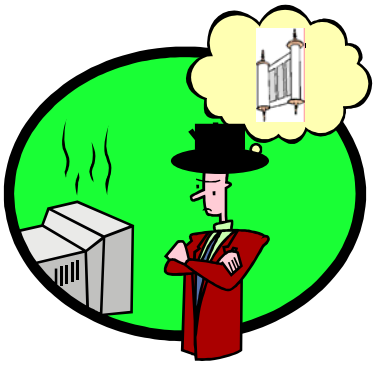
RISC6000 Troubleshooting Guide

(For Brisque/Timna/Brisque Serve)

Revision April 6, 2006



Company Confidential

By Lev Weissman

Brisque, Brisque Serve PSM,AIX+Networking PSS

Creo IL. Ltd., a subsidiary of Kodak |Kodak Graphic Communications Group|

graphics.kodak.com

972-99597319

Revision History

Rev	Date	Author	Comments
1.0	July 2, 2001	Lev Weissman	First draft
2.0	July 8, 2001	Lev Weissman	Added: Application core analysis
3.0	July 18 2001	Lev Weissman	Updated and Added: Application core analysis, more useful commands, corrupted FS crashes the RISC6000, removing an active en0 interface
4.0	August 1,2001	Lev Weissman	More commands, useful links, description, System problems, Helios issues, smit fast paths
5.0	Nov 15, 2001	Lev Weissman	Performance tools in focus, More commands, more Helios TS
6.0	Nov 28, 2001	Lev Weissman	Hardware issues, more useful links
7.0	Dec 29, 2001	Lev Weissman	dump/crash codes , Configuration Program Indicators , Diagnostic Load Progress Indicators ,
8.0	Feb 20 , 2002	Lev Weissman	More boot problems ,
9.0	April 1,2002	Lev Weissman	Restarting NFS , Privilege password prevents access to SMS , Can't qualify my own domain name , more Ethershare TS , More HW issues
10.0	July 28 ,2002	Lev Weissman	Security issues , nmon
11.0	Aug 25,2002	Lev Weissman	Application core analysis-updated , Removing stale NFS mount, more …
12.0	Jan 1,2003	Lev Weissman	AIX5 update, more useful links , LED 553 updated , RPC timeout error on Brisque when transferring files with a Mac , 6f1 hardware problems elimination ,
13.0	March 26,2003	Lev Weissman	Fix for bad links, Understanding disk issues , fixed useful links, IBM boards numbers, Identifying problematic Filesystem ,
14.0	April 26,2003	Lev Weissman	MAC OSX connectivity , NFS troubleshooting , a filesystem gets full 100% ,
15.0	July 26,2003	Lev Weissman	Updated core source determination (for AIX5) , SCSI ASC/ASCQ codes , display IP config ,
16.0	Sept 26,2003	Lev Weissman	AIX monitoring tools , 6E4 – reset the attention LED , updated PCI slots - location codes ,
17.0	Apr 2 ,2004	Lev Weissman	Copy from OSX to AIX is slow , IP address changes after reboot , Code 450B288D on 6F1 ,
18.0	May 2 ,2004	Lev Weissman	TigerII issues , Vi'ing a large file , F50 will not boot , Maximum AIX File/Filesystem Sizes , Writing a PVID to disk ,
19.0	Aug 20 ,2004	Lev Weissman	Establishing the reason for system dump using diag , Slow OSX to Brisque copy ,
20.0	Dec 22 ,2004	Lev Weissman	Samba issues , Making a floppy from the image , Slow cdesci login ,

Rev	Date	Author	Comments
21.0	Feb 10 ,2005	Lev Weissman	SMS not available , 6F1 platform fails to boot - Error 10111B05 , Stalled partitions after mirrored disk removal , 6E3 -Error 406C0CA6 during boot ,
22.0	June 22,2005	Lev Weissman	Performance issues , Error Code 28A00040 in TIGER-II , 6F1 - Determine if the 6F1 Platform CPU Should be Replaced ,
23.0	July 1,2005	Lev Weissman	Remove a stalled volume group , iostat shows 100% disk utilization ,cannot login as macuser ,file size limitation ,
24.0	Dec 15 ,2005	Lev Weissman	Copying over bad security files , Creating dataVolumes via scismit failed after a disk replacement , Reducing the paging space , NFS issues ,
25.0	April 5 ,2006	Lev Weissman	Links Update, reinitializing rootvg,

Table of Contents

Table of Contents 4
1. errpt 11
1.1 Browsing errors by timeframe 12
1.2 Browsing SW errors : 12
1.3 Browsing HW errors : 13
1.4 Clearing the errlog 15
1.5 Establishing the problematic board slot Number 15
2. Running AIX diag 17
2.1 Diagnosing the errlog 17
2.2 Running diag via smit 17
23 Running manual command 17
3. System Dump 19
3.1 Overview 19
3.2 Dump Status Codes 19
3.3 Crash Codes 19
3.4 Enabling system dump 20
3.5 Establishing the reason for system dump using diag 20
3.6 Analyzing system dump 20
4. Application dump analysis 23
4.1 Overview 23
4.2 Checking for an application core dump 23
4.3 Finding all current cores reasons 24
4.4 Automatic core determination 24
5. System issues 25
5.1 Synchronizing the systems clock 25
5.2 F50 issues 25
5.2.1 Error E0BF during boot 25
5.3 SMS not accessible 26
5.4 Security issues 27
5.5 Login to application (cdesci) takes long time (half hour) 28
5.6 CDE does not come up after power failure 28
5.7 TigerII issues (43p-150) 28
5.7.1 When proofing to the Iris.- keeps locking up 28
5.7.2 Error Code 28A00040 in TIGER-II 28
5.7.3 Tiger keeps crashing after 30 minutes 28
5.8 6F1 issues 28
5.8.1 6F1- Firmware Recovery 28
5.8.2 6F1 - LVD SCI adapters are “defined” 28
5.8.3 6F1 -The boot sequence was on CD only 29
5.8.4 6F1 -Privilege password' preventing access to SMS 29
5.8.5 6F1 -determine if there is a defective power supply 29
5.8.6 6F1 - Different errors appear in errpt, system crashes 30
5.8.7 6F1 -How to Determine if the 6F1 Platform CPU Should be Replaced 30
5.8.8 6F1 platform fails to boot with Error 0637 33
5.8.9 6F1 platform fails to boot with Error 10111B05 33
5.8.10 6F1 crashes with a 450B288D code in the lcd (memory problem) 33
5.8.11 6F1 crashes with a 4507300C code in the lcd (memory problem) 33
5.8.12 6f1 hardware problems elimination flow 35
5.9 6E4/6E3 issues 36

5.9.1 reset the Attention LED 36
5.9.2 Error 406C0CA6 during boot 36
5.10 44P-170 issues 36
5.10.1 determine if there is a defective power supply 36
6. Performance issues 38
6.1 Network issues 38
6.2 I/O issues 38
6.3 Memory issues 39
6.4 Check for full filesystems 39
7. Disk and filesystem problems 40
7.1 JFS Filesystem Overview 40
7.2 File size limitations 40
7.3 Can disk be accessed ? 40
7.4 iostat shows disk utilization at 100% 40
7.5 How do I remove a volume group with no disks? 40
7.6 Creating dataVolumes via scismit failed after a disk replacement. 41
7.7 Stalled mirrored partition after the mirror disk removal 41
7.8 Writing a PVID to disk 44
7.9 Recovering a logical volume 44
7.10 Reducing the paging space 44
7.11 Copy a superblock 46
7.12 Format jfslog 46
7.13 A filesystem gets full 100% 46
7.14 Maximum AIX File/Filesystem Sizes 47
7.15 /scitex is empty 47
7.16 Corrupted filesystem crashes fsck on boot 47
7.17 Identifying a problematic filesystem from errpt 47
7.18 Reinitializing the rootvg Volume Group 48
7.19 Problems With Booting A System 48
7.19.1 LEDs 517 or 518 – system boot sticks 48
7.19.2 LED 581 –system sticks 50
8. Network basic troubleshooting 51
8.1 TCP/IP 51
8.1.1 When it's a software problem... 51
8.1.2 When it occurs in only one application... 51
8.1.3 When problems occur in all applications... 51
8.1.4 When all nodes are affected... 51
8.1.5 When only one node is affected... 52
8.1.6 When it appears to be router problem 52
8.1.7 When it's a DNS problem 52
8.1.8 When DNS is down … 52
8.1.9 Ping command usage: 53
8.1.10 Can not qualify my own domain name, using short name... 53
8.1.11 IP address changes after reboot 54
8.2 NFS issues 54
8.2.1 Restarting NFS 54
8.2.2 NFS mount failes from all stations 54
8.2.3 Removing a stale NFS mount 55
8.2.4 NFS basic checklist 55
8.2.5 MountPro issues 59
8.2.6 Smit mounts issues 60
8.2.7 Mounts that used to work … 60

8.2.8 NFS Performance issues 60
8.3 Samba Issues 60
8.3.1 Level 1: Beginning the Climb up the Pyramid 60
8.3.2 Level 3: Remote Access to Shares 64
8.3.3 Level 4: Network Browsing 66
8.3.4 Level 5: A Wealth of Information—Log Filesand Packets 66
8.3.5 Level 6: Samba Internals 69
8.3.6 Summary 70
8.3.7 Q&A 70
8.4 Appletalk and Helios Issues 72
8.4.1 Cannot login as macuser 72
8.4.2 Calling “rebuild” 72
8.4.3 Atalk does not start 72
8.4.4 Boot hangs while loading EtherShare (message "atalk ..") 72
8.4.5 "File in use" message when performing "empty trash" on the Mac 73
8.4.6 Files from the RISC6000 "disappear" 73
8.4.7 Server is invisible in the Mac’s Chooser , but afpsrv is up and running 73
8.4.8 Icons fall one on top of the other and no user visible in the AppleShare, sharing option folder 74
8.4.9 Icons for RISC6000 applications don't appear on the Mac 74
8.4.10 "file cannot be copied onto itself" when copying files from the Mac 74
8.4.11 Message "can't copy file - permission denied" when copying files from the Mac 74
8.4.12 Mounted Volumes have much less free space than they should have 74
8.4.13 No connection can be established to the file server 74
8.4.14 Server not responding" message 74
8.4.15 Poor AppleTalk Network Performance 75
8.4.16 Slow OSX to Brisque copy 75
8.4.17 Files or folders have the wrong icons or appear in the wrong directories 76
8.4.18 Problems with the Network Trash Folder on the file server 76
8.4.19 Ripro volume on Mac has "read only" permission. 76
8.4.20 Some functions of the server are not available 76
8.4.21 Volume is grayed out in the Chooser list 76
8.4.22 OPI server cannot find hi-res files 76
8.4.23 Print Spooler Available Space Error 77
8.4.24 Folders appear “jumping” on the desktop 77
8.4.25 How to connect more then 4 concurrent users in Ethershare Admin 77
8.4.26 Ethershare 2.6 – multiple entries for some clients (login) 78
8.4.27 RPC timeout error on Brisque when transferring files with a Mac 78
8.5 MAC OSX connectivity 78
8.5.1 Adding hosts in Mac OS X 10.2 78
8.5.2 Copy from Mac OS X between 2 mounted volumes is very slow 78
8.5.3 Cannot connect to AIX via Chooser in Mac OS X 78
8.5.4 Zones do not appear in Chooser 79
8.5.5 File Server does not appear in Chooser 80
8.5.6 Guest access is grayed-out (unavailable) 80
8.5.7 Volumes are grayed-out (unavailable) in Chooser 80
8.5.8 "Server not responding" message 80
8.5.9 Forcing an AppleTalk connection 80
8.5.10 Can't connect using TCP/IP 80
8.5.11 Client stops responding when logging in to the server 80
8.5.12 File Server does not appear in Chooser 81
8.6 Removing an active en0 interface 82
8.7 Display all IP related configuration 82
8.8 Setting Full Duplex 82
8.8.1 What is Full Duplex? 82
8.8.2 What benefits? 83
8.8.3 Full Duplex set up 83

8.8.4 Changing board configuration 83
8.9 Network monitoring 83
8.9.1 AIX Tools 83
8.9.2 Mac Tools (OSX) 84
8.9.3 Mac Tools (OS9) 84
8.9.4 Helios LanTest 84
8.9.5 MacTCP Ping 84
8.9.6 NetInfo 84
8.9.7 Apple System Profiler 85
8.9.8 file copy 85
8.9.9 Change configuration to see the changes 85
8.9.10 Checking connectivity with a cross cable 85
8.9.11 PC tools 85
Useful commands 86
8.10 Memory 86
8.11 Devices 86
8.12 System info 87
8.13 System issues 87
8.14 Networking 88
8.15 Disks 89
8.16 Filesystem 89
8.17 Helios 90
8.18 System monitoring 90
8.19 Performance issues 90
8.20 Remote issues (working over the modem) 91
8.21 Browsing errlog with errpt 91
8.22 Creo issues - run those commands 91
8.23 Security issues 92
8.24 Miscellaneous 92
8.25 Examples on commands usage 92
8.26 Making a duplicate (or image) out of diskette in UNIX 93
8.26.1 Making an image from a diskette 93
8.26.2 Prepare for sending it via E-Mail 93
8.26.3 Making a floppy from the image 93
9. Important files 95
10. Useful links 96
11. Appendix A - vmstat 97
11.1 The vmstat Command (Memory) 97
11.2 vmstat command (disk) 99
11.3 The vmstat Command (CPU) 99
12. Appendix B – Understanding disk issues 103
12.1 Description of Logical Volume Management (LVM) 103
12.2 Volume groups 103
12.3 Logical volumes 103
12.4 Object Data Manager (ODM) 104
12.5 LVM problem determination 104
12.6 Data relocation 104
12.7 ODM re-synchronization 104
12.8 Understanding importvg problems 105
12.8.1 Invalid PVID 105
12.8.2 Disk change while volume group was exported 105

12.9 Extending number of max physical partitions 105
12.10 Disk replacement 106
12.10.1 Replacing a disk 106
12.10.2 Removing a bad disk 107
12.10.3 Adding a new disk 107
12.10.4 Recovering an incorrectly removed disk 108
12.11 Filesystem unmount problems 109
12.12 Removing file systems 109
12.13 Paging space 110
12.13.1 Recommendations for creating or enlarging paging space 110
12.13.2 Determining if more paging space is needed 110
13. Appendix C - jfs = Journaled file system 111
13.1 Introduction 111
13.2 Recoverable file system 111
13.3 Logging 111
13.4 Extents, inodes, block map 111
13.5 Log redo operations 112
13.6 Inodes, Index trees ,and directory trees 112
13.7 logredo 112
13.8 More detailed flow of logredo 112
14. Appendix D -errpt syntax 114
14.1 To Process a Report from the Error Log 114
14.2 To Process a Report from the Error Record Template Repository 114
14.3 Description 114
14.4 **Summery** 114
14.5 Flags 114
14.5.1 Examples 116
14.6 **AIX5 enhancements** 116
15. Appendix E - VI basics 118
15.1 vi or vedit Command 118
15.1.1 Purpose 118
15.1.2 Syntax 118
15.1.3 Description 118
15.1.4 Flags 127
15.1.5 vi General Subcommand Syntax 128
15.1.6 vi Editor Subcommands 128
15.1.7 Exit Status 135
15.1.8 Input Files 135
16. Appendix F - Troubleshooting a boot process 136
16.1 Normal boot and Service boot on PCI systems 136
16.2 POST LED codes on PCI systems 136
16.2.1 Configuration Program Indicators 136
16.2.2 Diagnostic Load Progress Indicators 142
16.2.3 Boot phase 1 143
16.2.4 Boot phase 2 143
16.2.5 LED 551, 555, or 557 143
16.2.6 LED 552, 554, 556 144
16.2.7 LED 518 144
16.2.8 The alog command 144
16.2.9 LEDS 0x539 145
16.2.10 /etc/inittab 145
16.2.11 LED 553 145

16.2.12 LED c31 149
16.2.13 System hangs at c33 with an LFT. 149
16.3 Boot phases summary 149
16.3.1 Boot phases 149
16.3.2 4.6.2 LED codes 149
17. Appendix G - Brisque processes – Ver 4.X 151
17.1 Overview 151
17.2 Brisque4 Queue (Ver 4) 152
18. Appendix H - smit fast paths 153
18.1 • Software Installation and Maintenance **(install)** 153
18.2 • Network Installation Management **(nim_client)** 153
18.3 • System Backup Manager **(backsys)** 153
18.4 • Software License Management **(licences)** 153
18.5 • Devices **(dev)** 153
18.6 • System Storage Management (Physical & Logical Storage) **(storage)** 154
18.7 • System Backup Manager **(backsys)** 154
18.8 • Security & Users **(security)** 154
18.9 • Communications Applications and Services **(commo)** 154
18.10 • Problem Determination **(problem)** 155
18.11 • System Environments **(system)** 155
19. Appendix I - Performance tools 156
19.1 **nmon** 156
19.1.1 Introduction 156
19.1.2 Benefits of the tool 156
19.1.3 Installing the tool on earlier Brisque and BrisqueServe versions 157
19.1.4 Using the tool 157
19.1.5 To run interactively 157
19.1.6 To get help information while running interactively 157
19.1.7 To get more help information 157
19.1.8 To capture the data to a file for later analysis and graphing 157
19.1.9 Obtaining the tool 158
19.1.10 Sample output 158
19.2 Topas 159
19.2.1 Topas fields 159
19.2.2 Topas sample output 162
20. Appendix K - Hardware issues 163
20.1 PCI slots - factory configuration (Brisque) 163
20.2 PCI slots - factory configuration (Brisque Serve) 163
20.3 PCI slots - location codes 164
21. Appendix L - SCSI ASC/ASCQ Assignments 165
21.1 Overview 165
21.2 Numeric Sorted Listing 165

Abstract

The goal of this document is to improve Creo specialist's ability to troubleshoot RISC6000 systems.
The document covers some aspects of HW and SW troubleshooting, using different AIX and CREO tools.

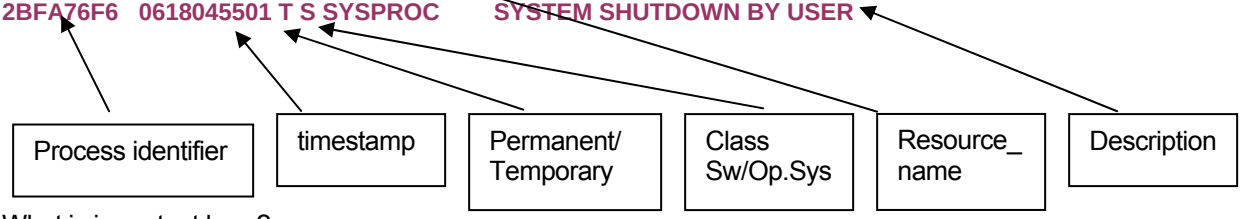
1. errpt

Basically **errpt** is a great tool, which is built in AIX. Using it can help troubleshooting both HW and SW issues. When I login to a remote computer, one of the first commands I run is errpt without any flags, in order to grasp the general system picture:

 # errpt

```
IDENTIFIER TIMESTAMP  T C RESOURCE_NAME  DESCRIPTION

3573A829   0614145901 U S CMDCRASH      SYSTEM DUMP
C0AA5338   0614145601 U S SYSDUMP       SYSTEM DUMP
C60BB505   0618111001 P S SYSPROC       SOFTWARE PROGRAM ABNORMALLY TERMINATED
C60BB505   0618095001 P S SYSPROC       SOFTWARE PROGRAM ABNORMALLY TERMINATED
C60BB505   0618091701 P S SYSPROC       SOFTWARE PROGRAM ABNORMALLY TERMINATED
C60BB505   0618091601 P S SYSPROC       SOFTWARE PROGRAM ABNORMALLY TERMINATED
C60BB505   0617184801 P S SYSPROC       SOFTWARE PROGRAM ABNORMALLY TERMINATED
C60BB505   0617181701 P S SYSPROC       SOFTWARE PROGRAM ABNORMALLY TERMINATED
C60BB505   0617152701 P S SYSPROC       SOFTWARE PROGRAM ABNORMALLY TERMINATED
C60BB505   0617134601 P S SYSPROC       SOFTWARE PROGRAM ABNORMALLY TERMINATED
5DFED6F1   0617172801 I O SYSPFS        UNABLE TO ALLOCATE SPACE IN FILE SYSTEM
BFE4C025   0617113501 P H sysplanar0    UNDETERMINED ERROR
0BA49C99   0617084801 T H scsi4         SCSI BUS ERROR
2BFA76F6   0618045501 T S SYSPROC       SYSTEM SHUTDOWN BY USER
9DBCFDEE   0618050001 T O errdemon      ERROR LOGGING TURNED ON
2BFA76F6   0618045501 T S SYSPROC       SYSTEM SHUTDOWN BY USER
```



What is important here?

Identifier

Numerical identifier for the event.

Timestamp

Time when the error occur in format mmddhhmmyy. The timestamp 0627172400 indicates that error occur June, 27th at 17:24 (5:24 PM) year 00 (year 2000).

Type

Severity of the error that has occurred. There are six possible values:

PEND The loss of availability of a device or component is imminent.

PERF The performance of the device or component has degraded to below an acceptable level.

PERM A condition has occurred that could not be recovered from. Error types with this value are usually the most severe errors and are more likely to mean that you have a defective hardware device or software module. Error types other than PERM usually do not indicate a defect, but they are recorded so that the diagnostics programs can analyze them...

TEMP A condition occurred that was recovered from after a number of unsuccessful attempts.

UNKN It is not possible to determine the severity of the error.

INFO The error log entry is informational and was not the result of an error.

Class

General source of the error. The possible error classes are:

H Hardware. When you receive a hardware error, refer to your system operator guide for information about performing diagnostics on the problem device or other piece of equipment.

S Software.

O Informational messages.

U Undetermined (for example, network).

Resource name

For software errors, this is the name of a software component or an executable program. For hardware errors, this is the name of a device or system component. It is used to determine the appropriate diagnostic modules that are to be used to analyze the error.

Description
A brief summary of the error. There are different types of HW and SW errors that are reported by errpt. I may want to get more details on a certain error, by using flags "-a" for all and "-N" (name) with the relevant resource_name (**SYSPROC**,**scsi4**,etc) ,or browse in details within a timeframe.

1.1 Browsing errors by timeframe

errpt -a -s 0604090601 -e 0605090901

This will browse the errlogin details for all errors that occurred between 4-th June 09:06 and 5-th June 09:09.
It can be done into a temp file, so it can be VI'ed later:

errpt -a -s 0604090601 -e 0605090901 >/tmp/errlog

1.2 Browsing SW errors :

Example:

errpt -a -N SYSPROC | more

```
LABEL:          CORE_DUMP
IDENTIFIER:     C60BB505

Date/Time:       Mon Jun 18 15:15:06
Sequence Number: 32
Machine Id:      000C168D4C00
Node Id:         condor2
Class:           S
Type:            PERM
Resource Name:   SYSPROC

Description
SOFTWARE PROGRAM ABNORMALLY TERMINATED

Probable Causes
SOFTWARE PROGRAM

User Causes
USER GENERATED SIGNAL

        Recommended Actions
        CORRECT THEN RETRY

Failure Causes
SOFTWARE PROGRAM

        Recommended Actions
        RERUN THE APPLICATION PROGRAM
        IF PROBLEM PERSISTS THEN DO THE FOLLOWING
        CONTACT APPROPRIATE SERVICE REPRESENTATIVE

Detail Data
SIGNAL NUMBER
          11
USER'S PROCESS ID:
       23332
FILE SYSTEM SERIAL NUMBER
           9
INODE NUMBER
        4098
PROGRAM NAME
atalkScitex
```

```
ADDITIONAL INFORMATION
??
__start 8C
Unable to generate symptom string.
```
----------This shows me that the process **atalkScitex** have cored (failed) for some reason.

In that case I would :

1. /scitex/version/logs/ripro_messages file for the relevant time of error, to find out what process/application was running then.
2. check and troubleshoot Ethershare config
3. check the system for the communication problems (see the communications problems section)

---

errpt -a -N SYSPFS | more

```
---------------------------------------------------------------------------
LABEL:          JFS_FS_FRAGMENTED
IDENTIFIER:     5DFED6F1

Date/Time:       Sun Jun 17 17:28:18
Sequence Number: 31
Machine Id:      000C168D4C00
Node Id:         condor2
Class:           O
Type:            INFO
Resource Name:   SYSPFS

Description
UNABLE TO ALLOCATE SPACE IN FILE SYSTEM

Probable Causes
FILE SYSTEM FREE SPACE FRAGMENTED

        Recommended Actions
        CONSOLIDATE FREE SPACE USING DEFRAGFS UTILITY

Detail Data
MAJOR/MINOR DEVICE NUMBER
002F 0001
FILE SYSTEM DEVICE AND MOUNT POINT
/dev/slv1.0, /dataVolumes/condor2.1.0
```

This simply means that /dataVolumes/condor2.1.0 filesystem is full.

1.3 Browsing HW errors :

errpt -a -N scsi4 | more

```
---------------------------------------------------------------------------
LABEL:       SCSI_ERR10
IDENTIFIER:    0BA49C99

Date/Time:      Sun Jun 17 08:48:41
Sequence Number: 29
Machine Id:     000C168D4C00
Node Id:        condor2
Class:          H
Type:           TEMP
Resource Name:  scsi4
Resource Class:  adapter
Resource Type:  sym896
Location:       3A-09
```

VPD:
Product Specific.( ).....DUAL CHANNEL PCI TO ULTRA2 SCSI ADAPTER
Part Number.....03N3606
EC Level.....F71335
Manufacture ID.....A16592
Serial Number.....0092

Description
SCSI BUS ERROR

Probable Causes
CABLE
CABLE TERMINATOR
DEVICE
ADAPTER

Failure Causes
CABLE LOOSE OR DEFECTIVE
DEVICE
ADAPTER

Recommended Actions
PERFORM PROBLEM DETERMINATION PROCEDURES
CHECK CABLE AND ITS CONNECTIONS

Detail Data
SENSE DATA
0001 0017 0000 0000 0000 0091 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 4304 0000 0000 0000 0000 0000 020F 0208 6760 5000 0000 F804 0130
F804 02B0 000B 0210 0600 C800 0000 881F 029F 1F20 058F F300 008F F300 F804 0008
0000 0000 015C 4000 3DFA F002

In this case one should check:

1. Cable
2. Termination
3. scsi device integrity - disk/tape/Iris/etc.

---

errpt -a -N sysplanar0 | more

```
---------------------------------------------------------------------------
LABEL:           SCAN_ERROR_CHRP
IDENTIFIER:      BFE4C025

Date/Time:       Sun Jun 17 11:35:20
Sequence Number: 30
Machine Id:      000C168D4C00
Node Id:         condor2
Class:           H
Type:            PERM
Resource Name:   sysplanar0
Resource Class:  planar
Resource Type:   sysplanar_rspc
Location:        00-00

Description
UNDETERMINED ERROR

Failure Causes
UNDETERMINED

        Recommended Actions
        RUN SYSTEM DIAGNOSTICS.
```

```
Detail Data
PROBLEM DATA
0344 0000 0000 003A C600 9300 0935 2000 2001 0617 0002 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 4942 4D00 5032 2031 2050 3120 0000 0000
0002 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
```

This error points at possible sysplanr0 (system board=motherboard) problem.
However some device drivers (CS written) have proven to cause those kinds of errors as well.
In order to eliminate a pure HW problem, we can request AIX diag to analyze the error.log - please refer to the section "Running AIX diag".
==========

1.4 Clearing the errlog

To clear ALL entries :

errclear 0

The errclear command deletes error-log entries older than the number of days specified by the Days parameter. To delete all error-log entries, specify a value of 0 for the Days parameter.

this will clear ALL SYSINTR errors :

errclear -j DADF69E4 0

1.5 Establishing the problematic board slot Number

If in errpt you get :
==========

```
LABEL:          INTRPPC_ERR
IDENTIFIER:     DADF69E4

Date/Time:      Mon Jan
31 10:18:48
Sequence Number: 373449
Machine Id:     0043C39A4C00
Node Id:
ripro2
Class:          H
Type:           UNKN
Resource Name:  SYSINTR
Resource Class:  NONE
Resource Type:  NONE
Location:       NONE

Description
UNDETERMINED ERROR

Probable Causes
SYSTEM I/O BUS
SOFTWARE PROGRAM
ADAPTER
DEVICE

    Recommended Actions
    PERFORM PROBLEM DETERMINATION
PROCEDURES

Detail Data
BUS NUMBER
0000 00C2
```

INTERRUPT LEVEL
0000 000C
==========
Now you want to establish the board slot number that is responsible for this error:
INTRPPC_ERR is pointing to device with the INTERRUPT LEVEL number, which is written in the errorlog as Hexadecimal number:

INTERRUPT LEVEL
0000 000C **<--- C==12 in decimal.**

Convert the number to Decimal (12) and do the following :

lsdev -C|grep Bus

record pcibuslist. Ex:

```
lsdev -C | grep Bus
pci0        Available 00-fef00000  PCI Bus
pci1        Available 00-fee00000  PCI Bus
```

lsresource -al "pcibuslist" | grep 'Decimal number from above'
Ex:
lsresource -al pci0 | grep 12

```
I   rot0   bus_intr_lvl            12    (A1)
```

This indicates that probably the Rotation board (rot0) with interrupt level 12 is responsible for this error.
This error can indicate a problem with the device drivers for this device or HW problem.
My best advice will be to run a full diag on the machine, and then try replacing the suspected board.
Note: in case of the Rotation boards – the errors (INTRPPC_ERR
) are normally harmless and should be disregarded.

2. Running AIX diag

AIX diag is a useful tool that can help analyzing HW problems.
Here are some examples of how it can be used.
The following error in **errpt** can be HW or SW oriented.
We can use **diag** in order to eliminate the HW issue with a motherboard:

2.1 Diagnosing the errlog

Run: **diag -> Diagnostics routines -> Problem determination**
This selection tests the system and analyzes the error log if one is available.
The output may be:

```
A PROBLEM WAS DETECTED ON Tue Jun 19 12:59:09 WET 2001
                    801014
The Service Request  Number(s)/Probable  Cause(s)
(causes are  listed in descending order of  probability):

 9CC-100: I/O bus time-out, access, or other error
Error log information:
Sequence number: 30
   pci0          FRU:  09P1175          n/a                PCI Bus
```

This would normally mean a HW motherboard problem (FRU 09P1175)
Using the "sequence number" (30), crosscheck versus errpt - establish the time of this failure:

```
errpt –a > /tmp/err.log
vi /tmp/err.log
```

Search for the sequence number "30" (in this example) .If this specific sequence preceded the system dump - this FRU (system board in this case) is the reason of the system dumps.

2.2 Running diag via smit

We can further run a physical motherboard diag:
Run: **diag -> Diagnostics routines -> System verification ->choose resource**
This selection runs the system HW diag on the selected resources :

```
sysplanar0      00-00         System Planar
oppanel         00-00         Operator panel
mem0            00-00         Memory
proc0           00-00         Processor
L2cache0        00-00         L2 Cache
proc2           00-02         Processor.
   And more…
```

23 Running manual command

```
diag -d sysplanar0

TESTING COMPLETE on Mon Jul 16 10:49:40 WET 2001                  801010
No trouble was found.
The resources tested were:
- sysplanar0      00-00         System Planar


diag –c -s
Starting diagnostics
Testing sysplanar0
Testing scsi2
Testing scsi1
```

```
Testing ses0
Testing ent1
Testing fd0
Testing ppa0
Testing sa0
Testing sa1
Testing sa2
Testing scsi0
Testing cd0
Testing ent0
Testing L2cache0
Testing mem0
Testing oppanel
Testing proc0
Testing proc1
Testing proc2
Testing proc3
Ending diagnostics.
```

diag –c -S1

```
Starting diagnostics
Testing sysplanar0
Testing L2cache0
Testing mem0
Testing oppanel
Testing proc0
Testing proc1
Testing proc2
Testing proc3
Ending diagnostics.
```

3. System Dump

3.1 Overview

During system **crash** (flashing 888 on the LCD) dump process is invoked.
Dump process will store the entire kernel segment that resides in real memory (the kernel segment is segment 0) to a disk for future debugging. It is actually creates snap shot core image of the machine in the moment of a crash and save it to a disk.
The core will include also the memory resident user data (such as u-blocks).
If the dump process was successful it will be indicated by 0c0 on the LCD.
Note: all findings (including the output of the below commands) should be sent Lev Weissman for analyzing.

3.2 Dump Status Codes

The following dump progress indicators, or dump status codes, are part of a Type 102 message.
Note: When a lowercase c is listed, it displays in the lower half of the character position. Some systems produce 4-digit codes, the two leftmost positions can have blanks or zeros. Use the two rightmost digits.
0c0 The dump completed successfully.
0c1 The dump failed due to an I/O error.
0c2 A dump, requested by the user, is started.
0c3 The dump is inhibited.
0c4 The dump device is not large enough.
0c5 The dump did not start, or the dump crashed.
0c6 Dumping to a secondary dump device.
0c7 Reserved.
0c8 The dump function is disabled.
0c9 A dump is in progress.
0cc Unknown dump failure

3.3 Crash Codes

Note: Some systems may produce 4-digit codes. If the leftmost digit of a 4-digit code is 0, use the three rightmost digits.
The following crash codes are part of a Type 102 message.

000 Unexpected system interrupts.
200 Machine check because of a memory bus error.
201 Machine check because of a memory timeout.
202 Machine check because of a memory card failure.
203 Machine check because of an out of range address.
204 Machine check because of an attempt to write to ROS.
205 Machine check because of uncorrectable address parity.
206 Machine check because of an uncorrectable ECC error.
207 Machine check because of an unidentified error.
208 Machine check due to an L2 uncorrectable ECC.
300 Data storage interrupt from the processor.
32x Data storage interrupt because of an I/O exception from IOCC.
38x Data storage interrupt because of an I/O exception from SLA.
400 Instruction storage interrupt.
500 External interrupt because of a scrub memory bus error.
501 External interrupt because of an unidentified error.
51x External interrupts because of a DMA memory bus error.
52x External interrupts because of an IOCC channel check.
53x External interrupts from an IOCC bus timeout; x represents the IOCC number.
54x External interrupts because of an IOCC keyboard check.
558 There is not enough memory to continue the IPL.
700 Program interrupt.
800 Floating point is not available.

3.4 Enabling system dump

We can check the current dump settings via "**smitty dump**" or as following :

```
sysdumpdev -l

primary              /dev/hd6
secondary            /dev/sysdumpnull
copy directory       /var/adm/ras
forced copy flag     TRUE
always allow dump    TRUE
dump compression     OFF
```

This means that the system dump is enabled (always allow dump= TRUE) and it will be copied to /var/adm/ras.
If **always allow dump=FALSE**, then the core dump will not be generated.
To change this, change the settings in smit:
Always ALLOW System Dump = true
/**var** filesystem must have enough space to accommodate a couple of system dumps.
Its size can be increased by, say, 100MB as following:

```
chfs -a size=+200000 /var
```

3.5 Establishing the reason for system dump using diag

One of the ways to establish the reason for a system dump is the foloowing (specialy when caused by a HW reason).
Run "diag" ,"problem determination" option in order to let the system analyze the errpt for you .
It can show the following :

```
A05-210: System shutdown due to over maximum temperature condition
        Error log information:
            Date: Wed Aug 18 04:34:43 2004
            Sequence number: 340
            Label: EPOW_SUS_CHRP
  n/a           FRU:  09P1175          P1
```

Then by using the sequence number **A05-210** I did "errpt -a >file",the "vi" this file and search for this sequence number.
Then I new that it happened exactly at the time the system dump occurred,and the the problem was the system overheating.

3.6 Analyzing system dump

If the customer complains that his system had frozen with 888 on the display, check errpt for the entry like this:

```
C0AA5338   0614145601 U S SYSDUMP       SYSTEM DUMP
```

This means that the system dump have occurred on 14 of June at 14:56.

Run the following command to verify the status of the last system dump:

```
sysdumpdev -L

0453-039

Device name:         /dev/hd6
Major device number: 10
Minor device number: 2
Size:                63952384 bytes
Date/Time:           Thu Jun 14 14:43:11 CST 2001
Dump status:         0
dump completed successfully
Dump copy filename: /var/adm/ras/vmcore.0
```

Run the **crash** command on AIX 4.3.3/4.2.1 or **kdb** command on AIX5 in order to get a basic idea on the possible reasons of the system dump.
The **crash** subcommands (**trace -k, thread -r, status 0**) are used to provide a hint on the problem origin:

```
cd /var/adm/ras
crash vmcore.0

Using /unix as the default namelist file.

> trace –k                              (AXI 4 ONLY !!!)
STACK TRACE:
0x2ff3b400 (excpt=edffff54:40000000:00001004:edffff54:00000106) (intpri=0)
      IAR:     .remove_e_list+38 (00032888):   tweqi   r7,0x0
      LR:      .e_block_thread+40c (00034424)
      2ff3b010: .e_sleep_thread+4c (0003497c)
      2ff3b060: .[nspdd]+4144 (016ba4e4)
      2ff3b100: .[nspdd]+2de4 (016b9184)
      2ff3b170: .[nspdd]+7e8 (016b6b88)
      2ff3b1f0: .rdevioctl+140 (001b4344)
      2ff3b260: .vnop_ioctl+1c (001c01d4)
      2ff3b2a0: .vno_ioctl+144 (001d81d8)
      2ff3b360: .common_ioctl+b0 (001e7894)
      2ff3b3c0: .sys_call_ret+0 (00003a90)
IAR not in kernel segment.


(0)> f                                (AXI 5 ONLY !!!)
pvthread+002C00 STACK:
[0003FD34]      dmpnow+000020 (0000000B [??])
[0039DB80]      dmpioctl+00020C (??, ??, ??, ??)
[00329F08] rdevioctl+0000E8 (??, ??, ??, ??, ??, ??)
[0033EDC0]      vnop_ioctl+000018 (??, ??, ??, ??, ??, ??)
[0039047C]vno_ioctl+000134 (??, ??, ??, ??, ??)
[003722AC]      common_ioctl+0000C8 (??, ??, ??, ??)
[003721B0]kioctl+000110 (0000000A, 00006404, 00000000, 00000000)
[00003A50].sys_call+000000 ()

> status 0

CPU    TID  TSLOT    PID  PSLOT  STOPPED  PROC_NAME
 0    700f   112    6db0   109      yes  pltDc

> thread -r
SLT ST   TID     PID    CPUID  POLICY PRI CPU    EVENT  PROCNAME    FLAGS
 2 r    205     204       0    FIFO  7f  78           wait
      t_flags:  sig_avail funnel kthread
 3 r    307     306       1    FIFO  7f  78           wait
      t_flags:  sig_avail funnel kthread
 4 r    409     408       2    FIFO  7f  78           wait
      t_flags:  sig_avail funnel kthread
 5 r    50b     50a       3    FIFO  7f  78           wait
      t_flags:  sig_avail funnel kthread
112 r   700f    6db0       0      RR  40   0          pltDc
      t_flags:  local cdefer funnel

> proc -r

SLT ST    PID   PPID   PGRP   UID  EUID  TCNT  NAME
 2 a     204      0      0     0     0     1  wait
      FLAGS: swapped_in no_swap fixed_pri kproc
 3 a     306      0      0     0     0     1  wait
      FLAGS: swapped_in no_swap fixed_pri kproc
```

```
 55 a    37b8   2282   2282   200   200     1  X
       FLAGS: swapped_in execed
112 a    7054   571a   25c8   200   200     1  expose
       FLAGS: swapped_in no_swap fixed_pri ppnocldstop execed
122 a    7a14      1   744c   200   200     1  plateExp_dlg35
       FLAGS: swapped_in orphanpgrp ppnocldstop execed

>q                    ;quits the crash command
```

==========

In this case **trace -k** shows a problem with nspdd process, which is part of the TSP driver.
thread -r and **status 0** both hint on the application process pltDc as responsible for the core dump (it's the last process that run).
If the above process does not provide the hint - call CIL support (Eli Cohen, Lev Weissman) for help.
The core file can be copied on a CD and sent to CIL for further analyzing.

4. Application dump analysis

4.1 Overview

Application dumps do not cause system crash, but rather point to problems in applications.
When a system encounters a core dump, a core file is created in the current directory when various errors occur. Errors such as memory-address violations, illegal instructions, bus errors, and user-generated quit signals commonly cause a core dump. The core file that is created contains a memory image of the terminated process. A process with a saved user ID that
differs from the real user ID does not produce a memory image. The goal is to determine the program that caused the core dump.

4.2 Checking for an application core dump

When a core dump is created, an error will be reported and this entry can be
seen in the error report as follows:

errpt

IDENTIFIER TIMESTAMP T C RESOURCE_NAME DESCRIPTION

...

C60BB505 0705101400 P S SYSPROC SOFTWARE PROGRAM ABNORMALLY TERMINATED

...

From the previous report, it can be seen that the error has an identifier of C60BB505. A detailed report of the error can be displayed as follows:

errpt -a -j C60BB505

LABEL:
CORE_DUMP
IDENTIFIER: C60BB505
Date/Time: Wed Jul 5 10:14:59
Sequence Number: 8
Machine Id: 000BC6DD4C00
Node Id: client1.Class: S
Type: PERM
Resource Name: SYSPROC
Description
SOFTWARE PROGRAM ABNORMALLY TERMINATED
Probable Causes
SOFTWARE PROGRAM
User Causes
USER GENERATED SIGNAL
Recommended Actions
CORRECT THEN RETRY
Failure Causes
SOFTWARE PROGRAM
Recommended Actions
RERUN THE APPLICATION PROGRAM
IF PROBLEM PERSISTS THEN DO THE FOLLOWING
CONTACT APPROPRIATE SERVICE REPRESENTATIVE
Detail Data
SIGNAL NUMBER
4
USER'S PROCESS ID:
15394
FILE SYSTEM SERIAL NUMBER
5
INODE NUMBER
2
PROGRAM NAME

```
netscape_aix4
ADDITIONAL INFORMATION
Unable to generate symptom string.
Too many stack elements.
```

In the previous output, it can be seen that the program that created the core dump was **netscape_aix4**. See the following section to help you determine where the core file is located.

4.3 Finding all current cores reasons

The following will find all current core files in the system and show their cause:

```
file `find / -name core 2>/dev/null|grep -v rsrc`
```

4.4 Automatic core determination

This small script generates the application and system core info .
It's output is the core file path and the program name - the one that generated it.
The results should be sent to CIL support .
It should be cut & pasted into the terminal window:

```
================================================================
ksh
#This scripts display the reasons for application core dumps (SOFTWARE PROGRAM ABNORMALLY TERMINATED)
if [[ `oslevel |cut -d. –f 1` = “5” ]] ;then
        ERROR=”AD2BA772”
else
    ERROR=”C60BB505”
fi
DATE1=`errpt -a -j $ERROR | grep Date | awk '{ print $5 }' | cut -d: -f 1,2 |head -1`
for SEQUENCE in `errpt -a -j $ERROR |grep Sequence|cut -d: -f2`;do
        DATE2=`errpt -a -j $ERROR -l $SEQUENCE | grep Date | awk '{ print $5 }' | cut -d: -f 1,2`
        if [[ $DATE1 != $DATE2 ]] ;then
            echo “`errpt -l  $SEQUENCE -a | grep Date | awk '{  print $3,$4,$5 }'` \c\t”
            errpt -a -j $ERROR -l $SEQUENCE | awk '/PROGRAM NAME/,/ADDITIONAL
            INFORMATION/' | grep -vE "PROG|ADD"
            DATE1=$DATE2
    fi
done
exit
================================================================
```

Sample output:

```
Jul 29 14:10:51 DHReporter
Jul 25 17:06:42 managerLS
Jul 25 17:02:34 DHReporter
Jul 25 16:59:18 DHReporter
Jul 24 16:09:20 splr_control
Jul 24 16:03:19 ftc_repair
Jul 24 16:02:43 ftc_repair
Jul 24 08:57:05 import
Jul 24 08:56:45 import
Jul 24 08:39:07 ftc_repair
Jul 24 08:38:59 ftc_repair
Jul 24 08:37:14 import
==================================
```

This shows the latest time and reason for the application core dumps .
Note: Brisque Serve and Brisque5 have a new command that lists all the application core dumps – **lsappl.sh**.

5. System issues

5.1 Synchronizing the systems clock

In order to synch other systems with my AIX system clock – use the command **setclock** .

The **/usr/sbin/setclock** command gets the time from a network time server, and if run by a user with root user authority, sets the local time and date accordingly.

http://www16.boulder.ibm.com/doc_link/en_US/a_doc_lib/cmds/aixcmds5/setclock.htm

5.2 F50 issues

5.2.1 Error E0BF during boot

Problem :Brisque F50, (ibm sn 44-077FA) at Canfield & Tack refuses to boot with 4 CPUs (CCR# 8001128147).
It will boot fine every time with only one processor board (2 CPUs), but fails every time with 2 CPU cards.
The failure is the same:

1) Start up then the leds flash 4B2,
2) It switches to E0BF,
3) The power supply shuts down.

It will do this 3 times in a row then display STBY on the led display.
In the SP diag menu the error log shows
"20040511150832 1. ABIST failed on slot 1 4B2"

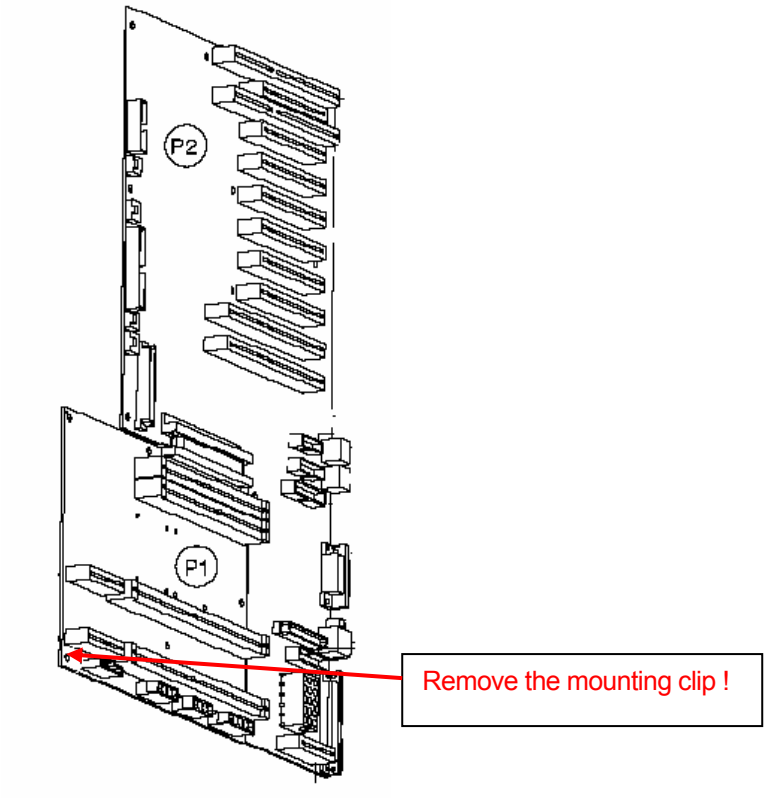
Action taken:

1) followed IBMs MAP diagnostic procedure,however the code E0BF isn't listed in the manual.
2) tried reseating the boards
3) a replacement CPU board didn't help.
4) 3 CPU boards on site, all will boot fine in the top slot, no combination of them will work with 2 boards.
5) tried resetting the SP
6) tried booting with all PCI cards removed,
7) tried replacing the I/O planar board,
8) tried replacing the system board,
9) tried replacing the service processor
10) tried replacing the power supply, all efforts resulted the same.

Solution:

The Error STB could caused when inserting an additional CPU.
The problem surfaces when adding an additional 2-CPUs to F50.The cause is the mounting clip that may shorten the lower system planner board occasionally.
To solve the problem with the STB Error please perform this steps:

1) Disconnect the power from the machine.
2) Disconnect the power cable from the CPU.
3) Remove the x2 CPU + Memory Card.
4) Disconnect the power cables from the System Planar(P1- see attached picture).
5) Remove all the screws that are holding the System Planar (P1).
6) Remove the Board.
7) Remove the Left Mounting Screw Holder (See the attached picture).
8) Install back the System Planar + screws (don't use the left screw that you remove).
Note- Check that the x2 boards are connected properly Upper & Lower boards.
9) Connect back the power cables to the board.
10) Clean with Eraser the connectors of the CPU.
11) Connect the power cable to the CPU.
12) Install the x2 CPU + Memory Card.
13) Connect the power to the machine.
14) Power on the machine.



5.3 SMS not accessible

Description : Occasionally one may not be able to access the SMS
Cause : If any device was connected to the first serial port (#1) this causes the machine to output the SMS to an unidentified console & not to the default Graphic monitor.
Step 1:
Make sure serial #1 is defined on the Baud rate set at 9600.
The following should be the default settings for tty0 :

[TOP]	[Entry Fields]		
TTY	tty0		
TTY type	tty		
TTY interface	rs232		
Description	Asynchronous Terminal		
Status	Available		
Location	01-S1-00-00		
Parent adapter	sa0		
PORT number	[0]	+	
Enable LOGIN	disable	+	
BAUDrate	[9600]	+	
PARITY	[none]	+	
BITS per character	[8]	+	
Number of STOP BITS	[1]	+	
TIME before advancing to next port setting		[0]	+
TERMINALtype	[dumb]	+	

1. Connect a laptop via the serial port to the serial #1 on the machine using the RS232 female-to-female cable.
2. Shutdown themachine completely. You should see the **OK** on the LCD panel
3. Hit <enter> on your PC, you should see the service processor's menu.
4. Select #2 **System Power Control** hit <enter>
5. Select #4 **Power-On System hit** <enter>

6. The machine at this point will start the POST (Power on self test), it will show the icons as text , press 1 **before** the last word (NOT F1) on your laptop to get to the SMS in text mode.

7. Select #3 **Utilities**

8. Select #8 **Select Console**

9. You will than be asked to press 0 to define this terminal as a console. **DON'T PRESS 0** ! at this moment you will get the same request on your Graphic monitor suggesting you **press 2 'to select this monitor'**

10. Press 2, this should start the SMS on your graphic monitor, disconnect the laptop from the serial port & continue with the boot process..

Step 2: If the above did not help – perform the following:
1) Unplug the Mouse Connector from the Brisque.
2) Power On the Brisque and wait until you get the Login.
3) Power Off the Brisque and Reconnect the Mouse Connector.
4) Power On the Brisque and wait until you will see on the LCD - E1DC.
After this you will get White screen with a message to press 2 or 3 in the Keyboard to continue, then you will get the SMS menu.

Step 3: If the above did not help – perform the following:
1.Shutt the system down
2.Unplugged power cord, then remove the battery for 10 minutes.
Put the battery back in,power on the system.
The system will power up to E1DC on the LED display, still no image on monitor.Then press "2" and a few seconds later I had the SMS and PowerPC logo up on the screen. The system has figured out what was the boot device by itself. It looks like there might have been some sort of corruption in wherever startup information is kept and removing all the power erases it all.

5.4 Security issues

- When you suspect user/groups/password problems – perform the following sequence:

usrck –y ALL
pwdck –y ALL
grpck -y ALL

Then, for AIX 4.2.1:
mkpasswd –v /etc/passwd

For AIX 4.3.3:
mkpasswd –f

- You can also copy all security files from a good system to a system with a corrupted security.

Copy over (or tar and copy):

/etc/passwd
/etc/group
/etc/security/group
/etc/security/passwd
/etc/security/limits
/etc/security/lastlog
/etc/security/user

I tend to vi in the details for all non-OS users and edit out the duplicate OS entries. Once completed check the completeness and consistency of the files via:

usrck -y ALL
pwdck -y ALL
grpck -y ALL

5.5 Login to application (cdesci) takes long time (half hour)

Problem :Logging in cdesci takes too long.
Reason: One directory on dataVolumes had 16000 files,this slowed the login.

5.6 CDE does not come up after power failure

Description :After a regular shutdown or ac power failure on the customer site, the Brisque or Server is not starting the CDE application.
After you login it starts two processes and when it comes to the point where it start's the X application, it drops
back to the login with the following message ***:" open /tmp/xlogfile.200 failed "***.

Workaround/ Permanent Fix : The permissions of the /tmp directory where changed.

I did ***chmod 777 /tmp*** and after that, the X-application started with no problem.

5.7 TigerII issues (43p-150)

5.7.1 When proofing to the Iris.- keeps locking up

Description :Tiger II when proofing to the Iris.- keeps locking up when proofing using DCP Color Sets or when running proof calibration.

Errpt says sysplanar0 error and diag gives me the FRU: 09P5318.

Workaround: try to install the patch for scsi drivers.

The patch contains 2 files, exscsi_dd and exscsi_pin ,these files should be replaced with the same files in /scitex/version/etc/drivers/
Instructions:
1. save the original files.
2. open the tar (tar -xvf sci_driver.tar)
the files will be copied to the right location .
3.restart the Brisque.

5.7.2 Error Code 28A00040 in TIGER-II

Problems with one of the FAN'S

1) Check fans for obstructions that prevent them from normal operation (Cable caught in the fan to prevent it from spinning)

2) Check that FAN'S are connected to the I/O Planar

5.7.3 Tiger keeps crashing after 30 minutes

Check the CPU FAN !

5.8 6F1 issues

5.8.1 6F1- Firmware Recovery

In case the firmware crashed on 6F1 during firmware loading or any other scenario, there is a pinhole switch on the system's operator panel that resets the service processor and then accesses the floppy to start loading the firmware.
The message will show on the panel: A1FD 0001 to insert diskette #1, A1FD 0002 to insert diskette #2 and A1FD 0003 to insert diskette #3
Note that during the recovery you will see on the panel: 8092, 8098 and 809C (good messages) but 809F is an error message.

5.8.2 6F1 - LVD SCI adapters are "defined"

Problem description

LVD SCI adapters are “defined” when placed on the same PCI bridge

Solution
In the system with combination of 6F1 and Emulex FC HBA this board (SCSI) cannot be connected to same PCI bus with Emulex FC HBA.
We recommend to move the SCSI LVD board preinstalled in slot 9 to slot 4,
The additional SCSI LVD board for the tape library can be installed in the slot 3.
The Emulex FC HBA can be installed in the slots 8 or 10.

5.8.3 6F1 -The boot sequence was on CD only

Problem description
Error 20EE00B which appears after SMS, before “Welcome to AIX”, where the booting process stops with the error.

The boot sequence was on CD only, not the boot hard drive. The IBM Doc’s do not point the Service Person in the proper direction as shown below.
Solution
By forcing the unit to go to SMS by using the Serial Port and a Laptop. Service Processor, Menu to Power Control, Boot Setup, and No. 1, Boot to SMS.

System Console was configured, and the station was rebooted, and now the Monitor and Keyboard/Mouse are working.

Booted the unit and now checked the boot sequence, and found it was on CD only, no Diskette/HD. Set it to Hard Drive, only, and the system booted,

5.8.4 6F1 -Privilege password' preventing access to SMS

Problem:
A 'privilege password' was preventing access to all boot menus, even the service processor. Nobody put it in by intention. We found out later that it was by accident, which is inherent in the structure of the SMS menu: If you press '1' during boot you will get the SMS menu. If you keep on pushing the '1' you will enter the password menu (no need to press <enter>), and without even mentioning it you have set a password string consisting of as many '1' as you pressed. If you panic and try to exit without knowing what you do, this will be saved,

Solution:
The only way out is to remove the battery from the main board for >30sec, then you get rid of the password, the boot sequence and the date/time settings, which have to be redone. (read the service manual for details)

5.8.5 6F1 -determine if there is a defective power supply

To determine if there is a defective power supply, watch the individual lights, one in each supply as the power cord is connected to the unit, and it is connected to a good outlet.

The lights should flash together, both On, then both Off- If this is true, then the supplies are good. If they flash out of sync, upper on while lower off, then lower on while the upper light is off then ONE or BOTH of the supplies is faulty. After the approx. 1 minute of normal flashing, one or both of the supplies light will be dark. If one light stays on, solid, then that is a good supply and the other one is faulty.

Prior to replacing a 6F1 Power Supply, except without removing it, press the button on the rear side of the unit, near the bottom, and to the right, located in a square cut-out, using a plastic straw or coffee stirrer while reaching through the screen on the rear of the unit. While the unit is has power applied, but not power button “on”, depress the P/S button for 20 seconds, 30 is better, and when you release the button, the power supply will trigger the unit to act if has just been reset by plugging it in.

If the light goes out again, try the reset again. If it goes out again, the supply is defective.
We recon all this is due to the fact that 6F1 is very sensitive to the PS behaviour, and reports wrong symptoms if voltage is slightly out.

5.8.6 6F1 - Different errors appear in errpt, system crashes

Errors appear in errpt like "environmental errors", "SCSI error", "Power Resumed Errors" or "Undetermined Errors".
Diagnostics will post an SRN of A05/160.
System may also crash occasionally.

Explanation:
Some 6F1 power supplies systems have an issue with impedance matching of the power supplies. This matching issue results in random EPOWs causing the system to report various errors.
This is a power supply problem.
The problem was found in FRU-Power Supply P/N: 24L1400
This problem was fixed on the new level of power supply.
If you encountered this error just change the power supply to a new power supply.
All power supply in the same 6F1 should be of the same FRU, p/n.

5.8.7 6F1 -How to Determine if the 6F1 Platform CPU Should be Replaced

Symptoms:
An error message appears on the 6F1 screen informing you to replace the processor unit.

Solution:
The following procedure should be performed to determine the CPU should really be replaced.

1. Disconnect the power cord from the workstation.
2. Remove the CPU and then remove the battery for 10 minutes.
3. **Connect a laptop computer to the 6F1 workstation:**

   For Windows® and UNIX® stations, see the file:
   Service_Process_or_access_via_local_or_remote_ASCII.pdf which is located on:
   http://www14.software.ibm.com/webapp/set2/firmware/gjsn

   From the Main Menu, select **3 System Information Menu**.

```
Service Processor Firmware
       Version: CL040712
 Copyright 2000, IBM Corporation
            un-named
_____________________________
            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. From the System Information Menu, select **3 Read Service Processor Error Logs**.
      Then clear the logs by typing **C** and pressing Enter.

```
SYSTEM INFORMATION MENU

 1. Read VPD Images from Last System Boot
 2. Read Progress Indicators from Last System Boot
 3. Read Service Processor Error Logs
 4. Read System POST Errors
 5. Read NVRAM
 6. Read Service Processor Configuration
 7. Processor Configuration/Deconfiguration Menu
 8. Memory Configuration/Deconfiguration Menu
 9. Power Control Network Utilities Menu
98. Return to Previous Menu
```

   2. From the System Information Menu, select **7 Processor Configuration/Deconfiguration menu**.

```
SYSTEM INFORMATION MENU
```

```
 1. Read VPD Images from Last System Boot
 2. Read Progress Indicators from Last System Boot
 3. Read Service Processor Error Logs
 4. Read System POST Errors
 5. Read NVRAM
 6. Read Service Processor Configuration
 7. Processor Configuration/Deconfiguration Menu
 8. Memory Configuration/Deconfiguration Menu
 9. Power Control Network Utilities Menu
98. Return to Previous Menu
99. Exit from Menus
```

3. The following screen appears. Verify that all the CPUs are configured. If one of the CPUs is not configured, you should configure it by selecting its number and pressing Enter (in the following example, the workstation has 4 CPUs).

```
77. Enable/Disable CPU Repeat Card: Currently Enabled

 1.   0  3.0  (00)   Configured by system
 2.   2  3.1  (00)   Configured by system
 3.   4  3.2  (00)   Configured by system
 4.   6  3.3  (00)   Configured by system
98.   Return to Previous Menu
```

Select **98. Return to Previous Menu**

4. From the System Information Menu, select **8 Memory Configuration/Deconfiguration menu**.

```
SYSTEM INFORMATION MENU

 1. Read VPD Images from Last System Boot
 2. Read Progress Indicators from Last System Boot
 3. Read Service Processor Error Logs
 4. Read System POST Errors
 5. Read NVRAM
 6. Read Service Processor Configuration
 7. Processor Configuration/Deconfiguration Menu
 8. Memory Configuration/Deconfiguration Menu
 9. Power Control Network Utilities Menu
98. Return to Previous Menu
```

5. From the following screen, select **1. Memory Riser Card 1**.

```
77. Enable/Disable Memory Repeat Card: Currently Enabled
1. Memory Riser Card 1
2. Not Available
98. Return to Previous Menu
```

6. In the screen that appears, verify that all the memories are configured. If one of them is not, change it by selecting the slot number of the module.
7. Press **98** three times to return to the Main menu.
8. From the Main menu, select **2. System Power Control menu**.
9. From the System Power Control menu, select **6. Enable/Disable Fast System Boot**.
10. In the following screen that appears, verify that option 6 is **Enable/Disable Fast System Boot: Currently Fast Boot**.

```
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 Fast Boot
7. Boot Mode Menu
98. Return to Previous Menu
99. Exit from Menus
```

If option 6 is incorrect, change it and then select **99. Exit from Menus** to disconnect from the workstation.

4. **Updating the machine firmware:**

   Select one of the following methods for updating the firmware.

   1. When the workstation is in **OK** mode (after shutdown):
      Note: This method is preferred when there is a problem with the CPU.
      Open the **6F1 DOS Firmware** folder located on:
      http://techplanet.creo.com/software_solutions/workflow_software/brisque/content/troubles/bsq5_57.htm
   2. *Extracting_&_Updating_6F1_Firmware.pdf* for instructions on how to update the firmware.
   3. When the workstation is running in UNIX prompt:
      Note: This method is preferred when the workstation is running and there's a need to update the firmware.
      Open the `6F1_AIX_FW.tar.Z` file located on:
      http://techplanet.creo.com/software_solutions/workflow_software/brisque/content/troubles/bsq5_57.htm
      Then follow the instructions on how to update the firmware.

5. **Running diagnostics:**

   1. Power on the workstation.
   2. Log in to the system.
   3. At the prompt, type `diag` and press Enter.
   4. On the Main screen, press Enter to continue.

Select **Advanced Diagnostics Routines**. The following screen appears:

```
Option System Verification
This selection tests the system but does not analyze the
error log. Use this option to verify that the machine is
functioning correctly after completing a repair or an
upgrade.

Option Problem Determination
This selection tests the system and analyzes the error log
if one is available. Use this option when a problem is
suspected on the machine.
```

   5. To run the diagnostics, select **Option System Verification**.
   6. The following screen appears:

```
ADVANCED DIAGNOSTICS SELECTION

From the list below select any number of resources by
moving the cursor to the resource and pressing Enter.
To cancel the selection, press Enter again.
To list the supported tasks for the resources highlighted,
press List.
Once all selections have been made, press Commit.
To exit without selecting a resource, press the exit key.
```

   7. Select **All Resources** and press Enter.
      All your resources are marked with a **+**.
   8. Press **F7=Commit**. The diagnostics will start running. Wait until it is completed.
      If the diagnostics is completed without detecting any errors, press F3 until you exit the diagnostics program. At the UNIX prompt, type `errclear 0` to clear the error log.
      If after the diagnostics there still CPU errors, then you should replace the CPU.
   9. Select **Option Problem Determination**.
   10. Select **All Resources** and press Enter.
       All your resources are marked with a **+**.

11. Press **F7=Commit**. The diagnostics will start running. Wait until it is completed.
    Option 2 is selected only to determine which part is defective. After the identified part is replaced, run the **Option System Verification**.

5.8.8 6F1 platform fails to boot with Error 0637

Symptoms: Error message " I9 (0637, P1-I9/Z2)" displays when the 6F1 platform fails to boot.
Cause: The PCI SCSI in location I9 or I4 fails because the upper power supply unit is not able to support the combined load of the system drive and CD-ROM drive.
Solution : Replace the upper power supply unit.

5.8.9 6F1 platform fails to boot with Error 10111B05

Symptoms: Error message 10111B05 displays when the 6F1 platform fails to boot.
Cause: Bad CPU board
Solution : Replace the CPU board.

5.8.10 6F1 crashes with a 450B288D code in the lcd (memory problem)

The symptom: server could not re-boot.
Service Processor was full of garbage and did not let the system up. System started to come up, but in couple of minutes was shut down.
Solution:
Resetted the Service Processor by inserting a paper clip into a tiny hole on top of the reset (yellow) button

5.8.11 6F1 crashes with a 4507300C code in the lcd (memory problem)

This is the Description of the Error code in the 6F1 service guide:
4507 300B Memory system and 6xx bus processor runtime diagnostics detected 128MB DIMM fault:
Memory DIMM, Location: P1-M1.n or P1-M2.n or P1-C1-Mn

4xxx xxxx Service Processor Error Codes
Perform memory problems diagnostics according to page 107-108 of the service guide.

If you replaced the Memory card (include the memory modules) –sometimes you will still have a problem ! (service processor locks on this error code).
Perform the following (You can find in the service guide the Chapter 7. Using the Service Processor) :

1. connect the machine to the power and wait to the OK prompt. don't power on the machine.
2. connect your laptop to the serial port no.1 when the machine is with the OK prompt.
3. Clear All the error log that you can find in the SMS.
   Read System POST Errors (perform clear)
   Read Service Processor Error Logs (perform clear)
4. choose: System Information Menu
5. choose: Memory Configuration/Deconfiguration Menu
6. choose: Memory riser card 1

7. Make sure that you have in all the memory slots **Configured by system** if you have one of the slot's as deconfigured - you will need to change it (Go to Step-8). if you have all the slots with **Configured by system** - all the memory Dimm's are working properly.
   (The first No. in every line see Example below in Red is the slot no.)

   MEMORY CONFIGURATION/DECONFIGURATION MENU
   77. Enable/Disable Memory Repeat Gard: Currently Enabled

   1. 11.17(00) Configured by system 2. 11.19(00) Configured by system
   15. 11.16(00) Configured by system 16. 11.18(00) Configured by system
   3. 11.21(00) Configured by system 4. 11.23(00) Configured by system
   13. 11.20(00) Configured by system 14. 11.24(00) Configured by system

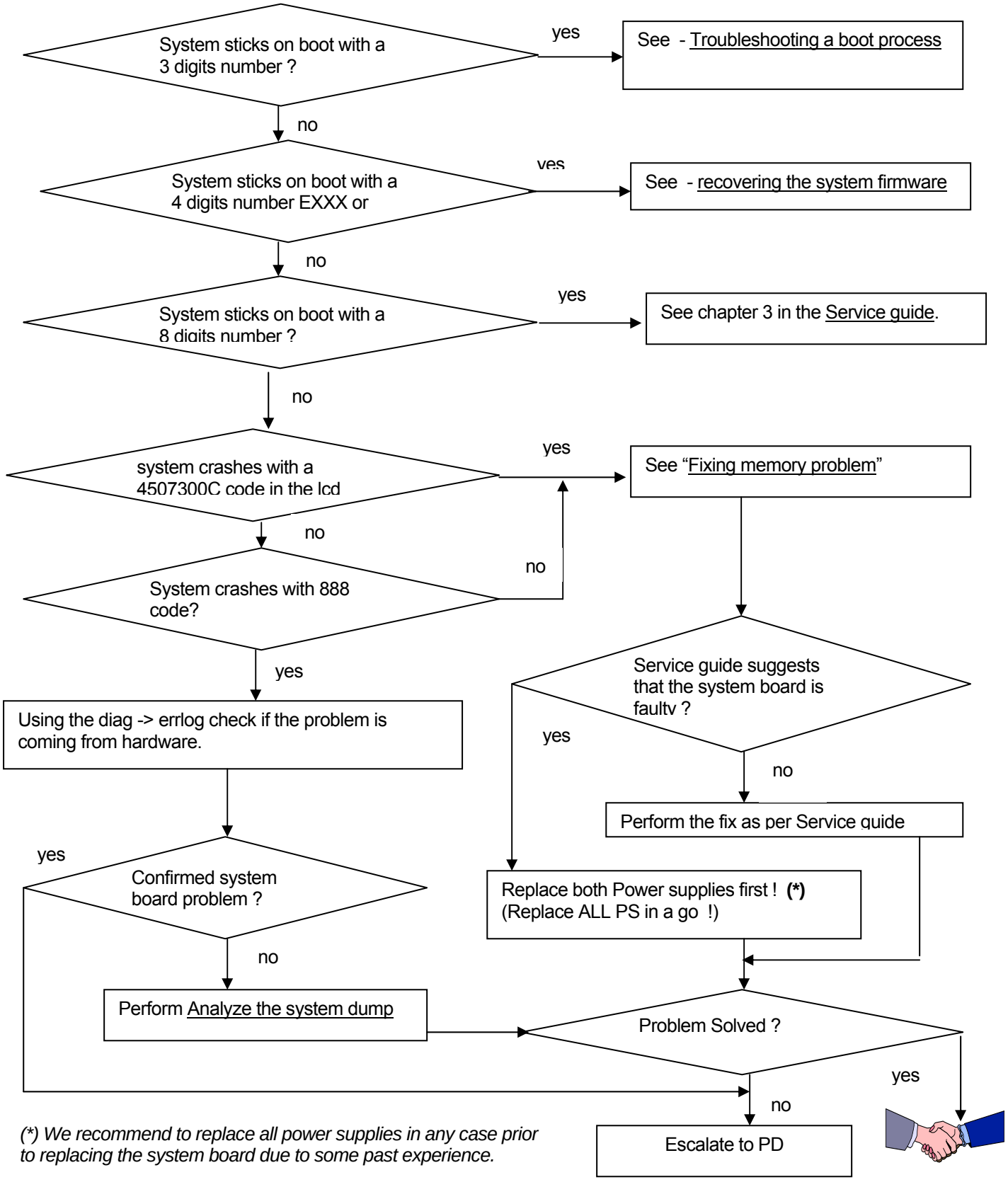
8. To change from **deconfigured** to **Configured by system** choose the slot No.xx until it will change to Manually Configure .

9. choose: Return to Previous Menu to go back to the Main Menu

10. Perform reset to the service processor:
    Service Processor Setup Menu
    Reset Service Processor
    Note: When you choose Y to reset the service processor you need to disconnect the laptop cable from the serial port immediately after you press Y !

11. Boot up the system

5.8.12 6f1 hardware problems elimination flow



(*) We recommend to replace all power supplies in any case prior to replacing the system board due to some past experience.

5.9 6E4/6E3 issues

5.9.1 reset the Attention LED

To reset the attention LED on 6E4 run the following command :

/usr/lpp/diagnostics/bin/usysfault -s normal

To check the attention LED status on 6E4 run the following command :

/usr/lpp/diagnostics/bin/usysfault

Or: type diag on the AIX command line, and do the following:

1. Select Task Selection.
2. On the Task Selection Menu, select Identify and Attention Indicators.
3. When the list of LEDs displays, use the cursor to highlight Set System Attention Indicator to Normal. 4. Press Enter, and then press F7 to commit. This action turns off the LED.

5.9.2 Error 406C0CA6 during boot

This is a Memory problem.
Can be caused by:

1) Defective modules - You said that they replaced the modules

2) Installed the memory modules in Wrong place.

3) Using illegal modules.

Try these steps:

1) Disconnect the machine from power.

2) Remove the Battery for 10 mints.

3) Remove the memory modules and clean them with eraser.

4) Install the memory back (Check that you installed them correctly)

5) Connect the power to the machine and wait for the OK on the LCD panel.

6) Connect the Laptop to the machine.

7) Clean all the ERROR logs in the SMS screen. **Page 226 in the service guide Book** :
http://techplanet.creo.com/software_solutions/workflow_software/brisque/content/docs/Brisque5/6E3_Service_SA38-0630-02.pdf

8) Check that the Memory modules are not in Deconfiguration state. If yes change it. **Page 228 in the service guide Book**

9) Reset the service Processor.
10) Try to Boot.

5.10 44P-170 issues

5.10.1 determine if there is a defective power supply

Prior to replacing a P/S, - remove it, plug in to power the P/S & see if LED inside is flashing. If yes, then press in

the button on the rear of the PS for 20 seconds while the internal to the P/S power controller is reset. If it starts flashing, unplug it and return it to the 44P and be happy. If not, replace it.

6. Performance issues

The following are the steps to be taken when a complaint about a performance is received, PRIOR to escalating it to PS or PD.
The result of the below scripts/commands should be submitted as part of the Performance issues escalation.
Generally – use **topas** and **nmon (Brisque5 only)** to grasp the current system load.
See the below link for the detailed refernce on the below scripts :
http://techplanet.creo.com/software_solutions/workflow_software/brisque/content/memos/support_tools.htm

On Brisque5 all commands can be run manually from command line or form scismit ->problem determination menu. For older products the support scripts must be downloaded from the above link.

6.1 Network issues

- Run **nettest.sh** script to test your current machine network throughput. This requires at least 1 GB free space available on both source and destination dataVolume (the script chooses the largest free dataVolume).
- In case the network does show slow (less then 1 MB/sec) – check your NIC +Switch settings. They should both match and be set for "100BT-Full duplex" for a 100BT interface, and to Auto-Negotiation for a Gigabit board.
- Use the new chent.sh script (or run it from scismit - >problem determination) to try out different speeds WITHOUT rebooting the machine.
- Verify in brisque_check.log that the Brisque5 IP defined in /etc/hosts matches the address defined in atalk.conf file. If not – fix the atalk config.
- Verify in brisque_check.log that the machine NICs are correctly defined – in lsip.sh section of the log.
- Verify in brisque_check.log that there are no Network oriented errors – in "errpt" section of the log. If present – check the physical part of your network (NIC, cable, switch, etc).
  Run the following command to check for any existent network interface errors:
  entstat -drt ent0 |grep –i error
- Use **nmonnfs** (Brisque5 only) command to traces all NFS processes activity
- For OSX Macs – run Helios Lantest 3.1 to check the Mac Networking performance versus Brisque.Download the Lantest from :
  http://techplanet.creo.com/software_solutions/workflow_software/brisque/content/memos/helios_lan_test.htm

6.2 I/O issues

- Run **datavol-test.sh** script to test your current Brisque5 dataVolumes (data disks) throughput.
  One should expect at least 30 MB/sec copy speed between dataVolumes on new machines (6F1,6E3,6E4,etc),and more then 10 MB/sec on older machines.
  Check that new (Ultra 160 and up) disks/towers are connected to fast enough adapters - we recommend a Dual Channel LVD board.
  The following boards are OK to support newer disks .The first one will also work on Brisque4.1, the second one will work only on 5. The cogs are around 340$.

  518-00094A KIT, DUAL CH. ULTRA-3 LVD (AIX 4.3.3)

  605B00303 DUAL CH. ULTRA-3 SCSI ADPT 4-Y

  518-00996A KIT, DUAL CH. ULTRA320 LVD (BRISQUE 5.X)

  603-00366 DUAL CH. ULTRA320 SCSI PCI-X ADAP.(5702)

- Verify that NO disks appear as "Other SCSI Disk Drive" ! IBM disk appear as "16 Bit LVD SCSI Disk Drive" ,and Seagate disk appear with full description - as per brisque_check.html .
  If a disk appears as "Other SCSI Disk Drive" – this means that it's stanza (from a diskette coming with the disk) was not installed, and the disk is running 4 times slower that it could have !
  To check your disk type (the one that appears as "other scsci disk") – run :
  lscfg –vl

The following disk types are supported :

barST318436LC, barST318436LW, barST318437LW, barST318438LW, barST336737LW, barST336938LW, barST39236LC, barST39236LW, chST173404LC, chST173404LCV, chST173404LW, chST3146707LC, chST3146707LW, chST318406LC, chST318406LW, chST3300007LC, chST3300007LW, chST336607LC, chST336607LW, chST336704LC, chST336704LW, chST336705LW, chST336706LC, chST336706LW, chST373207LC, chST373207LW, chST373307LC, chST373307LW, chST373405LC, chST373405LW, ibmDPSS-318350N, ibmDPSS-336950N, ST3146807LC, ST3146807LW

- Verify in **brisque_check.log** - the "***iostat***" part- watch out for any 100% busy disk: (If any disk stays 100% busy most of the time – this is abnormal)
- Using smit –>devices ensure that all active scsi channels are set to the max speed possible.
- Verify in **brisque_check.log** `in` ***"All disks"*** section that there are no slow devices (Iris,etc) connected together with fast scsi disks (system disk, etc)
- Check if the customer flow can be split to work with more then one dataVolume simultaneously , if available.
- Download and run the fsdefrag.sh script from: http://techplanet.creo.com/software_solutions/workflow_software/brisque/content/memos/support_tools.htm
  We strongly recommend to run it once a month on all customer machines .The script defragments all the customer dataVolumes.
  The script does not interrupt the customer usage of the disks, just slows it down for a while, till finished.

6.3 Memory issues

- Check in brisque_check.log for "Top 10 memory usage by process" – can show processes that are taking too much memory percentage .A single process taking more then 30% of the system memory should be alarming.
- Check in brisque_check.log for "Top 10 CPU usage by process" – can show processes that are taking too much CPU percentage. A single process taking more then 40% of the overall CPU time should be alarming. Wait process should be disregarded – normally means idle time.
- Check `in` **`brisque_check.log`** `– the "`***`vmstat`***`"` part -shows overall system load picture: (See the following link for the detailed info on vmstat fields : http://publib16.boulder.ibm.com/pseries/en_US/infocenter/base/43_docs/cmds/aixcmds6/vmstat.htm#A341F927
  Generaly if a sustained wait is higher then 20% - the performance is an issue. Then, one has to investigate the memory/cpu/disk usage from the above sections – top-10-memory/top-10-cpu/iostat. Persistent pi/po [paging space faults] higher then 20 can hint on lack of memory).

6.4 Check for full filesystems

Verify in **brisque_check.log** - the "***df***" part - that the there are no full file systems.

7. Disk and filesystem problems

Note: See Appendix C for a details JFS overview.

7.1 JFS Filesystem Overview

The Journaled File System (**JFS**) uses a database journaling technique to maintain a consistent file system structure. This involves duplicating transactions that are made to file system metadata to the circular **JFSlog**. File system metadata includes the **superblock**, **i-nodes**, indirect data pointers, and directories.
When pages in memory are actually written to disk, commit records are written to the JFS log to indicate that the data is now on disk.
JFS logs enable rapid and clean recovery of file systems if a system goes down.
Normally the first thing to try is running "**fsck -y**" on a unmounted filesystem.
If after a disk / scsi/ system crash the filesystem fails to mount or fsck crashes with or without messages - the following steps can be performed in the given order.
Note: There are some extra unpublished tools that a filesystem specialist can use in order to recover the filesystem it all other ways fail - please contact Eli Cohen/Lev Weissman in such a case.

Warning : .(Perform all the below carefully !!!! There is a risk of a data loss !!!!)

7.2 File size limitations

The following are the max file size limitations on Brisque 4.1 and Brisque5.

1.Helios 2.6 (Brisque5) implies a 2 GB file size limit.
2.Both Brisque 4.1 and 5 have the following file size limits for users (-1 means unlimited):

root fsize=-1
scitex fsize=-1
cdesci fsize=-1
macuser fsize=-1
nobody fsize=2097151

7.3 Can disk be accessed ?

If the disk fails to import or refuses to be defined as a new disk - first try to access it on a physical level.
dd if=/dev/hsdisk4 count=5 bs=32 of=/dev/null
This will verify that the disk is accessible physically, and not totally dead.
dd if=/dev/hdisk4 count=1 |od -x | grep 0000200
This will attempt to read the disk PVID = physical volume ID

7.4 iostat shows disk utilization at 100%

If you observe disks go frequently to 100% utilization - it may mean several things.
1.If it's a system (rootvg) disk with version 4.1 - you need to zero the watermarks as per below:
http://techplanet.creo.com/software_solutions/workflow_software/brisque/content/troubles/bsq5_14.htm
2.If it's Brisque3/5 - check if the system is paging heavily == needs more memory.
3.If it's a data disk - check the disk stanza is present with "lsdev -Csscsi" - make sure it does not show as "other disk".
4.If none of the above shows any hint - use "**filemon –O all –o filemon.out "** command (RISC6000 TS guide) to try and establish which LV's/files are overloading the data disk and why.
Possibly try to split the workflow to use more then one dataVolume for different operations,if possible - i.e. rip to use xx.1.0 ,and Expose to use xxx.2.0.
5.Try running the **fsdefrag.sh** script.Download from:
http://techplanet.creo.com/software_solutions/workflow_software/brisque/content/memos/support_tools.htm

7.5 How do I remove a volume group with no disks?

The main question I see is "I've taken away the disks, but how do I get rid of the volume group". The question should really say,"How do I get rid of the volume group INFORMATION" since that's
all you have on the system. You've got possible entries in the /etc/filesystems and definitely entries in the ODM. Just do:

exportvg <vgname>

It does a reverse importvg, except it doesn't go off and read the VGDA. It nukes anything relating to the volume group in the /etc/filesystems and ODM. The only time this won't work is if the system detects that the volume group is varied on. Then, it would be like trying to change tires on a moving car, we won't let you do it!

The second most often asked question is "How do I get rid of a disk that is no longer really in the volume group?"

In this case, you DON'T want to do an exportvg. What you want to do is tell the system you want to cut out the memory of the old, bad disk from the RS/6000 AND from the VGDA of the volume group. You simply do:
reducevg -d -f <vgname> <hdname>
or if the hdname can't be found:
reducevg -d -f <vgname> <PVID>
Be careful with this command. Unlike the exportvg command, actions done with this command WILL affect the VGDA information on the platter.

7.6 Creating dataVolumes via scismit failed after a disk replacement.

Problem : Creating dataVolumes via scismit failed because svg4 was assigned to hdisk5 instead of svg5 which was previously assigned to hdisk6. In order for the scimit procedure to work properly, the hdisk number must correspond to the svg number.

Workaround:

1. First, "re-align" all hdisks' with their corresponding svgs' using mvhdisk.sh script (part of Brisque5) from the below link :

http://techplanet.creo.com/software_solutions/workflow_software/brisque/content/troubles/bsq5_44.htm

2. Replace the disk
3 .Configure new disk (cfgmgr)
4. Using 'scismit', complete task by adding new dataVolumes

7.7 Stalled mirrored partition after the mirror disk removal

Problem : In a mirrored environment the failed system disk hdisk0 was removed without prior unmirroring.This resulted in stalled partitions on rootvg:

lsvg -l rootvg

rootvg:

LV NAME	TYPE	LPs	PPs	PVs	LV STATE	MOUNT POINT
hd5	boot	1	1	1	closed/syncd	N/A
hd6	paging	127	254	**2**	open/stale	N/A
hd8	jfslog	1	2	2	open/stale	N/A
hd4	jfs	2	4	2	open/stale	/
hd2	jfs	32	64	2	open/stale	/usr
hd9var	jfs	7	14	2	open/stale	/var
hd3	jfs	2	4	2	open/stale	/tmp
hd1	jfs	1	2	2	open/stale	/home
scitexlv	jfs	83	166	2	open/stale	/scitex
scitemplv	jfs	16	32	2	open/stale	/scitex/version/temp
psfontslv	jfs	8	16	2	open/stale	/scitex/version/usr/local/es/psfonts
scimarkerslv	jfs	7	14	2	open/stale	/scitex/version/markers
scistoredblv	jfs	2	4	2	open/stale	/scitex/version/storedb
SharedItemslv	jfs	7	14	2	open/stale	/scitex/version/SharedItems
mngr_DBRoot	jfs	16	32	2	closed/stale	N/A

Old hdisk0 PVID is stuck inside the VGD on hdisk5 ... :

lqueryvg -p hdisk5 –Atv

```
Max LVs:        256
PP Size:        24
Free PPs:       461
LV count:       15
PV count:       2
Total VGDAs:    2
Conc Allowed    0
MAX PPs per     1016
MAX PVs:        32
Conc Autovar    0
Varied on Co    0
Logical:        004328dac954a6e5.1    hd5 1
                004328dac954a6e5.2    hd6 3
                004328dac954a6e5.3    hd8 3
                004328dac954a6e5.4    hd4 3
                004328dac954a6e5.5    hd2 3
                004328dac954a6e5.6    hd9var 3
                004328dac954a6e5.7    hd3 3
                004328dac954a6e5.8    hd1 3
                004328dac954a6e5.9    scitexlv 3
                004328dac954a6e5.10   scitemplv 3
                004328dac954a6e5.11   psfontslv 3
                004328dac954a6e5.12   scimarkerslv 3
                004328dac954a6e5.13   scistoredblv 3
                004328dac954a6e5.14   SharedItemslv 3
                004328dac954a6e5.15   mngr_DBRoot 3
Physical:       004328daa95fc140 0    4
                004328daa96db391 2    0
VGid:           004328dac954a6e5
Total PPs:      1084
```

redefinevg -d hdisk5 rootvg

synclvodm -Pv rootvg

```
0516-510 synclvodm: Physical volume not found for physical volume
        identifier 004328daa95fc1400000000000000000.
0516-548 synclvodm: Partially successful with updating volume
        group rootvg.
synclvodm: Logical volume hd5 updated.
synclvodm: Logical volume hd6 updated.
synclvodm: Logical volume hd8 updated.
synclvodm: Logical volume hd4 updated.
synclvodm: Logical volume hd2 updated.
synclvodm: Logical volume hd9var updated.
synclvodm: Logical volume hd3 updated.
synclvodm: Logical volume hd1 updated.
synclvodm: Logical volume scitexlv updated.
synclvodm: Logical volume scitemplv updated.
synclvodm: Logical volume psfontslv updated.
synclvodm: Logical volume scimarkerslv updated.
synclvodm: Logical volume scistoredblv updated.
synclvodm: Logical volume SharedItemslv updated.
synclvodm: Logical volume mngr_DBRoot updated.
```

reducevg -d rootvg hdisk0

```
0516-022 lquerypv: Illegal parameter or structure value.
0516-022 lquerypv: Illegal parameter or structure value.
0516-884 reducevg: Unable to remove physical volume hdisk0.
```

==========

The solution was :

rmlvcopy hd6 1 004328daa95fc140
rmlvcopy hd4 1 004328daa95fc140
rmlvcopy hd2 1 004328daa95fc140
rmlvcopy hd9var 1 004328daa95fc140
rmlvcopy hd3 1 004328daa95fc140
rmlvcopy hd1 1 004328daa95fc140
rmlvcopy hd8 1 004328daa95fc140
rmlvcopy scitexlv 1 004328daa95fc140

lsvg -l rootvg

```
hd5             boot       1     1           1    closed/syncd  N/A
hd6             paging     127   127         1    open/syncd    N/A
hd8             jfslog     1     1           1    open/syncd    N/A
hd4             jfs        2     2           1    open/syncd    /
hd2             jfs        32    32          1    open/syncd    /usr
hd9var          jfs        7     7           1    open/syncd    /var
hd3             jfs        2     2           1    open/syncd    /tmp
hd1             jfs        1     1           1    open/syncd    /home
scitexlv        jfs        83    83          1    open/syncd    /scitex
scitemplv       jfs        16    16          1    closed/syncd  /scitex/version/temp
psfontslv       jfs        8     8           1    closed/syncd  /scitex/version/usr/local/es/psfonts
scimarkerslv    jfs        7     7           1    closed/syncd  /scitex/version/markers
scistoredblv    jfs        2     2           1    closed/syncd  /scitex/version/storedb
SharedItemslv   jfs        7     7           1    closed/syncd  /scitex/version/SharedItems
mngr_DBRoot     jfs        16    16          1    closed/syncd  N/A
```

lqueryvg -p hdisk5 –Atv

```
Max LVs:        256
PP Size:        24
Free PPs:       230
LV count:       15
PV count:       1
Total VGDAs:    2
Conc Allowed    0
MAX PPs per     1016
MAX PVs:        32
Conc Autovar    0
Varied on Co    0
Logical:        004328dac954a6e5.1    hd5 1
                004328dac954a6e5.2    hd6 1
                004328dac954a6e5.3    hd8 1
                004328dac954a6e5.4    hd4 1
                004328dac954a6e5.5    hd2 1
                004328dac954a6e5.6    hd9var 1
                004328dac954a6e5.7    hd3 1
                004328dac954a6e5.8    hd1 1
                004328dac954a6e5.9    scitexlv 1
                004328dac954a6e5.10   scitemplv 1
                004328dac954a6e5.11   psfontslv 1
                004328dac954a6e5.12   scimarkerslv 1
                004328dac954a6e5.13   scistoredblv 1
                004328dac954a6e5.14   SharedItemslv 1
                004328dac954a6e5.15   mngr_DBRoot 1
Physical:       004328daa96db391 2   0
VGid:       004328dac954a6e5
Total PPs:      542
```

Mazal Tov !!!

7.8 Writing a PVID to disk

WARNING: NEVER DO IT UNLESS YOU ABSOLUTELY SURE YOU KNOW WHAT YOU ARE DOING – OTHERWISE YOU WILL LOOSE DATA !
If you HAVE to force a PVID to a disk -first you need to translate the hex PVID into an octal value.

Assume you need to force a PVID 0045401c5c79b298 to a disk.

00 45 40 1C 5C 79 B2 98 becomes 000 105 100 033 134 171 262 230 (upper case for hex letters !!!)
Easy way to translate from hexadecimal to octal:

```
for num in `< /dev/tty`
do
  echo "ibase=16;obase=8;$num"|bc
done
```

Then you would enter in hex numbers, two digits at a time then enter, and also **upper-cased for any alphabetical letters. (1C instead of 1c).**
Then press control-d when you are ready for it to translate into octal.
Just make sure all octal digits are zero-padded to always make it three digits, with leading zeros if necessary. (0 hex would be 000 octal, 15 hex would be 025 octal, etc.)

Then you write the octal number back onto the disk. Mind the "\0" in front of any octal number and the final "\c". There are no blanks inside the "".

```
echo "\0000\0105 \0100\0033\0134\0171\0262\0230\c" | dd of=/dev/hdisk2 bs=1 seek=128
```

7.9 Recovering a logical volume

Sometimes you will get messages regarding problems with logical volumes.
The following procedure rebuilds the bad LVCB - logical volume control block in ODM.

```
getlvcb -AT slv4.3          #views LV info
putlvcb -N slv4.3           #rebuilds LVCB
synclvodm -v rootvg slv4.3  #resyncs ODM
```

7.10 Reducing the paging space

Symptoms : Sometimes you need to manually reduce the paging space to allow more space for the file system on the system disk.
The reduceps.sh script in Brisque v5.x automatically reduces the paging space to 1.5 GB. However, this script requires a free 512 MB partition space on rootvg. If there is less space, you need to manually reduce the paging space.
Note:The reduceps.sh script is available only for Brisque 5.x. For Brisque 4.x, you need to manually reduce the paging space, as described in this procedure.

(The script is built into Brisque 5.1.32 so there is no need to download it.)

Solution :To manually reduce the paging space if there is less than 512 MB on rootvg:

1. Determine the existing paging space logical volumes on your system. Type:
   lsps -a

2. Check how many free physical partitions (PPs) are available. Type:
   lsvg -p rootvg

3. Create a paging space for temporary use. Type:
   mkps -s X -a rootvg
   where X is a number in the range of 1 and the total number of PPs obtained in step 2.

4. Run lsps -a again and note the new paging space (probably paging00)

5. Change the characteristics of the default paging space (hd6) so that it is inactive at reboot. Type:
   chps -a n hd6

6. To edit the file, type:
   vi /sbin/rc.boot

7. Change the line swapon /dev/hd6 to swapon /dev/pagingXX where XX is the number of the new paging space created in step 3 (paging00).

8. Use the lslv command to determine which disk is the boot disk. Type: lslv -m hd5. The boot disk is shown in the PV1 column of the lslv output.

9. Run the bosboot command, using the hdisk obtained in step 8 (for example, hdisk0). Type:
   bosboot -a -d /dev/hdisk0

10. The system is rebooted to inactivate the hd6 paging space. Type:
    shutdown -Fr

11. The default dump device is set to hd6. hd6 cannot be removed while it is the dump device. Check the dump device. Type:
    sysdumpdev -l

12. If the primary or secondary dump device is set to hd6, reset the pointer. Type:
    sysdumpdev -P -p /dev/sysdumpnull

13. Because some scripts are hard-coded to activate /dev/hd6, you should create the new paging space under the same name. Remove hd6 and create a new hd6 of smaller size. Type:
    rmps hd6
    mklv -y hd6 -t paging rootvg <PS size in logical partitions>
    where PS size in logical partitions is the number of LPs allocated to hd6.

14. Edit the file. Type:
    vi /sbin/rc.boot

15. Change the swapon line back to swapon /dev/hd6. To confirm that hd6 is automatically swapped at reboot, type:
    chps -a y hd6
    lsps -a
    Verify that there is a y under the auto column for hd6.

16. Run the bosboot command, using the hdiskX obtained in step 8. Type:
    bosboot -a -d /dev/hdiskX

17. Change the characteristics of the temporary paging space (which is assumed to be paging00 in this procedure), so that it is inactive at the next reboot. Type:
    chps -a n paging00

18. The system is rebooted to inactivate the hd6 paging space. Type:
    shutdown -Fr

19. Remove the temporary paging space. Type:
    rmps paging00
    If the dump device was changed in step 11, reset the dump pointer. Type:
    sysdumpdev -P -p /dev/hd6

7.11 Copy a superblock

If you have a "**dirty superblock"** error message during **mount** or **fsck** -you might try to do "fsck". If this does not work try the following (This procedure does not promise 100% success).
USE this procedure ONLY as a last resort if fsck fails !!!!!
(The following example relates to a bad filesystem in slv2.0)

Copy the secondary superblock to the primary superblock. An example command and output follows:

```
dd count=1 bs=4k skip=31 seek=1 if=/dev/slv2.0 of=/dev/slv2.0
    dd: 1+0 records in.
    dd: 1+0 records out.
```

Then we'll run fsck on this filesystem to ensure it's back.

7.12 Format jfslog

If the **jfslog** has been damaged for any reason, it will cause the filesystems to not be mounted.
Assume the filesystem /dataVolumes/proof7.2.0 fails to mount and fsck does not help.
Find out the name of the jfslog that belongs to this filesystem:

```
lsvg -l    svg2

svg2:
LV NAME   TYPE    LPs   PPs   PVs  LV STATE      MOUNT POINT
slv2.0    jfs     1080  1080  2    open/syncd    /dataVolumes/proof7.2.0
loglv02   jfslog  1     1     1    open/syncd    N/A
```

we will reformat the jfslog. Enter:

```
logform  /dev/loglv02
```

This command will ask the horrible question "Do you wish to destroy the log?". Just say yes. This will get you a new, clean jfslog.
Then we'll run fsck on this filesystem to ensure it's back.

7.13 A filesystem gets full 100%

Occasionally one of the filesystems may get full to 100%.
The following our some basic checks to be done in order to establish the reason why it happened.

System FS :

If one of the system filesystems gets full – check first the following:

1. If it's a /**scitex** FS – check using "ls –la" if there is some huge log file in **$SCI_LOGS** and remove it.
2. if it's a "/" FS – use "ls –la /" to look for any possibly **core** or other big file.
3. Using "df" verify that all the FS that are supposed to be mounted are really mounted – otherwise a customer may have been copying data to a not mounted FS (just a mountpoint) ,thus exploding the "/" FS,where the /dataVolumes/* mountpoints reside.
   find / -xdev -size +20480 -ls|sort -rn +6|head –10
   to find 10 top files in the root (/) directory larger than 10 MB." -**xdev**" helps searching ONLY in "/" !!

Another common cause that is easily overlooked is the mountpoints under /dataVolumes can contain files that got there when the filesystem was unmounted at some point in the past. After looking for files in / I always umount -a then cd /dataVolmes and use a combination of du * | more and ls -l * to look for leftovers. When there is no core file or .ps file at / then I most often find jobs inside the mountpoints.

dataVolumes FS :

1. Use the following command to check for the top 10 biggest directories on this dataVolumes:
   du -ak /dataVolumes/brisque1.2.0 | grep -v .rsrc | sort -n -r | head –10
2. If there are no special huge files – try **fsck** on this FS
3. if you rm a file while its open or writting to it the file will go but the process may still be reseving the space.
   Find the process using **fuser -u /myfs**
   Or just kill it :
   fuser -k /myfs

7.14 Maximum AIX File/Filesystem Sizes

The maximum AIX file and filesystem size depends on the kernel type and AIX/JFS versions. Here are the maximum supported values.

Maximum File/Filesystem Sizes in AIX

	AIX 4.3	AIX 5.1			AIX 5.2		
JFS	JFS	JFS	JFS2		JFS	JFS2	
AIX Kernel	32/64	32/64	32 Bit	64 Bit	32/64	32 Bit	64 Bit
Maximum Supported							
File Size	64 GB	64 GB	1 TB	1 TB	64 GB	1 TB	16 TB
Filesystem Size	1 TB	1 TB	1 TB	1 TB	1 TB	1 TB	16 TB

7.15 /scitex is empty

Sometimes one finds that /scitex is empty – no application is accessible.
There maybe some problem with a /scitex filesystem – it may need a good fsck.
Unmount it and run:
fsck -y on /dev/scitexlv
If you cannot unmount it – boot from AIC CD and act as per "Led's 517 or 518" flow .

7.16 Corrupted filesystem crashes fsck on boot

There can be a situation when a computer will crash repeatedly during the fsck that runs automatically on every boot.
This can be due to a certain corrupted filesystem.
Workaround:

1. telnet from another station after tcpip has started and unmount the /dev/slv*, before atalk starts.
2. Run "fsck -y" till the filesystem is clean
3. Delete .Desktop from all volumes and Empty trash from the dataVolume causing the problem.
4. restart atalk.
5. reboot the system

7.17 Identifying a problematic filesystem from errpt

You have some filesystem that causes one of the processes (HFdaemon in this case) to crash.
If in errpt you get the following output

```
FILE SYSTEM SERIAL NUMBER
        11
INODE NUMBER
         23
PROGRAM NAME
HFdaemon
```

Now in order to tell the filesystem name by it's "serial number" (11 in this case) type:

echo vfs|crash

```
VFS     ADDRESS   TYPE  OBJECT     STUB  NUMBER FLAGS      PATHS
 0      317ac83c    jfs  138b4e80       0          5 D  /dev/hd4 mounted over /
 1      317ac8a4    jfs  14395b88 1620ad98     6 D  /dev/hd2 mounted over /usr
 2      317ac870    jfs  15b84230 14a1c858     7 D  /dev/hd9var mounted over /var
 3      317ac808    jfs  17372ba8 16cebc08     8 D  /dev/hd3 mounted over /tmp
 4      317ac8d8    jfs  14398450 13230a78     9 D  /dev/hd1 mounted over /home
 5      317ac90c    jfs  1572cd90 145c53b8    10 D  /dev/scitexlv mounted over /scitex
 6      317ac940    jfs  16cee4d0 15b86c60    11 D  /dev/scitemplv mounted over /scitex/version/temp
 7      317ac974    jfs  1416b650 13003c78    12 D  /dev/psfontslv mounted over
/scitex/version/usr/local/es/psfonts
```

```
 8       317ac9a8    jfs  13230d48 16667800     13 D  /dev/scimarkerslv mounted over
/scitex/version/markers
 9       317ac9dc    jfs  145c5520 1345db48     14 D  /dev/scistoredblv mounted over
/scitex/version/storedb
 10      317aca10    jfs  15959e60 147f2488     15 D  /dev/SharedItemslv mounted over
/scitex/version/SharedItems
 11      317aca44    jfs  14c9fcb0 15553618    17 D  /dev/slv3.0 mounted over /dataVolumes/timna1.3.0
 12      317aca78    jfs  162613f0 15780580    18 D  /dev/slv3.1 mounted over /dataVolumes/timna1.3.1
 13      317acaac    jfs  173c8dc8 159ad650    19 D  /dev/slv3.2 mounted over /dataVolumes/timna1.3.2
 14      317acae0    jfs  15780df0 143ec4b0    21 D  /dev/backuplv mounted over /backup
 15      317acb14    jfs  168e9470 15781a98    26 D  /dev/slv6.0 mounted over /dataVolumes/timna1.6.0
 16      317acb48    jfs  136df920 159aea00    27 D  /dev/slv6.1 mounted over /dataVolumes/timna1.6.1
 17      317acb7c    jfs  13d66758 15bdb968    28 D  /dev/slv6.2 mounted over /dataVolumes/timna1.6.2
 18      317acbb0    jfs  14ece298 15e088d0    29 D  /dev/slv6.3 mounted over /dataVolumes/timna1.6.3

flags:  C=disconnected D=device   I=remote P=removable R=readonly     S=shutdown U=unmounted Y=dummy
```

Then, compare the values in the NUMBER column of the VFS table with the VFS serial number from the error log.
In the above case the problematic FS is **/scitex/version/temp.**
Now you can find the file causing the problem in this FS searching for its inode :

```
find /scitex/version/temp –inum 23
```

7.18 Reinitializing the rootvg Volume Group

To reinitialize the rootvg volume group info in ODM, create a shell script to **/bin/rvgrecover** and run the following to make that file executable:

```
chmod +x /bin/rvgrecover
```
Then run:
```
/bin/rvgrecover
```

Use the following shell script to reinitialize the ODM entries for the rootvg volume group.
Note: The rootvg must be unmirrored first if mirrored !

```
#!/bin/ksh
PV=`lspv | grep rootvg | awk '{print $1}'`
VG=rootvg
cp /etc/objrepos/CuAt /etc/objrepos/CuAt.$$
cp /etc/objrepos/CuDep /etc/objrepos/CuDep.$$
cp /etc/objrepos/CuDv /etc/objrepos/CuDv.$$
cp /etc/objrepos/CuDvDr /etc/objrepos/CuDvDr.$$
lqueryvg -Lp $PV | awk '{ print $2 }' | while read LVname; do
      odmdelete -q "name = $LVname" -o CuAt
      odmdelete -q "name = $LVname" -o CuDv
      odmdelete -q "value3 = $LVname" -o CuDvDr
done
odmdelete -q "name = $VG" -o CuAt
odmdelete -q "parent = $VG" -o CuDv
odmdelete -q "name = $VG" -o CuDv
odmdelete -q "name = $VG" -o CuDep
odmdelete -q "dependency = $VG" -o CuDep
odmdelete -q "value1 = 10" -o CuDvDr
odmdelete -q "value3 = $VG" -o CuDvDr
importvg -y $VG $PV     # ignore lvaryoffvg errors
varyonvg $VG
```

7.19 Problems With Booting A System

7.19.1 LEDs 517 or 518 – system boot sticks

Typically, the problems with booting occur in the following areas:

1. Bootlv corruption
2. Filesystem corruption
3. JFSlog corruption

The following methodology is used to help repair/recover from the above named boot problems.
You will need bootable media (CD, tape) in order to insure the boot image is good. The level of the bootable media MUST be the same as the boot image on the installed machine.

1. Boot from AIX CD as if you do a Coldstart
2. Press F1 and enter to select the console (Key Board)
3. Type 1 and press enter for English
4. Type 3 and press enter for "Start Maintenance Mode…"
5. Type 1 and press enter for "Access a Root volume group"
6. Type 0 and press enter to continue
7. Type 1 and press enter to select hdisk0
8. Type 1 and press enter to Access this volume group and to start a shell. Now you should have a normal prompt.
9. At the shell prompt, we will try to do the repair mechanism. Enter the following:

fsck -y /dev/hd2
fsck -y /dev/hd4
fsck -y /dev/hd1
fsck -y /dev/hd3
fsck -y /dev/hd9var

Look at fsck output for any errors that are displayed. If a filesystem has been hosed, it may require a reload of the system, depending on the file system in question and the level of problem.

10. Assuming we have passed all the fsck's above, we will reformat the jfslog. If it has been damaged for any reason, it will cause the filesystems to not be mounted. Enter:
    /usr/sbin/logform /dev/hd8
    This command will ask the horrible question "Do you wish to destroy the log?". Just say yes. This will get you a new, clean jfslog.
11. Verify that the type field for the **/** (root) and **/usr** file systems is correct in the client's **/etc/filesystems** file. To do this, run the following command:

    pg /etc/filesystems

    Make sure that the **/** (root) and **/usr** stanzas contain a line that reads type=bootfs. If the type field is incorrect, use a text editor to correct it.
12. After this we will rebuild the boot image. Enter "exit" at the command prompt. This will complete the boot cycle by mounting all the file systems. Look for any error output, just in case.
13. At the prompt, enter:
    lslv -m hd5
    The output will show which disk has the boot image. Look under the PV1 column for this. Example output is below.

    lslv -m hd5

    hd5:N/A
    LP PP1 PV1 PP2 PV2 PP3 PV3
    01 0001 hdisk0
    02
    In the example, the boot disk is hdisk0. It is also vitally important that the data under LP and PP1 be both 0001! If it is not, then your boot image is not placed in the proper location on the disk and will need to be relocated!
14. Enter the following to recreate the boot image.
    If /usr is not mounted – mount it as following:
    mount /dev/hd2 /usr
    Then run the bosboot:
    /usr/bin/bosboot -a –d /dev/hdisk# , where # is the boot disk number.
15. Do a shutdown and reboot the system. This should clear up your problems. If not, detailed diagnostic information and support will be required.
16. **Check/reset all scsi cables/disks**
17. **Try booting from CD after disconnecting ALL disks but the system one.**

18. **If all the above does not help – replace your system disk ! It may well cause this issue.**

7.19.2 LED 581 –system sticks

This error reflects a network setting problem. Mostly after adding a new network board.

The Machine will boot after about 20-30 minutes

Solution:
Delete the file /etc/resolv.conf
Reboot the system

8. Network basic troubleshooting

8.1 TCP/IP

http://publib16.boulder.ibm.com/pseries/en_US/aixbman/commadmn/tcp_problems.htm

There are a lot of factors that could cause network connectivity problems:
Problems with physical connections between host and network
Problems with local system software
Problems with local configuration
Problems with local applications
Problems with physical connections between 2 or more networks
Problems with services being down (mail servers, DNS servers)
Try to determine what type of problem you're dealing with:
Is it clearly a "local" software problem, such as system errors, freezing, and corruption in software?

Does the problem occur in different applications? When connecting to different hosts? When using IP addresses instead of domain names? Finding the answer to these questions will help you determine if you're dealing with something application-specific, host-specific, DNS server specific, or something in between (configurations, physical connections).

Is everyone else on the network experiencing the same kind of problem? If so, (and if these services worked before) it's probably not a problem with their applications or configurations, but something outside that: look for problems with hubs, routers, servers, etc.

If only one of the machines on the network can duplicate the problem, then check physical connections and configuration.

TIPS:

8.1.1 When it's a software problem...

Use the usual software troubleshooting techniques to isolate problems such as system errors, freezing, and applications unexpectedly quitting, such as testing with third party extensions off (Mac) , removing preference files (Mac), and reinstalling software.
Remember that it's helpful to have a screenshot of the TCP/IP configuration before removing preferences/configuration, so you can reconfigure. Also, it's not necessary to actually tras/remove preference/configuration files.

8.1.2 When it occurs in only one application...

If other IP applications work properly--they can open connections, names get resolved, etc.--then the problem would seem to be one "problem" application, or its settings.

8.1.3 When problems occur in all applications...

If none of the users applications are working properly, it's time to find out if other nodes on the network are affected or if it's just this one machine.

8.1.4 When all nodes are affected...

If all devices on the network are having the same problem, then it's likely to be some network, router, or server problem.

Test Physical Connection See if AppleTalk/TCPIP is working over the network to verify the physical connection (could be a problem with the hub they're all connected to).
Try Pinging Different Devices. If AppleTalk/TCPIP work, see if the customer can make a connection to another device on the same subnet; ping utilities (MacTCP Ping, MacTCP Watcher or PC Ping) are very useful for this, since it doesn't require the target host to be running any particular type of service. Targeting devices on the same subnet, and using IP addresses to ping rather than domain names, removes a couple of variables from the picture and helps you isolate where the problem is coming from.
When pinging Mac-to-Mac, PC-to-PC or PC to Mac, make sure that Macs that TCP/IP is active on both machines. The TCP/.IP stack become active when an IP application is launched (or on startup if the "load only when needed" option in the TCP/IP control panel is Unchecked). A Mac cannot respond to pings if the IP stack is not active.

If the two devices are able to ping each other, next try pinging the router (it could be down or the address may be incorrect), then the DNS server, and then some external hosts.
Check Configuration Having two devices on the same subnet ping each other removes many of the variables that can affect connections. If the two devices can't ping each other, check configuration information carefully; the two devices should have the same network number, should be using the same subnet mask, and (on Mac) should have the same settings for "802.3" (normally, this will be unchecked).

In addition, when two Macs are trying to communicate directly to each other, they should either both be using MacIP, or neither using MacIP. If both are using MacIP, make sure they're talking on the same AppleTalk network (can they see each other in the chooser?)
And again make sure that the IP stack is active on the Macs; if the "load only when needed" option is checked in the TCP/IP, the stack only becomes active when an application that uses TCP/IP (Netscape, Telnet, Fetch) is first launched. If no IP applications are running, the IP stack may not be active, and the Mac may not respond.

8.1.5 When only one node is affected...

With only one device having problems on a network, it's likely to be a problem with physical connections, with configuration, or with the particular application they're using. But when you're dealing with some, but not all, machines having problems, don't rule out misconfiguration, since its possible that they were set up at the same time by the same person, and were all misconfigured or miswired.
Check physical connections; see if AppleTalk is working by looking for servers or printers in the Chooser.

Check TCP/IP Settings. If the physical connection appears to be okay, check configuration in the TCP/IP control panel carefully. Compare the configuration to that of a machine on the same subnet that is able to connect successfully; look especially for mistyping of the IP addresses, the subnet masks, the router, and DNS servers. Make sure the link selected in "connect via" popup is correct. Make sure "802.3" is not selected if using Ethernet.

Check for duplicate IP addresses**.** Make sure the IP address being used is not already in use by someone else. You could do this by shutting down the problem machine, then attempting to ping its address from another machine. If you get a response, some else is using that address.
Another test is to take the settings from a machine that's working properly, shut down that machine, and set up the "problem" machine with the same settings.

8.1.6 When it appears to be router problem

If two devices on a network can ping each other, but nothing else, the problem is most likely the router. Check the router address in the TCP/IP control panel, and try pinging it. If no ping utilities are available, you can usually try opening a connection to the router with NCSA Telnet, which the customer may have (it is part of AICK). If you get the "login:" prompt, you're connecting.
If you get no response from the router, it could be that that the router is down for maintenance, or this is the wrong address. If the IP address of the router does respond, but you still can't connect to anything outside the customer's subnet, its still time to check the address. Possibly this is not, in fact, the router address. Customers will need to deal with the network administrator at this point.

8.1.7 When it's a DNS problem

If devices can connect using IP addresses but not domain names (and remember, try with different applications and try with different domain names), look for problems with their DNS entries, or the DNS server itself. If you can't ping the DNS servers that they have entered in the TCP/IP control panel, they may be down for maintenance

8.1.8 When DNS is down …

To have the server running even when the DNS is down and also usable if available, you can create an extra config file in /etc create a file with name netsvc.conf .

in this file put a line:

hosts = local , bind

this will force the search order for the name service first to look into /etc/hosts (the local part) and if no success look for DNS (the bind part) .

Having this file configured the server can boot without problems and can use DNS when available, so you

don't have to delete the DNS entry .

8.1.9 Ping command usage:

Use the **ping** utility to test both the host name and the IP address of the host. For the syntax and description of the **ping** command, see Appendix A, "TCP/IP Utilities Reference."
To test TCP/IP using the ping utility :

ping -Rv bnc3

```
PING bnc3.stil.scitex.com  (10.4.35.74)  56 data bytes
64 bytes from 10.4.35.74  icmp_seq=0 ttl=255 time=0 ms
RR:     bnc3.stil.scitex.com (10.4.35.74)
        condor3.stil.scitex.com (10.4.35.75)
64 bytes from 10.4.35.74  icmp_seq=1 ttl=255 time=0 ms  (same route)
64 bytes from 10.4.35.74  icmp_seq=2 ttl=255 time=0 ms  (same route)
```

1. If the computer was configured using DHCP, use **ipconfig** to learn the IP address.
2. Use **ping** to check the loopback address by typing **ping 127.0.0.1** and pressing ENTER at the command prompt. The computer should respond immediately.
3. If **ping** is not found or the command fails, check the event log with Event Viewer and look for problems reported by Setup or the TCP/IP service.
4. To determine whether you configured IP properly, use **ping** with the IP address of your computer, your default gateway, and a remote host.

If you cannot use ping successfully at any point, check the following

* The computer was restarted after TCP/IP was installed and configured
* The local computer's IP address is valid and appears correctly in the TCP/IP Configuration dialog box
* The IP address of the default gateway and remote host are correct
* IP routing is enabled and the link between routers is operational

If you can use ping to connect to other Windows NT computers on a different subnet but cannot connect through File Manager or with net use *servershare*, check the following**

* The computer is WINS-enabled (if the network includes WINS servers).
* The WINS server addresses are correct, and the WINS servers are functioning.
* The correct computer name was used.
* The target host uses NetBIOS. If not, you must use FTP or Telnet to make a connection; in this case, the target host must be configured with the FTP server daemon or Telnet server daemon, and you must have correct permissions on the target host.
* The scope ID on the target host is the same as the local computer.
* A router exists between your system and the target system.
* LMHOSTS contains correct entries, so that the computer name can be resolved. For more information, see "Troubleshooting Name Resolution Problems" later in this chapter.
    - The computer is not configured to use WINS.

8.1.10 Can not qualify my own domain name, using short name...

Problem : There is a message that appears in Smit , Scismit or Terminal prompt (#) in frequency of every 20 seconds

" Mon-dd-yy hh:ms condor3 sendmail (31084): unable to quality my own domain name (lot6) -- using short name.

Cause :
-- This message is generated every time that 'sendmail' program sends mail to local user.

-- This message could be seen at every computer of our site that has not set 'nameserver' (149.115.39.1) and 'stil.scitex.com' that means that the computer is not using DNS service.

-- The situation becomes unbearable for console user when there is big mail traffic. In condor3 and lot6 the messages are being generated by
* * * * * /scitex/version/scripts/test_scripts issue of 'crontab' every minute

--This happens because "condor" is not enough for sendmail's name resolution.
The name is in "relative domain name format" but should be in "absolute domain name format"
or "Fully qualified domain name" that is it should be like "name.subdomain.subdomain.domain."

Workaround :
- Go to "smit hosts"
- Choose "Change/Show ..." and press F4 to pick name of the local host to change.
- Add alias that is local host name plus dot (For example "condor3.")
- Save the change and quit smit.

You should not restart sendmail after that, it solves the problem immediately.

This fix should not interfere when host gets attached to DNS,
because name resolution services are configured nowadays to use DNS at first
(by default) and our alias in hosts name going to be ignored.

8.1.11 IP address changes after reboot

Problem : After reboot IP address changes to some different one from the one defined by smit .
Deleting and redefining the interface does not help.

Cause : DHCP subsystem was enabled in **/etc/rc.tcpip** .It will show by running "ps –ef |grep dhcp"

Solution : Disable DHCP on startup by adding a "#" in **/etc/rc.tcpip** to the dhcp activation line.

8.2 NFS issues

8.2.1 Restarting NFS

To stop the NFS :
stopsrc -g NFS
To start the NFS :
rc.nfs

8.2.2 NFS mount failes from all stations

The NFS mount failes with some "..`Permission denied` …" message.

```
mount -n qatest /dataVolumes/qatest.3.0 /dataVolumes/qatest.3.0

mount: access denied for qatest:/dataVolumes/qatest.3.0
mount: giving up on:  qatest:/dataVolumes/qatest.3.0
Permission denied
```

- Unmount all dataVolumes on the NFS server.
  Check that there is nothing under any mount point – if there are any files or directories – remove them.If the mount point is not empty after all the FS are unmounted – this can cause NFS mounting issues.
- If it did not help – try the below procedure :
  stopsrc -g nfs
  stopsrc -s portmap
  If it's AIX5 :
  cd /var/statmon/
  rm -rf sm sm.bak
  If it's AIX 4.3.3 :
  cd /etc
  rm -rf sm sm.bak
  For all versions:

  cd /etc
  rm -rf state rmtab xtab

startsrc -s portmap
startsrc -g nfs
refresh -s inetd

- Remove and readd exports for all required volumes on your host (smit nfs).

8.2.3 Removing a stale NFS mount

Problem:
HostA has a filesystem mounted to HostB. HostA goes down and can't be accessed. HostB now has a stale mount. Can't umount it because it thinks it is in use.
Workaround:

lssrc -g NFS (to see if the NFS daemon is running)
Then you can stop them all with stopsrc :

stopsrc -s lockd
stopsrc -s statd
stopsrc -s portmap
stopsrc -s rpc.statd
stopsrc -s rpc.lockd
stopsrc -g NFS
stopsrc -g tcpip
cd /etc
rm state
cd /etc/sm (remove everything in this subdirectory)
cd /etc/sm.bak/ (remove everything in this directory)

Then do a startsrc -s portmap :

startsrc -s rpc.statd
startsrc -s lockd
startsrc -s rpc.lockd
startsrc -g NFS
startsrc -g tcpip

or you can start them all with starsrc -g NFS....but check to be sure they are up.
you might get errors that it is already running, that is ok. Do a lssrc -g NFS and lssrc -g tcpip and see that they are all up.

If all the above did not help – flash the routing tables and reboot :
smit ->tcpip-> Further Configuration -> Static Routes-> Flush Routing Table

8.2.4 NFS basic checklist

First, write down the following information before you even start.
Server name:
Server IP address:
Exported volume path:
Client name:
Client IP address:
Mount point path:

Check these items yourself; you will be surprised to find how often the items on this list will vary from what somebody will pull out of a file cabinet when you ask for this info. The server doesn't have access to the file cabinet.

Can you ping the server from the client? Can you ping the client from the server? The ping command bounces repeated icmp test packets off of your target until you quit with ^c. To test this you type:
ping servername
from the command line of the client. Use the hostname because this will test two things at once. The first is name resolution. When you type the name in, can the system resolve that into the correct IP address? That's how the

clients work, so test it the way they work and you won't miss something simple like a mistyped IP address in the hosts file. The second thing is the actual connectivity. If the other station can be reached you will see output like this:

```
root@Brisqueserve1:/ 71 > ping tasopc
PING tasopc: (10.2.25.160): 56 data bytes
64 bytes from 10.2.25.160: icmp_seq=0 ttl=128 time=0 ms
64 bytes from 10.2.25.160: icmp_seq=1 ttl=128 time=0 ms
64 bytes from 10.2.25.160: icmp_seq=2 ttl=128 time=0 ms
64 bytes from 10.2.25.160: icmp_seq=3 ttl=128 time=0 ms
^C
```

If it cannot be reached, you may get a few different kinds of returns.

ping brisque09

```
0821-062 ping: host name brisque09 NOT FOUND
```

This means that a host called brisque09 is not in the hosts file of this station.
If you put brisque09 into the hosts file and try again, you may see something like this:

```
ping brisque09
PING 10.10.10.99: (10.10.10.99): 56 data bytes
```

But it just sits there. This means that the other station isn't answering you. The take away from this is, if it won't ping in both directions, then it won't mount. Fix that first.

- Exports

When everybody is pinging, check the exports. If what you try to mount isn't exported, or if you don't have access to it, you will be denied. To check it you type:

```
# showmount -e Brisque6F1_TBed
export list for Brisque6F1_TBed:
/scitex/version/SharedItems         (everyone)
/dataVolumes/Brisque6F1_TBed.1.0   (everyone)
/scitex/version/markers             (everyone)
/scitex                             (everyone)
```

This output indicates that the above directories are exported and that access is not restricted. If it were, you would see a hostname or hostnames where everyone appears. If something does come up on the directory that you want to mount, don't panic as long as one of them is you. If the directory is not exported for everyone, or you somebody needs to remedy that.

If you get output like:

showmount –e brisque09

```
10.2.25.149: RPC: 1832-018 Port mapper failure - RPC: 1832-008 Timed out
```

That means that there are no NFS services running at the server. This can be due to a bunch of different things. The most common is that the exports never got done. Most NFS implementations do not launch if there are no exports. The other front-runner is the IP address is wrong. You contacted somebody, but he is not the station that you think he is. This is why you check these things directly at each station whenever possible

- Security

The server has a bit of security involved. It restricts NFS access to known hosts by default. This means that if your client's IP address is not in the server's hosts file, then your mount request will receive an "access denied" status message. The default export will be for everyone, but for some sites, the system administrator may insist on exporting volumes only for certain stations. If they do, then any client that doesn't show up on the list when you do showmount –e servername, will be denied access until that is fixed. It should be fixed by either adding each client to the list, or changing the export back to the unrestricted default.

- File Permissions

Even after you mount you may find that you have problems with accessing files or writing files. Creo Aix to Creo Aix you won't have these problems because the security configurations are identical, but when you are mounting Windows machines, or other UNIX machines you may find these type of problems. The first place to look is at the mount point folder itself, when you type:

```
# ls –l brisque04.1.0
drwxrwxrwx  43 macuser  macusers    2560 Apr 09 09:59 brisque04.1.0
```

look at the output, are the owners showing up as macuser:macusers, or scitex:scitex? Or is it numbers like 345:456, for example? What are the permissions? The above example shows drwxrwxrwx. Don't forget your UNIX 101 owner/group/world. So our volume is owned by the user macuser from the group macusers. The directory has read write and execute permissions for the owner, it has the same for members of the owners's group, and the same for the rest of the world. We might be in trouble if we see something like:
drwxr—r-- 43 604:607 2560 Apr 09 09:59 brisque04.1.0.
This example shows that the directory belongs to a user with user id 604 from group 607. The reason we see numbers instead of names here is because whatever user is on the server system, it doesn't exist on the client. The reason that becomes a problem for us is the file permissions. This one has read, write, and execute for the owner, but only read for the group and world fields. That means the even if we specify the mount to be read/write, we will never be able to write to that volume until somebody fixes the permissions, or creates a user on the server side with user id 200 and calls it scitex, and a group with a group id of 200 and calls it scitex, the make sure that this is who the exported volume is owned by. Then we will have full permissions.

- Configuration files

/etc/hosts

This file contains IP addresses, host names, aliases and comments. It is used to map hostnames to IP addresses by all TCP/IP applications on the machines. TCP/IP doesn't know anything about names, it all runs on numbers. Anything that follows a # is a comment and is ignored by the system. The syntax of the file is IP address, hostname, and alias, comment. You know what IP address and hostname are by now, alias is exactly what it sounds like, a second name that will also resolve to the same address.

Below is an example:

```
# IBM_PROLOG_BEGIN_TAG
# This is an automatically generated prolog.
#
# bos430 src/bos/usr/sbin/netstart/hosts 1.1
#
# Licensed Materials - Property of IBM
#
# (C) COPYRIGHT International Business Machines Corp. 1985,1989
# All Rights Reserved
#
# US Government Users Restricted Rights - Use, duplication or
# disclosure restricted by GSA ADP Schedule Contract with IBM Corp.
#
# IBM_PROLOG_END_TAG
#
# COMPONENT_NAME: TCPIP hosts
#
# FUNCTIONS: loopback
#
# ORIGINS: 26  27
#
# (C) COPYRIGHT International Business Machines Corp. 1985, 1989
# All Rights Reserved
# Licensed Materials - Property of IBM
#
# US Government Users Restricted Rights - Use, duplication or
# disclosure restricted by GSA ADP Schedule Contract with IBM Corp.
#
#  /etc/hosts
#
# This file contains the hostnames and their address for hosts in the
# network.  This file is used to resolve a hostname into an Internet
# address.
#
# At minimum, this file must contain the name and address for each
# device defined for TCP in your /etc/net file.  It may also contain
```

```
# entries for well-known (reserved) names such as timeserver
# and printserver as well as any other host name and address.
#
# The format of this file is:
# Internet Address      Hostname        # Comments
# Items are separated by any number of blanks and/or tabs.  A '#'
# indicates the beginning of a comment; characters up to the end of the
# line are not interpreted by routines which search this file.  Blank
# lines are allowed.

# Internet Address      Hostname        # Comments
# 192.9.200.1           net0sample      # ethernet name/address
# 128.100.0.1           token0sample    # token ring name/address
# 10.2.0.2              x25sample       # x.25 name/address
127.0.0.1               loopback localhost      # loopback (lo0) name/address
10.2.24.15      KensB4 KensB4.
10.2.25.214     EPSON   #NT   Kevin's pc
10.2.25.87      best    #NT Best color
10.2.24.17      rcen rcen. #NT
10.2.24.19      brisque04 brisque04.
10.2.24.16        Brisque6F1_Tbed
```

_____

/etc/filesystems

(example truncated for the sake of brevity, only two stanza show, one NFS, one local)

This is the table of accessible filesystems on this station (Brisque6F1_Tbed)

```
/dataVolumes/Brisque6F1_TBed.1.0:
        dev             = /dev/slv1.0
        vfs             = jfs
        log             = /dev/loglv00
        mount           = true
        check           = false
        options         = rw
        account         = false

/dataVolumes/KensB4.1.0:
        dev             = "/dataVolumes/KensB4.1.0"
        vfs             = nfs
        nodename        = KensB4
        mount           = true
        options         = bg,hard,intr,retry=3
        account         = false
```

_____

/etc/exports

Exports is the file that tells NFS what to export and whom to allow access to. It is consulted at startup time. The format is path of export, options, restrict to list. Default exports are read-write with no restrictions.

```
/scitex/version/SharedItems –ro brisque09
/dataVolumes/KensB4.1.0
/scitex/version/markers -ro
/scitex
```

_____

/etc/xtab

Xtab bears a striking resemblance to exports. The reason for this is because it is almost the same thing. It is the running copy of what is exported currently, this might be different that the list of thing you want to export at the next restart. It will usually be the same as exports.

```
/scitex/version/SharedItems –ro brisque09
```

/dataVolumes/KensB4.1.0 -rw
/scitex/version/markers -ro
/scitex -rw

_____

/etc/passwd

Passwd is the list of valid user logins for this machine, the format is
username:password:userid:groupid:homedirectory:defaultshell

root:!:0:0::/:/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::/:
nuucp:*:6:5:uucp login user:/var/spool/uucppublic:/usr/sbin/uucp/uucico
imnadm:*:2200:2200::/home/imnadm:/usr/bin/ksh
sysadmin:!:203:203:sysadmin User:/tmp:/bin/sh
prnadmin:!:204:204:prnadmin User:/tmp:/bin/sh
macuser:!:205:202:macuser User:/tmp:/bin/sh
diag:!:206:200:diagnostic User:/scitex/version/diag:/bin/sh
shutdown::0:0::/scitex/version/config:/etc/shutdown now
scitex:!:200:200:Scitex User:/scitex:/bin/ksh
cdesci:!:200:200:cdesci User:/home/cdesci:/bin/ksh
sciroot:!:0:200:Scitex Root User:/scitex:/bin/csh

_____
/etc/group

Group is the list of valid group ids on this system and the list of users belonging to each group.

system:!:0:root,sciroot
staff:!:1:imnadm
bin:!:2:root,bin
sys:!:3:root,bin,sys
adm:!:4:bin,adm
uucp:!:5:nuucp,uucp
mail:!:6:
security:!:7:root
cron:!:8:root
printq:!:9:
audit:!:10:root
ecs:!:28:
nobody:!:4294967294:nobody,lpd
usr:!:100:guest
perf:!:20:
shutdown:!:21:
imnadm:!:2200:imnadm
scitex:!:200:diag,scitex,cdesci,sciroot
macusers:!:202:macuser,diag,scitex,cdesci
SysAdm:!:203:sysadmin
PrnAdm:!:204:prnadmin
customer:!:201:

8.2.5 MountPro issues

It's easy to use and good for most purposes. The biggest limitation that it has is that you cannot designate the mount point name. It creates one for you by it's own rules. This can give you a problem if that name is confusing to the users, or if they are using a BrisqueImpose workflow. In the BrisqueImpose workflow, the mountpoint pathname must exactly match the appleshare volume name that the users see from their macs. Preps will

automatically put the appleshare volume name into the ICF file, so if the NFS name doesn't match, then the fetch won't work.

8.2.6 Smit mounts issues

When you create an NFS mount via smit and it fails, the mount point, and or the filesystems file stanza are created. If you go back into smit NFS and try to fix your mistake, it will fail. Even if you correct the mistake properly because it expects to create both the mount point and the stanza. If either exists if fails. Remove failed attempts through smit before attempting again.

8.2.7 Mounts that used to work …

Buut don't now are, it is often the case that these are caused by a period where the server was unavailable. I'm not sure how many attempts cause it, but after a number of failed attempts to mount an NFS volume, there is a function on the brisque called rmbrokenmounts. It deletes the mount point. So if the server comes back into service at this point all you need to do is recreate the mount point and it should mount up the next time you try it. To try it just type:

mount /dataVolumes/mountpointname

The system will try to mount it.

8.2.8 NFS Performance issues

Should always be treated as transport problems first. When you have the card transferring as fast as it will go on appleshare and with the send command, but NFS is still slow, start looking into the buffer sizes. In smit NFS it is these two lines you are concerned with:

Buffer SIZE for read [] #
Buffer SIZE for writes [] #

The default size is 8 mb (8192). Don't increase it, if you are having problems it's already too big. The quick check is drop them both down to 1024. If it starts to go faster, you are on the right track. Increase it in increments of 1024 until it begins to slow down, back off one because you have found your ceiling.

Manual mount is a procedure you may need to know. To do one, you need the same info as always. Type a the command line:

mount:servername/exportedpath /localmountpoint

This can be usefull for one time mounts to transfer legacy files, or even just to troubleshoot. Try not to forget to unmount it when you are done with umount /localmountpoint. If you don't it wll just go away at the next reboot anyway.

8.3 Samba Issues

8.3.1 Level 1: Beginning the Climb up the Pyramid

At the base of the pyramid , three components are presented as having foundational importance. These should be the first items we check if a problem arises.

- General TCP/IP connectivity
- Matching network masks and broadcast addresses among servers and clients
- A working smb.conf

8.3.1.1 Pinging the Server and Client

One of the basic tools for verifying TCP/IP connectivity is the ping command. At the risk of oversimplifying the ICMP protocol, ping sends a request to a host and asks, "Are you alive?" If the host does not respond, the machine sending the ping request assumes that it is not connected to the network or not currently available (for example, powered off).

First, we will attempt to ping the client from our Unix server.

```
$ ping win-client
PING win-client (192.168.1.135) from 192.168.1.74 : 56(84) bytes of data.
64 bytes from win-client (192.168.1.135): icmp_seq=0 ttl=255 time=2.138 msec
64 bytes from win-client (192.168.1.135): icmp_seq=1 ttl=255 time=2.181 msec
64 bytes from win-client (192.168.1.135): icmp_seq=2 ttl=255 time=2.263 msec
--- pogo.plainjoe.org ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max/mdev = 2.138/2.194/2.263/0.051 ms
```

The output from ping will appear slightly different depending upon the operating system installed, but success or failure should be obvious. The previous example was from a RedHat 7.1 host.

One of the fundamental services of TCP/IP networks is the Domain Name Service (DNS). If the server is unable to resolve the hostname to an address, you will see a message similar to $ ping win-client
ping: unknown host win-client
If this occurs, the first step is to try the ping command again, but using the IP address of the client.
$ ping 192.168.1.135
If this succeeds, we can point a finger at the DNS configuration. The most common errors are
• The DNS configuration on the server (/etc/resolv.conf) is broken
• The win-client name does not contain an entry in the DNS zone
• The DNS server is currently unreachable
If we are unable to ping the IP address of the client, the next step is to verify that the network card of both the client and the server is installed correctly and functioning properly.
You should also ensure that all the network cabling and intermediate components, such as hubs and switches, are connected properly.

Describing how to debug hardware components of either Windows or Unix systems can be a very detailed subject. I am of the opinion that experience is really the best teacher in this case. If you suspect hardware failures, try to find someone who is already familiar with your configuration and ask for advice. Books and other documentation are always helpful, but they are
rarely as quick to provide an answer as an experienced administrator.
The ping tool is also available on Windows clients. If you cannot find the ping.exe executable on the Windows client, make sure that the TCP/IP protocol is listed in the installed network components, which are displayed by the Network Control Panel applet.
Windows' ping command produces output similar to the Linux ping utility.

C:\WINDOWS>ping pogo
Pinging pogo [192.168.1.75] with 32 bytes of data:
Reply from 192.168.1.75: bytes=32 time=19ms TTL=255
Reply from 192.168.1.75: bytes=32 time=3ms TTL=255
Reply from 192.168.1.75: bytes=32 time=15ms TTL=255
Reply from 192.168.1.75: bytes=32 time=6ms TTL=255
Ping statistics for 192.168.1.75:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 3ms, Maximum = 19ms, Average = 10ms
The process of diagnosing a failed ping on the Windows client is the same as the one previously described for a Unix server.

8.3.1.2 Comparing Network Broadcast Addresses

It is possible to ping one host from another and still have a misconfigured netmask and broadcast address for the host's network interface. Why would a broken broadcast address matter to Samba?
Remember that our discussion of NetBIOS so far has covered only broadcast-based name registration and resolution. The NetBIOS name services are crucial to features such as the Network Neighborhood and connecting to a shared directory or printer. In Hour 18, "WINS and NetBIOS Name Services," we will see how the NetBIOS name space can be
extended beyond a single network segment. Until then we must rely on using broadcast packets to locate NetBIOS clients and servers.
Both POGO and WIN-CLIENT should be using a network mask of 255.255.255.0 and a broadcast address of 192.168.255. We can verify this information on our Unix server by running the ifconfig command with a single argument of the network adapter's name.
$ /sbin/ifconfig eth0
eth0 Link encap:Ethernet HWaddr 00:04:5A:0C:1C:19
inet addr:192.168.1.75 Bcast:192.168.255.255 Mask:255.255.0.0
inet6 addr: fe80::204:5aff:fe0c:1c19/10 Scope:Link
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:68006 errors:0 dropped:0 overruns:0 frame:0
TX packets:100783 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:100
RX bytes:12186135 (11.6 Mb) TX bytes:121642120 (116.0 Mb)
Interrupt:3 Base address:0x100
Our broadcast address is 192.168.255.255, which is incorrect. When run as root,
ifconfig can be used to set the broadcast address.
root# ifconfig eth0 192.168.1.75 netmask 255.255.255.0 broadcast 192.168.1.255

Viewing the current TCP/IP settings on a Windows NT/2000 client can be done with the ipconfig.exe tool. The /all option instructs ipconfig to display detailed information about all installed adapters. This listing is from a Windows NT 4.0 client named CAESAR, which obtains its IP settings via DHCP.

```
C:\WINNT\>ipconfig /all
Windows NT IP Configuration
Host Name . . . . . : caesar.plainjoe.org
DNS Servers . . . . . : 192.168.1.1
Node Type . . . . . : Broadcast
NetBIOS Scope ID. . . . . :
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
NetBIOS Resolution Uses DNS : No
Ethernet adapter AMDPCN1:
Description . . . . . : AMD PCNET Family Ethernet Adapter
Physical Address. . . . . : 00-50-56-91-01-4A
DHCP Enabled. . . . . : Yes
IP Address. . . . . : 192.168.1.134
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.1.1
DHCP Server . . . . . : 192.168.1.1
Lease Obtained. . . . . : Thursday, September 20, 2001 1:53:08 PM
Lease Expires . . . . . : Thursday, September 20, 2001 2:03:08 PM
```

Windows 9x/ME systems do not include a command line tool for viewing local TCP/IP settings. These hosts use a graphical program named winipcfg.exe. The IP configuration for a Windows 98 client is shown in Figure 13.2. If either the network mask or the broadcast address is incorrect on this client, refer to the instructions in Hours 10 and 11 on how to set the correct value. If the client obtained its information via DHCP, you should refer to your DHCP server's documentation for possible solutions.

Network settings made from a command line are almost always lost when the network interface is reset or the system is rebooted. Refer to your server's documentation for the correct procedure to make this change persistent.

8.3.1.3 Verifying the smb.conf Settings

Because Samba uses an extremely large amount of parameters in smb.conf, developers have provided a command line tool for verifying the syntax of a configuration file. The utility, named testparm, has already been described in Hour 4, "Starting Your Feet to Dance." It is being mentioned here again so that we do not overlook simple smb.conf errors when hunting for the source of a problem.

testparm can be instructed to parse a specific configuration file by using the -s switch.

It is a good idea to run the check on a new configuration file before putting it into production.

```
/scitex/version/usr/local/samba/bin/testparm -s /usr/local/samba/lib/smb.conf Load smb config files from
/usr/local/samba/lib/smb.conf.new
Processing section "[public]"
Loaded services file OK.
# Global parameters
[global]
coding system =

code page directory = /usr/local/samba/lib/codepages
<...remaining output deleted...>
```

After reviewing the specified configuration file, testparm continues to print a version of smb.conf that contains all parameter values, including default ones. This can help to verify that smbd and nmbd are using the values that you expect.

Level 2 :Local Server and Client Software

The second level of turns to the server and client software. Our goal is to make sure that both machines are running and responding to NetBIOS and CIFS requests. For the most part, we are concerned with an isolated host. It is not until the third layer that the server and client will begin to carry on a conversation.

8.3.1.4 smbd

For this test, smbd must be running, so first we check whether this is the case by using the ps command. The actual ps arguments on your system may be different than in this example from a Linux server.

```
$ ps -ef | grep smbd
root 28592 1 0 12:37 ? 00:00:00 /usr/local/samba/bin/smbd -D
```

Because default values can change between releases, it is important to use the version of testparm that matches

the smbd and nmbd daemons installed on your server.
Having a running nmbd is not a requirement of the tests in this section.
After verifying that smbd is running, or after launching it, if necessary, our next test is to enumerate the list of shares and browse masters known by the server. In Hour 4, smbclient's capability to browse a server was first introduced as a means of testing our new Samba server. The -L <server> option instructs smbclient to list the available resources on the server. The -N flag (anonymous login) is used to temporarily avoid any potential problems with authentication. This step should be executed while logged on to the Samba server locally (that is, not from another Unix host on the network).

```
$ smbclient -L pogo -N
added interface ip=192.168.1.75 bcast=192.168.1.255 nmask=255.255.255.0
Anonymous login successful
Domain=[STY-SAMBA] OS=[Unix] Server=[Samba 2.2.2]
Sharename Type Comment
--------- ---- -------
public Disk
IPC$ IPC IPC Service (Samba 2.2.2)

Server Comment
--------- -------
POGO Samba 2.2.2
Workgroup Master
--------- -------
STY-SAMBA POGO
```

Two common problems can result in a failure of this test. The first error, error connecting to 192.168.1.75:139 (Connection refused) Connection to <server> failed is caused by smbd not running or not being able to bind to port 139. An inability to bind to the correct port can be caused by configuring smbd to start from [x]inetd (possibly left over from a previous Samba installation) and then attempting to launch the server as a daemon. The most common means of correcting this is to ensure that smbd can actually start. Because smbd does not print error messages to the console window, it is a good idea to view the last few lines of the associated log file (see Level 5 for more information on log files).
The second error message often seen by administrators is session request to <server> failed (Not listening for calling name) When connecting locally using smbclient, this error is almost always a result of a misconfigured hosts allow or hosts deny parameter in smb.conf. The server is running by rejecting the NetBIOS session setup. These two parameters are covered in "Security Tips," when we focus on Samba network security concerns.
From the description of the NetBIOS Name Service in Hour 2, it sounds like we used the wrong NetBIOS name when connecting to the server. However, this is not the case here.
This error cannot be caused by a broken nmbd installation because nmbd does not even have to be running currently.
Assuming that we can successfully enumerate shares, we can next test Samba's ability to authenticate users. The details of connecting to a disk share or printer service using smbclient were covered thoroughly in the previous hour when we explored CIFS clients that are available for Unix hosts. In this test, we will attempt to connect to the [public] share as the account named "user1" with a password of "secret".

```
$ smbclient //pogo/public -U user1%secret
added interface ip=192.168.1.75 bcast=192.168.1.255 nmask=255.255.255.0
Domain=[STY-SAMBA] OS=[Unix] Server=[Samba 2.2.2]
smb: \>
```

If smbd is able to successfully authenticate the login name/password pair and that user is authorized to access the requested share, we are greeted with an smb: \> prompt.
If Samba is not able to validate the user's credentials, we are informed that session setup failed: ERRSRV - ERRbadpw (Bad password - name/password pair in a Tree Connect or Session Setup are invalid.)
There can be many reasons for this, such as a misspelled username or password, a missing smbpasswd entry for the user in the case of encrypt passwords = yes, or an invalid guest account if we are allowing non-authenticated access.
If the user was correctly authenticated, but could not access the request service, smbclient reports that the tree connect failed: ERRDOS - ERRnosuchshare (You specified an invalid share name)
This can be caused by a misspelled share name, permissions on the share which restrict the user in question from accessing that directory or printer, or a bad path statement in the share's definition as given by smb.conf.

8.3.1.5 nmbd

To test nmbd, we again use the ps command to ensure that it is running.

```
$ ps -ef | grep nmbd
root 29054 1 0 15:53 ? 00:00:00 /usr/local/samba/bin/bin/nmbd -D
```

If nmbd does not appear in the list reported by ps, it should be started as root using the normal means (/usr/local/samba/bin/nmbd -D).
Samba's nmblookup tool was briefly mentioned in Hour 4. Samba servers have a special NetBIOS name, __SAMBA__, to which they will always respond. By querying the server for this name, we can verify that nmbd is working correctly. The -U flag is used to specify the address to which the query should be sent.

```
$ ./nmblookup -U 127.0.0.1 __SAMBA__
querying __SAMBA__ on 127.0.0.1
192.168.1.75 __SAMBA__<00>
```

If nmbd had not been running, the query would have resulted in the following error message.

```
name_query failed to find name __SAMBA__
```

This can also be caused by not including the loopback interface name for the interfaces parameter in smb.conf and setting bind interfaces only = yes. Both of these parameters are discussed during Hour 23 in the context of capacity planning and system tuning.

Next we will check to see if nmbd was able to successfully register the name POGO.

```
$ nmblookup -U 127.0.0.1 POGO
querying POGO on 127.0.0.1
192.168.1.75 POGO<00>
```

Any error messages, such as "name query failed", are most likely caused by the same conditions that would cause the query for the __SAMBA__ name to fail. Another possible reason for a failure is that the server was unable to register its NetBIOS name. If this is
the case, you can locate the host that currently owns the name by sending a name query request to the broadcast address of the local subnet.

```
$ nmblookup -B 192.168.1.255 POGO
querying POGO on 192.168.1.255
192.168.1.98 POGO<00>
```

In this example, the name POGO has been registered by a host at address 192.168.1.98 and not our Samba server. Obviously, the way to correct this problem is to rename the rogue machine.

8.3.1.6 Windows' NetBIOS Interface

The NetBIOS interface on the Windows machine must also be verified, just as we checked the Samba installation on the server. Because the CIFS client and NetBIOS interface are intimately linked together on Microsoft clients, it is enough to check that the latter component is functioning correctly.
Windows' NetBIOS name query tool, nbtstat.exe, contains a few extra features beyond those available to nmblookup. One of these (-n) is the ability to ask the NetBIOS interface what names it has successfully registered.

```
C:\WINDOWS> nbtstat -n
Node IpAddress: [192.168.1.135] Scope Id: []
NetBIOS Local Name Table
Name Type Status
---------------------------------------------
WIN-CLIENT <00> UNIQUE Registered
STY-SAMBA <00> GROUP Registered
WIN-CLIENT <03> UNIQUE Registered
```

If the "Client for Microsoft Networks" has not been installed, nbtstat.exe will report (assuming that the tool is installed on the system at all)

```
Failed to access NBT driver 1
```

A more subtle error is when the Windows client reports that it has registered a workgroup name, but not its unique workstation name as shown here.

```
Name Type Status
---------------------------------------------
STY-SAMBA <00> GROUP Registered
```

This is often caused by a machine existing on the network with a duplicate NetBIOS name. The Windows client needs a unique name to use when establishing a NetBIOS Session with a server. Until the client is able to successfully register a workstation name,it will be unable to do things such as browse the Network Neighborhood or map a network
drive.

8.3.2 Level 3: Remote Access to Shares

So far, we have ensured that both machines are accessible on the network and that the NetBIOS and CIFS software components are working locally. At this level of the pyramid, we move beyond the local server and client to test how well the two can communicate

with each other.

8.3.2.1 Name Resolution

We will again turn to the nmblookup and nbtstat.exe programs for help in verifying that the server can resolve the name of the client and vice versa. This test will come in two stages. The first part will issue a broadcast name resolution request to test the responses of the server and the client. This is done by passing the network's broadcast address to nmblookup (-B 192.168.1.255) when querying for a name. This brings network communication into play. We will first attempt to resolve the server's name by running

```
$ nmblookup -B 192.168.1.255 pogo
querying pogo on 192.168.1.255
192.168.1.75 pogo<00>
```

Next we will query for the client's name using the same broadcast address.

```
$ nmblookup -B 192.168.1.255 win-client
querying win-client on 192.168.1.255
192.168.1.135 win-client<00>
```

If all has gone well up to this point, this test should seldom fail. However, if either step does result in an error, verify that the broadcast address on each client is set to the same value. You should also check for any interfaces or bind interface only settings that would prevent the Samba host from responding to queries arriving from this particular subnet.

Next we will perform a NetBIOS Node Status Lookup request from the server to the client and from the client to the server. This step sends a directed packet to the IP address given, requesting a list of all unique and group NetBIOS names registered by the host. We will begin by querying Samba from the Windows machine.

```
C:\WINDOWS\> nbtstat -A 192.168.1.75
NetBIOS Remote Machine Name Table
Name Type Status
---------------------------------------------
POGO <00> UNIQUE Registered
POGO <03> UNIQUE Registered
POGO <20> UNIQUE Registered
..__MSBROWSE__.<01> GROUP Registered
STY-SAMBA <00> GROUP Registered
STY-SAMBA <1D> UNIQUE Registered
STY-SAMBA <1E> GROUP Registered
MAC Address = 00-00-00-00-00-00
```

Troubleshooting Techniques 229

The nmbd daemon always reports a MAC address of 00-00-00-00-00-00 to node status requests.

We can perform the same operation on the Samba server to gain information about the client. The options for performing a Node Status Request with nmblookup are exactly the same as those used by Windows' nbtstat.exe tool.

```
$ nmblookup -A 192.168.1.135
Looking up status of 192.168.1.135
WIN-CLIENT <00> - B <ACTIVE>
STY-SAMBA <00> - <GROUP> B <ACTIVE>
WIN-CLIENT <03> - B <ACTIVE>
```

If either of these requests fails, you should back up to the IP connectivity tests of Level 1 and the NetBIOS interface checks for nmbd and the Windows client described in Level 2.

8.3.2.2 Enumerating Shares from the Windows Client

We have already used the smbclient tool to enumerate the list of file and printer services on our Samba server in Level 2 of the pyramid. During this section, we will perform the same test except that the request will come from the remote Windows client.

The net.exe command is Microsoft's Swiss army knife for its CIFS clients. This tool provides an equivalent version of the "smbclient -L" command. The view option can be used to browse the contents of a workgroup or, when given the name of a specific server (for example, \\POGO), enumerate the shared resources on that host.

Unless you have enabled the special guest settings described in Hour 7, "Security Levels and Passwords," it will be necessary to make sure the Samba server can successfully authenticate you. When executing net view \\POGO, the Windows client will attempt to

connect to the server using the login name and password of the currently logged on user. If a connection already exists, such as a mapped network drive, the net view command will use that session. Do not be surprised if the preceding command results in an "Access Denied" error message or indicates that your password is incorrect.
A successful view of POGO appears as

```
C:\WINDOWS\>net view \\pogo
Shared resources at \\pogo
Samba [2.2.2]
Share name Type Used as Comment
-------------------------------------------------------------------------------
public Disk
The command completed successfully.
```

8.3.2.3 Connecting to a Share Remotely

This step is often more of a goal for administrators than it is a test. Here, we will test the inter-operability of the Windows client with our server.
Before continuing, you should remember that there are several issues concerning Windows clients and clear text passwords that require special attention. These were thoroughly covered in Hours 10 and 11. We have conveniently avoided those problems here by enabling encrypted passwords in smb.conf.
Assuming that we are logged in to the Windows console with a valid username and password, the following command will connect the [public] share on POGO to drive P: on the local client.

```
C:\WINDOWS\> net use p: \\pogo\public
The command completed successfully.
```

Windows 9x/ME will not allow you to use a login name when accessing a CIFS server that is different from the one specified when logging on to the Windows console.
Windows NT 4.0/2000/XP supports an optional /user:<username> switch for setting the

username to be used in the SMBsessetup&X request. The following variation, which connects to the server as user1, works only under Windows NT/2000/XP systems.

```
C:\WINNT\>net use \\pogo\public /user:user1
The password or user name is invalid for \\pogo\public.
Type the password for \\pogo\public:
The command completed successfully.
```

There are many more things that can break with authentication. Often, these problems can be located and solved only by digging through Samba's log files, which will be discussed later in this hour.

8.3.3 Level 4: Network Browsing

Network browsing (that is, the Network Neighborhood) is a rather complicated dance. So much so that we will spend two hours discussing how it works and how to integrate Samba with other CIFS clients and servers. If you have reached Level 4 of the pyramid and the Network Neighborhood is still empty or only half working, I would suggest that you look at Hours 18, 19, and 20. These hours will take you through the steps necessary to configure Samba as a good neighbor both in its local network segment and with machines located on a remote network.

8.3.4 Level 5: A Wealth of Information—Log Filesand Packets

There are times when debugging subtle problems, which no form of diagnostic tool seems to give enough information to, tracks down the real issue. The first four levels of Figure 13.1 can be viewed as general diagnostics steps used to run a sanity check on the server when first installing or upgrading Samba. At Level 5, we have crossed over from the general diagnostics phase into the realm of hard-core Samba administration. Sooner or later, everyone hits a problem that requires cranking up the debug level, scanning the log files, and monitoring network traffic.

8.3.4.1 Samba's Log Files

Table 13.1 (originally presented as Table 5.2) describes the information recorded at each log level. The actual division of information is not this clean throughout all of Samba, so take the categories as a rule of thumb and not a firm design.
Troubleshooting Techniques 231

TABLE 13.1 Information Recorded at the Various Log Levels

Level Description
0 Critical failures such as failing to open a log file, dropping a connection, or receiving an unknown CIFS command
1 Connection and session information
2–4 System administration debugging information
5–9 Moderate developer debugging data
10 Full developer debugging information
In Samba 2.0, the debug level of a running process could be incremented by sending it the USR1 signal and decremented using the USR2 signal. With the introduction of Samba's internal messaging system in 2.2, this responsibility has been handed over to the smbcontrol tool.
To query the current log level of an smbd (for example, pid 1234), we would send the debuglevel message to the process by executing the smbcontrol command as root.
root# smbcontrol 1234 debuglevel
Current debug level of PID 1234 is 0
If we needed to increase this to debug level 10, we would send the process a debug message such as
root# smbcontrol 1234 debug 10
root# smbcontrol 1234 debuglevel
Current debug level of PID 1234 is 10
232 Hour 13
It is often helpful to set debug timestamp = no at higher log levels. This prevents smbd from adding a timestamp header to each log entry, which can become distracting.
The next question is, "What do we do with all of this information that smbd, nmbd, or some other Samba tool has just recorded?"
Here is one example of how log files can help to locate the source of a problem. In this case, we are attempting to connect to a disk share from a Windows client. However, smbd will never accept the password that we enter for the connection. When testing the server using smbclient we receive the error

$ smbclient //pogo/public -U testuser%test
session setup failed: ERRSRV - ERRbadpw (Bad password - name/password pair in a Tree Connect or Session Setup are invalid.)
We are sure that the testuser account has a valid entry in smbpasswd and that the password is set to the string "test". After making another attempt to connect the share with
log level = 10
log file = /usr/local/samba/var/log.%m
added to the [global] section of smb.conf, we notice the following lines in the log.pogo:
pdb_getsampwnam: search by name: testuser
startsmbfilepwent_internal: opening file /usr/local/samba/private/smbpasswd
getsmbfilepwent: returning passwd entry for user root, uid 0
getsmbfilepwent: returning passwd entry for user jerry, uid 786
getsmbfilepwent: returning passwd entry for user guest1, uid 782
getsmbfilepwent: returning passwd entry for user testuser, uid 791
endsmbfilepwent_internal: closed password file.
pdb_getsampwnam: found by name: testuser
build_sam_account: smbpasswd database is corrupt! username testuser not in unix passwd database!
Couldn't find user 'testuser' in passdb.
The final line of this excerpt gives us a clue to our problem. Samba could not locate a Unix account for the testuser account. The reason for this is that someone has commented out its entry in the /etc/passwd file.
#testuser:x:791:100::/dev/null:/bin/false
After removing the hash mark (#) from the beginning of the account entry, we try one more time to connect using smbclient. This time, however, we are met with success.
$ smbclient //pogo/public -U testuser%test
Domain=[STY-SAMBA] OS=[Unix] Server=[Samba 2.2.2]
smb: \>
This is just one example of how Samba's log files can tell you where they are sick. Though the amount of data logged at high levels (for example, 10) can be intimidating, here are some key phrases to grep for when searching for a problem.

• fail
• error
• unsuccessful
• corrupt
• unknown

8.3.4.2 Monitoring Network Traffic

Many networks use shared media, such as Ethernet, to connect computers together. This is similar to a conference call, where all the connected participants can hear everything spoken by every other person on the line. Many conference calls have a passcode or special access number because of the sensitive nature of the conversation. This prevents uninvited people from randomly listening in. Networks work in much the same way. If anyone who wanted to view all network packets as they flew by on the wire were allowed to do so, invariably a password or credit card number would be seen.

Many large networks now use Ethernet switches in the place of hubs. A switch will allow you only to see packets sent to and from your host and any packets sent to your broadcast address.

Packet sniffers, tools that allow administrators to view network traffic as it passes by, can also be used as a diagnostic tool for determining why hosts or services cannot communicate with each other. We will quickly examine two such programs: Ethereal and Microsoft's Network Monitor. The first is freely available, while the second is commercial software. Our goal is to understand what these tools do and what type of information we can gain from them.

Ethereal

Ethereal is a GTK+ based program available for Unix and Windows clients from http://www.ethereal.com/. Its main window is displayed in Figure 13.3. One of the main advantages of Ethereal is its ability to decode packets into a more humanreadable form.

Tethereal, a command line version of Ethereal, is also distributed with its GUI based sibling. To get a better idea of what ethereal (and tethereal) can tell us, we will watch the traffic between smbclient and our Samba server when connecting to a share.

```
$ smbclient //pogo/public -U user1%secret
```

Unless you know the exact string you are searching for, use grep's -i option to define the search string to be case insensitive (for example, grep -i fail log.smbd).

To capture the network traffic transmitted between smbclient and smbd running on the same host, we will instruct tethereal to watch the loopback network interface (-i lo) for all packets destined for port 139.

```
root# tethereal -i lo port 139
0.268257 pogo -> pogo SMB SMBnegprot Request
0.269917 pogo -> pogo SMB SMBnegprot Response
0.272619 pogo -> pogo SMB SMBsesssetupX Request
0.280524 pogo -> pogo SMB SMBsesssetupX Response
0.281527 pogo -> pogo SMB SMBtconX Request
0.283225 pogo -> pogo SMB SMBtconX Response
```

These packets illustrate the steps required to establish a connection to a CIFS share initially presented in Figure 2.8. It is possible to get tethereal to decode the packets and print a tree based view (-V) of each one. This is identical to the view provided by Ethereal. In this example, we are examining a portion of the Negotiate Protocol (SMBnegprot) response sent from smbd to smbclient.

```
root# tethereal -i lo -V port 139
<...output deleted...>
SMB (Server Message Block Protocol)
Message Type: 0xFF
Server Component: SMB
SMB Command: SMBnegprot (0x72)
Error Class: Success
Reserved: 0
Error Code: No Error
```

Can you guess what the values of the security and encrypt passwords parameters are based on in this listing? The "Security Mode" flag is an 8-bit field used to represent this information. The least significant bit (0x01) is set when the server is operating in usermode security (that is, security = [user|server|domain]). The next bit (0x02) is 1 when the server supports NTLM (that is, encrypt passwords = yes).

8.3.4.3 Microsoft's Network Monitor

Microsoft packages a packet-tracing tool with the Windows NT/2000 Server CD-ROM and with the System Management Software (SMS) CD-ROM called Network Monitor (also known as netmon). netmon is composed of two parts: the tool itself and a local or remote agent to which it connects. Both must be installed for the software to function correctly. Figure 13.4 displays the installation window shown by a Windows 2000 Server.

There are two distinct versions of netmon, neither of which is freely available like Ethereal. The version included with the Windows NT/2000 Server CD-ROM allows only for viewing packets sent to and from the local machine, similar to an Ethernet switch. The version included with the SMS CD-ROM enables the network interface to be put into promiscuous mode, with which all packets on the shared media can be seen.

Netmon has the ability to decode packets, much like Ethereal. In some cases Microsoft's tool is able to do a better job because their engineers added parsers to decode undocumented protocols such as MS-RPC.
Ethereal has the ability to read and write Network Monitor's CAP file format (see Figure 13.6). So though you may not have the full version of netmon available without purchasing SMS, it is possible to take advantage of its decoding capabilities by capturing the traffic using Ethereal and converting the packet trace to Network Monitor's own format.

8.3.5 Level 6: Samba Internals

One of the advantages of Open Source/Free Software is the availability of the source code. Many people, however, never make use of this. During this section, we will quickly look at means of tracking down bugs in the Samba source code using a symbolic debugger. You will need to be comfortable with programming C and somewhat familiar with Unix development tools such as gcc and gdb to get the most possible out of this section. If you do not feel quite up to speed with your programming skills or have no interest in fixing bugs in the source code, this section can be skipped.
For any type of source level debugging, it is imperative that Samba be compiled to include debugging symbols. With this extra information, we can match the currently running instruction with the exact line in the source code that generated that instruction. Enabling debugging symbols in the Samba binaries can be done by setting the --enable-debug flag when running the ./configure script. This switch is compatible with all other ./configure options, so we can use it in conjunction with Samba's support for PAM, for example.

```
root# ./configure --enable-debug --with-pam
```

The rest of Samba's installation process remains the same.

The --enable-debug option sets the -g flag when compiling. This will normally result in much larger binaries (as much as 4 to 8 times in size), which is something to consider when installing Samba in tight places with a minimal amount of free disk space.
There are two types of bugs we will be concerned with here: those bugs that make Samba crash, and those that make Samba do the wrong thing. Fortunately, the first class of bugs is not found very often in stable Samba releases. If Samba does encounter a fatal error such as a segmentation fault (attempting to access a region of memory that was off limits, generally due to an invalid pointer), a message similar to the following will be written to the smbd log file.

```
============================================================
INTERNAL ERROR: Signal 11 in pid 16124 (2.2.0)
Please read the file BUGS.txt in the distribution
============================================================
```

Before shutting down, however, smbd will also execute a global panic action command if one is defined. By default, the panic action parameter has no value. Because

Windows clients often reconnect transparently to the user, these crashes can easily be

missed. An obvious panic action setting would be to immediately attach to the faulty smbd with gdb and examine where the problem occurred. The following command will launch an xterm on the local server's display and attach to the crashed smbd.
panic action = /usr/X11R6/bin/xterm -display :0 \
-T Panic -n Panic -e /bin/sh -c 'gdb /usr/local/samba/bin/smbd %d'
Few servers run X in order to conserve resources. In this case, we can have the smbd sleep and wait for us to manually attach.
panic action = "/bin/sleep 99999"
We can then attach to the errant smbd at our leisure.

The panic action parameter is provided as an option for developers. All of the latest Samba code is available online for access via CVS (Concurrent
Versions System). More information about Samba's CVS repository can be found at http://samba.org/samba/cvs.html. CVS clients for many platforms can be downloaded from http://cvshome.org.
The second class of bugs can be much harder to track down. The reason for this is that the CIFS protocol is very complex and messy. Locating exactly where the problem lies in Samba's source code can be compared to looking for a needle in a haystack. One tool that can help you to navigate through the functions and data structures is the Cygnus Source Navigator. This Integrated Development Environment (IDE) has been released under the GPL and can be downloaded from http://sources.redhat.com/sourcenav/. Source Navigator is an excellent tool for understanding any piece of software for which the source code is available.

8.3.6 Summary
Troubleshooting any problem is somewhere between an art and a science. This hour has provided a methodology for tracking down problems with Samba installations through a process of elimination. The steps have been divided up into layers, each of which depends on the successful passing of the tests of the previous level. The troubleshooting layers shown in Figure 13.1 from the bottom up are
• Level 1—General network connectivity tests and a working smb.conf
• Level 2—Local client and server software
• Level 3—Remote access to shares
• Level 4—Network browsing
• Level 5—Logging and monitoring network traffic
• Level 6—Source level debugging
Various mailing lists, IRC channels, and Usenet newsgroups can put you in touch with people who can help you with the art of troubleshooting. Remember to approach the problem from all possible angles, not simply focusing on the piece that is broken.

8.3.7 Q&A
Q Are there archives for the different Samba mailing lists that I can search to see whether anyone has ever asked my question before?
A Yes. There is a searchable archive for all the mailing lists served by samba.org. See http://samba.org/samba/archives.html for details.
Q Where can I find out information about commercial support for Samba?
A The main Samba Web site includes a page containing a list of companies that offer commercial support for Samba. Look under the "Support" page. Vendors are grouped by country.
Q What information should I include when reporting a problem or bug in Samba?
A At the very minimum, you should include
• The server's operating system and relevant version numbers (for example, kernel 2.4.9 running on a SuSE 7.2 system, Solaris 8 x86, and so forth)
• The version of Samba (or branch tag and date of the cvs snapshot) you are running
• The operating system version, including hot fixes and Service Packs, of the clients that are experiencing the problem
• A good description of the problem and the means to reproduce it, if possible
You should also be prepared to make your smb.conf and log files available if necessary.
Q Is there a current list of known bugs available for released versions of Samba?

A The Samba developers maintain a list of known bugs and their status at http://samba.org/samba/buglist.html.

New Terms

packet sniffer This is a common name for a class of network tools, either software or hardware, that are able to display the raw data being transmitted across a network. These utilities are also called network tracers or packet tracers. Some also provide the capability to parse the packets and display the information in a format more readable to humans.

8.4 Appletalk and Helios Issues

See also Apple knowledge base - http://www.apple.com/support/

8.4.1 Cannot login as macuser

Problem: Cannont login to Brisque4 as "macuser" . root user still works
Explanation: When you do a fresh install from Cd of Ethershare 2.6 you get asked a new and different question. It stops and asks you "Ok to create the extra password file"? If you say yes to it,- one cannot login from macs anymore as macuser.
Workaround: Backup /usr/local/es/conf/afpvolumes, ethershare.license, atalk.conf, remove /usr/local/es and /scitex/version/usr/local/es then reinstall helios from cd. If you don't remove first it doesn't ask you the all important extra passwd file question that you say no to the second time.

8.4.2 Calling "rebuild"

Call the "rebuild" program from a UNIX shell as follows

rebuild <switches> <path_of_volume_root>

The available switches are :

-n output to system messages file instead of "stdout"
-o open ".Desktop" file only, repair if corrupted
-f force ".Desktop" file to be rebuilt (force create is off if you do not specify -f)
-c do not clean resource orphans automatically (clean orphans is default if you do not specify -c)
-C volume can be converted to another character set
-s scan desktop only (scan only is off if you do not specify -s)
-v verbose for diagnostics (verbose is off if you do not specify -v)
-2 2 ID check passes is active by default (two passes is disabled if you specify -2)
-x volume is exclusively opened for rebuilder

Usually, you call "rebuild" with the "-f" switch, for example
rebuild -f /usr/local/es/macapps

8.4.3 Atalk does not start

Recommended Solution

1. Run **netconf** program and reconfigure the atalk.
2. Check **/usr/local/es/conf/atalk.conf/atalk.conf** file for configuration.
3. Check that only one interface is defined for atalk.
4. check messages in **/var/adm/messages**
5. **errpt** - look for ent oriented problems
6. **netstat -in** - check the interfaces are properly defined
7. Check Ethershare license in **/usr/local/es/conf/ethershare.license**
8. Restart EtherShare.
9. If does not help - reinstall Helios from Helios CD.

8.4.4 Boot hangs while loading EtherShare (message "atalk ..")

Recommended Solution
Rebuild desktop of a corrupted File System may cause a 3 digit error on the Server.

1. Shutdown the system and perform a reboot.

2. Login immediately as root and turn the EtherShare server off "/usr/local/es/stop-atalk now".
3. Do ‘fsck’ (SciSmit) on all volumes.
4. Start the EtherShare server (SciSmit).

If this does not work try to isolate the problematic disk by

1. Login immediately as root and turn the EtherShare server off "/usr/local/es/stop-atalk now".
2. Add a "#" before the a line of one of the disks in the ‘afpvolumes’ file (in /usr/local/es/conf).
3. Start the EtherShare server (SciSmit).
4. Repeat the above step for all disks until you know which disk you have to mark and the EtherShare server can run normally.
5. Backup the disk ,format it and restore it.

8.4.5 "File in use" message when performing "empty trash" on the Mac

Recommended Solution

1. Do "empty trash" in Ethershare Admin (root user).
2. Try rebuild desktop from Ethershare admin
3. Run fsck on the volume
4. Remove file via unix

8.4.6 Files from the RISC6000 "disappear"

Recommended Solution

1. Do rebuild desktop and empty trash once a day/shift.
2. Verify that RISC6000’s disks are not full, using "df" RISC6000’s disks should not be filled to more than 97% of disk capacity. Should a disk exceed this value a message will be sent to the Helios Terminal and to the ripro_messages file.
3. In Photoshop when saving and immediately canceling - file may disappear.

TO RECOVER A MISSING FILE

1. Try Rebuilding the desktop of the RISC6000’s disk.
2. See whether the file exists on the RISC6000 from a UNIX shell (use ls command).
3. Try using Norton Disk Doctor for "Unerasing" files.

8.4.7 Server is invisible in the Mac’s Chooser , but afpsrv is up and running

Recommended Solution

1. Search the Error Log for messages from the atalkd module.
2. Check for inconsistent configuration of network numbers or zone names in AppleTalk networks.
3. Check **afpvolumes** file for proper volumes definition
4. Check **afpipaccess** file for proper security definition
5. Restart atalk.
6. Verify file server name and zone name.
7. See if anyone else can see it in the Chooser (may be network problems). Verify that the Web & File server is running.
8. Verify port selected in AppleTalk control panel on both server and client.

8.4.8 Icons fall one on top of the other and no user visible in the AppleShare, sharing option folder

Recommended Solution

1. User ID for user "macuser" changed. Do "ls -l" at UNIX prompt and note the User ID for files created by user "macuser". Do "smit users" and change the User ID to "macuser".

2. Check the "sharing" parameters of the volume. The user and group should be the same as the group accessing the data on the volume.

8.4.9 Icons for RISC6000 applications don't appear on the Mac

Recommend Solution

Restart Mac with rebuild desktop option "alt-apple".

8.4.10 "file cannot be copied onto itself" when copying files from the Mac

Recommended Solution

Do "rebuild desktop" on volume containing folder (Ethershare Admin). The .rsrc directory is probably missing

8.4.11 Message "can't copy file - permission denied" when copying files from the Mac

Recommended Solution

Check the owner and permission of the directory and .rsrc subdirectory "ls -al".

8.4.12 Mounted Volumes have much less free space than they should have

Recommended Solution

1. On the RISC6000 do "df" to verify if the Filesystem is mounted. If mounted, unmount from all the Macs and do Rebuild Desktop using Ethershare Admin. If not mounted go to 2.

2. See if disk is available by typing "lsdev -Cs scsi".If not available check hardware and run "cfgmgr". If available do "fsck" and then "mount -a".

3. The Mac OS and UNIX use different ways to calculate file sizes. To view the exact amount of disk space used from the Macintosh, select the file in question in the Finder and choose "Information" from the File menu.

4. The privileges for Unix directories or files may have been changed from within Unix.«

8.4.13 No connection can be established to the file server

Even though the server is visible in the Macintosh Chooser, volumes cannot be selected or mounted and/or printing services cannot be selected.

Recommended Solution

1. Check for error messages on the Macintosh.

2. Check for error messages from the Unix System Error Log (from afpsrv/desksrv and papsrv modules) regarding RPC, NFS, the file system, and SCSI devices.

3. Check if the "x" (Execute) privilege may have been removed from one of the UNIX directories (use "**ls -l /dataVolumes**").

4. Check that the number of Ethershare licenses is not larger than the permitted number.

5. Check /usr/local/es/conf/afpipaccess file for permissions.

Note If a Macintosh drops its connection to the file server or terminates it by shutting down or rebooting, it takes about three minutes before the Ethershare file server can reuse this license.

8.4.14 Server not responding" message

AppleShare IP servers with AFP over TCP enabled will attempt an IP connection whenever the client and the server are configured for TCP/IP. Occasionally, although both client and server are configured for IP, there is no IP connectivity between them.

(This might happen is there were no IP router between the client's network and the server's network.). In these cases, try to force an AppleTalk connection, instead of allowing the software to attempt an IP connection. See next step for details.

8.4.15 Poor AppleTalk Network Performance

Recommended Solution

1. Check total throughput of the Server. Start "LanTest" on several Macs on the network, select any of the RISC6000's Volumes to test, repeat the test at least 10 times.

Note

- Tests should only be performed on local file systems of the RISC6000. In no case should imported NFS file systems be used for tests, because there will be a performance hit of 30-50% even under ideal condition.
- The LanTest results may differ from the data transfer rates observed in the MacintoshFinder. LanTest achieves the maximum data transfer rate possible between Macintosh and server.
- Normal Macintosh applications achieve slower transfer rates because they have toprocess the data as well as transferring them

If the first iteration of the test shows good results that deteriorate in subsequent iterations

- o *The server load may be too high*
- o *The server may be equipped with additional RAM.*

2. An inconsistent configuration of an AppleTalk network or physical problems in the network (missing or improper termination, cables that are too long or too short) may adversely affect data transfer rates.
3. Check if the problem occur even when the Macintosh is booted without system extensions that are not included with the operating system.
4. See if the Error Log contain messages from the "atalkd" module?

8.4.16 Slow OSX to Brisque copy

Check which Brisque volumes are currently mounted by which MAC:

/usr/local/es/swho - c

```
----------------------
Server          PID Address         User     When       Comment
AFPServer     32778 65449.253.129   macuser  Thu  6:09  brisque02.1.0
AFPServer     33410 65486.088.130   macuser  Thu  7:22  brisque02.1.0
AFPServer     29666 65405.196.245   macuser  Thu  7:45  brisque02.1.0
AFPServer     28754 65312.105.130   macuser  Thu 18:30  brisque02.1.0
AFPServer     35184 65280.164.245   macuser  Thu 18:34  brisque02.1.0
AFPServer     27474 65368.238.130   macuser  Thu 18:47  brisque02.1.0
```

This shows that all MACs connect over afp, since their IP does not show !
Then :

ls -la /scitex/version/usr/local/es/conf/afpip*

```
-rw-r--r--  1 root    system        379 Jun 21 11:41 /scitex/version/usr/local/es/conf/afpipaccess
-rw-r--r--  1 root    system        350 Jun 17 11:57 /scitex/version/usr/local/es/conf/afpipaccess.xxx
```

cat afpipaccess

```
# AFP IP access control file
#
allow 10.4.8.0/255.255.254.0
deny 0.0.0.0/0.0.0.0
```

This means that only 10.4.8.0 network was enabled ! Since all machines there sit on 192.x.x.x.
This file is normally renamed on Brisque during coldstart to afpipaccess.xxx.
I have removed this file now,restarted the Ethershare,the copy performance from MACs became very high.

8.4.17 Files or folders have the wrong icons or appear in the wrong directories

Files or folders have the wrong icons or appear in the wrong directories.
Recommended Solution

1. No overlapping Ethershare volumes must be defined.
2. The UNIX privileges for the ".rsrc" directory may be insufficient.
3. The desktop of the volume may be defective and needs to be rebuilt using Ethershare Admin ("rebuild desktop").

8.4.18 Problems with the Network Trash Folder on the file server

Recommended Solution

1. The desktop of the Ethershare volume may be defective and needs to be rebuilt using Ethershare Admin.
2. It may be possible to resolve this problem by having the "root" user mount the volume in question and deleting a file. (It doesn't matter which file.) This creates a new "Network Trash Folder" that is also available to all other users.

8.4.19 Ripro volume on Mac has "read only" permission.

Recommended Solution

1. Check that file system is mounted on the RS/6000 ("df") if not, check that the disk is "available" ("**lsdev -Csscsi** ").
2. If the disk is "defined", remove it (" **rmdev -l <hdiskx> -d** ") and do " **cfgmgr** ".

8.4.20 Some functions of the server are not available

Reading or writing files or displaying files or directories is not possible.
Recommended Solution
Make sure that the desksrv process is running and check whether this process generates any error messages. ("**ps -e |grep desk**").

8.4.21 Volume is grayed out in the Chooser list

Recommended Solution

1. Unmount from all the Macs and do Rebuild Desktop using Ethershare Admin.
2. Remove .Desktop and .Desksrv files using "rm .Desk*" command. Use "pwd" to verify correct position before removing.
3. Check permission of /etc/hosts. Permission should be 664, use "chmod" if not correct.
4. Check using df if the FS is not 100% full.
5. Check if there is any nested .Desktop file.In priciple you should never publish any volume in Ethershare that resides underneath another published volume.
   ex: if you publish "/**scitex**" as volume (also appears in afpvolumes file) ,you may not publish folder **"/scitex/version/macprogs**". If you do so – the latest will not show in chooser,since each will have it's own .**Desktop** file.
   The workaround will be to publish only one of the folders/filesystems at a time (and remove manually the redundant .**Desktop** file).

8.4.22 OPI server cannot find hi-res files

Recommended Solution

Check OPI search paths (Ethershare Admin).
Note Make sure you have the "OPI Setup" in the Ethershare Admin folder when opening Ethershare Admin.

8.4.23 Print Spooler Available Space Error

When printing to a RISC6000's printer spooler fails due to lack of available disk space, spool-space is needed to be increased.
Default size of /var (which is the spooling file system) is about 100MB.
If an error has occurred, additional 100MB chunk is recommended for the spooler.
Recommended Solution

1. Login to the server as root.
2. Type
   df /var
   The result should look like

Filesystem	Total KB	free	%used	iused	%iused	Mounted on
/dev/hd9var	102400	98188	4%	102	0%	/var

Note: the Total space (KB equals 1024 blocs which is twice of 512 Blocks)
The above /var has a size of 204800 (in 512 blocks).

3. To change (add 100MB or 200,000 units of 512K blocks), type
   chfs -a size=+200000 /var
4. To verify the change, type "df/Var" again.

Note In case the new size is still not enough, an additional chunk may be added. The system will notify in case there is not enough free disk space for the operation. This command is irreversible. Take into consideration that the free space on the system disk is limited and may be necessary for future use (fonts, etc.) therefore add only what is a necessity.

8.4.24 Folders appear "jumping" on the desktop

Explanation:
The nofakeoffspring parameter turns off an optimization the file server does upon reading directories, namely to not also look into each subdirectory and count the number of offspring items. Especially in our pre-press environments users use workflows where every customers job is stored in a projects folder, where various workers perform tasks in turn. The projects folder thus contains lots of subfolders for each job, and using nofakeoffspring would cause the afpsrv to count the number of items of every job folder while enumerating the projects folder. This is a performance bottleneck.
This feature may be especially useful when folders with many subfolders are in use where the subfolders contain many files. Since the Mac Finder does request information not only on files in the current folder but in addition on files in subfolders, although this information is currently not used, this may result in a speedup when opening folders with many subfolders.
Workaround:
Change the Helios configuration file /usr/local/es/conf/atalk.conf by adding a 'nofakeoffspring' parameter:

afpsrv: nohomedir, noclip2g, nofakeoffspring

8.4.25 How to connect more then 4 concurrent users in Ethershare Admin

Problem:
It seems that you can only connect with 4 concurrent user in Ethershare Admin.

Solution:
If you want for example to have 15 clients to work in the same time with Ethershare Admin you should add to the atalk.conf file the following line:

admsrv : sessions=15

The default of sessions is maximum 4 clients.

8.4.26 Ethershare 2.6 – multiple entries for some clients (login)

Problem:
Customers have noticed that sometime there are multiple entries of the same Mac's in /usr/local/es/swho -c. (Or in Ethershare Admin)

The problem was discovered when some Mac's could not connect to the server due to ES license, the limit was reached.

From Helios:
This is a feature of Ethershare 2.6 that AppleShare IP is used. This means also that there is not longer an AppleTalk based 3 minutes timeout but the IP timeout of 3 hours for afpsrv processes which Mac Client was gone. Ethershare Admin can be used to terminate a waiting process.

8.4.27 RPC timeout error on Brisque when transferring files with a Mac

Problem: On Brisque, an RPC timeout error displays when you transfer files with a Macintosh computer.
If Brisque afpsrv processes are running during the RPC timeout, the Mac OS Chooser lists the name of the Brisque volume as unavailable.
When this event occurs, the Brisque volume's files can still be read. However, Brisque files cannot be created, deleted, renamed, moved or trashed.
Workaround: Investigate and correct all of the following possible causes:
High I/O loads occurring on the server—use the topas utility to check the load.
Slow I/O devices—use the topas utility to check the load.
Network communication problems.

If the RPC timeout still occurs, run the following scripts to restart Ethershare services on the server:
/usr/local/es/stop-atalk now
/usr/local/es/start-atalk

8.5 MAC OSX connectivity

8.5.1 Adding hosts in Mac OS X 10.2

See
http://techplanet.creo.com/software_solutions/workflow_software/brisque/content/docs/adding_hosts_MacOSX_102.pdf
for adding hosts to MAC OSX machine.

8.5.2 Copy from Mac OS X between 2 mounted volumes is very slow

Mounting 2 AIX volumes on OSX and copying between the volumes is very slow – about 40 KB/sec.
Reading from the AIX volumes is fast – 4-5 MB/sec.
The problem is resolved by settig the switch to which the OSX is connected to FULL DUPLEX (it was HALF-DUPLEX) !
I get 6 MB/sec copying between the volumes !

8.5.3 Cannot connect to AIX via Chooser in Mac OS X

Error: One of the following messages appears:
unknown user, invalid password, or log on disabled
Symptoms In Mac OS X, when you use the Chooser to connect to Brisque, Brisque Serve, or Timna, an error message appears, and the login attempt fails.
Following, is a detailed list of events that were performed:
In OS X, open the Chooser, choose **Go**, and then choose **Connect to Server**, and choose the desired AIX hostname to connect to.
In the Login dialog box, type the appropriate user name.
Choose **OK**.
After several minutes, the Chooser exits and an error message appears.

Cause: There is more than one network adapter installed in Brisque, Brisque Serve, or Timna. Mac OS X does not communicate well with mixed AIX and Helios environments.

Possible workaround:
Try with troubleshooting OSX, try nothing else first, then create a new user on the mac, and log/login the mac and then try to login to the brisque the same as before. If it works, it's just a setting or cache on the mac, nothing wrong with Helios.
Solution: Perform one of the three-workaround procedures, starting with workaround 1, which is the preferred workaround.
Use workarounds 2 and 3 if you are running Preps® software for impositioning, or StepOne and LRS software for packaging. Workarounds 2 and 3 let you type the network path of the Creo server to which you want to connect.

Workaround 1

In Brisque, open the **atalk.conf** file in a text editor.
Add the following line to the file:
ipaddress="10.4.27.35"
Where <x.x.x.x> represents the IP address of the network adapter that Macintosh clients will access.
The Ethershare Administration Guide (for Ethershare versions 2.5 and 2.6) explains the function of this variable further:
"Numberstring specifies the IP-address the "afpsrv" program offers to the Macintosh clients for logging in via IP protocol.
The default for numberstring is the number of all configured IP-addresses of all network cards installed in the server.
ipaddresses (see ipaddress) is applied for handling more than one IP-address, and is given out in a string in which the addresses appear comma-separated."
Workaround 2:
In Mac OS X, open the Chooser.
Choose **Go**, and then choose **Connect to Server**. The Login dialog box appears.
In the **address** text box, type the hostname of the desired Creo server to connect to, and press Enter.
For example, type afp://bnc3, and press Enter.
In the Chooser, choose **Go**.
In the **address** text box, type the hostname of the desired Creo server to connect to.
Choose **Add to Favorites**.
Mount the Creo server:
In the Chooser, choose **Go**.
Choose **Favorites**.
Select the desired server hostname.
Workaround 3:
In Mac OS X, open the Chooser.
Choose **Go**, and then choose **Connect to Server**. The Login dialog box appears.
In the **address** text box, type the IP address of the desired Creo server to connect to.
For example, type the IP address 10.4.27.350.
Choose **Add to Favorites**.
Tip:
In Mac OS X, create aliases to the Creo servers that you have mounted successfully. To mount a server's volume again in the future, simply double-click on the server's alias.

8.5.4 Zones do not appear in Chooser

Zones are created by AppleTalk routers, and divide network devices into logical groupings. When a computer tries to get on the network (either at system startup, or when the AppleTalk port is switched from one port to another), it:
Tries to obtain an AppleTalk address dynamically
Checks for routers on the network
Verifies its address against information it receives from the router
Requests information for the network from routers, such as zone names
Registers its own services, such as its Macintosh name for file sharing
If in a zoned network, zones do not appear in the Chooser, check the following items:
Is the correct port selected in the AppleTalk control panel?
Are network cables connected properly?
Can other devices on the network see zones?
If not, the router may be down, or there may be a general network problem; report the problem to the network administrator.
Can you swap networking hardware with another device that is working and see zones? If so, suspect

networking hardware.
Otherwise, suspect that the software is at fault, and try the following:
Reset PRAM and re-select the correct port in the AppleTalk control panel.
Restart with Mac OS-only extensions. Toss AppleTalk preferences, restart, and try again.
Test the IP connections on the port to verify that the network itself is available.
Run "Disk First Aid" or another disk utility.
It may be necessary to reinstall Open Transport, or a clean system folder.

8.5.5 File Server does not appear in Chooser

- Verify the file server name and zone name.
- See if anyone else can see the File Server in the Chooser (may be network problems).
- Verify that the Web and File server is running.
- Verify that the port selected in AppleTalk control panel on both server and client.

8.5.6 Guest access is grayed-out (unavailable)

User "guest" does not have file service enabled at Web and File server.
The server administrator must allow guests to log into the file server.

8.5.7 Volumes are grayed-out (unavailable) in Chooser

If the volumes that appear in the File Server's volume list in the Chooser appear grayed-out, it indicates that the user does not have any "read" privileges to the share point.
The server administrator must allow users to at least "read" at the share point level, for users to mount the volume.

8.5.8 "Server not responding" message

AppleShare IP servers that have AFP over TCP enabled, will attempt an IP connection whenever the client and the server are configured for TCP/IP. Occasionally, although both client and server are configured for IP, there is no IP connectivity between them. (This might happen is there were no IP router between the client's network and the server's network.).
In these cases, try to force an AppleTalk connection instead of allowing the software to attempt an IP connection. See next step for details.

8.5.9 Forcing an AppleTalk connection

AppleShare client software 3.7 and above will attempt to make an IP connection to the AppleShare IP server whenever this feature has been enabled at the server, and the client is also configured for TCP/IP. To prevent this, and force an AppleTalk connection:
Open the Chooser.
If on a zoned network, select the **AT** zone of file server.
Select the **AppleShare Client** icon in upper-left quadrant of the Chooser.
Hold down the **Option** key when selecting the file server's name in the upper-right quadrant of the Chooser.
Try this whenever you see a "server not responding" message.

8.5.10 Can't connect using TCP/IP

If the client's connection is made via AppleTalk instead of TCP/IP (this should be done behind the scenes if everything is set up right), check the following:
Verify that the client is configured for TCP/IP (control panel).
Verify that the server is an ASIP server with "AFP over TCP/IP" enabled. Personal File Sharing does not support AFP over TCP/IP, nor do previous versions of the AppleShare Server Software (pre-ASIP 5.x), and possibly other types of file servers; in these cases, you can only connect using AppleTalk.
Attempt the connection using the "Server IP Address..." button in the AppleShare client software. If this button is missing, update client software to version 3.7.4 or later.
Test IP connectivity between the client and server.

8.5.11 Client stops responding when logging in to the server

This problem is currently under investigation at Apple. The client stops responding when attempting to log into the server just at the point where the server volumes are expected to mount. Force-quitting the Chooser sometimes allows the client to continue. Many have reported that this issue does not affect the administrator

user, only other registered users.
Workaround:
Disable the "Remember Recent" feature of Apple Menu Options control panel. (Changing values to "0" is not sufficient, the feature must be turned off).

8.5.12 File Server does not appear in Chooser

- **IP Connections:**
  Verifying IP connections

When clients report issues with accessing IP services, it's good practice to verify IP connectivity at the client and at the server. Even if the client connected successfully in the past, many factors can cause unsuccessful attempts, such as:
TCP/IP settings accidentally changed
The routers are not functioning
DNS services are not running
Duplicate IP addresses appear on the network
The DHCP or BootP address server is not functioning, or is not accessible
Some system files or TCP/IP preference files may have become unusable

- **Ping Utilities**

Testing IP connectivity is often done using utilities that send ping packets. Ping packets are small packets that are sent from one host to another, that request a response from the recipient. Many ping utilities are available for free download on the Internet. One favorite is MacTCP Watcher. Some sort of ping utility is invaluable when troubleshooting IP connections, and the following suggestions assuming that some ping utility is available.
If no ping utility is available, then use whatever IP applications are at hand, the simpler the better. Remember that the device you're attempting to contact has to support the service that the client software is trying to reach. For example, you may be able to use a Web browser to test a connection with another computer that has Personal Web Sharing enabled, but you cannot use it to test a connection to your router.
The following procedure describes methods for determining why a client connect with a host:
Ping the host using its Domain name.
If pinging succeeds, then there are no issues with the client or the IP connection between client and host. Next step would be to check the applications at client and host, and look for problems there (Web server, file server, mail client, etc.).

If pinging fails, it could indicate an issue with the routers or DNS servers, and not necessarily with the workstation itself. Proceed with the next step.
Ping a device on the local subnet using its IP address.
Pinging a device on your same subnet using its IP address does not require routers or DNS servers to be successful, so it verifies that each machine is able to communicate, at least on its own subnet, using TCP/IP.
Note:
Be sure that the workstation you are attempting to ping has its IP stack (i.e., protocol set) initialized. Most Macintosh computers do not initialize the IP stack until an application that uses IP is launched. On the computer you'll be pinging, launch an IP application, such as the Web browser or a ping utility, to initialize the stack before attempting the ping.
You can determine which other devices are on the same subnet by checking the physical connections (are they connected to the same hub? or same bus?) or by checking their IP addresses (are the network portions of the IP addresses identical? You have to consider the IP address AND the subnet mask to determine this).
If pinging a device on the same subnet is successful, then you have verified that the computer's IP connections are working, but there still may be some issue with external network devices, such as routers, DNS servers. Continue on with the next step.
If pinging a device on the same subnet fails, then you need to carefully check the local software and hardware configurations. Here are some tips on how to do that:
See if any other device on same subnet can ping other devices.
This will let you know if the local network is functioning, and if basically the IP addresses have been set up correctly.
If server addressing is being used, see if you can test with a manual address, to see if there is a communication problem between the client and address server.
Check TCP/IP configurations carefully; compare them with that of a computer that is working properly:
Verify link being used, IP address, subnet mask, and router information
Check whether "802.3" is checked (Advanced mode)
Check network connections to make sure they're not loose.
Swap out non-working hardware with a working machine to test AppleTalk on the same link if possible.

8.6 Removing an active en0 interface

It may happen that you will need to remove an active enx interface.
The following is the way to do it.

```
chdev -l 'en0' -a state='down'
chdev -l 'et0' -a state='down'
rmdev -dl en0
rmdev -dl et0
rmdev -dl ent0
```

And eventually redefine tcpip vi smit and Helios via netconf.

One can also download a **rment.sh** script that does the same from:
http://techplanet.creo.com/software_solutions/workflow_software/brisque/content/memos/support_tools.htm

8.7 Display all IP related configuration

In order to display all enX interfaces IP configuration cut&paste the following in any shell:

```
==================================
ksh
#The script  displays IP settings on all ent interfaces
DO=0
for EN in `lsdev -Cs pci| awk '/ent/ { print $1 }'|cut -c 1,2,4`;do
    if [[ $DO = 0 ]] ;then
        printf "%-4s %-15s %-15s %-12s %-12s %-21s %-20s %-8s\n" "Int" "IP_address" "Mask" "DNS"
"Gateway"  "Domain"    "Speed Selected" "Type"
        printf "%-4s %-15s %-15s %-12s %-12s %-21s %-20s %-8s\n" "---" "----------" "----" "---" "-------" "-----
-" "--------------" "------"
    fi
    mktcpip -S $EN 2>&1|awk -F: '$0 !~ /host/  {printf  ("%-4s %-15s %-15s %-12s %-12s %-
22s",$4,$2,$3,$5,$7,$6 )}'
    ENT=`echo $EN|cut -c 3`
    SPEED=`lsattr -El ent$ENT | grep -i speed|awk '{print $2}'`
    lscfg -v -l ent$ENT|grep -iE "gigabit|10/100/1000" >/dev/null
    if [[ $? = 0 ]] ;then
        DESCRIPTION=GIGABIT
    else
        DESCRIPTION=100BT
    fi
    printf "%-20s %-20s \n" $SPEED $DESCRIPTION
    DO=1
done
exit
==================================
```

The output will look like:

```
IntIP_addressMaskDNSGatewayDomainSpeedSelectedType
---------------------------------------------------
en0 10.4.27.18 255.255.254.0 10.4.2.12 10.4.26.1 cil.creo.com 100_Full_Duplex 100BT
```

One can also download a **lsip.sh** script that does the same from:
http://techplanet.creo.com/software_solutions/workflow_software/brisque/content/memos/support_tools.htm

8.8 Setting Full Duplex

- Please note that it is a essential to configure *FullDuplex* on both ends.

8.8.1 What is Full Duplex?

Full Duplex allows simultaneous transmission and reception of data . This is not possible on a shared repeater segment (because all devices attached to the repeater share a single, common transmit and receive channel). Full Duplex can be used on point-to-point links where switch ports are directly connected to each other. When

Full Duplex is activated, both ends can transmit and receive simultaneously, the collision detect mechanism is not activated.
Full Duplex will give the potential to increase the throughput on a Fast Ethernet port beyond 100 Mbps (up to 200 Mbps). This will be most useful on inter-switch and server links, which carry significant two-way traffic.
Even for less then 100Mbps bi-directional traffic the Full Duplex is more efficient (than Half Duplex) since it is possible to "receive and transmit simultaneously on the link".

8.8.2 What benefits?

The first advantage is that a switch can receive data from another switch while simultaneously transmitting data, theoretically allowing up to 100 Mbps (Fast Ethernet) in each direction.
In practice the benefit is lower than a doubling of bandwidth, owing to the half-duplex nature of the traffic.
The Fast Ethernet ports on the Creo switches normally support Half & Full Duplex.

8.8.3 Full Duplex set up

On the AIX command line execute sequence
Smit devices-> Communication -> Ethernet Adapter-> Adapter-> Change/S*how Characteristics of an Ethernet Adapter* and press *Enter*

In the Full Duplex field you can set the adapter speed to one of the following
• no
• yes
• Auto

8.8.4 Changing board configuration

On the AIX it is impossible to change the configuration of the IBM PCI FE board when the device is busy.
When you try to change the configuration on busy device you will get the following error
Method error (/usr/lib/methods/chgv3boom)
0514-062 Cannot perform the requested function because the specified device is busy.
To over come the above situation you should do the following (only on a monitor attached to the station and not from a remote station since this process involves disconnecting from the network)

1. From the AIX command line execute sequence
   smit tcpip -> Further Configuration -> Network Interfaces -> Network Interface Selection -> Change / Show Characteristics of a Network Interface
   and press *Enter*.
   Select *en0* and press *Enter*.

5. Change the IBM PCI Fast Ethernet adapter set up ,specifying use the '**Apply change to DATABASE only**' !!!!
   This will enabling changing the parameters on a working system, without a need to disable the interface.

6. Reboot the machine.

Or – optionally use the chent.sh script available as of Brisque5 to change the interface speed WITHOUT the reboot !

8.9 Network monitoring

8.9.1 AIX Tools

From Brisue version 5.0.46 and Brisque Serve 4.0.37 the following tool can be used – called **nettest.sh**.

A simple script that just runs a **rcp** and NFS copy of 100MB (that it creates) ten times from your local host to a remote.
The output is the total time that a copy of a file took.
Each host should be defined either in DNS or in the other host's /etc/hosts file !!!
Usage: **nettest.sh timna10**
Sample output:

```
-----------
Running over ent0 (100BT), Auto_Negotiation ,10.4.27.186
-----------
```

Establishing the largest available local dataVolumes . . .(AIX 4.3.3.0)
Establishing the largest available remote dataVolumes . . . (AIX 4.3.3.0)
Mounting /dataVolumes/timna10.4.2 over NFS
Now creating the required test file

Running rcp and NFS copy of 100MB from /dataVolumes/timna6.2.0 to /dataVolumes/timna10.4.2
---
rcp throughput = 11084 KByte/sec , NFS throughput = 4670 KByte/sec
rcp throughput = 10798 KByte/sec , NFS throughput = 4609 KByte/sec
rcp throughput = 11081 KByte/sec , NFS throughput = 4671 KByte/sec
rcp throughput = 10792 KByte/sec , NFS throughput = 4609 KByte/sec
rcp throughput = 11083 KByte/sec , NFS throughput = 4672 KByte/sec
---
Average: 10701 KByte/sec 4601 KByte/sec

8.9.2 Mac Tools (OSX)

The **Network Utility** combines several information and troubleshooting tools you may find helpful if you understand basic networking. It can be found on OSX under Applications/Utilities
Use the **Network Utility** to:

Check your computer's network interfaces (Info)
Review network performance statistics (Netstat)
Test access to specific hosts or IP addresses (Ping)
Convert between IP addresses and host names (Lookup)
Find user information (Whois, Finger)
Scan active TCP ports (Port Scan)
Help for some of these tools is available in Terminal. Type "man" followed by the tool's name (for example, "man ping").

8.9.3 Mac Tools (OS9)

Five tools I like to use when testing Macintoshes on a network are Helios LanTest MacTCP Ping, NetInfo, Apple System Profiler and raw file copies.

8.9.4 Helios LanTest

Helios LanTest is used to give network performance statistics to another computer mounted the local Macintosh Desktop. Helios LanTest can be downloaded off of any Timna Server from the Ethershare Applications Volume in the Unsupported folder. To run this test, download this application to the Macintosh. Next, mount a volume of the computer you are testing network speed to. Launch Helios LanTest. Once opened select Write 3000 KB to File and Read 3000 KB from File and leave all other tests unselected. Next select the File pull down menu and choose Select Test Volume.
Navigate to the volume of the mounted computer and choose select. Press the Start button. This will run ten tests and give you the average KB per second of a 3MB file written to and read from the mounted volume. Next select the Edit pull down menu and choose Edit Other Settings. Select the Faster Networks Button then use the Start button to run the tests again. This second test will read and write a 30MB file and give the average read/write times.

8.9.5 MacTCP Ping

MacTCP Ping is a useful utility to check TCP/IP connectivity between a Mac and another station. To use this to check if you have TCP/IP connectivity to another station launch the application. Next enter the IP address of the other station in the field that reads “Ping Host Address” and click on the button that reads “Start Ping”.
After about ten tries click “Stop Ping” button. Near the bottom of the message field you will see a line that reads “Packets out/in/bad/%loss”. If the %loss field is 100 then the two computers are not communicating. If the %loss field is 0 then TCP/IP communication is working and setup can proceed.

8.9.6 NetInfo

NetInfo is an application that looks at the AppleTalk network and creates a line of text that shows what should be entered to correctly to correctly configure the atalk.conf file. The atalk.conf file can be modified with vi editor or netconf.

8.9.7 Apple System Profiler

Apple System Profiler provides information about your computer's software and installed hardware devices. It includes information about the version of system software you're using, how many and what kind of devices are connected to your computer, and what applications are installed on your computer. This can provide a valuable troubleshooting tool for system configuration.

8.9.8 file copy

Another test I like to run is to create a file in PhotoShop that is about 120MB. Take this file and copy it to and from the mounted volume that you are testing. Time the copy and divide the file size by the amount of time it takes to read/write, which will give you the MB per second, the file is being read/written to.

8.9.9 Change configuration to see the changes

While older Macintoshes (older iMacs, Blue & White G3 desktops, and 1999-G3 PowerBook "Bronze") unofficially supported manual configuration of speed and duplexing (Apple has released an unsupported package of extensions called Duplex Tool) the modern Macintosh ("slot-loading" CDROM drive, G4 desktops, or the iBook) at this time does not support anything but auto-negotiation.

8.9.10 Checking connectivity with a cross cable

Eliminating basic network issues/ performance between Unix platforms /Mac's use of a cross over cable direct connection between two machines.
Each engineer should have a cross over coupler with him Scitex number 605A00120.

8.9.11 PC tools

The following utilities are provided with Microsoft TCP/IP for troubleshooting TCP/IP problems .
See http://www.ss64.com/nt/ for NT commands.

Troubleshooting Utility	Function
PING	Verifies configurations and tests connectivity
FINGER	Retrieves system information from a remote computer that supports the TCP/IP FINGER service
ARP	Displays cache of locally resolved IP addresses to MAC (media access control) addresses
IPCONFIG	Displays the current TCP/IP configuration
NBTSTAT	Displays a list of NetBIOS computer names that have been resolved to IP addresses
NETSTAT	Displays the TCP/IP protocol session information
ROUTE	Displays or modifies the local routing table
HOSTNAME	Returns the local computers host name for authentication by the RCP, RSH, and REXEC utilities
TRACERT	Displays the path a packet takes to a destination host

Useful commands

Note All AIX commands reference can be found under
http //www.austin.ibm.com/doc_link/en_US/a_doc_lib/aixgen/wbinfnav/CmdsRefTop.htm

8.10 Memory

`bootinfo –r`	shows how much RAM does my machine has (as root)
`lsattr –E –l sys0 –a realmem`	shows how much RAM does my machine have (as non root)
`lscfg -vp | grep -E "Size|Physical Location.*M[12]." | awk '/Physical/{printf "%-35s",$0;getline}1'|grep Size`	Show the exact memory modules config
`rmss -c 512` `rmss -r`	sets the memory size to 512 MB resets the memory size to the original one

8.11 Devices

`lsattr -El en0`	displays en0 driver params
`lsattr -El ent0`	displays ent0 HW params
`lsattr -El rmt0`	displays tape params
`lscfg -vp -l rmt0`	(all information about a tape drive)
`lsattr -El sys0`	displays system type, firmware, etc driver params
`lscfg –v`	lists all system HW config (NVRAM)
`lsdev –Cscsi`	list all scsi devices
`lsdev –Cspci`	list all pci devices
`lsdev -Cc adapter`	list all pci adapters
`lsparent –Ck scsi`	list all scsi adapters
`lsdevfc`	list fiberchannel devices
`cfgmgr`	Configures devices
`cfgmgr -s`	Turnes the “defined” device into an “available” state
`cfgmgr -v -l device -v`	Specifies verbose output. The cfgmgr command writes information about what it is doing to standard output.
`cfgmgr -v -l device`	Name Specifies the named device to configure along with its children. If you only turned on a disk tower at e.g. scsi2 cfgmgr -v -l scsi2 will only configure this with detailed output.
`lsdev -Ccdisk`	Shows all disks
`lsdev -Cctape`	Shows all tapes
`lsdisp`	To check which graphic adapter is installed.
`lscfg -vp -l mga0`	(all information about a adapter)
`lscfg -vp -l hdisk0 | grep Machine`	gives info about the disk manufacture type
`lsslot -c pci`	For 6F1/6E3/6E4 only !!!! Lists all slots ,voltage,boards,etc !!!!
`bootlist -m normal cd0 rmt0 hdisk0`	Changes the default bootlist
`lsmcode -c`	display the system firmware level and service processor
`lsmcode -r -d scraid0`	display the adapter microcode levels for a RAID adapter scraid0
`lsmcode -A`	display the microcode level for all supported devices
`rmdev -l nsp0 -d`	This resets your TSP boards !

cfgmgr	
ipl_varyon -i	Check which disk is bootable

8.12 System info

/usr/bin/uname -m	Get machine ID
/usr/bin/uname -M	Get platform type
alog -o -t boot | more	check the boot log !!!!
oslevel	Displays current AIX level
oslevel -r	Displays current AIX maintenance level
oslevel -g	List filesets at levels later than maintenance level !!!
lsps -a	Paging space settings.
lscfg -vp -l proc0 (1,2,3)	(all information about a processor[s])
lscfg -vp -l mem0 |pg	(all information about memory modules installed)
env ulimit	Environment setings - show user ulimit
bootinfo –s hdisk0	Displays disk size
lsattr -El sys0 -a systemid	Determines the system serial number
lscfg –vp|grep ROM|grep -v CD	Determines the system Firmware level
/usr/lpp/diagnostics/bin/uesensor -l	read voltage/fan speed/temperature from Hammerhead and 6F1
prtconf |more	Displays all the system HW config
prtconf -s	Displays the CPU clock speed

8.13 System issues

TERM=vt100	If you execute a command/application and it responds with msg ‘ The type of your terminal is unknown to the system’,run those commands (In ‘ksh’)
set term=vt100	Same (In tcsh’)
rcp -rp /dataVolumes/brisque1.1.0/jobs/flower.job sciroot@ripro3:/dataVolumes/ripro3.3.0/jobs/	Copying a file from one Unix machine (Brisque) to another (Server) the assumption is that both machines know each other’s names (in hosts file)
dd if=/dev/fd0 of=/temp/diskimage bs=4096	Duplicate a diskette copy from diskette to hard drive
dd if=/temp/diskimage of=/dev/fd0 bs=4096	copy diskette image onto diskette
/usr/lpp/X11/bin/xset -display unix 0 s off	Kill display timeout
lsfs -v jfs	List of Filesystem items.
lsfs -q -v jfs	you can see also the parameter of a filesystem and thus see if e.g. /backup was or is a big_filesystem_enabled one. Important for the 2GB File limit.
lsuser –f root	Shows all user parameters (max .file size,etc)
sysdumpdev -L	Check last system dump status
sysdumpdev -l	Check system dump device settings
lslpp -f Upd_Timna_DTM.obj	List contents of the package
lssrc -a	get the status of all subsystems on the local machine
lssrc -g nfs	get the status of nfs on the local machine

`lssrc -g tcpip`	get the status of tcpip on the local machine
`lppchk -v`	command verifies that files for an installable software product (fileset) match the Software Vital Product Data (SWVPD) database information for file sizes, checksum values, or symbolic links.
`lppchk -l`	command verifies the system symbolic links.
`lppchk -f`	command verifies the files existence,length
`portmir -t /dev/pts/0 -m /dev/pts/1`	This allowes to effectively do and see the same thing from two different terminals. Either can have control, both see output.
`diag –c -S1`	Run offline diag on system resources only

8.14 Networking

`nettest.sh timna7`	Checks speed while running a **rcp** and NFS copy of 100MB (that it creates) ten times from your local host to a remote. Works on Brisque5 and BrisqueServer 4.0.38 and up.
`ksh` `for ENT in ` ` lsdev –Cs pci|grep ent | awk '{` `print $1 }'|cut –c 1,2,4 `;do` ` mktcpip –S $ENT` `done` `exit`	**Shows all interfaces IP config+mask+router+DNS !**
`host timna1`	displays station default IP address – works ONLY in **DNS** environment
`ifconfig en0`	displays en0 driver params
`netstat -i`	displays network interfaces setting
`mktcpip -S en0`	#host:addr:mask:_rawname:nameserv:domain:gateway:type:start **syslab18:192.9.100.1:255.255.255.0:en0:10.4.2.12:csil.creoscitex.com:10.4.30.1:N/A:no** **GREAT TCPIP info in one command !!!**
`showmount -e`	displays all exported volumes
`showmount -a`	**show who's got my filesystemsses mounted over IP !**
`lssrc –g tcpip`	displays all IP oriented processes status
`entstat -drt ent0 |grep –i error`	display any communication errors on etn0
`entstat -r`	Resets all the statistics back to their initial values.
`arp -a`	shows a local arp cache
`cd /usr/local/es/;res`	restarts appletalk
`netstat -p ip`	**shows IP statistics**
`netstat -p udp`	**shows UDP statistics**
`netstat -D|grep -E "P|Source"`	**Shows all protocols statistics**

`netstat -c`
`-s`
`-m`
	client only;
	server only
	NFS mount

`netstat -I en0 10`	Trace en0 every 10 seconds
`netstat –s –s`	shows only server NON-ZERO lines !
`netstat -rn`	Display routing info with IP address (10.4.27.182)
`netstat -in`	Shows the state of all configured interfaces
`netstat -r`	Display routing info with full hostnames (timna2.csil.creoscitex)
`nfsstat –z`	reset NFS stats without reboot
`nfsstat –m`	**show current NFS stats for mounted filesystems !!!**
`lssrc -g nfs`	Show all nfs processes status
`cat /etc/resolv.conf`	Check DNS settings
`stopsrc –g NFS`	To stop NFS services on a client

`startsrc –g NFS`	To start NFS services on a client
`traceroute 149.115.39.1`	Trace all hobs (interconnections=routers) to the destination IP
`netpmon -o netpmon.out` `trcstop`	Traces all network processes activity into a logfile. Must be preceede by a trcstop command !
`nslookup hostname`	Shows the DNS server name and address
`ping -R -c 1 bnc2`	Ping with displaying the routing info
`namerslv -s | grep domain | awk '{ print $2 }'`	Displays a fully qualified domain name of a host
`rup`	Shows the status of a remote hosts on the local network
`nmonnfs`	Traces all NFS processes activity
`mount hostname:/filesystem /mount-point`	Mount an NFS filesystem
`mknfsexp -d /directory`	Creates an NFS export directory
`mknfsmnt`	Creates an NFS mount directory
`rmnfs`	Stops and un-configures NFS services
`mknfs`	Configures and starts NFS services
`exportfs -u (filesystem)`	Un-exports a filesystem
`exportfs`	Lists all exported filesystems
`exportfs -a`	re-Exports all fs's in /etc/exports file

8.15 Disks

`synclvodm -vP svg3`	synchronizes ODM and the disk VG info.
`redefinevg -d hdisk1 svg1`	Redfined VG definition in ODM
`lqueryvg -p hdisk0 -Avt`	reads logical volumes info from disk
`bootinfo -s hdiskx`	Shows Megabytes available even if no volume group is assigned.
`lspv -p hdiskx`	(PP's used, location on disk, mount point)
`lscfg -vp -l hdiskx`	(all information about a disk/raid)
`reducevg <vg-name> PVID`	**Removes the stalled PVID from the ODM !!!!**

8.16 Filesystem

`chfs -a size=+200000 /var`	increases /var FS by 100MB
`du -sk /john`	**shows directory used space in kb !!**
`mount all`	mounts all FS
`umount /dataVolumes/rtest9.1.0`	unmounts a FS
`fuser -k /dev/cd0`	Releases a CD that will not unmount !
`fuser –c /dataVolumes/rtest9.1.0`	Find out which process_id lock the FS
`istat <filename>`	Shows when the file was last created/modified/accessed !!!!
`crfs -v jfs -a bf=true –A yes -g'svg10' -a size='142000000' -a nbpi='8192' –m '/dataVolumes/timna1.10.0'`	73 GB manual filesystem creation
`crfs -v jfs -a bf=true –A yes -g'svg10' -a size='284000000' -a nbpi='16384' –m '/dataVolumes/timna1.10.0'`	144 GB manual filesystem creation

istat <filename>	Displays file's inode info
ncheck -i 690 /tmp	Lists the file name by inode

8.17 Helios

/usr/local/es/rebuild -f /dataVolumes/rtest9.1.0	rebuilds desktop
/usr/local/es/rebuild -s /dataVolumes/rtest9.1.0	diagnose only desktop problems
vi /usr/adm/messages	browse for Helios messages
/usr/local/es/zones	Display Ethershare zones
/usr/local/es/poll |grep Workstation	Shows all active Appletalk devices
/usr/local/es/vpoll	Shows more structured output of poll.
afpmsg [-u user] message	Sends a message to Mac-users.
usr/local/es/dt mkdir /dataVolumes/ripro01.1.0/lev	The 'dt' utility should be used for all kind of changes on UNIX level! (creates directory 'lev' by involving Helios)

8.18 System monitoring

istat <filename>	**Shows create/modify/access file info**
alog -o -t boot | more	displays system boot log
w	Lists login users and their programs.
who	Identifies the users currently logged in
/usr/local/es/swho	Identifies the Ethershare users currently logged in
last |more	shows last logins
last –20	Shows recent 20 lines
last root	Shows username 'root' login/logout record
last ftp	Shows all FTP session in the record
mount	shows all mounted filesystems (nfs+local)
ps -ef	show all running processes
ps -efl|fold	show all running processes, break long lines !!!
ps -ef |grep scitex	show all scitex running processes
du -ak /home|grep -v .rsrc|sort -rn|head -10	Display 10 biggest directories on the volume by size
find /scitex -xdev -size +20480 -ls|sort -rn +6|head -10	**to find 10 top files in /scitex directory larger than 10 MB."-xdev" helps searching ONLY in "/" !!!!!!!!!**
history	Last commands run on the system by this user
alog -ot boot	Lists a log of all boot operations
grep TX /etc/environment	Verify daylight settings

8.19 Performance issues

nmon	a nice monitor - runs only on AIX5 and up
topas	a nice monitor - runs only on AIX 4.3.3 and up
monitor -top 10 -s 2	monitors system 10 top processes with 2 seconds
iostat 2	displays disks activity every 2 seconds refresh interval

`iostat –a 2`	AIX5 ONLY !!!! displays disks and ADAPTER !!!! activity every 2 seconds refresh interval
`vmstat 2`	;monitors virtual memory statistics every 2 seconds (see appendix A)
`sar –P ALL 2 2`	Show all CPU's activity on an SMP machine
`svmon –i 2`	Monitors real and virtual memory
`ps auxw | sort –r +3 |head –10`	**Shows top 10 memory usage by process**
`ps auxw | sort –r +2 |head –10`	**Shows top 10 CPU usage by process**
`ps –auw | grep defunct`	Shows zombies processes (to kill – reboot or kill the parent)
`filemon –O all –o filemon.out ; find / -name core ; trcstop`	Traces **FS,LV,disks,files** activityof a "find" command into a logfile **(**filemon.out**).** Must be preceded by a trcstop command.
`tprof –x find / -name core ; trcstop`	Traces **CPU** activityof a "find" command Severall logfile are created**.** Must be preceded by a trcstop command.
`tprof -ske -x "sleep 30"`	Trace CPU activity for next 30 seconds.Results in file **sleep.tprof**
`lvmstat –ev svg1` `lvmstat –v svg1 2`	AIX5 ONLY !!!! enable gathering the VG statistics Display VG logical volumes statistics every 2 seconds

8.20 Remote issues (working over the modem)

`pdelay tty0; pdisable tty0 >/dev/null ;penable tty0`	Resets tty0
`stty erase '^?'`	Makes bakespace to work
`/scitex/version/utils/modem/kermit -l /dev/ttyx –c atdt {phone #}`	Use Unix to Dail-out (for any reason) ttyx is the serial port the cable is connected
`/scitex/version/utils/modem/kermit -s /u/d0/ripro_messages -i`	Sends a file to a remote desktop in binary mode
`/scitex/version/utils/modem/kermit -r`	Receives a file to from remote desktop
`rsh brisque01 -l sciroot lslpp -l |grep Upd`	**Enables running any command remotely on a different AIX machine !!!!!!!** **In this example we check the other brisque versions status.**
`rsh brisque03 -l sciroot grep "error" $SCI_LOGS/ripro_messages`	**In this example we grep ripro_messages for error on the other AIX machine.**
`portmir -t /dev/pts/0 -m /dev/pts/1`	This allowes to effectively do and see the same thing from two different terminals. Either can have control, both see output.

8.21 Browsing errlog with errpt

`errpt -a -s 0604090601 -e 0605090901`	browse the errlog in detail for all errors within a timeframe
`errpt -a -N SYSPROC |more` `errpt -a -N SYSPROC > /tmp/err.log`	Browse the errlog for the **SYSPROC** resource, can be into the file
`errpt -j 5DFED6F1`	Browse the errlog by the identifier
`errpt -A`	**AIX5 ONLY !!!!** Shows less detailes then errpt -a
`errpt -D`	**AIX5 ONLY !!!!** eliminates double entries

8.22 Creo issues - run those commands

`find / -name core`	Find all application core files
`/usr/bin/cat /scitex/version/plt_config/tcpipSet.Def | /usr/bin/grep items | awk -F '{ print $2 }'`	Get Lotem PC IP address

`/scitex/version/utils/license/list_option `/scitex/version/utils/license/station_types | grep + | awk -F+ '{ print $1 }'``	Get Creo licenses options
`recover –Tvf Upd_Timna_DTManager_3178.image`	**Displays the contents of the Upd image**

8.23 Security issues

`chmod -s Filename`	Remove Sticky Bit to a file or directory
`chmod +r+w+x+t Filename`	Add Read+Write+Execute+Temp mode to a file or directory. This is a 'blanket' change for all owner, user & group. **Numeric Access Modes** 0 (---) - no access 1 (--x) - execute permissions; search permissions for directories 2 (-w-) - write access 3 (-wx) - execute/search permission and write access 4 (r--) - read access 5 (r-x) - execute/search permission and read access 6 (rw-) - read and write access 7 (rwx) - execute/search permission and read and write access
`usrck –y ALL`	Checks for user problems
`pwdck –y ALL`	Checks for password problems
`grpck –y ALL`	Checks for groups problems
`mkpasswd -f`	rebuild the /etc/passwd indexes in case of suspected corruption
`lssec -f /etc/security/user -s macuser -a ALL`	List all security parameters for macuser

8.24 Miscellaneous

`ksh` `find / -type f|xargs grep "10.4.27.181" 2> /dev/null`	Find all files containing my IP address
`compress -c file > file.Z`	Compresses the files while keeps the original
`whereis <command-ame>`	Returns full path of program

8.25 Examples on commands usage

`last -17`

```
root     pts/1        10.4.26.42           Nov 21 12 09   still logged in.
root     pts/0                             Nov 20 16 10   still logged in.
root     pts/1        10.4.26.42           Nov 20 13 15 - 15 32  (02 17)
root     ftp          10.4.26.42           Nov 20 13 14 - 13 16  (00 02)
root     pts/1        10.4.26.42           Nov 19 15 48 - 15 56  (00 08)
scitex   pts/0                             Nov 18 17 56 - 16 10 (1+22 13)
cdesci   lft0                              Nov 18 17 56   still logged in.
reboot   ~                                 Nov 18 17 54
shutdown lft0                              Nov 18 17 09
root     lft0                              Nov 18 17 07   System is halted root pts/2   10.4.26.42   Nov 18 08 04 - 08 04  (00 00)

root     pts/2        10.4.26.42           Nov 18 07 59 - 08 00  (00 01)
root     ftp          10.4.34.68           Nov 16 14 06 - 14 52  (00 46)
root     pts/0                             Nov 16 13 52 - 17 05 (2+03 13)
root     pts/0                             Nov 16 12 52 - 13 52  (01 00)
root     pts/0                             Nov 16 12 49 - 12 52  (00 02)
root     pts/0                             Nov 16 11 08 - 11 09  (00 00)
```

8.26 Making a duplicate (or image) out of diskette in UNIX

General Note: *Directory **dup** and filename **anyname** are arbitrary. You can use any name you want for both. I tried to make it as simple as possible.*

If your source and destination are local, you obviously, skip the E-Mail section and start from step 5 of making a floppy from the image.

8.26.1 Making an image from a diskette

1. Put the first original floppy in the floppy drive
2. Create a directory in /**dataVolumes/brisquex.x.x**

   ```
   mkdir dup <CR>
   cd dup
   ```

3. Type the following:

   ```
   dd if=/dev/fd0 of=./anyname bs=4096  <CR>
   ls  <CR>
   ```

   Note: *You should see at least the following file:*

   anyname

   Note: *Until now we created an image of a diskette*

8.26.2 Prepare for sending it via E-Mail

1. Do steps 1 to 3
2. Tar the file and compress it:

   ```
   tar –cvf anyname.tar ./anyname <CR>
   compress anyname.tar <CR>
   ls  <CR>
   ```

   Note: *You should see at least the following files:*

   anyname anyname.tar.Z
3. Via FTP on Internet Explorer (or any other way), bring this file to your MAC or PC

   ftp://root:ripro@IP_Address_Of_Brisque ***(root:ripro@ disappear after login)***
4. Drag & Drop this file to your (MAC or PC) hard drive and E-Mail

8.26.3 Making a floppy from the image

1. In destination Brisque, put the image on one of the dataVolumes

   Note: *It can be via FTP (like above) or any other way.*
2. Open a Terminal session
3. Create a directory in /**dataVolumes/brisquex.x.x**

   ```
   mkdir dup <CR>
   cd dup <CR>
   ```

4. Then, type the following:

   ```
   uncompress anyname.tar.Z <CR>
   tar -xvf anyname.tar <CR>
   ```

5. Insert a floppy into drive and format. Format command:

   ```
   format /dev/fd0 <CR> <CR>
   ```

6. Type the following command:

```
dd if=./anyname of=/dev/fd0 bs=4096 <CR>
```

After a successful completion, label each diskette appropriately

9. Important files

/smit.log	Holds last installations and smit logs
/usr/adm/messages	AIX and Helios messages
/scitex/version/logs/ripro_messages	All Creo application messages
/home/cdesci/.dt/errorlog **/home/cdesci/.dt/startlog**	CDE logs
/var/adm/ras/bootlog	System bootlog
/scitex/version/logs/station_info.log	Station info
/scitex/version/logs/inst.log	Installation log
/scitex/version/logs/start.ScitexServers.log	That's where ALL Creo applications dump errors in a very unorganized manner …
/etc/exports	All exported volumes
/etc/hosts	Hosts list
/etc/filesystems	All filesystems that are mounted on boot
/etc/passwd	All Unix users and passwords
/usr/local/es/	Main Helios dir
/usr/local/es/conf	Helios config files
/usr/local/es/conf/afpvolumes	All volumes published by Helios
/usr/local/es/conf/afpipaccess	Helios security definitions - who can mount
/usr/local/es/conf/atalk.conf	Local Ethershare definitions - boards, zones, printers,etc
/usr/local/es/Versions	All Helios files versions
/scitex/version/logs	All Creo logs
/scitex/version/scripts	All Creo scripts
/scitex/version/progs	All Creo programs (executables)
/var/adm/ras	This is where the vmcore.X file is placed (system core)
/scitex/version/diag	Here the Creo diagnostics resides
/etc/netsvc.conf	The /etc/netsvc.conf file is used to specify the ordering of certain services in AIX; specifically, name resolution for send mail, the gethostbyname, gethostaddr, and gethostent subroutines, in addition to alias resolution for send mail. The default order can be overwritten by creating the configuration file, /etc/netsvc.conf, and specifying the desired ordering.
/var/adm/ras/BosMenus.log	Shows you the settings during AIX install.
/var/adm/ras/devinst.log	Shows output during AIX install.

10. Useful links

AIX commands reference (AIX 5.2)
http://publib.boulder.ibm.com/infocenter/pseries/v5r3/index.jsp?topic=/com.ibm.aix.doc/cmds/aixcmds3/aixcmds302.htm
All AIX commands (AIX 4.3.3)
http://publib16.boulder.ibm.com/pseries/en_US/infocenter/base/aix43.htm#refgds
888 numbers interpretation
http://www.unet.univie.ac.at/aix/aixprob/msgdnref/3digit888.htm#A113C128ef
VI reference manual
http://drumlin.thehutt.org/vi/
AIX 4.3.3/ 5.2 books
http //www.rs6000.ibm.com/cgi-bin/ds_form
AIX LVM TS & commands !!!!!!!!!
http://www.redbooks.ibm.com/redbooks/SG245433.html
Network TS link1
http://compnetworking.about.com/cs/troubleshootgen/index.htm?once=true&
Unix files UNDELETE utility
http://www.compunix.com/prod/analyse.vs
Network Calculators - helps calculating net masks and nodes
http://www.subnetmask.info/
PCI adapter placement guide
http://publib16.boulder.ibm.com/pseries/en_US/infocenter/base/hardware_docs/pdf/380538.pdf
TCP/IP troubleshooting
http://publib16.boulder.ibm.com/pseries/en_US/aixbman/commadmn/tcp_problems.htm
Performance tuning
http://www.redbooks.ibm.com/pubs/pdfs/redbooks/sg246184.pdf
IBM Microcode download
http://www14.software.ibm.com/webapp/set2/firmware/gjsn
Digit Display (LED) Values
http://www.rootvg.net/ledlist.htm
AIX troubleshouting -IBM
http://publib16.boulder.ibm.com/pseries/en_US/infocenter/base/HT_AIXlibrary_TroubleRefs.htm
Troubleshooting Modem Problems
http://publib16.boulder.ibm.com/pseries/en_US/aixasync/asycomgd/Modem_trblsht_AsynComm.htm#de214f4076trau
vmstat Tool
http://berdmann.dyndns.org/doc/ibm/aix/aix_hints_and_tips/6914708.htm
NT commands
http://www.ss64.com/nt/
AIX tips !!!
http://www.aixtips.com/AIXtip

11. Appendix A - vmstat

11.1 The vmstat Command (Memory)

The **vmstat** command summarizes the total *active* virtual memory used by all of the processes in the system, as well as the number of real-memory page frames on the free list. Active virtual memory is defined as the number of virtual-memory working segment pages that have actually been touched . This number can be larger than the number of real page frames in the machine, because some of the active virtual-memory pages may have been written out to paging space.
When determining if a system might be short on memory or if some memory tuning needs to be done, run the **vmstat** command over a set interval and examine the pi and po columns on the resulting report. These columns indicate the number of paging space page-ins per second and the number of paging space page-outs per second. If the values are constantly non-zero, there might be a memory bottleneck. Having occasional non-zero values is not be a concern because paging is the main principle of virtual memory.

vmstat 2 10

```
kthr     memory             page              faults        cpu
----- ----------- ------------------------ ------------ -----------
 r  b   avm   fre  re  pi  po  fr   sr  cy  in   sy  cs us sy id wa
 1  3 113726   124   0  14   6 151  600   0 521 5533 816 23 13  7 57
 0  3 113643   346   0   2  14 208  690   0 585 2201 866 16  9  2 73
 0  3 113659   135   0   2   2 108  323   0 516 1563 797 25  7  2 66
 0  2 113661   122   0   3   2 120  375   0 527 1622 871 13  7  2 79
 0  3 113662   128   0  10   3 134  432   0 644 1434 948 22  7  4 67
 1  5 113858   238   0  35   1 146  422   0 599 5103 903 40 16  0 44
 0  3 113969   127   0   5  10 153  529   0 565 2006 823 19  8  3 70
 0  3 113983   125   0  33   5 153  424   0 559 2165 921 25  8  4 63
 0  3 113682   121   0  20   9 154  470   0 608 1569 1007 15  8  0 77
 0  4 113701   124   0   3  29 228  635   0 674 1730 1086 18  9  0 73
```

Notice the high I/O wait in the output and also the number of threads on the blocked queue. Most likely, the I/O wait is due to the paging in/out from paging space.
To see if the system has performance problems with its VMM, examine the columns under memory and page

- **memory**

Provides information about the real and virtual memory.

- **avm**

The avm (Active Virtual Memory) column gives the average number of 4 K pages that are allocated to paging space. The avm value can be used to calculate the amount of paging space assigned to executing processes. The number in the avm field divided by 256 will yield the approximate number of megabytes (MB) allocated to paging space system wide. Prior to operating system version 4.3.2 the same information is reflected in the Percent Used column of the lsps -s command output or with the svmon -G command under the pg space inuse field.

- **fre**

The fre column shows the average number of free memory pages. A page is a 4 KB area of real memory. The system maintains a buffer of memory pages, called the free list that will be readily accessible when the VMM needs space.
When an application terminates, all of its working pages are immediately returned to the free list. Its persistent pages (files), however, remain in RAM and are not added back to the free list until they are stolen by the VMM for other programs. Persistent pages are also freed if the corresponding file is deleted.
For this reason, the fre value may not indicate all the real memory that can be readily available for use by processes. If a page frame is needed, then persistent pages related to terminated applications are among the first to be handed over to another program.
If the fre value is substantially above the maxfree value, it is unlikely that the system is thrashing. Thrashing means that the system is continuously paging in and out. However, if the system is experiencing thrashing, you can be assured that the fre value will be small.

- **page**

Information about page faults and paging activity. These are averaged over the interval and given in units per second.

- **re**

Note In operating system version 4, reclaiming is no longer supported. The algorithm to keep track of reclaims costs performance, and the value delivered does provide very useful information about the performance of the system.

- **pi**

The pi column details the number (rate) of pages paged in from paging space. Paging space is the part of virtual memory that resides on disk. It is used as an overflow when memory is over committed. Paging space consists of logical volumes dedicated to the storage of working set pages that have been stolen from real memory. When the process references a stolen page, a page fault occurs, and the page must be read into memory from paging space.
Due to the variety of configurations of hardware, software and applications, there is no absolute number to look out for. But five page-ins per second per paging space should be the upper limit. This guideline should not be rigidly adhered to, but used as a reference. This field is important as a key indicator of paging-space activity. If a page-in occurs, there must have been a previous page-out for that page. It is also likely in a memory-constrained environment that each page-in will force a different page to be stolen and, therefore, paged out. But systems could also work fine when they have close to 10 pi per second for 1 minute and then work without any page-ins.

- **po**

The po column shows the number (rate) of pages paged out to paging space. Whenever a page of working storage is stolen, it is written to paging space, if it does not yet reside in paging space or if it was modified. If not referenced again, it will remain on the paging device until the process terminates or disclaims the space. Subsequent references to addresses contained within the faulted-out pages results in page faults, and the pages are paged in individually by the system. When a process terminates normally, any paging space allocated to that process is freed. If the system is reading in a significant number of persistent pages (files), you might see an increase in po without corresponding increases in pi. This does not necessarily indicate thrashing, but may warrant investigation into data-access patterns of the applications.

- **fr**

Number of pages that were freed per second by the page-replacement algorithm during the interval. As the VMM page-replacement routine scans the Page Frame Table (PFT), it uses criteria to select which pages are to be stolen to replenish the free list of available memory frames. The criteria include both kinds of pages, working (computational) and file (persistent) pages. Just because a page has been freed, it does not mean that any I/O has taken place. For example, if a persistent storage (file) page has not been modified, it will not be written back to the disk. If I/O is not necessary, minimal system resources are required to free a page.

- **sr**

Number of pages that were examined per second by the page-replacement algorithm during the interval. The VMM page-replacement code scans the PFT and steals pages until the number of frames on the free list is at least the maxfree value. The page-replacement code might have to scan many entries in the PFT before it can steal enough to satisfy the free list requirements. With stable, unfragmented memory, the scan rate and free rate might be nearly equal. On systems with multiple processes using many different pages, the pages are more volatile and disjoint. In this scenario, the scan rate might greatly exceed the free rate.
Memory is over committed when the ratio of fr to sr (fr sr) is high.
An fr sr ratio of 1 4 means that for every page freed, four pages had to be examined. It is difficult to determine a memory constraint based on this ratio alone, and what constitutes a high ratio is workload/application dependent.

- **cy**

Number of cycles per second of the clock algorithm. The VMM uses a technique known as the clock algorithm to select pages to be replaced. This technique takes advantage of a referenced bit for each page as an indication of what pages have been recently used (referenced). When the page-stealer routine is called, it cycles through the PFT, examining each page's referenced bit.
The cy column shows how many times per second the page-replacement code has scanned the PFT. Because the free list can be replenished without a complete scan of the PFT and because all of the vmstat fields are reported as integers, this field is usually zero. If not, it indicates a complete scan of the PFT, and the stealer has to scan the PFT again, because fre is still under the maxfree value.
One way to determine the appropriate amount of RAM for a system is to look at the largest value for avm as reported by the vmstat command. Multiply that by 4 K to get the number of bytes and then compare that to the number of bytes of RAM on the system. Ideally, avm should be smaller than total RAM. If not, some amount of

virtual memory paging will occur. How much paging occurs will depend on the difference between the two values. Remember, the idea of virtual memory is that it gives us the capability of addressing more memory than we have (some of the memory is in RAM and the rest is in paging space). But if there is far more virtual memory than real memory, this could cause excessive paging which then results in delays. If avm is lower than RAM, then RAM being filled up with file pages could cause paging-space paging.
The page-in and page-out numbers in the summary represent virtual memory activity to page in or out pages from page space and file space. The paging space ins and outs are representative of only page space. If you are experiencing considerable I/O wait time, but are not memory-constrained, the problem might be due to poor distribution of I/O across drives. To determine if the problem is due to paging space or files, take multiple samples of the vmstat -s command and see if the page ins and outs to paging space are the majority of the total paging.

11.2 vmstat command (disk)

To prove that the system is I/O bound, it is better to use the iostat command. However, the vmstat command could point to that direction by looking at the wa column, as discussed in The vmstat Command. Other indicators for I/O bound are

- The disk xfer part of the vmstat output

  To display a statistic about the logical disks (a maximum of four disks is allowed), use the following command

vmstat hdisk0 hdisk1 1 8

```
kthr     memory      page              faults       cpu     disk xfer
----  ----------  ------------------------ ------------ ----------- ----
r  b   avm fre    re  pi  po  fr  sr  cy in   sy  cs  us sy id wa  1 2 3 4
0  0  3456 27743   0   0   0   0   0   0 131  149  28  0  1 99  0  0 0
0  0  3456 27743   0   0   0   0   0   0 131   77  30  0  1 99  0  0 0
1  0  3498 27152   0   0   0   0   0   0 153 1088  35  1 10 87  2  0 11
0  1  3499 26543   0   0   0   0   0   0 199 1530  38  1 19  0 80  0 59
0  1  3499 25406   0   0   0   0   0   0 187 2472  38  2 26  0 72  0 53
0  0  3456 24329   0   0   0   0   0   0 178 1301  37  2 12 20 66  0 42
0  0  3456 24329   0   0   0   0   0   0 124   58  19  0  0 99  0  0 0
0  0  3456 24329   0   0   0   0   0   0 123   58  23  0  0 99  0  0 0
```

The disk xfer part provides the number of transfers per second to the specified physical volumes that occurred in the sample interval. One to four physical volume names can be specified. Transfer statistics are given for each specified drive in the order specified. This count represents requests to the physical device. It does not imply an amount of data that was read or written. Several logical requests can be combined into one physical request.

- The in column of the **vmstat** output

  This column shows the number of hardware or device interrupts (per second) observed over the measurement interval. Examples of interrupts are disk request completions and the 10 millisecond clock interrupt. Since the latter occurs 100 times per second, the in field is always greater than 100. But the **vmstat** command also provides a more detailed output about the system interrupts.

11.3 The vmstat Command (CPU)

The processing unit is one of the fastest components of the system. It is comparatively rare for a single program to keep the CPU 100 percent busy (that is, 0 percent idle and 0 percent wait) for more than a few seconds at a time. Even in heavily loaded multi-user systems, there are occasional 10 milliseconds (ms) periods that end with all threads in a wait state. If a monitor shows the CPU 100 percent busy for an extended period, there is a good chance that some program is in an infinite loop. Even if the program is "merely" expensive, rather than broken, it needs to be identified and dealt with.
The first tool to use is the **vmstat** command, which quickly provides compact information about various system resources and their related performance problems. The **vmstat** command reports statistics about kernel threads in the run and wait queue, memory, paging, disks, interrupts, system calls, context switches, and CPU activity. The reported CPU activity is a percentage breakdown of user mode, system mode, idle time, and waits for disk I/O.

Note If the **vmstat** command is used without any options or only with the interval and optionally, the count

parameter, such as **vmstat 2 10**; then the first line of numbers is an average since system reboot.
As a CPU monitor, the **vmstat** command is superior to the **iostat** command in that its one-line-per-report output is easier to scan as it scrolls and there is less overhead involved if there are a lot of disks attached to the system. The following example can help you identify situations in which a program has run away or is too CPU-intensive to run in a multi-user environment.

vmstat 2

```
kthr     memory             page              faults       cpu
----- ----------- ------------------------ ------------ -----------
 r  b   avm   fre  re  pi  po  fr   sr  cy  in   sy  cs us sy id wa
 1  0 22478  1677   0   0   0   0    0   0 188 1380 157 57 32  0 10
 1  0 22506  1609   0   0   0   0    0   0 214 1476 186 48 37  0 16
 0  0 22498  1582   0   0   0   0    0   0 248 1470 226 55 36  0  9

 2  0 22534  1465   0   0   0   0    0   0 238  903 239 77 23  0  0
 2  0 22534  1445   0   0   0   0    0   0 209 1142 205 72 28  0  0
 2  0 22534  1426   0   0   0   0    0   0 189 1220 212 74 26  0  0
 3  0 22534  1410   0   0   0   0    0   0 255 1704 268 70 30  0  0
 2  1 22557  1365   0   0   0   0    0   0 383  977 216 72 28  0  0

 2  0 22541  1356   0   0   0   0    0   0 237 1418 209 63 33  0  4
 1  0 22524  1350   0   0   0   0    0   0 241 1348 179 52 32  0 16
 1  0 22546  1293   0   0   0   0    0   0 217 1473 180 51 35  0 14
```

This output shows the effect of introducing a program in a tight loop to a busy multi-user system. The first three reports (the summary has been removed) show the system balanced at 50-55 percent user, 30-35 percent system, and 10-15 percent I/O wait. When the looping program begins, all available CPU cycles are consumed. Because the looping program does no I/O, it can absorb all of the cycles previously unused because of I/O wait. Worse, it represents a process that is always ready to take over the CPU when a useful process relinquishes it. Because the looping program has a priority equal to that of all other foreground processes, it will not necessarily have to give up the CPU when another process becomes dispatchable. The program runs for about 10 seconds (five reports), and then the activity reported by the **vmstat** command returns to a more normal pattern.
The CPU statistics can be somewhat distorted on systems with very high device-interrupt load. This situation is due to the fact that the tool samples on timer interrupts. The timer is the lowest priority device and therefore it can easily be preempted by other interrupts. To eliminate this distortion, operating system versions later than 4.3.3 uses a different method to sample the timer.

> **Note** For SMP systems the us, sy, id and wa columns are only averages over the processors (the **sar** command can report per-processor statistics). But keep in mind that the I/O wait statistic per processor is not really a processor-specific statistic; it is a global statistic. An I/O wait is distinguished from *idle time* only by the state of a pending I/O. If there is any pending disk I/O, and the processor is not busy, then it is an I/O wait time. Operating system version 4.3.3 and later contains an enhancement to the method used to compute the percentage of CPU time spent waiting on disk I/O (wio time).

Optimum use would have the CPU working 100 percent of the time. This holds true in the case of a single-user system with no need to share the CPU. Generally, if us + sy time is below 90 percent, a single-user system is not considered CPU constrained. However, if us + sy time on a multi-user system exceeds 80 percent, the processes may spend time waiting in the run queue. Response time and throughput might suffer.
To check if the CPU is the bottleneck, consider the four cpu columns and the two kthr (kernel threads) columns in the **vmstat** report. It may also be worthwhile looking at the faults column

- **cpu**

  Percentage breakdown of CPU time usage during the interval. The cpu columns are as follows

  - **us**

    The us column shows the percent of CPU time spent in user mode. A UNIX process can execute in either user mode or system (kernel) mode. When in user mode, a process executes within its application code and does not require kernel resources to perform computations, manage memory, or set variables.

- **sy**

  The sy column details the percentage of time the CPU was executing a process in system mode. This includes CPU resource consumed by kernel processes (**kprocs**) and others that need access to kernel resources. If a process needs kernel resources, it must execute a system call and is thereby switched to system mode to make that resource available. For example, reading or writing of a file requires kernel resources to open the file, seek a specific location, and read or write data, unless memory mapped files are used.

- **id**

  The id column shows the percentage of time, which the CPU is idle, or waiting, without pending local disk I/O. If there are no processes available for execution (the run queue is empty), the system dispatches a process called **wait**. On an SMP system, one **wait** process per processor can be dispatched. The report generated by the **ps** command (with the **-k** or **-g 0** option) identifies this as kproc or wait. On a uniprocessor system, the process ID (PID) usually is 516. SMP systems will have an idle kproc for each processor. If the **ps** report shows a high aggregate time for this process, it means there were significant periods of time when no other process was ready to run or waiting to be executed on the CPU. The system was therefore mostly *idle* and *waiting* for new tasks.
  If there are no I/Os pending to a local disk, all time charged to **wait** is classified as *idle time*. In operating system version 4.3.2 and earlier, an access to remote disks (NFS-mounted disks) is treated as *idle time* (with a small amount of sy time to execute the NFS requests) because there is no pending I/O request to a local disk. With operating system version 4.3.3 and later NFS goes through the buffer cache, and waits in those routines are accounted for in the wa statistics.

- **wa**

  The wa column details the percentage of time the CPU was *idle* with pending local disk I/O (in operating system version 4.3.3 and later this is also true for NFS-mounted disks). If there is at least one outstanding I/O to a disk when **wait** is running, the time is classified as waiting for I/O. Unless the process is using asynchronous I/O, an I/O request to disk causes the calling process to block (or sleep) until the request has been completed. Once an I/O request for a process completes, it is placed on the run queue. If the I/Os were completing faster, more CPU time could be used.
  A wa value over 25 percent could indicate that the disk subsystem might not be balanced properly, or it might be the result of a disk-intensive workload.

- **kthr**

  Kernel threads placed on various queues per second over the sampling interval (state changes). The kthr columns are as follows

  - **r**

    Average number of kernel threads waiting on the run queue per second; this means the average number of kernel threads that are in the run queue per second. This field indicates the number of threads that can be run. This value should be less than five for non-SMP systems. For SMP systems, this value should be less than
    $5 \times (N_{total} - N_{bind})$
    Where N_{total} stands for total number of processors and N_{bind} for the number of processors, which have been bound to, processes, for example, with the

bindprocessor command.
If this number increases rapidly, examine the applications. But systems may be also running fine with 10 to 15 threads on their run queue, depending on the thread tasks and the amount of time they run.

- **b**

  Average number of kernel threads in the wait queue per second. These threads are waiting for resources or I/O. Threads are also located in the wait queue when waiting for one of their thread pages to be paged in. This value is usually near zero. But, if the run-queue value increases, the wait-queue normally also increases.
  If processes are suspended due to memory load control, the blocked column (b) in the **vmstat** report indicates the increase in the number of threads rather than the run queue.

- **faults**

  Information about process control, such as trap and interrupt rate. The faults columns are as follows

  - **in**

    Number of device interrupts per second observed in the interval.

  - **sy**

    The number of system calls per second observed in the interval. Resources are available to user processes through well-defined system calls. These calls instruct the kernel to perform operations for the calling process and exchange data between the kernel and the process. Because workloads and applications vary widely, and different calls perform different functions, it is impossible to define how many system calls per-second are too many. But typically, when the sy column raises over 10000 calls per second on a uniprocessor, further investigations is called for (on an SMP system the number is 10000 calls per second per processor). One reason could be "polling" subroutines like the **select()** subroutine. For this column, it is advisable to have a baseline measurement that gives a count for a normal sy value.

  - **cs**

    Number of context switches per second observed in the interval. The physical CPU resource is subdivided into logical time slices of 10 milliseconds each. Assuming a thread is scheduled for execution, it will run until its time slice expires, until it is preempted, or until it voluntarily gives up control of the CPU. When another thread is given control of the CPU, the context or working environment of the previous thread must be saved and the context of the current thread must be loaded. The operating system has a very efficient context switching procedure, so each switch is inexpensive in terms of resources. Any significant increase in context switches, such as when cs is a lot higher than the disk I/O and network packet rate, should be cause for further investigation.

12. Appendix B – Understanding disk issues

12.1 Description of Logical Volume Management (LVM)

What is?

1. **LVM (logical volume manager)**
2. **PVID (Physical Volume Identifier)**
3. **ODM (Objekt Data Manager)**
4. **VGDA (Volume Group Descriptor Area)**
5. **LVCB (Logical Volume Control Block)**

LVM data
The logical volume manager (LVM) data structures that are required for the LVM to operate are stored in a number of structures. The logical layout of them are described in the following sections.

Physical volumes
Each disk is assigned a Physical Volume Identifier (PVID) when it is first assigned to a volume group. The PVID is a combination of the serial number
of the machine creating the volume group and the time and date of the operation. The PVID is stored on the physical disk itself and is also stored in
the Object Data Manager (ODM) of a machine when a volume group is created or imported.
You should not use the dd command to copy the contents of one physical volume to another, since the PVID will also be copied; this will result in two disks having the same PVID which can confuse the system.

12.2 Volume groups

Each volume group has a Volume Group Descriptor Area (VGDA). There are (commonly) multiple copies of the VGDA in a volume group. A copy of the VGDA is stored on each disk in the volume group. The VGDA stores information about the volume group, such as the logical volumes and the disks in the volume group.
The VGDA is parsed by the importvg command when importing a volume group into a system. It is also used by the varyonvg command in the quorum voting process to decide if a volume group should be varied on.
For a single disk volume group, there are two VGDAs on the disk. When a second disk is added to make a two disk volume group, the original disk retains two VGDAs and the new disk gets one VGDA.
Adding a third disk results in the extra VGDA from the first disk moving to the third disk for a quorum of three with each disk having one vote. Adding this additional disk adds a new VGDA per disk.
A volume group with quorum checking enabled (the default) must have at least 51 percent of the VGDAs in the volume group available before it can be varied on. Once varied on, if the number of VGDAs falls below 51 percent, the volume group will automatically be varied off.
In contrast, a volume group with quorum checking disabled must have 100 percent of the VGDAs available before it can be varied on. Once varied on, only one VGDA needs to remain available to keep the volume group online.
A volume group also has a Volume Group Identifier (VGID), a soft serial number for the volume group similar to the PVID for disks.
Each disk in a volume group also has a Volume Group Status Area (VGSA), a 127 byte structure used to track mirroring information for up to the maximum 1016 physical partitions on the disk.

12.3 Logical volumes

Each logical volume has a Logical Volume Control Block (LVCB) that is stored in the first 512 bytes of the logical volume. The LVCB holds important details about the logical volume, including its creation time, mirroring information, and mount point (if it contains a Journaled File System [JFS]).
Each logical volume has a Logical Volume Identifier (LVID) that is used to represent the logical volume to the LVM libraries and low-level commands. The LVID is made up of VGID.<num>,where<num> is the order that it was created in the volume group.

12.4 Object Data Manager (ODM)

The Object Data Manger (ODM) is used by the LVM to store information about the volume groups, physical volumes, and logical volumes on the system. The information held in the ODM is placed there when the volume group is imported or when each object in the volume group is created.
There exists an ODM object known as the vg-lock. Whenever an LVM modification command is started, the LVM command will lock the vg-lock for the volume group being modified. If for some reason the lock is inadvertently left behind, the volume group can be unlocked by running the varyonvg -b
command, which can be run on a volume group that is already varied on.

12.5 LVM problem determination

The most common LVM problems are related to disk failures. Depending on the extent of the failure, you may be able to recover the situation with little or no data loss. However, a failed recovery attempt may leave the system in a worse condition. This leaves restoring from backup as the only way to
recover. Therefore, always take frequent backups of your system.

12.6 Data relocation

When a problem occurs with a disk drive, data relocation may take place.
There are three types of data relocation, namely:
• Internal to the disk
• Hardware relocate ordered by LVM
• Software relocation
Relocation typically occurs when the system fails to perform a read or write due to physical problems with the disk platter. In some cases, the data I/O request completes but with warnings. Depending on the type of recovered error, the LVM may be wary of the success of the next request to that physical
location, and it orders a relocation to be on the safe side.
The lowest logical layer of relocation is the one that is internal to the disk.
These types of relocations are typically private to the disk and there is no notification to the user that a relocation occurred.
The next level up in terms of relocation complexity is a hardware relocation called for by the LVM device driver. This type of relocation will instruct the disk to relocate the data on one physical partition to another portion (reserved) of the disk. The disk takes the data in physical location A and copies it to a reserved portion of the disk (location B). However, after this is complete, the LVM device driver will continue to reference physical location A, with the understanding that the disk itself will handle the true I/O to the real location B.
The top layer of data relocation is the soft relocation handled by the LVM device driver. In this case, the LVM device driver maintains a bad block directory, and whenever it receives a request to access logical location A, the LVM device driver will look up the bad block table and translate it to actually send the request to the disk drive at physical location B.

12.7 ODM re-synchronization

Problems with the LVM tend to occur when a physical disk problem causes the ODM data to become out of sync with the VGDA, VGSA, and LVCB information stored on disk.
ODM corruption can also occur if an LVM operation terminates abnormally and leaves the ODM in an inconsistent state. This may happen, for example, if the file system on which the ODM resides (normally root, /) becomes full during the process of importing a volume group.
If you suspect the ODM entries for a particular volume group have been corrupted, a simple way to re-synchronize the entries is to vary off and export the volume group from the system, then import and vary on to refresh the
ODM. This process can only be performed for non-rootvg volume groups.
For the rootvg volume group, you can use the redefinevg command that examines every disk in the system to determine which volume group it belongs to, and then updates the ODM. For example:
redefinevg rootvg
If you suspect the LVM information stored on disk has become corrupted, use the synclvodm command to synchronize and rebuild the LVCB, the device configuration database, and the VGDAs on the physical volumes. For example:
synclvodm -v myvg
If you have a volume group where one or more logical volumes is mirrored,
use the syncvg command if you suspect that one or more mirror copies has become stale. The command can be used to re-synchronize an individual logical volume, a physical disk, or an entire volume group. For example:
syncvg -l lv02
Synchronizes the mirror copies of the logical volume lv02.

syncvg -v myvg
Synchronizes all of the logical volumes in the volume group myvg.

12.8 Understanding importvg problems

If importing a volume group into a system is not possible using the importvg command, the following areas are the typical problem areas:
•AIXversionlevel
• Invalid PVID
• Disk change while volume group was exported
• Shared disk environment
In general, if the importvg command is unsuccessful, check the error log for information that can point to the problem.

AIX version level
Verify that the volume group you are importing is supported by the level of AIX running on the system. Various new features have been added to the LVM system at different levels of AIX, such as support for large volume groups. A number of these features require a change to the format of the VGDA stored on the disk, and thus will not be understood by previous levelsof AIX.

12.8.1 Invalid PVID

Check that all of the disks in the volume group you are trying to import are marked as available to AIX and have valid PVIDs stored in the ODM. This can be checked using the lspv command. If any disks do not have a PVID displayed, use the chdev command to resolve the problem. For example:

lspv
```
hdisk0 000bc6fdc3dc07a7 rootvg
hdisk1 000bc6fdbff75ee2 testvg
hdisk2 000bc6fdbff92812 testvg
hdisk3 000bc6fdbff972f4 None
hdisk4 None None

# chdev -l hdisk4 -a pv=yes
hdisk4 changed
```

lspv
```
hdisk0 000bc6fdc3dc07a7 rootvg
hdisk1 000bc6fdbff75ee2 testvg
hdisk2 000bc6fdbff92812 testvg
hdisk3 000bc6fdbff972f4 None
hdisk4 000bc6fd672864b9 None
```

In this example, the PVID for hdisk4 Is not shown by the lspv command. This is resolved by running the chdev command. The PVID is read from the disk and placed in the ODM, if the disk is accessible. It will only write a new PVID if there truly is no PVID on the disk. Alternately, the disk can be removed
using the rmdev command and, by running the configuration manager cfgmgr command, the device is re-created with the correct PVID. After this, an import of the volume group with the importvg command should be possible.

12.8.2 Disk change while volume group was exported

If the importvg command fails with an error message similar the following message, the physical volume is marked missing and it is possible that some disk change to the disks defined in the volume group was done while the volume group was exported:

```
0516-056 varyon testvg: The volume group is not varied on because a
physical volume is marked missing. Run diagnostics.
```
Check the error log with the errpt command in order to see what happened to the respective disk.
In order to force the volume group to be varied online, use the -f flag of the importvg command. This makes it possible to operate on the volume group and, depending on the situation, reconfigure the volume group by excluding the disk that is marked missing with the reducevg command.

12.9 Extending number of max physical partitions

When adding a new disk to a volume group, you may encounter an error due to there being too few PP descriptors for the required number of PVs. This may occur when the new disk has a much higher capacity than existing disks in the volume group.

This situation is typical on older installations, due to the rapid growth of storage technology. To overcome this, a change of the volume group LVM meta-data is required.
The chvg command is used for this operation using the -t flag and applying a factor value, as shown in the following example:

lsvg testvg
VOLUME GROUP: testvg VG IDENTIFIER: 000bc6fd5a177ed0
VG STATE: active PP SIZE: 16 megabyte(s)
VG PERMISSION: read/write TOTAL PPs: 542 (8672 megabytes)
MAX LVs: 256 FREE PPs: 42 (672 megabytes)
LVs: 1 USED PPs: 500 (8000 megabytes)
OPEN LVs: 0 QUORUM: 2
TOTAL PVs: 1 VG DESCRIPTORS: 2
STALE PVs: 0 STALE PPs: 0
ACTIVE PVs: 1 AUTO ON: yes
MAX PPs per PV: 1016 MAX PVs: 32
chvg -t 2 testvg
0516-1193 chvg: WARNING, once this operation is completed, volume group testvg
cannot be imported into AIX 430 or lower versions. Continue (y/n) ?
y
0516-1164 chvg: Volume group testvg changed. With given characteristics testvg can include up to 16 physical volumes with 2032 physical partitions each.

This example shows that the volume group testvg with a current 9.1 GB disk has a maximum number of 1016 PPs per physical volume. Adding a larger 18.2 GB disk would not be possible; the maximum size of the disk is limited to 17 GB unless the maximum number of PPs is increased. Using the chvg command to increase the maximum number of PPs by a factor of 2 to 2032 PPs allows the volume group to be extended with physical volumes of up to approximately 34 GB.

12.10 Disk replacement
AIX, like all operating systems, can be problematic when you have to change a disk. AIX provides the ability to prepare the system for the change using the LVM. You can then perform the disk replacement and then use the LVM to restore the system back to how it was before the disk was changed. This process manipulates not only the data on the disk itself, but is also a way of keeping the Object Data Manager (ODM) intact.
The ODM within AIX is a database that holds device configuration details and AIX configuration details. The function of the ODM is to store the information between reboots, and also provide rapid access to system data, eliminating the need for AIX commands to interrogate components for configuration information. Since this database holds so much vital information regarding the configuration of a machine, any changes made to the machine, such as the changing of a defective disk, need to be done in such a way as to preserve the integrity of the database.

12.10.1 Replacing a disk
The following scenario shows a system, which has a hardware error on a physical volume. However, since the system uses a mirrored environment, which has multiple copies of the logical volume, it is possible to replace the disk while the system is active. The disk hardware in this scenario are hot-swappable SCSI disks, which permit the replacement of a disk in a running environment.
One important factor is detecting the disk error. Normally, mail is sent to the system administrator (root account) from the Automatic Error Log Analysis (diagela). Figure 19 shows the information of such a diagnostics mail.

Automatic Error Log Analysis (diagela) provides the capability to do error log analysis whenever a permanent hardware error is logged. Whenever a permanent hardware resource error is logged, the diagela program is invoked. Automatic Error Log Analysis is enabled by default on all platforms.
The diagela message shows that the hdisk4 has a problem. Another way of locating a problem is to check the state of the logical volume using the lsvg command, as in the following example:

lsvg -l mirrorvg
mirrorvg:
LV NAME TYPE LPs PPs PVs LV STATE MOUNT POINT
lvdb01 jfs 500 1000 2 open/syncd /u/db01
lvdb02 jfs 500 1000 2 open/**stale** /u/db02
loglv00 jfslog 1 1 1open/syncd N/A
The logical volume lvdb02 in the volume group mirrorvg is marked with a status stale, indicating the copies in this

LV are not synchronized. Look at the error log using the error reporting errpt command, as in the following example:

errpt
EAA3D429 0713121400 U S LVDD **PHYSICAL PARTITION MARKED STALE**
F7DDA124 0713121400 U H LVDD PHYSICAL VOLUME DECLARED MISSING
41BF2110 0713121400 U H LVDD MIRROR WRITE CACHE WRITE FAILED
35BFC499 0713121400 P H **hdisk4 DISK OPERATION ERROR**
This error information displays the reason why the LV lvdb02 is marked stale.
The hdisk4 had an DISK OPERATION ERROR and the LVDD could not write the mirror cache.
From the information in the example, hdisk4 needs to be replaced. Before doing any action on the physical disk of the mirrored LV, it is recommended to do a file system backup in case anything should go wrong. Since the other
disk of the mirrored LV is still functional, all the data should be present. If the LV contains a database, then the respective database tools for backup of the data should be used.

12.10.2 Removing a bad disk
If the system is a high availability (24x7) system, you might decide to keep the system running while performing the disk replacement, provided that the hardware supports an online disk exchange with hot-swappable disks. However, the system administrator or customer should agree upon the procedure before continuing. Using the following steps to remove a disk:
1. To remove the physical partition copy of the mirrored logical volume from the erroneous disk, use the rmlvcopy command as follows:
 # rmlvcopy lvdb02 1 hdisk4
The logical volume lvdb02 is now left with only one copy, as shown in the following:
 # lslv -l lvdb02
lvdb02:/u/db02
PV COPIES IN BAND DISTRIBUTION
hdisk3 500:000:000 21% 109:108:108:108:067

2. Reduce the volume group by removing the disk you want to replace from its volume group:
 # reducevg -f mirrorvg hdisk4
 # lsvg -l mirrorvg
mirrorvg:
LV NAME TYPE LPs PPs PVs LV STATE MOUNT
POINT
lvdb01 jfs 500 1000 2 open/syncd /u/db01
lvdb02 jfs 500 500 1 open/syncd /u/db02
loglv00 jfslog 1 1 1open/syncd N/A
3. Remove the disk as a device from the system and from the ODM database with the rmdev command:
 # rmdev -d -l hdisk4
hdisk4 deleted
This command is valid for any SCSI disk. If your system is using SSA, then an additional step is required. Since SSA disks also define the device pdisk, the corresponding pdisk device must be deleted as well. Use the SSA menus in SMIT to display the mapping between hdisk and pdisk. These menus can also be used to delete the pdisk device.
4. The disk can now be safely removed from your system.

12.10.3 Adding a new disk
Continuing the scenario from the previous section, this section describes how to add a new disk into a running environment. After hdisk4 has been removed, the system is now left with the following disks:
 # lsdev -Cc disk
hdisk0 Available 30-58-00-8,0 16 Bit SCSI Disk Drive
hdisk1 Available 30-58-00-9,0 16 Bit SCSI Disk Drive
hdisk2 Available 10-60-00-8,0 16 Bit SCSI Disk Drive
hdisk3 Available 10-60-00-9,0 16 Bit SCSI Disk Drive
Use the following steps to add a new disk:
1. Plug in the new disk and run the configuration manager cfgmgr command.
The cfgmgr command configures devices controlled by the Configuration Rules object class, which is part of the Device Configuration database.
The cfgmgr command will see the newly inserted SCSI disk and create the corresponding device. The command requires no options, as shown in the following:
 # cfgmgr
The result is a new hdisk4 added to the system:

lsdev -Cc disk
hdisk0 Available 30-58-00-8,0 16 Bit SCSI Disk Drive
hdisk1 Available 30-58-00-9,0 16 Bit SCSI Disk Drive
hdisk2 Available 10-60-00-8,0 16 Bit SCSI Disk Drive
hdisk3 Available 10-60-00-9,0 16 Bit SCSI Disk Drive
hdisk4 Available 10-60-00-12,0 16 Bit SCSI Disk Drive

2. The new hdisk must now be assigned to the volume group mirrorvg by using the LVM extendvg command:

extendvg mirrorvg hdisk4

3. To re-establish the mirror copy of the LV, use the mklvcopy command.

 # mklvcopy lvdb02 2 hdisk4

The number of copies of LV is now two, but the LV stat is still marked as stale, because the LV copies are not synchronized with each other:

 # lsvg -l mirrorvg
mirrorvg:
LV NAME TYPE LPs PPs PVs LV STATE MOUNT POINT
lvdb01 jfs 500 1000 2 open/syncd /u/db01
lvdb02 jfs 500 1000 2 open/**stale** /u/db02
loglv00 jfslog 1 1 1open/syncd N/A

4. To get a fully synchronized set of copies of the LV lvdb02, use the syncvg command:

 # syncvg -p hdisk4

The syncvg command can be used with logical volumes, physical volumes, or volume groups. The synchronization process can be quite time consuming, depending on the hardware characteristics and the amount of data.

After the synchronization is finished, verify the logical volume state using either the lsvg or lslv command:

 # lsvg -l mirrorvg
mirrorvg:
LV NAME TYPE LPs PPs PVs LV STATE MOUNT POINT
lvdb01 jfs 500 1000 2 open/syncd /u/db01
lvdb02 jfs 500 1000 2 open/**syncd** /u/db02
loglv00 jfslog 1 1 1open/syncd N/A

The system is now back to a normal.

12.10.4 Recovering an incorrectly removed disk

If a disk was incorrectly removed from the system, and the system has been rebooted, the synclvodm command will need to be run to rebuild the logical volume control block, as shown in the following examples.

In the examples, a disk has been incorrectly removed from the system and the logical volume control block needs to be rebuilt.

The disks in the system before the physical volume was removed is shown in the following command output:

 # lsdev -Cc disk
hdisk0 Available 30-58-00-8,0 16 Bit SCSI Disk Drive
hdisk1 Available 30-58-00-9,0 16 Bit SCSI Disk Drive
hdisk2 Available 10-60-00-8,0 16 Bit SCSI Disk Drive
hdisk3 Available 10-60-00-9,0 16 Bit SCSI Disk Drive

The allocation of the physical volumes before the disk was removed is shown as follows:

 # lspv
hdisk0 000bc6fdc3dc07a7 rootvg
hdisk1 000bc6fdbff75ee2 volg01
hdisk2 000bc6fdbff92812 volg01
hdisk3 000bc6fdbff972f4 volg01

The logical volumes on the volume group:

 # lsvg -l volg01
volg01:
LV NAME TYPE LPs PPs PVs LV STATE MOUNT POINT
logvol01 jfs 1000 1000 2 open/syncd /userfs01
loglv00 jfslog 1 1 1open/syncd N/A

The logical volume distribution on the physical volumes is shown using the lslv command:

 # lslv -l logvol01
logvol01:/userfs01
PV COPIES IN BAND DISTRIBUTION
hdisk1 542:000:000 19% 109:108:108:108:109
hdisk3 458:000:000 23% 109:108:108:108:025

The system after a reboot has the following physical volumes:

 # lspv
hdisk0 000bc6fdc3dc07a7 rootvg

hdisk1 000bc6fdbff75ee2 volg01
hdisk3 000bc6fdbff972f4 volg01
When trying to mount the file system on the logical volume, the error may look similar to the following example:
mount /userfs01
mount: 0506-324 Cannot mount /dev/logvol01 on /userfs01: There is an input or output error.
To synchronize the logical volume, the following command should be run:
synclvodm -v volg01
synclvodm: Physical volume data updated.
synclvodm: Logical volume logvol01 updated.
synclvodm: Warning, lv control block of loglv00 has been over written.
0516-622 synclvodm: Warning, cannot write lv control block data.
synclvodm: Logical volume loglv00 updated.
The system can now be repaired; if the file system data was spread across all the disks, including the failed disk, it may need to be restored from the last backup.

12.11 Filesystem unmount problems

A file system can not be unmounted if any references are still active within that file system. The following error message will be displayed:
Device busy
or
A device is already mounted or cannot be unmounted The following situations can leave open references to a mounted file system.
• Files are open within a file system. These files must be closed before the file system can be unmounted. The fuser command is often the best way to determine what is still active in the file system. The fuser command will return the process IDs for all processes that have open references within a specified file system, as shown in the following example:
umount /home
umount: 0506-349 Cannot unmount /dev/hd1: The requested resource is busy.
fuser -x -c /home
/home: 11630
ps -fp 11630
UID PID PPID C STIME TTY TIME CMD
guest 11630 14992 0 16:44:51 pts/1 0:00 -sh
kill -1 11630
umount /home
The process having an open reference can be killed by using the kill command (sending a SIGHUP), and the unmount can be accomplished. A stronger signal may be required, such as SIGKILL.
• If the file system is still busy and still cannot be unmounted, this could be due to a kernel extension that is loaded but exists within the source file system. The fuser command will not show these kinds of references, since a user process is not involved. However, the genkex command will report
on all loaded kernel extensions.
• File systems are still mounted within the file system. Unmount these file systems before the file system can be unmounted. If any file system is mounted within a file system, this leaves open references in the source file system at the mount point of the other file system. Use the mount command to get a list of mounted file systems. Unmount all the file systems that are mounted within the file system to be unmounted.

12.12 Removing file systems

When removing a JFS, the file system must be unmounted before it can be removed. The command for removing file systems is rmfs.
In the case of a JFS, the rmfs command removes both the logical volume on which the file system resides and the associated stanza in the /etc/filesystems file. If the file system is not a JFS, the command removes only the associated stanza in the /etc/filesystems file, as shown in the following example:
lsvg -l testvg
testvg:
LV NAME TYPE LPs PPs PVs LV STATE MOUNT POINT
loglv00 jfslog 1 1 1open/syncd N/A
lv02 jfs 2 2 1 open/syncd /u/testfs
rmfs /u/testfs
rmfs: 0506-921 /u/testfs is currently mounted.
umount /u/testfs
rmfs /u/testfs
rmlv: Logical volume lv02 is removed.
lsvg -l testvg
testvg:

LV NAME TYPE LPs PPs PVs LV STATE MOUNT POINT
loglv00 jfslog 1 1 1closed/syncd N/A
This example shows how the file system testfs is removed. The first attempt fails because the file system is still mounted. The associated logical volume lv02 is also removed. The jfslog remains defined on the volume group.

12.13 Paging space

On AIX systems, the following list indicates possible problems associated with paging space:
• All paging spaces defined on one physical volume
• Page space nearly full
• Imbalance in allocation of paging space on physical volumes
• Fragmentation of a paging space in a volume group

12.13.1 Recommendations for creating or enlarging paging space

Do not put more than one paging space logical volume on a physical volume.
All processes started during the boot process are allocated paging space on the default paging space logical volume (hd6). After the additional paging space logical volumes are activated, paging space is allocated in a round robin manner in 4 KB units. If you have paging space on multiple physical volumes and put more than one paging space on one physical volume, you are no longer spreading paging activity over multiple physical volumes.
Avoid putting a paging space logical volume on the same physical volume as a heavily active logical volume, such as that used by a database.
It is not necessary to put a paging space logical volume on each physical volume.
Make each paging space logical volume roughly equal in size. If you have paging spaces of different sizes and the smaller ones become full, you will nolonger be spreading your paging activity across all of the physical volumes.
Do not extend a paging space logical volume onto multiple physical volumes.
If a paging space logical volume is spread over multiple physical volumes, you will not be spreading paging activity across all the physical volumes. If you want to allocate space for paging on a physical volume that does not already have a paging space logical volume, create a new paging space logical volume on that physical volume.
For best system performance, put paging space logical volumes on physical volumes that are each attached to a different disk controller.

12.13.2 Determining if more paging space is needed

Allocating more paging space than necessary results in unused paging space that is simply wasted disk space. If you allocate too little paging space, a variety of negative symptoms may occur on your system. To determine how much paging space is needed, use the following guidelines:
• Enlarge paging space if any of the following messages appear on the console or in response to a command on any terminal:
INIT: Paging space is low
ksh: cannot fork any swap space
Not enough memory
Fork function failed
fork () system call failed
Unable to fork, too many processes
Fork failure - not enough memory available
Fork function not allowed. Not enough memory available.
Cannot fork: Not enough space
• Enlarge paging space if the %Used column of the lsps -s output is greater than 80.
Use the following commands to determine if you need to make changes regarding paging space logical volumes:
iostat
vmstat
lsps
If you wish to remove a paging space from the system, or reduce the size of a paging space, this should be performed in two steps. The first step in either case is to change the paging space so that it is no longer automatically used when the system starts. This is done with the chps command. For example:
chps -a n paging00
To remove a paging space, you need to reboot the system, since there is no way to dynamically bring a paging space offline (at the time of writing). Once the system reboots, the paging space will not be active. At this point, you can remove the paging space logical volume.
To reduce the size of the paging space, you should remove the logical volume, and then create the new paging space with the desired size. The new paging space can be activated without having to reboot the machine using the mkps.

13. Appendix C - jfs = Journaled file system

Abstract This part describes the logging done by the Journaled File System (JFS). By logging, JFS can restore the file system to a consistent state in a matter of seconds, versus minutes or hours with non-Journaled file systems. This white paper gives an overview of the changes to meta-data structures that JFS logs.

13.1 Introduction

The Journaled File System (JFS) provides a log-based, byte-level file system that was developed for transaction-oriented, high performance systems. Scaleable and robust, one of the key features of the file system is logging. JFS, a recoverable file system, ensures that if the system fails during power outage, or system crash, no file system transactions will be left in an inconsistent state. The on-disk layout of JFS will remain consistent without the need to run fsck. JFS provides the extra level of stability with a small decrease in performance when meta-data changes need to be logged.
JFS uses a transaction-based logging technique to implement recoverability. This design ensures a full partition recovery within seconds for even large partition sizes. JFS limits its recovery process to the file system structures to ensure that at the very least the user will never lose a partition because of a corrupted file system. Note, that user data is not guaranteed to be fully updated if a system crash has occurred. JFS is not designed to log user data and therefore is able to keep all file operations to an optimal level of performance.
A general architecture and design overview of JFS is presented in [JFSOverview].
The development of a recoverable file system can be viewed as the next step in file system technology.

13.2 Recoverable file system

A recoverable file system, such as IBM's Journaled File System-(JFS), ensures partition consistency by using database-logging techniques originally developed for transaction processing. If the operating system crashes, JFS restores consistency by executing the logredo procedure that accesses information that has been stored in the JFS log file.
JFS incurs some performance costs for the reliability it provides. Every transaction that alters the on-disk layout structures requires that one record be written to the log file for each transaction's sub-operations. For each file operation that requires meta-data changes, JFS starts the logging transaction by calling the TxBegin routine. JFS ends the transaction's sub-operation by calling the TxEnd routine. Both TxBegin and TxEnd will be discussed in more detail in a later section.

13.3 Logging

JFS provides file system recoverability by the method of transaction processing technique called logging. The sub-operations of any transactions that change meta-data are recorded in a log file before they are committed to the disk. By using this technique, if the system crashes, partially completed transactions can be undone when the system is rebooted. A transaction is defined as an I/O operation that alters the on-disk layout structures of JFS. A completed list of operations that are logged by JFS will be discussed later. One example of an operation that JFS logs is the unlink of a file.
There are two main components of the JFS logging system the log file itself and the transaction manager. The log file is a system file created by the mkfs.jfs format utility.
There are several JFS data structures that the transaction manager uses during logging and they will be defined next.

13.4 Extents, inodes, block map

A "file" is allocated in sequences of extents. An Extent is a sequence of contiguous aggregate blocks allocated to a JFS object as a unit. An extent is wholly contained within a single aggregate (and therefore a single partition); however, large extents may span multiple allocation groups. An extent can range in size from 1 to 2(24) -1 aggregate blocks.
Every JFS object is represented by an inode. Inodes contain the expected object-specific information such as time stamps and file type(regular vs. directory, etc.).
The Block Allocation Map is used to track the allocated or freed disk blocks for an entire aggregate.
The Inode Allocation Map is a dynamic array of Inode Allocations Groups (IAGS). The IAG is the data for the Inode Allocation Map.
A more complete description of JFS'on-disk layout structures is presented in [JFSLayout].

13.5 Log redo operations

Logredo is the JFS utility that replays the log file upon start-up of the file system. The job of logredo is to replay all of the transactions committed since the most recent synch point.
The log replay is accomplished in one pass over the log, reading backwards from log end to the first synch point record encountered. This means that the log entries are read and processed in Last-In-First-Out (LIFO) order. In other words, the records logged latest in time are the first records processed during log replay.

13.6 Inodes, Index trees ,and directory trees

Inodes, index tree structures, and directory tree structures are handled by processing committed redopage records, which have not been superseded by noredo records. This processing copies data from the log record into the appropriate disk extent page(s).
To ensure that only the last (in time) updates to any given disk page are applied during log replay, logredo maintains a record (union structure summary1/summary2), for each disk page which it has processed, of which portions have been updated by log records encountered.

13.7 logredo

Overall, the following actions are taken at logredo time
Apply log record data to the specified page.
Initialize freelist for directory B+ tree manager page or root.
Rebuild Inode allocation map manager.
Rebuild block allocation map Inode.
In addition, in order to ensure the log record applies only to a certain portion of page one time, logredo will start NoRedoFile.
The three log record types REDOPAGE, NOREDOPAGE, NOREDOINOEXT, and UPDATEMAP, are the main force to initiate these actions.
If the aggregate has state of FM_DIRTY, then fsck.jfs will run after the logredo process since logredo could not get 100% recovery.
The maps are rebuilt in the following way At the init phase, storage is allocated for the whole map file for both Inode allocation map manager and block allocation map Inode and then the map files are read in from the disk. The working allocation map (wmap) is initialized to zero. At the logredo time, the wmap is used to track the bits in persistent allocation map (pmap). In the beginning of the logredo process the allocation status of every block is in doubt. As log records are processed, the allocation state is determined and the bit of pmap is updated. This fact is recorded in the corresponding bits in wmap. So a pmap bit is only updated once at logredo time and only updated by the latest in time log record.
At the end of logredo, the control information, the freelist, etc. are built from the value of pmap; then pmap is copied to wmap and the whole map is written back to disk.
The status field s_state in the superblock of each file-system is set to FM_CLEAN provided the initial status was either FM_CLEAN or FM_MOUNT and logredo processing was successful. If an error is detected in logredo the status is set to FM_LOGREDO. The status is not changed if its initial value was FM_DIRTY. fsck should be run to clean up the probable damage if the status after logredo is either FM_LOGREDO or FM_DIRTY

13.8 More detailed flow of logredo

Below are the major steps that logredo must complete.
Validate that the log is not currently in use.
Recover if the JFS partition has increased in size.
Open the log.
Read the superblock and check the following fields version, magic, state. If state is LOGREDONE, update the superblock and exit.
Find the end of the log and initialize the data structures used by Logredo.
Replay log. This reads the log backwards and processes records as it goes. Reading stops at the place specified by the first SYNCPT that is encountered.
Start processing log records. There are only seven possible log records.
After each loop through the different log records, check to see if the transaction just completed was the last for the current transaction, then flush the buffers.
After processing all of the log records, check to see any 'dtpage extend' records were processed. If so

go back and rebuild their freelists.
Run logform so the following disk pages starting from the beginning of the log are formatted as follows
page 1 - log superblock
page 2 - A SYNC log record is written
page 3 - N - set to empty log pages.
Flush data page buffer cache.
Finalize the file system by updating the allocation map and superblock.
Finalize the log by updating the following fields end, state, and magic.
When recovering after a system failure, JFS reads through the log file and if needed redoes each committed transaction. After redoing the committed transactions during a file system recovery, JFS locates all the transactions in the log file that were not committed at failure time and rolls back (undoes) each sub-operation that had been logged.
By logging JFS can restore the file system to a consistent state in a matter of seconds, by replaying the log file.
By logging only meta-data changes JFS is able to keep the performance of this file system high.

14. Appendix D -errpt syntax

Generates a report of logged errors.

14.1 To Process a Report from the Error Log

errpt [**-a**] [**-c**] [**-d** *ErrorClassList*] [**-e** *EndDate*] [**-g**] [**-i** *File*] [**-j** *ErrorID* [**,***ErrorID*]] | [**-k** *ErrorID* [**,***ErrorID*]] [**-J** *ErrorLabel* [**,***ErrorLabel*]] | [**-K** *ErrorLabel* [**,***ErrorLabel*]] [**-l** *SequenceNumber*] [**-m** *Machine*] [**-n** *Node*] [**-s** *StartDate*] [**-F** *FlagList*] [**-N** *ResourceNameList*] [**-R** *ResourceTypeList*] [**-S** *ResourceClassList*] [**-T** *ErrorTypeList*] [**-y** *File*] [**-z** *File*]

14.2 To Process a Report from the Error Record Template Repository

errpt [**-a**] [**-t**] [**-d** *ErrorClassList*] [**-j** *ErrorID* [**,***ErrorID*]] | [**-k** *ErrorID* [**,***ErrorID*]] [**-J** *ErrorLabel* [**,***ErrorLabel*]] | [**-K** *ErrorLabel* [**,***ErrorLabel*]] [**-F** *FlagList*] [**-T** *ErrorTypeList*] [**-y** *File*] [**-z** *File*]

14.3 Description

14.4 Summery

The **errpt** command generates an error report from entries in an error log. It includes flags for selecting errors that match specific criteria. By using the default condition, you can display error log entries in the reverse order they occurred and were recorded. By using the **- c** (concurrent) flag, you can display errors as they occur. If the **-i** flag is not used with the **errpt** command, the error log file processed by **errpt** is the one specified in the error log configuration database. (To view the information in the error log configuration database, use the **errdemon** command.)

The default summary report contains one line of data for each error. You can use flags to generate reports with different formats.

> **Note:** The **errpt** command does not perform error log analysis; for analysis, use the **diag** command.

You can use the Web-based System Manager Devices application (**wsm devices** fast path) to run this command. You could also use the System Management Interface Tool (SMIT) **smit errpt** fast path to run this command.

14.5 Flags

-a	Displays information about errors in the error log file in detailed format. If used in conjunction with the **- t** flag, all the information from the template file is displayed.
-c	Formats and displays each of the rror entries concurrently, that is, at the time they are logged. The existing entries in the log file are displayed in the order in which they were logged.
-d *ErrorClassList*	Limits the error report to certain types of error records specified by the valid *ErrorClassList* variables: **H** (hardware), **S** (software), **0** (**errlogger** command messages), and **U** (undetermined). The *ErrorClassList* variable can be separated by , (commas), or enclosed in "" (double quotation marks) and separated by , (commas) or space characters.
-e *EndDate*	Specifies all records posted prior to and including the *EndDate* variable, where the *EndDate* variable has the form *mmddhhmmyy* (month, day, hour, minute, and year).
-i *File*	Uses the error log file specified by the *File* variable. If this flag is not specified, the value from the error log configuration database is used.

-j *ErrorID*[**,***ErrorID*] Includes only the error-log entries specified by the *ErrorID* (error identifier) variable. The *ErrorID* variables can be separated by , (commas), or enclosed in "" (double quotation marks) and separated by , (commas) or space characters. When combined with the **-t** flag, entries are processed from the error-template repository. (Otherwise entries are processed from the error-log repository.)

-k *ErrorID*[**,***ErrorID*] Excludes the error-log entries specified by the *ErrorID* variable. The *ErrorID* variables can be separated by , (commas), or enclosed in "" (double quotation marks) and separated by , (commas) or space characters. When combined with the **-t** flag, entries are processed from the error-template repository. (Otherwise entries are processed from the error-log repository.)

-l *SequenceNumber* Selects a unique error-log entry specified by the *SequenceNumber* variable. This flag is used by methods in the error-notification object class. The *SequenceNumber* variable can be separated by , (commas), or enclosed in "" (double quotation marks) and separated by , (commas) or space characters.

-m *Machine* Includes error-log entries for the specified *Machine* variable. The **uname -m** command returns the *Machine* variable value.

-n *Node* Includes error-log entries for the specified *Node* variable. The **uname -n** command returns the *Node* variable value.

-s *StartDate* Specifies all records posted on and after the *StartDate* variable, where the *StartDate* variable has the form *mmddhhmmyy* (month, day, hour, minute, and year).

-t Processes the error-record template repository instead of the error log. The **-t** flag can be used to view error-record templates in report form.

-y *File* Uses the error record template file specified by the *File* variable. When combined with the **-t** flag, entries are processed from the specified error template repository. (Otherwise, entries are processed from the error log repository, using the specified error template repository.)

-z *File* Uses the error logging message catalog specified by the *File* variable. When combined with the **-t** flag, entries are processed from the error template repository. (Otherwise, entries are processed from the error log repository.)

-F *FlagList* Selects error-record templates according to the value of the Alert, Log, or Report field of the template. The *FlagList* variable can be separated by , (commas), or enclosed in "" (double quotation marks) and separated by , (commas) or space characters. The **-F** flag is used with the **-t** flag only.

Valid values of the *FlagList* variable include:

alert=0	Selects error-record templates with the Alert field set to False.
alert=1	Selects error-record templates with the Alert field set to True.
log=0	Selects error-record templates with the Log field set to False.
log=1	Selects error-record templates with the Log field set to True.
report=0	Selects error-record templates with the Report field set to False.
report=1	Selects error-record templates with the Report field set to True.

-J *ErrorLabel* Includes the error log entries specified by the *ErrorLabel* variable. The *ErrorLabel* variable values can be separated by commas or enclosed in double-quotation marks and separated by commas or blanks. When combined with the **-t** flag, entries are processed from the error template repository. (Otherwise, entries are processed from the error log repository.)

-K *ErrorLabel* Excludes the error log entries specified by the *ErrorLabel* variable. The *ErrorLabel* variable values can be separated by commas or enclosed in double-quotation marks and separated by commas or blanks. When combined with the **-t** flag, entries are processed from the error template repository. (Otherwise, entries are processed from the error log repository).

-N *ResourceNameList* Generates a report of resource names specified by the *ResourceNameList* variable. The *ResourceNameList* variable is a list of names of resources that have detected errors. For software errors, these are the names of resources that have detected errors. For hardware errors, these are names of devices or system components. It does not indicate that the component is faulty or needs replacement. Instead, it is used to determine the

appropriate diagnostic modules to be used to analyze the error. The *ResourceNameList* variable can be separated by , (commas), or enclosed in "" (double quotation marks) and separated by , (commas) or space characters.

-R *ResourceTypeList* Generates a report of resource types specified by the *ResourceTypeList* variable; for hardware errors the *ResourceTypeList* variable is a device type; for software errors it is the **LPP** value. The *ResourceTypeList* variable can be separated by , (commas), or enclosed in "" (double quotation marks) and separated by , (commas) or space characters.

-S *ResourceClassList* Generates a report of resource classes specified by the *ResourceClassList* variable. For hardware errors, the *ResourceClassList* variable is a device class. The *ResourceClassList* variable can be separated by , (commas), or enclosed in "" (double quotation marks) and separated by , (commas) or space characters.

-T *ErrorTypeList* Limits the error report to error types specified by the valid *ErrorTypeList* variables: **INFO**, **PEND**, **PERF**, **PERM**, **TEMP**, and **UNKN**. The *ErrorTypeList* variable can be separated by , (commas), or enclosed in "" (double quotation marks) and separated by , (commas) or space characters.

14.5.1 Examples

1. To display a complete summary report, enter:

   errpt

2. To display a complete detailed report, enter:

   errpt -a

3. To display a detailed report of all errors logged for the error identifier E19E094F, enter:

   errpt -a -j E19E094F

4. To display a detailed report of all errors logged in the past 24 hours, enter:

   errpt -a -s mmddhhmmyy
   where the mmddhhmmyy string equals the current month, day, hour, minute, and year, minus 24 hours.

5. To list error-record templates for which logging is turned off for any error-log entries, enter:

   errpt -t -F log=0

6. To view all entries from the alternate error-log file /var/adm/ras/errlog.alternate, enter:

   errpt -i /var/adm/ras/errlog.alternate

7. To view all hardware entries from the alternate error-log file /var/adm/ras/errlog.alternate, enter:

   errpt -i /var/adm/ras/errlog.alternate -d H

8. To display a detailed report of all errors logged for the error label ERRLOG_ON, enter:

   errpt -a -J ERRLOG_ON

14.6 AIX5 enhancements

In addition to the two new flags (-D and -P) mentioned in the previous section, **errpt** now supports an intermediate output format using the -A flag, in addition to the summary and the details already provided. Only the values for LABEL,
Date/Time, Type, Resource Name, Description, and Detail Data are displayed.
The following lines show the output of the **errpt** command for one specific error using the summary, intermediate, and detailed options, respectively:

```
# errpt -j 9DBCFDEE
IDENTIFIER TIMESTAMP T C RESOURCE_NAME DESCRIPTION
9DBCFDEE 0919101600 T O errdemon ERROR LOGGING TURNED ON

# errpt -A -j 9DBCFDEE
---------------------------------------------------------------------------
LABEL: ERRLOG_ON
Date/Time: Tue Sep 19 10:16:41 CDT
```

```
Type: TEMP
Resource Name: errdemon
Description
ERROR LOGGING TURNED ON
# errpt -a -j 9DBCFDEE
---------------------------------------------------------------------------
LABEL: ERRLOG_ON
IDENTIFIER: 9DBCFDEE
Date/Time: Tue Sep 19 10:16:41 CDT
Sequence Number: 1
Machine Id: 000BC6FD4C00
Node Id: localhost
Class: O
Type: TEMP
Resource Name: errdemon
Description
ERROR LOGGING TURNED ON
Probable Causes
ERRDEMON STARTED AUTOMATICALLY
User Causes
/USR/LIB/ERRDEMON COMMAND
Recommended Actions
NONE
```

5.1.3 Link between error log and diagnostics

When the diagnostic tool runs, it automatically tries to diagnose hardware errors it finds in the error log. Starting with AIX 5L, the information generated by the **diag** command is put back into the error log entry so that it is easy to make the connection between the error event and, for example, the FRU number required to repair failing hardware.

The following lines show an example of this process; first the header of the error log entry is shown, and then the information added by the diagnostic tool:

```
LABEL: EPOW_SUS_CHRP
IDENTIFIER:BE0A03E5
Date/Time: Wed Sep 20 13:47:27 CDT
Sequence Number: 14
Machine Id: 000BC6DD4C00
Node Id: server3
Class: H
Type: PERM
Resource Name: sysplanar0
Resource Class: planar
Resource Type: sysplanar_rspc
Location: 00-00
...
Diagnostic Analysis
Diagnostic Log sequence number:8
Resource tested:sysplanar0
Resource Description:System Planar
Location:P1
SRN: 651-812
Description:System shutdown due to: 1) Loss of AC power, 2)
Power button was pushed without proper
system shutdown, 3) Power supply failure.
```

15. Appendix E - VI basics

Edits files with a full-screen display.

15.1 vi or vedit Command

15.1.1 ***Purpose***
Edits files with a full-screen display.

15.1.2 ***Syntax***
{ **vi** | **vedit** } [**-l**] [**-R**] [**-t***Tag*] [**-v**] [**-w***Number*] [**-y***Number*] [**-r** [*File*]] [{ **+** | **-c** } { *Subcommand* }] [*File* ...]

15.1.3 ***Description***
The **vi** command starts a full-screen editor based on the underlying ex editor. Therefore, ex subcommands can be used within the vi editor. The **vedit** command starts a version of the vi editor intended for beginners. In the vedit editor, the **report** option is set to 1, the **showmode** option is set, and the **novice** option is set, making it a line editor.
You start the vi editor by specifying the name of the file or files to be edited. If you supply more than one *File* parameter on the command line, the vi editor edits each file in the specified order. The vi editor on an existing file displays the name of the file, the number of lines, and the number of characters at the bottom of the screen. In case of multibyte locales the number of characters need to be interpreted as the number of bytes.
Since the vi editor is a full-screen editor, you can edit text on a screen-by-screen basis. The vi editor makes a copy of the file you are editing in an edit buffer, and the contents of the file are not changed until you save the changes. The position of the cursor on the display screen indicates its position within the file, and the subcommands affect the file at the cursor position.

15.1.3.1 vi Editor Limitations
The following list provides the maximum limits of the vi editor. These counts assume single-byte characters.

- 256 characters per global command list
- 128 characters in the previously inserted and deleted text
- 2048 characters in a shell escape command
- 128 characters in a string-valued option
- 30 characters in a tag name
- 128 map macros with 2048 characters total
- 1,048,560 lines silently enforced
- The macro name and the macro text are limited to 100 characters.

Note:
The vi editor supports a maximum of 2 GB edit buffer.

15.1.3.2 vi Editing Modes

The vi editor operates in the following modes:

command mode

When you start the vi editor, it is in command mode. You can enter any subcommand except those designated for use only in the text input mode. The vi editor returns to command mode when subcommands and other modes end. Press the Esc key to cancel a subcommand.

text-input mode

You use the vi editor in this mode to add text. Enter text input mode with any of the following subcommands: the **a** subcommand, **A** subcommand, **i** subcommand, **I** subcommand, **o** subcommand, **O** subcommand, **c***x* subcommands (where the *x* represents the scope of the subcommand), **C** subcommand, **s** subcommand, **S** subcommand, and **R** subcommand. After entering one of these subcommands, you can enter text into the editing buffer. To return to command mode, press the Esc key for normal exit or press Interrupt (the Ctrl-C key sequence) to end abnormally.

last-line mode

Subcommands with the prefix **:** (colon), **/** (slash), **?** (question mark), **!** (exclamation point), or **!!** (two exclamation points) read input on a line displayed at the bottom of the screen. When you enter the initial character, the vi editor places the cursor at the bottom of the screen, where you enter the remaining characters of the command. Press the Enter key to run the subcommand, or press Interrupt (the Ctrl-C key sequence) to cancel it. When the **!!** prefix is used, the cursor moves only after both exclamation points are entered. When you use the **:** prefix to enter the last-line mode, the vi editor gives special meaning to the following characters when they are used before commands that specify counts:

%

All lines regardless of cursor position

$

Last line

.

Current line

15.1.3.3 Customizing the vi Editor

You can customize the vi editor by:

- Setting vi editor options
- Defining macros
- Mapping keys
- Setting abbreviations

15.1.3.3.1 Setting vi Editor Options

The following list describes the vi editor options you can change with the **set** command. The default setting for these options is **off**. If you turn on one of these toggle options, you can turn it off again by entering the word **no** before the option. If you want to discontinue the **autowrite** vi option, enter **noaw**, where **no** turns off the option and **aw** specifies the **autowrite** option.

Note:

Do not include parentheses when entering vi options.

vi Option (Abbreviation)	Description
autoindent (ai)	Indents automatically in text input mode to the indentation of the previous line by using the spacing between tab stops specified by the **shiftwidth** option. The default is **noai**. To back the cursor up to the previous tab stop, press the Ctrl-D key sequence. This option is not in effect for global commands.
autoprin (ap)	Prints the current line after any command that changes the editing buffer. The default is **ap**. This option applies only to the last command in a sequence of commands on a single line and is not in effect for global commands.
autowrite (aw)	Writes the editing buffer to the file automatically before the **:n** subcommand, the **:ta** subcommand, the Ctrl-A, Ctrl -], and Ctrl -T key sequences, and the **!** subcommand if the editing buffer changed since the last **write** subcommand. The default is **noaw**.
backtags (bt)	Allows the Ctrl-T subcommand to return the file editing position to the location where the previous Ctrl-] subcommand was issued. If **nobacktags** is set, then Ctrl-T is the same as Ctrl-]. The default is **backtags**.
beautifying text (bf)	Prevents the user from entering control characters in the editing buffer during text entry (except for tab, new-line, and form-feed indicators). The default is **nobf**. This option applies to command input.
closepunct (cp=)	Handles a list of closing punctuation, especially when wrapping text (**wraptype** option). Precedes multicharacter punctuation with the number of characters; for example, cp=3.;)}. The **vi** command does not split closing punctuation when wrapping.
directory (dir=)	Displays the directory that contains the editing buffer. The default is **dir = /var/tmp**.
edcompatible (ed)	Retains **g** (global) and **c** (confirm) subcommand suffixes during multiple substitutions and causes the **r** (read) suffix to work like the **r** subcommand. The default is **noed.**
exrc (exrc)	If not set, ignores any **.exrc** file in the current directory during initialization, unless the current directory is that named by the **HOME** environment variable. The default is **noexrc**.
hardtabs (ht=)	Tells the vi editor the distance between the hardware tab stops on your display screen. (This option must match the tab setting of the underlying terminal or terminal emulator.) The default is **ht=8**.
ignorecase (ic)	Ignores distinction between uppercase and lowercase while searching for regular expressions. The default is **noic**.
linelimit (ll=)	Sets the maximum number of lines, as per the **-y** command-line option. This option only is effective if used with the **.exrc** file or the **EXINIT** environment variable.
lisp (lisp)	Removes the special meaning of ( ), { }, [[, and]] and enables the = (formatted print) operator for s-

vi Option (Abbreviation)	Description
	expressions, so you can edit list processing (LISP) programs. The default is **nolisp.**
list (list)	Displays text with tabs (^I) and the marked end of lines ($). The default is **nolist.**
magic (magic)	Treats the . (period), [(left bracket), and * (asterisk) characters as special characters when searching for a pattern. In off mode, only the ( ) (parentheses) and $ (dollar sign) retain special meanings. However, you can evoke special meaning in other characters by preceding them with a \ (backslash). The default is **magic**.
mesg (mesg)	Turns on write permission to the terminal if set while in visual mode. This option only is effective if used with the **.exrc** file or the **EXINIT** environment variable. The default is **on**.
modeline (modeline)	Runs a vi editor command line if found in the first five or the last five lines of the file. A vi editor command line can be anywhere in a line. For the vi editor to recognize a command line, the line must contain a space or a tab followed by the `ex:` or `vi:` string. The command line is ended by a second **:** (colon). The vi editor tries to interpret any data between the first and second colon as vi editor commands. The default is **nomodeline**.
novice	Indicates whether you are in **novice** mode. You cannot change the value by using the **set** command.
number (nu)	Displays lines prefixed with their line numbers. The default is **nonu**.
optimize (opt)	Speeds the operation of terminals that lack cursor addressing. The default is **noopt**.
paragraphs (para=)	Defines vi macro names that start paragraphs. The default is **para=IPLPPPQPP\ LIpplpipnpbp**. Single-letter **nroff** macros, such as the **.P** macro, must include the space as a quoted character if respecifying a paragraph.
partialchar (pc=)	Appears in the last display column where a double-wide character would not be displayed completely. The default character is **-** (minus sign).
prompt	Prompts for a new vi editor command when in command mode by printing a **:** (colon). The default is **on**.
readonly (ro)	Sets permanent read-only mode. The default is **noreadonly**.
redraw (redraw)	Simulates a smart workstation on a dumb workstation. The default is **nore**.
remap	Allows defining macros in terms of other macros. The default is **on**.
report (re=)	Sets the number of times you can repeat a command before a message is displayed. For subcommands that produce many messages, such as global subcommands, the messages are displayed when the command sequence completes. The default is **report=5.**
scroll (scr=)	Sets the number of lines to be scrolled when the user scrolls up or down. The default is 1/2 of the window size, rounded down.
sections (sect=)	Defines vi macro names that start sections. The default is **sect=NHSHHH\ HUuhsh+c**. Single-letter **nroff** macros, such as the **.P** macro, must include the space as a quoted character if respecifying a paragraph.

vi Option (Abbreviation)	Description
shell (sh=)	Defines the shell for the **!** subcommand or the **:!** subcommand. The default is the login shell.
shiftwidth (sw=)	Sets the distance for the software tab stops used by the **autoindent** option, the shift commands **(>** and **<)**, and the text input commands (the Ctrl-D and Ctrl-T key sequences). This vi option only affects the indentation at the beginning of a line. The default is **sw=8.**
showmatch (sm)	Shows the ((matching left parenthesis) or { (left bracket) as you type the) (right parenthesis) or } (right bracket). The default is **nosm**.
showmode (smd)	Displays a message to indicate when the vi editor is in input mode. The default is **nosmd**.
slowopen (slow)	Postpones updating the display screen during inserts. The default is **noslow.**
tabstop (ts=)	Sets the distance between tab stops in a displayed file. The default is **ts=8**.
tags (tags =)	Defines the search path for the database file of function names created using the **ctags** command. The default is **tags=tags\ /usr/lib/tags**.
term (term=)	Sets the type of workstation you are using. The default is **term=$TERM**, where **$TERM** is the value of the **TERM** shell variable.
terse (terse)	Allows the vi editor to display the short form of messages. The default is **noterse**.
timeout (to)	Sets a time limit of two seconds on an entry of characters. This limit allows the characters in a macro to be entered and processed as separate characters when the **timeout** option is set. To resume use of the macro, set the **notimeout** option. The default is **to**.
ttytype	Indicates the tty type for the terminal being used. You cannot change this value from the vi editor.
warn (warn)	Displays a warning message before the **!** subcommand executes a shell command if it is the first time you issued a shell command after changes were made in the editing buffer but not written to a file. The default is **warn**.
window (wi=)	Sets the number of lines displayed in one window of text. The default depends on the baud rate at which you are operating: 600 baud or less, 8 lines; 1200 baud, 16 lines; higher speeds, full screen minus 1 line.
wrapmargin (wm=)	Sets the margin for automatic word wrapping from one line to the next. The default is **wm=0**. A value of 0 turns off word wrapping.
wrapscan (ws)	Allows string searches to wrap from the end of the editing buffer to the beginning. The default is **ws**.
wraptype (wt=)	Indicates the method used to wrap words at the end of a line. The default value is **general**. You can specify one of the following four values: **general** Allows wraps on word breaks as white space between two characters. This setting is the default.

vi Option (Abbreviation)	Description
	word Allows wraps on words. **rigid** Allows wraps on columns and before closing punctuation. **flexible** Allows wraps on columns, but one character of punctuation can extend past the margin.
writeany (wa)	Turns off the checks usually made before a **write** subcommand. The default is **nowa**.

To see a list of the vi editor settings that have changed from the default settings, enter `set` and press the spacebar. Press the Enter key to return to the command mode.
To see a complete list of the vi editor settings, enter `set all`. Press the Enter key to return to the command mode.
To turn on a vi editor option, enter `set Option`. This command automatically returns you to the command mode.
To turn on multiple vi editor options, enter `set Option Option Option`. This command turns on the three designated vi editor options and returns you to the command mode.
To turn off a vi editor option, enter `set noOption`. This command automatically returns you to the command mode.
To change the value of a vi editor option, enter `set Option=Value`. This command automatically returns you to the command mode.
You can use the **:set** subcommand of the vi editor to set options for this editing session only, or to set options for this editing session and all future editing sessions.
To set or change vi editor options *for this editing session only*, enter the **:set** subcommand from the command line.
To set vi options for *all editing sessions*, put the **:set** subcommand in the **EXINIT** environment variable in the **.profile** file (read by the shell on login) or put the **set** subcommand into a **.exrc** file. The vi editor first looks for the **EXINIT** environment variable and runs its commands. If the **EXINIT** environment variable does not exist, the vi editor then looks for the **$HOME/.exrc** file and runs its commands. Last, and regardless of any previous results, the vi editor looks for the local **.exrc** file and runs its commands.
Note:
This process is true except with the **tvi** command (trusted vi). In this instance, the vi editor looks for and runs only the **/etc/.exrc** file.
For information about changing an option by setting the **EXINIT** environment variable, see the description of environment variables in the **environment** file.
The **.exrc** file can contain subcommands of the form **set** *Option*=*Value*; for example:

```
set cp=3 . . ;
```

To include a comment in the **.exrc** file, use a **"** (double quotation mark) as the first character in the line.

15.1.3.3.2 Defining Macros

If you use a subcommand or sequence of subcommands frequently, you can use the vi editor to define a macro that issues that subcommand or sequence.
To define a macro, enter the sequence of subcommands into a buffer named with a letter of the alphabet. The lowercase letters a through z overlay the contents of the buffer, and the uppercase letters A through Z append text to the previous contents of the buffer, allowing you to build a macro piece by piece.
For example, to define a buffer macro named c that searches for the word corner and makes the third line after the word corner the current line, enter the following command:

```
o /corner/+3
```

Then press the Esc key and enter the following command:
```
"c
```
where c is the name of the buffer macro.
To add text to the previous contents of the defined buffer, enter the `o viSubcommand`, press the Esc key, and enter `"CapitalLetter`, where the *CapitalLetter* variable specifies an uppercase letter A through Z. For example, to build a buffer macro named T that searches for the word corner and allows you to add more commands, enter the following command:
```
o corner
```
Then press the Esc key and enter the following command:
```
"T
```
where T is the name of the buffer macro. You can repeat this process at any time to add more vi subcommands to the same buffer.
For example, to add commands that move the cursor to the previous line and delete that line, enter the following command:
```
o -dd
```
where - (minus sign) means to move the cursor up one line, and dd means to delete the current line. Press the Esc key and enter the following command:
```
"Tdd
```
To start the macro, enter `@Letter`, where the *Letter* variable specifies the letter name of the buffer macro you want to use. To use the same macro again, enter @@ (two at symbols). For example, enter `@T` to start the T buffer macro and run the **search**, **move cursor**, and **delete line** commands. Enter `@@T` to start the T buffer macro again.
The character set used by your system is defined by the collation table. This table affects the performance of vi macros.

15.1.3.3.3 Mapping Keys

You can use the **:map**, **:map!**, and **:ab** subcommands to map a keystroke to a command or a sequence of commands. The **:map** subcommand is used in the command mode. The **:map!** and **:ab** subcommands are used in the text input mode. You can map keys for this editing session and all future editing sessions or only for the current editing session from either mode.
To map keys *for all future editing sessions*, put the subcommand into a **$HOME/.exrc** file. Each time you start the vi editor, it reads this file. The mapping remains in effect for every editing session.
To map keys *for the current editing session only* from the *command mode*, start the subcommand during the vi editor session. To map keys for the current editing session only from the *text input mode*, enter the subcommand on the command line during the vi editor session. The mapping remains in effect only for the current editing session.
Attention: If you use an IBM® 3161 ASCII display station, IBM 3163 ASCII display station, or IBM 3101 ASCII display station, the default key-mapping of the vi editor can cause you to lose data. To see the default mapping, issue a **:map** subcommand. Specific problems arise with the Esc-J or Shift-J key sequence. These key sequences delete all information from the current position of the cursor to the end of the file. To avoid problems, change this key sequence using a **.exrc** file.
The **:map**, **:map!**, and **:ab** subcommands are defined and used as follows:

Defines macros in the command mode. The **:map** subcommand allows you to run a specified command or sequence of commands by pressing a single key while in the vi editor.
To map keys in the command mode, start the vi editor with an empty editing buffer and do not name a vi file using the **vi** command or type anything into the buffer after the vi editor starts. You can use the **:map** subcommand to do the following:

- To map a character to a sequence of editing commands, enter:

:map

```
:map Letter viSubcommand
```

- To unmap a character previously mapped in command mode, enter:

```
:unmap Letter
```

- To display a list of current mappings for the command mode, enter

:map

The following keys are not used by the vi editor, but are available for use with the **:map** subcommand in the command mode:

- Letters g, K, q, V, and v
- Control key sequences Ctrl-A, Ctrl-K, Ctrl-O, Ctrl-W, and Ctrl-X
- Symbols _ (underscore), * (asterisk), \ (backslash), and = (equal sign)

Although you can map a key that is already used by the vi editor, the key's usual function is not available as long as the map is in effect. Some terminals allow you to map command sequences to function keys. If you are in LISP mode, the = (equal sign) cannot be used because it is used by the vi editor.

To map the letter v to the sequence of commands that would locate the next occurrence of the word map and change it to the word MAP, enter the following command:

```
:map v /map<Ctrl-V><Enter>cwMAP<Ctrl-V><Esc><Ctrl-V><Enter>
```

The previous example instructs the vi editor to locate the next occurrence of map (/map<Ctrl-V><Enter>), change map to MAP (cwMAP), end the change-word subcommand (<Ctrl-V><Esc>), and enter the command (<Ctrl-V><Enter>).

Note:

To prevent the vi editor from interpreting the Enter key, it must be preceded by the Ctrl-V key sequence when being mapped. This condition is also true of the Esc, Backspace, and Delete keys.

To map the control characters Ctrl-A, Ctrl-K, and Ctrl-O, simultaneously press the Ctrl key and the letter. For example, to map the Ctrl-A key sequence to the sequence of commands that saves a file and edits the next one in a series, enter the following command:

```
:map <Ctrl-A> :w<Ctrl-V><Enter>:n<Ctrl-V><Enter>
```

To map the control characters Ctrl-T, Ctrl-W, and Ctrl-X, you must first escape them with the Ctrl-V key sequence.

To map the | (pipe symbol), you must first escape it with the two Ctrl-V key sequences, as illustrated by the following example that maps the character g to the sequence of commands that escapes to the shell, concatenates the file **/etc/motd**, and pipes the output to the **wc** command:

```
:map g :!cat /etc/motd <Ctrl-V><Ctrl-V>| wc<Ctrl-V><Enter>
```

If your terminal permits you to map function keys, you must reference them with the #*number* key sequence to designate the number of the function key that you want to map. In the following example, the F1 function key is mapped to the sequence of commands that deletes a word and moves the cursor three words down:

```
:map #1 dwwww
```

In order for function key mapping to work, the output of the function key for your terminal type must match the output defined in the **terminfo** file. These definitions are denoted by the kf*number* entries, where kf1 represents the F1 function key, kf2 represents the F2 function key, and so on. If the output that you get when you press the function key does not match this entry, you must use the terminal's setup mode to correct the settings to match these terminal database entries before any mapping can occur.

You can also map certain keyboard special keys, such as the Home, End, Page Up, and Page Down keys. For most terminals, these keys are already mapped in the vi editor. You can verify this mapping by using the **:map** subcommand. If these keys are not already mapped, you can use the **:map** subcommand as follows:

```
:map <Ctrl-V><End> G
:map <Ctrl-V><Home> 1G
:map <Ctrl-V><PageUp> <Ctrl-F>
:map <Ctrl-V><PageDown> <Ctrl-B>
```

To get a listing of all current maps in the command mode, enter the **:map** subcommand. The preceding examples are then displayed as follows:

```
v         v          /map<Ctrl-M>cwMAP<Ctrl-[>Ctrl-M>
```

```
<Ctrl-A>  <Ctrl-A>   :w<Ctrl-M>:n<Ctrl-M>
g         g          :!cat /etc/motd | wc <Ctrl-M>
```

Note:
The Ctrl-V and Enter key sequence is displayed as the Ctrl-M key sequence, and the Ctrl-V and Esc key sequence is displayed as the Ctrl-[key sequence.

Maps character strings to single keys while in text input mode. To map keys in the text input mode, start the vi editor with an empty editing buffer and do not name a vi file using the **vi** command or type anything into the buffer after the vi editor starts. You can use the **:map!** subcommand to do the following:

- To map a letter to one or more vi strings in text input mode, enter:

  ```
  :map! Letter String
  ```

- To unmap a letter previously mapped in text input mode, enter:

  ```
  :unmap! Letter
  ```

- To display a list of existing strings that are mapped to specific keys in text input mode, enter:

  ```
  :map!
  ```

:map!

Typing the mapped key while in text input mode produces the specified string. The Ctrl-V and Esc key sequence puts you into command mode, backs up to the beginning of the current word (**bbw**), and starts the **cw** (change-word) subcommand. For example:
`:map! % <Ctrl-V><Esc>bbwcw`
When typing text, if you realize that you have mistyped a word, you can change it by pressing the % (percent) key and retyping the word. You are automatically returned to insert mode.

Note:
Be careful when choosing keys to be used for the **:map!** subcommand. Once keys have been mapped, they can no longer be input as text without first issuing the **:unmap!** subcommand.

Maps a key or sequence of keys to a string of characters for use in the text input mode. The **:ab** subcommand is useful when inputting text that possesses several repetitive phrases, names, or titles.
The following example replaces the word `city` with the phrase `Austin, Texas 78759` whenever it is typed in text input mode and followed by a white space, period, or comma:
`:ab city Austin, Texas 78759`
For example, if while inputting text, you type the following:
`My current residence is city.`
Pressing the Tab key expands the word `city` to read:
`My current residence is Austin, Texas 78759.`

:ab

The abbreviation is not expanded within a word. For example, if you type `My current residence iscity`, the word iscity is not expanded.
If the **:map!** subcommand is used to map abbreviations for insert mode, then all occurrences of the abbreviations are expanded regardless of where it occurs. If you used the **:map!** subcommand for the preceding example (`:map! city Austin, Texas 78759`), then whenever you type the word `city`, regardless of what precedes or follows, the word will be expanded to `Austin, Texas 78759`. Therefore, the word `iscity` becomes `isAustin, Texas 78759`.

Note:
Be careful when choosing the keys that are used for the **:ab** subcommand. Once keys are defined, they can no longer be input as text without first issuing the **:unab** subcommand.

15.1.3.3.4 Setting Abbreviations

The **set** command has behavior similar to the **map!** command except that the **set** command substitutes the string for the abbreviation only when the abbreviation is a separate word. You can use the **set** command of the vi editor to:

- List existing abbreviations

- Remove an abbreviation
- Set (define) an abbreviation

Note:

Start the vi editor with an empty editing buffer. Do not name a vi file using the **vi** command or type anything into the buffer after the vi editor starts. Press the Esc key to be sure you are in the command mode.

To list abbreviations	Enter the **:ab** command to list existing abbreviations. Press the Enter key to return to command mode.
To remove abbreviations	Enter the **:anab***Abbreviation* command to remove an abbreviation, where the *Abbreviation* variable specifies the character string you do not want abbreviated any more.
To set (define) an abbreviation	Enter the **:ab** *Abbreviation String* command to set an abbreviation, where the *Abbreviation* variable specifies the character string being defined as an abbreviation and the *String* variable specifies the character string being abbreviated. The abbreviation can be substituted for the string only when the abbreviation is a separate word. For example, if you enter the **:ab kn upper** command and then type acknowledge while in the text input mode, the set abbreviation string is not started because the kn string in the word acknowledge is not a separate word. However, if you type the **:ab kn upper** command and then type `make the kn line all` kncase while in the text input mode, the result is `make the upper line all` uppercase.

15.1.4 ***Flags***

-c*Subcommand*	Carries out the ex editor subcommand before viewing with **vi** begins. The cursor moves to the line affected by the last subcommand to be carried out. When a null operand is entered, as in **-c' '**, the vi editor places the cursor on the first line of the file. The **-c** flag is incompatible with the **+** flag. Do not specify both flags at the same time.
-l	Enters the vi editor in LISP mode. In this mode, the vi editor creates indents appropriate for LISP code, and the **(**, **)**, **{**, **}**, **[[**, and **]]** subcommands are modified to act appropriately for LISP.
-r[*File*]	Recovers a file after a vi editor or system malfunction. If you do not specify the *File* variable, the vi editor displays a list of all saved files.
-R	Sets the **readonly** option to protect the file against overwriting.
-t*Tag*	Edits the file containing the *Tag* variable and positions the vi editor at its definition. To use this flag, you must first create a database of function names and their locations using the **ctags** command.
-v	Enters the vi editor in the verbose mode.

-w*Number*	Sets the default window size to the value specified by the *Number* variable. This flag is useful when you use the vi editor over a low-speed line.
-y*Number*	Overrides the maximum line setting of 1,048,560 with any value greater than 1024. You should request twice the number of lines that you require because the vi editor uses the extra lines for buffer manipulation.
+[*Subcommand*]	Carries out the ex editor subcommand before editing begins. If you do not specify the *Subcommand* variable, the cursor is placed on the first line of the file. This **+** flag is incompatible with the **-c** flag. Do not specify both flags at the same time.

15.1.5 vi General Subcommand Syntax

Use the following general syntax to enter subcommands:
[*Named_Buffer*] [*Operator*] [*Number*] *Object*
Note:
Square brackets indicate optional items.

[*Named_Buffer*]	Specifies a temporary text storage area.
[*Operator*]	Specifies the subcommand or action; instructs the vi editor.
[*Number*]	Specifies either the extent of the action or a line address as a whole number.
Object	Specifies what to act on, such as a text object (a character, word, sentence, paragraph, section, character string) or a text position (a line, position in the current line, screen position).

15.1.5.1 Counts before Subcommands

You can put a number in front of many subcommands. The vi editor interprets this number in one of the following ways:

- Go to the line specified by the *Number* parameter:
  - `5G`

    `10Z`
- Go to the column specified by the *Number* parameter:

  `25|`
- Scroll the number of lines up or down specified by the *Number* parameter:
  - `10Ctrl-U`

    `10Ctrl-D`

15.1.6 vi Editor Subcommands

Use the subcommands to perform these kinds of actions:

- Moving the cursor
- Editing text
- Manipulating files
- Other actions

15.1.6.1 Moving the Cursor

Use subcommands to move the cursor within a file in these ways:

- Moving within a line
- Moving within a line by character position
- Moving to words
- Moving by line position
- Moving to sentences, paragraphs, or sections
- Moving by redrawing the screen
- Paging and scrolling
- Searching for patterns
- Marking a specific location in a file and returning

15.1.6.1.1 Moving within a Line

Enter the following subcommands in command mode. You can cancel an incomplete command by pressing the Esc key. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

Left Arrow or **h** or **Ctrl-H**	Moves the cursor one character to the left.
Down Arrow or **j** or **Ctrl-J** or **Ctrl-N**	Moves the cursor down one line (it remains in the same column).
Up Arrow or **k** or **Ctrl-P**	Moves the cursor up one line (it remains in the same column).
Right Arrow or **l**	Moves the cursor one character to the right.

15.1.6.1.2 Moving within a Line by Character Position

Enter the following subcommands in command mode. You can cancel an incomplete command by pressing the Esc key. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

^	Moves the cursor to the first nonblank character.
0	Moves the cursor to the beginning of the line.
$	Moves the cursor to the end of the line.
f*x*	Moves the cursor to the next *x* character.
F*x*	Moves the cursor to the last *x* character.
t*x*	Moves the cursor to one column before the next *x* character.
T*x*	Moves the cursor to one column after the last *x* character.
;	Repeats the last **f**, **F**, **t**, or **T** subcommand.
,	Repeats the last **f**, **F**, **t**, or **T** subcommand in the opposite direction.
*Number***|**	Moves the cursor to the specified column.

15.1.6.1.3 Moving to Words

Enter the following subcommands in command mode. If you need information about the format of vi subcommands, "vi General Subcommand Syntax."

w	Moves the cursor to the next small word.
b	Moves the cursor to the previous small word.
e	Moves the cursor to the next end of a small word.
W	Moves the cursor to the next big word.

B Moves the cursor to the previous big word.

E Moves the cursor to the next end of a big word.

15.1.6.1.4 Moving by Line Position

Enter the following subcommands in command mode. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

H Moves the cursor to the top line on the screen.

L Moves the cursor to the last line on the screen.

M Moves the cursor to the middle line on the screen.

+ Moves the cursor to the next line at its first nonblank character.

- Moves the cursor to the previous line at its first nonblank character.

Enter Moves the cursor to the next line at its first nonblank character.

15.1.6.1.5 Moving to Sentences, Paragraphs, or Sections

Enter the following subcommands in command mode. You can cancel an incomplete subcommand by pressing the Esc key. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

(Places the cursor at the beginning of the previous sentence, or the previous s-expression if you are in LISP mode.

) Places the cursor at the beginning of the next sentence, or the next s-expression if you are in LISP mode.

{ Places the cursor at the beginning of the previous paragraph, or at the next list if you are in LISP mode.

} Places the cursor at the beginning of the next paragraph, at the next section if you are in C mode, or at the next list if you are in LISP mode.

]] Places the cursor at the next section, or function if you are in LISP mode.

[[Places the cursor at the previous section, or function if you are in LISP mode.

15.1.6.1.6 Moving by Redrawing the Screen

Enter the following subcommands in command mode. You can cancel an incomplete subcommand by pressing the Esc key. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

z Redraws the screen with the current line at the top of the screen.

z- Redraws the screen with the current line at the bottom of the screen.

z. Redraws the screen with the current line at the center of the screen.

/Pattern/z- Redraws the screen with the line containing the character string, specified by the *Pattern* parameter, at the bottom.

15.1.6.1.7 Paging and Scrolling

Enter the following subcommands in command mode. You can cancel an incomplete subcommand by pressing the Esc key. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

Ctrl-U Scrolls up one-half screen.

Ctrl-D Scrolls down one-half screen.

Ctrl-F Scrolls forward one screen.

Ctrl-B Scrolls backward one screen.

Ctrl-E Scrolls the window down one line.

Ctrl-Y Scrolls the window up one line.

z+ Pages up.

z^ Pages down.

15.1.6.1.8 Searching for Patterns

Enter the following subcommands in command mode. You can cancel an incomplete subcommand by pressing the Esc key. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

[*Number***]G** Places the cursor at the line number specified by the *Number* parameter or at the last line if the *Number* parameter is not specified.

/Pattern Places the cursor at the next line containing the character string specified by the *Pattern* parameter.

?*Pattern* Places the cursor at the next previous line containing the character string specified by the *Pattern* parameter.

n	Repeats the last search for the text specified by the *Pattern* parameter in the same direction.
N	Repeats the last search for the text specified by the *Pattern* parameter in the opposite direction.
/*Pattern***/ +***Number***	Places the cursor the specified number of lines after the line matching the character string specified by the *Pattern* parameter.
?*Pattern***?-***Number***	Places the cursor the specified number of lines before the line matching the character string specified by the *Pattern* parameter.
%	Finds the parenthesis or brace that matches the one at current cursor position.

15.1.6.2 Editing Text

The subcommands for editing enable you to perform the following tasks:

- Marking a specific location in a file and returning
- Adding text to a file
- Changing text while in input mode
- Changing text from command mode
- Copying and moving text
- Restoring and repeating changes

15.1.6.2.1 Marking a Specific Location in a File and Returning

Enter the following subcommands in command mode. You can cancel an incomplete subcommand by pressing the Esc key. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

''	Moves the cursor to the previous location of the current line.
"	Moves the cursor to the beginning of the line containing the previous location of the current line.
m*x*	Marks the current position with the letter specified by the *x* parameter.
`*x*	Moves the cursor to the mark specified by the *x* parameter.
'*x*	Moves the cursor to the beginning of the line containing the mark specified by the *x* parameter.

15.1.6.2.2 Adding Text to a File (Text Input Mode)

Enter the following subcommands in command mode to change the vi editor into text input mode. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

a*Text*	Inserts text specified by the *Text* parameter after the cursor. End text input mode by pressing the Esc key.
A*Text*	Adds text specified by the *Text* parameter to the end of the line. End text input mode by pressing the Esc key.
i*Text*	Inserts text specified by the *Text* parameter before the cursor. End text input mode by pressing the Esc key.
I*Text*	Inserts text specified by the *Text* parameter before the first nonblank character in the line. End text input mode by pressing the Esc key.
o	Adds an empty line below the current line. End text input mode by pressing the Esc key.
O	Adds an empty line above the current line. End text input mode by pressing the Esc key.

15.1.6.2.3 Changing Text While in Input Mode

Use the following subcommands only while in text input mode. These commands have different meanings in command mode. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

Ctrl-D Goes back to previous autoindent stop.
^ Ctrl-D Ends autoindent for this line only.
0Ctrl-D Moves cursor back to left margin.
Esc Ends insertion and returns to command state.
Ctrl-H Erases the last character.
Ctrl-Q Enters any character if xon is disabled.
Ctrl-V Enters any character.
Ctrl-W Erases the last small word.
**** Quotes the erase and kill characters.
Ctrl-? Interrupts and ends insert or the Ctrl-D key sequence.

15.1.6.2.4 Changing Text from Command Mode

Use the following subcommands in command mode. An incomplete subcommand can be canceled by pressing the Esc key. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

C Changes the rest of the line (same as **c$**).
cc Changes a line.
cw Changes a word.
cw*Text* Changes a word to the text specified by the *Text* parameter.
D Deletes the rest of the line (same as **d$**).
dd Deletes a line.
dw Deletes a word.
J Joins lines.
r*x* Replaces the current character with the character specified by *x*.
R*Text* Overwrites characters with the text specified by the *Text* parameter.
s Substitutes characters (same as **cl**).
S Substitutes lines (same as **cc**).
u Undoes the previous change.
x Deletes a character at the cursor.
X Deletes a character before the cursor (same as **dh**).
<< Shifts one line to the left.
<L Shifts all lines from the cursor to the end of the screen to the left.
>> Shifts one line to the right.
>L Shifts all lines from the cursor to the end of the screen to the right.
~ Changes letter at the cursor to the opposite case.
! Indents for LISP.

15.1.6.2.5 Copying and Moving Text

Use the following subcommands in command mode. An incomplete subcommand can be canceled by pressing the Esc key. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

p Puts back text from the undo buffer after the cursor.
P Puts back text from the undo buffer before the cursor.
"*x***p** Puts back text from the *x* buffer.
"*x***d** Deletes text into the *x* buffer.
y Places the object that follows (for example, **w** for word) into the undo buffer.
"*x***y** Places the object that follows into the *x* buffer, where *x* is any letter.
Y Places the line in the undo buffer.

15.1.6.2.6 Restoring and Repeating Changes

Use the following subcommands in command mode. An incomplete subcommand can be canceled by pressing the Esc key. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

Undoes the last change.

u **Note:**
After an undo, the cursor moves to the first non-blank character on the updated current line.

U Restores the current line if the cursor has not left the line since the last change.
. Repeats the last change or increments the **"***n***p** command.

Notes:

1. This subcommand will repeat the last change, including an undo. Therefore, after an undo, repeat performs an undo rather than repeat the last change.

2. This subcommand is not meant for use with a macro. Enter @@ (two at signs) to repeat a macro.

"*n* **p** Retrieves the *n*th last delete of a complete line or block of lines.

15.1.6.3 Manipulating Files

The subcommands for manipulating files allow you to do the tasks outlined in the following sections:

- Saving changes to a file
- Editing a second file
- Editing a list of files
- Finding file information

15.1.6.3.1 Saving Changes to a File

Use the following subcommands in command mode. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

:w	Writes the edit buffer contents to the original file. If you are using this subcommand within the ex editor, you do not need to type the : (colon).
:w *File*	Writes the edit buffer contents to the file specified by the *File* parameter. If you are using this subcommand within the ex editor, you do not need to type the : (colon).
:w! *File*	Overwrites the file specified by the *File* parameter with the edit buffer contents. If you are using this subcommand within the ex editor, you do not need to type the : (colon).

15.1.6.3.2 Editing a Second File

Enter the following subcommands in command mode. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

:e *File*	Edits the specified file. If you are using this subcommand from the ex editor, you do not need to type the : (colon).
:e!	Re-edits the current file and discards all changes.
:e + *File*	Edits the specified file starting at the end.
:e + *Number File*	Edits the specified file starting at the specified line number.
:e #	Edits the alternate file. The alternate file is usually the previous file name before accessing another file with a **:e** command. However, if changes are pending on the current file when a new file is called, the new file becomes the alternate file. This subcommand is the same as the **Ctrl-A** subcommand.
:r *File*	Reads the file into the editing buffer by adding new lines below the current line. If you are using this subcommand from the ex editor, you do not need to type the **:** (colon).
:r !*Command*	Runs the specified command and places its output into the file by adding new lines below the current cursor position.
:ta *Tag*	Edits a file containing the *Tag* tag starting at the location of the tag. To use this subcommand, you must first create a database of function names and their locations using the **ctags** command. If you are using this subcommand from the ex editor, you do not need to type the **:** (colon).
Ctrl-]	Edits a file containing the tag associated with the current word starting

at the location of the tag. To use this subcommand, you must first create a database of function names and their locations using the **ctags** command. Ctrl-T edits a file at the editing position where the previous Ctrl-] subcommand was issued. If multiple Ctrl-] subcommands have been issued, then multiple Ctrl-T subcommands can be used to return to previous editing positions where Ctrl-] subcommands were issued.

Ctrl-A Edits the alternate file. The alternate file is usually the previous current file name. However, if changes are pending on the current file when a new file is called, the new file becomes the alternate file. This subcommand is the same as the **:e #** subcommand.

15.1.6.3.3 Editing a List of Files

Enter the following subcommands in command mode. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

:n Edits the next file in the list entered on the command line. If you are using this subcommand from the ex editor, a : (colon) is not needed.

:n *Files* Specifies a new list of files to edit. If you are using this subcommand from the ex editor, a **:** (colon) is not needed.

15.1.6.3.4 Finding File Information

Enter the following subcommand in command mode. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax".

Ctrl-G Shows the current file name, current line number, number of lines in the file, and percentage of the way through the file where the cursor is located.

15.1.6.4 Other Actions

The vi editor provides the subcommands described in the following sections:

- Adjusting the screen
- Entering shell commands
- Interrupting and ending the vi editor

15.1.6.4.1 Adjusting the Screen

Enter the following subcommands in command mode. An incomplete subcommand can be canceled by pressing the Esc key. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

Ctrl-L Clears and redraws the screen.

Ctrl-R Redraws the screen and eliminates blank lines marked with @ (at sign).

z*Number* Makes the window the specified number of lines long.

15.1.6.4.2 Entering Shell Commands

The following subcommands allow you to run a command within the vi editor. Enter these subcommands in command mode. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

:sh Enters the shell to allow you to run more than one command. You can return to the vi editor by pressing the Ctrl-D key sequence. If you are using this subcommand within the ex editor, a : (colon) is not needed.

:!*Command* Runs the specified command and then returns to the vi editor. If you are using this subcommand within the ex editor, a : (colon) is not needed.

Note:
The # (alternate file), **%** (current file), and **!** (previous command) special characters are expanded when following a **:!** subcommand. To prevent any of these characters from being expanded, use the **** (backslash).

:!! Repeats the last **:!***Command* subcommand**.**

*Number***!!***Command* Runs the specified command and replaces the lines specified

	by *Number* with the output of the command**.** If a number is not specified, the default value is 1. If the command expects standard input, the specified lines are used as input.
!*Object Command*	Runs the specified command and replaces the object specified by the *Object* parameter with the output of the command**.** If the command expects standard input, the specified object is used as input.

15.1.6.4.3 Interrupting and Ending the vi Editor

Enter the following subcommands in command mode. If you need information about the format of vi subcommands, see "vi General Subcommand Syntax."

Q	Enters the ex editor in command mode.
ZZ	Exits the vi editor, saving changes.
:q	Quits the vi editor. If you have changed the contents of the editing buffer, the vi editor displays a warning message and does not quit. If you are using this subcommand from the ex editor, a : (colon) is not needed.
:q!	Quits the vi editor, discarding the editing buffer. If you are using this subcommand from the ex editor, a : (colon) is not needed.
Esc	Ends text input or ends an incomplete subcommand.
Ctrl-?	Interrupts a subcommand.

15.1.7 Exit Status

The following exit values are returned:

0	Indicates successful completion.
>0	Indicates an error occurred.

15.1.8 Input Files

Input files must be text files or files that are similar to text files except for an incomplete last line that contains no null characters.

The **.exrc** files must be text files consisting of **ex** commands.

By default, the vi editor reads lines from the files to be edited without interpreting any of those lines as any form of vi editor command.

16. Appendix F - Troubleshooting a boot process

16.1 Normal boot and Service boot on PCI systems

Some PCI systems do not support service mode, for example, the 7248-43P.The only way to boot in another mode, such as maintenance mode, is to change the normal bootlist. This can be done with the bootlist -m normal command if the system is accessible. If the system is not accessible, this can be done by booting from media and changing the bootlist through the SMS menus..70 IBM Certification Study Guide AIX Installation and System Recovery.

All PCI systems have a default bootlist. On modern PCI systems, using the F5 function key can access this default bootlist. On older PCI systems, this cannot be done. Instead, a single bootlist is provided that can be reset to the default values by removing the battery for about 30 seconds. This is because the bootlist is stored in NVRAM, and the NVRAM is only non-volatile as long as the battery is maintaining the memory.

Newer PCI architecture machines, for example, the 43P-150, supports a service bootlist. The simplest way to find out if a particular system supports the service boot option is to execute

 # bootlist -m service -o

0514-220 bootlist Invalid mode (service) for this model
The error message above indicates that the system does not support the service boot option.
All new PCI systems support the following key allocation standard
• F1 or 1 on ASCII terminal Starts System Management Services
• F5 or 5 on ASCII terminal Boot diag, use default boot list of fd, cd, scdisk, network adapter
• F6 or 6 on ASCII terminal Boot diag, use of custom service boot list

16.2 POST LED codes on PCI systems

The codes generated during this phase of the system startup differs from model to model.

16.2.1 Configuration Program Indicators

The numbers in this list are displayed on the operator panel as the system is loading the operating system and preparing the hardware by loading software drivers.
Note: Some systems may produce 4-digit codes. If the leftmost digit of a 4-digit code 0, use the three rightmost digits.

2E6 The PCI Differential Ultra SCSI adapter or the Universal PCI Differential Ultra SCSI adapter being configured.
2E7 Configuration method unable to determine if the SCSI adapter type is SE DE type.
440 9.1GB Ultra SCSI Disk Drive being identified or configured.
441 18.2GB Ultra SCSI Disk Drive being identified or configured.
444 2-Port Multiprotocol PCI Adapter (ASIC) being identified or configured.
500 Querying Standard I/O slot.
501 Querying card in Slot 1.
502 Querying card in Slot 2.
503 Querying card in Slot 3.
504 Querying card in Slot 4.
505 Querying card in Slot 5.
506 Querying card in Slot 6.
507 Querying card in Slot 7.
508 Querying card in Slot 8.
510 Starting device configuration.
511 Device configuration completed.
512 Restoring device configuration files from media.
513 Restoring basic operating system installation files from media.
516 Contacting server during network boot.
517 Mounting client remote file system during network IPL.

518 Remote mount of the root (/) and /usr file systems failed during network boot.
520 Bus configuration running.
521 /etc/init invoked **cfgmgr** with invalid options; **/etc/init**has been corrupted or incorrectly modified (irrecoverable error).
522 The configuration manager has been invoked with conflicting options (irrecoverable error).
523 The configuration manager is unable to access the ODM database (irrecoverable error).
524 The configuration manager is unable to access the config.rules object in the ODM database (irrecoverable error).
525 The configuration manager is unable to get data from a customized device object in the ODM database (irrecoverable error).
526 The configuration manager is unable to get data from a customized device driver object in the ODM database (irrecoverable error).
527 The configuration manager was invoked with the phase 1 flag; running phase 1 at this point is not permitted (irrecoverable error).
528 The configuration manager cannot find sequence rule, or no program name was specified in the ODM database (irrecoverable error).
529 The configuration manager is unable to update ODM data (irrecoverable error).
530 The program **savebase** returned an error.
531 The configuration manager is unable to access the **PdAt** object class (irrecoverable error).
532 There is not enough memory to continue (malloc failure); irrecoverable error.
533 The configuration manager could not find a configururation method for a device.
534 The configuration manager is unable to acquire database lock (irrecoverable error).
535 HIPPI diagnostics interface driver being configured.
536 The configuration manager encountered more than one sequence rule specified in the same phase (irrecoverable error).
537 The configuration manager encountered an error when invoking the program in the sequence rule.
538 The configuration manager is going to invoke a configuration method.
539 The configuration method has terminated, and control has returned to the configuration manager.
541 A DLT tape device is being configured.
551 IPL vary-on is running.
552 IPL vary-on failed.
553 IPL phase 1 is complete.
554 The boot device could not be opened or read, or unable to define NFS swap device during network boot.
555 An ODM error occurred when trying to vary-on the rootvg, or unable to create an NFS swap device during network boot.
556 Logical Volume Manager encountered error during IPL vary-on.
557 The root filesystem does not mount.
558 There is not enough memory to continue the system IPL.
559 Less than 2 M bytes of good memory are available to load the AIX kernel.
570 Virtual SCSI devices being configured.
571 HIPPI common function device driver being configured.
572 HIPPI IPI-3 master transport driver being configured.
573 HIPPI IPI-3 slave transport driver being configured.
574 HIPPI IPI-3 transport services user interface device driver being configured.
575 A 9570 disk-array driver being configured.
576 Generic async device driver being configured.
577 Generic SCSI device driver being configured.
578 Generic commo device driver being configured.
579 Device driver being configured for a generic device.
580 HIPPI TCPIP network interface driver being configured.
581 Configuring TCP/IP.
582 Configuring Token-Ring data link control.
583 Configuring an Ethernet data link control.
584 Configuring an IEEE Ethernet data link control.
585 Configuring an SDLC MPQP data link control.
586 Configuring a QLLC X.25 data link control.
587 Configuring a NETBIOS.
588 Configuring a Bisync Read-Write (BSCRW).
589 SCSI target mode device being configured.
590 Diskless remote paging device being configured.
591 Configuring an LVM device driver.
592 Configuring an HFT device driver.
593 Configuring SNA device drivers.
594 Asynchronous I/O being defined or configured.
595 X.31 pseudo-device being configured.
596 SNA DLC/LAPE pseudo-device being configured.
597 OCS software being configured.
598 OCS hosts being configured during system reboot.
599 Configuring FDDI data link control.

5C0 Streams-based hardware drive being configured.
5C1 Streams-based X.25 protocol being configured.
5C2 Streams-based X.25 COMIO emulator driver being configured
5C3 Streams-based X.25 TCP/IP interface driver being configured.
5C4 FCS adapter device driver being configured.
5C5 SCB network device driver for FCS being configured.
5C6 AIX SNA channel being configured
600 Starting network boot portion of **/sbin/rc.boot**.
602 Configuring network parent devices.
603 /usr/lib/methods/defsys, /usr/lib/methods/cfgsys, or **/usr/lib/methods/cfgbus** failed.
604 Configuring physical network boot device.
605 Configuration of physical network boot device failed.
606 Running **/usr/sbin/ifconfig** on logical network boot device.
607 /usr/sbin/ifconfig failed.
608 Attempting to retrieve the **client.info** file with **tftp.**Note that a flashing 608 indicates multiple attempt(s) to retrieve the **client_info** file are occurring.
609 The **client.info** file does not exist or it is zero length.
610 Attempting remote mount of NFS file system.
611 Remote mount of the NFS file system failed.
612 Accessing remote files; unconfiguring network boot device.
614 Configuring local paging devices.
615 Configuration of a local paging device failed.
616 Converting from diskless to dataless configuration.
617 Diskless to dataless configuration failed.
618 Configuring remote (NFS) paging devices.
619 Configuration of a remote (NFS) paging device failed.
61B 36.4GB 80-pin LVD SCSI Disk Drive being configured.
61D 36.4GB 80-pin LVD SCSI Disk Drive being configured.
620 Updating special device files and ODM in permanent filesystem with data from boot RAM filesystem.
622 Boot process configuring for operating system installation.
62D 9.1GB 68-pin LVD SCSI Disk Drive being configured.
62E 9.1GB 68-pin LVD SCSI Disk Drive being configured.
636 TURBROWAYS 622 Mbps PCI MMF ATM Adapter.
637 Dual Channel PCI-2 Ultra2 SCSI Adapter being configured.
638 4.5GB Ultra SCSI Single Ended Disk Drive being configured.
639 9.1GB 10K RPM Ultra SCSI Disk Drive (68-pin).
63B 9.1GB 80-pin LVD SCSI Disk Drive being configured.
63C 18.2GB 68-pin LVD SCSI Disk Drive being configured.
63D 18.2GB 80-pin LVD SCSI Disk Drive being configured.
63E 36.4GB 68-pin LVD SCSI Disk Drive being configured.
640 9.1GB 10K RPM Ultra SCSI Disk Drive (80-pin).
646 High-Speed Token-Ring PCI Adapter being configured.
64B 9.1GB 80-pin LVD SCSI Disk Drive being configured.
64C 18.2GB 68-pin LVD SCSI Disk Drive being configured.
64D 18.2GB 80-pin LVD SCSI Disk Drive being configured.
64E 36.4GB 68-pin LVD SCSI Disk Drive being configured.
650 IBM SCSD disk drive being configured.
653 18.2GB Ultra-SCSI 16-bit Disk Drive being configured.
655 GXT130P Graphics adapter being configured.
657 GXT2000P graphics adapter being configured.
658 PCI Fibre Channel Disk Subsystem Controller being identified or configured.
659 2102 Fibre Channel Disk Subsystem Controller Drawer being identified or configured.
660 2102 Fibre Channel Disk Array being identified or configured.
662 Ultra2 Integrated SCSI controller.
663 The ARTIC960RxD Digital Trunk Quad PCI Adapter or the ARTIC960RxF Digital Trunk Resource Adapter being configured.
664 32x (MAX) SCSI-2 CD-ROM drive being configured.
667 PCI 3-Channel Ultra2 SCSI RAID Adapter being configured.
669 PCI Gigabit Ethernet Adapter being configured.
66C 10/100/1000 Base-T EthernetPCI Adapter.
66D PCI 4-Channel Ultra-3 SCSI RAID Adapter.
674 ESCON® Channel PCI Adapter being configured.
677 PCI Fiber Channel Arbitrated Loop Adapter being configured.
67B PCI Cryptographic Coprocessor being configured.
682 20x (MAX) SCSI-2 CD-ROM Drive being configured.
689 4.5GB Ultra SCSI Single Ended Disk Drive being configured.

68C 20 GB 4-mm Tape Drive being configured.
68E POWER GXT6000P PCI Graphics Adapter.
690 9.1GB Ultra SCSI Single Ended Disk Drive being configured.
6CC SSA disk drive being configured.
700 A 1.1 GB 8-bit SCSI disk drive being identified or configured.
701 A 1.1 GB 16-bit SCSI disk drive being identified or configured.
702 A 1.1 GB 16-bit differential SCSI disk drive being identified or configured.
703 A 2.2 GB 8-bit SCSI disk drive being identified or configured.
704 A 2.2 GB 16-bit SCSI disk drive being identified or configured.
705 The configuration method for the 2.2 GB 16-bit differential SCSI disk drive is being run. If an rrecoverable error occurs, the system halts.
706 A 4.5 GB 16-bit SCSI disk drive being identified or configured.
707 A 4.5 GB 16-bit differential SCSI disk drive being identified or configured.
708 A L2 cache being identified or configured.
710 POWER GXT150M graphics adapter being identified or configured.
711 Unknown adapter being identified or configured.
712 Graphics slot bus configuration is executing.
713 The IBM ARTIC960 device being configured.
714 A video capture adapter being configured.
715 The Ultramedia Services audio adapter being configured. (this number displays briefly on the panel)
717 TP Ethernet Adapter being configured.
718 GXT500 Graphics Adapter being configured.
720 Unknown read/write optical drive type being configured.
721 Unknown disk or SCSI device being identified or configured.
722 Unknown disk being identified or configured.
723 Unknown CD-ROM being identified or configured.
724 Unknown tape drive being identified or configured.
725 Unknown display adapter being identified or configured.
726 Unknown input device being identified or configured.
727 Unknown async device being identified or configured.
728 Parallel printer being identified or configured.
729 Unknown parallel device being identified or configured.
730 Unknown diskette drive being identified or configured.
731 PTY being identified or configured.
732 Unknown SCSI initiator type being configured.
733 7GB 8 mm tape drive being configured.
734 4x SCSI-2 640 MB CD-ROM Drive being configured.
736 Quiet Touch keyboard and speaker cable being configured.
741 1080 MB SCSI Disk Drive being configured.
745 16GB 4 mm Tape Auto Loader being configured.
746 SCSI-2 Fast/Wide PCI Adapter being configured.
747 SCSI-2 Differential Fast/Wide PCI Adapter being configured.
749 7331 Model 205 Tape Library being configured.
751 SCSI 32-bit SE F/W RAID Adapter being configured.
754 1.1GB 16-bit SCSI disk drive being configured.
755 2.2GB 16-bit SCSI disk drive being configured.
756 4.5GB 16-bit SCSI disk drive being configured.
757 External 13GB 1.5M/s 1/4 inch tape being configured.
763 SP Switch MX Adapter being configured.
764 SP System Attachment Adapter being configured.
772 4.5GB SCSI F/W Disk Drive being configured.
773 9.1GB SCSI F/W Disk Drive being configured.
774 9.1GB External SCSI Disk Drive being configured.
776 PCI Token-Ring Adapter being identified or configured.
777 10/100 Ethernet Tx PCI Adapter being identified or configured.
778 POWER GXT3000P 3D PCI Graphics adapter being configured.
77B 4-Port 10/100 Ethernet Tx PCI Adapter being identified or configured.
77c A 1.0 GB 16-bit SCSI disk drive being identified or configured.
783 4 mm DDS-2 Tape Autoloader being configured.
789 2.6 GB External Optical Drive being configured.
78B POWER GXT4000P PCI Graphics Adapter.
78C PCI bus configuration executing.
78D GXT300P 2D Graphics adapter being configured.
790 Multi-bus Integrated Ethernet Adapter being identified or configured.
797 TURBOWAYS® 155 UTP/STP ATM Adapter being identified or configured.
798 Video streamer adapter being identified or configured.

799 2-Port Multiprotocol PCI adapter being identified or configured.
79c ISA bus configuration executing.
7C0 CPU/System Interface being configured.
7C1 Business Audio Subsystem being identified or configured.
7cc PCMCIA bus configuration executing.
800 TURBOWAYS 155 MMF ATM Adapter being identified or configured.
803 7336 Tape Library robotics being configured.
804 8x Speed SCSI-2 CD-ROM Drive being configured.
806 POWER GXT800 PCI Graphics adapter being configured.
807 SCSI Device Enclosure being configured.
80c SSA 4-Port Adapter being identified or configured.
811 Processor complex being identified or configured.
812 Memory being identified or configured.
813 Battery for time-of-day, NVRAM, and so on being identified or configured, or system I/O control logic being identified or configured.
814 NVRAM being identified or configured.
815 Floating-point processor test.
816 Operator panel logic being identified or configured.
817 Time-of-day logic being identified or configured.
819 Graphics input device adapter being identified or configured.
821 Standard keyboard adapter being identified or configured.
823 Standard mouse adapter being identified or configured.
824 Standard tablet adapter being identified or configured.
825 Standard speaker adapter being identified or configured.
826 Serial Port 1 adapter being identified or configured.
827 Parallel port adapter being identified or configured.
828 Standard diskette adapter being identified or configured.
831 3151 adapter being identified or configured, or Serial Port 2 being identified or configured.
834 64-port async controller being identified or configured.
835 16-port async concentrator being identified or configured.
836 128-port async controller being identified or configured.
837 16-port remote async node being identified or configured.
838 Network Terminal Accelerator Adapter being identified or configured.
839 7318 Serial Communications Server being configured.
840 PCI Single-Ended Ultra SCSI Adapter being configured.
841 8-port async adapter (EIA-232) being identified or configured.
842 8-port async adapter (EIA-422A) being identified or configured.
843 8-port async adapter (MIL-STD 188) being identified or configured.
844 7135 RAIDiant Array disk drive subsystem controller being identified or configured.
845 7135 RAIDiant Array disk drive subsystem drawer being identified or configured.
846 RAIDiant Array SCSI 1.3GB Disk Drive being configured.
847 16-port serial adapter (EIA-232) being identified or configured.
848 16-port serial adapter (EIA-422) being identified or configured.
849 X.25 Interface Co-Processor/2 adapter being identified or configured.
850 Token-Ring network adapter being identified or configured.
851 T1/J1 Portmaster® adapter being identified or configured.
852 Ethernet adapter being identified or configured.
854 3270 Host Connection Program/6000 connection being identified or configured.
855 Portmaster Adapter/A being identified or configured.
857 FSLA adapter being identified or configured.
858 5085/5086/5088 adapter being identified or configured.
859 FDDI adapter being identified or configured.
85c Token-Ring High-Performance LAN adapter being identified or configured.
861 Optical adapter being identified or configured.
862 Block Multiplexer Channel Adapter being identified or configured.
865 ESCON Channel Adapter or emulator being identified or configured.
866 SCSI adapter being identified or configured.
867 Async expansion adapter being identified or configured.
868 SCSI adapter being identified or configured.
869 SCSI adapter being identified or configured.
870 Serial disk drive adapter being identified or configured.
871 Graphics subsystem adapter being identified or configured.
872 Grayscale graphics adapter being identified or configured.
874 Color graphics adapter being identified or configured.
875 Vendor generic communication adapter being configured.
876 8-bit color graphics processor being identified or configured.
877 POWER Gt3™/POWER Gt4™ being identified or configured.

878 POWER Gt4 graphics processor card being configured.
879 24-bit color graphics card, MEV2 being configured.
880 POWER Gt1™ adapter being identified or configured.
887 Integrated Ethernet adapter being identified or configured.
889 SCSI adapter being identified or configured.
890 SCSI-2 Differential Fast/Wide and Single-Ended Fast/Wide Adapter/A being configured.
891 Vendor SCSI adapter being identified or configured.
892 Vendor display adapter being identified or configured.
893 Vendor LAN adapter being identified or configured.
894 Vendor async/communications adapter being identified or configured.
895 Vendor IEEE 488 adapter being identified or configured.
896 Vendor VME bus adapter being identified or configured.
897 S/370™ Channel Emulator adapter being identified or configured.
898 POWER Gt1x™ graphics adapter being identified or configured.
899 3490 attached tape drive being identified or configured.
89c A multimedia SCSI CD-ROM being identified or configured.
900 GXT110P Graphics Adapter being identified or configured.
901 Vendor SCSI device being identified or configured.
902 Vendor display device being identified or configured.
903 Vendor async device being identified or configured.
904 Vendor parallel device being identified or configured.
905 Vendor other device being identified or configured.
908 POWER GXT1000 Graphics subsystem being identified or configured.
910 1/4GB Fiber Channel/266 Standard Adapter being identified or configured.
911 Fiber Channel/1063 Adapter Short Wave being configured.
912 2.0GB SCSI-2 differential disk drive being identified or configured.
913 1.0GB differential disk drive being identified or configured.
914 5GB 8 mm differential tape drive being identified or configured.
915 4GB 4 mm tape drive being identified or configured.
916 Non-SCSI vendor tape adapter being identified or configured.
917 A 2.0 GB 16-bit differential SCSI disk drive being identified or configured.
918 A 2 GB 16-bit single-ended SCSI disk drive being identified or configured.
920 Bridge Box being identified or configured.
921 101 keyboard being identified or configured.
922 102 keyboard being identified or configured.
923 Kanji keyboard being identified or configured.
924 Two-button mouse being identified or configured.
925 Three-button mouse being identified or configured.
926 5083 tablet being identified or configured.
927 5083 tablet being identified or configured.
928 Standard speaker being identified or configured.
929 Dials being identified or configured.
930 Lighted program function keys (LPFK) being identified or configured.
931 IP router being identified or configured.
933 Async planar being identified or configured.
934 Async expansion drawer being identified or configured.
935 3.5-inch diskette drive being identified or configured.
936 5.25-inch diskette drive being identified or configured.
937 An HIPPI adapter being configured.
938 Serial HIPPI PCI adapter being configured.
942 POWER GXT 100 graphics adapter being identified or configured.
943 A 3480 or 3490 control unit attached to a System/370 Channel Emulator/A adapter are being identified or configured.
944 100MB ATM adapter being identified or configured.
945 1.0GB SCSI differential disk drive being identified or configured.
946 Serial port 3 adapter being identified or configured.
947 A 730MB SCSI disk drive being configured.
948 Portable disk drive being identified or configured.
949 Unknown direct bus-attach device being identified or configured.
950 Missing SCSI device being identified or configured.
951 670MB SCSI disk drive being identified or configured.
952 355MB SCSI disk drive being identified or configured.
953 320MB SCSI disk drive being identified or configured.
954 400MB SCSI disk drive being identified or configured.
955 857MB SCSI disk drive being identified or configured.
956 670MB SCSI disk drive electronics card being identified or configured.
957 120 MB DBA disk drive being identified or configured.

958 160 MB DBA disk drive being identified or configured.
959 160 MB SCSI disk drive being identified or configured.
960 1.37GB SCSI disk drive being identified or configured.
964 Internal 20 GB 8 mm tape drive identified or configured.
968 1.0 GB SCSI disk drive being identified or configured.
970 Half-inch, 9-track tape drive being identified or configured.
971 150 MB 1/4-inch tape drive being identified or configured.
972 2.3 GB 8 mm SCSI tape drive being identified or configured.
973 Other SCSI tape drive being identified or configured.
974 CD-ROM drive being identified or configured.
975 An optical disk drive being identified or configured.
977 M-Audio Capture and Playback Adapter being identified or configured.
981 540MB SCSI-2 single-ended disk drive being identified or configured.
984 1GB 8-bit disk drive being identified or configured.
985 M-Video Capture Adapter being identified or configured.
986 2.4GB SCSI disk drive being identified or configured.
987 An Enhanced SCSI CD-ROM drive being identified or configured.
989 200MB SCSI disk drive being identified or configured.
990 2.0GB SCSI-2 single-ended disk drive being identified or configured.
991 525MB 1/4-inch cartridge tape drive being identified or configured.
994 5 GB 8 mm tape drive being identified or configured.
995 1.2GB 1/4 inch cartridge tape drive being identified or configured.
996 A single-port, multiprotocol communications adapter being identified or configured.
997 FDDI adapter being identified or configured.
998 2.0 GB 4 mm tape drive being identified or configured.
999 7137 or 3514 Disk Array Subsystem being configured.
D46 Token-Ring cable
D81 T2 Ethernet Adapter being configured.

16.2.2 Diagnostic Load Progress Indicators

c00 AIX Install/Maintenance loaded successfully.
c01 Insert the first diagnostic diskette.
c02 Diskettes inserted out of sequence.
c03 The wrong diskette is in diskette drive.
c04 The loading stopped with an irrecoverable error.
c05 A diskette error occurred.
c06 The **rc.boot** configuration shell script is unable to determine type of boot.
c07 Insert the next diagnostic diskette.
c08 RAM file system started incorrectly.
c09 The diskette drive is reading or writing a diskette.
c20 An unexpected halt occurred, and the system is configured to enter the kernel debug program instead of entering a system dump.
c21 The **ifconfig** command was unable to configure the network for the client network host.
c22 The **tftp** command was unable to read client's ClientHostName **info** file during a client network boot.
c24 Unable to read client's ClientHostName.**info** file during a client network boot.
c25 Client did not mount remote miniroot during network install.
c26 Client did not mount the /usr file system during the network boot.
c29 The system was unable to configure the network device.
c31 Select the console display for the diagnostics. To select No console display, set the key mode switch to Normal then to Service. The diagnostic programs then load and run the diagnostics automatically.
c32 A directly attached display (HFT) was selected.
c33 A TTY terminal attached to serial ports S1 or S2 was selected.
c34 A file was selected. The console messages store in a file.
c40 Configuration files are being restored.
c41 Could not determine the boot type or device.
c42 Extracting data files from diskette.
c43 Cannot access the boot/install tape.
c44 Initializing installation database with target disk information.
c45 Cannot configure the console.
c46 Normal installation processing.
c47 Could not create a physical volume identifier (PVID) on disk.
c48 Prompting you for input.
c49 Could not create or form the JFS log.
c50 Creating root volume group on target disks.
c51 No paging devices were found.

c52 Changing from RAM environment to disk environment.
c53 Not enough space in the **/tmp** directory to do a preservation installation.
c54 Installing either BOS or additional packages.
c55 Could not remove the specified logical volume in a preservation installation.
c56 Running user-defined customization.
c57 Failure to restore BOS.
c58 Displaying message to turn the key.
c59 Could not copy either device special files, device ODM, or volume group information from RAM to disk.
c61 Failed to create the boot image.
c62 Loading platform dependent debug files.
c63 Loading platform dependent data files.
c64 Failed to load platform dependent data files.
c70 Problem Mounting diagnostic CD-ROM disc.
c99 Diagnostics have completed. This code is only used when there is no console.
Fxx (xx is any number) Refer to Firmware chapter.

16.2.3 Boot phase 1

So far, the system has tested the hardware, found a BLV, created the
RAMFS, and started the init process from BLV. The rootvg has not yet been activated. From now on, the boot sequence is the same on both MCA systems and PCI systems.
During this phase, the following steps are taken.
• The init process started from RAMFS executes the boot script rc.boot 1. At this stage, the restbase command is called to copy the reduced ODM from
the BLV into the RAMFS. If this operation fails, you will see a LED code of **548**.
• After this, cfgmgr -f reads the Config_Rules class from the reduced ODM.
In this class, devices with the attribute phase=1 will be considered base devices. Base devices are all devices that are necessary to access rootvg.
The process invoked with rc.boot 1 attempts to configure devices so that rootvg can be activated in the next rc.boot phase.
• At the end of boot phase 1, the bootinfo -b command is called to determine the last boot device. At this stage, the LED shows **511**..72 IBM Certification Study Guide AIX Installation and System Recovery

16.2.4 Boot phase 2

In boot phase 2 the rc.boot script is passed the parameter 2.
During this phase, the following steps are taken.
• Rootvg will be varied on with the special ilp_varyon utility. If this command
is not successful, one of the following LED codes will appear - **552, 554,556**.
• After the successful execution of ipl_varyon, the root file system (/dev/hd4)
will be mounted on a temporary mount point (/mnt) in RAMFS. If this fails, **555** or **557** will appear in the LED display.
• Next, the /usr and /var file system is mounted. If this fails, the LED **518** appears. The mounting of /var at this point enables the system to copy an.Chapter 4. System boot 73
eventual dump from default dump devices, /dev/hd6, to default copy directory, /var/adm/ras. This is done with the copycore command.
• After this, rootvg's primary paging space, /dev/hd6, will be activated.
• Next, the copy of rootvg's RAMFS ODM, and /dev directories will occur (mergedev). This is possible because of the temporary mount point, /mnt, is used for the mounted root file system.
• Next, the /usr and /var from the RAMFS is unmounted.
• Finally, the root file system from rootvg (disk) is mounted over the root file
system from the RAMFS. The mount points for the rootvg file systems
become available. Now, the /var and /usr file systems from the rootvg can be mounted again on their ordinary mount points.
• There is no console available at this stage; so all boot messages will be copied to the error log..74 IBM Certification Study Guide AIX Installation and System Recovery
As mentioned, there are a lot of different problem possibilities in this phase of the boot. The following section discusses how to correct some of them.

16.2.5 LED 551, 555, or 557

There can be several reasons for a system to halt with LED codes - 551,555,
or 557. For example
• A damaged file system
• A damaged Journaled File System (JFS) log device

• A failing disk in the machine that is a member of the rootvg
To diagnose and fix these problems, you will need to boot from a bootable media, access the maintenance menus, and choose Access a Volume Group
and start a shell before mounting file systems, and then do one or all of the following actions.
To ensure file system integrity, run the fsck command to fix any file systems that may be corrupted

fsck -y /dev/hd1
fsck -y /dev/hd2
fsck -y /dev/hd3
fsck -y /dev/hd4
fsck -y /dev/hd9var

To correct the function of the log device, run logform on /dev/hd8 to re-create
the logdevice

/usr/sbin/logform /dev/hd8

Or, if the BLV is corrupted, re-create the BLV and update the bootlist

bosboot -a -d /dev/hdisk0
bootlist -m normal hdisk0

16.2.6 LED 552, 554, 556

An LED code of 552, 554, or 556 during a standard disk based boot indicates
a failure occurred during the varyon of the rootvg volume group. This can be
the cause of
• A damaged file system
• A damaged Journaled File System log device
• A damaged IPL-device record or a damaged IPL-device magic number (the magic number indicates the device type).
• A damaged copy of the Object Data Manager (ODM) database on the boot logical volume
• A hard disk in the inactive state in the root volume group
• A damaged superblock

To diagnose and fix the problem, you will need to boot from the installation media and navigate the menus to access the volume group and start a shell before mounting the file systems.
If fsck indicates that block 8 could not be read when used,, the file system is probably unrecoverable. The easiest way to fix an unrecoverable file system is to re-create it. This involves deleting it from the system and restoring it from a backup. Note that /dev/hd4 (root file system) cannot be re-created. If /dev/hd4 is unrecoverable, you must reinstall AIX.

A corrupted ODM in the BLV is also a possible cause for these LED codes.
Another possible reason for these error codes is a corrupted superblock. If you boot in maintenance mode and get error messages, such as not an AIX.76 IBM Certification Study Guide AIX Installation and System Recovery file system, or not a recognized file system type, it is probably due to a corrupted superblock in the file system. Refer to a section "copy a superblock " in this doc for recovering a good superblock copy.

16.2.7 LED 518

The **518** LED code has an unclear definition in the Messages Guide and reference, which says :
Display Value **518**

Explanation Remote mount of the **/** (root) and **/usr** file systems during network boot did not complete successfully.
This is not the entire problem. If the system runs into problems while mounting the /usr from disk (locally, not network mount) you will get the same error. Fix this problem the same way as any other rootvg file system corruption is fixed.

See LED 517 and 518 troubleshoouting.

16.2.8 The alog command

Up until this stage, the system has not yet configured the console; so, there is
no stdout defined for the boot processes. At this stage, the alog command

comes to good use.
The alog command can maintain and manage logs. All boot information is sent through the alog. To look at the boot messages, use the following command

 # alog -ot boot

16.2.9 LEDS 0x539

At this point, the bootup_option is checked to determine if a BSD-style configuration of TCP/IP services is to be used, or if the default of ODM
supported configuration should be used. During this stage, the LED codes 538 and 539 are shown as shown in the preceding example.
Boot phase 3
So far, the following boot tasks has been accomplished
• Hardware configuration performed during BIST and / or POST
• The load of BLV
• Phase 1 where base devices are configured to prepare the system for activating the rootvg
• Phase 2 where rootvg is activated
Finally, the init process loaded from rootvg initiates phase 3.
• Phase 3 is started in /etc/inittab.
• First it will mount /tmp.
• After this, the rootvg will be synchronized. This can take some time. That is why the syncvg rootvg is executed as a background process. At this stage, the LED code 553 is shown.
• At this stage, the cfgmgr -p2 for normal boot and the cfgmgr -p3 for service mode also is executed. cfgmgr reads the Config_rules file from ODM and checks for devices with phase=2 or phase=3.
• Next, the console will be configured.
• And finally, the synchronization of the ODM in the BLV with the ODM from the / (root) file system is done by the savebase command.
When cfgcons is called, different LED codes are shown depending on which device is configured.

16.2.10 /etc/inittab

The /etc/inittab file supplies configuration scripts to the init process.
1. **c31** Console not yet configured. Provides instructions to select console.
2. **c32** Console is a lft terminal.
3. **c33** Console is a tty.
4. **c34** Console is a file on the disk.
cfgcon LED codes. Chapter 4. System boot 79
The /etc/inittab file is composed of entries that are position dependent and have the following format
Identifier RunLevel Action Command
The first line in /etc/inittab (initdefault) defines what runlevel is to be considered as a default runlevel. In this example, the runlevel is 2, which
means a normal multi-user boot. If this line is missing, you are prompted at boot to define the runlevel. You can also use the telinit command to direct a particular run level.
The rc.boot line is to be executed on all run levels (this equals runlevel 0123456789). The action defined, sysinit, has to finish before continuing with
the next line in /etc/inittab. From rc.boot 3, among a lot of other things, the rootvg is synchronized, the mirrord is started, and the /tmp directory mounted. A detailed description of /etc/inittab is provided in IBM Certification Study Guide AIX V4.3 System Support, SG24-5129.

16.2.11 LED 553

An LED value of 553 is a checkpoint code displayed to indicate the system transition to phase 3 of IPL. A halt or hang at LED 553 is often the result of a corrupted or missing **/etc/inittab** file. It can also be caused by full **/** (root) or **/tmp** file systems, inconsistencies in either startup configuration files, Object Data Manager (ODM) object class databases, or system library files. Additionally, a number of other issues involving file permissions, invalid hard links in the root file system, etc. have been observed to cause a hang at LED 553.

16.2.11.1 Summary of the recovery procedure

To attempt to isolate the cause for an LED 553 hang, start by checking the root file systems with the **fsck** command. Then check **/dev/hd3** and **/dev/hd4** for space problems, and erase files if necessary. Check the **/etc/inittab** file for corruption, and fix it if necessary. If the **inittab** file was not corrupted, you will need to check the shell profile and environment files, the **/bin/bsh** file, as well as other system configuration files. A check of the consistency of all installed files within the installed fileset base and an update of the boot image should be done. To conclude, run the configuration manager to find out if there is a hang during device configuration.

16.2.11.2 Recovery procedure

1. Boot your system into a limited function maintenance shell (Service or Maintenance mode) from AIX bootable media.

   Please refer to your system user's or installation and service guide for specific IPL procedures related to your type and model of hardware.

2. With **bootable media of the same version and level as the system**, boot the system. The bootable media can be any ONE of the following:

   - Bootable CD-ROM
   - **mksysb**
   - Bootable Install Tape

   Follow the screen prompts to the Welcome to Base OS menu.

3. Choose Start Maintenance Mode for System Recovery (Option 3). The next screen contains prompts for the Maintenance menu.

   a. Choose Access a Root Volume Group (Option 1).

      The next screen displays a warning that indicates you will not be able to return to Base OS menu without rebooting.

   b. Choose 0 continue.

      The next screen displays information about all volume groups on the system.

   c. Select the root volume group by number. The logical volumes in **rootvg** will be displayed with two options below.

   d. Choose Access this volume group and start a shell before mounting file systems (Option 2).

   If you get errors from the preceding option, do not continue with the rest of this procedure. Correct the problem causing the error. If you need assistance correcting the problem causing the error, contact your Creo support center.If no errors occur, proceed with the following steps.

4. Run the following series of commands to check and repair file systems.

   fsck /dev/hd4
   fsck /dev/hd2
   fsck /dev/hd3
   fsck /dev/hd9var
   fsck /dev/hd1

   NOTE: The **-y** option gives the **fsck** command permission to repair file system corruption when necessary. This flag can be used to avoid having to manually answer multiple confirmation prompts, however, use of this flag can cause permanent data loss in some situations.

5. To format the default **jfslog** for the **rootvg** Journaled File Systems (JFS), run the following command:

   /usr/sbin/logform /dev/hd8

   Answer yes when asked if you want to destroy the log.

6. Type exit to exit from the shell. The file systems should automatically mount after you type exit. If you receive error messages at this point, reboot into a limited function maintenance shell again to attempt to address the failure causes.

7. Use the **df** command to check for free space in **/dev/hd3** and **/dev/hd4**.

```
df  /dev/hd3
df  /dev/hd4
```

8. If the output from the **df** command shows that either file system is out of space, erase some files from that file system. Three files you may want to erase are **/smit.log**, **/smit.script** and **/.sh_history**.

9. Next, check the **/etc/inittab** file for corruption. It may be empty or missing, or it may have an incorrect entry. For comparison, see the section "Sample /etc/inittab file" at the end of this document.

10. If the **inittab** file is corrupt, set your terminal type in preparation for editing the file. (xxx stands for a terminal type, such as lft, ibm3151, or vt100.)

```
TERM=xxx
export TERM
```

Now use an editor to create the **/etc/inittab** file. For an example, see the section "Sample /etc/inittab file" in this document. If your **/etc/inittab** file was corrupt and you recreated it, the following steps may not be necessary.
There are only three entries which must be in the **/etc/inittab** file to successfully boot the system. If your **/etc/inittab** file is missing or corrupted AND you are unable to use an editor while in Service mode, do the following to create a minimal **inittab** file to boot the machine into run level 2 (Normal mode).

```
mv /etc/inittab /etc/inittab.MMYYDD
touch /etc/inittab
chmod 500 /etc/inittab
chown root:system /etc/inittab
echo 'init:2:initdefault:' >> /etc/inittab
echo 'brc::sysinit:/sbin/rc.boot 3 >/dev/console 2>&1' >> /etc/inittab
echo 'cons:0123456789:respawn:/usr/sbin/getty /dev/console' >> /etc/inittab
```

MMDDYY represents the current two-digit representation of the Month, Day and Year respectively.

11. Use the following command to check for any modifications or problems with permissions on shell startup files.

NOTE: The **/.kshrc** and **/.profile** files are not necessary for the system to boot into run level 2 (Normal mode) and, in fact, may not exist on your system.

```
ls -al /.kshrc /.profile /etc/environment /etc/profile
```

Sample output:

```
-rw-r--r--  1 root  system   71 Dec 14 1993  /.kshrc
-rw-r--r--  1 root  system  158 Dec 14 1993  /.profile
-rw-rw-r--  1 root  system 1389 Oct 26 1993  /etc/environment
-rw-r--r--  1 root  system 1214 Jan 22 1993  /etc/profile
```

etc/profile or **.profile** may contain a command that is valid only in the Korn shell. Change the command to something that is also valid in the Bourne shell. For example, change the following:

```
export PATH=/bin:/usr/bin/:/etc:/usr/ucb:.
```

to the following:

```
PATH=/bin:/usr/bin/:/etc:/usr/ucb:.
export PATH
```

/etc/environment is a special case. The only commands it may contain are simple variable assignments, such as statements of the form [*varname*]=[*value*]. Check this file with an editor to verify the format. See the section "Sample /etc/environment file" at the end of this document.

12. Check for missing or moved files, or changed ownership/permissions with the following command:

```
ls -al /bin /bin/bsh /bin/sh /lib /unix /u
```

Sample output:

```
lrwxrwxrwx 1 root sys      8 Aug 5 1994 /bin -> /usr/bin
-r-xr-xr-x 3 bin  bin 256224 Jun 4 1993 /bin/bsh
```

-r-xr-xr-x 3 bin bin 256224 Jun 4 1993 /bin/sh
lrwxrwxrwx 1 root sys 8 Aug 5 1994 /lib -> /usr/lib
lrwxrwxrwx 1 root sys 5 Aug 5 1994 /u -> /home
lrwxrwxrwx 1 root sys 18 Aug 5 1994 /unix -> /usr/lib/boot/unix

If any of these files are missing, the problem may be a missing symbolic link. Use the commands from the following list that correspond to the missing links.

ln -s /usr/bin /bin
ln -s /usr/lib/boot/unix /unix
ln -s /usr/lib /lib
ln -s /home /u

13. Use the following command to make sure that **fsck** and **rc.boot** are not missing or corrupt.

ls -l /etc/fsck /sbin/rc.boot

Sample output:

lrwxrwxrwx 1 root system 14 Aug 5 1994 /etc/fsck -> /usr/sbin/fsck
-rwxrwxr-- 1 root system 33760 Aug 30 1993 /sbin/rc.boot

14. Make sure the **/etc/inittab** file is for AIX Version 4. For this version, the line that begins with brc is

brc::sysinit:/sbin/rc.boot 3 >/dev/console 2>&1

See the section "Sample /etc/inittab file" in this document for an example.

15. If you have not found any obvious problems, try substituting **ksh** for **bsh** with the following series of commands. (The first command saves your **bsh** before you copy over it.)

cp /bin/bsh /bin/bsh.orig
cp /bin/ksh /bin/bsh

If you can then reboot successfully, this indicates that one of the profiles was causing problems for **bsh**. Check the profiles again by running the following:

/bin/bsh.orig /.profile
/bin/bsh.orig /etc/profile
/bin/bsh.orig /etc/environment

If you receive errors with any of the preceding commands, this indicates that there is a command in that profile that **bsh** cannot handle.

16. To run a checksum validation of all files in the installed fileset base and a consistency check of the fileset installation, run the following commands:

lppchk -c
lppchk -v

NOTE: These commands should not produce output. If they do, then the messages should be examined to assess whether it is a potential cause of the hang.

17. Detemine the boot drive and update the boot image with the following command:

18. lslv -m hd5

Sample output:

hd5:N/A
LP PP1 PV1 PP2 PV2 PP3 PV3
0001 0001 hdisk0

The disk number under the PV1 column is the disk name you should use to run the following two commands:

bosboot -ad /dev/hdisk0
bootlist -m normal hdisk0

19. To check the device configuration routines, the following command should identify any problems associated with configuration routines:

cfgmgr -vp 2

If the **cfgmgr** command hangs, this is likely the cause of the system hang. You may be able to stop the command by pressing Ctrl-C, however, a reboot is often required to get back into Service mode and continue troubleshooting the problem.

20. If your model has a mode select key, turn it to the Normal position.

21. Attempt to reboot the system into Normal mode by running the following command:

sync;sync;sync;reboot

- If you followed all of the preceding steps and the system still stops at an LED 553 during a reboot in Normal mode, you may want to consider reinstalling your system from a recent backup. Isolating the cause of the hang could be excessively time-consuming and may not be cost-effective in your operating environment. It is possible, in the end, that isolation of the problem may indicate a restore or reinstall of AIX is necessary to correct it.

16.2.11.3 Sample /etc/inittab file for AIX Versions 4 and 5

```
#45 2 * * 0 /usr/lib/spell/compress
#45 23 * * * ulimit 5000; /usr/lib/smdemon.cleanu > /dev/null
0 11 * * * /usr/bin/errclear -d S,O 30
0 12 * * * /usr/bin/errclear -d H 90
0 3 * * *  /scitex/version/scripts/rebuild_desktop.sh now
0 4 * * *  /scitex/version/scripts/cron.scr
0 3 * * * /etc/skulker
0 2 * * * /scitex/version/scripts/rebuild-s.sh
#0 3 * * * /scitex/version/scripts/rebuildRunner.ksh
0 1 * * * /scitex/version/scripts/find_new.sh
```

16.2.12 LED c31

LED **c31** is not really an error code, but the system is waiting for input from you on the keyboard. This is usually encountered when booting from CD-ROM or mksysb tape. This is normally the dialog to select the system console.

16.2.13 System hangs at c33 with an LFT.

Solution:
c33 is configuring the console as a **tty**. Typcially this occurs because the console is configured as a **tty** but has no **tty**. In this situation, when booting into service mode and executing an **lscons**, the console will show up as an **lft**. To verify that this is the case, enter **smitty chcons**. PATHNAME of console will be set to **/dev/tty0**. Change the pathname to **/dev/lft0** and reboot your system.

16.3 Boot phases summary

The next sections provide short summaries of the boot phases and some common LED codes.

16.3.1 Boot phases

BIST and POST are used to test hardware and to find a successful hardware
path to a BLV.
Boot phase 1 (init rc.boot 1) is used to configure base devices.
Boot phase 2 (init rc.boot 2) is used to activate the rootvg.
Boot phase 3(init /sbin/rc.boot 3) is used to configure the rest of devices.

16.3.2 4.6.2 LED codes

LED codes shown during POST on a MCA system are listed in Table 11.
100 - 195 Hardware problem during BIST
200 Key mode switch in secure position
201 1. If LED 299 passed re-create the BLV
If LED **299** has not passed, POST encountered a hardware error. Chapter 4. System boot 81
221,721,221 - 229,223 - 229,225 - 229,233 - 235
The bootlist in NVRAM is incorrect (boot from media and change the bootlist), or
the bootlist device has no bootimage (boot from media and recreate the BLV), or the bootlist device is unavailable (check for hardware errors).
LED Reason / Action
551,555, 557
1. Corrupted file system
(fsck -y <device>)
2. Corrupted jfslog
(/usr/sbin/logform /dev/hd8)
3. Corrupted BLV - (bosboot -ad <device>)
552,554,556

The ipl_varyon failed. Except for the reason mentioned above (551, 555, or 557)
1. Corrupted ODM
(backup ODM, recreate with savebase)
2. Superblock dirty
(Copy in superblock from block 31)
518 /usr cannot be mounted
1. If /usr should be mounted over the network
(check for network problem)
2. If /usr is to be mounted locally
(fix the file system)
LED Reason / Action
553 Syntax error in /etc/inittab
c31 Define the console

17. Appendix G - Brisque processes – Ver 4.X

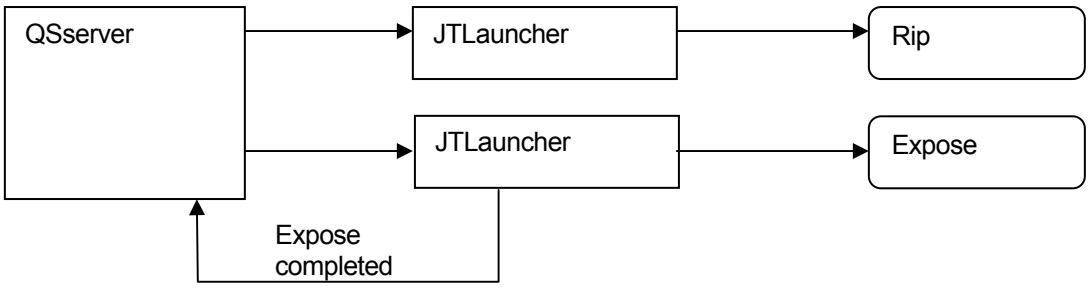
17.1 Overview

Process name	Principle	Files involved	Output log
QSserver	1. Started within login to Brisque 2. Launches all processes that are tracked in the Queue Manager (Rip, FAF Expose, etc.) 3. Communicates with Q Manager Clients (local and on MacFE)	1. /scitex/version/config/jt.config - configuration file for Queue Server (should be never changed) 2. /scitex/version/config/QS_backup – persistent storage for Queue lists. In the case that Queue is corrupted and crashes logout-login , it's recommended to remove this file.	/scitex/version/logs/start.ScitexServers.log
JTLauncher	Launches Brisque Steps (like Rip) and waits for its completion		
HFdaemon	Hot Folder daemon – triggers "job tickets" when file is copied or moved to Hot Folder or printed via Brisque spoolers	/scitex/version/config/hotFolder/HotFolder.ans /scitex/version/config/hotFolder/ReportConf.ans - configuration files (should be never changed)	
All processes		/scitex/version/logs/rmFiles.log – log file for almost all files that are removed by Brisque applications. Maybe useful for trouble shooting.	

17.2 Brisque4 Queue (Ver 4)

The main responsibility of Brisque Queue server (/scitex/version/progs/QSserver) process is to launch all Brisque operations (Rip, FAF, expose, proof, etc.).
In addition, Q Server is updates all connected Q Manager clients (Brisque or MAC FE) and manages the BIG (export to Excel) status.

In order to launch an operation, Queue Server executes an additional process - /scitex/version/progs/JTLaunhcer, that, in turn, executes the operation itself.
That means that for each operation that is running in the Queue, there is additional process that runs and could be seen in 'ps' command.



When the operation is completed or failed, JTLauncher sends a message to Queue Server with the completion status.
When the entire job ticket is finished, Queue Server removes the files related to this job according to the completion policy defined in the Job Ticket Template.

Each change in the Queue like is saved to the hard disk so that after the system re-starts all the jobs are restored in the Queue. (/scitex/version/config/QS_backup)

18. Appendix H - smit fast paths

The following list provides a quick reference to many SMIT fast paths. In this list, its associated fast path in parentheses follows a SMIT menu name.
Enter the word **smit** and the fast path shown to go directly to its associated menu.

18.1 • Software Installation and Maintenance **(install)**

- Install and Update Software **(install_update)**
- Install and Update from LATEST Available Software **(install_latest)**
- Update Installed Software to Latest Level (Update All) **(install_all)**
- Install and Update Software by Package Name (includes devices and printers) **(install_package)**
- Install Software Bundle (Easy Install) **(install_bundle)**
- Update Software by Fix (APAR) **(update_by_fix)**
- Install and Update from ALL Available Software **(install_all)**
- List Software and Related Information **(list_software)**
- Software Maintenance and Utilities **(maintain_software)**
- Commit Applied Software Updates (Remove Saved Files) **(commit)**
- Reject Applied Software Updates (Use Previous Version) **(reject)**
- Remove Installed Software **(remove)**
- Copy Software to Hard Disk for Future Installation **(bffcreat**e)
- Check Software File Sizes After Installation **(check_files)**
- Verify Software Installation and Requisites **(verify_install)**

18.2 • Network Installation Management **(nim_client)**

18.3 • System Backup Manager **(backsys)**

- Back Up the System **(mksysb)**
- List Files in a System Image **(lsmksysb)**
- Restore Files in a System Image **(restmksysb)**

18.4 • Software License Management **(licences)**

- Manage Nodelocked Licenses **(manage_nodelocked)**
- Manage License Servers and License Databases **(manage_servers)**
- Show License Usage on Servers **(show_server_status)**

18.5 • Devices **(dev)**

- Install/Configure Devices Added After IPL **(cfgmgr)**
- Printer/Plotter **(printer)**
- Printer/Plotter Devices **(pdp)**

Add a Printer/Plotter **(makprt)**
Move a Printer/Plotter to Another Port **(movprt)**
Change / Show Characteristics of a Printer/Plotter **(chgprt)**
Remove a Printer/Plotter **(rmvprt)**
Install Additional Printer/Plotter Software **(printerinst)**

- Print Spooling **(spooler)**
- TTY **(tty)**
- PTY **(pty)**
- Console **(console)**
- Fixed Disk **(disk)**
- CD ROM Drive **(cdrom)**
- Read/Write Optical Drive **(rwopt)**
- Diskette Drive **(diskette)**
- Tape Drive **(tape)**
- Communication **(commodev)**
- Graphic Displays **(g_display)**

• Graphic Input Devices **(input)**
• Low Function Terminal (LFT) **(lft)**
• SCSI Initiator Device **(scsiid)**
• SCSI Adapter **(scsia)**
• Asynchronous I/O **(aio)**
• Multimedia **(mm)**
• List Devices **(lsattr)**
• Install Additional Device Software **(devinst)**

18.6 • System Storage Management (Physical & Logical Storage) **(storage)**

• Logical Volume Manager **(lvm)**
• Volume Groups **(vg)**
• Logical Volumes **(lv)**
• Physical Volumes **(pv)**
• Paging Space **(pgsp)**
Add Another Paging Space **(mkps)**
Change / Show Characteristics of a Paging Space **(chps)**
Remove a Paging Space **(rmps)**
Activate a Paging Space **(swapon)**
• File Systems **(fs)**
• Add / Change / Show / Delete File Systems **(manfs)**
• Mount a File System **(mountfs)**
• Mount a Group of File Systems **(mountg)**
• Unmount a File System **(umountfs)**
• Unmount a Group of File Systems **(umountg)**
• Verify a File System **(fsck)**
• Backup a File System **(backfilesys)**
• Restore a File System **(restfilesys)**
• List Contents of a Backup **(listtoc)**
• Files & Directories **(filemgr)**
• Backup a File or Directory **(backfile)**
• Restore a File or Directory **(restfile)**

18.7 • System Backup Manager **(backsys)**

18.8 • Security & Users **(security)**

• Users **(users)**
• Add a User **(mkuser)**
• Change a User's Password **(passwd)**
• Change / Show Characteristics of a User **(chuser)**
• Lock / Unlock a User's Account **(lockuser)**
• Reset User's Failed Login Count **(failed_login)**
• Remove a User **(rmuser)**
• Groups **(groups)**
• Passwords **(passwords)**
• Login Controls **(login)**
• Roles **(roles)**

18.9 • Communications Applications and Services **(commo)**

• TCP/IP **(tcpip)**
• Minimum Configuration & Startup **(mktcpip)**
• Further Configuration **(configtcp)**
• Use DHCP for TCPIP Configuration & Startup **(usedhcp)**
• IPV6 Configuration **(configtcp6)**
• NFS **(nfs_menu) (NFS)**
• CIFS/SMB **(smb)**
• Print Spooling **(spooler)**
• Start a Print Job **(qprt)**
• Manage Print Jobs **(jobs)**

• Manage Print Queues **(pqmanage)**
• Add a Print Queue **(mkpq)**
• Add an Additional Printer to an Existing Print Queue **(mkpqprt)**
• Change / Show Print Queue Characteristics **(chpq)**
• Change / Show Printer Connection Characteristics **(chprtcom)**
• Remove a Print Queue **(rmpq)**
• Manage Print Server **(server)**
• Programming Tools **(pqtools)**

18.10 • Problem Determination **(problem)**

• Error Log **(error)**
• Generate Error Report **(errpt)**
• Change / Show Characteristics of the Error Log **(errdemon)**
• Clean the Error Log **(errclear)**
• System Dump **(dump)**
• Change the Primary Dump Device **(dumpchgp)**
• Change the Secondary Dump Device **(dumpchgs)**
• Alog **(alog)**
• Hardware Diagnostics **(diag).**• Verify Software Installation and Requisites **(verify_install)**
• Performance & Resource Scheduling **(performance)**
• Resource Status & Monitors **(monitors)**
• Analysis Tools **(analysis)**
• Resource Controls **(controls)**
• Schedule Jobs **(at)**

18.11 • System Environments **(system)**

• Stop the System **(shutdown)**
• Assign the Console **(chcons)**
• Change / Show Date and Time **(chtz_date)**
• Manage Language Environment **(mlang)**
• Change / Show Characteristics of Operating System **(chgsys)**
• Change / Show Number of Licensed Users **(chlicense)**
• Manage AIX Floating User Licenses for this Server **(netls_server)**
• Broadcast Message to all Users **(wall)**
• Manage System Logs **(logs)**
• Change / Show Characteristics of System Dump **(dump)**
• Internet and Documentation Services **(web_configure)**
• Change System User Interface **(dt_config)**
• Manage Remote Reboot Facility **(rrbtty)**
• Processes & Subsystems **(src)**
• Processes **(process)**
• Subsystems **(subsys)**
• Subservers **(subserver)**

19. Appendix I - Performance tools

19.1 nmon

This free tool is part of Brisque5 and BrisqueServe 4.0.37 versions, gives you a huge amount of information all on one screen. Even though IBM doesn't officially support the tool and you must use it at your own risk, you can get a wealth of performance statistics.

The nmon tool is also being tested with older versions of AIX. The tool is updated roughly every six months or when AIX releases are available.

19.1.1 Introduction

The **nmon** tool is designed for AIX and IBM eServer pSeries performance specialists to use for analyzing AIX performance data, including the following:

- CPU utilization
- Memory use
- Kernel statistics and run queue information
- Disks I/O rates, transfers, and read/write ratios
- Free space on file systems
- Disk adapters
- Network I/O rates, transfers, and read/write ratios
- Paging space and paging rates
- CPU and AIX specification
- Top processors
- IBM HTTP web cache

19.1.2 Benefits of the tool

The **nmon** tool is helpful in presenting all the important performance tuning information on one screen and dynamically updating it. The tool works on any dumb screen, telnet session, or even dial-up line. In addition, the tool is very efficient. It does not consume many CPU cycles, usually below 2%. On newer machines, CPU usage is well below 1%.

Data is displayed on the screen and updated once every two seconds using a dumb screen. However, you can easily change this interval to a longer or shorter time period. If you display the data on X-Windows via telnet and stretch the window, nmon can output a great of information all in one place.

The nmon tool can also capture the same data to a text file for later analysis and graphing for reports. The output is in a spreadsheet format (.csv).

19.1.3 Installing the tool on earlier Brisque and BrisqueServe versions

The tool is one standalone binary file that you can install in five seconds, probably less if you type fast. Installation is simple:

- Copy the nmon6f.tar file to the AIX RS/6000 or pSeries machine
- Run tar xvf nmon.tar
- Start the tool by typing the command nmon
- If you are the root user you may need to type ./nmon

19.1.4 Using the tool

You must be the root user or allow regular users to read the /dev/kmem file by typing the following command (as root):

chmod ugo+r /dev/kmem

If you want the disk statistics, then also run (as root):

chdev -l sys0 -a iostat=true

19.1.5 To run interactively

For running the tool interactively, read the front page of the file for a few hints. Then start the tool and use the one-key commands to see the data you want. For example, to get **C**pu, **M**emory, and **D**isk statistics, start nmon and type:

cmd

19.1.6 To get help information while running interactively

Press the h key.

19.1.7 To get more help information

- For brief details, type nmon -?
- For full details, type nmon -h

19.1.8 To capture the data to a file for later analysis and graphing

Run nmon with the -f flag. See nmon -h for the details, but as an example, to run nmon for an hour capturing data snapshots every 30 seconds use:

nmon -f -s 30 -c 120

This will create the output file in the current directory called

<hostnmae>_date_time.nmon

Before this file can be loaded into a spreadsheet, it needs to be sorted. On AIX, follow this example:

sort -A mymachine_311201_1030.nmon > xxx.csv

Notes:

1. To load this into a spreadsheet, check the spreadsheet documentation for loading comma-separated data files. Many spreadsheets accept this data as just one of the possible files to load or provide an import function to do this.

2. Many spreadsheets have fixed numbers of columns and rows. We suggest you collect a maximum of 300 snapshots to avoid hitting these issues.

3. When you are capturing data to a file, the nmon tool disconnects from the shell to ensure that it continues running even if you log out. This means that nmon can appear to crash, but it is still running in the background.

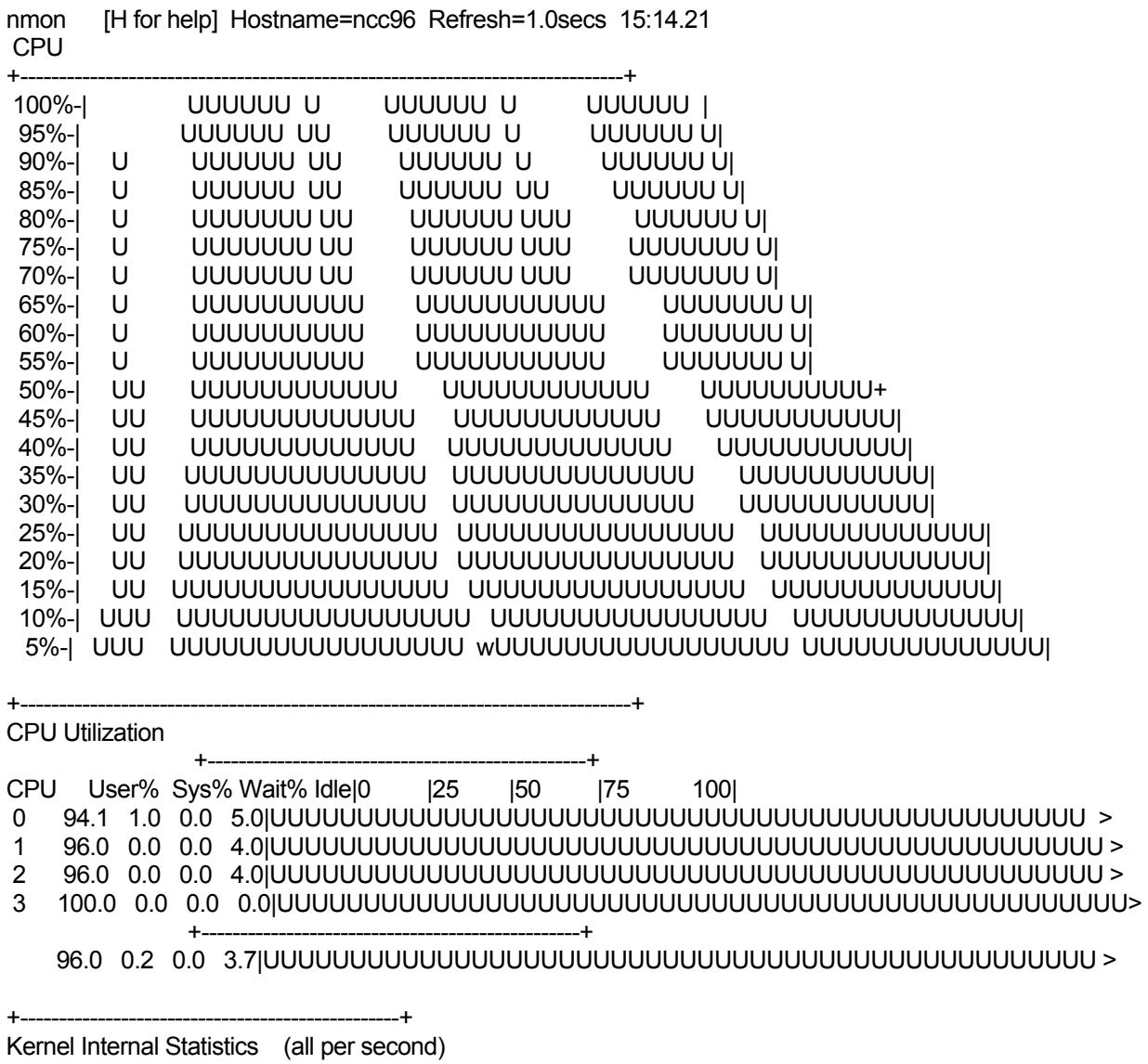
19.1.9 Obtaining the tool

You can FTP the tool (nmon6g.tar) from the download page.

As noted previously, nmon is for 32-bit AIX kernels (both 32- and 64-bit hardware) and nmon64 is for the 64-bit AIX kernels (currently only AIX 5.1).

19.1.10 Sample output

Following is a sample of the screen output:



```
pswitch =   44.7   syscall=   56.6  rawch =     1.0   canch =    0.0
fork    =    4.0   read   =   17.9  dirblk=     0.0   outch = 1030.5
exec    =    0.0   write  =    2.0  readch = 2188.1
msg     =    0.0   sem    =    0.0  writech= 1029.5
Network I/O
I/F Name Recv  Trans kB/s  packin  packout  insize  outsize
    lo0  0.0   0.0         0.0     0.0     0.0     0.0
    tr0  0.6   1.2         8.9     3.0    68.2   411.0
Adapter I/O    read  write      xfers  Adapter Type
10-60          0.0    0.0 kB/s   0.0 Wide/Fast-20 SCSI I/O Controller
Disk I/O
DiskName Busy  Read  Write   |0         |25         |50         |75        100|
hdisk1    0%    0.0    0.0 kB|>                                   |
hdisk2    0%    0.0    0.0 kB|>                                   |
hdisk3    25% 111.0  130.0 kB|WWWWWWRRRRRR>                                |
hdisk3    21%  13.0  201.0 kB|WWWWWWWWWRR>                                 |
hdisk5    0%    0.0    0.0 kB|>                                   |
hdisk4    0%    0.0    0.0 kB|>                                   |
cd0       0%    0.0    0.0 kB|>                                  |
Top Processes Processes=49 mode=3 (1=Basic, 2=CPU 3=Perf. w=wait-procs)
PID   %CPU    Size  Res  Res    Res   Char  RAM    Paging       Command
      Used     K   Set  Text   Data   I/O  Use io other repage
 11730  11.9    96    32    16    16 38576  0%    0   17    0 pmon
 11384   1.0   744   860    76   784  3184  0%    0    0    0 nmon
  1548   0.0    12 14044 14032    12     0  5%    0    0    0 lrud
  1806   0.0    16 14048 14032    16     0  5%    0    0    0 xmgc
  2064   0.0    16 14048 14032    16     0  5%    0    0    0 netm
  2322   0.0    64 14096 14032    64     0  5%    0    0    0 gil = TCP/IP
  2580   0.0    16 14048 14032    16     0  5%    0    0    0 wlmsched
  3222   0.0   144   164     4   160     0  0%    0    0    0 syncd
```

19.2 Topas

19.2.1 Topas fields

The **topas** command reports selected statistics about the activity on the local system. The command uses the curses library to display its output in a format suitable for viewing on an 80x25 character based display or in a window of at least the same size on a graphical display. The **topas** command requires the **perfagent.tools** fileset to be installed on the system.

If the **topas** command is invoked without flags, it runs as if invoked with the command line topas -d5 -i2 -n2 -p16

The program extracts statistics from the system with an interval specified by the *monitoring_interval_in_seconds* argument. The output, as shown below, consists of a two fixed parts and a variable section. The top seven lines at the left of the display shows the name of the system **topas** runs on, the date and time of the last observation, and the monitoring interval. Following this is a section that lists the cpu utilization in numeric and block-graph format.

The second fixed part fills the rightmost 32 positions of the display. It contains five subsections of statistics, as follows

EVENTS/QUEUES Displays the per-second frequency of selected system-global events and the average size of the thread run- and wait queues

Cswitch
The number of context switches per second over the monitoring interval.

Syscalls
The total number of system calls per second executed over the monitoring interval.

Reads
The number of read system calls per second executed over the monitoring interval.

Writes
The number of write system calls per second executed over the monitoring interval.

Forks
The number of fork system calls per second executed over the monitoring interval.

Execs
The number of exec system calls per second executed over the monitoring interval.

Runqueue
The average number of threads that were ready to run but were waiting for a processor to become available.

Waitqueue
The average number of threads that were waiting for paging to complete.

FILE/TTY Displays the per-second frequency of selected file and tty statistics.

Readch
The number of bytes read per second through the **read** system call over the monitoring interval.

Writech
The number of bytes written per second through the **write** system call over the monitoring interval.

Rawin
The number of raw bytes read per second from TTYs over the monitoring interval.

Ttyout
The number of bytes written to TTYs per second over the monitoring interval.

Igets
The number of calls per second to the inode lookup routines over the monitoring interval.

Namei
The number of calls per second to the pathname lookup routines over the monitoring interval.

Dirblk
The number of directory blocks scanned per second by the directory search routine over the monitoring interval.

PAGING Displays the per-second frequency of paging statistics.

Faults
Total number of page faults taken per second over the monitoring interval. This includes page faults that do not cause paging activity.

Steals
Physical memory 4K frames stolen per second by the virtual memory manager over the monitoring interval.

PgspIn
Number of 4K pages read from paging space per second over the monitoring interval.

PgspOut
Number of 4K pages written to paging space per second over the monitoring interval.

PageIn
Number of 4K pages read per second over the monitoring interval. This includes paging activity associated with reading from file systems. By subtracting **PgspIn** from this value you get the number of 4K pages read from file systems per second over the monitoring interval.

PageOut
Number of 4K pages written per second over the monitoring interval. This includes paging activity associated with writing to file systems. By subtracting **PgspOut** from this value you get the number of 4K pages written to file systems per second over the monitoring interval.

Sios
The number of I/O requests per second issued by the virtual memory manager over the monitoring interval.

MEMORY Displays the real memory size and the distribution of memory in use.

Real,MB
The size of real memory in megabytes.

% Comp
The percentage of real memory currently allocated to computational page frames. Computational page frames are generally those that are backed by paging space.

% Noncomp
The percentage of real memory currently allocated to non-computational frames. Non-computational page frames are generally those that are backed by file space, either data files, executable files, or shared library files.

% Client
The percentage of real memory currently allocated to cache remotely mounted files.

PAGING SPACE Display size and utilization of paging space.

Size,MB
The sum of all paging spaces on the system, in megabytes.

% Used
The percentage of total paging space currently in use.

% Free
The percentage of total paging space currently free.

The variable part of the **topas** display can have one, two, or three subsections. If more than one appears, they are always shown in the following order

- Network Interfaces
- Physical Disks
- Processes

Network Interfaces Lists the selected number of network interfaces. The interfaces are ordered after the activity over the monitoring interval. The interface that transferred most bytes (sum of bytes read and written) over the interval is listed first. For each network interface the following fields are displayed

Interf
The name of the network interface.

KBPS
The total throughput in megabytes per second over the monitoring interval. This field is the sum of kilobytes received and kilobytes sent per second.

I-Pack
The number of data packets received per second over the monitoring interval.

O-Pack
The number of data packets sent per second over the monitoring interval.

KB-In
The number of kilobytes received per second over the monitoring interval.

KB-Out
The number of kilobytes sent per second over the monitoring interval.

Physical Disks Lists the selected number of physical disks. The disks are ordered after the activity over the monitoring interval. The interface that was most busy over the interval is listed first. For each disk the following fields are displayed

Disk
The name of the physical disk.

Busy%
Indicates the percentage of time the physical disk was active (bandwidth utilization for the drive).

KBPS
The number of kilobytes read and written per second over the monitoring interval. This field is the sum of **KB-Read** and **KB-Read**.

TPS
The number of transfers per second that were issued to the physical disk. A transfer is an I/O request to the physical disk. Multiple logical requests can be combined into a single I/O request to the disk. A transfer is of indeterminate size.

KB-Read
The number of kilobytes read per second from the physical disk.

K -Writ
The number of kilobytes written per second to the physical disk.

Processes Lists the selected number of processes or as many as will fit on the display. The processes are ordered after their cpu usage over the monitoring interval. The process that consumed the most cpu over the interval is listed first. For each process the following fields are displayed

Name
The name of the executable program executing in the process. The name is stripped of

any pathname and argument information and truncated to 9 characters in length.

Process ID

The process ID of the process.

% CPU Utilization

The average cpu utilization of the process over the monitoring interval. The first time a process is shown, this value will be the average cpu utilization over the lifetime of the process.

Paging Space Used

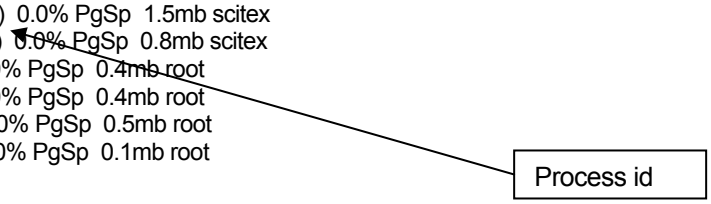
The size of the paging space allocated to this process. This can be considered an expression of the footprint of the process but does not include the memory used to keep the executable program and any shared libraries it may depend on.

Process Owner

The user name of the user that owns the process.

19.2.2 Topas sample output

```
 Topas Monitor for host     bnc3              EVENTS/QUEUES    FILE/TTY
Wed Nov 21 12 09 29 2001   Interval  2       Cswitch     89  Readch    14305
                                             Syscall     512  Writech     295
Kernel    0.2  |                                          | Reads       110  Rawin        0
User      1.2  |                                          | Writes        0  Ttyout      295
Wait      0.0  |                                          | Forks         0  Igets        0
Idle     98.5  |################################          | Execs         0  Namei         0
                                             Runqueue    0.0  Dirblk       0
Interf   KBPS   I-Pack  O-Pack   KB-In  KB-Out  Waitqueue   2.0
en1       0.3     1.4     0.4     0.0     0.3
et1       0.1     1.9     0.0     0.1     0.0  PAGING          MEMORY
                                             Faults        0  Real,MB     511
Disk    Busy%     KBPS     TPS KB-Read KB-Writ  Steals       0  % Comp     30.4
hdisk0    0.0      0.0     0.0     0.0     0.0  PgspIn       0  % Noncomp  38.4
hdisk1    0.0      0.0     0.0     0.0     0.0  PgspOut      0  % Client    0.5
hdisk2    0.0      0.0     0.0     0.0     0.0  PageIn       0
hdisk3    0.0      0.0     0.0     0.0     0.0  PageOut      0  PAGING SPACE
                                             Sios          0  Size,MB     832
OutputSer(23740)  0.4% PgSp  0.5mb scitex                    % Used      0.7
OutputCon(23250)  0.2% PgSp  0.7mb scitex                    % Free     99.2
PMsgServe(20134)  0.2% PgSp  0.8mb scitex
QSserver (26592)  0.2% PgSp  1.3mb scitex
HFdaemon (19218)  0.1% PgSp  0.4mb root          Press "h" for help screen.
topas    (27180)  0.1% PgSp  0.5mb root          Press "q" to quit program.
StoreManS(22192)  0.1% PgSp  1.2mb scitex
timesrv  (13932)  0.0% PgSp  0.2mb root
MacFEServ(28126)  0.0% PgSp  1.5mb scitex
ODBServer(29964)  0.0% PgSp  0.8mb scitex
tcsh     (28526)  0.0% PgSp  0.4mb root
ksh      (27712)  0.0% PgSp  0.4mb root
telnetd  (24312)  0.0% PgSp  0.5mb root
syncd    (3914)   0.0% PgSp  0.1mb root
```



If you want to kill a certain process from the list (in this example - syncd) - use
#kill 28126
Tip expand the display window to a full screen to see all the entries.

20. Appendix K - Hardware issues

See the following link for all parts :
http://techplanet.creo.com/software_solutions/workflow_software/brisque/content/parts/Brisque_parts.pdf

20.1 PCI slots - factory configuration (Brisque)

	E30	43P-140	43P-150	F50	44P-170	6F1
System ports	SCSI (F&W)*	SCSI (F&W)*	SCSI (Ultra)*	SCSI (F&W) *	SCSI (Ultra) *	SCSI (Ultra) *
				SCSI (F&W) **	SCSI (Ultra2) **	SCSI (Ultra2) **
					Ethernet	Ethernet
PCI slots	1- Graphics	1- Graphics	1- Graphics	1- SCSI *	1 -(3.3V only)	12- (3.3V / 5V) -
	2- Ethernet	2- Ethernet	2- Ethernet	2- Ethernet	2- (3.3V only)	11- (3.3V / 5V)
	3- SFL	3- TSP/SFL	3- TSP/SFL	3- Graphics	3- (3.3V / 5V)	10- (3.3V only)
	4-Rotation**	4-Rotation**	4-Rotation**	4-Lanc/Giga **	4- (3.3V / 5V) - TSP	9- (3.3V only) - SCSI LVD *
	5-LANC**	5- SCSI**	5- SCSI**	5- SFL/TSP	5- (3.3V / 5V)	8 -(3.3V only)
	6-SCSI**			6-	6- (3.3V / 5V) - Graphics	7- (3.3V / 5V) - TSP
				7-		6 (3.3V / 5V) - Graphics
				8-		5- (3.3V only) -
				9-		4- (3.3V only) -
						3- (3.3V only) -

20.2 PCI slots - factory configuration (Brisque Serve)

44P-170	6F1
SCSI (Ultra) *	SCSI (Ultra) *
SCSI (Ultra2) **	SCSI (Ultra2) **
Ethernet	Ethernet
1 -(3.3V only) -Gigabit	12- (3.3V / 5V) -
2- (3.3V only) - FC adapter	11- (3.3V / 5V)
3- (3.3V / 5V)	10- (3.3V only) – Gigabit **
4- (3.3V / 5V) -	9- (3.3V only) - FC adapter **
5- (3.3V / 5V) - SCSI LVD *	8 -(3.3V only) - FC adapter
6- (3.3V / 5V) - Graphics	7- (3.3V / 5V) -
	6 (3.3V / 5V) - Graphics
	5- (3.3V only) - Gigabit
	4- (3.3V only) - SCSI LVD *
	3- (3.3V only) - SCSI LVD **

*- for internal SCSI devices
** - (optional)
3.3V / 5V - for IBM or Creo boards 3.3V only - not for Creo boards

20.3 PCI slots - location codes

	E30	**43P-140**	**43P-150**	**F50**	**44P-170**	**6F1**	**6E4**	**6E3**
Slot #1	04-01	04-01	1P-08	20-58	20-58	31-08	1V-08	1Z-08
Slot #2	04-02	04-02	10-b0	20-60	20-60	34-08	1H-08	1c-08
Slot #3	04-03	04-03	10-90	10-68	10-68	38-08	1n-08	1f-08
Slot #4	04-04	04-04	1P-18	10-70	10-70	3A-08	1Z-08	1n-08
Slot #5	04-05	04-05	1P-10	10-78	10-78	27-08	1D-08	1H-08
Slot #6	04-06	-----	-----	30-60	10-88	2A-08	11-08	1V-08
Slot #7	-----	-----	-----	30-68	-----	2D-08	-----	-----
Slot #8	-----	-----	-----	30-70	-----	14-08	-----	-----
Slot #9	-----	-----	-----	30-78	-----	17-08	-----	-----
SCSI port #1	04-C0	04-C0	10-80	10-60	10-60	11-08	1S-08	1S-08
SCSI port #2	-----	-----	-----	30-58	10-61	11-09	1S-09	
SCSI port #3	-----	-----	-----	-----	-----	-----	1c-08	
Ethernet port #1	-----	04-B0	10-60	10-80	10-80	1A-08	1L-08	1L-08
Ethernet port #2	-----	-----	-----	-----	-----	-----	14-08	1j-08 1GB
ide0	-----	-----	-----	-----	-----	-----	1G-19	1G-19

21. Appendix L - SCSI ASC/ASCQ Assignments

21.1 Overview

It happens that **errpt –a** will show the following scsi information:

Detail Data
SENSE DATA
0602 0000 1510 0000 0C00 0000 0000 0000 0102 0000 **7000** 0300 0000 0014 0000 0000
3B08 0000 4400 0000 0000 0308 BCEC 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

7000 or F000 (byte0 = **red**) in this position means that the sense data is valid and worth cheking for ASC/ASCQ info. Then bytes 12+13 (ASC/ASCQ -**blue**) should be searched using the table below to get an idea on the scpecific device problem.
In this example **3B08** will means:

3B/08h T REPOSITION ERROR

21.2 Numeric Sorted Listing

```
      D - DIRECT ACCESS DEVICE (SBC-2)              device column key
      .T - SEQUENTIAL ACCESS DEVICE (SSC)           ------------------
      . L - PRINTER DEVICE (SSC)                  blank = reserved
      .  P - PROCESSOR DEVICE (SPC)                 not blank = allowed
      .  .W - WRITE ONCE READ MULTIPLE DEVICE (SBC-2)
      .  . R - CD DEVICE (MMC)
      .  .  S - SCANNER DEVICE (SCSI-2)
      .  .  .O - OPTICAL MEMORY DEVICE (SBC-2)
      .  .  . M - MEDIA CHANGER DEVICE (SMC)
      .  .  .  C - COMMUNICATION DEVICE (SCSI-2)
      .  .  .  .A - STORAGE ARRAY DEVICE (SCC)
      .  .  .  . E - ENCLOSURE SERVICES DEVICE (SES)
      .  .  .  .  B - SIMPLIFIED DIRECT-ACCESS DEVICE (RBC)
      .  .  .  .  .K - OPTICAL CARD READER/WRITER DEVICE (OCRW)
ASC/ASCQ DTLPWRSOMCAEBK  Description
-------  --------------  -----------------------------------------------------
00/00h  DTLPWRSOMCAEBK  NO ADDITIONAL SENSE INFORMATION
00/01h   T              FILEMARK DETECTED
00/02h   T   S          END-OF-PARTITION/MEDIUM DETECTED
00/03h   T              SETMARK DETECTED
00/04h   T   S          BEGINNING-OF-PARTITION/MEDIUM DETECTED
00/05h   TL  S          END-OF-DATA DETECTED
00/06h  DTLPWRSOMCAEBK  I/O PROCESS TERMINATED
00/11h      R           AUDIO PLAY OPERATION IN PROGRESS
00/12h      R           AUDIO PLAY OPERATION PAUSED
00/13h      R           AUDIO PLAY OPERATION SUCCESSFULLY COMPLETED
00/14h      R           AUDIO PLAY OPERATION STOPPED DUE TO ERROR
00/15h      R           NO CURRENT AUDIO STATUS TO RETURN
00/16h  DTLPWRSOMCAEBK  OPERATION IN PROGRESS
00/17h  DTL WRSOM AEBK  CLEANING REQUESTED
```

00/18h T ERASE OPERATION IN PROGRESS
00/19h T LOCATE OPERATION IN PROGRESS
00/1Ah T REWIND OPERATION IN PROGRESS
00/1Bh T SET CAPACITY OPERATION IN PROGRESS
00/1Ch T VERIFY OPERATION IN PROGRESS
01/00h D W O BK NO INDEX/SECTOR SIGNAL
02/00h D WR OM BK NO SEEK COMPLETE
03/00h DTL W SO BK PERIPHERAL DEVICE WRITE FAULT
03/01h T NO WRITE CURRENT
03/02h T EXCESSIVE WRITE ERRORS
04/00h DTLPWRSOMCAEBK LOGICAL UNIT NOT READY, CAUSE NOT REPORTABLE
04/01h DTLPWRSOMCAEBK LOGICAL UNIT IS IN PROCESS OF BECOMING READY
04/02h DTLPWRSOMCAEBK LOGICAL UNIT NOT READY, INITIALIZING COMMAND REQUIRED
04/03h DTLPWRSOMCAEBK LOGICAL UNIT NOT READY, MANUAL INTERVENTION REQUIRED
04/04h DTL R O B LOGICAL UNIT NOT READY, FORMAT IN PROGRESS
04/05h DT W OMCA BK LOGICAL UNIT NOT READY, REBUILD IN PROGRESS
04/06h DT W OMCA BK LOGICAL UNIT NOT READY, RECALCULATION IN PROGRESS
04/07h DTLPWRSOMCAEBK LOGICAL UNIT NOT READY, OPERATION IN PROGRESS
04/08h R LOGICAL UNIT NOT READY, LONG WRITE IN PROGRESS
04/09h DTLPWRSOMCAEBK LOGICAL UNIT NOT READY, SELF-TEST IN PROGRESS
04/0Ah DTLPWRSOMCAEBK LOGICAL UNIT NOT ACCESSIBLE, ASYMMETRIC ACCESS STATE TRANSITION
04/0Bh DTLPWRSOMCAEBK LOGICAL UNIT NOT ACCESSIBLE, TARGET PORT IN STANDBY STATE
04/0Ch DTLPWRSOMCAEBK LOGICAL UNIT NOT ACCESSIBLE, TARGET PORT IN UNAVAILABLE STATE
04/10h DT WR OM B LOGICAL UNIT NOT READY, AUXILIARY MEMORY NOT ACCESSIBLE
05/00h DTL WRSOMCAEBK LOGICAL UNIT DOES NOT RESPOND TO SELECTION
06/00h D WR OM BK NO REFERENCE POSITION FOUND
07/00h DTL WRSOM BK MULTIPLE PERIPHERAL DEVICES SELECTED
08/00h DTL WRSOMCAEBK LOGICAL UNIT COMMUNICATION FAILURE
08/01h DTL WRSOMCAEBK LOGICAL UNIT COMMUNICATION TIME-OUT
08/02h DTL WRSOMCAEBK LOGICAL UNIT COMMUNICATION PARITY ERROR
08/03h DT R OM BK LOGICAL UNIT COMMUNICATION CRC ERROR (ULTRA-DMA/32)
08/04h DTLPWRSO C K UNREACHABLE COPY TARGET
09/00h DT WR O B TRACK FOLLOWING ERROR
09/01h WR O K TRACKING SERVO FAILURE
09/02h WR O K FOCUS SERVO FAILURE
09/03h WR O SPINDLE SERVO FAILURE
09/04h DT WR O B HEAD SELECT FAULT
0A/00h DTLPWRSOMCAEBK ERROR LOG OVERFLOW
0B/00h DTLPWRSOMCAEBK WARNING
0B/01h DTLPWRSOMCAEBK WARNING - SPECIFIED TEMPERATURE EXCEEDED
0B/02h DTLPWRSOMCAEBK WARNING - ENCLOSURE DEGRADED
0C/00h T RS WRITE ERROR
0C/01h K WRITE ERROR - RECOVERED WITH AUTO REALLOCATION
0C/02h D W O BK WRITE ERROR - AUTO REALLOCATION FAILED
0C/03h D W O BK WRITE ERROR - RECOMMEND REASSIGNMENT
0C/04h DT W O B COMPRESSION CHECK MISCOMPARE ERROR
0C/05h DT W O B DATA EXPANSION OCCURRED DURING COMPRESSION
0C/06h DT W O B BLOCK NOT COMPRESSIBLE
0C/07h R WRITE ERROR - RECOVERY NEEDED
0C/08h R WRITE ERROR - RECOVERY FAILED
0C/09h R WRITE ERROR - LOSS OF STREAMING
0C/0Ah R WRITE ERROR - PADDING BLOCKS ADDED
0C/0Bh DT WR OM B AUXILIARY MEMORY WRITE ERROR
0C/0Ch DTLPWRSOMCAEBK WRITE ERROR - UNEXPECTED UNSOLICITED DATA
0C/0Dh DTLPWRSOMCAEBK WRITE ERROR - NOT ENOUGH UNSOLICITED DATA
0D/00h DTLPWRSO CA K ERROR DETECTED BY THIRD PARTY TEMPORARY INITIATOR
0D/01h DTLPWRSO CA K THIRD PARTY DEVICE FAILURE
0D/02h DTLPWRSO CA K COPY TARGET DEVICE NOT REACHABLE

0D/03h DTLPWRSO CA K INCORRECT COPY TARGET DEVICE TYPE
0D/04h DTLPWRSO CA K COPY TARGET DEVICE DATA UNDERRUN
0D/05h DTLPWRSO CA K COPY TARGET DEVICE DATA OVERRUN
0E/00h DT PWR OM AEBK INVALID INFORMATION UNIT
0E/01h DT PWR OM AEBK INFORMATION UNIT TOO SHORT
0E/02h DT PWR OM AEBK INFORMATION UNIT TOO LONG
0F/00h
10/00h D W O BK ID CRC OR ECC ERROR
11/00h DT WRSO BK UNRECOVERED READ ERROR
11/01h DT WRSO BK READ RETRIES EXHAUSTED
11/02h DT WRSO BK ERROR TOO LONG TO CORRECT
11/03h DT W SO BK MULTIPLE READ ERRORS
11/04h D W O BK UNRECOVERED READ ERROR - AUTO REALLOCATE FAILED
11/05h WR O B L-EC UNCORRECTABLE ERROR
11/06h WR O B CIRC UNRECOVERED ERROR
11/07h W O B DATA RE-SYNCHRONIZATION ERROR
11/08h T INCOMPLETE BLOCK READ
11/09h T NO GAP FOUND
11/0Ah DT O BK MISCORRECTED ERROR
11/0Bh D W O BK UNRECOVERED READ ERROR - RECOMMEND REASSIGNMENT
11/0Ch D W O BK UNRECOVERED READ ERROR - RECOMMEND REWRITE THE DATA
11/0Dh DT WR O B DE-COMPRESSION CRC ERROR
11/0Eh DT WR O B CANNOT DECOMPRESS USING DECLARED ALGORITHM
11/0Fh R ERROR READING UPC/EAN NUMBER
11/10h R ERROR READING ISRC NUMBER
11/11h R READ ERROR - LOSS OF STREAMING
11/12h DT WR OM B AUXILIARY MEMORY READ ERROR
11/13h DTLPWRSOMCAEBK READ ERROR - FAILED RETRANSMISSION REQUEST
12/00h D W O BK ADDRESS MARK NOT FOUND FOR ID FIELD
13/00h D W O BK ADDRESS MARK NOT FOUND FOR DATA FIELD
14/00h DTL WRSO BK RECORDED ENTITY NOT FOUND
14/01h DT WR O BK RECORD NOT FOUND
14/02h T FILEMARK OR SETMARK NOT FOUND
14/03h T END-OF-DATA NOT FOUND
14/04h T BLOCK SEQUENCE ERROR
14/05h DT W O BK RECORD NOT FOUND - RECOMMEND REASSIGNMENT
14/06h DT W O BK RECORD NOT FOUND - DATA AUTO-REALLOCATED
14/07h T LOCATE OPERATION FAILURE
15/00h DTL WRSOM BK RANDOM POSITIONING ERROR
15/01h DTL WRSOM BK MECHANICAL POSITIONING ERROR
15/02h DT WR O BK POSITIONING ERROR DETECTED BY READ OF MEDIUM
16/00h D W O BK DATA SYNCHRONIZATION MARK ERROR
16/01h D W O BK DATA SYNC ERROR - DATA REWRITTEN
16/02h D W O BK DATA SYNC ERROR - RECOMMEND REWRITE
16/03h D W O BK DATA SYNC ERROR - DATA AUTO-REALLOCATED
16/04h D W O BK DATA SYNC ERROR - RECOMMEND REASSIGNMENT
17/00h DT WRSO BK RECOVERED DATA WITH NO ERROR CORRECTION APPLIED
17/01h DT WRSO BK RECOVERED DATA WITH RETRIES
17/02h DT WR O BK RECOVERED DATA WITH POSITIVE HEAD OFFSET
17/03h DT WR O BK RECOVERED DATA WITH NEGATIVE HEAD OFFSET
17/04h WR O B RECOVERED DATA WITH RETRIES AND/OR CIRC APPLIED
17/05h D WR O BK RECOVERED DATA USING PREVIOUS SECTOR ID
17/06h D W O BK RECOVERED DATA WITHOUT ECC - DATA AUTO-REALLOCATED
17/07h D WR O BK RECOVERED DATA WITHOUT ECC - RECOMMEND REASSIGNMENT
17/08h D WR O BK RECOVERED DATA WITHOUT ECC - RECOMMEND REWRITE
17/09h D WR O BK RECOVERED DATA WITHOUT ECC - DATA REWRITTEN
18/00h DT WR O BK RECOVERED DATA WITH ERROR CORRECTION APPLIED
18/01h D WR O BK RECOVERED DATA WITH ERROR CORR. & RETRIES APPLIED

18/02h D WR O BK RECOVERED DATA - DATA AUTO-REALLOCATED
18/03h R RECOVERED DATA WITH CIRC
18/04h R RECOVERED DATA WITH L-EC
18/05h D WR O BK RECOVERED DATA - RECOMMEND REASSIGNMENT
18/06h D WR O BK RECOVERED DATA - RECOMMEND REWRITE
18/07h D W O BK RECOVERED DATA WITH ECC - DATA REWRITTEN
18/08h R RECOVERED DATA WITH LINKING
19/00h D O K DEFECT LIST ERROR
19/01h D O K DEFECT LIST NOT AVAILABLE
19/02h D O K DEFECT LIST ERROR IN PRIMARY LIST
19/03h D O K DEFECT LIST ERROR IN GROWN LIST
1A/00h DTLPWRSOMCAEBK PARAMETER LIST LENGTH ERROR
1B/00h DTLPWRSOMCAEBK SYNCHRONOUS DATA TRANSFER ERROR
1C/00h D O BK DEFECT LIST NOT FOUND
1C/01h D O BK PRIMARY DEFECT LIST NOT FOUND
1C/02h D O BK GROWN DEFECT LIST NOT FOUND
1D/00h DT WR O BK MISCOMPARE DURING VERIFY OPERATION
1E/00h D W O BK RECOVERED ID WITH ECC CORRECTION
1F/00h D O K PARTIAL DEFECT LIST TRANSFER
20/00h DTLPWRSOMCAEBK INVALID COMMAND OPERATION CODE
20/01h DT PWR OM AEBK ACCESS DENIED - INITIATOR PENDING-ENROLLED
20/02h DT PWR OM AEBK ACCESS DENIED - NO ACCESS RIGHTS
20/03h DT PWR OM AEBK ACCESS DENIED - INVALID MGMT ID KEY
20/04h T ILLEGAL COMMAND WHILE IN WRITE CAPABLE STATE
20/05h T Obsolete
20/06h T ILLEGAL COMMAND WHILE IN EXPLICIT ADDRESS MODE
20/07h T ILLEGAL COMMAND WHILE IN IMPLICIT ADDRESS MODE
20/08h DT PWR OM AEBK ACCESS DENIED - ENROLLMENT CONFLICT
20/09h DT PWR OM AEBK ACCESS DENIED - INVALID LU IDENTIFIER
20/0Ah DT PWR OM AEBK ACCESS DENIED - INVALID PROXY TOKEN
20/0Bh DT PWR OM AEBK ACCESS DENIED - ACL LUN CONFLICT
21/00h DT WR OM BK LOGICAL BLOCK ADDRESS OUT OF RANGE
21/01h DT WR OM BK INVALID ELEMENT ADDRESS
21/02h R INVALID ADDRESS FOR WRITE
22/00h D ILLEGAL FUNCTION (USE 20 00, 24 00, OR 26 00)
23/00h
24/00h DTLPWRSOMCAEBK INVALID FIELD IN CDB
24/01h DTLPWRSOMCAEBK CDB DECRYPTION ERROR
24/02h T Obsolete
24/03h T Obsolete
25/00h DTLPWRSOMCAEBK LOGICAL UNIT NOT SUPPORTED
26/00h DTLPWRSOMCAEBK INVALID FIELD IN PARAMETER LIST
26/01h DTLPWRSOMCAEBK PARAMETER NOT SUPPORTED
26/02h DTLPWRSOMCAEBK PARAMETER VALUE INVALID
26/03h DTLPWRSOMCAE K THRESHOLD PARAMETERS NOT SUPPORTED
26/04h DTLPWRSOMCAEBK INVALID RELEASE OF PERSISTENT RESERVATION
26/05h DTLPWRSOMCA BK DATA DECRYPTION ERROR
26/06h DTLPWRSO C K TOO MANY TARGET DESCRIPTORS
26/07h DTLPWRSO C K UNSUPPORTED TARGET DESCRIPTOR TYPE CODE
26/08h DTLPWRSO C K TOO MANY SEGMENT DESCRIPTORS
26/09h DTLPWRSO C K UNSUPPORTED SEGMENT DESCRIPTOR TYPE CODE
26/0Ah DTLPWRSO C K UNEXPECTED INEXACT SEGMENT
26/0Bh DTLPWRSO C K INLINE DATA LENGTH EXCEEDED
26/0Ch DTLPWRSO C K INVALID OPERATION FOR COPY SOURCE OR DESTINATION
26/0Dh DTLPWRSO C K COPY SEGMENT GRANULARITY VIOLATION
27/00h DT WR O BK WRITE PROTECTED
27/01h DT WR O BK HARDWARE WRITE PROTECTED
27/02h DT WR O BK LOGICAL UNIT SOFTWARE WRITE PROTECTED

27/03h T R ASSOCIATED WRITE PROTECT
27/04h T R PERSISTENT WRITE PROTECT
27/05h T R PERMANENT WRITE PROTECT
27/06h R CONDITIONAL WRITE PROTECT
28/00h DTLPWRSOMCAEBK NOT READY TO READY CHANGE, MEDIUM MAY HAVE CHANGED
28/01h DT WR OM B IMPORT OR EXPORT ELEMENT ACCESSED
29/00h DTLPWRSOMCAEBK POWER ON, RESET, OR BUS DEVICE RESET OCCURRED
29/01h DTLPWRSOMCAEBK POWER ON OCCURRED
29/02h DTLPWRSOMCAEBK SCSI BUS RESET OCCURRED
29/03h DTLPWRSOMCAEBK BUS DEVICE RESET FUNCTION OCCURRED
29/04h DTLPWRSOMCAEBK DEVICE INTERNAL RESET
29/05h DTLPWRSOMCAEBK TRANSCEIVER MODE CHANGED TO SINGLE-ENDED
29/06h DTLPWRSOMCAEBK TRANSCEIVER MODE CHANGED TO LVD
29/07h DTLPWRSOMCAEBK I_T NEXUS LOSS OCCURRED
2A/00h DTL WRSOMCAEBK PARAMETERS CHANGED
2A/01h DTL WRSOMCAEBK MODE PARAMETERS CHANGED
2A/02h DTL WRSOMCAE K LOG PARAMETERS CHANGED
2A/03h DTLPWRSOMCAE K RESERVATIONS PREEMPTED
2A/04h DTLPWRSOMCAE RESERVATIONS RELEASED
2A/05h DTLPWRSOMCAE REGISTRATIONS PREEMPTED
2A/06h DTLPWRSOMCAEBK ASYMMETRIC ACCESS STATE CHANGED
2A/07h DTLPWRSOMCAEBK IMPLICIT ASYMMETRIC ACCESS STATE TRANSITION FAILED
2B/00h DTLPWRSO C K COPY CANNOT EXECUTE SINCE HOST CANNOT DISCONNECT
2C/00h DTLPWRSOMCAEBK COMMAND SEQUENCE ERROR
2C/01h S TOO MANY WINDOWS SPECIFIED
2C/02h S INVALID COMBINATION OF WINDOWS SPECIFIED
2C/03h R CURRENT PROGRAM AREA IS NOT EMPTY
2C/04h R CURRENT PROGRAM AREA IS EMPTY
2C/05h B ILLEGAL POWER CONDITION REQUEST
2C/06h R PERSISTENT PREVENT CONFLICT
2C/07h DTLPWRSOMCAEBK PREVIOUS BUSY STATUS
2C/08h DTLPWRSOMCAEBK PREVIOUS TASK SET FULL STATUS
2C/09h DTLPWRSOM EBK PREVIOUS RESERVATION CONFLICT STATUS
2D/00h T OVERWRITE ERROR ON UPDATE IN PLACE
2E/00h R INSUFFICIENT TIME FOR OPERATION
2F/00h DTLPWRSOMCAEBK COMMANDS CLEARED BY ANOTHER INITIATOR
30/00h DT WR OM BK INCOMPATIBLE MEDIUM INSTALLED
30/01h DT WR O BK CANNOT READ MEDIUM - UNKNOWN FORMAT
30/02h DT WR O BK CANNOT READ MEDIUM - INCOMPATIBLE FORMAT
30/03h DT R K CLEANING CARTRIDGE INSTALLED
30/04h DT WR O BK CANNOT WRITE MEDIUM - UNKNOWN FORMAT
30/05h DT WR O BK CANNOT WRITE MEDIUM - INCOMPATIBLE FORMAT
30/06h DT WR O B CANNOT FORMAT MEDIUM - INCOMPATIBLE MEDIUM
30/07h DTL WRSOM AEBK CLEANING FAILURE
30/08h R CANNOT WRITE - APPLICATION CODE MISMATCH
30/09h R CURRENT SESSION NOT FIXATED FOR APPEND
30/10h R MEDIUM NOT FORMATTED
31/00h DT WR O BK MEDIUM FORMAT CORRUPTED
31/01h D L R O B FORMAT COMMAND FAILED
31/02h R ZONED FORMATTING FAILED DUE TO SPARE LINKING
32/00h D W O BK NO DEFECT SPARE LOCATION AVAILABLE
32/01h D W O BK DEFECT LIST UPDATE FAILURE
33/00h T TAPE LENGTH ERROR
34/00h DTLPWRSOMCAEBK ENCLOSURE FAILURE
35/00h DTLPWRSOMCAEBK ENCLOSURE SERVICES FAILURE
35/01h DTLPWRSOMCAEBK UNSUPPORTED ENCLOSURE FUNCTION
35/02h DTLPWRSOMCAEBK ENCLOSURE SERVICES UNAVAILABLE
35/03h DTLPWRSOMCAEBK ENCLOSURE SERVICES TRANSFER FAILURE

35/04h DTLPWRSOMCAEBK ENCLOSURE SERVICES TRANSFER REFUSED
36/00h L RIBBON, INK, OR TONER FAILURE
37/00h DTL WRSOMCAEBK ROUNDED PARAMETER
38/00h B EVENT STATUS NOTIFICATION
38/02h B ESN - POWER MANAGEMENT CLASS EVENT
38/04h B ESN - MEDIA CLASS EVENT
38/06h B ESN - DEVICE BUSY CLASS EVENT
39/00h DTL WRSOMCAE K SAVING PARAMETERS NOT SUPPORTED
3A/00h DTL WRSOM BK MEDIUM NOT PRESENT
3A/01h DT WR OM BK MEDIUM NOT PRESENT - TRAY CLOSED
3A/02h DT WR OM BK MEDIUM NOT PRESENT - TRAY OPEN
3A/03h DT WR OM B MEDIUM NOT PRESENT - LOADABLE
3A/04h DT WR OM B MEDIUM NOT PRESENT - MEDIUM AUXILIARY MEMORY ACCESSIBLE
3B/00h TL SEQUENTIAL POSITIONING ERROR
3B/01h T TAPE POSITION ERROR AT BEGINNING-OF-MEDIUM
3B/02h T TAPE POSITION ERROR AT END-OF-MEDIUM
3B/03h L TAPE OR ELECTRONIC VERTICAL FORMS UNIT NOT READY
3B/04h L SLEW FAILURE
3B/05h L PAPER JAM
3B/06h L FAILED TO SENSE TOP-OF-FORM
3B/07h L FAILED TO SENSE BOTTOM-OF-FORM
3B/08h T REPOSITION ERROR
3B/09h S READ PAST END OF MEDIUM
3B/0Ah S READ PAST BEGINNING OF MEDIUM
3B/0Bh S POSITION PAST END OF MEDIUM
3B/0Ch T S POSITION PAST BEGINNING OF MEDIUM
3B/0Dh DT WR OM BK MEDIUM DESTINATION ELEMENT FULL
3B/0Eh DT WR OM BK MEDIUM SOURCE ELEMENT EMPTY
3B/0Fh R END OF MEDIUM REACHED
3B/11h DT WR OM BK MEDIUM MAGAZINE NOT ACCESSIBLE
3B/12h DT WR OM BK MEDIUM MAGAZINE REMOVED
3B/13h DT WR OM BK MEDIUM MAGAZINE INSERTED
3B/14h DT WR OM BK MEDIUM MAGAZINE LOCKED
3B/15h DT WR OM BK MEDIUM MAGAZINE UNLOCKED
3B/16h R MECHANICAL POSITIONING OR CHANGER ERROR
3C/00h
3D/00h DTLPWRSOMCAE K INVALID BITS IN IDENTIFY MESSAGE
3E/00h DTLPWRSOMCAEBK LOGICAL UNIT HAS NOT SELF-CONFIGURED YET
3E/01h DTLPWRSOMCAEBK LOGICAL UNIT FAILURE
3E/02h DTLPWRSOMCAEBK TIMEOUT ON LOGICAL UNIT
3E/03h DTLPWRSOMCAEBK LOGICAL UNIT FAILED SELF-TEST
3E/04h DTLPWRSOMCAEBK LOGICAL UNIT UNABLE TO UPDATE SELF-TEST LOG
3F/00h DTLPWRSOMCAEBK TARGET OPERATING CONDITIONS HAVE CHANGED
3F/01h DTLPWRSOMCAEBK MICROCODE HAS BEEN CHANGED
3F/02h DTLPWRSOMC BK CHANGED OPERATING DEFINITION
3F/03h DTLPWRSOMCAEBK INQUIRY DATA HAS CHANGED
3F/04h DT WR OMCAEBK COMPONENT DEVICE ATTACHED
3F/05h DT WR OMCAEBK DEVICE IDENTIFIER CHANGED
3F/06h DT WR OMCAEB REDUNDANCY GROUP CREATED OR MODIFIED
3F/07h DT WR OMCAEB REDUNDANCY GROUP DELETED
3F/08h DT WR OMCAEB SPARE CREATED OR MODIFIED
3F/09h DT WR OMCAEB SPARE DELETED
3F/0Ah DT WR OMCAEBK VOLUME SET CREATED OR MODIFIED
3F/0Bh DT WR OMCAEBK VOLUME SET DELETED
3F/0Ch DT WR OMCAEBK VOLUME SET DEASSIGNED
3F/0Dh DT WR OMCAEBK VOLUME SET REASSIGNED
3F/0Eh DTLPWRSOMCAE REPORTED LUNS DATA HAS CHANGED
3F/0Fh DTLPWRSOMCAEBK ECHO BUFFER OVERWRITTEN

3F/10h DT WR OM B MEDIUM LOADABLE
3F/11h DT WR OM B MEDIUM AUXILIARY MEMORY ACCESSIBLE
40/00h D RAM FAILURE (SHOULD USE 40 NN)
40/NNh DTLPWRSOMCAEBK DIAGNOSTIC FAILURE ON COMPONENT NN (80H-FFH)
41/00h D DATA PATH FAILURE (SHOULD USE 40 NN)
42/00h D POWER-ON OR SELF-TEST FAILURE (SHOULD USE 40 NN)
43/00h DTLPWRSOMCAEBK MESSAGE ERROR
44/00h DTLPWRSOMCAEBK INTERNAL TARGET FAILURE
45/00h DTLPWRSOMCAEBK SELECT OR RESELECT FAILURE
46/00h DTLPWRSOMC BK UNSUCCESSFUL SOFT RESET
47/00h DTLPWRSOMCAEBK SCSI PARITY ERROR
47/01h DTLPWRSOMCAEBK DATA PHASE CRC ERROR DETECTED
47/02h DTLPWRSOMCAEBK SCSI PARITY ERROR DETECTED DURING ST DATA PHASE
47/03h DTLPWRSOMCAEBK INFORMATION UNIT iuCRC ERROR DETECTED
47/04h DTLPWRSOMCAEBK ASYNCHRONOUS INFORMATION PROTECTION ERROR DETECTED
47/05h DTLPWRSOMCAEBK PROTOCOL SERVICE CRC ERROR
47/7Fh DT PWR OM AEBK SOME COMMANDS CLEARED BY ISCSI PROTOCOL EVENT
48/00h DTLPWRSOMCAEBK INITIATOR DETECTED ERROR MESSAGE RECEIVED
49/00h DTLPWRSOMCAEBK INVALID MESSAGE ERROR
4A/00h DTLPWRSOMCAEBK COMMAND PHASE ERROR
4B/00h DTLPWRSOMCAEBK DATA PHASE ERROR
4B/01h DT PWR OM AEBK INVALID TARGET PORT TRANSFER TAG RECEIVED
4B/02h DT PWR OM AEBK TOO MUCH WRITE DATA
4B/03h DT PWR OM AEBK ACK/NAK TIMEOUT
4B/04h DT PWR OM AEBK NAK RECEIVED
4B/05h DT PWR OM AEBK DATA OFFSET ERROR
4B/06h DT PWR OM AEBK INITIATOR RESPONSE TIMEOUT
4C/00h DTLPWRSOMCAEBK LOGICAL UNIT FAILED SELF-CONFIGURATION
4D/NNh DTLPWRSOMCAEBK TAGGED OVERLAPPED COMMANDS (NN = QUEUE TAG)
4E/00h DTLPWRSOMCAEBK OVERLAPPED COMMANDS ATTEMPTED
4F/00h
50/00h T WRITE APPEND ERROR
50/01h T WRITE APPEND POSITION ERROR
50/02h T POSITION ERROR RELATED TO TIMING
51/00h T R O ERASE FAILURE
51/01h R ERASE FAILURE - INCOMPLETE ERASE OPERATION DETECTED
52/00h T CARTRIDGE FAULT
53/00h DTL WRSOM BK MEDIA LOAD OR EJECT FAILED
53/01h T UNLOAD TAPE FAILURE
53/02h DT WR OM BK MEDIUM REMOVAL PREVENTED
54/00h P SCSI TO HOST SYSTEM INTERFACE FAILURE
55/00h P SYSTEM RESOURCE FAILURE
55/01h D O BK SYSTEM BUFFER FULL
55/02h DTLPWRSOM AE K INSUFFICIENT RESERVATION RESOURCES
55/03h DTLPWRSOMCAE K INSUFFICIENT RESOURCES
55/04h DTLPWRSOM AE K INSUFFICIENT REGISTRATION RESOURCES
55/05h DT PWR OM AEBK INSUFFICIENT ACCESS CONTROL RESOURCES
55/06h DT WR OM B AUXILIARY MEMORY OUT OF SPACE
56/00h
57/00h R UNABLE TO RECOVER TABLE-OF-CONTENTS
58/00h O GENERATION DOES NOT EXIST
59/00h O UPDATED BLOCK READ
5A/00h DTLPWRSOM BK OPERATOR REQUEST OR STATE CHANGE INPUT
5A/01h DT WR OM BK OPERATOR MEDIUM REMOVAL REQUEST
5A/02h DT WR O A BK OPERATOR SELECTED WRITE PROTECT
5A/03h DT WR O A BK OPERATOR SELECTED WRITE PERMIT
5B/00h DTLPWRSOM K LOG EXCEPTION
5B/01h DTLPWRSOM K THRESHOLD CONDITION MET

5B/02h DTLPWRSOM K LOG COUNTER AT MAXIMUM
5B/03h DTLPWRSOM K LOG LIST CODES EXHAUSTED
5C/00h D O RPL STATUS CHANGE
5C/01h D O SPINDLES SYNCHRONIZED
5C/02h D O SPINDLES NOT SYNCHRONIZED
5D/00h DTLPWRSOMCAEBK FAILURE PREDICTION THRESHOLD EXCEEDED
5D/01h R B MEDIA FAILURE PREDICTION THRESHOLD EXCEEDED
5D/02h R LOGICAL UNIT FAILURE PREDICTION THRESHOLD EXCEEDED
5D/03h R SPARE AREA EXHAUSTION PREDICTION THRESHOLD EXCEEDED
5D/10h D B HARDWARE IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5D/11h D B HARDWARE IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5D/12h D B HARDWARE IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5D/13h D B HARDWARE IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5D/14h D B HARDWARE IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5D/15h D B HARDWARE IMPENDING FAILURE ACCESS TIMES TOO HIGH
5D/16h D B HARDWARE IMPENDING FAILURE START UNIT TIMES TOO HIGH
5D/17h D B HARDWARE IMPENDING FAILURE CHANNEL PARAMETRICS
5D/18h D B HARDWARE IMPENDING FAILURE CONTROLLER DETECTED
5D/19h D B HARDWARE IMPENDING FAILURE THROUGHPUT PERFORMANCE
5D/1Ah D B HARDWARE IMPENDING FAILURE SEEK TIME PERFORMANCE
5D/1Bh D B HARDWARE IMPENDING FAILURE SPIN-UP RETRY COUNT
5D/1Ch D B HARDWARE IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5D/20h D B CONTROLLER IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5D/21h D B CONTROLLER IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5D/22h D B CONTROLLER IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5D/23h D B CONTROLLER IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5D/24h D B CONTROLLER IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5D/25h D B CONTROLLER IMPENDING FAILURE ACCESS TIMES TOO HIGH
5D/26h D B CONTROLLER IMPENDING FAILURE START UNIT TIMES TOO HIGH
5D/27h D B CONTROLLER IMPENDING FAILURE CHANNEL PARAMETRICS
5D/28h D B CONTROLLER IMPENDING FAILURE CONTROLLER DETECTED
5D/29h D B CONTROLLER IMPENDING FAILURE THROUGHPUT PERFORMANCE
5D/2Ah D B CONTROLLER IMPENDING FAILURE SEEK TIME PERFORMANCE
5D/2Bh D B CONTROLLER IMPENDING FAILURE SPIN-UP RETRY COUNT
5D/2Ch D B CONTROLLER IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5D/30h D B DATA CHANNEL IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5D/31h D B DATA CHANNEL IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5D/32h D B DATA CHANNEL IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5D/33h D B DATA CHANNEL IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5D/34h D B DATA CHANNEL IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5D/35h D B DATA CHANNEL IMPENDING FAILURE ACCESS TIMES TOO HIGH
5D/36h D B DATA CHANNEL IMPENDING FAILURE START UNIT TIMES TOO HIGH
5D/37h D B DATA CHANNEL IMPENDING FAILURE CHANNEL PARAMETRICS
5D/38h D B DATA CHANNEL IMPENDING FAILURE CONTROLLER DETECTED
5D/39h D B DATA CHANNEL IMPENDING FAILURE THROUGHPUT PERFORMANCE
5D/3Ah D B DATA CHANNEL IMPENDING FAILURE SEEK TIME PERFORMANCE
5D/3Bh D B DATA CHANNEL IMPENDING FAILURE SPIN-UP RETRY COUNT
5D/3Ch D B DATA CHANNEL IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5D/40h D B SERVO IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5D/41h D B SERVO IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5D/42h D B SERVO IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5D/43h D B SERVO IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5D/44h D B SERVO IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5D/45h D B SERVO IMPENDING FAILURE ACCESS TIMES TOO HIGH
5D/46h D B SERVO IMPENDING FAILURE START UNIT TIMES TOO HIGH
5D/47h D B SERVO IMPENDING FAILURE CHANNEL PARAMETRICS
5D/48h D B SERVO IMPENDING FAILURE CONTROLLER DETECTED
5D/49h D B SERVO IMPENDING FAILURE THROUGHPUT PERFORMANCE

5D/4Ah D B SERVO IMPENDING FAILURE SEEK TIME PERFORMANCE
5D/4Bh D B SERVO IMPENDING FAILURE SPIN-UP RETRY COUNT
5D/4Ch D B SERVO IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5D/50h D B SPINDLE IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5D/51h D B SPINDLE IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5D/52h D B SPINDLE IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5D/53h D B SPINDLE IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5D/54h D B SPINDLE IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5D/55h D B SPINDLE IMPENDING FAILURE ACCESS TIMES TOO HIGH
5D/56h D B SPINDLE IMPENDING FAILURE START UNIT TIMES TOO HIGH
5D/57h D B SPINDLE IMPENDING FAILURE CHANNEL PARAMETRICS
5D/58h D B SPINDLE IMPENDING FAILURE CONTROLLER DETECTED
5D/59h D B SPINDLE IMPENDING FAILURE THROUGHPUT PERFORMANCE
5D/5Ah D B SPINDLE IMPENDING FAILURE SEEK TIME PERFORMANCE
5D/5Bh D B SPINDLE IMPENDING FAILURE SPIN-UP RETRY COUNT
5D/5Ch D B SPINDLE IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5D/60h D B FIRMWARE IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5D/61h D B FIRMWARE IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5D/62h D B FIRMWARE IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5D/63h D B FIRMWARE IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5D/64h D B FIRMWARE IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5D/65h D B FIRMWARE IMPENDING FAILURE ACCESS TIMES TOO HIGH
5D/66h D B FIRMWARE IMPENDING FAILURE START UNIT TIMES TOO HIGH
5D/67h D B FIRMWARE IMPENDING FAILURE CHANNEL PARAMETRICS
5D/68h D B FIRMWARE IMPENDING FAILURE CONTROLLER DETECTED
5D/69h D B FIRMWARE IMPENDING FAILURE THROUGHPUT PERFORMANCE
5D/6Ah D B FIRMWARE IMPENDING FAILURE SEEK TIME PERFORMANCE
5D/6Bh D B FIRMWARE IMPENDING FAILURE SPIN-UP RETRY COUNT
5D/6Ch D B FIRMWARE IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5D/FFh DTLPWRSOMCAEBK FAILURE PREDICTION THRESHOLD EXCEEDED (FALSE)
5E/00h DTLPWRSO CA K LOW POWER CONDITION ON
5E/01h DTLPWRSO CA K IDLE CONDITION ACTIVATED BY TIMER
5E/02h DTLPWRSO CA K STANDBY CONDITION ACTIVATED BY TIMER
5E/03h DTLPWRSO CA K IDLE CONDITION ACTIVATED BY COMMAND
5E/04h DTLPWRSO CA K STANDBY CONDITION ACTIVATED BY COMMAND
5E/41h B POWER STATE CHANGE TO ACTIVE
5E/42h B POWER STATE CHANGE TO IDLE
5E/43h B POWER STATE CHANGE TO STANDBY
5E/45h B POWER STATE CHANGE TO SLEEP
5E/47h BK POWER STATE CHANGE TO DEVICE CONTROL
5F/00h
60/00h S LAMP FAILURE
61/00h S VIDEO ACQUISITION ERROR
61/01h S UNABLE TO ACQUIRE VIDEO
61/02h S OUT OF FOCUS
62/00h S SCAN HEAD POSITIONING ERROR
63/00h R END OF USER AREA ENCOUNTERED ON THIS TRACK
63/01h R PACKET DOES NOT FIT IN AVAILABLE SPACE
64/00h R ILLEGAL MODE FOR THIS TRACK
64/01h R INVALID PACKET SIZE
65/00h DTLPWRSOMCAEBK VOLTAGE FAULT
66/00h S AUTOMATIC DOCUMENT FEEDER COVER UP
66/01h S AUTOMATIC DOCUMENT FEEDER LIFT UP
66/02h S DOCUMENT JAM IN AUTOMATIC DOCUMENT FEEDER
66/03h S DOCUMENT MISS FEED AUTOMATIC IN DOCUMENT FEEDER
67/00h A CONFIGURATION FAILURE
67/01h A CONFIGURATION OF INCAPABLE LOGICAL UNITS FAILED
67/02h A ADD LOGICAL UNIT FAILED

67/03h A MODIFICATION OF LOGICAL UNIT FAILED
67/04h A EXCHANGE OF LOGICAL UNIT FAILED
67/05h A REMOVE OF LOGICAL UNIT FAILED
67/06h A ATTACHMENT OF LOGICAL UNIT FAILED
67/07h A CREATION OF LOGICAL UNIT FAILED
67/08h A ASSIGN FAILURE OCCURRED
67/09h A MULTIPLY ASSIGNED LOGICAL UNIT
67/0Ah DTLPWRSOMCAEBK SET TARGET PORT GROUPS COMMAND FAILED
68/00h A LOGICAL UNIT NOT CONFIGURED
69/00h A DATA LOSS ON LOGICAL UNIT
69/01h A MULTIPLE LOGICAL UNIT FAILURES
69/02h A PARITY/DATA MISMATCH
6A/00h A INFORMATIONAL, REFER TO LOG
6B/00h A STATE CHANGE HAS OCCURRED
6B/01h A REDUNDANCY LEVEL GOT BETTER
6B/02h A REDUNDANCY LEVEL GOT WORSE
6C/00h A REBUILD FAILURE OCCURRED
6D/00h A RECALCULATE FAILURE OCCURRED
6E/00h A COMMAND TO LOGICAL UNIT FAILED
6F/00h R COPY PROTECTION KEY EXCHANGE FAILURE - AUTHENTICATION FAILURE
6F/01h R COPY PROTECTION KEY EXCHANGE FAILURE - KEY NOT PRESENT
6F/02h R COPY PROTECTION KEY EXCHANGE FAILURE - KEY NOT ESTABLISHED
6F/03h R READ OF SCRAMBLED SECTOR WITHOUT AUTHENTICATION
6F/04h R MEDIA REGION CODE IS MISMATCHED TO LOGICAL UNIT REGION
6F/05h R DRIVE REGION MUST BE PERMANENT/REGION RESET COUNT ERROR
70/NNh T DECOMPRESSION EXCEPTION SHORT ALGORITHM ID OF NN
71/00h T DECOMPRESSION EXCEPTION LONG ALGORITHM ID
72/00h R SESSION FIXATION ERROR
72/01h R SESSION FIXATION ERROR WRITING LEAD-IN
72/02h R SESSION FIXATION ERROR WRITING LEAD-OUT
72/03h R SESSION FIXATION ERROR - INCOMPLETE TRACK IN SESSION
72/04h R EMPTY OR PARTIALLY WRITTEN RESERVED TRACK
72/05h R NO MORE TRACK RESERVATIONS ALLOWED
73/00h R CD CONTROL ERROR
73/01h R POWER CALIBRATION AREA ALMOST FULL
73/02h R POWER CALIBRATION AREA IS FULL
73/03h R POWER CALIBRATION AREA ERROR
73/04h R PROGRAM MEMORY AREA UPDATE FAILURE
73/05h R PROGRAM MEMORY AREA IS FULL
73/06h R RMA/PMA IS ALMOST FULL
74/00h
75/00h
76/00h
77/00h
78/00h
79/00h
7A/00h
7B/00h
7C/00h
7D/00h
7E/00h
7F/00h