



Managing the IBM[®] TotalStorage[®] DR550 and DR550 Express An Introductory Guide

IBM Storage Products
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IBM TotalStorage DR550
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Introduction

This document is intended to provide a brief overview of some of the management tasks associated with the IBM TotalStorage DR550. Included in this document is a description of management tasks for the operating system (AIX), disk subsystem (DS4100) and Tivoli Storage Manager. This paper will focus on the basic tasks that should be performed on a daily or weekly basis. It is not intended to be a complete guide for all management tasks.

While some of the administration tasks described in this document should be done daily, others could be done weekly. If all of these status commands were done and analyzed daily it would take approximately 30 minutes to perform these tasks.

Most status checks in AIX can be done with non-admin (root) id but when working with support personnel make sure you have root authority to execute commands recommended by AIX support line. Same thing for the HACMP status check as well. Use TSM admin ID (which has system authority) or customer created equivalent when working with TSM support line.

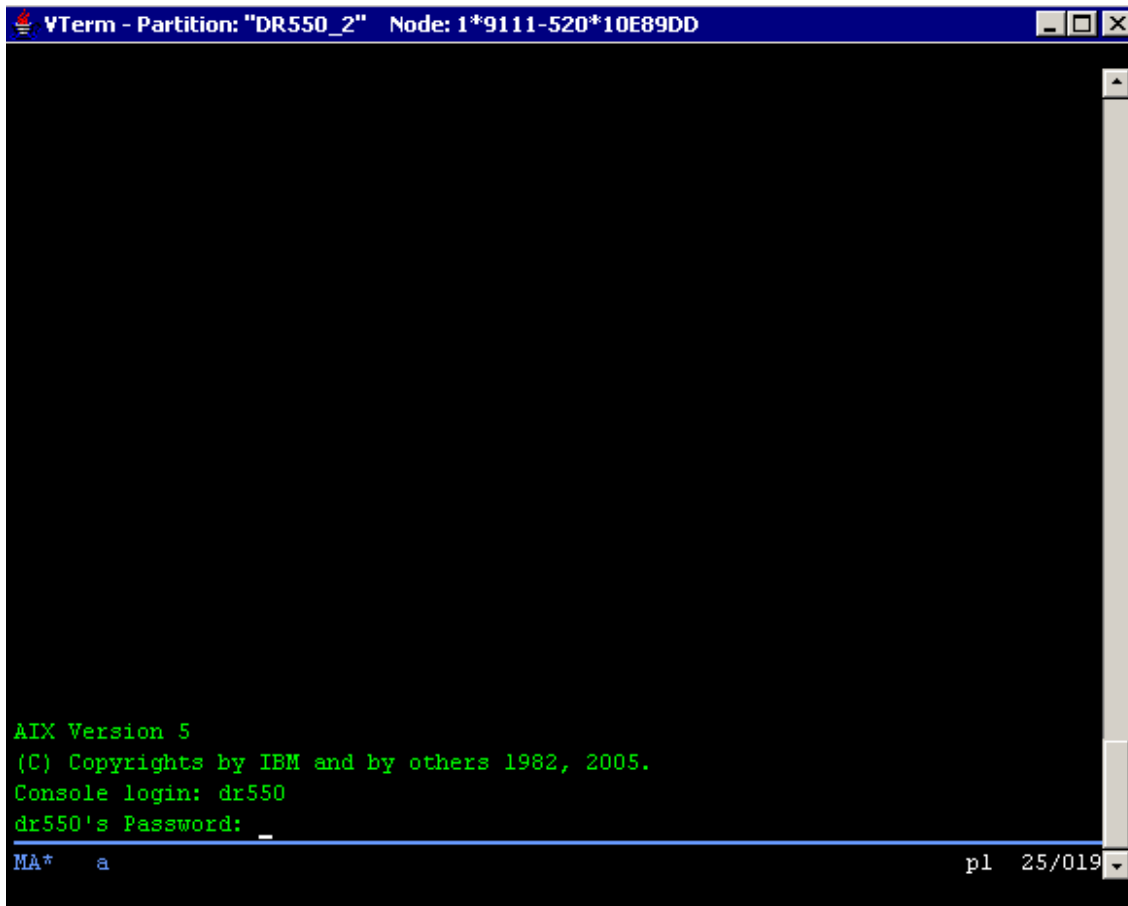
A Frequently Asked Questions section is also included. This section provides a set of questions and answers for many common tasks regarding management and operations of the DR550.

Note: The commands executed in AIX or TSM are highlighted in red and output displayed is normal (black) text. This is real output from AIX or TSM that is for informational purposes only. The actual output may be different in values based on when and what configuration is running and what errors have occurred. Most of the AIX commands can be entered at either the AIX prompt (system will display a \$) or the prompt used when logged in as Root (system will display a #). In this guide, the AIX prompt is shown for these commands.

AIX

Regular checking of the status of AIX should be performed by the team responsible for the operation of the DR550. Any problems discovered should be resolved in a timely manner to prevent a more serious issue from occurring. You will need to login to AIX before you can begin the status review.

To login, type DR550 and use the default password of DR550¹. You can log on using the DR550 console or you can logon remotely if you have enabled remote access. This can be seen in the picture below.



Logging on to DR550 node with username DR550

Monitoring AIX Error Logs

You should check the AIX error logs frequently (daily is recommended, weekly at a minimum). If a problem has occurred, then daily monitoring is strongly recommended for a period of time. You should especially monitor the AIX error logs for any AIX or disk errors. Once you are logged on, you should see a welcome screen and the AIX prompt (shown as "\$").

¹ While this password is the default shipped with the DR550, the customer is expected to change this password upon installation. This procedure is provided in the DR550 Installation Guide.

If you need Root authority (you should only use this if you plan to make changes – which is not the subject of this paper), then you can issue the following command.

\$ su – and then enter the default password of d3rv1sh (or the password that you setup during the installation). This will log you in as root. The prompt will now be a # sign.

As we are focused on monitoring the DR550, Root access is not required. To begin checking the status of the system, enter the following commands. When the AIX prompt is displayed, you can check the error logs.

The command to display the following output is:

\$ errpt | more (the resulting display will list the errors that have occurred. You should look for potential failures or errors.)

IDENTIFIER	TIMESTAMP	T	C	RESOURCE_NAME	DESCRIPTION
BC669AA7	1109094804	P	H	dacl	CONTROLLER HEALTH CHECK FAILURE
3074FEB7	1109094804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109094804	T	H	fscsil h	ADAPTER ERROR
3074FEB7	1109094804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109094804	T	H	fscsil	ADAPTER ERROR
BC669AA7	1109093804	P	H	dacl	CONTROLLER HEALTH CHECK FAILURE
3074FEB7	1109093804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109093804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109093804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109093804	T	H	fscsil	ADAPTER ERROR
BC669AA7	1109092804	P	H	dacl	CONTROLLER HEALTH CHECK FAILURE
3074FEB7	1109092804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109092804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109092804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109092804	T	H	fscsil	ADAPTER ERROR
BC669AA7	1109091804	P	H	dacl	CONTROLLER HEALTH CHECK FAILURE
3074FEB7	1109091804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109091804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109091804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109091804	T	H	fscsil	ADAPTER ERROR
BC669AA7	1109090804	P	H	dacl	CONTROLLER HEALTH CHECK FAILURE
3074FEB7	1109090804	T	H	fscsil	ADAPTER ERROR

You can see additional details by entering:

\$ errpt -a | more

```

LABEL:          FCP_ARRAY_ERR7
IDENTIFIER:     BC669AA7

Date/Time:      Tue Nov  9 09:48:56 EST
Sequence Number: 24451
Machine Id:     000C6D7C4C00
Node Id:        DRs_engine1

```

```

Class:          H
Type:          PERM
Resource Name:  dac1
Resource Class: array
Resource Type:  ibm-dac-V4
Location:       U0.1-P1-I4/Q1-W200700A0B8132158
VPD:

```

```

Manufacturer.....IBM
Machine Type and Model.....1722-600
Part Number.....348-0049472
ROS Level and ID.....0520
Serial Number.....1T35011541
Device Specific.(Z1).....2D363030
Device Specific.(Z2).....6F6E7472
Device Specific.(Z3).....20202020

```

Description
CONTROLLER HEALTH CHECK FAILURE

Probable Causes
ARRAY CONTROLLER
CABLES AND CONNECTIONS
ARRAY DASD MEDIA

Failure Causes
DASD MEDIA
ARRAY CONTROLLER
CABLES AND CONNECTIONS

Recommended Actions
PERFORM PROBLEM DETERMINATION PROCEDURES

Detail Data
SENSE DATA

```

0600 0000 0000 0000 0000 0004 0000 0000 0000 0000 0000 0000 0200 0B00 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

```

\$ errpt

```

09890235    0809212505 P H hdisk13          ARRAY DRIVE FAILURE
09890235    0809212505 P H hdisk12          ARRAY DRIVE FAILURE

```

Please make sure all Drives show a green status. If any one has an amber light, then replace it soon. You should contact the IBM support center for assistance with the Drive replacement.

You can enter the following command to see additional details for the first error.

\$ errpt -a | more

```

LABEL:          FCP_ARRAY_ERR14
IDENTIFIER:     09890235

Date/Time:     Tue Aug  9 21:25:35 EDT
Sequence Number: 21510
Machine Id:    00CB163E4C00
Node Id:      DRs_engine1
Class:        H
Type:         PERM
Resource Name: hdisk13
Resource Class: disk
Resource Type: array
Location:     U787A.001.DNZOCDE-P1-C4-T1-W200300A0B8166E8F-LB0000000000000
    
```

Description
 ARRAY DRIVE FAILURE

Probable Causes
 ARRAY DASD DEVICE
 ARRAY DASD MEDIA

Failure Causes

Recommended Actions
 PERFORM PROBLEM DETERMINATION PROCEDURES

```

Detail Data
SENSE DATA
0600 0308 0000 FF00 0000 0004 0000 0000 0000 0000 0000 0000 0000 0000 7000 0600
0000 0098 0000 0000 3F80 D700 0000 0000 0000 0000 0000 8405 0000 0000 0000 0000
0008 0500 0000 0000 0000 0000 0000 0000 0000 0000 3154 3432 3436 3438 3930 2020 2020
2020 0542 1000 000B 0100 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0005 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0045 10DF 3038 3039 3035 2F32 3130 3331 3500 0000 0000 0000 0000 0000 0000
0000 0000 08E2 7000 F205 2101 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000
    
```

Once you have identified that a problem in AIX may be disk related, then you can perform further investigation within the DS4100 using the Storage Manager Client (SMclient). See the section for the SMclient for further details. You can also take a look at disks and visually identify any disk which is possibly failing as it should have an amber light flashing.

There are many types of errors that can occur. Disk drive failure is one you will want to monitor regularly. Other types of errors may occur. If a problem does occur, you can use the AIX documentation or call the IBM support center for assistance.

HACMP

You can view the status of the HACMP cluster by either using the AIX command line or use the SMITTY menus.

AIX Command Line

To view the status of the HACMP cluster (if you have a dual node DR550), use the following command at the AIX prompt. (If you are logged on as Root, then you will see the # prompt instead of \$.)

```
$ /usr/es/sbin/cluster/clstat
```

Note: This is a normal working cluster of both nodes (primary and standby node). Node one is running the TSM server and 192.168.1.21 took over virtual address 192.168.1.22 where the content manager (or application server) will connect and archive data to. The screen output below will show the cluster status. If the cluster is not up or is not operational, then a different output will be displayed. If the cluster will not come up then a call to IBM HACMP support line is required to report a cluster issue. During this time the support line may ask for a “snap” file of the cluster to help further diagnose an issue or problem. The IBM AIX HACMP support team will guide you through all the necessary processes.

```
clstat - HACMP Cluster Status Monitor
```

```
-----
```

```
Cluster: DRs450 (1077722580)
Fri Sep  9 07:07:45 MDT 2005
      State: UP                Nodes: 2
      SubState: STABLE

Node: DRs_engine1                State: UP
  Interface: DRs_engine1_boot (1)  Address: 192.168.1.21
                                   State:   DOWN
  Interface: DRs_engine1_stdby (1) Address: 192.168.2.10
                                   State:   UP
  Interface: DRs_engine1_hrtbeat (2) Address: 192.168.3.10
                                   State:   UP
  Interface: DS4100Lun_1 (0)       Address: 0.0.0.0
                                   State:   UP
  Interface: DRs_cluster_svc (1)   Address: 192.168.1.22
                                   State:   UP
  Resource Group: DRs450_rg        State:  On line
```

```
***** f/forward, b/back, r/refresh, q/quit *****
```


clstat - HACMP Cluster Status Monitor

```
Cluster: DRs450 (1077722580)
Fri Sep 9 07:07:46 MDT 2005
      State: UP                Nodes: 2
      SubState: STABLE

Node: DRs_engine1          State: UP
  Interface: DRs_engine1_boot (1)  Address: 192.168.1.21
                                   State:  DOWN
  Interface: DRs_engine1_stdbby (1) Address: 192.168.2.10
                                   State:  UP
  Interface: DRs_engine1_hrtbeat (2) Address: 192.168.3.10
                                   State:  UP
  Interface: DS4100Lun_1 (0)       Address: 0.0.0.0
                                   State:  UP
  Interface: DRs_cluster_svc (1)   Address: 192.168.1.22
                                   State:  UP
  Resource Group: DRs450_rg        State:  On line
```

***** f/forward, b/back, r/refresh, q/quit *****

clstat - HACMP Cluster Status Monitor

```
Cluster: DRs450 (1077722580)
Fri Sep 9 07:07:46 MDT 2005
      State: UP                Nodes: 2
      SubState: STABLE

Node: DRs_engine1          State: UP
  Interface: DRs_engine1_boot (1)  Address: 192.168.1.21
                                   State:  DOWN
  Interface: DRs_engine1_stdbby (1) Address: 192.168.2.10
                                   State:  UP
  Interface: DRs_engine1_hrtbeat (2) Address: 192.168.3.10
                                   State:  UP
  Interface: DS4100Lun_1 (0)       Address: 0.0.0.0
                                   State:  UP
  Interface: DRs_cluster_svc (1)   Address: 192.168.1.22
                                   State:  UP
  Resource Group: DRs450_rg        State:  On line
```

***** f/forward, b/back, r/refresh, q/quit *****

The SubState field shows **STABLE**. If it lists **ACTIVE** or **STABLE**, no issue is present. If it shows **FAILED**, then additional work will need to be done to determine the reason for the failure.

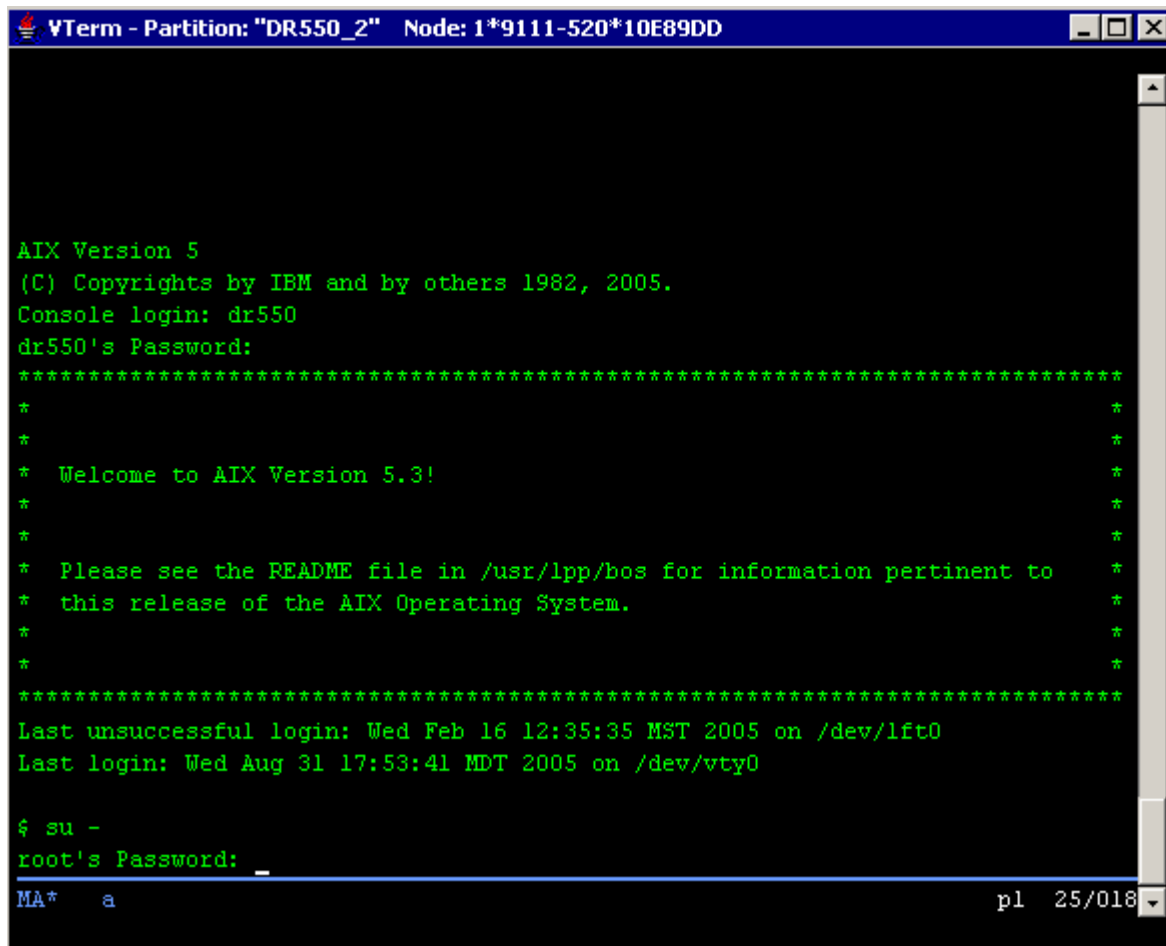
SMITTY Menu

You can also get the same information via the SMITTY menus, as follows:

You must be logged on using the AIX root userid (this must be done at the DR550 console).

If you have not switched user IDs to root, then complete the next step. If you have already switched to root, then you can skip this step.

\$ **su -** and then enter the default password of d3rv1sh (or the password that you setup during the installation). This can be seen in the picture below.



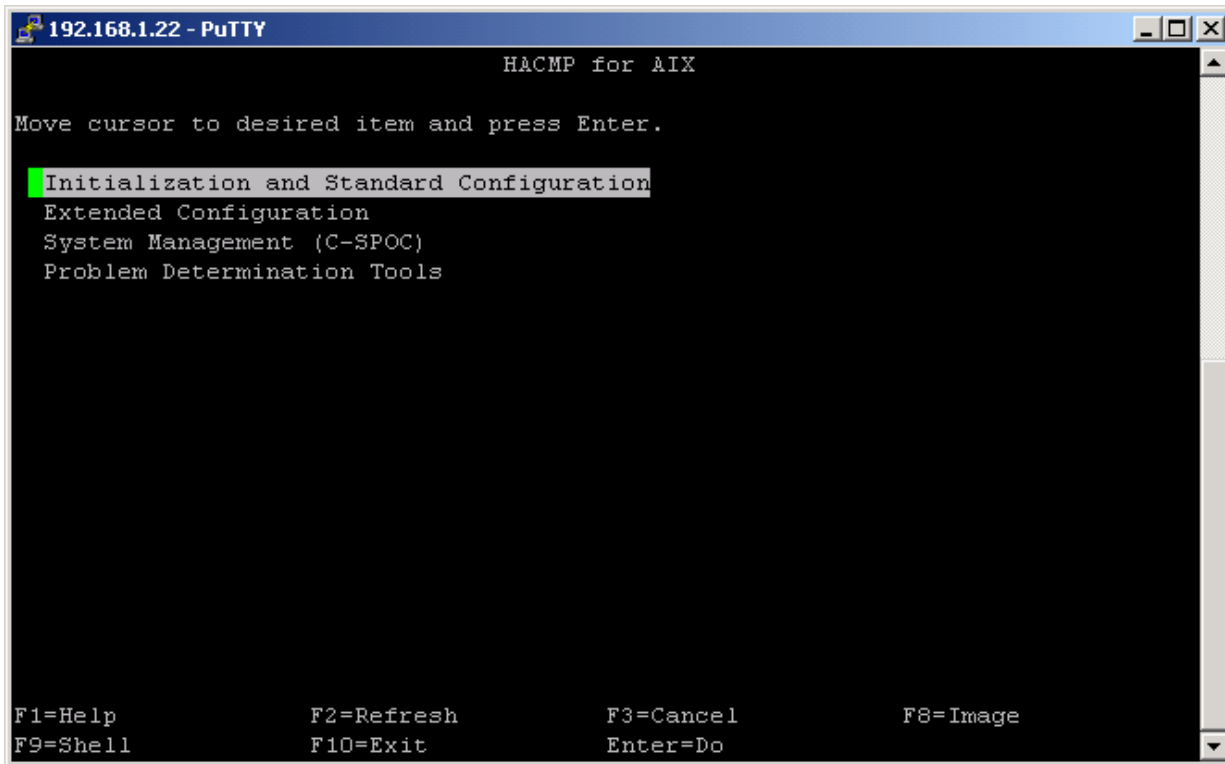
```
VTerm - Partition: "DR550_2" Node: 1*9111-520*10E89DD

AIX Version 5
(C) Copyrights by IBM and by others 1982, 2005.
Console login: dr550
dr550's Password:
*****
*
*
* Welcome to AIX Version 5.3!
*
*
* Please see the README file in /usr/lpp/bos for information pertinent to
* this release of the AIX Operating System.
*
*
*****
Last unsuccessful login: Wed Feb 16 12:35:35 MST 2005 on /dev/lft0
Last login: Wed Aug 31 17:53:41 MDT 2005 on /dev/vty0

$ su -
root's Password: _
MA* a p1 25/018
```

smitty hacmp

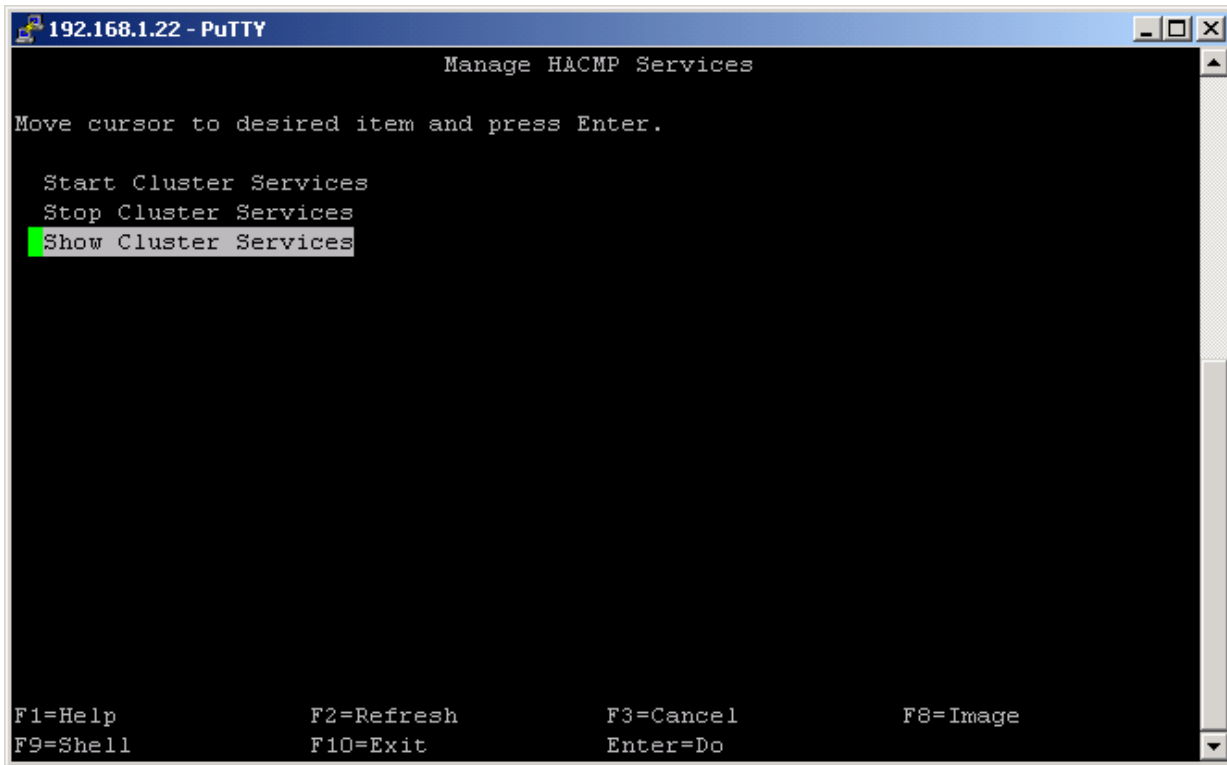
When this command is submitted, the following screen will be shown.



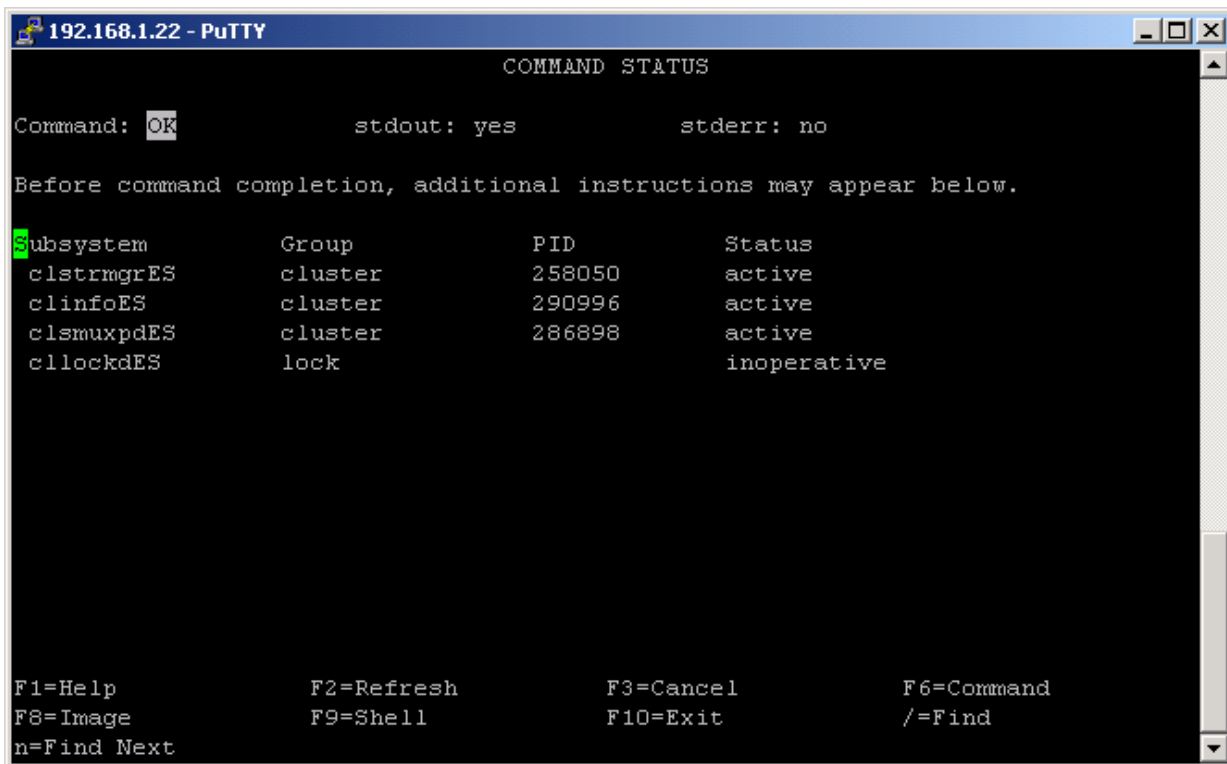
Select the System Management (C-SPOC) option and press Enter.



Select the Manage HACMP Services option and press enter..



Select Show Cluster Services and press Enter.



The screen above shows that the cluster subsystem is active with no issues. If your display shows something different, then you will need to refer to the HACMP guide (see the list of publications later in the paper).

Tivoli Storage Manager for Data Retention

This section displays detailed output of some of the TSM commands which can be used to monitor the TSM environment.

From the AIX prompt, enter the following command:

```
$ dsmadm
```

```
IBM Tivoli Storage Manager
```

```
Command Line Administrative Interface - Version 5, Release 2, Level 0.0 (This is an  
admin client and not TSM server version level. TSM server version is 5.3.1.2 is listed below once you  
logged in.)
```

```
(c) Copyright by IBM Corporation and other(s) 1990, 2003. All Rights Reserved.
```

```
Enter your user id: admin
```

```
Enter your password: xxxxxx
```

```
Session established with server TSM: AIX-RS/6000
```

```
Server Version 5, Release 3, Level 1.2
```

```
Server date/time: 06/02/05 08:45:07 Last access: 06/01/05 10:33:24
```

TSM Storage pools and Storage Volume utilization Monitoring

To display the storage pools with usage information, enter the following command from the TSM prompt.

```
tsm: TSM>q stg
```

Storage Pool Name	Device Class Name	Estimated Capacity	Pct Util	Pct Migr	High Mig Pct	Low Mig Pct	Next Storage Pool
ARCHIVEPOOL	DISK	5.0 M	48.0	47.9	90	70	
TAPEPOOL	LTOWORM	0.0 M	0.0	0.0	90	70	

The storage pool display above shows the estimated capacity and percentage utilized. This will give you an indication that you are filling up the disk. More detailed information by disk volume can be displayed using the following command. You should look at the percent utilized column and use that number as an indicator as to when additional capacity should be purchased. A good rule of thumb would be to add capacity when the last logical volume is 60% utilized.²

```
tsm: TSM>q vol
```

² In looking at the output in this document please note that the Pct Util is 0.0 since this report comes from our test machine. On your machine, this column will have your actual utilization.

Volume Name	Storage Pool Name	Device Class Name	Estimated Capacity (MB)	Pct Util	Volume Status
/dev/rtsmstglv1	ARCHIVEPOOL	DISK	1,024,000.0	0.0	On-Line
/dev/rtsmstglv10	ARCHIVEPOOL	DISK	652,288.0	0.0	On-Line
/dev/rtsmstglv2	ARCHIVEPOOL	DISK	1,024,000.0	0.0	On-Line
/dev/rtsmstglv3	ARCHIVEPOOL	DISK	1,024,000.0	0.0	On-Line
/dev/rtsmstglv4	ARCHIVEPOOL	DISK	1,024,000.0	0.0	On-Line
/dev/rtsmstglv5	ARCHIVEPOOL	DISK	1,024,000.0	0.0	On-Line
/dev/rtsmstglv6	ARCHIVEPOOL	DISK	1,024,000.0	0.0	On-Line
/dev/rtsmstglv7	ARCHIVEPOOL	DISK	1,024,000.0	0.0	On-Line
/dev/rtsmstglv8	ARCHIVEPOOL	DISK	1,024,000.0	0.0	On-Line
/dev/rtsmstglv9	ARCHIVEPOOL	DISK	1,024,000.0	0.0	On-Line

To increase the disk storage space, add more storage volumes and define them in TSM. Please refer to the TSM 5.3 Administration Guide Chapter 10 “Managing Storage Pools and Volumes”.

TSM Activity Log Monitoring

You can use the following command to display recent activity within the TSM server. You should review this information weekly and look for any messages then end with “E” vs “I” or “W” – see below for more details – to get more info on errors or warnings the command to use is “h 994” at the TSM admin prompt)

```
tsm: TSM>q actlog
```

```
07/12/05 15:03:25 ANR2017I Administrator ADMIN issued command: BACKUP DB
                devc=ltoworm type=full (SESSION: 17)
07/12/05 15:03:25 ANR0984I Process 18 for DATABASE BACKUP started in the
                BACKGROUND at 15:03:25. (SESSION: 17, PROCESS: 18)
07/12/05 15:03:25 ANR2280I Full database backup started as process 18.
                (SESSION: 17, PROCESS: 18)
07/12/05 15:03:28 ANR2017I Administrator ADMIN issued command: QUERY PROCESS
                (SESSION: 17)
07/12/05 15:03:32 ANR2017I Administrator ADMIN issued command: QUERY PROCESS
                (SESSION: 17)
07/12/05 15:03:44 ANR8337I LTO volume 3TX019L3 mounted in Drive DRIVE0
                (/dev/rmt0). (SESSION: 17, PROCESS: 18)
```

```

07/12/05 15:03:44 ANR0513I Process 18 opened output volume 3TX019L3.
                (SESSION: 17, PROCESS: 18)
07/12/05 15:03:44 ANR1360I Output volume 3TX019L3 opened (sequence number
                1). (SESSION: 17, PROCESS: 18)
07/12/05 15:03:48 ANR1361I Output volume 3TX019L3 closed. (SESSION: 17,
                PROCESS: 18)
07/12/05 15:03:48 ANR0515I Process 18 closed volume 3TX019L3. (SESSION: 17,
                PROCESS: 18)
more... (<ENTER> to continue, 'C' to cancel)

07/12/05 15:03:48 ANR8336I Verifying label of LTO volume 3TX019L3 in Drive
                DRIVE0 (/dev/rmt0). (SESSION: 17, PROCESS: 18)
07/12/05 15:03:49 ANR4550I Full database backup (process 18) complete, 409
                pages copied. (SESSION: 17, PROCESS: 18)
07/12/05 15:03:49 ANR0985I Process 18 for DATABASE BACKUP running in the
                BACKGROUND completed with completion state SUCCESS at
                15:03:49. (SESSION: 17, PROCESS: 18)
07/12/05 15:03:57 ANR2017I Administrator ADMIN issued command: QUERY MOUNT
                (SESSION: 17)
07/12/05 15:03:57 ANR8331I LTO volume 3TX019L3 is mounted R/W in Drive
                DRIVE0 (/dev/rmt0), status: DISMOUNTING. (SESSION: 17)
07/12/05 15:03:57 ANR8334I 1 matches found. (SESSION: 17)
07/12/05 15:04:09 ANR8468I LTO volume 3TX019L3 dismounted from Drive DRIVE0
                (/dev/rmt0) in library LIB1. (SESSION: 17, PROCESS: 18)
07/12/05 15:04:10 ANR2017I Administrator ADMIN issued command: QUERY PROCESS
                (SESSION: 17)
07/12/05 15:04:10 ANR0944E QUERY PROCESS: No active processes found.
                (SESSION: 17)
07/12/05 15:04:10 ANR2017I Administrator ADMIN issued command: ROLLBACK
                (SESSION: 17)
    
```

Above display shows detailed output of all TSM server activities. Please refer to TSM 5.3 Administration Guide Chapter 20 “Monitoring The IBM Tivoli Storage Manager Server” for additional information.

To display the TSM tunable parameters, please enter the following command at the TSM prompt.

```
tsm: TSM>q opt
```

```

Session established with server TSM: AIX-RS/6000
  Server Version 5, Release 2, Level 3.0
  Server date/time: 02/04/05 07:22:47 Last access: 02/04/05 06:45:04
    
```

Server Option	Option Setting	Server Option	Option Setting
CommTimeOut	300	IdleTimeOut	15
BufPoolSize	512000	LogPoolSize	512
MessageFormat	1	Language	en_US
Alias Halt	HALT	MaxSessions	100
ExpInterval	24	ExpQuiet	No

EventServer	Yes	MirrorRead DB	Normal
MirrorRead LOG	Normal	MirrorWrite DB	Sequential
MirrorWrite LOG	Parallel	VolumeHistory	/tsm/files/volhist
Devconfig	/tsm/files/devconfig	TxnGroupMax	512
MoveBatchSize	40	MoveSizeThresh	500
StatusMsgCnt	10	RestoreInterval	1,440
UseLargeBuffers	Yes	DisableScheds	No
NOBUFPREFetch	No	AuditStorage	Yes
REQSYSauthoutfile	Yes	SELFTUNEBUFpools-	No
		size	
SELFTUNETXNsize	Yes	DBPAGEShadow	Yes
DBPAGEShadowFile	dbpgshdw.bdt	MsgStackTrace	On
QueryAuth	None	LogWarnFullPerCe-	90
		nt	
ThroughPutDataTh-	0	ThroughPutTimeTh-	0
reshold		reshold	
NOPREEMPT	(No)	Resource Timeout	60
TEC UTF8 Events	No		
TCPPort	1500	TcpAdminport	1500
HTTPPort	1580	TCPWindowSize	64512
TCPBufsize	16384	TCPNoDelay	Yes
CommMethod	TCPIP	CommMethod	ShMem
CommMethod	HTTP	MsgInterval	1
ShmPort	1510	FileExit	
UserExit		FileTextExit	
AssistVCRRecovery	Yes	AcsAccessId	
AcsTimeoutX	1	AcsLockDRive	No
AcsQuickInit	No	SNMPSubagentPort	1521
SNMPSubagentHost	127.0.0.1	SNMPHeartBeatInt	5
TECHost		TECPort	0
UNIQUETECEvents	No	UNIQUETDPTCEven-	No
		ts	
Async I/O	No	Direct I/O	Yes
SHAREDLIBIDLE	No	3494Shared	No

The above displays the TSM server parameters which are set for the server. To make any changes please refer to TSM 5.3 Administration Guide Chapter 20 “Monitoring The IBM Tivoli Storage Manager”. There is also has a section called “Daily Monitoring Scenario”. The parameters have been set to optimize TSM within the DR550. Unless there is some overriding need to change, it is recommended that you should not change these parameters.

For detailed information regarding the administration schedule defined on the server, please enter the following command at the TSM prompt. DR550 has several administrative schedules that are predefined. This includes scheduled backups (using disk capacity within the DR550) for the TSM database and log files.

tsm: TSM>q sched type=admin f=d

```
Schedule Name: BAVOLH
Description:
Command: ba volh file=/tsm/files/backupvolhist
```

```

        Priority: 5
        Start Date/Time: 03/01/04    10:00:00
        Duration: 1 Hour(s)
        Period: 1 Day(s)
        Day of Week: Any
        Expiration:
        Active?: Yes
Last Update by (administrator): ADMIN
        Last Update Date/Time: 03/31/04    19:22:30
        Managing profile:

        Schedule Name: DBB
        Description:
        Command: backup db devc=dbbkup type=full
        Priority: 5
        Start Date/Time: 03/01/04    06:00:00
        Duration: 1 Hour(s)
        Period: 1 Day(s)
        Day of Week: Any
        Expiration:
        Active?: Yes
Last Update by (administrator): ADMIN
        Last Update Date/Time: 03/31/04    19:21:35
        Managing profile:

        Schedule Name: DELVOLH
        Description:
        Command: del volh todate=-2 type=dbb
        Priority: 5
        Start Date/Time: 03/01/04    23:59:00
        Duration: 1 Hour(s)
        Period: 1 Day(s)
        Day of Week: Any
        Expiration:
        Active?: Yes
Last Update by (administrator): ADMIN
        Last Update Date/Time: 10/12/04    10:53:41
        Managing profile:
    
```

To display the daily administration schedules and its status, please enter the following command at the TSM prompt.

tsm: TSM>q event * type=admin

Scheduled Start	Actual Start	Schedule Name	Status
-----	-----	-----	-----
05/13/04 06:00:00	05/13/04 06:00:19	DBB	Completed
05/13/04 10:00:00	05/13/04 10:00:19	BAVOLH	Completed
05/13/04 23:59:00		DELVOLH	Future

Above display indicates that two of the scheduled events successfully completed. If any schedule has

failed, look for the possible errors in TSM server activity logs to find out more detail on why it failed. There will be more information with the error code in the activity log file. To find out more information on schedules and events, please refer to TSM 5.3 Administration Guide Chapter 18 “Managing Schedules and Event records”.

TSM Database and Logs Monitoring

To display the TSM database utilization and its volume information, you can enter the next 2 commands.

tsm: TSM>q db (This command will show information on TSM database space, percent used, usable, pages, etc.)

Available Space (MB)	Assigned Capacity (MB)	Maximum Extension (MB)	Maximum Reduction (MB)	Page Size (bytes)	Total Usable Pages	Used Pages	Pct Util	Max. Pct Util
476	472	4	404	4,096	120,832	401	0.3	0.3

tsm: TSM>q dbvol (This command will show the volume name of the file that holds the TSM database. The TSM database can be made up of multiple volumes and can have multiple copies if required.)

Volume Name (Copy 1)	Copy Status	Volume Name (Copy 2)	Copy Status	Volume Name (Copy 3)	Copy Status
/tsmDb/dbvol0	Sync'd		Undefined		Undefined

To display the TSM log utilization and its volume information, you can enter the next 2 commands.

tsm: TSM>q log (This command will show information on TSM logs.)

Available Space (MB)	Assigned Capacity (MB)	Maximum Extension (MB)	Maximum Reduction (MB)	Page Size (bytes)	Total Usable Pages	Used Pages	Pct Util	Max. Pct Util
476	472	4	468	4,096	120,320	119	0.1	0.3

tsm: TSM>q logvol (This command will show the volume name of the file that holds the TSM logs. The log files can be made up of multiple volumes and can have multiple copies if required.)

Volume Name (Copy 1)	Copy Status	Volume Name (Copy 2)	Copy Status	Volume Name (Copy 3)	Copy Status
/tsmLog/logvol0	Sync'd		Undefined		Undefined

To display the TSM DB information in detail to monitor its performance...see the information in [blue](#) – this is the best you can get the DB to perform – if it is < 98% then you may need to consider increasing the size of the database buffer pool – see the TSM administration guide for details).

tsm: TSM>q db f=d

```

    Available Space (MB): 476
    Assigned Capacity (MB): 472
    Maximum Extension (MB): 4
    Maximum Reduction (MB): 404
      Page Size (bytes): 4,096
    Total Usable Pages: 120,832
      Used Pages: 401
      Pct Util: 0.3
    Max. Pct Util: 0.3
    Physical Volumes: 1
    Buffer Pool Pages: 128,000
    Total Buffer Requests: 76,894
      Cache Hit Pct.: 99.65
    Cache Wait Pct.: 0.00
    Backup in Progress?: No
    Type of Backup In Progress:
    Incrementals Since Last Full: 0
    Changed Since Last Backup (MB): 0.05
      Percentage Changed: 3.49
    Last Complete Backup Date/Time: 07/20/05 06:00:10
    Estimate of Recoverable Space (MB):

```

To display the TSM log information in detail to monitor its performance, enter the following command. See the line in [blue](#) – this current setting is adequate for the log to perform – if it is > 10 %, then you may need to consider increasing the recovery log buffer pool size – see the TSM administration guide for details).

tsm: TSM>q log f=d

```

    Available Space (MB): 476
    Assigned Capacity (MB): 472
    Maximum Extension (MB): 4
    Maximum Reduction (MB): 468
      Page Size (bytes): 4,096
    Total Usable Pages: 120,320
      Used Pages: 119
      Pct Util: 0.1
    Max. Pct Util: 0.3
    Physical Volumes: 1
    Log Pool Pages: 128
      Log Pool Pct. Util: 0.27
    Log Pool Pct. Wait: 0.00
    Cumulative Consumption (MB): 7,176.34

```

Consumption Reset Date/Time: 02/26/04 18:40:30

The commands above display the status of the TSM database and logs in details. Notice that the information highlighted in blue is the key status indicator of their respective performance. As shown, TSM is performing at its optimal level. Please refer to TSM 5.3 Administration Guide Chapter 19 “Managing Database and Recovery Log” for more detailed information.

DS4100 storage server via the Storage Manager Client

The purpose of this section is to give the customer a brief overview of the monitoring recommended for the DS4100 storage subsystem (DS4100) that is part of the DR550. This is going to be done via the Storage Manager Client. This is by no means a complete list and the customer is urged to familiarize themselves with the DR550 and its respective storage server(s).

DS4000 series Redbooks, online articles and also the help feature built into the Storage Manager Client are all excellent additional references that should be used in conjunction with this section to effectively monitor the DR550 external storage. (DS4100).

The DS4100 can be monitored externally by use of indicator/warning lights on the front and back sides of the controller and expansion units (if purchased as part of the DR550). The LEDs/indicators are discussed in detail in the “Installation, User’s, and Maintenance Guide” for the controller (DS4100) and the expansion units (EXP100) and will not be covered here.

The DS4100 can also be monitored internally through the Storage Manager Client via the Recovery Guru.

You can use the external indicators to alert you about potential issues and then use Storage Manager Client (referred to as SMclient) to get a detailed explanation of the indicator and possible procedures (steps) to perform to clear the indicators. A regular check of SMclient will also help in identifying issues as they arise and allow the customer to be more proactive.

Using SMclient to Monitor a DS4100

To use SMclient, log on locally to the DR550. If you have an a dual node system (HACMP) , then you need to log on to node 2 as that is where the SMclient runs. An example would be user DR550. You will need to use the console provided in the DR550 solution (mounted at rack location 21) in the DR550 and shipped with the DR550 Express. To access the AIX server, press the PRT SC key on the console keyboard. This will bring up a screen that will allow you to switch the console to the appropriate server within the DR550. Assuming you have not changed the host names, you would select Engine1 for a single node DR550 (including DR550 Express) or select Engine2 for a dual node DR550 (this is the secondary server in the cluster).

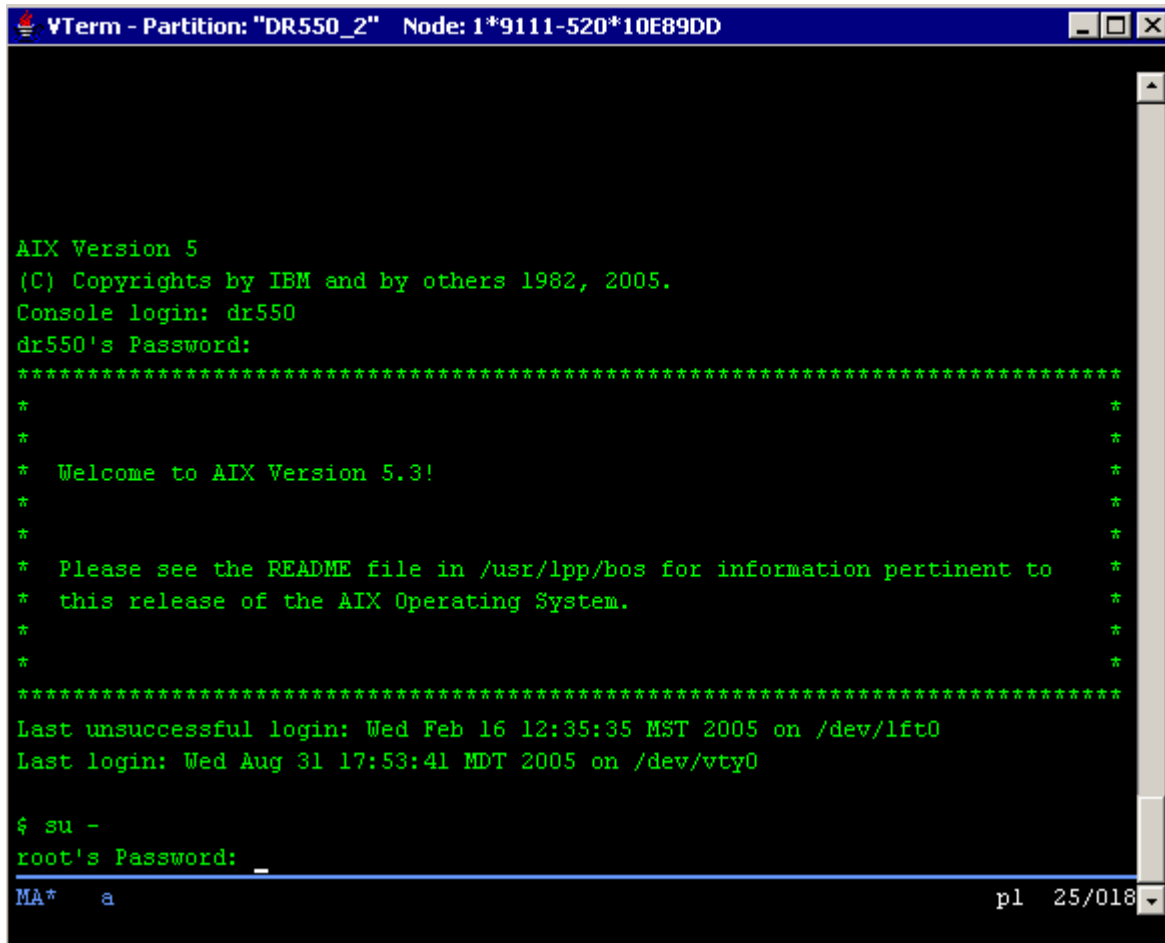
To login, type DR550 and use the default password of DR550 (or whatever password is now valid). This can be seen in the picture below.



Logging on to DR550 node with username DR550

Change to Root by entering

\$ **su -** and then enter the default password of d3rv1sh (or the password that you setup during the installation). This can be seen in the picture below.



```
VTerm - Partition: "DR550_2" Node: 1*9111-520*10E89DD

AIX Version 5
(C) Copyrights by IBM and by others 1982, 2005.
Console login: dr550
dr550's Password:
*****
*
*
* Welcome to AIX Version 5.3!
*
*
* Please see the README file in /usr/lpp/bos for information pertinent to
* this release of the AIX Operating System.
*
*
*****
Last unsuccessful login: Wed Feb 16 12:35:35 MST 2005 on /dev/lft0
Last login: Wed Aug 31 17:53:41 MDT 2005 on /dev/vty0

$ su -
root's Password: _
MA* a p1 25/018
```

Changing to root on DR550 node

Start the AIX GUI by typing

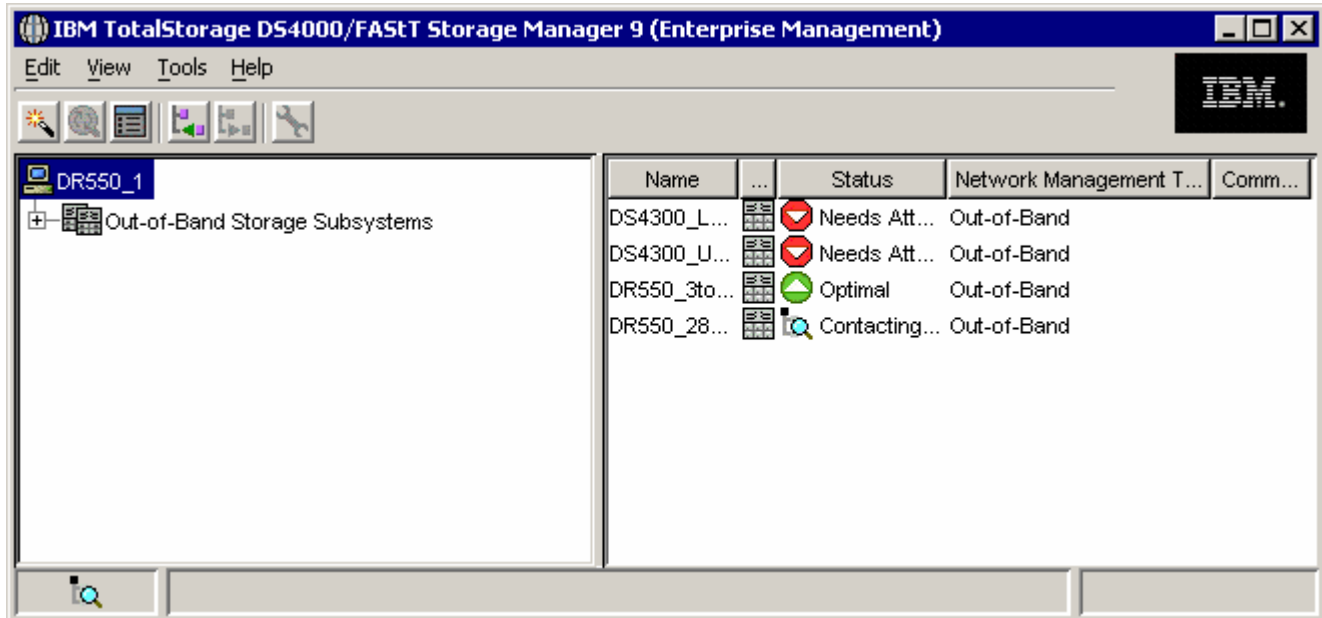
startx at the prompt and then hit enter.

At the prompt, type

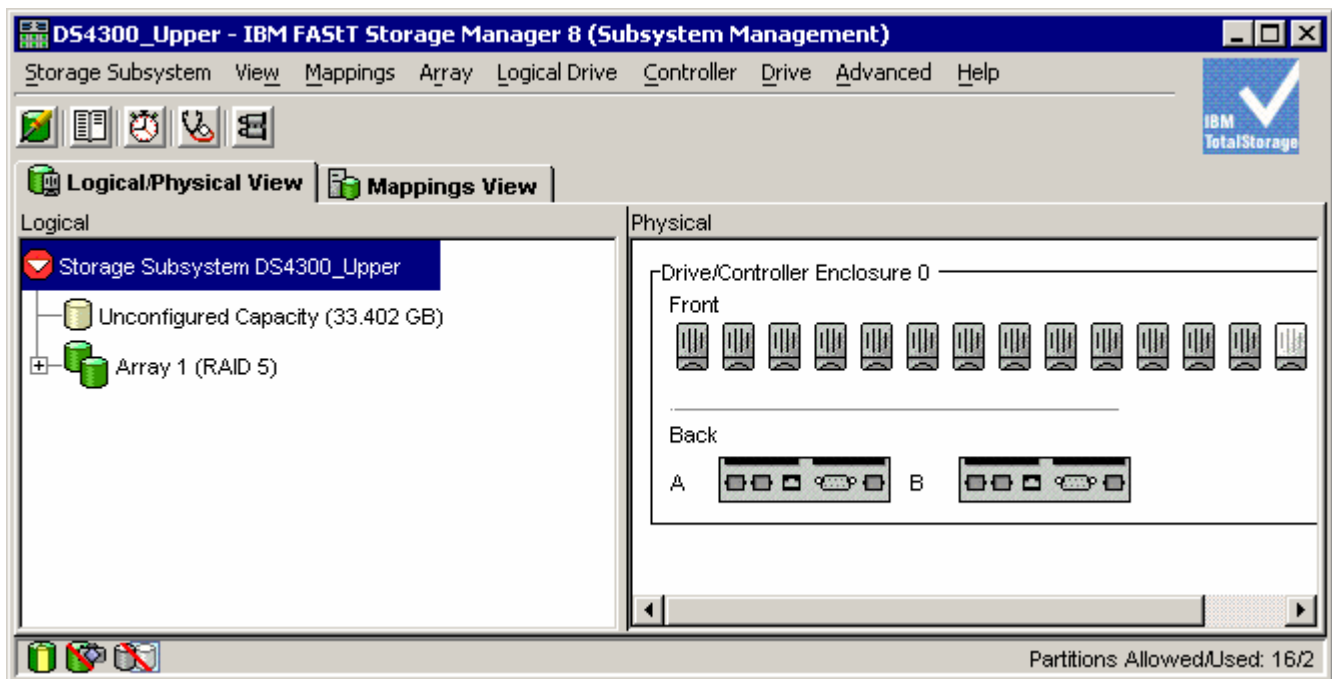
SMclient (case sensitive) and wait for SMclient to start.

Once SMclient has started, you should be able to see your specific DS4100 Storage Subsystems. If the status of it is optimal, then there are no pending issues. The icon representing your DS4100 Storage Subsystem will be green. If the icon representing your subsystem is red, then it will report as 'needs attention' under the status portion.

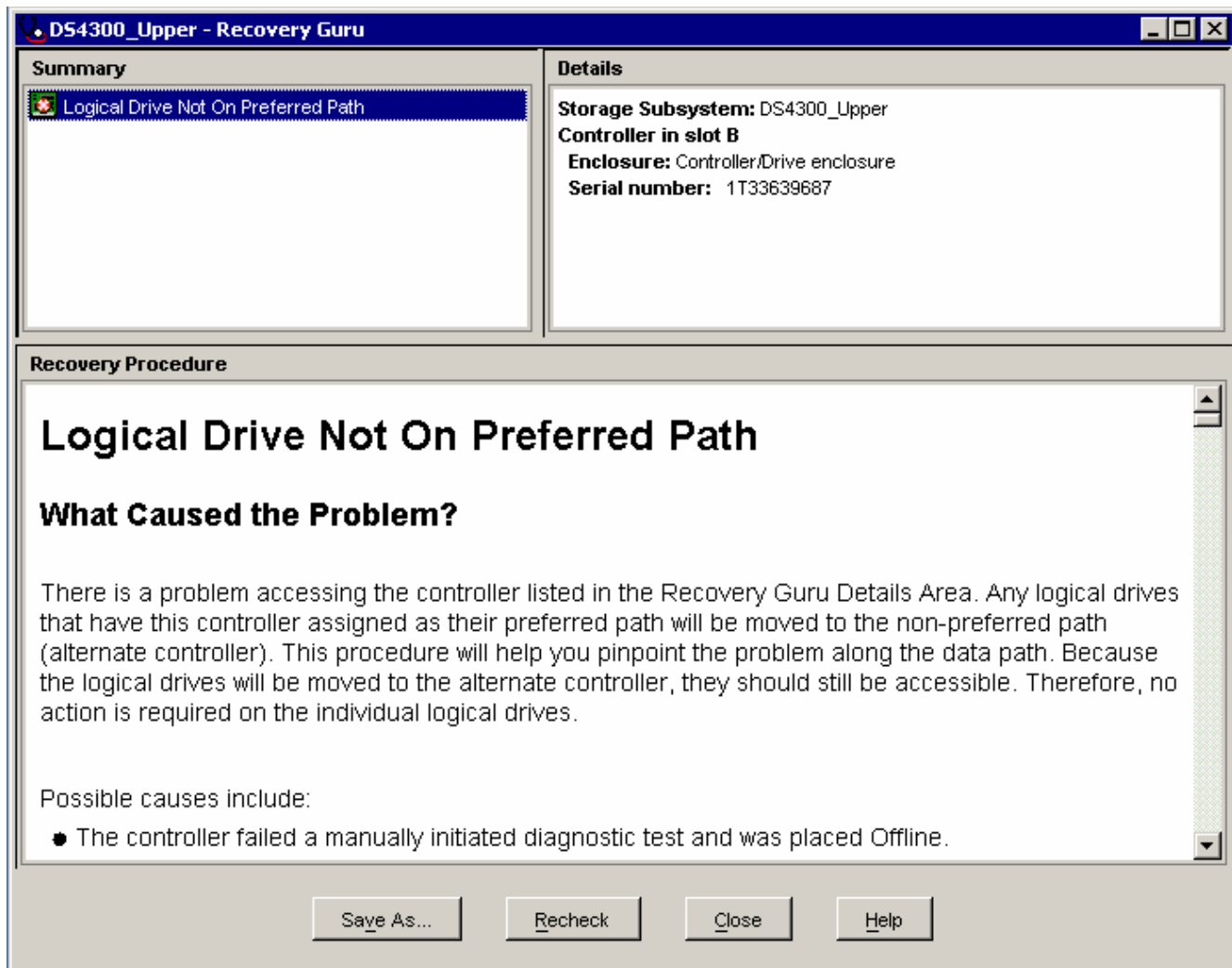
There are storage subsystems that are optimal, needing attention, and unresponsive as seen in the figure below.



If your subsystem is red, then click on the subsystem to perform additional troubleshooting. The red icon represents a condition that needs your attention. Double-clicking on the second storage server (DS4300_Upper) in the list brings up the Storage Manager Client for that specific storage server.



Then from the pull down menu, **Storage Subsystem -> Recovery Guru**. This will bring up the recovery guru. You can also get there by clicking on the icon that looks like a stethoscope.



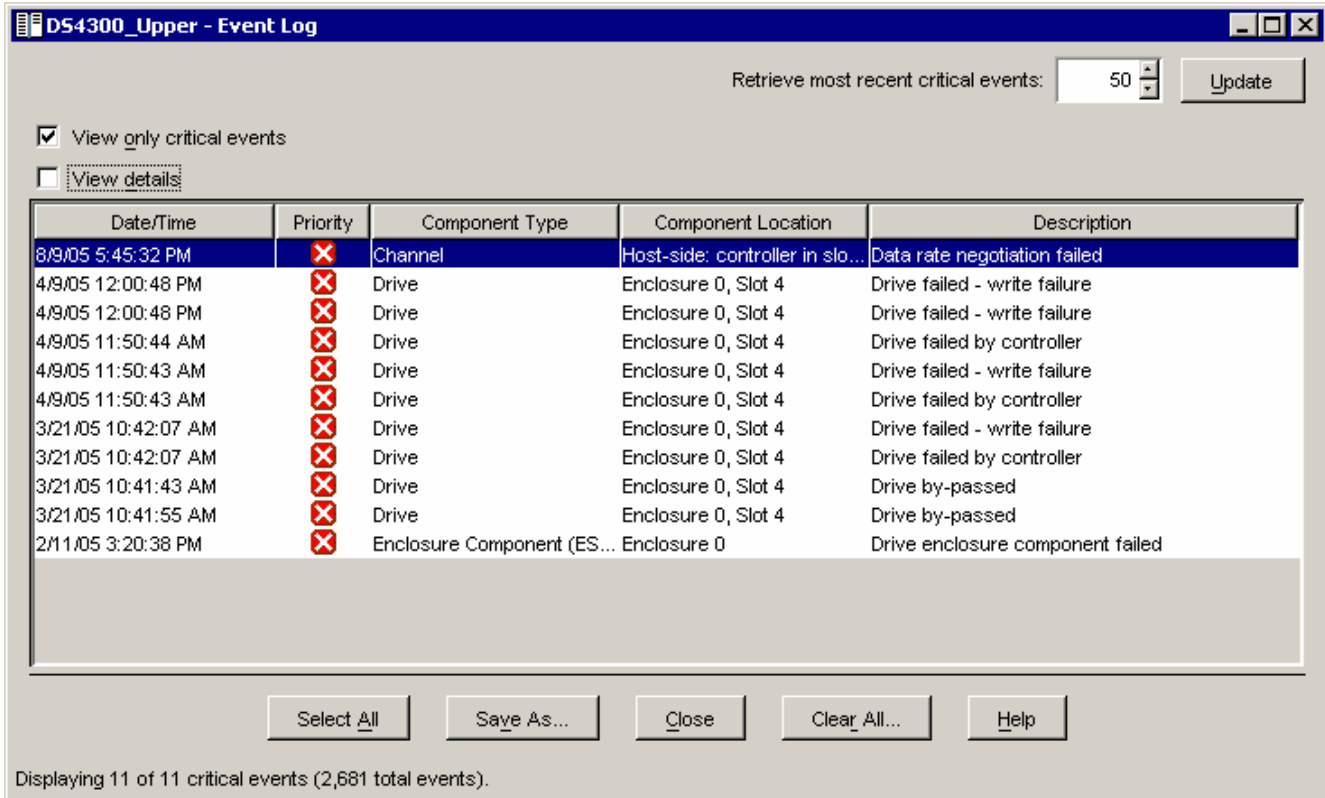
Once you have brought up the recovery guru, read the summary and then follow the recovery procedures outlined in the recovery procedure panel. As you can see in this example the summary section informs the user that the logical Drive is not on the preferred path. Under the recovery procedure pane is information on what the problem is, possible causes, and steps on how to fix issue.

Once all the issues have been addressed, the status of the storage subsystem will change to optimal and become green again.

Using the Event Log to Monitor Subsystem

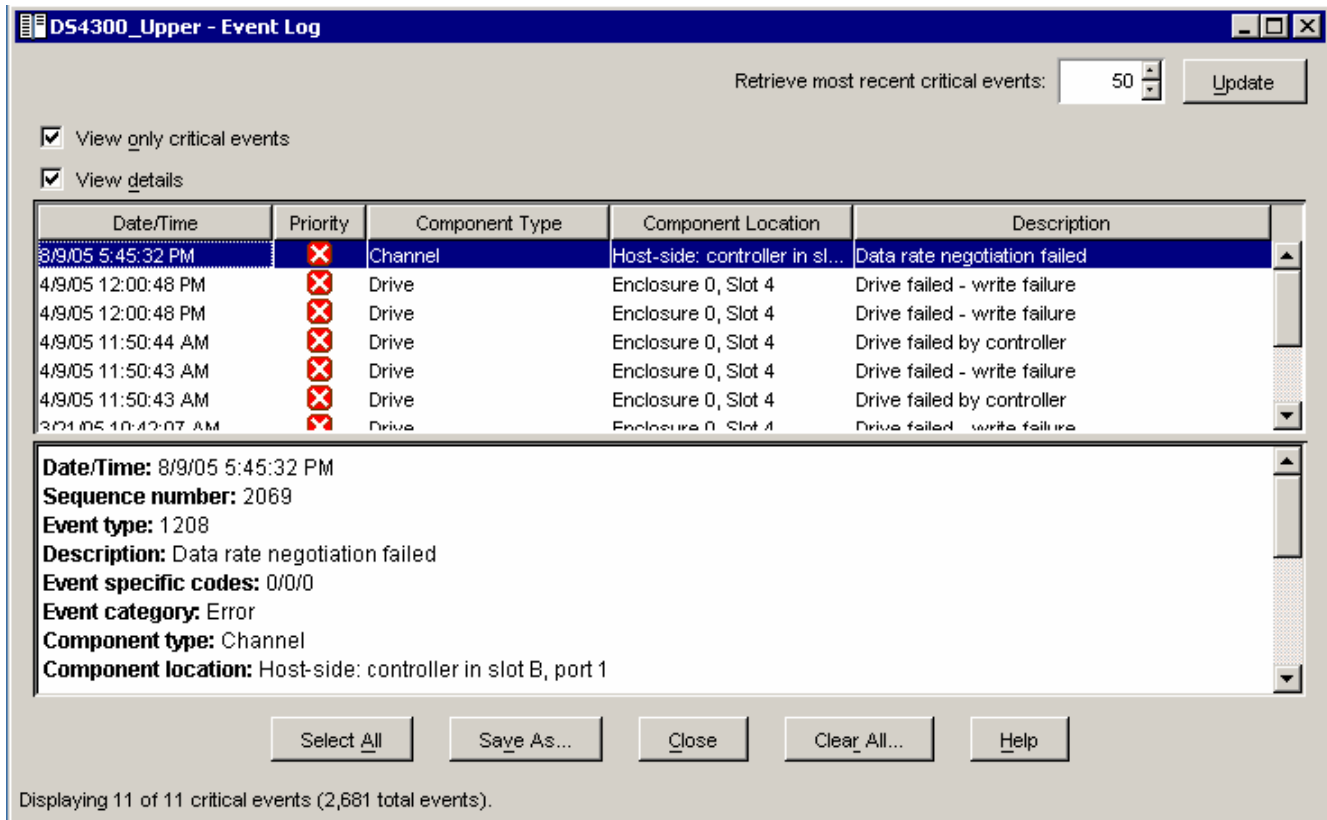
The event log is another way to monitor the storage subsystem.

From the pull down menu: **view -> event log**. It can also be done by clicking on the icon that looks like an open book. The event log is shown in the next figure.



In the figure only critical events have been shown. If the check in the “view only critical events” box is removed, then all events will be shown.

You can double click on the event listed to get more specific information about an event. This might be needed by IBM support to help diagnose the problem.



To close out of the SMclient application, just exit like any other application by either choosing exit from one of the pull down menus or clicking on the X box in the upper right hand corner of the window. To close the GUI in AIX right click on the desktop and choose quit.

SNMP can be used in addition to external indicators and the SMclient application to monitor the storage attached to a DR550. How to set up SNMP to send messages from SMclient is covered in the DR550 installation guide. Enabling SNMP traps and messaging should not be a replacement for the daily and weekly commands used to monitor the DR550. SNMP can help to alert people to issues, but should not be the only method of monitor the DR550.

Hardware Management Console

The HMC is provided specifically for hardware and partition management of a pSeries server (partitioning of the pSeries server is not supported with DR550 at this time). The HMC is not included with DR550 Express. The HMC has 3 specific service applications. They are the Service Agent, Remote Support, and the Service Focal Point. Again, you would use the HMC to monitor and manage the server hardware and use AIX and its error logs to monitor the operating system.

Service Agent

The Service Agent application helps you manage hardware inventory and error information. Use Service Agent tasks for the following:

- Customer user ID registration with the eService web site so you can view system and HMC data
- Customer notification when service events occur on the HMC or connected systems
- Immediate transmission of service information to IBM.

Remote Support

Remote support includes setting up connectivity between the system and its service provider. The customer information is used to identify the system and its administrators to the service provider. It also contains tasks used to set up connectivity between the service provider and the system. Active remote support requests and remote connections may be viewed and managed. Details on setting up this “call home” capability are included in the DR550 Users Guide.

Service Focal Point

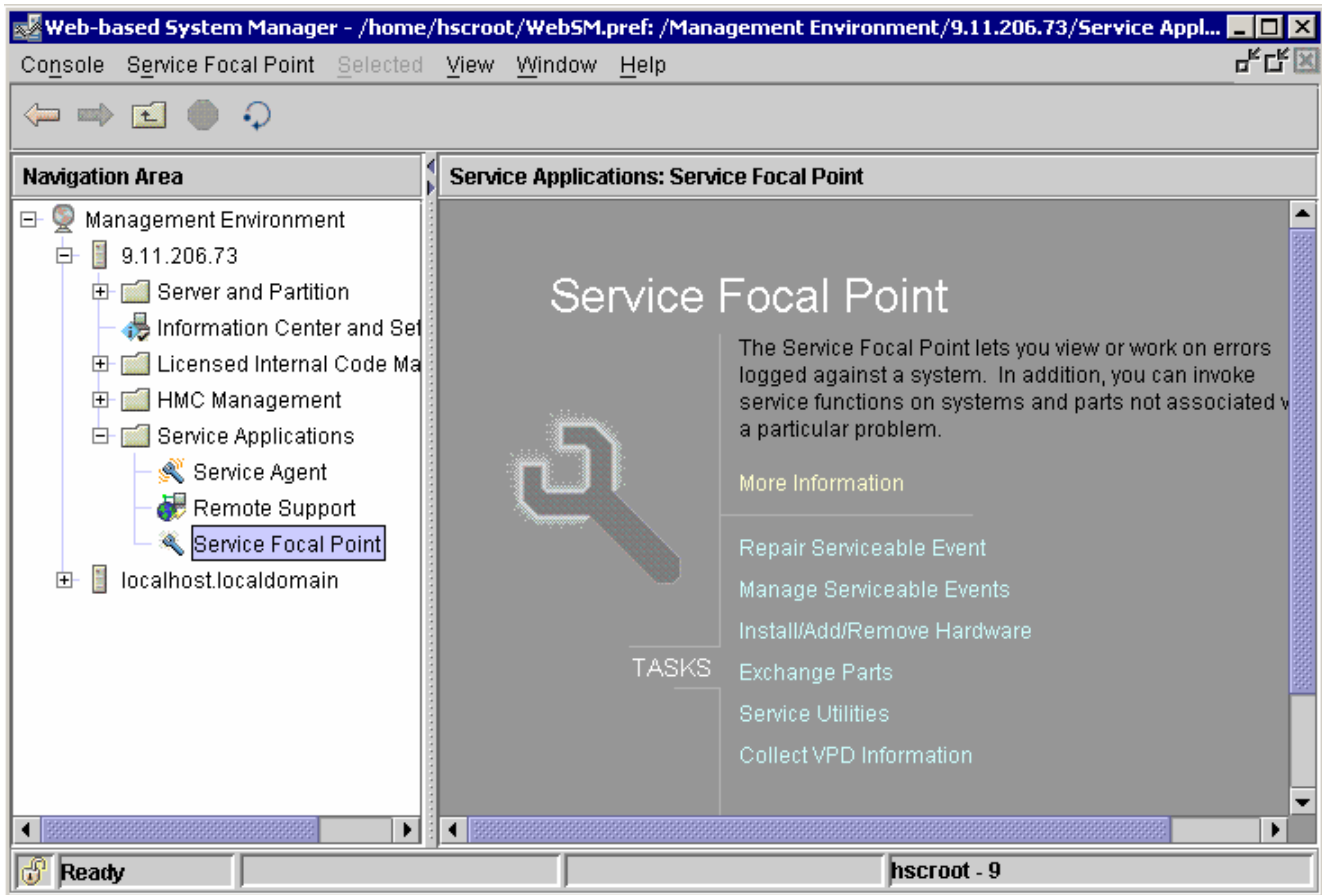
The Service Focal Point lets you view or work on errors logged against a system. In addition, you can invoke service functions on systems and parts not associated with a particular problem.

This section will show how to log onto the HMC and view information in the service focal point application, specifically serviceable events. The service focal point can supply detailed information on the serviceable event and list FRUs associated with the serviceable event. More troubleshooting or working with IBM support to narrow down the possible issue may be required.

To access the Service Focal Point application:

1. Log on to HMC with default username of hscroot and password of abc123.
2. Double-click on the Service Applications folder.
3. Highlight and select the Service Focal Point icon.

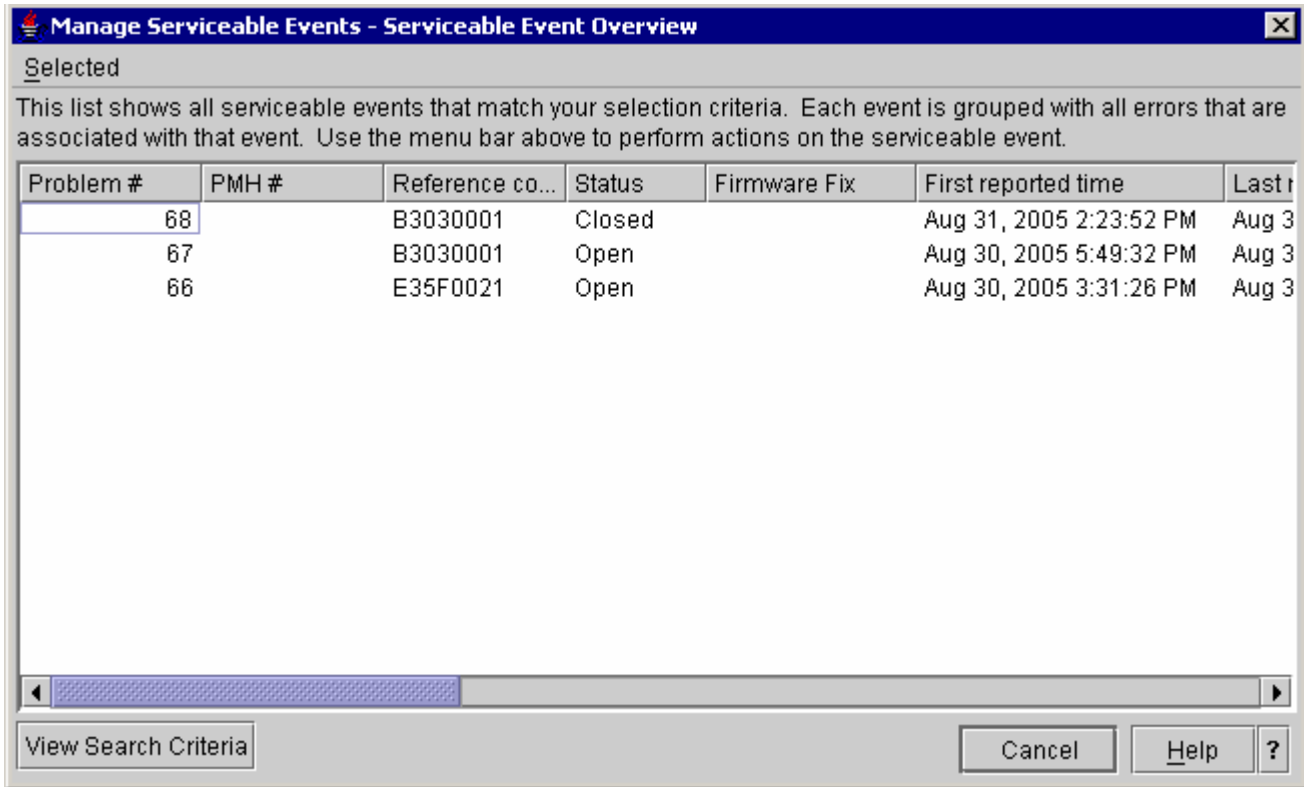
As you can see by the figure below, there are several tasks that can be performed on your system.



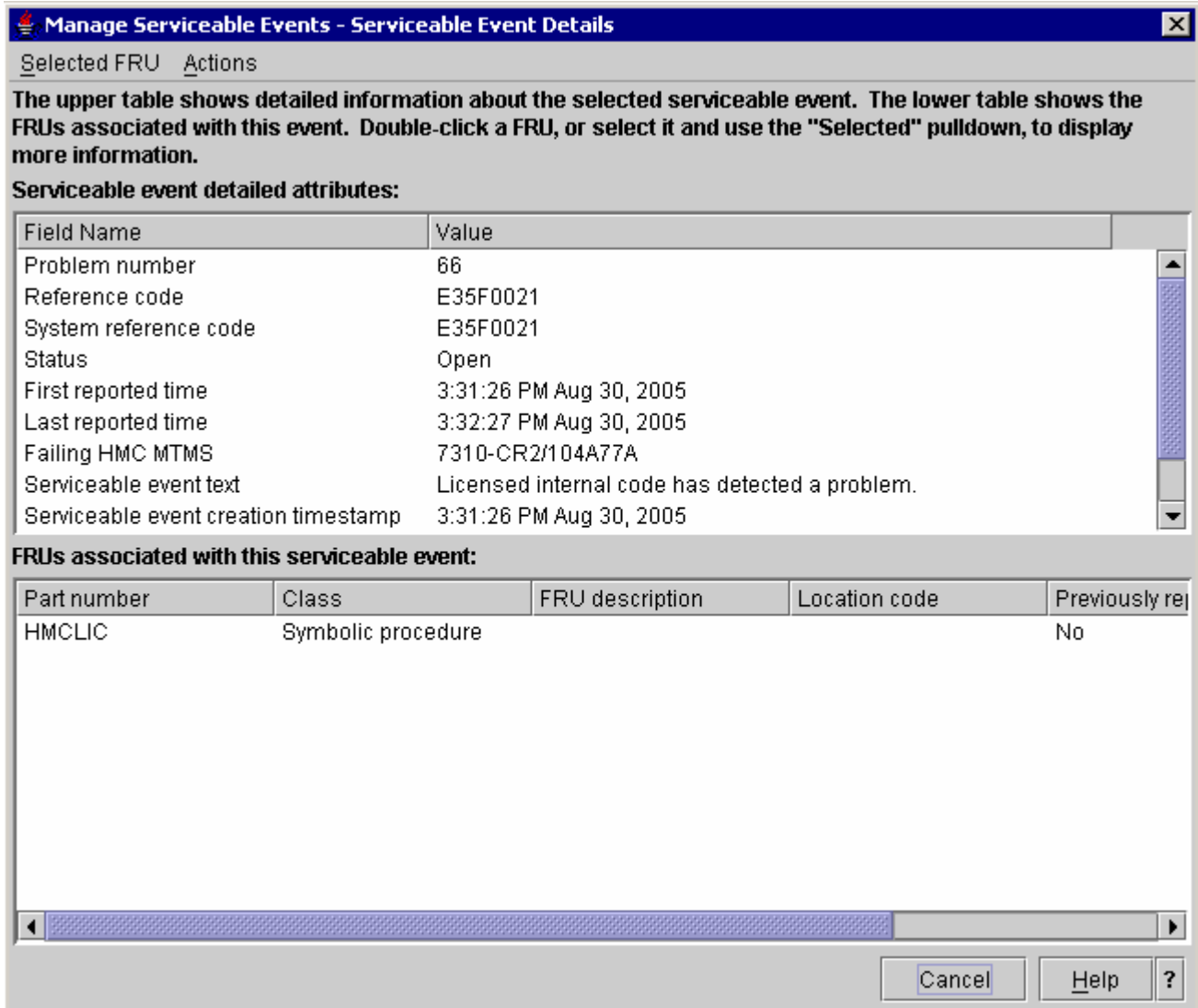
They are as follows:

- Repair Serviceable Event – All systems that are connected to the HMC you are logged on to will appear in a table. You would then select the Machine type-model/serial number of the machine you want to.
- Manage Serviceable Events – Use this window to specify selection criteria for the serviceable events you wish to view or manage. Only events that meet all the criteria that you specify will be displayed.
- Install/Add/Remove Hardware – This is used to add remove hardware from a specific pSeries system.
- Exchange Parts – Use this to replace an enclosure or Field Replaceable Unit (FRU).
- Service Utilities – This is where you would go to launch the ASM menu, manage Dumps, etc.
- Collect VPD Information – This will allow you to collect Vital Product Data and record that information on floppy disk.

4. Click on Manage Serviceable Events. A window will appear allowing you to specifically select criteria for serviceable events you want to manage. If you leave all the default settings, the system will bring up a list of serviceable events. We have two open events and one closed event as seen in the next figure.



5. Double-click on any event that you would like more detailed information on. As you can see in the next figure, we have gotten more information on problem #66.



Use the information on the serviceable event to determine your next plan of action.

Note: You should check the HMC serviceable events listing frequently (daily is recommended, weekly at a minimum). If a problem has occurred, then daily monitoring is strongly recommended for a period of time. Once repaired, continue to monitor until you are comfortable that the error has been resolved and no new hardware events occur.

Frequently Asked Questions

This portion of the document is intended for use by DR550 and DR550 Express customers and administrators to understand DR550 and DR550 Express solutions as well as to troubleshoot any problems. The following questions are based on operations questions that have been or are expected to be asked. DR550 and DR550 Express are fully integrated solutions using multiple IBM products; these include pSeries servers running AIX, High Availability Clustering Multi Processing (HACMP) – only in the dual node DR550, Tivoli Storage Manager for Data Retention, SAN Switches, Hardware Maintenance Console and flat panel monitor, and DS4100. This FAQ guide will help you to identify how to get the right information and how to make some changes as needed. You can also use some of the information to help monitor system status to prevent any future problems. It also provides additional reference material, in Appendix below, for further help.

General Assumptions:

1. User has remote and/or physical access to the (DR550 or DR550 Express) system.
2. User is authorized to work on the system with an administrative authority to make changes as necessary.
3. This support guide is designed specifically for DR550 Dual Nodes, DR550 Single Node or DR550 Express support based on the usage of each product and will provide assistance to guide the administrator to pinpoint the problem or get further assistance from IBM support center.

AIX

Q1: Why can I not remotely login to AIX with DR550 ID?

Answer: You can login remotely via secure shell (ssh) with “ibmce” ID only. All other IDs (DR550 and DR550adm) are intended to be used at the console which is integrated in the system rack.

Note: Remember to change all passwords once the DR550 is in production.

Q2: How do I change the user password?

Answer: Use “passwd” and respond at the prompts or “smit passwd” admin command and enter the user name that requires the new password. Any user can change its own password but to change other users you will need “root” authority. See AIX administration guide for more details.

Q3: Why can't the content management server connect to the dual node DR550?

Answer: Make sure that your IP network is working properly. Ping the virtual address from any computer or from your server which archives the data to DR550 to the IP address of DR550. If you

can not ping successfully, then there may be something changed in your network and now the two networks are not part of the same VPN which is required by HACMP. Please contact your local network administrator for further assistance.

Hint: The commands to use ping <ip address> or use traceroute command from any UNIX server which will provide you detail information of all routes it travels through to get to the IP address. When you see infinite display of “* * * * *” means last router or gateway can not pass the information to the destination or to the next router and that is where the problem may be.

Q4: How do I check my AIX error report?

Answer: Run “errpt” command at the AIX prompt. See example below:

\$ **errpt | more**

IDENTIFIER	TIMESTAMP	T	C	RESOURCE_NAME	DESCRIPTION
AA8AB241	0831181305	T	0	clstrmgrES	OPERATOR NOTIFICATION
A96B4002	0831181305	I	0	grpsvcs	Group Services informational message
A96B4002	0831181305	I	0	grpsvcs	Group Services informational message
AFA89905	0831181305	I	0	grpsvcs	Group Services daemon started
A96B4002	0831181305	I	0	grpsvcs	Group Services informational message
A96B4002	0831181305	I	0	grpsvcs	Group Services informational message
97419D60	0831181305	I	0	topsvcs	Topology Services daemon started
A6DF45AA	0831174505	I	0	RMCdaemon	The daemon is started.
2BFA76F6	0831174105	T	S	SYSPROC	SYSTEM SHUTDOWN BY USER
9DBCDFDEE	0831174505	T	0	errdemon	ERROR LOGGING TURNED ON
192AC071	0831173905	T	0	errdemon	ERROR LOGGING TURNED OFF
6D19271E	0831171805	I	0	topsvcs	Topology Services daemon stopped
28854E81	0831171805	I	0	grpsvcs	Group Services daemon stopped
99FA80C7	0831171805	U	S	haemd	SOFTWARE
AA8AB241	0831171805	T	0	clstrmgrES	OPERATOR NOTIFICATION
173C787F	0831165105	I	S	topsvcs	Possible malfunction on local adapter
E7A89C7D	0831164905	U	U	topsvcs	Local adapter disabled after unstable
E7A89C7D	0831164505	U	U	topsvcs	Local adapter disabled after unstable
E7A89C7D	0831164105	U	U	topsvcs	Local adapter disabled after unstable

Q5: How do I find out more detail for a specific error message?

Answer: Use “errpt -a <msg id | more” at AIX prompt. See below.

\$ **errpt -a 6D19271E | more**

```

-----
LABEL:                OPMSG
IDENTIFIER:           AA8AB241

Date/Time:            Wed Aug 31 18:13:46 MDT 2005
Sequence Number:      8847
Machine Id:           00CE89FD4C00
Node Id:              DRs_engine1
Class:                0
Type:                 TEMP
Resource Name:        clstrmgrES

```

Description
OPERATOR NOTIFICATION

User Causes
ERRLOGGER COMMAND

Recommended Actions
REVIEW DETAILED DATA

Detail Data
MESSAGE FROM ERRLOGGER COMMAND
HACMP/ES Cluster Manager Started

LABEL: GS_MESSAGE_ST
IDENTIFIER: A96B4002

Date/Time: Wed Aug 31 18:13:38 MDT 2005
Sequence Number: 8846
Machine Id: 00CE89FD4C00
Node Id: DRs_engine1
Class: 0
Type: INFO
Resource Name: grpsvcs

Description
Group Services informational message

Probable Causes
Informational message

Failure Causes
Informational message

Recommended Actions
NONE

Detail Data
DETECTING MODULE
RSCT,TraceStream.C,1.79,693

If there are disks and other errors they might look like this:

IDENTIFIER	TIMESTAMP	T	C	RESOURCE_NAME	DESCRIPTION
BC669AA7	1109094804	P	H	dacl	CONTROLLER HEALTH CHECK FAILURE
3074FEB7	1109094804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109094804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109094804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109094804	T	H	fscsil	ADAPTER ERROR
BC669AA7	1109093804	P	H	dacl	CONTROLLER HEALTH CHECK FAILURE
3074FEB7	1109093804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109093804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109093804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109093804	T	H	fscsil	ADAPTER ERROR
3074FEB7	1109093804	T	H	fscsil	ADAPTER ERROR
BC669AA7	1109092804	P	H	dacl	CONTROLLER HEALTH CHECK FAILURE
3074FEB7	1109092804	T	H	fscsil	ADAPTER ERROR

```

3074FEB7 1109092804 T H fscsil ADAPTER ERROR
3074FEB7 1109092804 T H fscsil ADAPTER ERROR
3074FEB7 1109092804 T H fscsil ADAPTER ERROR
BC669AA7 1109091804 P H dac1 CONTROLLER HEALTH CHECK FAILURE
3074FEB7 1109091804 T H fscsil ADAPTER ERROR
3074FEB7 1109091804 T H fscsil ADAPTER ERROR
3074FEB7 1109091804 T H fscsil ADAPTER ERROR
3074FEB7 1109091804 T H fscsil ADAPTER ERROR
3074FEB7 1109091804 T H fscsil ADAPTER ERROR
BC669AA7 1109090804 P H dac1 CONTROLLER HEALTH CHECK FAILURE
3074FEB7 1109090804 T H fscsil ADAPTER ERROR

```

Q7: How do I find out if the filesystem is full? How can I increase the file space?

Answer: Enter “df –m” command at an AIX prompt. Look in to 3rd column labeled “Free” to make sure the value is “0” or very low number to add more file space (You may want to remove unnecessary or old files to free up some space). Use “chfs” or “smit chfs” AIX commands to extend file system.

Q8: How do I know that I have free space available to use to extend a file system?

Answer: Use “lsvg <volumegroup name>” and check FREE PPs to see if there are FREE PPs (physical Partitions) available to use.

\$ lsvg TSMDbLogs

```

VOLUME GROUP:      TSMDbLogs          VG IDENTIFIER:
00ce89fd00004c000000105fc29c1bc
VG STATE:          active             PP SIZE:          32 megabyte(s)
VG PERMISSION:    read/write        TOTAL PPs:       3679 (117728 megabytes)
MAX LVs:          256                FREE PPs:        69 (2208 megabytes)
LVs:              3                USED PPs:        3610 (115520 megabytes)
OPEN LVs:         3                QUORUM:          2
TOTAL PVs:        1                VG DESCRIPTORS:  2
STALE PVs:        0                STALE PPs:       0
ACTIVE PVs:       1                AUTO ON:         no
Concurrent:       Enhanced-Capable  Auto-Concurrent: Disabled
VG Mode:          Concurrent
Node ID:          1                Active Nodes:    3
MAX PPs per VG:  32512                MAX PPs per PV:  4064
MAX PPs per PV:  4064                MAX PVs:         8
LTG size:         128 kilobyte(s)  AUTO SYNC:       no
HOT SPARE:        no                BB POLICY:       relocatable

```

Q9: Once I have extended the file system with “chfs”, is the extra space available to use right away?

Answer: Yes. You can verify by using “df –m” command at AIX prompt to see that the file system with “0” or low space has now additional space you just assigned.

Q10: How do I know my Operating System and maintenance level?

Answer: Use “oslevel -r” at AIX prompt. See example below:

```
$ oslevel -r
```

5200-06 (this means it is running AIX 5.2 with maintenance level 06)

Q11: How do I know what level of Tivoli Storage Manager is running?

Answer: Enter “lspp -l tivoli.tsm.server*” command at AIX prompt. See example below:

```
$ lspp -l tivoli.tsm.server*
```

Fileset	Level	State	Description

Path: /usr/lib/objrepos			
tivoli.tsm.server.aix5.rte64	5.3.0.0	COMMITTED	IBM Tivoli Storage Manager 64 bit Server Runtime
tivoli.tsm.server.com	5.3.0.0	COMMITTED	IBM Tivoli Storage Manager Server common services
tivoli.tsm.server.webadmin	5.2.3.0	APPLIED	IBM Tivoli Storage Manager Server Web Administrator Icons
Path: /etc/objrepos			
tivoli.tsm.server.aix5.rte64	5.3.0.0	COMMITTED	IBM Tivoli Storage Manager 64 bit Server Runtime
tivoli.tsm.server.com	5.3.0.0	COMMITTED	IBM Tivoli Storage Manager Server common services

Q12: How do I extend a volume group to use new disks?

Answer: Use “extendvg” or “smit extendvg” command to add new disk to existing volume group. See the AIX administration guide for more details.

Q13: How do I create a new logical volume?

Answer: Use the “mklv” or the “smit mklv” admin command. See the AIX administration guide for more details.

Q14: How do I create a new file system?

Answer: Use the “crfs” or the “smit crfs” admin command. See the AIX administration guide for more details.

Q15: We have a DR550 Express and I don't see any volume groups that are mentioned in the HACMP section, so how does the TSM server start and what resources does it use?

Answer: DR550 Express uses the following resources:

Volume Groups:

rootvg (for all data, AIX Operating System and TSM application data)

File Systems:

/tsm (TSM related data)

/tsmDb (TSM database volumes)

/tsmLog (TSM log volumes)

/tsmdbbkup (TSM database backup volumes)

The TSM server starts at boot time from the entry in the /etc/inittab file. The entry is called "autoserv" which executes "/usr/tivoli/tsm/server/bin/rc.admserv"

DS4000 Storage Manager

Note: This section does not apply to **DR550 Express** configuration.

Q1: How do I start the DS4000 Storage Manager to see the DS4100 status or add new storage?

Answer: Refer to DR550 Readme/Setup guide or Managing the DR550 guide or see DS4100 storage server via the Storage Manager Client for more detail.

Q2: I noticed one of the Drives has green and amber light blinking in one of the disk Drawers, what does it mean?

Answer: It means that the Drive has failed and it is being rebuilt (copying the data to spare Drive). You need to call 1-800-IBM SERV (1-800-426-7378) or your local service number if outside of the United States and report the problem. They will ship you new Drive (if still under warranty) with instruction on how to return the faulty Drive back to them.

HACMP

Note: This section does not apply to the **DR550 Express** and **DR550 Single node** configurations.

Q1: What are the shared resources used by HACMP?

Answer: HACMP uses following shared resources:

Volume Groups:

TSMApps (application data and files)

TSMDBLogs (TSM database and logs)

TSMDBBkup (TSM database backup volumes stored)

TSMStg (TSM archive pool volumes)

File Systems:

/tsm (two directories (files and data) have files which are very important for TSM application)

/tsmDb (TSM database volumes)

/tsmLog (TSM log volumes)

/tsmdbbkup (TSM database backup volumes)

TSM server Start and Stop scripts (on each node):

/usr/bin/startserver (starts TSM server and executed via HACMP)

/usr/bin/stopsserver (stops TSM server and executed via HACMP)

Q2: Can I use the “startserver and stopsserver” scripts to start and stop TSM server?

Answer: No. The scripts are designed to use with HACMP so when TSM server stops via HACMP it also release all resources with it and starts TSM server with all resources properly acquired. If you use the scripts at your will then HACMP and TSM server may not work at all and you may experience application down time.

Q3: How many Ethernet network interfaces are used for HACMP and what are they used for?

Answer: There are three Ethernet interfaces used as follows:

En3 - Boot interface

En2 – Standby interface

En4 – Disk heartbeat interface

Q4: How do I check the cluster status?

Answer: Use “/usr/es/sbin/cluster/clstat” command at the AIX prompt to see the status.

Note: This is a normal working cluster of both nodes (primary and standby node). Node one is running the TSM server and 192.168.1.21 took over the virtual IP address 192.168.1.22 where the content manager (or application server) will connect and archive/retrieve data to/from.

```
clstat - HACMP Cluster Status Monitor
-----
```

```
Cluster: DRs450 (1077722580)
```

```
Fri Sep 9 07:07:45 MDT 2005
```

```
State: UP
```

```
Nodes: 2
```

```
SubState: STABLE
```

```
Node: DRs_engine1
```

```
State: UP
```

```

Interface: DRs_engine1_boot (1)      Address: 192.168.1.21
                                     State:   DOWN
Interface: DRs_engine1_stdbby (1)    Address: 192.168.2.10
                                     State:   UP
Interface: DRs_engine1_hrtbeat (2)   Address: 192.168.3.10
                                     State:   UP
Interface: DS4100Lun_1 (0)           Address: 0.0.0.0
                                     State:   UP
Interface: DRs_cluster_svc (1)       Address: 192.168.1.22
                                     State:   UP
Resource Group: DRs450_rg             State:   On line
    
```

***** f/forward, b/back, r/refresh, q/quit *****

clstat - HACMP Cluster Status Monitor

```

Cluster: DRs450 (1077722580)
Fri Sep  9 07:07:46 MDT 2005
      State: UP           Nodes: 2
      SubState: STABLE
    
```

```

Node: DRs_engine1      State: UP
  Interface: DRs_engine1_boot (1)  Address: 192.168.1.21
                                    State:   DOWN
  Interface: DRs_engine1_stdbby (1) Address: 192.168.2.10
                                    State:   UP
  Interface: DRs_engine1_hrtbeat (2) Address: 192.168.3.10
                                    State:   UP
  Interface: DS4100Lun_1 (0)       Address: 0.0.0.0
                                    State:   UP
  Interface: DRs_cluster_svc (1)   Address: 192.168.1.22
                                    State:   UP
  Resource Group: DRs450_rg        State:   On line
    
```

***** f/forward, b/back, r/refresh, q/quit *****

clstat - HACMP Cluster Status Monitor

```

Cluster: DRs450 (1077722580)
Fri Sep  9 07:07:46 MDT 2005
      State: UP           Nodes: 2
      SubState: STABLE
    
```

```

Node: DRs_engine1      State: UP
  Interface: DRs_engine1_boot (1)  Address: 192.168.1.21
                                    State:   DOWN
  Interface: DRs_engine1_stdbby (1) Address: 192.168.2.10
                                    State:   UP
  Interface: DRs_engine1_hrtbeat (2) Address: 192.168.3.10
                                    State:   UP
  Interface: DS4100Lun_1 (0)       Address: 0.0.0.0
                                    State:   UP
  Interface: DRs_cluster_svc (1)   Address: 192.168.1.22
                                    State:   UP
    
```


Resource Group: DRs450_rg

State: On line

***** f/forward, b/back, r/refresh, q/quit *****

Q5: How do I know what level of HACMP I am running?

Answer: Use “lspp -l cluster.es*” command at AIX prompt to see the level. In the output below it is 5.2.x.x.

\$ lspp -l cluster.es*

Fileset	Level	State	Description

Path: /usr/lib/objrepos			
cluster.es.cfs.rte	5.2.0.3	COMMITTED	ES Cluster File System Support
cluster.es.client.lib	5.2.0.3	COMMITTED	ES Client Libraries
cluster.es.client.rte	5.2.0.3	COMMITTED	ES Client Runtime
cluster.es.client.utils	5.2.0.3	COMMITTED	ES Client Utilities
cluster.es.clvm.rte	5.2.0.2	COMMITTED	Web based Smit
cluster.es.clvm.rte	5.2.0.0	COMMITTED	ES for AIX Concurrent Access
cluster.es.cspoc.cmds	5.2.0.3	COMMITTED	ES CSPOC Commands
cluster.es.cspoc.dsh	5.2.0.2	COMMITTED	ES CSPOC dsh
cluster.es.cspoc.rte	5.2.0.3	COMMITTED	ES CSPOC Runtime Commands
cluster.es.plugins.dhcp	5.2.0.0	COMMITTED	ES Plugins - dhcp
cluster.es.plugins.dns	5.2.0.0	COMMITTED	ES Plugins - Name Server
cluster.es.plugins.printserver	5.2.0.0	COMMITTED	ES Plugins - Print Server
cluster.es.server.cfgast	5.2.0.1	COMMITTED	ES Two-Node Configuration Assistant
cluster.es.server.diag	5.2.0.3	COMMITTED	ES Server Diags
cluster.es.server.events	5.2.0.3	COMMITTED	ES Server Events
cluster.es.server.rte	5.2.0.4	COMMITTED	ES Base Server Runtime
cluster.es.server.testtool	5.2.0.1	COMMITTED	ES Cluster Test Tool
cluster.es.server.utils	5.2.0.3	COMMITTED	ES Server Utilities
cluster.es.worksheets	5.2.0.3	COMMITTED	Online Planning Worksheets
Path: /etc/objrepos			
cluster.es.client.rte	5.2.0.0	COMMITTED	ES Client Runtime
cluster.es.clvm.rte	5.2.0.0	COMMITTED	ES for AIX Concurrent Access
cluster.es.cspoc.rte	5.2.0.0	COMMITTED	ES CSPOC Runtime Commands
cluster.es.server.diag	5.2.0.0	COMMITTED	ES Server Diags
cluster.es.server.events	5.2.0.0	COMMITTED	ES Server Events
cluster.es.server.rte	5.2.0.4	COMMITTED	ES Base Server Runtime
cluster.es.server.utils	5.2.0.0	COMMITTED	ES Server Utilities

Q6: My cluster comes up but I can not login in to TSM or my API client can not connect to TSM server to archive or retrieve the data, why?

Answer: There could be any one of the following reasons. Start checking them in order as listed below.

1. Check to see all volume groups are varied on and available. They are TSMapps, TSMDBLogs, TSMDBBkup and TSMStg. (AIX command to use is “lsvg -o”)

2. Next check to see all file systems are mounted. They are /tsm, /tsmDb, /tsmLog, /tsmdbbkup (AIX command to use is “df -m”)
3. Next check to see if TSM server is up and running. AIX command to use is “ ps -ef| grep dsmserv” ==>output will look something like this “root 372984 1 0 Aug 31 - 0:56 /usr/tivoli/tsm/server/bin/dsmserv quiet”
4. Next step is to check to see if port 1500 is ready and listening for connections to TSM application. AIX command to use is “ netstat -a | grep 1500” ==> output will look like “ tcp4 0 0 *.1500 *.* LISTEN”
5. If all of the above are true then make sure you can ping the virtual IP address of TSM server from any machine or the client machine which connects to TSM server via API. If you can not then it could be your local network issue and you may want to contact your local network support.
6. If any of the first five command fails then there is some problem with either HACMP or DISKS are not available. At this time call IBM support.

Hardware Management Console

Note: This section does not apply to **DR550 Express** configuration.

You must be at the DR550 in order to implement the changes. Access to the HMC is via the flat panel monitor installed in the DR550 rack.

Q1. How do I change the password in the HMC?

Answer: Login to the HMC server using the existing user id (hscroot is the one provided by the factory) and password (factory setting is abc123 – you may have changed it already) and click on HMC management. Click on HMC users and then Manage HMC Users and Access. Select the user from the pull down menu (USER -> Modify), put in the new password and then verify the password by typing it in again.

Q2. How do I check the code level within the HMC?

Answer: Login to the HMC, then look under the licensed internal code maintenance, then under HMC code update. The status section will show the version, release and build number.

Q3. How do I update the code within the HMC?

Answer: HMC code is available by download or ordering from the IBM website. Once you have secured the code and created CDs, boot the HMC with the new code CD and follow the directions on the screen. Refer to the IBM website for additional information.

Flat Panel Monitor and Switch

You must be at the DR550 or DR550 Express to make these changes or to verify code levels.

Q1. How do I change the server names for the flat panel monitor?

Answer: Press the PRT SC key to activate the software. Then click on Setup, click on Names, select the port you wish to change, and then click Modify. Now you can key in the new name and press OK. To exit, click on the “X” three times.

Q2. How do you check the version level of the monitor code?

Answer: Press the PRT SC key to activate the software. Then click on Commands and click on display version. The screen will then show the version of software.

Q3. How do you change the display to show the server name?

Answer: To show the server name for a short time and then have it disappear, press the PRT SC key to activate the software. Then click Setup, click on Flag, and then check the Timed box and press OK.

To show the server name all the time, make sure the Timed box is not checked and the Displayed box is checked.

To not show the server name, make sure the Displayed box is not checked.

You can also change the colors of the server names, the display mode (opaque or transparent), and you can change the position of the name (click on Set Position and then use the red trackball to move the name to a new location. Click on the “X” when you are ready.

From the Setup menu, you can also set Security options. IBM has not set a password for the monitor. If you wish to set the password, key in the password twice. You can also enable a screen saver as well. When you have the settings you wish, click OK.

Tivoli Storage Manager

Q1: How do I login to TSM?

Answer: You can login to TSM with command line interface (CLI) with the program called /usr/bin/dsmadm (it is a default in your AIX path). So you just enter “dsmadm” and you will get TSM login prompt where you login as “admin” with a password.

The login prompt and TSM prompt (displayed in blue below) will look like this:

```
$ dsmadm
```

```
IBM Tivoli Storage Manager
```

```
Command Line Administrative Interface - Version 5, Release 2, Level 0.0
```

```
(c) Copyright by IBM Corporation and other(s) 1990, 2003. All Rights Reserved.
```

Enter your user id: **admin**

Enter your password: *********

```
Session established with server TSM: AIX-RS/6000
Server Version 5, Release 3, Level 1.0
Server date/time: 09/16/05 12:04:29 Last access: 09/16/05 11:33:26
```

tsm: TSM>

Q2: How do I add a new user to TSM?

Answer: Use “**register admin**” command at the TSM prompt. Once a new user is registered then use “**grant authority**” to grant appropriate authority based on what type of work the user will be doing. Please check the TSM administration guide for more information.

Q3: How do I know if TSM is running or not?

Answer: Use the following command at the AIX prompt to see if the application is running.

```
$ ps -ef | grep dsmserv
root 372984 1 0 Aug 31 - 0:56 /usr/tivoli/tsm/server/bin/dsmserv quiet
root 569428 544930 0 07:17:25 pts/0 0:00 grep dsmserv
```

If you don't see the /usr/tivoli/tsm/server/bin/dsmserv quiet process running then look at the Q6 of HACMP for dual node configuration for further troubleshooting.

For the DR550 single node and DR550 Express the process starts at the boot time via /etc/inittab entry called autoserv by executing the command “/usr/tivoli/tsm/server/bin/rc.adsmserv”. Make that the entry is still in there. Also make sure all volume groups are varied on and file systems are mounted as well. (see Q1 of the HACMP section for further details on volume groups and file systems).

Q4: I can not connect to the TSM server. When I tried to login as TSM admin I get an error message communication failure with -50 code.

Answer: There could be many reasons but first to make sure that port 1500 is open and listening to connect requests. Use the following command at the AIX prompt to make sure it is ready.

```
$ netstat -a | grep 1500
tcp4 0 0 *.1500 *.* LISTEN
```

If the port is not there then TSM server is not started and running. Please check previous question for more details.

Q5: How do I know if my TSM database is performing at its best?

Answer: Use the following TSM command. Check “cache Hit Pct” value. If it is lower than 96% then you need to take some action. Check the TSM administration guide for further details.

tsm: TSM>q db f=d

```

    Available Space (MB): 476
    Assigned Capacity (MB): 472
    Maximum Extension (MB): 4
    Maximum Reduction (MB): 404
        Page Size (bytes): 4,096
    Total Usable Pages: 120,832
        Used Pages: 401
            Pct Util: 0.3
        Max. Pct Util: 0.3
    Physical Volumes: 1
    Buffer Pool Pages: 128,000
    Total Buffer Requests: 639,552
        Cache Hit Pct.: 99.96 ←
        Cache Wait Pct.: 0.00
    Backup in Progress?: No
    Type of Backup In Progress:
    Incrementals Since Last Full: 0
    Changed Since Last Backup (MB): 0.04
        Percentage Changed: 2.49
    Last Complete Backup Date/Time: 09/09/05 06:00:22
    Estimate of Recoverable Space (MB):
    
```

Q6: How do I check the status of the TSM database? How can I increase the TSM database space?

Answer: Use the following TSM command and check the 3rd column to see any spare capacity is available to extend the database. If there is, use the “ext db” command to extend the TSM database. If there is no more space, then refer to the TSM admin guide to see how to assign more database space by defining additional volumes.

tsm: TSM>q db

Available Space (MB)	Assigned Capacity (MB)	Maximum Extension (MB)	Maximum Reduction (MB)	Page Size (bytes)	Total Usable Pages	Used Pages	Pct Util	Max. Pct Util
476	472	4	404	4,096	120,832	401	0.3	0.3

Q7: How do I check status of the TSM logs? How can I increase the TSM log space?

Answer: Use the following TSM command and check the 3rd column to see if there is any spare capacity available to extend the log. If there is, use the “ext log” command to extend TSM log. If there

is no more space available, then refer to the TSM administration guide to see how to assign more log space by defining additional volumes.

Note: TSM supports maximum log size of 13 GB.

tsm: TSM>q log

Available Space (MB)	Assigned Capacity (MB)	Maximum Extension (MB)	Maximum Reduction (MB)	Page Size (bytes)	Total Usable Pages	Used Pages	Pct Util	Max. Pct Util
476	472	4	468	4,096	120,320	61	0.1	0.3

Q8: How do I know if all of my administrative schedules are working as they are set to execute?

Answer: Use the following TSM command to see the status of all the schedules.

tsm: TSM>q event * type=admin

Scheduled Start	Actual Start	Schedule Name	Status
09/09/05 06:00:00	09/09/05 06:00:28	DBB	Completed
09/09/05 10:00:00		BAVOLH	Future
09/09/05 23:59:00		DELVOLH	Future

Please check “q actlog” (TSM activity log) for more details on any failure or missed schedule.

Q9: How do I check the status of all of my storage volumes?

Answer: Use the following TSM command. If any of the volumes are off-line, then make sure they are powered on (disk or tapes) and available to the Operating System, Make sure that all of the volume groups are varied on and file systems are mounted, if any. (see TSM for AIX administration guide for more details)

tsm: TSM>q vol

Volume Name	Storage Pool Name	Device Class Name	Estimated Capacity	Pct Util	Volume Status
/tsm/stgvoll	ARCHIVEPOOL	DISK	5.0	48.0	On-Line

tsm: TSM>q act

Date/Time	Message
09/09/05 06:00:22	ANR2750I Starting scheduled command DBB (backup db devc=dbbkup type=full). (SESSION: 155)
09/09/05 06:00:22	ANR2017I Administrator ADMIN issued command: BACKUP DB devc=dbbkup type=full (SESSION: 155)

```

09/09/05 06:00:22 ANR0984I Process 101 for DATABASE BACKUP started in the
                BACKGROUND at 06:00:22. (SESSION: 155, PROCESS: 101)
09/09/05 06:00:22 ANR2280I Full database backup started as process 101.
                (SESSION: 155, PROCESS: 101)
09/09/05 06:00:22 ANR2753I (DBB):ANR2280I Full database backup started as
                process 101. (SESSION: 155)
09/09/05 06:00:22 ANR2756I Scheduled command DBB started successfully.
                (SESSION: 155, PROCESS: 101)
09/09/05 06:00:22 ANR8340I FILE volume /tsmdbbkup/26220422.DBB mounted.
                (SESSION: 155, PROCESS: 101)
09/09/05 06:00:22 ANR0513I Process 101 opened output volume
                /tsmdbbkup/26220422.DBB. (SESSION: 155, PROCESS: 101)
09/09/05 06:00:22 ANR1360I Output volume /tsmdbbkup/26220422.DBB opened
                (sequence number 1). (SESSION: 155, PROCESS: 101)
09/09/05 06:00:22 ANR1361I Output volume /tsmdbbkup/26220422.DBB closed.
                (SESSION: 155, PROCESS: 101)
09/09/05 06:00:22 ANR0515I Process 101 closed volume
                /tsmdbbkup/26220422.DBB. (SESSION: 155, PROCESS: 101)
09/09/05 06:00:22 ANR4550I Full database backup (process 101) complete, 402
                pages copied. (SESSION: 155, PROCESS: 101)
09/09/05 06:00:22 ANR0985I Process 101 for DATABASE BACKUP running in the
                BACKGROUND completed with completion state SUCCESS at
                06:00:22. (SESSION: 155, PROCESS: 101)

```

Q9: My content manager server can not connect to TSM. I get password expired message. How do I fix it?

Answer: Reset the password or change the password expire time in TSM. At the TSM admin prompt use the “update node” command to change or update the passexp parameter. Default password for any register node in TSM is 90 days. Look in to TSM activity log as it will log the message in its activity log. See below.

tsm: TSM>q act

```

09/09/05 07:27:52 ANR2017I Administrator ADMIN issued command: QUERY ACTLOG
                (SESSION: 30)
09/09/05 07:35:22 ANR0406I Session 31 started for node DR550_1 (Sample-API)
                (Tcp/Ip 192.168.1.1(4697)). (SESSION: 31)
09/09/05 07:35:22 ANR1639I Attributes changed for node DR550_1: TCP Name
                from GATEWAY71 to DR550_1. (SESSION: 31)
09/09/05 07:35:22 ANR0425W Session 31 for node DR550_1 (Sample-API) refused
                - password has expired. (SESSION: 31)
09/09/05 07:35:22 ANR0403I Session 31 ended for node DR550_1 (Sample-API).
                (SESSION: 31)

```

Q10: How do I monitor the TSM server activity?

Answer: Use “q act” command as TSM admin prompt to see the log. Each message ends with one of the three letter “I, W or E”. For example ANRnnnnI, ANRnnnnW or ANRnnnnE – I for Informative, W for Warnings and E for Errors. (see activities in previous question)

Q11: We have a dual node DR550. HACMP is running, but the TSM server is not coming up as part of the activating the cluster. What should I check?

Answer: Make sure all external storage devices are powered on, all cables are connected and there is no hardware failure of any kind (basically all green lights). Next check and see all if all the volume groups (AIX command “**lsvg -o**” and file systems are mounted “**df -m**”, dsmserv process is running and port 1500 is available to connect to – see HACMP section for more details and call HACMP support for further assistance.

Q12: How do I setup policies in TSM and how do they work?

Answer: At the installation time policies are already setup but if you need to set up new policies please review the chapter 12 “Implementing Policies for the client data” in TSM for AIX: Administrator’s Guide for more details. Once the policies are set in TSM and clients are associated with the policy then once the client archives data TSM server apply those policies to the archived data. Here are some examples:

Multiple Policy Examples

These are the generic examples that you were given with the numbers corrected:

```
define mgmtclass standard standard event
define copygroup standard standard event standard type=archive dest=archivepool retinit=event
retver=365 retmin=730
define mgmtclass standard standard norm
define copygroup standard standard norm standard type=archive dest=archivepool retver=2555
assign defmgmtclass standard standard event
delete mgmtclass standard standard standard
validate policyset standard standard
activate policyset standard standard
set archiveretentionprotection on
```

Then maybe for some specific industry. As an example, let’s say this is a hospital/clinic and a patients records must be kept for 2 years after some event and at least 12 years. An example might be:

```
define domain patient_records archretention=4380
define policyset patient_records primary
define mgmtclass patient_records primary xrays
define copygroup patient_records primary xrays type=archive destination=archivepool
retinit=event retver=730 retmin=4380
define mgmtclass patient_records primary charts
define copygroup patient_records primary charts type=archive destination=archivepool
retinit=event retver=730 retmin=4380
```

But they also have a finance department which has some retention requirements, say financial statements provided to the IRS might have to be kept for 7 years and any billings must be kept for 4 years but payroll information must be kept for 3 years after someone retires but for a minimum of 30 years.

```
define domain financial archretention=2555
define policyset finance statements
```



```

define mgmtclass finance statements IRS
define copygroup finance statements IRS type=archive destination=archivepool retinit=creation
retver=2555
define mgmtclass finance statements billing
define copygroup finance statements billing type=archive destination=archivepool retinit=creation
retver=1460
define mgmtclass finance statements payroll
define copygroup finance statements payroll type=archive destination=archivepool retinit=event
retver=1095 retmin=10950

```

The following statements would still be required:

```

validate policyset financial statements
activate policyset financial statements
validate policyset patient_records primary
activate policyset patient_records primary

```

Q13: How do I assign or bind a client (content manager) node to a specific policy?

Answer: When you register “**register node**” via the TSM admin command, use the domain=<domain> you want to bind to. Now all archive data that comes from that node will be bind to the associated policy and its rules. For example, if you use financial domain then retention of that policy will apply. Refer to TSM 5.3 administration guide for more detail.

Q14: How do I know my backups and volume usage in past few days?

Answer: Use the following TSM command to display volume usage. See below which displays volume used by TSM database backup with details.

tsm: TSM>q volh

```

Session established with server TSM: AIX-RS/6000
Server Version 5, Release 3, Level 1.2
Server date/time: 09/09/05 08:54:27 Last access: 09/09/05 06:48:32

```

```

Date/Time: 09/07/05 06:00:19
Volume Type: BACKUPFULL
Backup Series: 107
Backup Operation: 0
Volume Seq: 1
Device Class: DBBKUP
Volume Name: /tsmdbbkup/26047619.DBB
Volume Location:
Command:

```

```

Date/Time: 09/08/05 06:00:20
Volume Type: BACKUPFULL
Backup Series: 108
Backup Operation: 0
Volume Seq: 1
Device Class: DBBKUP

```

Volume Name: /tsmdbbkup/26134020.DBB
Volume Location:
Command:

Date/Time: 09/09/05 06:00:22
Volume Type: BACKUPFULL
Backup Series: 109
Backup Operation: 0
Volume Seq: 1
Device Class: DBBKUP
Volume Name: /tsmdbbkup/26220422.DBB
Volume Location:
Command:

.

Advanced Management References

The following documentation should be reviewed for additional management techniques.

- DR550 Redbook – Chapter 4 has information on monitoring the DR550.
<http://www.redbooks.ibm.com/redpieces/abstracts/sg247091.html?Open> This guide is currently in Draft form, but should be finalized in the next 30 days.
- DS4000 Redbook – Chapter 4 has information on managing the DS4000.
<http://www.redbooks.ibm.com/abstracts/sg247010.html?Open> A DS4000 Best Practices and Performance Tuning redbook is expected to be published in early 2006. Please check the redbook website (www.ibm.com/redbooks) for availability. You will need to search for DS4000 to get this new listing.
- DS4000 – the following publications are available for the DS4100.
 - IBM TotalStorage DS4100 Storage Server Installation, User's and Maintenance Guide, GC26-7733-00 <http://www-1.ibm.com/support/docview.wss?rs=1100&uid=psg1MIGR-58666>
 - DS4000 Hardware Maintenance Manual <http://www-1.ibm.com/support/docview.wss?rs=1100&uid=psg1MIGR-57820>
 - DS4000 Problem Determination Guide GC26-7703-01
 - <http://www-1.ibm.com/support/docview.wss?rs=1100&uid=psg1MIGR-57817>
 - DS4000 Storage Server and Storage Expansion Enclosure Quick Start Guide GC26-7738-00 <http://www-1.ibm.com/support/docview.wss?rs=1100&uid=psg1MIGR-58664>
- AIX – the following publications are available for AIX management.
http://publib16.boulder.ibm.com/cgi-bin/ds_rslt#1
- HACMP – the following publications are available for HACMP management. http://www-03.ibm.com/servers/eserver/pseries/library/hacmp_docs.html
- TSM – the following library site provides a variety of publications are available for TSM management <http://publib.boulder.ibm.com/infocenter/tivihelp/v1r1/index.jsp>
 - Certification Study Guide: IBM Tivoli Storage Manager Version 5.3, SG24-7127-00 Redbook <http://www.redbooks.ibm.com/abstracts/sg247127.html?Open>
 - IBM Tivoli Storage Manager Version 5.3 Technical Workshop Presentation Guide, SG24-6774-00 Redbook <http://www.redbooks.ibm.com/abstracts/sg246774.html?Open>
- Hardware Management Console – the IBM eServer Hardware Management Console for pSeries Installation and Operations Guide, SA38-0590, provides information to operators and system administrators on how to use an IBM Hardware Management Console for pSeries (HMC) to manage a system.
- SAN switches – while not covered in this paper, the 2005 Model H08 and Model H16 Installation, Service and User's Guide provides valuable guidance for managing the switches.
<http://publib.boulder.ibm.com/infocenter/tivihelp/v1r1/index.jsp>