:  
 rsct.core.utils 2.2.0.10  
 rsct.core.rmc 2.2.0.10  
 rsct.core.hostrm 2.2.0.10  
 rsct.core.fsrn 2.2.0.10  
 rsct.core.errm 2.2.0.10  
 rsct.core.auditrm 2.2.0.10

0513-071 The ctrmc Subsystem has been added.  
 0513-071 The ctcas Subsystem has been added.

Filesets processed: 17 of 18  
 System Installation Time: 4 minutes Tasks Complete: 17%

installp: APPLYING software for:  
 devices.chrp.base.ServiceRM 1.1.0.0

..... << Copyright notice for devices.chrp.base >> . . . . .  
 Licensed Materials - Property of IBM

5765E6100  
 (C) Copyright International Business Machines Corp. 1985, 2001.

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

..... << End of copyright notice for devices.chrp.base >> . . . .

Finished processing all filesets.  
 System Installation Time: 4 minutes Tasks Complete: 18%

installp: APPLYING software for:  
 rpm.rte 3.0.5.30

..... << Copyright notice for rpm.rte >> .....  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 2000,  
2001.

(C) Copyright Regents of the University of California 1990,  
1993, 1994, 1995.

(C) Copyright Jean-loup Gailly and Mark Adler, 1995 - 1998.

(C) Copyright The President and Fellows of Harvard University  
1995, 1996.

(C) Copyright Julian R Seward, 1996 - 2000

(C) Copyright Sleepycat Software, 1990 - 2000

All rights reserved.

US Government Users Restricted Rights - Use, duplication or  
disclosure

restricted by GSA ADP Schedule Contract with IBM Corp.

..... << End of copyright notice for rpm.rte >> ....

Finished processing all filesets.

System Installation Time: 4 minutes    Tasks Complete: 18%

#### Installing Base Operating System

If you used the system key to select SERVICE mode,  
turn the system key to the NORMAL position any time before  
the installation ends.

Please wait...

Approximate	Elapsed time
% tasks complete	(in minutes)

#### FAILURES

-----  
Filesets listed in this section failed pre-installation verification  
and will not be installed.

##### Missing Filesets

-----  
The following filesets could not be found on the installation  
media.

If you feel these filesets really are on the media, check for  
typographical  
errors in the name specified or, if installing from directory,  
check for  
discrepancies between the Table of Contents file (.toc) and the  
images that  
reside in the directory.

devices.isa\_sio.8042  
devices.isa\_sio.CRUS.CS4236B  
devices.isa\_sio.IBM.tablet-port  
devices.isa\_sio.fdc  
devices.isa\_sio.parallel  
devices.isa\_sio.pnpPNP.b007  
devices.isa\_sio.serial  
devices.isa\_sio.sound  
devices.pci.ethernet  
devices.pci.pciclass.010000  
devices.pci.pciclass.020000  
devices.pci.pciclass.020100  
devices.pci.scsi

devices.pci.token-ring  
devices.isa\_sio.8042  
devices.isa\_sio.CRUS.CS4236B  
devices.isa\_sio.IBM.tablet-port  
devices.isa\_sio.fdc  
devices.isa\_sio.parallel  
devices.isa\_sio.pnpPNP.b007  
devices.isa\_sio.serial  
devices.isa\_sio.sound  
devices.pci.ethernet  
devices.pci.pciclass.010000  
devices.pci.pciclass.020000  
devices.pci.pciclass.020100  
devices.pci.scsi  
devices.pci.token-ring

<< End of Failure Section >>

installp: APPLYING software for:  
invscout.ldb 1.3.0.0

..... << Copyright notice for invscout.ldb >> .....  
Licensed Materials - Property of IBM

5765C3421

(C) Copyright International Business Machines Corp. 1999,  
2001.

All rights reserved.

US Government Users Restricted Rights - Use, duplication or  
disclosure

restricted by GSA ADP Schedule Contract with IBM Corp.

..... << End of copyright notice for invscout.ldb >> ....

Filesets processed: 1 of 150  
System Installation Time: 5 minutes    Tasks Complete: 18%

installp: APPLYING software for:  
invscout.rte 1.3.0.0

..... << Copyright notice for invscout.rte >> .....  
Licensed Materials - Property of IBM

5765C3421

(C) Copyright International Business Machines Corp. 1999,  
2001.

(C) Copyright RSA Data Security, Inc. 1991-1992.

All rights reserved.

License to copy and use this software is granted provided that it  
is identified as the RSA Data Security, Inc. MD5 Message-  
Digest

Algorithm in all material mentioning or referencing this  
software

or this function.

License is also granted to make and use derivative works  
provided

that such works are identified as derived from the RSA Data  
Security, Inc. MD5 Message-Digest Algorithm in all material  
mentioning or referencing the derived work.

RSA Data Security, Inc. makes no representations concerning  
either

the merchantability of this software or the suitability of this

software for any particular purpose. It is provided as is without express or implied warranty of any kind.  
These notices must be retained in any copies of any part of this documentation and/or software.  
(C) Copyright RSA Data Security, Inc. 1990-1995.

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

..... << End of copyright notice for invscout.rte >>.....

Filesets processed: 2 of 150  
System Installation Time: 5 minutes      Tasks Complete: 18%

installp: APPLYING software for:  
    csm.client 1.1.0.1

..... << Copyright notice for csm.client >> .....  
Licensed Materials - Property of IBM

5765E6110  
(C) Copyright International Business Machines Corp. 1985, 2001.

All rights reserved.  
US Government Users Restricted Rights - Use, duplication or disclosure  
restricted by GSA ADP Schedule Contract with IBM Corp.  
..... << End of copyright notice for csm.client >>.....

Filesets processed: 3 of 150  
System Installation Time: 5 minutes      Tasks Complete: 19%

installp: APPLYING software for:  
    rsct.msg.EN\_US.core.utils 2.2.0.0  
    rsct.msg.EN\_US.core.sr 2.2.0.0  
    rsct.msg.EN\_US.core.sec 2.2.0.0  
    rsct.msg.EN\_US.core.rmc 2.2.0.0  
    rsct.msg.EN\_US.core.hostrm 2.2.0.0  
    rsct.msg.EN\_US.core.fsrn 2.2.0.0  
    rsct.msg.EN\_US.core.errm 2.2.0.0  
    rsct.msg.EN\_US.core.auditrm 2.2.0.0

..... << Copyright notice for rsct.msg.EN\_US >> .....  
Licensed Materials - Property of IBM

5765E6110  
(C) Copyright International Business Machines Corp. 1985, 2001.

All rights reserved.  
US Government Users Restricted Rights - Use, duplication or disclosure  
restricted by GSA ADP Schedule Contract with IBM Corp.  
..... << End of copyright notice for rsct.msg.EN\_US >>.....

Filesets processed: 11 of 150  
System Installation Time: 5 minutes      Tasks Complete: 23%

installp: APPLYING software for:

rsct.msg.en\_US.core.utils 2.2.0.0  
rsct.msg.en\_US.core.sr 2.2.0.0  
rsct.msg.en\_US.core.sec 2.2.0.0  
rsct.msg.en\_US.core.rmc 2.2.0.0  
rsct.msg.en\_US.core.hostrm 2.2.0.0  
rsct.msg.en\_US.core.fsrn 2.2.0.0  
rsct.msg.en\_US.core.errm 2.2.0.0  
rsct.msg.en\_US.core.auditrm 2.2.0.0

..... << Copyright notice for rsct.msg.en\_US >> .....  
Licensed Materials - Property of IBM

5765E6110  
(C) Copyright International Business Machines Corp. 1985, 2001.

All rights reserved.  
US Government Users Restricted Rights - Use, duplication or disclosure  
restricted by GSA ADP Schedule Contract with IBM Corp.  
..... << End of copyright notice for rsct.msg.en\_US >>.....

Filesets processed: 19 of 150  
System Installation Time: 5 minutes      Tasks Complete: 27%

installp: APPLYING software for:  
    Tivoli\_Management\_Agent.client.rte 3.7.1.0

..... << Copyright notice for Tivoli\_Management\_Agent.client >>.....

Licensed Materials - Property of Tivoli Systems, Inc

5697FRA  
(C) Copyright Tivoli Systems, Inc 1997, 2001

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

..... << End of copyright notice for  
Tivoli\_Management\_Agent.client >>.....

Filesets processed: 20 of 150  
System Installation Time: 5 minutes      Tasks Complete: 27%

installp: APPLYING software for:  
    X11.apps.pm 5.1.0.0

..... << Copyright notice for X11.apps >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1985, 2001.

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

..... << End of copyright notice for X11.apps >>.....

Filesets processed: 21 of 150  
System Installation Time: 5 minutes      Tasks Complete: 28%

installp: APPLYING software for:  
          devices.sys.pci.rte 5.1.0.10

..... << Copyright notice for devices.sys.pci >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1991,  
2001.

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

..... << End of copyright notice for devices.sys.pci >>.....

Filesets processed: 22 of 150  
System Installation Time: 5 minutes      Tasks Complete: 28%

installp: APPLYING software for:  
          devices.scsi.tape.rte 5.1.0.10  
          devices.scsi.tape.rspc 5.1.0.0

..... << Copyright notice for devices.scsi.tape >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1985,  
2001.

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

..... << End of copyright notice for devices.scsi.tape >>.....

Filesets processed: 24 of 150  
System Installation Time: 5 minutes      Tasks Complete: 30%

installp: APPLYING software for:  
          devices.scsi.disk.rte 5.1.0.10  
          devices.scsi.disk.rspc 5.1.0.0

..... << Copyright notice for devices.scsi.disk >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1985,  
2001.

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

Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1993,  
2001.

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

..... << End of copyright notice for devices.scsi.disk >>.....

Filesets processed: 26 of 150  
System Installation Time: 5 minutes      Tasks Complete: 30%

installp: APPLYING software for:  
          devices.pci.PNP0A03.rte 5.1.0.0

..... << Copyright notice for devices.pci.PNP0A03 >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1991,  
2001.

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

..... << End of copyright notice for devices.pci.PNP0A03 >>.....

Filesets processed: 27 of 150  
System Installation Time: 5 minutes      Tasks Complete: 31%

installp: APPLYING software for:  
          devices.pci.pci.rte 5.1.0.0

..... << Copyright notice for devices.pci.pci >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1996,  
2001.

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

..... << End of copyright notice for devices.pci.pci >>.....

Filesets processed: 28 of 150  
System Installation Time: 5 minutes      Tasks Complete: 31%

installp: APPLYING software for:  
          devices.pci.86808404.rte 5.1.0.0  
          devices.pci.86808404.com 5.1.0.0

..... << Copyright notice for devices.pci.86808404 >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1991,  
2001.

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

Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1993,  
2001.

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

..... << End of copyright notice for devices.pci.86808404 >> ...  
.

Filesets processed: 30 of 150  
System Installation Time: 6 minutes    Tasks Complete: 33%

installp: APPLYING software for:  
devices.pci.23100020.rte 5.1.0.10

..... << Copyright notice for devices.pci.23100020 >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1994,  
2001.

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

..... << End of copyright notice for devices.pci.23100020 >> ...  
.

Filesets processed: 31 of 150  
System Installation Time: 6 minutes    Tasks Complete: 33%

installp: APPLYING software for:  
devices.pci.isa.rte 5.1.0.0

..... << Copyright notice for devices.pci.isa >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1996,  
2001.

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

..... << End of copyright notice for devices.pci.isa >> ....

Filesets processed: 32 of 150  
System Installation Time: 6 minutes    Tasks Complete: 33%

installp: APPLYING software for:  
devices.pci.14103e00.rte 5.1.0.10

..... << Copyright notice for devices.pci.14103e00 >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1994,  
2001.

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

..... << End of copyright notice for devices.pci.14103e00 >> ...  
.

Filesets processed: 33 of 150  
System Installation Time: 6 minutes    Tasks Complete: 34%

installp: APPLYING software for:  
devices.pci.00100f00.rte 5.1.0.10

..... << Copyright notice for devices.pci.00100f00 >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1991,  
2001.

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

..... << End of copyright notice for devices.pci.00100f00 >> ...  
.

Filesets processed: 34 of 150  
System Installation Time: 6 minutes    Tasks Complete: 34%

installp: APPLYING software for:  
devices.pci.00100c00.rte 5.1.0.10

..... << Copyright notice for devices.pci.00100c00 >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1998,  
2001.

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

..... << End of copyright notice for devices.pci.00100c00 >>...  
.

Filesets processed: 35 of 150  
System Installation Time: 6 minutes Tasks Complete: 35%

installp: APPLYING software for:  
devices.pci.00100100.com 5.1.0.10

..... << Copyright notice for devices.pci.00100100 >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1991,  
2001.

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

..... << End of copyright notice for devices.pci.00100100 >>...  
.

Filesets processed: 36 of 150  
System Installation Time: 6 minutes Tasks Complete: 36%

installp: APPLYING software for:  
devices.msg.en\_US.sys.mca.rte 5.1.0.0  
devices.msg.en\_US.rspc.base.com 5.1.0.0  
devices.msg.en\_US.base.com 5.1.0.0

..... << Copyright notice for devices.msg.en\_US >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1990,  
2001.

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

Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1994,  
2001.

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

..... << End of copyright notice for devices.msg.en\_US >>...  
.

Filesets processed: 39 of 150  
System Installation Time: 6 minutes Tasks Complete: 37%

installp: APPLYING software for:  
devices.isa\_sio.pnpPNP.700.rte 5.1.0.0

..... << Copyright notice for devices.isa\_sio.pnpPNP.700 >> ..  
.....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1995,  
2001.

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

..... << End of copyright notice for devices.isa\_sio.pnpPNP.700  
>>.....

Filesets processed: 40 of 150  
System Installation Time: 6 minutes Tasks Complete: 37%

installp: APPLYING software for:  
devices.isa\_sio.pnpPNP.501.rte 5.1.0.0

..... << Copyright notice for devices.isa\_sio.pnpPNP.501 >> ..  
.....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1991,  
2001.

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

..... << End of copyright notice for devices.isa\_sio.pnpPNP.501  
>>.....

Filesets processed: 41 of 150  
System Installation Time: 6 minutes Tasks Complete: 38%

installp: APPLYING software for:  
devices.isa\_sio.PNP0700.rte 5.1.0.0

..... << Copyright notice for devices.isa\_sio.PNP0700 >> .....  
..  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1995,  
2001.

All rights reserved.  
US Government Users Restricted Rights - Use, duplication or

disclosure  
restricted by GSA ADP Schedule Contract with IBM Corp.

.... << End of copyright notice for devices.isa\_sio.PNP0700  
>>....

Filesets processed: 42 of 150  
System Installation Time: 6 minutes Tasks Complete: 39%

installp: APPLYING software for:  
devices.isa\_sio.PNP0501.rte 5.1.0.0

.... << Copyright notice for devices.isa\_sio.PNP0501 >> ....  
..  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1991,  
2001.

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

.... << End of copyright notice for devices.isa\_sio.PNP0501  
>>....

Filesets processed: 43 of 150  
System Installation Time: 6 minutes Tasks Complete: 39%

installp: APPLYING software for:  
devices.isa\_sio.PNP0400.rte 5.1.0.10

.... << Copyright notice for devices.isa\_sio.PNP0400 >> ....  
..  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1991,  
2001.

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

.... << End of copyright notice for devices.isa\_sio.PNP0400  
>>....

Filesets processed: 44 of 150  
System Installation Time: 6 minutes Tasks Complete: 39%

installp: APPLYING software for:  
devices.isa\_sio.km.rte 5.1.0.0

.... << Copyright notice for devices.isa\_sio.km >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1991,

2001.

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

.... << End of copyright notice for devices.isa\_sio.km >>....

Filesets processed: 45 of 150  
System Installation Time: 6 minutes Tasks Complete: 40%

installp: APPLYING software for:  
devices.isa\_sio.IBM0019.rte 5.1.0.0

.... << Copyright notice for devices.isa\_sio.IBM0019 >> ....  
..  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1991,  
2001.

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

.... << End of copyright notice for devices.isa\_sio.IBM0019  
>>....

Filesets processed: 46 of 150  
System Installation Time: 6 minutes Tasks Complete: 40%

installp: APPLYING software for:  
devices.isa\_sio.IBM0017.rte 5.1.0.0

.... << Copyright notice for devices.isa\_sio.IBM0017 >> ....  
..  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1993,  
2001.

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

.... << End of copyright notice for devices.isa\_sio.IBM0017  
>>....

Filesets processed: 47 of 150  
System Installation Time: 6 minutes Tasks Complete: 41%

installp: APPLYING software for:  
devices.isa\_sio.chrp.ecp.rte 5.1.0.10

.... << Copyright notice for devices.isa\_sio.chrp.ecp >> .....  
.

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1996, 2001.

All rights reserved.

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

..... << End of copyright notice for devices.isa\_sio.chrp.ecp >>.  
...

Filesets processed: 48 of 150

System Installation Time: 6 minutes Tasks Complete: 42%

installp: APPLYING software for:  
devices.isa\_sio.chrp.8042.rte 5.1.0.0

..... << Copyright notice for devices.isa\_sio.chrp.8042 >> .....  
..  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1993, 2001.

All rights reserved.

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

..... << End of copyright notice for devices.isa\_sio.chrp.8042  
>>.....

Filesets processed: 49 of 150

System Installation Time: 6 minutes Tasks Complete: 42%

installp: APPLYING software for:  
devices.isa\_sio.baud.rte 5.1.0.0

..... << Copyright notice for devices.isa\_sio.baud >> .....  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1993, 2001.

All rights reserved.

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

..... << End of copyright notice for devices.isa\_sio.baud >>.....

Filesets processed: 50 of 150

System Installation Time: 6 minutes Tasks Complete: 42%

installp: APPLYING software for:  
devices.common.IBM.tokenring.rte 5.1.0.10

..... << Copyright notice for devices.common.IBM.tokenring  
>>.....

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1985, 2001.

All rights reserved.

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

..... << End of copyright notice for  
devices.common.IBM.tokenring >>.....

Filesets processed: 51 of 150

System Installation Time: 6 minutes Tasks Complete: 43%

installp: APPLYING software for:  
devices.common.IBM.scsi.rte 5.1.0.10

..... << Copyright notice for devices.common.IBM.scsi >> .....  
..  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1995, 2001.

All rights reserved.

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

..... << End of copyright notice for devices.common.IBM.scsi  
>>.....

Filesets processed: 52 of 150

System Installation Time: 6 minutes Tasks Complete: 43%

installp: APPLYING software for:  
devices.common.IBM.ppa.rte 5.1.0.0

..... << Copyright notice for devices.common.IBM.ppa >> .....  
..  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1995, 2001.

All rights reserved.

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

..... << End of copyright notice for devices.common.IBM.ppa  
>>.....

Filesets processed: 53 of 150

System Installation Time: 6 minutes    Tasks Complete: 44%

installp: APPLYING software for:  
devices.common.IBM.pmmdd\_chrp.rte 5.1.0.0

..... << Copyright notice for devices.common.IBM.pmmdd\_chrp  
>> .....

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1991,  
2001.

All rights reserved.

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

..... << End of copyright notice for  
devices.common.IBM.pmmdd\_chrp >> .....

Filesets processed: 54 of 150

System Installation Time: 6 minutes    Tasks Complete: 45%

installp: APPLYING software for:  
devices.common.IBM.modemcfg.data 5.1.0.0

..... << Copyright notice for devices.common.IBM.modemcfg  
>> .....

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1996,  
2001.

All rights reserved.

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

..... << End of copyright notice for  
devices.common.IBM.modemcfg >> .....

Filesets processed: 55 of 150

System Installation Time: 6 minutes    Tasks Complete: 45%

installp: APPLYING software for:  
devices.common.IBM.ktm\_std.rte 5.1.0.0

..... << Copyright notice for devices.common.IBM.ktm\_std >> .  
.....

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1993,  
2001.

All rights reserved.

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

..... << End of copyright notice for  
devices.common.IBM.ktm\_std >> .....

Filesets processed: 56 of 150

System Installation Time: 6 minutes    Tasks Complete: 45%

installp: APPLYING software for:  
devices.common.IBM.fda.rte 5.1.0.0

..... << Copyright notice for devices.common.IBM.fda >> .....

...

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1995,  
2001.

All rights reserved.

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

..... << End of copyright notice for devices.common.IBM.fda  
>> .....

Filesets processed: 57 of 150

System Installation Time: 6 minutes    Tasks Complete: 46%

installp: APPLYING software for:  
devices.common.IBM.ethernet.rte 5.1.0.10

..... << Copyright notice for devices.common.IBM.ethernet >> .

.....

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1985,  
2001.

All rights reserved.

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

..... << End of copyright notice for  
devices.common.IBM.ethernet >> .....

Filesets processed: 58 of 150

System Installation Time: 6 minutes    Tasks Complete: 46%

installp: APPLYING software for:  
devices.common.IBM.disk.rte 5.1.0.0

..... << Copyright notice for devices.common.IBM.disk >> .....

...

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1985,  
2001.

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

..... << End of copyright notice for devices.common.IBM.disk  
>>.....

Filesets processed: 59 of 150  
System Installation Time: 6 minutes      Tasks Complete: 47%

installp: APPLYING software for:  
          devices.tty.rte 5.1.0.10

..... << Copyright notice for devices.tty >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1985,  
2001.

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

..... << End of copyright notice for devices.tty >>.....

Filesets processed: 60 of 150  
System Installation Time: 7 minutes      Tasks Complete: 48%

installp: APPLYING software for:  
          devices.chrp.pci.rte 5.1.0.0

..... << Copyright notice for devices.chrp.pci >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1996,  
2001.

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

..... << End of copyright notice for devices.chrp.pci >>.....

Filesets processed: 61 of 150  
System Installation Time: 7 minutes      Tasks Complete: 48%

installp: APPLYING software for:  
          printers.rte 5.1.0.0

..... << Copyright notice for printers.rte >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1987,  
2001.

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

..... << End of copyright notice for printers.rte >>.....

Filesets processed: 62 of 150  
System Installation Time: 7 minutes      Tasks Complete: 48%

installp: APPLYING software for:  
          bos.terminfo.com.data 5.1.0.0

..... << Copyright notice for bos.terminfo >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1985,  
2001.

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

..... << End of copyright notice for bos.terminfo >>.....

Filesets processed: 63 of 150  
System Installation Time: 7 minutes      Tasks Complete: 49%

installp: APPLYING software for:  
          bos.terminfo.rte 5.1.0.0

..... << Copyright notice for bos.terminfo >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1985,  
2001.  
(C) Copyright AT&T 1984, 1985, 1986, 1987, 1988, 1989.  
(C) Copyright Open Software Foundation, Inc. 1989, 1994.

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

..... << End of copyright notice for bos.terminfo >>.....

Filesets processed: 64 of 150  
System Installation Time: 7 minutes      Tasks Complete: 49%

installp: APPLYING software for:  
          bos.sysmgt.sysbr 5.1.0.10  
          bos.sysmgt.smit 5.1.0.10  
          bos.sysmgt.serv\_aid 5.1.0.10  
          bos.sysmgt.loginlic 5.1.0.0

..... << Copyright notice for bos.sysmgt >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1989,  
2001.

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

Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1987,  
2001.

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

Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1988,  
2001.

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

Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1985,  
2001.

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

..... << End of copyright notice for bos.sysmgt >>.....

Filesets processed: 68 of 150  
System Installation Time: 7 minutes      Tasks Complete: 51%

installp: APPLYING software for:  
bos.svprint.rte 5.1.0.10  
bos.svprint.ps 5.1.0.0  
bos.svprint.hpnp 5.1.0.0  
bos.svprint.fonts 5.1.0.0

..... << Copyright notice for bos.svprint >>.....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 2000,  
2001.  
(C) Copyright The Santa Cruz Operations, Inc. 1997,1999.

All rights reserved.

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

Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 2000,  
2001.  
(C) Copyright Hewlett-Packard Company, 1993  
(C) Copyright The Santa Cruz Operations, Inc. 1997,1999.

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

..... << End of copyright notice for bos.svprint >>.....

Filesets processed: 72 of 150  
System Installation Time: 7 minutes      Tasks Complete: 54%

installp: APPLYING software for:  
bos.powermgt.rte 5.1.0.10

..... << Copyright notice for bos.powermgt >>.....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1985,  
2001.

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

..... << End of copyright notice for bos.powermgt >>.....

Filesets processed: 73 of 150  
System Installation Time: 7 minutes      Tasks Complete: 54%

installp: APPLYING software for:  
bos.net.uucp 5.1.0.10  
bos.net.tcp.smit 5.1.0.10  
bos.net.tcp.server 5.1.0.10  
bos.net.tcp.adt 5.1.0.0  
bos.net.snapp 5.1.0.0  
bos.net.nfs.client 5.1.0.10  
bos.net.nis.client 5.1.0.10  
bos.net.nfs.server 5.1.0.0  
bos.net.nfs.cachefs 5.1.0.10  
bos.net.nfs.adt 5.1.0.0  
bos.net.ncs 5.1.0.10

..... << Copyright notice for bos.net >>.....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1985,  
2001.  
(C) Copyright AT&T 1984, 1985, 1986, 1987, 1988, 1989.

(C) Copyright Regents of the University of California 1982, 1986, 1987.  
(C) Copyright INTERACTIVE Systems Corporation 1984.

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

#### Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1985, 2001.

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

#### Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1985, 2001.  
(C) Copyright The United States Army 1987.  
(C) Copyright AT&T 1984, 1985, 1986, 1987, 1988, 1989.  
(C) Copyright Regents of the University of California 1990, 1993, 1994, 1995.  
(C) Copyright BULL 1996, 2001.  
(C) Copyright Cornell University, 1995.  
(C) Copyright Check Point Software Technologies, 1999.  
(C) Copyright Digital Equipment Corporation, 1993.  
(C) Copyright D.L.S. Associates, 1991.  
(C) Copyright of the EGPUP User Process, Paul Kirton and ISI 1984.  
(C) Copyright INRIA-CNRS-INPG 1996, 1997.  
(C) Copyright Internet Software Consortium, 1994-1999.  
(C) Copyright John Robert LoVerso, 1990.  
(C) Copyright The University of Maryland, 1989-1991.  
(C) Copyright MetaInfo, Incorporated, 1998.  
(C) Copyright Regents of The University of Michigan, 1996-1997.  
(C) Copyright Paul Milazzo 1984, 1985.  
(C) Copyright Open Software Foundation, Inc. 1990, 1993.  
(C) Copyright RSA Data Security, Inc. 1990-1997.  
(C) Copyright Leland Stanford Junior University, 1988.  
(C) Copyright Sun Microsystems, Inc. 1984, 1985, 1986, 1987, 1988, 1991.  
(C) Copyright Trusted Information Systems, Inc. 1995-1998.  
(C) Copyright University of Washington, 1995-1997.  
(C) Copyright X Consortium, 1989-1994.

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

#### Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1985, 2001.  
(C) Copyright Regents of the University of California 1990,

1993, 1994, 1995.  
(C) Copyright BULL 1996, 2001.  
(C) Copyright INRIA-CNRS-INPG 1996, 1997.

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

#### Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 2000, 2001.

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

#### Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1985, 2001.  
(C) Copyright AT&T 1984, 1985, 1986, 1987, 1988, 1989.  
(C) Copyright Regents of the University of California 1980, 1982,  
1983, 1985, 1986, 1987, 1988, 1989.  
(C) Copyright Sun Microsystems, Inc. 1984, 1985, 1986, 1987, 1988, 1991.

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

#### Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1993, 2001.  
(C) Copyright Apollo Computer Inc. 1987.  
(C) Copyright Gradient Technologies, Inc., 1991, 1997.

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

... << End of copyright notice for bos.net >> ...

Restoring files, please wait.  
730 files restored.  
0513-065 The imapd Subserver has been added.  
0513-065 The pop3d Subserver has been added.  
0513-071 The gated Subsystem has been added.  
0513-071 The named Subsystem has been added.  
0513-071 The routed Subsystem has been added.  
0513-071 The iptrace Subsystem has been added.  
0513-071 The timed Subsystem has been added.  
0513-071 The dhcpcd Subsystem has been added.  
0513-071 The dhcprd Subsystem has been added.  
0513-071 The mrouted Subsystem has been added.

0513-071 The rsvpd Subsystem has been added.  
0513-071 The policyd Subsystem has been added.  
0513-071 The pxed Subsystem has been added.  
0513-071 The binld Subsystem has been added.  
0513-071 The dfpd Subsystem has been added.  
0513-071 The biod Subsystem has been added.  
0513-071 The nfsd Subsystem has been added.  
0513-071 The rpc.statd Subsystem has been added.  
0513-071 The rpc.lockd Subsystem has been added.  
0513-071 The rpc.mountd Subsystem has been added.  
0513-071 The automountd Subsystem has been added.  
0513-071 The keysevr Subsystem has been added.  
0513-071 The ypbind Subsystem has been added.

Filesets processed: 84 of 150  
System Installation Time: 8 minutes    Tasks Complete: 60%

installp: APPLYING software for:  
bos.msg.en\_US.svprint 5.1.0.0  
bos.msg.en\_US.rte 5.1.0.0  
bos.msg.en\_US.net.tcp.client 5.1.0.0

..... << Copyright notice for bos.msg.en\_US >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 2000,  
2001.  
(C) Copyright Hewlett-Packard Company, 1993  
(C) Copyright The Santa Cruz Operations, Inc. 1997,1999.

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

Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1990,  
2001.

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

..... << End of copyright notice for bos.msg.en\_US >>.....

Filesets processed: 87 of 150  
System Installation Time: 9 minutes    Tasks Complete: 61%

installp: APPLYING software for:  
bos.man.en\_US.cmds 5.1.0.0

..... << Copyright notice for bos.man.en\_US >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1997,  
2001.  
(C) Copyright Apollo Computer Inc. 1987.  
(C) Copyright AT&T 1984, 1985, 1986, 1987, 1988, 1989.

(C) Copyright Regents of the University of California 1986,  
1987, 1988, 1989.  
(C) Copyright Carnegie Mellon, 1988.

Common Desktop Environment

(C) Copyright Hewlett-Packard Company 1993, 1994.  
(C) Copyright International Business Machines Corp. 1993,  
1994.  
(C) Copyright Sun Microsystems, Inc. 1993, 1994.  
(C) Copyright UNIX System Labs, Inc., a subsidiary of Novell,  
Inc. 1993, 1994.

#### RESTRICTED RIGHTS LEGEND

Use, duplication, or disclosure by the U.S. Government is  
subject to  
restrictions as set forth in subparagraph (c)(1)(ii) of the Rights  
in

Technical Data and Computer Software clause in DFARS  
252.227-7013. Rights  
for non-DOD U.S. Government Departments and Agencies are  
as set forth in  
FAR 52.227-19(c)(1,2).  
Hewlett-Packard Company, 3000 Hanover Street, Palo Alto, CA  
94304 U.S.A.  
International Business Machines Corp., Route 100, Somers, NY  
10589 U.S.A.  
Sun Microsystems, Inc., 2550 Garcia Avenue, Mountain View,  
CA 94043 U.S.A.  
UNIX System Labs, Inc., 190 River Road, Summit, NJ 07901  
U.S.A.

(C) Copyright Cornell University 1990.  
(C) Copyright Digital Equipment Corporation, 1985, 1988,  
1990, 1991.  
(C) Copyright Graphic Software Systems Incorporated 1984,  
1990, 1991.  
(C) Copyright Massachusetts Institute of Technology 1985,  
1986,

1987, 1988, 1989.

(C) Copyright Stanford University, 1988.  
(C) Copyright TITN Inc. 1984, 1989.

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

..... << End of copyright notice for bos.man.en\_US >>.....

Restoring files, please wait.  
1082 files restored.

Filesets processed: 88 of 150  
System Installation Time: 9 minutes    Tasks Complete: 61%

installp: APPLYING software for:  
bos.loc.iso.en\_US 5.1.0.0

..... << Copyright notice for bos.loc.iso >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1991,  
2001.

All rights reserved.  
US Government Users Restricted Rights - Use, duplication or

disclosure  
restricted by GSA ADP Schedule Contract with IBM Corp.

..... << End of copyright notice for bos.loc.iso >>.....

Filesets processed: 89 of 150  
System Installation Time: 10 minutes      Tasks Complete: 62%

installp: APPLYING software for:  
bos.help.msg.en\_US.com 5.1.0.0

..... << Copyright notice for bos.help.msg.en\_US >>.....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1997,  
2001.

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

..... << End of copyright notice for bos.help.msg.en\_US >>.....

Filesets processed: 90 of 150  
System Installation Time: 10 minutes      Tasks Complete: 63%

installp: APPLYING software for:  
bos.help.msg.en\_US.smit 5.1.0.0

Filesets processed: 91 of 150  
System Installation Time: 10 minutes      Tasks Complete: 63%

installp: APPLYING software for:  
bos.docsearch.client.com 5.1.0.0

..... << Copyright notice for bos.docsearch >>.....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1997,  
2001.

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

..... << End of copyright notice for bos.docsearch >>.....

Filesets processed: 92 of 150  
System Installation Time: 10 minutes      Tasks Complete: 63%

installp: APPLYING software for:  
bos.docregister.com 5.1.0.10

..... << Copyright notice for bos.docregister >>.....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1998,  
2001.

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

..... << End of copyright notice for bos.docregister >>.....

Filesets processed: 93 of 150  
System Installation Time: 10 minutes      Tasks Complete: 64%

installp: APPLYING software for:  
bos.diag.util 5.1.0.10  
bos.diag.rte 5.1.0.10  
bos.diag.com 5.1.0.10

..... << Copyright notice for bos.diag >>.....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1985,  
2001.  
(C) Copyright AT&T 1984, 1985, 1986, 1987, 1988, 1989.  
(C) Copyright INTERACTIVE Systems Corporation 1983,  
1988.

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

Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1995,  
2001.

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

..... << End of copyright notice for bos.diag >>.....

Filesets processed: 96 of 150  
System Installation Time: 10 minutes      Tasks Complete: 66%

installp: APPLYING software for:  
bos.adt.lib 5.1.0.10  
bos.adt.include 5.1.0.10  
bos.adt.base 5.1.0.10

..... << Copyright notice for bos.adt >>.....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1987,  
2001.  
(C) Copyright AT&T 1984, 1985, 1986, 1987, 1988, 1989.

(C) Copyright Regents of the University of California 1982, 1983,

1986, 1987.

(C) Copyright INTERACTIVE Systems Corporation 1983.

(C) Copyright Open Software Foundation, Inc. 1993.

(C) Copyright Silicon Graphics, Inc. 1987.

(C) Copyright Sun Microsystems, Inc. 1988.

All rights reserved.

US Government Users Restricted Rights - Use, duplication or disclosure

restricted by GSA ADP Schedule Contract with IBM Corp.

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1987, 2001.

(C) Copyright AT&T 1984, 1985, 1986, 1987, 1988, 1989.

(C) Copyright Regents of the University of California 1982, 1983,

1986, 1987.

(C) Copyright BULL 1993, 2001.

(C) Copyright Interactive Systems Corporation 1985, 1991.

(C) Copyright Open Software Foundation, Inc. 1993.

(C) Copyright Silicon Graphics, Inc. 1987.

(C) Copyright Sun Microsystems, Inc. 1988.

All rights reserved.

US Government Users Restricted Rights - Use, duplication or disclosure

restricted by GSA ADP Schedule Contract with IBM Corp.

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1985, 2001.

(C) Copyright AT&T 1993.

(C) Copyright Regents of the University of California 1982, 1983,

1986, 1987.

(C) Copyright INTERACTIVE Systems Corporation 1983.

(C) Copyright Open Software Foundation, Inc. 1993.

(C) Copyright Silicon Graphics, Inc. 1987.

(C) Copyright Sun Microsystems, Inc. 1988.

All rights reserved.

US Government Users Restricted Rights - Use, duplication or disclosure

restricted by GSA ADP Schedule Contract with IBM Corp.

..... << End of copyright notice for bos.adt >> . . . .

Filesets processed: 99 of 150

System Installation Time: 10 minutes      Tasks Complete: 67%

installp: APPLYING software for:

bos.64bit 5.1.0.10

..... << Copyright notice for bos.64bit >> . . . . .

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1996, 2001.

All rights reserved.

US Government Users Restricted Rights - Use, duplication or disclosure

restricted by GSA ADP Schedule Contract with IBM Corp.

..... << End of copyright notice for bos.64bit >> . . . .

Filesets processed: 100 of 150

System Installation Time: 10 minutes      Tasks Complete: 67%

installp: APPLYING software for:

bos.mp64 5.1.0.10

..... << Copyright notice for bos.mp64 >> . . . . .

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 2000, 2001.

(C) Copyright RSA Data Security, Inc. 1991-1992.

All rights reserved.

License to copy and use this software is granted provided that it is identified as the RSA Data Security, Inc. MD5 Message-Digest

Algorithm in all material mentioning or referencing this software

or this function.

License is also granted to make and use derivative works provided

that such works are identified as derived from the RSA Data Security, Inc. MD5 Message-Digest Algorithm in all material mentioning or referencing the derived work.

RSA Data Security, Inc. makes no representations concerning either

the merchantability of this software or the suitability of this software for any particular purpose. It is provided as is without express or implied warranty of any kind.

These notices must be retained in any copies of any part of this documentation and/or software.

All rights reserved.

US Government Users Restricted Rights - Use, duplication or disclosure

restricted by GSA ADP Schedule Contract with IBM Corp.

..... << End of copyright notice for bos.mp64 >> . . . .

Filesets processed: 101 of 150

System Installation Time: 10 minutes      Tasks Complete: 68%

installp: APPLYING software for:

bos.mp 5.1.0.10

..... << Copyright notice for bos.mp >> . . . . .

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1993, 2001.

(C) Copyright RSA Data Security, Inc. 1991-1992.  
All rights reserved.  
License to copy and use this software is granted provided that it is identified as the RSA Data Security, Inc. MD5 Message-Digest  
Algorithm in all material mentioning or referencing this software or this function.  
License is also granted to make and use derivative works provided that such works are identified as derived from the RSA Data Security, Inc. MD5 Message-Digest Algorithm in all material mentioning or referencing the derived work.  
RSA Data Security, Inc. makes no representations concerning either the merchantability of this software or the suitability of this software for any particular purpose. It is provided as is without express or implied warranty of any kind.  
These notices must be retained in any copies of any part of this documentation and/or software.

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

..... << End of copyright notice for bos.mp >>.....

Filesets processed: 102 of 150  
System Installation Time: 11 minutes      Tasks Complete: 69%

installp: APPLYING software for:  
  invscout.msg.en\_US.rte 1.2.0.0

..... << Copyright notice for invscout.msg.en\_US >>.....  
Licensed Materials - Property of IBM

5765C3421  
(C) Copyright International Business Machines Corp. 1990, 2001.

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

..... << End of copyright notice for invscout.msg.en\_US >>.....

Filesets processed: 103 of 150  
System Installation Time: 11 minutes      Tasks Complete: 69%

installp: APPLYING software for:  
  ifor\_ls.base.cli 5.1.0.10

..... << Copyright notice for ifor\_ls.base >>.....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1993, 2001.  
(C) Copyright Apollo Computer Inc. 1987.  
(C) Copyright Gradient Technologies, Inc., 1991, 1997.

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

..... << End of copyright notice for ifor\_ls.base >>.....

Filesets processed: 104 of 150  
System Installation Time: 11 minutes      Tasks Complete: 69%

installp: APPLYING software for:  
  xlC.msg.en\_US.rte 5.0.2.0

..... << Copyright notice for xlC.msg.en\_US >>.....  
Licensed Materials - Property of IBM

5765E2600  
(C) Copyright International Business Machines Corp. 1990, 2001.  
(C) Copyright AT&T 1984, 1985, 1986, 1987, 1988, 1989.  
(C) Copyright UNIX System Labs, Inc., a subsidiary of Novell, Inc. 1993.

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

..... << End of copyright notice for xlC.msg.en\_US >>.....

Filesets processed: 105 of 150  
System Installation Time: 11 minutes      Tasks Complete: 70%

installp: APPLYING software for:  
  X11.msg.en\_US.apps.pm 5.1.0.0

..... << Copyright notice for X11.msg.en\_US >>.....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1985, 2001.

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

..... << End of copyright notice for X11.msg.en\_US >>.....

Filesets processed: 106 of 150  
System Installation Time: 11 minutes      Tasks Complete: 70%

installp: APPLYING software for:  
  devices.scsi.tape.diag 5.1.0.10

Filesets processed: 107 of 150  
System Installation Time: 11 minutes      Tasks Complete: 71%

installp: APPLYING software for:  
  devices.scsi.disk.diag.rte 5.1.0.10

devices.scsi.disk.diag.com 5.1.0.10

Filesets processed: 109 of 150  
System Installation Time: 11 minutes    Tasks Complete: 72%

installp: APPLYING software for:  
    devices.pci.23100020.diag 5.1.0.10

..... << Copyright notice for devices.pci.23100020 >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1997,  
2001.

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

..... << End of copyright notice for devices.pci.23100020 >> ...

Filesets processed: 110 of 150  
System Installation Time: 11 minutes    Tasks Complete: 72%

installp: APPLYING software for:  
    devices.pci.14103e00.diag 5.1.0.10

..... << Copyright notice for devices.pci.14103e00 >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1997,  
2001.

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

..... << End of copyright notice for devices.pci.14103e00 >> ...

Filesets processed: 111 of 150  
System Installation Time: 11 minutes    Tasks Complete: 73%

installp: APPLYING software for:  
    devices.pci.00100f00.diag 5.1.0.0

..... << Copyright notice for devices.pci.00100f00 >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1995,  
2001.

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

..... << End of copyright notice for devices.pci.00100f00 >> ...

Filesets processed: 112 of 150  
System Installation Time: 11 minutes    Tasks Complete: 73%

installp: APPLYING software for:  
    devices.pci.00100c00.diag 5.1.0.0

..... << Copyright notice for devices.pci.00100c00 >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1995,  
2001.

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

..... << End of copyright notice for devices.pci.00100c00 >> ...

Filesets processed: 113 of 150  
System Installation Time: 11 minutes    Tasks Complete: 74%

installp: APPLYING software for:  
    devices.pci.00100300.diag 5.1.0.10

..... << Copyright notice for devices.pci.00100300 >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1995,  
2001.

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

..... << End of copyright notice for devices.pci.00100300 >> ...

Filesets processed: 114 of 150  
System Installation Time: 11 minutes    Tasks Complete: 75%

installp: APPLYING software for:  
    devices.msg.en\_US.diag.rte 5.1.0.0

Filesets processed: 115 of 150  
System Installation Time: 12 minutes    Tasks Complete: 75%

installp: APPLYING software for:  
    devices.isa\_sio.pnpPNP.700.diag 5.1.0.0

..... << Copyright notice for devices.isa\_sio.pnpPNP.700 >> ...  
.....

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1996, 2001.

All rights reserved.

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

.... << End of copyright notice for devices.isa\_sio.pnpPNP.700  
>>....

Filesets processed: 116 of 150

System Installation Time: 12 minutes      Tasks Complete: 75%

installp: APPLYING software for:

devices.isa\_sio.pnpPNP.501.diag 5.1.0.0

.... << Copyright notice for devices.isa\_sio.pnpPNP.501 >> ..

....

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1996, 2001.

All rights reserved.

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

.... << End of copyright notice for devices.isa\_sio.pnpPNP.501  
>>....

Filesets processed: 117 of 150

System Installation Time: 12 minutes      Tasks Complete: 76%

installp: APPLYING software for:

devices.isa\_sio.pnpPNP.400.rte 5.1.0.0

devices.isa\_sio.pnpPNP.400.diag 5.1.0.0

.... << Copyright notice for devices.isa\_sio.pnpPNP.400 >> ..

....

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1996, 2001.

All rights reserved.

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

.... << End of copyright notice for devices.isa\_sio.pnpPNP.400  
>>....

Filesets processed: 119 of 150

System Installation Time: 12 minutes      Tasks Complete: 77%

installp: APPLYING software for:

devices.isa\_sio.PNP0F03.diag 5.1.0.0

.... << Copyright notice for devices.isa\_sio.PNP0F03 >> ....

..

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1995, 2001.

All rights reserved.

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

.... << End of copyright notice for devices.isa\_sio.PNP0F03  
>>....

Filesets processed: 120 of 150

System Installation Time: 12 minutes      Tasks Complete: 78%

installp: APPLYING software for:

devices.isa\_sio.PNP0303.diag 5.1.0.0

.... << Copyright notice for devices.isa\_sio.PNP0303 >> ....

..

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1995, 2001.

All rights reserved.

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

.... << End of copyright notice for devices.isa\_sio.PNP0303  
>>....

Filesets processed: 121 of 150

System Installation Time: 12 minutes      Tasks Complete: 78%

installp: APPLYING software for:

devices.isa\_sio.km.diag 5.1.0.0

.... << Copyright notice for devices.isa\_sio.km >> .....

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1995, 2001.

All rights reserved.

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

.... << End of copyright notice for devices.isa\_sio.km >>....

Filesets processed: 122 of 150  
System Installation Time: 12 minutes    Tasks Complete: 78%

installp: APPLYING software for:  
    devices.isa\_sio.IBM0019.diag 5.1.0.0

..... << Copyright notice for devices.isa\_sio.IBM0019 >> .....  
..  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1995,  
2001.

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

..... << End of copyright notice for devices.isa\_sio.IBM0019  
>>.....

Filesets processed: 123 of 150  
System Installation Time: 12 minutes    Tasks Complete: 79%

installp: APPLYING software for:  
    devices.isa\_sio.IBM0017.diag 5.1.0.10

..... << Copyright notice for devices.isa\_sio.IBM0017 >> .....  
..  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1995,  
2001.

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

..... << End of copyright notice for devices.isa\_sio.IBM0017  
>>.....

Filesets processed: 124 of 150  
System Installation Time: 12 minutes    Tasks Complete: 79%

installp: APPLYING software for:  
    devices.isa\_sio.chrp.ecp.diag 5.1.0.0

..... << Copyright notice for devices.isa\_sio.chrp.ecp >> .....  
.  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1997,  
2001.

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

..... << End of copyright notice for devices.isa\_sio.chrp.ecp >> .  
...

Filesets processed: 125 of 150  
System Installation Time: 12 minutes    Tasks Complete: 80%

installp: APPLYING software for:  
    devices.isa\_sio.chrp.8042.diag 5.1.0.0

..... << Copyright notice for devices.isa\_sio.chrp.8042 >> .....  
..  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1996,  
2001.

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

..... << End of copyright notice for devices.isa\_sio.chrp.8042  
>>.....

Filesets processed: 126 of 150  
System Installation Time: 12 minutes    Tasks Complete: 81%

installp: APPLYING software for:  
    devices.common.IBM.ppa.diag 5.1.0.0

Filesets processed: 127 of 150  
System Installation Time: 12 minutes    Tasks Complete: 81%

installp: APPLYING software for:  
    devices.common.IBM.ktm\_std.diag 5.1.0.0

..... << Copyright notice for devices.common.IBM.ktm\_std >> .  
.....  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1995,  
2001.

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

..... << End of copyright notice for  
devices.common.IBM.ktm\_std >>.....

Filesets processed: 128 of 150  
System Installation Time: 12 minutes    Tasks Complete: 81%

installp: APPLYING software for:  
    devices.common.IBM.fda.diag 5.1.0.0

Filesets processed: 129 of 150  
System Installation Time: 12 minutes    Tasks Complete: 82%

installp: APPLYING software for:  
    devices.common.IBM.async.diag 5.1.0.0

..... << Copyright notice for devices.common.IBM.async >> ...

.....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1995,  
2001.

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

..... << End of copyright notice for devices.common.IBM.async  
>>.....

Filesets processed: 130 of 150  
System Installation Time: 12 minutes    Tasks Complete: 82%

installp: APPLYING software for:  
    devices.common.base.diag 5.1.0.10

..... << Copyright notice for devices.common.base >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1995,  
2001.

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

..... << End of copyright notice for devices.common.base >> ...  
.

Filesets processed: 131 of 150  
System Installation Time: 12 minutes    Tasks Complete: 83%

installp: APPLYING software for:  
    devices.chrp.base.diag 5.1.0.10

..... << Copyright notice for devices.chrp.base >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1995,  
2001.

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

..... << End of copyright notice for devices.chrp.base >> ...

Filesets processed: 132 of 150  
System Installation Time: 12 minutes    Tasks Complete: 84%

installp: APPLYING software for:  
    printers.msg.en\_US.rte 5.1.0.0

..... << Copyright notice for printers.msg.en\_US >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1990,  
2001.

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

..... << End of copyright notice for printers.msg.en\_US >> ...

Filesets processed: 133 of 150  
System Installation Time: 12 minutes    Tasks Complete: 84%

installp: APPLYING software for:  
    bos.terminfo.wyse.data 5.1.0.0  
    bos.terminfo.teletype.data 5.1.0.0  
    bos.terminfo.svprint.data 5.1.0.0  
    bos.terminfo.pc.data 5.1.0.0  
    bos.terminfo.ibm.data 5.1.0.0  
    bos.terminfo.dec.data 5.1.0.0  
    bos.terminfo.ansi.data 5.1.0.0

..... << Copyright notice for bos.terminfo >> .....  
Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 1993,  
2001.  
(C) Copyright AT&T 1993.

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

Licensed Materials - Property of IBM

5765E6100  
(C) Copyright International Business Machines Corp. 2000,  
2001.  
(C) Copyright The Santa Cruz Operations, Inc. 1997,1999.

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

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1985, 2001.

#### Common Desktop Environment

(C) Copyright Hewlett-Packard Company 1993, 1994.  
(C) Copyright International Business Machines Corp. 1993, 1994.  
(C) Copyright Sun Microsystems, Inc. 1993, 1994.  
(C) Copyright UNIX System Labs, Inc., a subsidiary of Novell, Inc. 1993, 1994.

#### RESTRICTED RIGHTS LEGEND

Use, duplication, or disclosure by the U.S. Government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in

Technical Data and Computer Software clause in DFARS 252.227-7013. Rights

for non-DOD U.S. Government Departments and Agencies are as set forth in

FAR 52.227-19(c)(1,2).

Hewlett-Packard Company, 3000 Hanover Street, Palo Alto, CA 94304 U.S.A.

International Business Machines Corp., Route 100, Somers, NY 10589 U.S.A.

Sun Microsystems, Inc., 2550 Garcia Avenue, Mountain View, CA 94043 U.S.A.

UNIX System Labs, Inc., 190 River Road, Summit, NJ 07901 U.S.A.

All rights reserved.

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

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1993, 2001.

(C) Copyright Open Software Foundation, Inc. 1993.

All rights reserved.

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

..... << End of copyright notice for bos.terminfo >>.....

Filesets processed: 140 of 150

System Installation Time: 12 minutes      Tasks Complete: 87%

installp: APPLYING software for:  
bos.sysmgt.nim.client 5.1.0.10

..... << Copyright notice for bos.sysmgt >>.....  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1993, 2001.

All rights reserved.

US Government Users Restricted Rights - Use, duplication or

disclosure  
restricted by GSA ADP Schedule Contract with IBM Corp.

..... << End of copyright notice for bos.sysmgt >>.....

Filesets processed: 141 of 150

System Installation Time: 13 minutes      Tasks Complete: 88%

installp: APPLYING software for:  
bos.net.nis.server 5.1.0.10

..... << Copyright notice for bos.net >>.....  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1985, 2001.

(C) Copyright AT&T 1984, 1985, 1986, 1987, 1988, 1989.

(C) Copyright Regents of the University of California 1980, 1982,

1983, 1985, 1986, 1987, 1988, 1989.

(C) Copyright Sun Microsystems, Inc. 1985, 1986, 1987, 1988.

All rights reserved.

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

..... << End of copyright notice for bos.net >>.....

0513-071 The ypserv Subsystem has been added.

0513-071 The ypupdated Subsystem has been added.

0513-071 The yppasswdd Subsystem has been added.

Filesets processed: 142 of 150

System Installation Time: 13 minutes      Tasks Complete: 88%

installp: APPLYING software for:  
bos.msg.en\_US.mp 5.1.0.0  
bos.msg.en\_US.docsearch.client.com 5.1.0.0  
bos.msg.en\_US.docregister.com 5.1.0.0  
bos.msg.en\_US.diag.rte 5.1.0.0

..... << Copyright notice for bos.msg.en\_US >>.....  
Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1993, 2001.

All rights reserved.

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

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1997, 2001.

All rights reserved.

US Government Users Restricted Rights - Use, duplication or

disclosure  
restricted by GSA ADP Schedule Contract with IBM Corp.

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1998,  
2001.

All rights reserved.

US Government Users Restricted Rights - Use, duplication or  
disclosure

restricted by GSA ADP Schedule Contract with IBM Corp.

..... << End of copyright notice for bos.msg.en\_US >> . . .

Filesets processed: 146 of 150

System Installation Time: 13 minutes      Tasks Complete: 90%

installp: APPLYING software for:

bos.docsearch.rte 5.1.0.0

Filesets processed: 147 of 150

System Installation Time: 13 minutes      Tasks Complete: 91%

installp: APPLYING software for:

ifor\_ls.msg.en\_US.base.cli 5.1.0.0

..... << Copyright notice for ifor\_ls.msg.en\_US >> . . . . .

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1993,  
2001.

(C) Copyright Apollo Computer Inc. 1987.

(C) Copyright Gradient Technologies, Inc., 1991, 1997.

All rights reserved.

US Government Users Restricted Rights - Use, duplication or  
disclosure

restricted by GSA ADP Schedule Contract with IBM Corp.

..... << End of copyright notice for ifor\_ls.msg.en\_US >> . . .

Filesets processed: 148 of 150

System Installation Time: 13 minutes      Tasks Complete: 91%

installp: APPLYING software for:

bos.html.en\_US.topnav.navigate 5.1.0.0

..... << Copyright notice for bos.html.en\_US.topnav >> . . . . .

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1997,  
2001.

(C) Copyright Apollo Computer Inc. 1987.

(C) Copyright AT&T 1984, 1985, 1986, 1987, 1988, 1989.

(C) Copyright Regents of the University of California 1986,  
1987, 1988, 1989.

(C) Copyright Carnegie Mellon, 1988.

Common Desktop Environment

(C) Copyright Hewlett-Packard Company 1993, 1994.

(C) Copyright International Business Machines Corp. 1993,  
1994.

(C) Copyright Sun Microsystems, Inc. 1993, 1994.

(C) Copyright UNIX System Labs, Inc., a subsidiary of Novell,  
Inc. 1993, 1994.

RESTRICTED RIGHTS LEGEND

Use, duplication, or disclosure by the U.S. Government is  
subject to

restrictions as set forth in subparagraph (c)(1)(ii) of the Rights  
in

Technical Data and Computer Software clause in DFARS  
252.227-7013. Rights

for non-DOD U.S. Government Departments and Agencies are  
as set forth in

FAR 52.227-19(c)(1,2).

Hewlett-Packard Company, 3000 Hanover Street, Palo Alto, CA  
94304 U.S.A.

International Business Machines Corp., Route 100, Somers, NY  
10589 U.S.A.

Sun Microsystems, Inc., 2550 Garcia Avenue, Mountain View,  
CA 94043 U.S.A.

UNIX System Labs, Inc., 190 River Road, Summit, NJ 07901  
U.S.A.

(C) Copyright Cornell University 1990.

(C) Copyright Digital Equipment Corporation, 1985, 1988,  
1990, 1991.

(C) Copyright Graphic Software Systems Incorporated 1984,  
1990, 1991.

(C) Copyright Massachusetts Institute of Technology 1985,  
1986,

1987, 1988, 1989.

(C) Copyright Stanford University, 1988.

(C) Copyright TITN Inc. 1984, 1989.

All rights reserved.

US Government Users Restricted Rights - Use, duplication or  
disclosure

restricted by GSA ADP Schedule Contract with IBM Corp.

..... << End of copyright notice for bos.html.en\_US.topnav >> .  
..

Filesets processed: 149 of 150

System Installation Time: 13 minutes      Tasks Complete: 92%

installp: APPLYING software for:

IMNSearch.rte.httpdlite 2.0.0.10

..... << Copyright notice for IMNSearch.rte.httpdlite >> . . . . .

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1997,  
2001.

All rights reserved.

US Government Users Restricted Rights - Use, duplication or  
disclosure

restricted by GSA ADP Schedule Contract with IBM Corp.

..... << End of copyright notice for IMNSearch.rte.httpdlite >>.

If there were any users logged into the system while the Lite NetQuestion HTTP Web Server was being installed, these users will need to log out and then log back in to make the Documentation Library Service operate properly for their accounts.

Finished processing all filesets.

System Installation Time: 13 minutes      Tasks Complete: 93%

Filesystem size changed to 49152

mttools-3.9.7-4  
cdrecord-1.9-4  
mkisofs-1.13-4

FAILURES

Filesets listed in this section failed pre-installation verification and will not be installed.

## Missing Filesets

The following filesets could not be found on the installation media.

If you feel these filesets really are on the media, check for typographical errors in the name specified or, if installing from directory, check for discrepancies between the Table of Contents file (.toc) and the images that reside in the directory.

devices.isa\_sio.8042  
devices.isa\_sio.CRUS.CS4236B  
devices.isa\_sio.IBM.tablet-port  
devices.isa\_sio.fdc  
devices.isa\_sio.parallel  
devices.isa\_sio.pnpPNP.b007  
devices.isa\_sio.serial  
devices.isa\_sio.sound  
devices.pci.ethernet  
devices.pci.pciclass.010000  
devices.pci.pciclass.020000  
devices.pci.pciclass.020100  
devices.pci.scsi  
devices.pci.token-ring  
devices.isa\_sio.8042  
devices.isa\_sio.CRUS.CS4236B  
devices.isa\_sio.IBM.tablet-port  
devices.isa\_sio.fdc  
devices.isa\_sio.parallel  
devices.isa\_sio.pnpPNP.b007  
devices.isa\_sio.serial  
devices.isa\_sio.sound  
devices.pci.ethernet  
devices.pci.pciclass.010000  
devices.pci.pciclass.020000  
devices.pci.pciclass.020100  
devices.pci.scsi  
devices.pci.token-ring

<< End of Failure Section >>

## Installing Base Operating System

If you used the system key to select SERVICE mode,

turn the system key to the **NORMAL** position any time before the installation ends.

Please wait...

Approximate % tasks complete	Elapsed time (in minutes)
0	0
10	10
20	20
30	30
40	40
50	50
60	60
70	70
80	80
90	90
100	100

20 Installing additional software.  
96 20 Creating boot image.

Licensed Materials - Property of IBM

5765E6100

(C) Copyright International Business Machines Corp. 1985,  
2001.

(C) Copyright AT&T 1984, 1985, 1986, 1987, 1988, 1989.

(C) Copyright Regents of the University of California 1980, 1982,

1983, 1985, 1986, 1987, 1988, 1989.

(C) Copyright BULL 1993, 2001.

(C) Copyright Digi International Inc. 1988-1993.

(C) Copyright Interactive Systems Corporation 1985, 1991.

(C) Copyright ISQUARE, Inc. 1990.

(C) Copyright Mentat Inc. 1990, 1991.

(C) Copyright Open Software Foundation, Inc. 1989, 1994.

(C) Copyright Sun Microsystems, Inc. 1984, 1985, 1986, 1987, 1988, 1991.

All rights reserved.

US Government Users Restricted Rights - Use, duplication or disclosure

restricted by GSA ADP Schedule Contract with IBM Corp.

Rebooting . . .

## Appendix <??> First Boot Configuration Menu

RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000  
RS/6000 RS/6000 RS/6000 RS/6000  
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000  
RS/6000 RS/6000 RS/6000 RS/6000  
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000  
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000  
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000  
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000  
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000  
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000  
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000  
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000  
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000  
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000  
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000

STARTING SOFTWARE

PLEASE WAIT... RS/6000

RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000

RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000

```
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000
RS/6000 RS/6000 RS/6000 RS/6000
```

```
-----
Welcome to AIX.
boot image timestamp: 18:32 11/01
The current time and date: 18:34:01 11/01/2001
number of processors: 1 size of memory: 512Mb
boot device: /pci@fef00000/scsi@c/sd@8:2
closing stdin and stdout...
-----
```

```
Saving Base Customize Data to boot disk
Starting the sync daemon
Starting the error daemon
System initialization completed.
Starting Multi-user Initialization
Performing auto-varyon of Volume Groups
Activating all paging spaces
0517-075 swapon: Paging device /dev/hd6 is already active.
/dev/rhd1 (/home): ** Unmounted cleanly - Check suppressed
/dev/rhd10opt (/opt): ** Unmounted cleanly - Check suppressed
Performing all automatic mounts
Multi-user initialization completed
Checking for srmstr active...complete
Starting tcpip daemons:
0513-059 The syslogd Subsystem has been started. Subsystem
PID is 4160.
0513-059 The sendmail Subsystem has been started. Subsystem
PID is 4908.
0513-059 The portmap Subsystem has been started. Subsystem
PID is 5162.
0513-059 The inetd Subsystem has been started. Subsystem PID
is 5418.
0513-059 The snmpd Subsystem has been started. Subsystem PID
is 5676.
0513-059 The dpid2 Subsystem has been started. Subsystem PID
is 5934.
0513-059 The hostmibd Subsystem has been started. Subsystem
PID is 6192.
Finished starting tcpip daemons.
Starting NFS services:
0513-059 The biod Subsystem has been started. Subsystem PID is
7228.
0513-059 The rpc.statd Subsystem has been started. Subsystem
PID is 7744.
statd -a can't get ip configuration
: A system call received a parameter that is not valid.
statd -a can't get ip configuration
: A system call received a parameter that is not valid.
```

```
statd -a can't get ip configuration
: A system call received a parameter that is not valid.
0513-059 The rpc.lockd Subsystem has been started. Subsystem
PID is 7752.
Completed NFS services.
```

```
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) 88 Help ? | to return to this screen.
99 Exit |
```

```
>>> Choice []: vt100
Software License
Accept License Agreements
Set root Password
Set Installation Device
Configure Network Communications
Manage System Storage and Paging Space (rootvg)
Manage Language Environment
Create Users
Define Printers
Import Existing Volume Groups
Install Software Applications
Back Up the System
Using SMIT (information only)
Tasks Completed - Exit to Login
```

```
Set root Password
root's New password:
Enter the new password again:
Set the Hostname
localhost
TCPIP Further Configuratio
```

```
Hostname
Static Routes
Network Interfaces
Name Resolution
Client Network Services
Server Network Services
Manage Print Server
Select BSD style rc Configuration
Start Configured TCPIP Daemons
Stop TCPIP Daemons
Authentication Configuration
```

```
REBOOT
```

```
AIX Version 5
```

(C) Copyrights by IBM and by others 1982, 2000.

Console login: root  
root's Password: 0513-059 The ctrmc Subsystem has been  
started. Subsystem PID is 9812.

```
*****
*****
*                                     *
*                                     *
* Welcome to AIX Version 5.1!          *
*                                     *
*                                     *
* Please see the README file in /usr/lpp/bos for information
pertinent to *
* this release of the AIX Operating System.      *
*                                     *
*                                     *
```

---

---

## End Notes

<sup>1</sup> Those trademarks followed are registered trademarks of IBM in the United States; all others are trademarks or common law marks of IBM in the United States.

AIX®

AIX/ESA®

AIX/L

AIX/L (logo)

AIX 5L

RS/6000

Power Series

<sup>2</sup> The SANS Institute, "Solaris Security: Step by Step v2.0" USA, The SANS Institute, 2001

<sup>3</sup> Slashcode is owned by Open Source Development Network, Inc. ("OSDN"). Original Authors of Slash were [CmdrTaco](#) and [CowboyNeal](#).

Current maintainers of Slashcode: [CaptTofu](#), [Krow](#) and [pudge](#).

<sup>4</sup> <http://www.mysql.org/company/trademark.html>

<sup>5</sup> IBM Redbook SG24-5139, pages 11-12

<sup>6</sup> IBM Redbook SG24-5129-00, pages 105-171

<sup>7</sup> IBM Redbook SG24-5765-01, pages 81-94

<sup>8</sup> IBM Redbook SG24-5765-01

<sup>9</sup> IBM Redbook SG24-5765-01, pages 324-354

<sup>10</sup> IBM Redbook SG24-5765-01, pages 169-170

<sup>11</sup> IBM Redbook SG24-5765-01, pages 169-170

IBM Redbook SG24-5129-00, pages 229-233

<sup>12</sup> [http://www.cert.org/contact\\_cert/](http://www.cert.org/contact_cert/) (date of last access 12/18/01)

<sup>13</sup> <http://www.kiwi-enterprises.com/contact.htm> (date of last access 12/18/01)

<sup>14</sup> <http://www.linuxdoc.org/HOWTO/Chroot-BIND-HOWTO-2.html>

<sup>15</sup> IBM Redbook SG24-5765-01, pages 233-257

<sup>16</sup> Quercia, Valerie and O'Reilly, Tim "X Window System Users' Guide: OSF/Motif 1.2 Edition," USA, O'Reilly & Associates, Inc, 1993. pages 748-750

<sup>17</sup> Coar, Ken. "Security and Apache: An Essential Primer: Maxwell's Demon and Hat Colour"  
<http://www.linuxplanet.com/linuxplanet/tutorials/1527/1/> (date of access 12-18-01)

"Apache tutorials," <http://httpd.apache.org/docs/misc/tutorials.html> (date of access 12-18-01)

<sup>18</sup> Nessus is found at <http://www.nessus.org> (date of last access 12/18/01)