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SAP Oracle TruCluster ASE DIGITAL UNIX AlphaServer 8400

DIGITAL HiTest Notes

Part Number: EK-HSPXB-HN. B01

February 1998

Revision/Update Information: This is a revised manual.

Digital Equipment Corporation
Maynard, Massachusetts

February 1998

Table of Contents

6 Detailed Hardware Configuration

Figures

Tables

Preface

This document provides an overview of DIGITAL HiTest Suites and detailed technical information about the SAP R/3 ASE DIGITAL UNIX AlphaServer 8400 HiTest Suite. This information includes the HiTest AppSet, the HiTest Foundation, configuration details, installation instructions, tuning parameters, problems encountered and their solutions, tests and test results, and system diagrams. Together, a HiTest Foundation and HiTest AppSet (Application Set) comprise all of the components in a HiTest Suite. The HiTest Foundation includes the hardware, operating system, middleware, and database software. The HiTest AppSet contains a collection of software specific to one class of customer solutions.

Audience

Primary users of this document are DIGITAL and Partners sales representatives and technical support personnel. Secondary audiences include product managers, customers, and the personnel responsible for installing, setting up, and operating a DIGITAL HiTest Suite.

Organization

This document is organized as follows:

Chapter Title	Description
Chapter 1 – Advantages of DIGITAL HiTest Suites	Provides a summary of the benefits of DIGITAL HiTest Suites and an overview of the Suite covered in this document.
Chapter 2 – Configuration Data	Includes tables of configuration data about the hardware and software components that define the DIGITAL HiTest Template, and special configuration rules if any.
Chapter 3 – System Installation and Setup	Provides information for installing and setting up this DIGITAL HiTest Suite.
Chapter 4 – Tests and Results	Describes how the tests were set up including database organization, where data and programs were placed, and how the tests were run. It also describes system limits and characterization data.
Chapter 5 – Problems and Solutions	Discusses any problems and solutions that were discovered during testing.
Chapter 6 – Detailed Hardware Configuration	Contains more detailed information about the configuration of the hardware and software components listed in the Configuration Data chapter.
Appendix A – Post Installation for ASE	Contains more detailed information about the Post-Installation for TruCluster ASE V1.4 in a SAP R/3 Environment.

Customer Feedback

What our readers think of this or any other DIGITAL documentation is important to us. If you have any comments, we would appreciate hearing from you. Send your comments to: *reader-comments@digital.com*.

Please reference the complete document title and part number (EK-HSPXB-HN. B01) in your correspondence about this document.

Ordering Information

Copies of this and other DIGITAL documents can be ordered by calling 1-800-DIGITAL.

All DIGITAL HiTest documents can also be downloaded over the Internet. Visit the Technical Support Center web page:

`http://cosmo.tay.dec.com` (Intranet)
`http://www.partner.digital.com:9003/cgi-bin/comet` (Internet)

Related Documents

This document references the following manuals:

- *StorageWorks Array Controllers: HS Family of Array Controllers Users Guide* (EK-HSFAM-UG)
- *SAP R/3 DECsafe Package V2.2*
- *DIGITAL Unix Installation Guide* (AA-QTLGB-TE)
- *R/3 Installation on UNIX - ORACLE Database* guide.

A copy of the *SAP R/3 DECsafe Package V2.2* is available from the DIGITAL Intranet at `http://www.fra.dec.com/SAP-Eng/available/cluster.html`.

For a copy of *R/3 Installation on UNIX - ORACLE Database* guide contact SAP at `http://www.sap.com`.

1
Advantages of DIGITAL HiTest Suites

This chapter describes what a HiTest Suite is, the suite components and advantages, and customer add-ons.

What Is a DIGITAL HiTest Suite?

DIGITAL HiTest Suites are guidelines for configuring a set of prequalified computer systems. A HiTest Suite often contains all the hardware and software needed for a complete customer solution. DIGITAL HiTest Suites can be used as a basis for configuring systems that satisfy a wide set of customer requirements. Typically, Suites target specific markets such as Data Warehousing or SAP Solution and Internet Servers.

In each HiTest Suite, the components are selected and the configurations designed to ensure high system reliability, application performance, and ability to upgrade. The suite's hardware and software components have been successfully tested for interoperability.

The specifications for allowed ranges of hardware and software components, part numbers, description, and revision information are listed in the *DIGITAL HiTest Template*.

DIGITAL HiTest Suite Components

The SAP R/3 ASE DIGITAL UNIX AlphaServer 8400 HiTest Suite contains three groups of components: the *DIGITAL HiTest Foundation*, the *DIGITAL HiTest AppSet* and *System Management Station*.

The DIGITAL HiTest AppSet contains application software unique to the targeted market. The DIGITAL HiTest foundation contains the operating system, middleware, database software, and hardware and can be used as a configuration guideline for the base platform for many applications and target markets.

This Suite will meet the needs of medium- to high-end SAP TruCluster configurations.

Select components from the HiTest Template to configure a DIGITAL HiTest System. Any system configured as specified in the DIGITAL HiTest Template can be called a DIGITAL HiTest System.

Additional Hardware and Software

Besides the hardware and software specified in a DIGITAL HiTest Suite, additional hardware and software can be added to a HiTest System. Add-on hardware consists of accessory components such as printers, modems, and scanners that are supported by the operating system and other software. Adding these components should not affect interoperability and, therefore, the system can still be considered a DIGITAL HiTest System.

Customers who purchase a DIGITAL HiTest System that is configured below the maximum specified in the Template, can later add additional hardware up to the specified maximum range and still maintain the integrity of a DIGITAL HiTest System.

If additional hardware components beyond the maximum specified in the Template are configured into a system, you still have the assurance that the rest of the system has been thoroughly tested for component interoperability. Therefore, the risk of experiencing problems is greatly reduced.

2
Configuration Data

This chapter describes the tested DIGITAL HiTest Suite including the hardware, software, and firmware components and their revision levels. If required, special configuration rules are explained.

Hardware and Software Components

Table 2-1 identifies the range of hardware and software components that can be configured using the SAP Oracle TruCluster ASE DIGITAL UNIX AlphaServer 8400 HiTest Suite. This is the DIGITAL HiTest Template.

Table 2-2 lists the System Management Station hardware and software.

Table 2-3 lists the revision levels of the components.

The DIGITAL HiTest Template consists of three categories:

- **AppSet Software** – Includes software specific to one class of customer solutions, in this case medium- to high-end SAP TruCluster users.
- **Foundation Hardware** – Includes the base system, storage, and other hardware options.
- **Foundation Software** – Includes the operating system, middleware, and database software.

When ordering an item from a HiTest Template, select a quantity that is within the minimum and maximum range for the item. If the minimum quantity is zero (0), then the component is optional. If the minimum quantity is one or more, order at least the minimum quantity, but be cautious about exceeding the maximum quantity. The maximum quantity represents the greatest number of components that were tested for interoperability with all the other components in the Suite.

For more details on the HiTest Suite hardware configuration, see Chapter 6.

Table 2-1: SAP Oracle DIGITAL UNIX AlphaServer 8400 HiTest Template

SAP R/3 HiTest AppSet Oracle DIGITAL UNIX AlphaServer 8400 HiTest Foundation				
For documentation and updates: http://cosmo.tay.dec.com and http://www.partner.digital.com:9003/cgi-bin/comet				
Line Item	**Description**	**Part Number**	**HiTest Range**	
			Min	**Max**
AppSet Software				
1	**SAP R/3 Version 3.1H** *Contact SAP at:* `http://www.sap.com`	**SAP**	2	2
Foundation Hardware				
2	*Select two base systems:* **AlphaServer 8400 5/440, DIGITAL UNIX, 2 GB** **AlphaServer 8400 5/440, DIGITAL UNIX, 4 GB** *Hardware includes*: • Dual CPU, TLASER Cabinet, 756BC-AC • System I/O module (4 chan), KFTHA-AA • Memory • BA660-AB StorageWorks Plug-in Unit • 4.3 GB SCSI drive • BN21K-02, 2-meter SCSI cable • One SCSI signal converter (SE-FWD), DWZZB-VW • In-cabinet SCSI CD-ROM, RRDCD-CA • PCI PIU for 8400 cabinet, DWLPB-AA • KZPSA-BB PCI FWD SCSI host adapter • KZPAA-AA PCI-FNSE SCSI host adapter • One 2.0 meter SCSI-2 cable, BN21H-02 • DE500-BA 10/100 Mbit Fast Ethernet NIC *Software includes*: • DIGITAL UNIX Operating System base license • Unlimited User licenses • Server Extensions • ServerWORKS • Internet AlphaServer Administration software • DECevent • BMC Patrol Agent **Note:** In the part number, **DA** = 60Hz, 208 V, **DB** = 50 Hz, 380/416 V, **DC** = 50/60 Hz, 202 V Japan.	**DA-292FF-DA, -DB, or -DC** **DA-292FG-DA, -DB, or -DC**	2	2
3	**5/440 Dual CPU Upgrade DIGITAL UNIX**	**756P2-AX**	0	10
4	**512 MB Memory Module** **1 GB Memory Module** **2 GB Memory Module** **Note:** This HiTest Template supports a memory range from 2 GB to 4 GB per system. When selecting memory options, stay within the Template's 4 GB maximum.	**MS7CC-DA** **MS7CC-EA** **MS7CC-FA**	0	See Note
5	**2nd PCI Expansion Box for mounting in DWLPB-AA**	**DWLPB-BA**	0	2
6	**PCI plug in with one PCI box**	**DWLPB-AA**	0	2
7	**PCI one-port FWD SCSI controller**	**KZPSA-BB**	5	5
8	**Console Monitor**	**VT510-KA**	2	2
9	**PS/2 Style Keyboard**	**LK47W-A2**	2	2
10	**Basic StorageWorks Data Center Cabinet**	**SW822-LB**	1	1
11	**Dual HSZ50 SCSI RAID array controllers**	**HSZ52-AH**	2	2
12	**SCSI-2 Y cable**	**BN21W-0B**	4	4

SAP R/3 HiTest AppSet Oracle DIGITAL UNIX AlphaServer 8400 HiTest Foundation				
For documentation and updates: http://cosmo.tay.dec.com and http://www.partner.digital.com:9003/cgi-bin/comet				
Line Item	**Description**	**Part Number**	**HiTest Range**	
			Min	**Max**
13	**Differential SCSI Terminator**	**H879-AA**	4	4
14	**3 meter 16-bit SCSI cable**	**BN21K-03**	2	2
15	**15 meter 16-bit SCSI cable**	**BN21K-15**	2	2
16	**4.3 GB 7200 RPM UltraSCSI Disks** **Note:** This part number replaces RZ29B-VW, which was used for testing this HiTest Suite. When UltraSCSI drives are used in a BA356-series StorageWorks Shelf, ensure that the shelf contains a 180W power supply (DS-BA35X-HH).	**DS-RZ1CB-VW**	60	60
17	**FDDI-Controller Fiber - Dual Attach**	**DEFPA-DB**	2	2
18	**20-m SC to SC dual fiber cable**	**BN34B-20**	2	2
19	**140/280 GB 7-Cartridge Tape Loader System**	**TZ887-NE**	1	1
20	**SCSI Bus Extender and Signal Converter**	**DWZZA-AA**	1	1
21	**SCSI cable, HD50 to LD50**	**BN23G-02**	1	1
Foundation Software				
22	**DIGITAL UNIX for AlphaServer V4.0B**	**Included with item 2**	2	2
23	**DIGITAL UNIX V4.0B CD-ROM**	**QA-MT4AA-H8**	1	1
24	**TruCluster Available Server Software V1.4**	**QB-05SAQ-AA**	2	2
25	**Oracle7 for DIGITAL UNIX V7.3.3**	**Included with item 1**	2	2
26	**StorageWorks PLUS**, which includes: • Networker Save and Restore for DIGITAL UNIX V4.3 • Logical Storage Manager (LSM) • AdvFS Utilities	**QB-5RYAQ-AA**	2	2
27	**Networker Save & Restore Application Interface for SAP R/3**	**QL-5JGAQ-AA**	2	2
28	**NSR Jukebox Tier 1 Lic.**	**QL-04UAL-3B**	1	1
29	**StorageWorks Platform kit (DIGITAL UNIX)** which includes: • PC Card containing HSOF software V5.1 • StorageWorks Command Console • Documentation	**QB-5JCAB-SA**	1	1
30	**HSZ50 Array Controller Operating Software (HSOF) V5.1 LIC/MCD Kit** (no documentation)	**QB-5CJAA-SB**	3	3
31	**Hard copy of this Suite's HiTest Notes**	**EK-HSPXB-HN**	0	1
32	**System Management Station**	**See Table 2-2**	0	1

Table 2-2: System Management Station Template

SAP HiTest AppSet System Management Station				
Line Item	**Description**	**Part Number**	**HiTest Range**	
			Min	**Max**
Note: This HiTest Suite is realized without a systems management station. When the system management option is included, this HiTest Template identifies the items required. When system management is provided through other means, this option may be omitted without invalidating the HiTest Suite.				
Management Station Hardware				
1	**DIGITAL PC 5100** *Hardware includes*: • 200-MHz Pentium CPU with MMX • 512 KB secondary cache • 32 MB memory • Integrated Fast Ethernet (10/100) • 16X CD-ROM • PCI 64-bit S3 ViRGE/GX graphics controller (with 2 MB) • 3.2 GB disk drive • 1.44 MB floppy *Software includes*: • Windows NT Workstation 4.0 (factory installed) **Note:** A functionally equivalent X86 system may be substituted without invalidating this HiTest Template.	**FR-DAB04-AF**	1	1
2	**Country Kit, North American**	**FR-PC94K-AA**	1	1
3	**32 MB SDRAM dual-bank DIMM Memory**	**FR-PCCAM-EC**	1	1
4	**Diamond 56.6 K Modem** **Note:** Used for page notification.	**FR-PCXFA-AA**	0	1
5	*Select one high-resolution monitor:* **21" (19.6" view) 1600 x 1200 @75Hz** **19" (18" view) 1600 x 1200 @75Hz** **17" (16" view) 1280 x 1024 @75Hz**	 **FR-PCXAV-WZ** **FR-PCXAV-TZ** **FR-PCXAV-YZ**	1	1
Management Station Software				
6	**Windows NT Workstation 4.0** **Note:** Install Windows NT Service Pack 3 (available from `ftp://ftp.microsoft.com/bussys/winnt`)	**Included with item 1**	1	1
7	**Hummingbird Exceed, Version 6.0** Contact `http://www.hummingbird.com`	**Hummingbird**	1	1
8	**DIGITAL ServerWORKS Manager, Version 3.0**	**Included with the base system**	1	1
9	**StorageWorks Command Console, V1.1B**	**Included with the Storage-Works kit**	1	1
10	*Choose one BMC product:* **BMC PATROLWATCH for ServerWORKS, V3.2**, **BMC PATROL Operator Console Windows NT** **BMC PATROL Developer Console Windows NT** **Note:** BMC products that are included with the AlphaServer are on the ServerWORKS Quick Launch CD. BMC PATROL Developer Console includes BMC PATROL Operator Console. Contact BMC at: `http://www.bmc.com`	 **Included with base system** **BMC** **BMC**	0	1

SAP HiTest AppSet System Management Station				
Line Item	**Description**	**Part Number**	**HiTest Range**	
			Min	**Max**
11	**BMC PATROL Agent for Windows NT, lic. and media**	**QB-5KKAB-WA**	0	1
12	**BMC Operating System Knowledge Module for Windows NT, license and media**	**QB-5KLAB-WA**	0	1
Software Installed and Licensed on Each UNIX Server				
13	**Base UNIX systems management tools**	**Included with DIGITAL UNIX**	1	1
14	**DIGITAL UNIX Management Agent**	**Included with item 8**	1	1
15	**StorageWorks Command Console Agent**	**Included with item 9**	1	1
16	**BMC PATROL Agent for UNIX**	**Included with the AlphaServer**	0	1
17	**BMC Operating System Knowledge Module** **Note: W*** refers to the class: WA - Desktop; WB - Workgroup; WC - Departmental; WD - Enterprise Server	**QB-5KLAA-W***	0	1

For more details on the hardware configuration, see Chapter 6.

Table 2-3: Component Revision Levels

Hardware Component	Hardware	Firmware	Software
SRM console	–	4.8-6	–
HSZ52-HA	A02		
DEFPA-DB	F02	3.10	
TZ887-NE	A03		
DWZZA-AA	E02		
KZPAA-AA (SCSI host adapter)	B01	–	–
KZPSA-BB (FWD SCSI controller)	P01	A10	–
4.3 GB disks (RZ29B-VW)	–	DEC0016	–
KN7CE-AB (5/440 MHz CPU)	E02	–	–
MS7CC-FA (2 GB Memory)	B01	–	–
KFTHA-AA (4-ch I/O)	D03	–	–
StorageWorks shelf power supply (DS-BA35X-HH)	B01	–	–
Software Component	**Version/ Revision**	**Patch Level**	
DIGITAL UNIX	4.0B	Rev564 40BAS00005 (all patches)	
SAP R/3	3.1H		
HSZ50Array Controller software	5.1		
Networker Save & Restore (NSR) for DIGITAL UNIX	4.3		
Networker Save & Restore Application Interface for SAP R/3	1.1		

Special Configuration Rules

The special configuration rules for this Suite are as follows:

Hardware

To ensure that the rz numbers of the disks within UNIX remain the same after hardware upgrades, make sure that all non-disk controllers (for tapes and CD-ROM) are put into the top slots of the highest PCI bus in use. Distribute disk controllers evenly across the PCI boxes.

Before starting the software installation check the settings of the Ethernet devices. The ewa0_mode variable must be set to Twisted-Pair.

Disk Configuration

To guarantee that each disk keeps its OS-specific ID, ensure that `rz` numbers do not change. UNIX cannot handle a disk-specific identifier such as a label; instead, it uses the physical position within the hardware configuration to identify the disk. If the order of controllers changes, this could lead to database crashes and may make the system unbootable.

Each disk must have the same structure of partitions which does away with the DIGITAL UNIX standard partitioning where partitions overlap each other. The following partitions will be used on all RZ29s:

- c (whole disk)
- a (1st quarter)
- b (2nd quarter)
- d (3rd quarter)
- e (4th quarter)
- f (whole disk without blocks 0-15)
- g (like partition a without blocks 0-15)

Partitions f and g are used as workarounds to help LSM and the UNIX raw devices handle the first few blocks of a disk.

The partitions should be equally sized and should not overlap, with the exception of partition c which describes the whole disk. For the label descriptor see section Labeling the Shared Disks

The shared disks have to be labeled only once on the db server (tcr003).
The other system (tcr004) will recognize the labels automatically.

For the application-specific data structures, striped LSM volumes shall be used wherever possible. Multi-partition LSM volumes shall be built from partitions of the same letter (g, c, d, e, or f, depending on the amount of data needed), taken from disks on different controllers/shelves.

Access and Accounts

All logins for accounts root, db-administrator (for instance oratcr) and SAP R/3 administrator (for instance tcradm) start with the c shell, have the display properly set, and line editing mode via cursor keys enabled.

The path is setup so all work-related tasks can be performed without switching from directory to directory.

SAP R/3 Specific Configuration Rules

The R/3-specific configuration rules for this Suite.

The whole disk configuration of a SAP R/3 system should exist on paper before performing any physical setup.

The following two categories of rules must be followed:

Security Rules

These security rules are the most important ones and *must* be respected. Failure to do so could lead to loss of data.

The following directories must be on (at least) three different disks:

- /oracle/<*SID*>/origlogA and B
- /oracle/<*SID*>/mirrlogA and B
- /oracle/<*SID*>/saparch

The following directory may not be on the same disk as the /oracle/<*SID*>/sapdata<n> directories:

- /oracle/<*SID*>/saparch

The following directories must be on (at least) two different disks to keep (at least) two copies of the Oracle control file on separate disks:

- /oracle/<*SID*>
- /oracle/<*SID*>/sapdata1
- /oracle/<*SID*>/sapdata2

Performance Rules

The following directories should be located on different disks:

- /oracle/<*SID*>/origlogA
- /oracle/<*SID*>/origlogB

The redo logs should be on different disks than the /oracle/<*SID*>/sapdata<*n*> directories.

Use the file systems /oracle/<*SID*>/sapdata<*n*> exclusively for the data files of the database.

Use a separate disk for /oracle/<*SID*>/saparch.

Redo logs contain hot files (/usr/sap/<*SID*> contains the SAP page and roll files). For this reason, they are best located on different disks.

Keep the following hot tablespaces on different disks, if possible:

- PSAPSTABD
- PSAPCLUD
- PSAPBTABD

Try to distribute the load evenly amongst the disks, the disk controllers, and the I/O buses.

3
System Installation and Setup

This chapter provides useful information when preparing to install and set up a DIGITAL HiTest System configured from this DIGITAL HiTest Suite. System preparation includes installing hardware, operating system, and applications.

It is important to perform the operating system and application installations in the same sequence as described in the documentation:

1. Install UNIX on the DB-Server (hostname tcr003) and the Application-Server (hostname tcr004).
2. Install TruCluster ASE on both systems.
3. Install Logical Storage Manager (LSM) with the disk layout on the DB-Server, and only install LSM on the Application Server.
4. Install SAP R/3 on both systems.
5. Perform the post installation for TruCluster ASE in a SAP R/3 environment.

Hardware Installation

Install and interconnect the hardware as shown in Chapter 6.

The difference between the maximum and the minimum configuration is the amount of memory, CPU's and swapspace. The amount of CPU's don't influence the amount of disks and memory.

If more memory is added, the SAP kernel and profile parameters are modified and the disks for swapping have to be increased.

Amount of swapdisks (SAP rule 3xRAM + 500 MB):

- 1 GB memory 1 swapdisk (4 GB)
- 2 GB memory 2 swapdisks
- 3 GB memory 3 swapdisks
- 4 GB memory 3 swapdisks

The amount of disks in the HSZ's is not changeable during installation.

Installation of the KZPSA

If both systems are connected to the HSZ50s through shared-SCSI buses, be aware that the KZPSA-BB options are set to SCSI ID 7 by default. Set the SCSI ID to 6 on one of the two systems, as the following describes.

If the system is running, bring it down to console mode with the following command:

```
# shutdown -h now
```

The following procedure shows how to change the SCSI IDs and check the system configuration:

1. Set the SCSI ID of the shared KZPSAs to 6, as follows:

```
P00>>>set kzpsa1_host_id 6
P00>>>set kzpsa2_host_id 6
```

2. Check the shared KZPSA option settings, as follows:

```
P00>>>show kzp*
kzpsa0_fast           1
kzpsa0_host_id        7     ← internal disks
kzpsa0_termpwr        1
kzpsa1_fast           1
kzpsa1_host_id        6     ← 1st shared bus
kzpsa1_termpwr        1
kzpsa2_fast           1
kzpsa2_host_id        6     ←2nd shared bus
kzpsa2_termpwr        1
kzpsa5_fast           1
kzpsa5_host_id        7     ← 3rd for tape drive
kzpsa5_termpwr        1
```

3. Check all devices:

```
P00>>>show dev
polling for units on kzpsa0, slot 3, bus 0, hose0...
kzpsa0.7.0.3.0     dka     TPwr 1 Fast 1 Bus ID 7   P01  A10
dka100.1.0.3.0     DKa100                   RZ29B  0016
dka200.2.0.3.0     DKa200                   RZ29B  0016
dka300.3.0.3.0     DKa300                   RZ29B  0016
dka400.4.0.3.0     DKa400                   RZ29B  0016
polling for units on kzpsa1, slot 7, bus 0, hose0...
kzpsa1.6.0.7.0     dkb     TPwr 1 Fast 1 Bus ID 6   P01  A10
dkb100.1.0.7.0     DKb100                   HSZ50-AX  V51Z
dkb101.1.0.7.0     DKb101                   HSZ50-AX  V51Z
dkb102.1.0.7.0     DKb102                   HSZ50-AX  V51Z
dkb200.2.0.7.0     DKb200                   HSZ50-AX  V51Z
dkb201.2.0.7.0     DKb201                   HSZ50-AX  V51Z
dkb202.2.0.7.0     DKb202                   HSZ50-AX  V51Z
dkb300.3.0.7.0     DKb300                   HSZ50-AX  V51Z
dkb301.3.0.7.0     DKb301                   HSZ50-AX  V51Z
dkb302.3.0.7.0     DKb302                   HSZ50-AX  V51Z
dkb400.4.0.7.0     DKb400                   HSZ50-AX  V51Z
dkb401.4.0.7.0     DKb401                   HSZ50-AX  V51Z
jkb707.7.0.7.0     JKb707                   DIGITAL  ffff
polling for units on kzpsa2, slot 3, bus 0, hose1...
kzpsa2.6.0.3.1    dkc     TPwr 1 Fast 1 Bus ID 6   P01  A10
dkc101.1.0.3.1     DKc101                   HSZ50-AX  V51Z
dkc102.1.0.3.1     DKc102                   HSZ50-AX  V51Z
```

```
dkc200.2.0.3.1     DKc200                  HSZ50-AX  V51Z
dkc201.2.0.3.1     DKc201                  HSZ50-AX  V51Z
dkc202.2.0.3.1     DKc202                  HSZ50-AX  V51Z
dkc300.3.0.3.1     DKc300                  HSZ50-AX  V51Z
dkc301.3.0.3.1     DKc301                  HSZ50-AX  V51Z
dkc302.3.0.3.1     DKc302                  HSZ50-AX  V51Z
dkc400.4.0.3.1     DKc400                  HSZ50-AX  V51Z
dkc401.4.0.3.1     DKc401                  HSZ50-AX  V51Z
jkc707.7.0.3.1     JKc707                  DIGITAL  ffff
polling for units on kzpsa3, slot 7, bus 0, hose1...
kzpsa3.6.0.7.1     dkd     TPwr 1 Fast 1 Bus ID 6   P01  A10
polling for units on kzpsa4, slot 3, bus 0, hose2...
kzpsa4.6.0.3.2     dke     TPwr 1 Fast 1 Bus ID 6   P01  A10
polling for units on kzpsa5, slot 7, bus 0, hose2...
kzpsa5.7.0.7.2     dkf     TPwr 1 Fast 1 Bus ID 7   P01  A10
polling for units on kzpaa0, slot 10, bus 0, hose2...
pkg0.7.0.10.2      kzpaa6              SCSI Bus ID 7
dkg400.4.0.10.2    DKg400                  RRD45  0436
```

4. Check the CPUs, as follows:

```
P00>>>show cpu
Primary CPU:      00
Active CPUs:      00 01 02 03 04 05 06 07 08 09 10 11
Configured CPUs:  00 01 02 03 04 05 06 07 08 09 10 11
```

5. Check the amount of Memory:

```
P00>>>show mem
Set   Node    Size          Base Address    Intlv   Position
---  ------  ------    -------- --------   ------ ----------
 A      6    2048 Mb   00000000 00000000   2-Way      0
 B      7    2048 Mb   00000000 80000000   2-Way      0
```

6. Check the boot device settings, as follows:

```
P00>>>show boot*
boot_dev               dka100.1.0.3.0
boot_file
boot_osflags           A
boot_reset             OFF
bootdef_dev            dka100.1.0.3.0
booted_dev
booted_file
booted_osflags
```

Proceed to Installation of the HSZ50 on both systems.

Installation of the HSZ50

The HSZ50 software (HSOF) is shipped separately. The HSZ will not function without the HSOF software.

Connect a serial terminal (vtxxx) to the first HSZ50 serial port. After the HSZ50 has been powered on, enter the following commands from the terminal to create and verify the controller configuration:

Note

Refer to the *StorageWorks Array Controllers: HS Family of Array Controllers Users Guide* (EK-HSFAM-UG) for a complete description of the HSZ50 configuration procedures.

1. Verify that the HSZ50 firmware (HSOF) is at revision 5.1, the cache size is 64 MB and in a GOOD state, and the battery state is GOOD:

```
HSZ> sho this
Controller:
HSZ50-CX ZG61200944 Firmware V51Z-1, Hardware A01
Not configured for dual-redundancy
SCSI address 7
Time: NOT SET

Host port:
      SCSI target(s) (0), No preferred targets
Cache:
128 megabyte write cache, version 2
```

(64 MB per HSZ50, 128 MB per HSZ52)

```
Cache is GOOD
Battery is GOOD
No unflushed data in cache
CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
CACHE_POLICY = A
Host Functionality Mode = A
```

2. Setup the HSZ52 (HSZ50 pair) to enable the failover dual redundancy, as follows:

```
HSZ> set this prompt="HSZ1_1> "
HSZ1_1> set this time=16-MAY-1997:11:00:00
HSZ1_1> set failover copy = this
HSZ1_1> set this id = 1,2,3,4
HSZ1_1> set this PREFERRED_ID = 1,2
```

3. Connect to second HSZ50:

```
HSZ> set this prompt="HSZ1_2> "
HSZ1_2> set nofailover
HSZ1_2> set this id = 1,2,3,4
HSZ1_2> set this PREFERRED_ID = 3,4
HSZ1_2> restart other
HSZ1_2> restart this
```

4. Display the HSZ50 configuration again, as follows:

```
HSZ1_1> show this
Controller:
HSZ50-AX ZG71124885 Firmware V51Z-0, Hardware A01
Configured for dual-redundancy with ZG71024492
```

```
In dual-redundant configuration
SCSI address 7
Time: NOT SET

Host port:
SCSI target(s) (1, 2, 3, 4), Preferred target(s) (1, 2)
TRANSFER_RATE_REQUESTED = 10MHZ
Cache:
64 megabyte write cache, version 3
Cache is GOOD
Battery is GOOD
No unflushed data in cache
CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
CACHE_POLICY = A
NOCACHE_UPS
Host Functionality Mode = A
HSZ1_1>
HSZ1_1> show other
Controller:
HSZ50-AX ZG71024492 Firmware V51Z-0, Hardware A01
Configured for dual-redundancy with ZG71124885
In dual-redundant configuration
SCSI address 6
Time: NOT SET
Host port:
SCSI target(s) (1, 2, 3, 4), Preferred target(s) (3, 4)
TRANSFER_RATE_REQUESTED = 10MHZ
Cache:
64 megabyte write cache, version 3
Cache is GOOD
Battery is GOOD
No unflushed data in cache
CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
CACHE_POLICY = A
NOCACHE_UPS
Host Functionality Mode = A
HSZ1_1>
```

5. Check the disk layout. If no disk is seen or disks are added after the config of the HSZ50, run either run config or run cfmenu where cfmenu is menu driven. Config automatically adds all known disks.

```
HSZ1_1> show dev
Name          Type      Port Targ  Lun        Used by
------------------------------------------------------------
DISK100       disk        1    0    0
DISK110       disk        1    1    0
DISK120       disk        1    2    0
DISK130       disk        1    3    0
DISK140       disk        1    4    0
DISK200       disk        2    0    0
DISK210       disk        2    1    0
DISK220       disk        2    2    0
DISK230       disk        2    3    0
DISK240       disk        2    4    0
DISK300       disk        3    0    0
```

```
DISK310       disk        3    1    0
DISK320       disk        3    2    0
DISK330       disk        3    3    0
DISK340       disk        3    4    0
DISK400       disk        4    0    0
DISK410       disk        4    1    0
DISK420       disk        4    2    0
DISK430       disk        4    3    0
DISK500       disk        5    0    0
DISK510       disk        5    1    0
DISK520       disk        5    2    0
DISK530       disk        5    3    0
DISK600       disk        6    0    0
DISK610       disk        6    1    0
DISK620       disk        6    2    0
DISK630       disk        6    3    0
HSZ1_1>
```

6. Each member of a stripeset is located on a different HSZ52 SCSI bus port. While referring to Figure 3-1, configure the stripesets and set the chunksize, as follows:

```
HSZ1_1> add stripe s1 DISK100 DISK200 DISK300
HSZ1_1> add stripe s2 DISK400 DISK500 DISK600
HSZ1_1> add stripe s3 DISK110 DISK210 DISK310
HSZ1_1> add stripe s4 DISK410 DISK510 DISK610
HSZ1_1> add stripe s5 DISK120 DISK220 DISK320
HSZ1_1> add stripe s6 DISK420 DISK520 DISK620
HSZ1_1> add stripe s7 DISK130 DISK230 DISK330
HSZ1_1> add stripe s8 DISK430 DISK530 DISK630
HSZ1_1>
HSZ1_1> init s1 chunksize=256
HSZ1_1> init s2 chunksize=256
HSZ1_1> init s3 chunksize=256
HSZ1_1> init s4 chunksize=256
HSZ1_1> init s5 chunksize=256
HSZ1_1> init s6 chunksize=256
HSZ1_1> init s7 chunksize=256
HSZ1_1> init s8 chunksize=256
HSZ1_1>
```

(256 because this value works fine with UNIX, see also *StorageWorks Array Controllers: HS Family of Array Controllers User's Guide*)

Figure 3-1: Stripeset Configuration

7. The following three disks are for redolog a (disk140), redolog b (disk240), and all the R/3 mountpoints (disk340):

```
HSZ1_1> init disk140
HSZ1_1> init disk240
HSZ1_1> init disk340
HSZ1_1>
```

8. Add the following units (1024=max value):

```
HSZ1_1> add unit d100 s1 writeback_cache maximum_cached_transfer=1024
HSZ1_1> add unit d300 s2 writeback_cache maximum_cached_transfer=1024
HSZ1_1> add unit d101 s3 writeback_cache maximum_cached_transfer=1024
HSZ1_1> add unit d301 s4 writeback_cache maximum_cached_transfer=1024
HSZ1_1> add unit d102 s5 writeback_cache maximum_cached_transfer=1024
HSZ1_1> add unit d302 s6 writeback_cache maximum_cached_transfer=1024
HSZ1_1> add unit d200 s7 writeback_cache maximum_cached_transfer=1024
HSZ1_1> add unit d400 s8 writeback_cache maximum_cached_transfer=1024
HSZ1_1>
HSZ1_1> add unit d201 disk140 (origlogA HSZ1_1)
HSZ1_1> add unit d401 disk240 (origlogB HSZ1_2)
HSZ1_1> add unit d202 disk340
HSZ1_1>
```

9. Display the current units and disks, as follows:

```
HSZ1_1> show units
LUN                                             Uses
-------------------------------------------------
  D100                                          S1
  D101                                          S3
  D102                                          S5
  D200                                          S7
  D201                                          DISK140
  D202                                          DISK340
  D300                                          S2
  D301                                          S4
  D302                                          S6
  D400                                          S8
  D401                                          DISK240
HSZ1_1> show disk
Name          Type      Port Targ  Lun       Used by
-------------------------------------------------------
DISK100       disk         1    0    0        S1
DISK110       disk         1    1    0        S3
DISK120       disk         1    2    0        S5
DISK130       disk         1    3    0        S7
DISK140       disk         1    4    0        D201
DISK200       disk         2    0    0        S1
DISK210       disk         2    1    0        S3
DISK220       disk         2    2    0        S5
DISK230       disk         2    3    0        S7
DISK240       disk         2    4    0        D401
DISK300       disk         3    0    0        S1
DISK310       disk         3    1    0        S3
DISK320       disk         3    2    0        S5
DISK330       disk         3    3    0        S7
DISK340       disk         3    4    0        D202
DISK400       disk         4    0    0        S2
DISK410       disk         4    1    0        S4
DISK420       disk         4    2    0        S6
DISK430       disk         4    3    0        S8
DISK500       disk         5    0    0        S2
DISK510       disk         5    1    0        S4
DISK520       disk         5    2    0        S6
DISK530       disk         5    3    0        S8
DISK600       disk         6    0    0        S2
DISK610       disk         6    1    0        S4
DISK620       disk         6    2    0        S6
DISK630       disk         6    3    0        S8
HSZ1_1>
```

10. Perform the same procedure for the second HSZ52, which is the second member in an LSM mirrorset. The disk configuration of HSZ2 must be equal to that for HSZ1.

```
HSZ2_2> show disk
Name          Type       Port Targ  Lun      Used by
-----------------------------------------------------
DISK100       disk          1    0    0        S1
DISK110       disk          1    1    0        S3
DISK120       disk          1    2    0        S5
```

```
DISK130       disk          1    3    0        S7
DISK140       disk          1    4    0        D201
DISK200       disk          2    0    0        S1
DISK210       disk          2    1    0        S3
DISK220       disk          2    2    0        S5
DISK230       disk          2    3    0        S7
DISK240       disk          2    4    0        D401
DISK300       disk          3    0    0        S1
DISK310       disk          3    1    0        S3
DISK320       disk          3    2    0        S5
DISK330       disk          3    3    0        S7
DISK340       disk          3    4    0        D202
DISK400       disk          4    0    0        S2
DISK410       disk          4    1    0        S4
DISK420       disk          4    2    0        S6
DISK430       disk          4    3    0        S8
DISK500       disk          5    0    0        S2
DISK510       disk          5    1    0        S4
DISK520       disk          5    2    0        S6
DISK530       disk          5    3    0        S8
DISK600       disk          6    0    0        S2
DISK610       disk          6    1    0        S4
DISK620       disk          6    2    0        S6
DISK630       disk          6    3    0        S8
HSZ2_2>
HSZ2_2> show unit
   LUN                                          Uses
-------------------------------------------------------
  D100                                          S1
  D101                                          S3
  D102                                          S5
  D200                                          S7
  D201                                          DISK140
  D202                                          DISK340
  D300                                          S2
  D301                                          S4
  D302                                          S6
  D400                                          S8
  D401                                          DISK240
HSZ2_2>
```

Operating System Installation

Install the DIGITAL UNIX 4.0B operating system with all kernel options.

1. Boot the CD containing the DIGITAL UNIX 4.0B distribution:
   P00>>>**boot *device*** (where device = CD)
2. Follow the steps in the *DIGITAL UNIX Installation Guide Version 4.0B* (or higher) (Part Number: AA-QTLGB-TE).
3. When prompted to select the type of installation, select 3) UNIX Shell and proceed to the Disk Maintenance section to create disk device special files and check partitioning.

Disk Initialization

This section describes the steps required to create disk device special files, label the disks, and check the partitions.

1. Change to the /dev directory, as follows:
   # **cd /dev**
2. Use the MAKEDEV command to create disk device special files for rz1:
   # **./MAKEDEV rz1**
   ```
   MAKEDEV: special file(s) for rz1:
   rz1a rz1b rrz1b rz1c rrz1c rz1d rrz1d rz1e rrz1e rz1f rrz1f
   rz1g rrz1g rz1h rrz1h
   ```
3. Check the disk label information on rz1:
   # **disklabel -wr rz1**
   ```
   /dev/rrz1a:
   type: SCSI
   disk: RZ29B
   label:
   flags:
   bytes/sector: 512
   sectors/track: 113
   tracks/cylinder: 20
   sectors/cylinder: 2260
   cylinders: 3708
   sectors/unit: 8380080
   rpm: 7200
   interleave: 1
   trackskew: 9
   cylinderskew: 16
   headswitch: 0           # milliseconds
   track-to-track seek: 0  # milliseconds
   drivedata: 0
   8 partitions:
   #    size     offset  fstype  [fsize bsize cpg]
   a:  131072       0    unused    0     0    # (Cyl.0 - 57*)
   b:  401408    131072  unused    0     0    # (Cyl.57*- 235*)
   c: 8380080       0    unused    0     0    # (Cyl.0 - 3707)
   d: 2623488    532480  unused    0     0    # (Cyl.235*- 1396*)
   e: 2623488    315596  unused    0     0    # (Cyl.1396*- 2557*)
   f: 2600624   5779456  unused    0     0    # (Cyl.2557*- 3707)
   g: 3936256    532480  unused    0     0    # (Cyl.235*- 1977*)
   h: 3911344   4468736  unused    0     0    # (Cyl.1977*- 3707)
   #
   ```

4. Start the disk label editor:

```
# disklabel -e rz1
/dev/rrz1a:
type: SCSI
disk: RZ29B
label:
flags:
bytes/sector: 512
sectors/track: 113
tracks/cylinder: 20
sectors/cylinder: 2260
cylinders: 3708
sectors/unit: 8380080
rpm: 7200
interleave: 1
trackskew: 9
cylinderskew: 16
headswitch: 0           # milliseconds
track-to-track seek: 0  # milliseconds
drivedata: 0
8 partitions:


#    size     offset  fstype  [fsize bsize cpg]
a:  2000000     0     unused     0     0    # (Cyl.    0 - 57*)
b:  2000000  2000000  unused     0     0    # (Cyl.   57*- 235*)
c:  8380080     0     unused     0     0    # (Cyl.    0 - 3707)
d:  2000000  4000000  unused     0     0    # (Cyl.  235*- 1396*)
e:  2000000  6000000  unused     0     0    # (Cyl. 1396*- 2557*)
f:    0         0     unused     0     0    # (Cyl. 2557*- 3707)
g:    0         0     unused     0     0    # (Cyl.  235*- 1977*)
h:   380080  8000000  unused     0     0    # (Cyl. 1977*- 3707)
```

5. Save your edits and exit the editor:

```
:wq
write new label? [y]: y
#
# exit
INIT: SINGLE-USER MODE
Initializing system for DIGITAL UNIX installation. Please
wait...
*** Performing CD-ROM Installation
Loading installation process and scanning system hardware.
```

Go to the section Operating System Custom Installation.

Operating System Custom Installation

1. Select 2) `Custom Installation.`
2. Follow the display and enter data when prompted. The hostname for the first HiTest system was tcr003.

3. The following message is displayed when the disk scan occurs:

```
** Scanning system for disk devices.  Please wait ...
Only one disk detected in this system (/dev/rz1, SCSI RZ29B
type).  All file systems will be on that disk.
The rz1 disk has a non-default partition table.
Partition  Start      Size       End    Overlaps
Default
    a          0    131072     131071    c
    b     131072    401408     532479    c
    c          0   8380080    8380079    a b d e f g h
    d     532480   2623488    3155967    c g
    e    3155968   2623488    5779455    c g h
    f    5779456   2600624    8380079    c h
    g     532480   3936256    4468735    c d e
    h    4468736   3911344    8380079    c e f
Existing
    a          0   2000000    1999999    c
    b    2000000   2000000    3999999    c
    c          0   8380080    8380079    a b d e h
    d    4000000   2000000    5999999    c
    e    6000000   2000000    7999999    c
    f          0         0         -1
    g          0         0         -1
    h    8000000    380080    8380079    c
```

4. Select the existing table and do not use the default disk layout, as follows:

```
Choose which partition table to use.
1) Default table
2) Existing table
Enter your choice: 2
The default disk layout is:
  * root file system on the "a" partition, type UFS
  * /usr file system on the "g" partition, type UFS
  * /var as part of /usr
  * first swapping area (swap1) on the "b" partition
  * no second swapping area (swap2)
Use this default disk layout (y/n) ? n
```

5. Select the AdvFS file system for the root file system, as follows:

```
1) UFS -- UNIX file system
2) AdvFS -- advanced file system
Enter your choice: 2
```

6. Select the rz1 partition where the /usr file system will reside, as follows:

```
  Partition   Start         Size         End   Overlaps
1)    b      2000000     2000000     3999999     c
2)    d      4000000     2000000     5999999     c
3)    e      6000000     2000000     7999999     c
4)    h      8000000      380080     8380079     c
Enter your choice: 2
```

7. Select the rz1 partition where the first swapping area (swap1) will reside, as follows:

```
  Partition   Start         Size         End   Overlaps
1)    b      2000000     2000000     3999999     c
2)    e      6000000     2000000     7999999     c
3)    h      8000000      380080     8380079     c
Enter your choice: 1
```

8. You may choose to have a second swapping area (swap2).

```
Do you want a second swapping area (y/n) ? n
```

9. You can make /var a separate file system, or you can have it share space on the /usr file system.

```
Should /var be a separate file system (y/n) ? y
```

10. Select the rz1 partition where the /var file system will reside.

```
  Partition   Start        Size         End   Overlaps
1)    e      6000000    2000000     7999999     c
2)    h      8000000     380080     8380079     c
Enter your choice: 1
```

11. Select the file system type for the /var file system.

```
1) UFS -- UNIX file system
2) AdvFS -- advanced file system
Enter your choice: 2
```

12. Check the file system:

```
You have requested this file system layout:
  * root file system on rz1a, type AdvFS
  * /usr file system on rz1d, type AdvFS
  * /var file system on rz1e, type AdvFS
  * first swapping area (swap1) will be on rz1b
  * no second swapping area (swap2)
Is this the correct file system layout (y/n) ? y
```

13. Install all mandatory and optional subsets.

14. Set the console boot variables, as follows, then boot:

```
>>> set boot_osflags A
>>> set bootdef_dev DKA100
>>> boot
```

15. When prompted, select all kernel options. At this point the kernel is built and the system is rebooted. Proceed to the section Configure Network Interfaces.

Configure Network Interfaces

After the kernel build and system reboot, login as root and start setup as follows:

1. `# setup`
2. From the setup menu, select:
   `1) Network Configuration Application`.
3. From the Network Configuration Application menu, select:
   `1  Configure Network Interfaces`

Note

Refer to the System Administration and Network Administration guides for configuring information.

The environment in which a system is installed determines many of the network configuration settings. The following sections list the settings used for this HiTest System as installed in the test laboratory. After the interfaces are configured, exit the menu and enter yes when prompted to have netsetup automatically restart the network services. Exit from the Setup menu and reboot the system. The DIGITAL UNIX installation is complete.

FDDI Controller (fta0)

Hostname for the system is tcr003.
IP address for interface fta0 is 1.0.0.3.
Subnet mask for fta0 is 255.255.255.0.
No additional ifconfig flags for this interface were set.

Fast Ethernet Controller (tu0)

Hostname for interface tu0 is tcr003e.
The IP address for interface tu0 is 155.56.201.103.
The subnet mask for tu0 is 255.255.255.0.
No additional ifconfig flags for this interface were set.

Licenses

Licenses, also known as PAKs (Product Authorization Keys) are delivered with the system. The PAKs that come with this system include:

- OSF-BASE – Required for any system running the DIGITAL UNIX Operating System.
- NET-APP-SUP-200 – Required to use the AdvFS Utility product.

Register using the following steps:

1. **`#lmf register`** (or **`#lmfsetup`**)
   A template is displayed. At this moment, you are using the vi editor.
2. Add the information contained in the PAKs that came with the software.

The NAS-APP-SUP-200 is one license for multiple products. Generate multiple product licenses using the following procedure:

1. Place the CD, "DIGITAL NAS V7.1 for DIGITAL UNIX" (April 96 - AG-QVDTA-BE) in the CD drive.
2. Mount it as follows:
   # **`mount -dr /dev/rz29c /mnt`**

Note

If desired, you can create a softlink between `/dev/cd` and `/dev/rz29c`.by issuing the following command: # **`ln -s /dev/rz29c /dev/cd`**

3. Install the NAS product, as follows:
   # **`setld -l /mnt/n30710/kit NASBASE710`**

4. Generate the license with the following command:
   # **/bin/nasinstall**
5. Display the licenses with the command:
   # **lmf list**

DIGITAL UNIX Patch Installation

Patches are dependent on the DIGITAL UNIX version (4.0b for this HiTest System). The patches are located at:
`ftp://ftp.service.digital.com/public/Digital_UNIX/v4.0b`.

Copy and install the patches using the following steps:

1. Using a browser or ftp, copy the following files:
   Patch: duv40bas00005-19971009.tar
   Readme: duv40bas00005-19971009.README
   Checksum: duv40bas00005-19971009.CHKSUM
   Rel.Notes: duv40bas00005-19971009.ps

   Note

   The contents of the patch directory are frequently updated. The patch file names may change as these updates occur.

2. Move duv40bas00005-19971009.* to /, as follows:
   # **mv duv40bas00005-19971009.* /**
3. Read duv40bas00005-19971009.README:
   # **more duv40bas00005-19971009.README**
4. Read, the release notes, duv40bas00005-19971009.ps:
   # **dxvdoc duv40bas00005-19971009.ps**
5. Unpack the tar file, as follows:
   # **tar xvf duv40bas0005-19971009.tar**
6. Bring system to single user mode:
   # **shutdown now**
   or
   # **shutdown -h now**
   >>> **boot -fl "s"**
7. Mount `/usr` and `/var` and `/` writeable:
   # **mount -u /**
   # **mount /usr**
   # **mount /var**
8. Call the Patch Utility:
   # **cd /patch_kit**
   # **./dupatch**
9. From the DIGITAL UNIX Patch Utility, select`: ALL of the above`.

10. After the patches are installed and you have exited from the patch utility, exit from superuser into run level 3, as follows:
```
#
# exit
Enter run level (0-9, s or S): 3
will change to state 3
INIT: New run level: 3
starting LSM
system is starting up to multi user level ...
```
11. Rebuild the kernel to incorporate the modifications:
logon as user root
```
# doconfig -c TCR003
```
The new kernel is /sys/TCR003/vmunix
```
# mv /sys/TCR003/vmunix /vmunix
# reboot
```

Network Setup

This section describes setting up NFS and the hosts and rhosts files:

1. Start nfssetup as follows:
```
tcr003> nfssetup
```
2. As the nfssetup prompts appear, enter the following information:
```
NFS locking to be enabled [y] ? y
Will you be exporting any directories [n] ? y
Do you want to allow non-root mounts [n] ? n
Enter the number of TCP daemons to run (0 to 128) [8] : 8
Enter the number of UDP daemons to run (0 to 120) [8] : 8
Would you like to run the property list daemon [n] ? n
Enter the number of block I/O daemons to run [7] : 7
Would you like to run the PC-NFS daemon [n] ? n
Would you like to run the automount daemon [n] ? n
Enter the directory pathname: /sapmnt/TCR
Netgroup/Machine name: tcr004
Enter the directory pathname: /usr/sap/trans
Netgroup/Machine name: tcr004
```
3. Verify the nfssetup confirmation of the NFS environment is as follows:
```
8 TCP server daemons, 8 UDP server daemons
7 nfsiod daemons
locking daemons installed
```
Directory export list:
```
/sapmnt/TCR exported to: tcr004
/usr/sap/trans exported to: tcr004
```

Note

The /usr/sap/trans directory must also be on the shared devices. In a normal R/3 installation it is not the default so please adjust for the Availability Server purposes.

hosts and rhosts

Use the following steps to create and set up the rhosts and hosts files.

1. Create the file `.rhosts` in the directory /. The HiTest system rhosts files contained the following lines:
   ```
   tcr003 root
   <any other host> root
   ```
   This allows **rsh**, **rlogin** and **rcp** between these systems.

2. Edit the file `hosts` in /etc to include the names of the hosts on the network. The lines added for the HiTest System environment are:
   ```
   #
   127.0.0.1       localhost
   1.0.0.3         tcr003       ← FDDI host name DB Server
   1.0.0.30        vtcr003      ← virtual host name for TCR140 DB Server
   155.56.201.103  tcr003e      ← Ethernet name DB Server
   1.0.0.4         tcr004       ← FDDI host name Appl. Server
   1.0.0.40        vtcr004      ← Virtual host name for TCR140 Appl. Server
   155.56.201.104  tcr004e      ← Ethernet host name DB Server
   155.56.201.224  du1001.fra.dec.com  du1001
   155.56.201.222  vaxsap
   155.56.201.10   alf0a
   ```

Post-Installation Procedures

The procedures in this section label the disks, configure additional swap space, and modify the crontab file.

Labeling the Shared Disks

The shared disks have to be labeled only once on the db server (tcr003).
The other system (tcr004) will recognize the labels automatically.

```
# disklabel -z /dev/rrz10c
# disklabel -z /dev/rrz11c
# disklabel -z /dev/rrz12c
# disklabel -z /dev/rrz17c
# disklabel -z /dev/rrz18c
# disklabel -z /dev/rrz19c
# disklabel -z /dev/rrz20c
# disklabel -z /dev/rrz9c
# disklabel -z /dev/rrzb10c
# disklabel -z /dev/rrzb11c
# disklabel -z /dev/rrzb12c
# disklabel -z /dev/rrzb17c
# disklabel -z /dev/rrzb18c
# disklabel -z /dev/rrzb19c
# disklabel -z /dev/rrzb20c
# disklabel -z /dev/rrzb9c
# disklabel -z /dev/rrzc10c
# disklabel -z /dev/rrzc11c
# disklabel -z /dev/rrzc17c
# disklabel -z /dev/rrzc18c
# disklabel -z /dev/rrzc19c
# disklabel -z /dev/rrzc9c
```

```
# disklabel -wr /dev/rrzc9c   HSZ50
# disklabel -wr /dev/rrz10c   HSZ50
```

```
# disklabel -wr /dev/rrz11c   HSZ50
# disklabel -wr /dev/rrz12c   HSZ50
# disklabel -wr /dev/rrz17c   HSZ50
# disklabel -wr /dev/rrz18c   HSZ50
# disklabel -wr /dev/rrz19c   HSZ50
# disklabel -wr /dev/rrz20c   HSZ50
# disklabel -wr /dev/rrz9c   HSZ50
# disklabel -wr /dev/rrzb10c   HSZ50
# disklabel -wr /dev/rrzb11c   HSZ50
# disklabel -wr /dev/rrzb12c   HSZ50
# disklabel -wr /dev/rrzb17c   HSZ50
# disklabel -wr /dev/rrzb18c   HSZ50
# disklabel -wr /dev/rrzb19c   HSZ50
# disklabel -wr /dev/rrzb20c   HSZ50
# disklabel -wr /dev/rrzb9c   HSZ50
# disklabel -wr /dev/rrzc10c   HSZ50
# disklabel -wr /dev/rrzc11c   HSZ50
# disklabel -wr /dev/rrzc17c   HSZ50
# disklabel -wr /dev/rrzc18c   HSZ50
# disklabel -wr /dev/rrzc19c   HSZ50
```

Adding Swap Space

At least three more disks (if 4.3 GB) should be used for swapping (this is a SAP R/3 requirement for normal OLTP applications). The additional swap space is calculated as follows: 3 x RAM + 500 MB => 3 x 4.3 GB disks

Add the following lines to `/etc/fstab:`

```
/dev/rz2c   swap2 ufs sw 0 2
/dev/rz3c   swap3 ufs sw 0 2
/dev/rz4c   swap4 ufs sw 0 2
```

Editing the crontab File

1. Edit the `crontab` file for the user `root` because files in the `/tmp` directory are automatically deleted after 2 days. Note that the `/tmp` directory is used during the SAP installation. If an installation is started on Friday and continued on Monday, there could be problems.
2. Type the following to edit the file:
   # **`crontab -e`**

TruCluster Available Server

Install the TruCluster Available Server Software. The software is located on the DIGITAL UNIX V4.0B Associated Products Volume 2 - December 1996 CD-ROM.

1. Before proceeding to Step 2, familiarize yourself with the following files located at: `/<`*`CD-Mountpoint`*`>/DOCUMENTATION/TCR/TEXT`:

   ```
   TCR_USING_ON_4.0B.TXT
   AS_LETTER.TXT
   AS_SPD.TXT
   AS_Version1.4_CLD_Fixes.TXT
   ```

2. Start the installation and select : `ALL mandatory and optional subsets`
   # **`cd /<CD-Mountpoint>/TCR140`**
   # **`setld -l`**

3. Enter the following information (or information specific to your system), as prompted by the installation program:

```
Enter the IP name for the member network interface [tcr003]:tcr003
You chose "tcr003," IP 1.0.0.3 using interface fta0

Do you want to run the ASE logger on this node? [n]: y

The ASE I/O Bus Renumbering Tool has been invoked.
Select the controllers that define the shared ASE I/O buses.
        Name    Controller      Slot    Bus     Slot
    0)  scsi0   pza0            0       pci0    2
    1)  scsi1   pza1            0       pci0    6
    2)  scsi2   pza2            0       pci1    5
    3)  scsi3   pza3            0       pci1    9
    4)  scsi4   pza4            0       pci2    3
    5)  scsi5   pza5            0       pci2    7
     )  scsi6   psiop0          0       pci2    9
q)  Quit without making changes

Enter your choices (comma or space separated): 1 2
        scsi1 pza1 0 pci0 6
        scsi2 pza2 0 pci1 5
Are the above choices correct (y|n)? [y]:y
```

4. Exit the I/O Controller Name Specification Menu.

```
All controllers connected to an I/O bus must be named the
same on all ASE members.  Enter the controller names for all
shared ASE I/O buses by assigning them one at a time or all
at once with the below options.
    Name     New Name   Controller  Slot    Bus    Slot
 1) scsi1    scsi1      pza1         0      pci0    6
 2) scsi2    scsi2      pza2         0      pci1    5
 f)  Assign buses starting at a given number
 p)  Assign buses as was done in pre-ASE V1.3
 v)  View non shared controllers
 s)  Show previous assignments
 r)  Reapply previous assignments
 q)  Quit without making any changes
 x)  Exit (done with modifications)
Enter your choice [f]: x

Your new scsi controller configuration is:
        Name    Controller      Slot    Bus     Slot
        scsi0   pza0            0       pci0    2
        scsi1   pza1            0       pci0    6
        scsi2   pza2            0       pci1    5
        scsi3   pza3            0       pci1    9
        scsi4   pza4            0       pci2    3
        scsi5   pza5            0       pci2    7
        scsi6   psiop0          0       pci2    9

Is this ok? [y]: y
```

5. The kernel is rebuilt after exiting from the menu. Check the kernel files, then move them and reboot, as follows:

```
tcr003> ls -l /vm*
-rwxr-xr-x   1 root     system   12260144 May 26 10:02 /vmunix
-rwxr-xr-x   1 root     system   12240512 May 23 15:05 /vmunix.bef_patch
```

Move the kernel:

```
tcr003> mv /vmunix /vmunix.bef_ase
tcr003> mv /sys/TCR003/vmunix /vmunix
tcr003> ls -l /vm*
-rwxr-xr-x   1 root     system   12406448 Jun  3 09:09 /vmunix
-rwxr-xr-x   1 root     system   12260144 May 26 10:02 /vmunix.bef_ase
-rwxr-xr-x   1 root     system   12240512 May 23 15:05 /vmunix.bef_patch
```

Reboot the system:

```
tcr003>  reboot
```

6. Repeat the previous steps on the Application server (tcr004 in this HiTest Suite).

Note

If the configuration in /sys/conf/TCR003 is changed, especially SCSI setup, run /var/ase/sbin/ase_fix_config again to make the changes work with TruCluster V1.4. However, changing SCSI assignments will invalidate any volume definition that may exist then.

Refer to *SAP R/3 DECsafe Package V2.2*, which is available from the DIGITAL Intranet at URL:
`http://www.fra.dec.com/SAP-Eng/available/cluster.html`

Read install.doc very carefully before you start to install TruCluster V1.4.

Logical Storage Manager (LSM)

The standard SAP R/3 database was located on striped HSZ50 volumes (made up of three complete 4.3 GB drives on different HSZ50 shelves). The redo log files were written to a single HSZ50 volume.

Some basic knowledge about LSM is needed to understand the topics discussed in this section.

Before LSM Installation

Check the following:

- Ensure that the DIGITAL UNIX operating system is installed as previously described.
- All the disks have a disklabel, as previously described.
- License LSM-OA is installed and loaded.

Installing LSM Option

If the LSM option was not selected during the DIGITAL UNIX installation, install it now, as follows:

1. Mount the DEC OSF/1 Operating System CD:

```
# mount -dr /dev/cd /mnt
# cd /mnt/ALPHA/BASE
# setld -l
```

2. Select the options:
   Logical Storage Manager
   Logical Storage Manager GUI
   Logical Storage Manager Kernel Header and Common Files
   Logical Storage Manager Kernel Objects

3. Save a copy of the `/usr/sys/conf/TCR003` configuration file.

4. Build a new kernel by using doconfig without any option:

```
# doconfig
Do you want to replace the existing configuration file ? Yes
```

5. Select all the kernel options. (Logical Storage Manager is included in the "All of the above.")

Note

Step 5 must be done to get LSM in the kernel. Do not just add the following two lines in Step 6 to the configuration files.

6. Compare the old and new configuration file, there are now two new lines near the end of the file:

```
pseudo-device    lsm_ted      0
pseudo-device    lsm          1
```

7. Rebuild the kernel:

```
# cp /vmunix /vmunix.save
# doconfig -c TCR003

*** KERNEL CONFIGURATION AND BUILD PROCEDURE ***

Saving /sys/conf/TCR003 as /sys/conf/TCR003.bck
```

8. Do you want to edit the configuration file? (y/n) [n]: **n**

```
*** PERFORMING KERNEL BUILD ***
Working....Fri Feb 7 11:02:11 MET DST 1997
```

9. Move the new kernel to /vmunix:

```
# mv /sys/TCR003/vmunix /vmunix
```

10. Stop and start the system to activate the new kernel:

```
# init 0   (or shutdown -r now)
>>> boot
```

volinstall

Create the LSM special files with the following command:

```
# volinstall
```

The command also sets up the system for automatic LSM start at boot time (see /etc/inittab).

volsetup

Run volsetup to create the rootdg. Partition h of the system disk will be used.

With this command:

- vold is initialized
- root disk group (rootdg) is initialized
- rz1 will be an LSM simple disk

Remember, the rootdg disk group not only has information of its own disk group, but also from all other disks and disk groups defined with LSM.

Note

You will be asked which volume to add this disk. Choose a new volume group like sapdg because the TruCluster V1.4 installation does not work with the rootdg.

1. Start the volsetup utility:

```
# volsetup

Approximate maximum number of physical disks that will be
managed: 20
Enter the disk(s) to add into the rootdg disk group: rz1h
Initialize vold and the root disk group:
Add disk rz1h to the root disk group as rz1h:
Addition of disk rz1h as rz1h succeeded.
```

Note

Up to here the LSM setup is equal to both systems. From now on you will see the LSM setup which is done only for the db server (tcr003). TruCluster will do the LSM setup on the application server (tcr004), in case of errors, automatically.

2. Initial all disks which should be used by LSM.

```
# voldisksetup -i rz9c nlog=1 nconfig=1
# voldisksetup -i rzb9c nlog=1 nconfig=1
# voldisksetup -i rzc9c nlog=1 nconfig=1
# voldisksetup -i rz10c nlog=1 nconfig=1
# voldisksetup -i rzb10c nlog=1 nconfig=1
# voldisksetup -i rzc10c nlog=1 nconfig=1
# voldisksetup -i rz11c nlog=1 nconfig=1
# voldisksetup -i rzb11c nlog=1 nconfig=1
# voldisksetup -i rzc11c nlog=1 nconfig=1
# voldisksetup -i rz12c nlog=1 nconfig=1
# voldisksetup -i rzb12c nlog=1 nconfig=1
# voldisksetup -i rz17c nlog=1 nconfig=1
# voldisksetup -i rzb17c nlog=1 nconfig=1
```

```
# voldisksetup -i rzc17c nlog=1 nconfig=1
# voldisksetup -i rz18c nlog=1 nconfig=1
# voldisksetup -i rzb18c nlog=1 nconfig=1
# voldisksetup -i rzc18c nlog=1 nconfig=1
# voldisksetup -i rz19c nlog=1 nconfig=1
# voldisksetup -i rzb19c nlog=1 nconfig=1
# voldisksetup -i rzc19c nlog=1 nconfig=1
# voldisksetup -i rz20c nlog=1 nconfig=1
# voldisksetup -i rzb20c nlog=1 nconfig=1
#
```

3. Create the LSM disk group sapdg:

```
# voldg init sapdg rz9=rz9c
```

4. Add disks to LSM group sapdg:

```
# voldg -g sapdg adddisk  rzb9=rzb9c
# voldg -g sapdg adddisk  rzc9=rzc9c
# voldg -g sapdg adddisk  rz10=rz10c
# voldg -g sapdg adddisk  rzb10=rzb10c
# voldg -g sapdg adddisk  rzc10=rzc10c
# voldg -g sapdg adddisk  rz11=rz11c
# voldg -g sapdg adddisk  rzb11=rzb11c
# voldg -g sapdg adddisk  rzc11=rzc11c
# voldg -g sapdg adddisk  rz12=rz12c
# voldg -g sapdg adddisk  rzb12=rzb12c
# voldg -g sapdg adddisk  rz17=rz17c
# voldg -g sapdg adddisk  rzb17=rzb17c
# voldg -g sapdg adddisk  rzc17=rzc17c
# voldg -g sapdg adddisk  rz18=rz18c
# voldg -g sapdg adddisk  rzb18=rzb18c
# voldg -g sapdg adddisk  rzc18=rzc18c
# voldg -g sapdg adddisk  rz19=rz19c
# voldg -g sapdg adddisk  rzb19=rzb19c
# voldg -g sapdg adddisk  rzc19=rzc19c
# voldg -g sapdg adddisk  rz20=rz20c
# voldg -g sapdg adddisk  rzb20=rzb20c
#
```

5. Since Block Change logging will be used, create Log sub-disks to be associated with each Plex.

```
# volmake -g sapdg sd rz9-01 dm_name=rz9 dm_offset=0 len=1
# volmake -g sapdg sd rzb9-01 dm_name=rzb9 dm_offset=0 len=1
# volmake -g sapdg sd rzc9-01 dm_name=rzc9 dm_offset=0 len=1
# volmake -g sapdg sd rz10-01 dm_name=rz10 dm_offset=0 len=1
# volmake -g sapdg sd rzb10-01 dm_name=rzb10 dm_offset=0 len=1
# volmake -g sapdg sd rzc10-01 dm_name=rzc10 dm_offset=0 len=1
# volmake -g sapdg sd rz11-01 dm_name=rz11 dm_offset=0 len=1
# volmake -g sapdg sd rzb11-01 dm_name=rzb11 dm_offset=0 len=1
# volmake -g sapdg sd rzc11-01 dm_name=rzc11 dm_offset=0 len=1
# volmake -g sapdg sd rz12-01 dm_name=rz12 dm_offset=0 len=1
# volmake -g sapdg sd rzb12-01 dm_name=rzb12 dm_offset=0 len=1
# volmake -g sapdg sd rz17-01 dm_name=rz17 dm_offset=0 len=1
# volmake -g sapdg sd rzb17-01 dm_name=rzb17 dm_offset=0 len=1
# volmake -g sapdg sd rzc17-01 dm_name=rzc17 dm_offset=0 len=1
# volmake -g sapdg sd rz18-01 dm_name=rz18 dm_offset=0 len=1
# volmake -g sapdg sd rzb18-01 dm_name=rzb18 dm_offset=0 len=1
```

```
# volmake -g sapdg sd rzc18-01 dm_name=rzc18 dm_offset=0 len=1
# volmake -g sapdg sd rz19-01 dm_name=rz19 dm_offset=0 len=1
# volmake -g sapdg sd rzb19-01 dm_name=rzb19 dm_offset=0 len=1
# volmake -g sapdg sd rzc19-01 dm_name=rzc19 dm_offset=0 len=1
# volmake -g sapdg sd rz20-01 dm_name=rz20 dm_offset=0 len=1
# volmake -g sapdg sd rzb20-01 dm_name=rzb20 dm_offset=0 len=1
```

6. Create the LSM mirrored volume:

```
# volassist -g sapdg -U fsgen make SAP01 12566002k alloc=0 align=0 rz9
# volassist -g sapdg -U fsgen make SAP02 12566002k alloc=0 align=0 rzb9
# volassist -g sapdg -U fsgen make SAP03 12566002k alloc=0 align=0 rzc9
# volassist -g sapdg -U fsgen make SAP04 12566002k alloc=0 align=0 rz10
# volassist -g sapdg -U fsgen make SAP05  4187974k alloc=0 align=0 rzb10
# volassist -g sapdg -U fsgen make SAP06  4187974k alloc=0 align=0 rzc10
# volassist -g sapdg -U fsgen make SAP07 12566002k alloc=0 align=0 rz11
# volassist -g sapdg -U fsgen make SAP08 12566002k alloc=0 align=0 rzb11
# volassist -g sapdg -U fsgen make SAP09 12566002k alloc=0 align=0 rzc11
# volassist -g sapdg -U fsgen make SAP10 12566002k alloc=0 align=0 rz12
# volassist -g sapdg -U fsgen make SAP11  4187974k alloc=0 align=0 rzb12
```

7. Do the mirror sets in the background:

```
# volassist -g sapdg mirror SAP01 rz17 &
# volassist -g sapdg mirror SAP02 rzb17 &
# volassist -g sapdg mirror SAP03 rzc17 &
# volassist -g sapdg mirror SAP04 rz18 &
# volassist -g sapdg mirror SAP05 rzb18 &
# volassist -g sapdg mirror SAP06 rzc18 &
# volassist -g sapdg mirror SAP07 rz19 &
# volassist -g sapdg mirror SAP08 rzb19 &
# volassist -g sapdg mirror SAP09 rzc19 &
# volassist -g sapdg mirror SAP10 rz20 &
# volassist -g sapdg mirror SAP11 rzb20 &
#
```

8. Associate the Log Plex with each data plex. This step can only be done when both plexes of each mirrored volume are synchronized.

```
# volsd -g sapdg aslog SAP01-01 rz9-01
# volsd -g sapdg aslog SAP01-02 rz17-01
# volsd -g sapdg aslog SAP02-01 rzb9-01
# volsd -g sapdg aslog SAP02-02 rzb17-01
# volsd -g sapdg aslog SAP03-01 rzc9-01
# volsd -g sapdg aslog SAP03-02 rzc17-01
# volsd -g sapdg aslog SAP04-01 rz10-01
# volsd -g sapdg aslog SAP04-02 rz18-01
# volsd -g sapdg aslog SAP05-01 rzb10-01
# volsd -g sapdg aslog SAP05-02 rzb18-01
# volsd -g sapdg aslog SAP06-01 rzc10-01
# volsd -g sapdg aslog SAP06-02 rzc18-01
# volsd -g sapdg aslog SAP07-01 rz11-01
# volsd -g sapdg aslog SAP07-02 rz19-01
# volsd -g sapdg aslog SAP08-01 rzb11-01
# volsd -g sapdg aslog SAP08-02 rzb19-01
# volsd -g sapdg aslog SAP09-01 rzc11-01
# volsd -g sapdg aslog SAP09-02 rzc19-01
# volsd -g sapdg aslog SAP10-01 rz12-01
# volsd -g sapdg aslog SAP10-02 rz20-01
```

```
# volsd -g sapdg aslog SAP11-01 rzb12-01
# volsd -g sapdg aslog SAP11-02 rzb20-01
```

A log subdisk (also called BCL subdisk) allows room on a disk for Logical Storage Manager support of Block Change Logging. When data is written to a volume, ranges of sector numbers are written to the log subdisk so that a record is kept of recent disk activity. When the system is restarted after a crash, these ranges of block numbers are used to limit the amount of data copying that is required to recover plex consistency for the volume.

One log subdisk may be associated with each plex to greatly speed up recovery of the volume. However, the presence of a BCL subdisk degrades volume performance under normal conditions due to the writing of the log entries. Only one log subdisk may be associated with a plex at a time.

Note

From this point, let the LSM GUI run in the background to monitor what happens. Start it from csh with the commands:

```
# setenv DISPLAY <node name>:0.0
# dxlsm &
```

where <*node name*> is a node with a graphical display.

SAP R/3 Installation

At this point, the system is ready for the SAP R/3 installation. The current release at installation time was 3.1H. This section describes the installation process.

SAP System ID

Following are the specifics for the SAP R/3 installation:

- SID =TCR
  TCR will have the instance number 00 for the DIGITAL HiTest environment.

  The name of the SAP System is abbreviated to SID (SAP System ID).
  Since an R/3 System consists of exactly one database, the DB name and the SAP System ID can be identified. Contrary to that, one database consist of different DB Instances which are abbreviated to SID.
- Available RAM: 2-4GB
- Modify SAPFS.TPL Yes:No ORACLE mirroring for logfiles
- /usr/sap/trans: local File System
- Installation directory: /sapmnt/TCR/install

R/3 and Oracle Directory Structure

SAP enforces a rigid naming scheme concerning the entry points for the R/3 structures. The following entries must be present:

Table 3-1: Directory Structure

Entries	Description
/usr/sap/trans	Global directory for all SAP systems
/sapmnt/TCR	Systemwide data for one SAP system
/usr/sap/TCR	Instance specific data
/oracle/stage	Installation and upgrade directory for the database software
/oracle/TCR	Directory for the TCR ORACLE instance.
/oracle/TCR/sapdata1	SAP data
/oracle/TCR/sapdata2	SAP data
/oracle/TCR/sapdata3	SAP data
/oracle/TCR/sapdata4	SAP data
/oracle/TCR/sapdata5	SAP data
/oracle/TCR/sapdata6	SAP data
/oracle/TCR/sapdata7	SAP data
/oracle/TCR/origlogA	ORACLE redo logs 1 and 3
/oracle/TCR/origlogB	ORACLE redo logs 2 and 4
/oracle/TCR/saparch	ORACLE archives of redologs
/oracle/TCR/sapreorg	Work directory for database administration
/oracle/TCR/sapbackup	Backup information

With the UNIX File System (UFS) it is impossible to have these directories and still adhere to the security rules given in the Special Configuration Rules section of Chapter 2. The entries in /etc/fstab and the subsequent procedure are used to set up the directory structure for the HiTest System.

The following entries are found in /etc/fstab:

```
root_domain#root  /          advfs      rw 0 0
/proc             /proc      procfs     rw 0 0
usr_domain#usr    /usr       advfs      rw 0 0
var_domain#var    /var       advfs      rw 0 0
/dev/rz1b         swap1      ufs        sw 0 2
/dev/rz2c         swap2      ufs        sw 0 2
/dev/rz3c         swap3      ufs        sw 0 2
/dev/rz4c         swap4      ufs        sw 0 2
alf1a:/STC        /STC       nfs        rw 0 0
alf0a:/exc        /exc       nfs        rw 0 0
```

Note

All other mountpoints which are on the shared buses are only mounted when the procedure for post-installation of TruCluster V1.4 in a SAP R/3 environment is performed (detailed later in this chapter).

Map the SAP structures onto the available physical structure using the following commands:

```
mkdir /oracle
mkdir /oracle/TCR
mkdir /sapmnt
mkdir /sapmnt/TCR
mkdir /usr/sap
mkdir /usr/sap/trans
mkdir /usr/sap/TCR
mkfdmn /dev/vol/sapdg/SAP06 sapmnt_dom
mkfset sapmnt_dom top_fs
mount sapmnt_dom#top_fs /oracle/TCR
mkfset sapmnt_dom mnt_fs
mount sapmnt_dom#mnt_fs /sapmnt/TCR
mkfset sapmnt_dom usr_fs
mount sapmnt_dom#usr_fs /usr/sap/TCR
mkfset sapmnt_dom trans
mount sapmnt_dom#trans /usr/sap/trans

mkfdmn /dev/vol/sapdg/SAP01 sapdat_dom
mkfset sapdat_dom sapdata1_fs
mkdir /oracle/TCR/sapdata1
mount sapdat_dom#sapdata1_fs /oracle/TCR/sapdata1

mkfdmn /dev/vol/sapdg/SAP02 sapdat_dom2
mkfset sapdat_dom2 sapdata2_fs
mkdir /oracle/TCR/sapdata2
mount sapdat_dom2#sapdata2_fs /oracle/TCR/sapdata2

mkfdmn /dev/vol/sapdg/SAP03 sapdat_dom3
mkfset sapdat_dom3 sapdata3_fs
mkdir /oracle/TCR/sapdata3
mount sapdat_dom3#sapdata3_fs /oracle/TCR/sapdata3

mkfdmn /dev/vol/sapdg/SAP04 sapdat_dom4
mkfset sapdat_dom4 sapdata4_fs
mkdir /oracle/TCR/sapdata4
mount sapdat_dom4#sapdata4_fs /oracle/TCR/sapdata4

mkfdmn /dev/vol/sapdg/SAP09 sapdat_dom5
mkfset sapdat_dom5 sapdata5_fs
mkdir /oracle/TCR/sapdata5
mount sapdat_dom5#sapdata5_fs /oracle/TCR/sapdata5

mkfdmn /dev/vol/sapdg/SAP07 sapidx_dom
mkfset sapidx_dom sapdata6_fs
mkdir /oracle/TCR/sapdata6
mount sapidx_dom#sapdata6_fs /oracle/TCR/sapdata6
```

```
mkfdmn /dev/vol/sapdg/SAP10 sapidx_dom2
mkfset sapidx_dom2 sapdata7_fs
mkdir /oracle/TCR/sapdata7
mount sapidx_dom2#sapdata7_fs /oracle/TCR/sapdata7

mkfdmn /dev/vol/sapdg/SAP05 saplg1_dom
mkfset saplg1_dom origlogA_fs
mkdir /oracle/TCR/origlogA
mount saplg1_dom#origlogA_fs /oracle/TCR/origlogA

mkfdmn /dev/vol/sapdg/SAP11 saplg2_dom
mkfset saplg2_dom origlogB_fs
mkdir /oracle/TCR/origlogB
mount saplg2_dom#origlogB_fs /oracle/TCR/origlogB

mkfdmn /dev/vol/sapdg/SAP08 saparc_dom
mkfset saparc_dom saparch_fs
mkdir /oracle/TCR/saparch
mount saparc_dom#saparch_fs /oracle/TCR/saparch


mkfset saparc_dom sapreorg_fs
mkdir /oracle/TCR/sapreorg
mount saparc_dom#sapreorg_fs /oracle/TCR/sapreorg


mkfset saparc_dom sapbackup_fs
mkdir /oracle/TCR/sapbackup
mount saparc_dom#sapbackup_fs /oracle/TCR/sapbackup
```

Starting the SAP R/3 Installation

SAP provides documentation to install their R/3 software. This section highlights the main SAP R/3 installation steps, and is intended to make the reader aware of the choices, and reasons for those choices, made during the SAP R/3 installation on this HiTest System.

Notes (Hinweise)

Every time a SAP installation or upgrade is performed, read the latest notes for information concerning your plans. To ensure that the notes are read, a password (included in the notes) is prompted by the SAP installation or upgrade procedure.

Following is the list of notes for the installation of SAP R/3 3.1H with Oracle which are relevant to this HiTest Suite:

- 74278 R/3 Installation on UNIX
- 74279 R/3 Installation on UNIX - OS Dependencies
- 74275 R/3 Installation on UNIX - ORACLE Database

Check List

The document, *Check list - Installation Requirements: ORACLE*, is used to make sure that the system meets SAP requirements. This document is provided by SAP as part of the installation kit.

OS Dependencies

Complete the Check list - Installation Requirements, then continue by using the *R/3 Installation on UNIX - OS Dependencies* manual. The manual covers the following topics:

1. General Notes on NIS
2. Users and Groups
3. Services
4. Mounting a CD-ROM
5. Checking and Modifying the DIGITAL UNIX Kernel
6. File Systems/Raw Devices/Swap Space
7. Mounting Directories via NFS
8. Creating Groups and Users
9. SAP Tool Kinst
10. Troubleshooting

The following sections cover steps 4 and 5.

Mounting a CD-ROM

1. Create a mount point directory if it does not already exist:
   ```
   # mkdir /sapcd
   ```
2. Mount your CDs with the command:
   ```
   # mount -t cdfs -dr /dev/cd /sapcd
   ```

Checking and Modifying the DIGITAL UNIX Kernel

Since DIGITAL UNIX Version 3.0, a dynamic approach exists to change kernel parameters. Most of the system parameters can be specified in a file called `/etc/sysconfigtab`. Any modification in this file will be applied at the next system boot. A new kernel generation is not required.

The values for the system configuration file `/etc/sysconfigtab` are listed *in R/3 Installation on UNIX – OS Dependencies* in the particular DIGITAL Unix Chapter. Please apply these values as demanded.

1. Build a new kernel:
   ```
   # doconfig -c TCR003
   Edit configuration file ? no
   ```
   The system proceeds to build the kernel.
2. Once complete, copy it to the root directory:
   ```
   # cp /sys/TCR003/vmunix /vmunix
   ```
   Reboot the system:
   ```
   # init 0
   >>> boot
   ```

General Installation Preparations

Refer to the *R/3 Installation on UNIX - ORACLE Database* guide.

Install a Dialog Instance

Install a dialog instance on the second system (tcr004) as described in *SAP R/3 Installation on UNIX-ORACLE Database* guide.

Take a Full Backup

Use the DIGITAL UNIX command vdump to make backups of the disks. The backup will run for approximately 45 minutes.

Note

Do not forget the h-partition of root disk, which carries the information of LSM rootdg and sapdg.

When it is completed,
As root: # **<Ctrl>D**
As tcradm: **startsap**

Post-Installation for TruCluster V1.4 in a SAP R/3 Environment

To install the TruCluster V1.4 in a SAP R/3 environment, refer to the actual documentation at:
`http://www.fra.dec.com/SAP-Eng/available/cluster.html`

For questions and information contact the ALL-IN-1 account at: TBD

Note

These post-installation adjustments are mandatory for the R/3 installation.

Differences to the Original Documentation

During the post-installation tasks for TruCluster V1.4 in a SAP R/3 Environment on this DIGITAL HiTest System, parts of the procedure were performed differently than documented in the file `install.ps` (part of DECSAFE_V2_2.tar). In some cases, useful information was missing. The differences are described in Appendix A.

4
Tests and Results

The DIGITAL HiTest program tests for several types of problems that affect the system. The HiTest program works together with other organizations to obtain and share test information for other categories.

This chapter describes the overview of test results, how the tests were set up, and where the data and programs were placed.

Also covered in this chapter is the test environment, tools used for testing, test configuration, system limits and characterization data, and the test process.

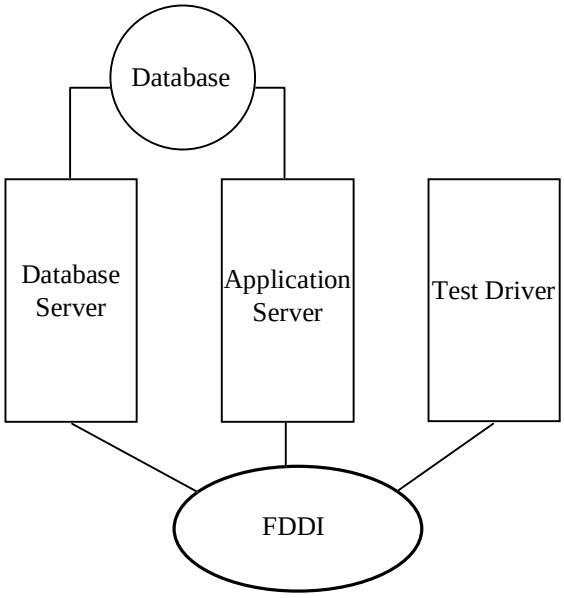
Overview of Results

Interoperability testing was performed successfully on the SAP Oracle TruCluster ASE DIGITAL UNIX AlphaServer 8400 HiTest Suite.

Test Environment

Figure 4-1 shows the SAP test environment.

Figure 4-1: Test Environment



Test Tools

The following test tools were used for interoperability testing:

- *ftp* and *tar* to move the client data file to the driver and expand it
- *benchinst* to create the structure of the simulation directory tree on the driver
- *cleandb* and *impsrc* to import the client data into the database on the HiTest system and change some source code
- *mmpv* (period shifter) to bring the booking period of the SAP transactions into the current month (must be rerun at import and at the start of every month)

The following test tools were used to create the load and measure the behavior of the system:

- *mkapl* to define the load parameters (number of users, number of loops)
- *mksim* to create all scripts and additional directories for a load
- *benchrun* to start one load
- *vmubc* to watch the overall CPU and memory behavior of the HiTest system
- *iostat* to watch the disk behavior
- R/3 transaction ST02 to watch the memory behavior of R/3
- R/3 transaction SM50 to watch the behavior of the various R/3 processes

Test Configuration

To stress test the HiTest configuration and to prove its viability, a standardized SAP benchmark method is being used. To put a meaningful load onto the HiTest System, the following conditions must be met:

- A third system (called driver) is connected to the DB and Application Server through a FDDI connection that is able to connect to the virtual hostnames.
- The driver simulates the user load with the help of SAP-written scripts and executables. This benchmark environment is available for all customers if a person from the specific Competence Center is available and runs the tests.

Note

Do not use this benchmark software in Production Environments. You will get no support from SAP.

- Get the benchmark software from SAP network together with the newest VERY_IMPORTANT.doc. All Competence Centers know the location of this Kit. Together with the kit you get three descriptions:
  1. Installation of the SAP R/3 benchmark
  2. Hints for the SAP R/3 benchmark
  3. Executing the SAP R/3 benchmark
- Create a user on the driver who will drive the benchmark and modify the environment. Check and modify the network so that all systems can connect to each other.
- Unpack the benchmark tar file. (It is self-extracting.)

System Limits and Characterization

It was not in the scope of our testing to specifically determine system limitations or provide comprehensive performance characterization. The focus was on functional testing in a typical client situation.

For DIGITAL Intranet users, sizing systems for SAP R/3 information is available at:

```
http://www.fra.dec.com/SAP-Cc/Intranet/sizing
/sizing_doc_dir/Sizing.html
```

Test Process and Results

The following information describes the test results:

1. A short 10-User benchmark was run as a sanity check. No failures should appear. Please check Syslog with Transaction SM21 for all Instances.
2. Run a 100 SD User Benchmark to the normal distributed Systems. Fifty to the DB Server with the Central System and 50 to the Application Server.
3. Relocate the service Application Server from vtcr004 to vtcr003 to check if both Instances can run on the DB Server in the case the Application Server dies.
4. Run 50 Users to the DB Server with the Central System and 50 to the Application Server which was failed over to the DB Server System.
5. Relocate the Service Application Server vtcr004 back to the Application Server System and rerun 100 SD User (50/50).
6. Relocate the Service DB Server from vtcr003 to vtcr004 to check if both instances can run on the Application Server in the case the DB Server dies.
7. Run 50 Users to the Application Server and 50 to the DB Server which was failed over to the Application Server System.
8. Relocate the service DB Server vtcr003 to the Application server system and rerun 100 SD User (50/50).
9. Switch off one HSZ52 to simulate a powerfail and check the mirrorsets.
   The System will wait until the HSZ52 is back again.

   This is a feature because the system manager does not see that the HSZ is gone. If the second HSZ52 faults, the System will be unavailable and a restore has to be done because the data on the HSZ50s is gone.

   If you run 100 SD User to that scenario the user will be stuck until the HSZ52 is back online.
10. Remove a disk out of a working 3 disk stripeset to simulate a power fail of a disk. This is done during a 100 SD benchmark.

    LSM finds a faulty stripeset and marks the faulty disk "disabled."
11. Move the faulty plex out of the LSM-Volume and recreate it. After that bring the plex back to the volume and check the shadowcopy.
12. Rerun 100 SD User to check everything works fine.

In the failover situations tested, there were no problems with our SD-benchmark. The system

5
Problems and Solutions

This chapter describes problems encountered during the testing. Where appropriate, a solution for each problem is given which provides a fix or workaround.

The following problems were identified:

Foundation Hardware

No problems found.

Foundation Operating System

lsm:v0liod: cannot open /dev/voliod

Problem

```
Alf5> volsetup
lsm:voliod: cannot open /dev/voliod: No such device or address
Approximate maximum number of physical disks that will be
managed by LSM ? [10]
Fatal errors prevent /usr/sbin/volsetup from continuing.
Stop.
```

Solution

If you encounter this error, check the /sys/conf/<HOSTNAME> file and add the following pseudo devices:

```
pseudo-device   lsm_ted 0
pseudo-device   lsm     1
```

Then create a new kernel:

```
# doconfig -c <HOSTNAME>
```

Directory /usr/users not found

Problem

During the installation of the Central Instance the R§INST will fail with the following error during the phase “Creating UNIX Users”:

Directory /usr/users not found.

Solution

Create the directory and use it as the parent directory for R/3 Administrator.

Cannot Change /sapcd/DEC/INSTALL

Problem During R/3 Installation in the phase "copy RDBMS SW" the procedure prints:
`Cannot change to /sapcd/DEC/INSTALL`

Solution Check logfile R3INST.log, exit R3INST and restart again.
The fault came from the function “change cd-mountpoint with R3INST-assistence.”

Short printout of R3INST.log:

```
1997-May-28 10:11:11 I exit_on_label 4 Continuing with
incorrect CD-LABEL
1997-May-28 10:11:11 E ik011_cd_to_exe 3 Cannot change to
/sapcd/DEC/INSTALL
1997-May-28 10:11:14 E ik011_check_instdir 3 Copying templates
from CD failed !
1997-May-28 10:11:15 E ik011_adapt_user 3 Installation
templates from Kernel CD are missing !
```

1 end unsuccessfully

Problem During R/3 Installation in the phase "DB Load" the procedure prints:
`Out of 1 started processes did 1 end unsuccessfully`

Solution You forgot to install Oracle NETV2.
See *R/3 Installation on UNIX - ORACLE Database*.

0 entries in TCPDB

Problem If you check the SAP R/3 installation and you take a look at the syslog with transaction SM21, you will see the following error:
In table TCPDB are 0 entries.

Solution Apply SAP note 15023.

APPL-SERVER not found

Problem During the installation of the Dialog Instance on the Application Server the R3INST will fail with the following error:

Expected line [APPL-SERVER] not found.

Solution Do not use the installation directory, which you have used to install Central Instance.

Oracle Installation

Failure during check of directories

Problem During SAP R/3 installation in phase “R/3 Installation on UNIX Oracle Database” the R3INST will fail during check of directories.

Solution Create directory /oracle/stage/stage_733 and do not use the default value oracle/stage/stage_723 as shown on page 4-7.

orainst Compile Errors

Problem During orainst, a few errors appeared about compiling.

Solution Check that: /tmp is larger than 75 MB or use different temporary file system.

local bin Directory

Problem During run of root.sh the system is asking for the path of the "local bin directory." The default is /usr/local/bin but it has to exist.

Solution If you answer with default, you have to create the directory bin manually.

```
# mkdir /usr/local/bin
```

Testphase

No connect to the database

Problem During the installation of the benchmark environment you cannot connect the database from the driver system. You can test the connection with

R3trans –d

You will see the following error in the local directory in file trans.log, which is created during connection:

2EETW169 no connect possible: "DBMS = ORACLE --- ORACLE_SID = 'SDR' "

Solution The variable dbs_ora_tnsname is not set. Do that in the $HOME/.cshrc file of the benchmark user.

Setenv dbs_ora_tnsname = SDR

ORA-1631

Problem During the operation the error appeared:

ora-1631 `max extends reached in table <table name>`

Solution Increase storage value of the particular table with SAPDBA to 505 (max. value Rel. 3.1H)

ORA-1632

Problem ora-1632 `max extends reached in index <index name>`

Solution Increase storage value of the particular index with SAPDBA to 505 (max. value Rel. 3.1H)

ORA-1653

Problem ora-1653 `unable to extend table <table name> in table space <table space name>`

Solution Add new data file for this tablespace with SAPDBA.

Unable to Obtain Requested Swapspace

Problem During start up of R/3 the following error appears on the console terminal:

"`unable to obtain requested swapspace`"

This error can occur after a memory upgrade.

Solution Add more swap space; add a disk.

Benchinst fail

Problem The benchinst during installation of the benchmark environment will fail when compiling the file benchrun.c. This is an error in the SAP CAR tool, which is nearly similar to the UNIX tar.

Solution Cd /$SIMDIR/src
vi benchrun.c
goto line 374
remove the * at the end of the line
save the file
restart the benchinst

Perl is needed

Problem Since R/3 3.1H and the equivalent benchmark software 3.1H, the command language Perl is used to run the benchmark software either on UNIX or on NT.

Perl is not available on standard UNIX and NT systems.

Solution Get Perl (Perl15003setld.tar) from the following web site:

ftp://ftp.digital.com/pub/Digital

If you have untared and installed it with setld, you can check the version.

perl –v

This is perl, version 5.003 with EMBED
build under dec_osf at Sep 20 1996 13:47:02
+ suidperl security patch

Copyright…

Cleandb fail

Problem The cleandb during installation of the benchmark environment will fail with the following error:

/$SIMDIR/mandt/mandt_exp not found.

Solution Go to this directory and create a softlink from mandt_exp.31H to mandt_exp and restart cleandb.

ln –s mandt_exp.31H mandt_exp

Unable to extend table SAPR3.MDKP

Problem Error during cleandb in the $SIMDIR/tmp/import900.log

Unable to extend table SAPR3.MDKP by 1280 in tablespace PSAPBTABD.

Solution Add new datafile for tablespace PSAPBTABD with sapdba.

Impsrc fail

Problem The impsrc fail during installation of the benchmark environment with the following error:

/$SIMDIR/mandt/mandt_exp_source not found

Solution Go to this directory and create a softlink from mandt_exp_source.31H to mandt_exp_source and restart impsrc.

ln –s mandt_exp_source.31H mandt_exp_source

Mmpv fail

Problem The mmpv during installation of the benchmark software will fail with the following error in a SAP icon.

SAPGUI Icon: This failure should be handled by the caller of DPTM-layer

Solution The variable SAPRELEASE is not set to 31H.

Set this variable in $HOME/.cshrc of the benchmark user and restart mmpv.

Mess-tools not started

Problem The benchrun during the run of benchmark will not start the mess-tools.

The name ‘mess’ is coming from the German word ‘Messung’, that means measurement.

Solution Do *not* use the hosttype PR in the apl file of the local simulation directory.

This is not supported.

6
Detailed Hardware Configuration

This chapter provides a system diagram of the HiTest Suite and also describes the minimum and maximum hardware configuration for the following:

- System Diagram
- HiTest System Slot Configuration
- Input/Output Slot Usage

System Diagram

Figure 6-1 shows a diagram of the HiTest Suite and Table 6-1 lists the major cables.

Figure 6-1: System Diagram

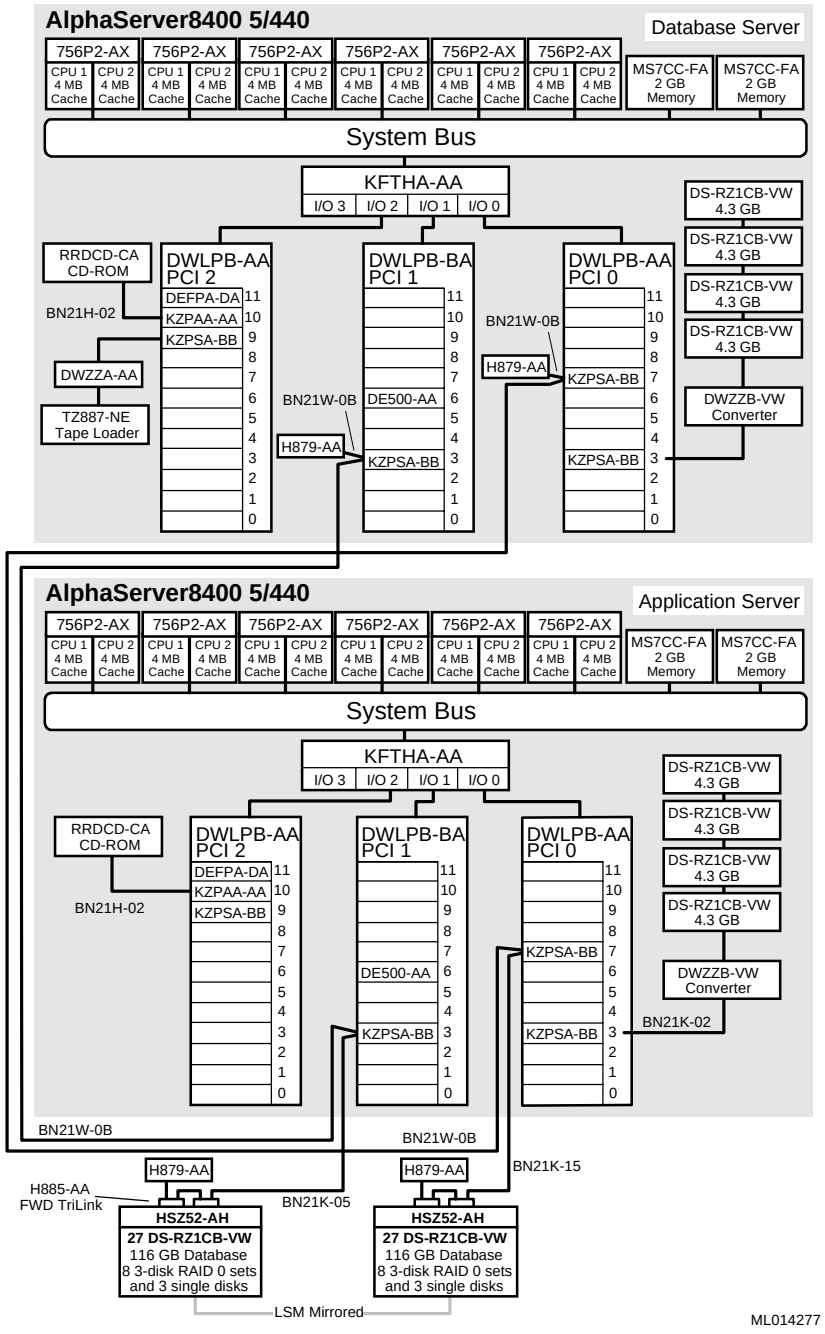


Table 6-1: Configuration Cabling

Part Number	Qty	Description	From	To
BN21K-15	3			HSZ52 (2) and DWZZA-AA
BN21K-03	2	SCSI bus	KZPSA-BB	KZPSA-BB
BN23G-02	1	SCSI bus	DWZZA-AA	TZ887-NE

HiTest System Slot Configuration

Figure 6-2 shows the HiTest System Slot Usage and Table 6-2 describes the minimum and maximum hardware configurations used in this HiTest Template.

Figure 6-2: HiTest System Slot Usage

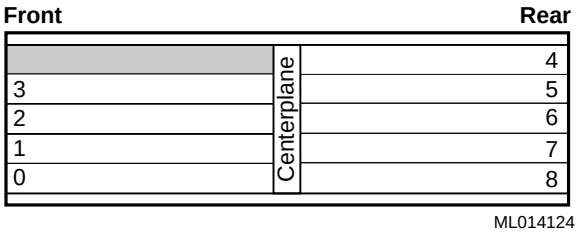


Table 6-2: System Slot Usage (Minimum and Maximum Configurations)

Slot	Minimum Option	Maximum Option	Description
0	CPU	CPU	Dual CPU processor 5/440
1		CPU	Dual CPU processor 5/440
2		CPU	Dual CPU processor 5/440
3		CPU	Dual CPU processor 5/440
4		CPU	Dual CPU processor 5/440
5		CPU	Dual CPU processor 5/440
6		MS7CC-FA	2 GB Tlaser memory option
7	MS7CC-FA	MS7CC-FA	2 GB Tlaser memory option
8	KFTHA-AA	KFTHA-AA	I/O module, 4 channel

Input/Output Slot Usage

Figure 6-3 and Table 6-3 show the input/output (I/O) slot usage for the minimum and maximum configurations of this HiTest Template.

Figure 6-3: I/O Slot Usage

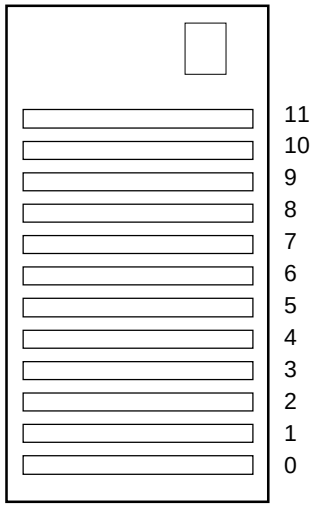


Table 6-3: I/O Slot Usage (Minimum and Maximum Configurations)

Slot	Minimum Configuration Options	Maximum Configuration Options	Description
3	KZPSA-BB	KZPSA-BB	FWD SCSI controller
7	KZPSA-BB	KZPSA-BB	FWD SCSI controller
3	KZPSA-BB	KZPSA-BB	FWD SCSI controller
6	DE500-AA	DE500-AA	10/100 Ethernet controller
7	KZPSA-BB	KZPSA-BB	FWD SCSI controller
3	KZPSA-BB	KZPSA-BB	FWD SCSI controller
7	KZPSA-BB	KZPSA-BB	FWD SCSI controller
9*	KZPSA-BB	KZPSA-BB	FWD SCSI controller
10	KZPAA-AA	KZPAA-AA	SE SCSI controller
11	DEFPA-DA	DEFPA-DA	FDDI controller

*This option is present in database server only.

A

Post-Installation for TruCluster V1.4 in a SAP R/3 Environment

Portions of the Post-Installation Tasks for TruCluster V1.4 in a SAP R/3 Environment procedure were performed differently than documented in the file `install.ps` (part of DECSAFE_V2_2.tar). In some cases, useful information was missing. This appendix describes those differences.

The following changes were made to the procedure, *Example for DECsafe installation in the R/3 environment* (located in chapter 2 of install.ps).

Page 41 Step 4

The directory `/usr/sap/<SID>` has to be on the shared disk…

This is already done during the installation in the R/3 and Oracle Directory Structure section of the DIGITAL HiTest notes.

Page 43 Step 9

The DB-Reconnect is not supported up to now.

Do not adjust the DEFAULT.PFL with the following lines:

```
rsdb/reco_trials        =100
rsdb/reco_sleep_time    =5
rsdb/reco_sosw_for_db   =ON
rsdb/reco_sync_all_server     =ON
```

Page 43 Step 10

If you are using LSM you have to create rootdg...

Do not create the *rootdg* in LSM on the Application server.
This is already done during installation in the volsetup section of the DIGITAL HiTest Notes.

Page 45 Step 13

INCLUDE /etc/exports.ase.vtcr001 is the value you have to add to /etc/exports.ase on both systems.

Please check if .INCLUDE /etc/exports.ase is set in /etc/exports on both systems.

Note

Be sure that NFS is installed on both systems for mounting and exporting nfs directories.

In the netsetup you also have to enable:

2 Enable/Disable Network Daemons and Add Static Routes

Use default answers in that case if you have no other network configurations.

Page 45 Step 14

`# cd /usr/local/ase/` (please create this directory if it does not exist already)

After you have done the extract of the `R3_DECSAFE_V2_2.tar` archive, modify the permissions of the scripts. Do not forget to do that on both systems.

`# chmod 755 *.ksh`

Otherwise you will have problems during start or relocating of an ASE Service.

Page 46 Step 14.2

Here is our `rc_serv.conf` file which we have modified for our purposes on both systems equally.

```
#############################################################################
#
# PROGRAM:            /usr/local/ase/rc_serv.conf
# LAST.MOD:             Apr/18/1997
# PURPOSE:            Site specific definitions used by all ASE scripts
# ENVIRONMENT:        DIGITAL UNIX V3.2, ASE V1.3 or higher, SAP R/3 30E
# AUTHOR:             DEC/SAP CC, April 1997
# SUBSTITUTIONS:      (required): pick your database - Oracle, Informix, Adabas
#                     and change the following parameters
#                     for your environment.

#
#############################################################################
#############################################################################
#
# the following substitutions are site specific - change where necessary
#
#############################################################################
#############################################################################
#
# Global parameters for the failover database environment
# Insert the values for your environment.
# If the SAP frontends connect this database R/3 instances via a second network,
# insert the second alias for the specified instance to the parameter DB1_ALIAS2_HOST
# and the netmask to NETMASK_NETADAPTER_2. if not, don't insert any value.
#
#############################################################################
ASEDIR="/usr/local/ase"              # directory where the scripts reside
SAPSYSTEMNAME=TCR     # SID of the database
DB1_SERV=vtcr001              # name of the disk-database service in the asemgr
DB1_ALIAS_HOST=vtcr001 # virtual name of the db and central instance for net-adapter 1
DB1_INSTANCE=DVEBMGS00 # instance name of the central instance
DB1_ALIAS2_HOST=              # virtual name of the central instance for net-adapter 2
NETMASK_NETADAPTER_2=          # netmask for the second network adapter
NETADAPTER_2=                    # name of the second network adapter (ex. tu0)
#############################################################################
DB1_INSTANCE_ID=`print - ${DB1_INSTANCE} | awk '{n=length($0); printf "%s", substr($0,n-1)}'`
DB1_STARTSAP="startsap_vtcr001_00"           # start script for the central instance
DB1_STOPSAP="stopsap_vtcr001_00"             # stop script for the central instance
TIMEOUT=200           # timeframe in sec. to stop the R/3 system + database
```

```
DB1_START_LOG="${ASEDIR}/log.start_db1_service"     # logfile for the start action
DB1_STOP_LOG="${ASEDIR}/log.stop_db1_service"       # logfile for the stop action
#############################################################################
#
# Global parameters for the application server environment
# Insert the values for your environment.
# If the SAP frontends connect this R/3 application instances via a second network
# insert the second alias for the specified instance at the parameter AS1_ALIAS2_HOST
# if not, don't insert any value.
#
#############################################################################AS1_SERV=vtcr002
             # name of the user-defined-application service in the asemg
AS1_ALIAS_HOST=vtcr002 # virtual name of the appl. server instance for net-adapter 1
AS1_ALIAS2_HOST=            # virtual name of the appl. server instance for net-adapter 2
AS1_INSTANCE=D01            # instance nam eof the application server instance
AS1_SCRIPT=as_serv.ksh        # script name to start the application service
#############################################################################AS1_INSTANCE_ID=`pr
int - ${AS1_INSTANCE} | awk '{n=length($0); printf "%s",
substr($0,n-1)}'`
AS1_STARTSAP="startsap_vtcr002_01"    # start script for the appl. server instance
AS1_STOPSAP="stopsap_vtcr002_01"      # stop script for the appl. server instance
AS1_START_LOG="${ASEDIR}/log.start_as1_service"   # logfile for the start action
AS1_STOP_LOG="${ASEDIR}/log.stop_as1_service"  # logfile for the stop action
#############################################################################
#
# uncomment following lines if you have external instances
# Here are the global parameters for one external application server
# If you have more than one external application server this part has
# to be multiplied.
# Insert the values for your environment.
# if not, don't insert any value.
#
#############################################################################
#
#APP_INSTANCE=D02                # Instance name of the external application
#ASEDIR="/usr/local/ase"         # directory where the scripts reside
#SAPSYSTEMNAME=ASE               # SID of the database
#START_SAP="startsap"            # startsap command for the external application
#STOP_SAP="stopsap"              # stopsap command for the external application
#SAP_RESTART_LOG="${ASEDIR}/log.app_restart"     # logfile for the restart action
#
#APP_INSTANCE_ID=`print - ${APP_INSTANCE} | awk '{n=length($0); printf "%s", substr($0,n-1)}'`
#
#############################################################################
#
# uncomment following lines if you have external instances and modify
# the server name and the external instance names in the EXTERNAL_INSTANCES
# parameter:
# e.g. alpha10 D02
#      alpha11 D03 etc.
#
#############################################################################
#
#RESTART_SCRIPT=${ASEDIR}/app_restart.ksh
#EXTERNAL_INSTANCES=" \
#alpha10 D02 \
#alpha11 D03 \
#"
#
#############################################################################
#
# Global parameters for the second database running on the failover server
# Insert the values for your environment, if you use a second database system.
#
#############################################################################
DB2_HOSTNAME=          # "hostname -s" of second database server
DB2_STARTSAP=          # start script for the second instance
DB2_STOPSAP=           # stop script for the second instance
DB2_INSTANCE=          # instance name of the central instance
DB2_SAPSYSTEMNAME=     # SID of the second database
DB2_START_LOG="${ASEDIR}/log.start_db2_service"       # logfile for the start action
DB2_STOP_LOG="${ASEDIR}/log.stop_db2_service"     # logfile for the stop action
TRUL='tr "[:upper:]" "[:lower:]"'
DB2USER="`echo $DB2_SAPSYSTEMNAME | $TRUL`adm"
#############################################################################TRUL='tr
```

```
"[:upper:]" "[:lower:]"'
ADMUSER="`echo $SAPSYSTEMNAME | $TRUL`adm"
ASE_ADMIN="root"
ASETMP="/var/ase/tmp"
SCRIPT="$0"
HOSTNAME=`/usr/bin/hostname -s`
NFS_LOCK_INFO="/sapmnt/${SAPSYSTEMNAME}/.ase/nfs_lock"
NFS_EXPORT="/usr/sap/trans /sapmnt/${SAPSYSTEMNAME}"
NFS_SAPMNT="${DB1_ALIAS_HOST}:/sapmnt/${SAPSYSTEMNAME}"
NFS_TRANS="${DB1_ALIAS_HOST}:/usr/sap/trans"
NFS_OPTS="-o bg,soft,timeo=10,retrans=10,retry=10"
#############################################################################
#
# uncomment following lines if database is ORACLE
# and modify the parameter, domain- and directory structure for your
# environment
#
#############################################################################DB_TYPE=ORACLE

ORAUSER="ora`echo $SAPSYSTEMNAME | $TRUL`"
SGADEF=/oracle/${SAPSYSTEMNAME}/dbs/sgadef${SAPSYSTEMNAME}
MOUNT_FS_POINTS=" \
sapmnt_dom#top_fs          /oracle/${SAPSYSTEMNAME} \
sapmnt_dom#mnt_fs          /sapmnt/${SAPSYSTEMNAME} \
sapmnt_dom#usr_fs          /usr/sap/${SAPSYSTEMNAME} \
sapmnt_dom#trans           /usr/sap/trans \
sapdat_dom#sapdata1_fs     /oracle/${SAPSYSTEMNAME}/sapdata1 \
sapdat_dom2#sapdata2_fs    /oracle/${SAPSYSTEMNAME}/sapdata2 \
sapdat_dom3#sapdata3_fs    /oracle/${SAPSYSTEMNAME}/sapdata3 \
sapdat_dom4#sapdata4_fs    /oracle/${SAPSYSTEMNAME}/sapdata4 \
sapdat_dom5#sapdata5_fs    /oracle/${SAPSYSTEMNAME}/sapdata5 \
sapidx_dom#sapdata6_fs     /oracle/${SAPSYSTEMNAME}/sapdata6 \
sapidx_dom2#sapdata7_fs    /oracle/${SAPSYSTEMNAME}/sapdata7 \
saplg1_dom#origlogA_fs     /oracle/${SAPSYSTEMNAME}/origlogA \
saplg2_dom#origlogB_fs     /oracle/${SAPSYSTEMNAME}/origlogB \
saparc_dom#saparch_fs      /oracle/${SAPSYSTEMNAME}/saparch \
saparc_dom#sapreorg_fs     /oracle/${SAPSYSTEMNAME}/sapreorg \
saparc_dom#sapbackup_fs    /oracle/${SAPSYSTEMNAME}/sapbackup \
"
#############################################################################
# uncomment following lines if database is ADABAS
# and modify the domain and directory structure for your
# environment
#
#############################################################################
#DB_TYPE=ADABAS
#MOUNT_FS_POINTS=" \
#sap#adabas    /adabas/${SAPSYSTEMNAME} \
#sap#sapmnt    /sapmnt/${SAPSYSTEMNAME} \
#sap#usr_sap   /usr/sap/${SAPSYSTEMNAME} \
#sap#trans      /usr/sap/trans \
#"
#############################################################################
#
# uncomment following lines if database is INFORMIX
# and modify the domain and directory structure for your environment
#
#############################################################################
#
#DB_TYPE=INFORMIX
#MOUNT_FS_POINTS=" \
#sap#informix  /adabas/${SAPSYSTEMNAME} \
#sap#sapmnt    /sapmnt/${SAPSYSTEMNAME} \
#sap#usr_sap   /usr/sap/${SAPSYSTEMNAME} \
#sap#trans     /usr/sap/trans \
#"
#
#############################################################################
#
# SUBROUTINE DEFINITION
# do not modify this section.
#############################################################################MOUNT_POINTS=""
set $MOUNT_FS_POINTS
while [ "X$1" != "X" ]
do
```

```
  MOUNT_POINTS="${MOUNT_POINTS} $2"
  shift;shift
done
UMOUNT_POINTS=`for i in ${MOUNT_POINTS};do print - "$i";done|sort -r`

################################################################################MAIL_ADMIN () {
       if [ -n "${ASE_ADMIN}" ]; then
       mailx -s "Critical ASE/R3-Error:" ${ASE_ADMIN} < $1
       fi
}
kill_proc_on () {
  # stop processes with open files.
  ${ASEDIR}/bin/fuser -ck $*
}
proc_timeout () {
  # start this function in the background before the proc you want to timeout
  # eg. # proc_timeout sleep 20 5 & sleep 300; echo "exit status: $?"
  proc_string=$1; wait_seconds=$2; interval=$3; i=0
  # wait interval seconds to let the process start
  sleep $interval
  while [ $i -lt $wait_seconds ]
  do
    is_running=`ps axww | grep -w "$proc_string" | grep -v grep | wc -l`
    if [ $is_running -eq 0 ]
    then
      break
    else
      i=`expr $i + $interval`; sleep $interval
    fi
  done
  if [ $i -ge $wait_seconds ]
  then
    pids=`ps axww | grep -w "$proc_string" | grep -v grep | awk '{print $1}'`
    if [ "$pids" != "" ]; then
      echo "\ntimeout reached, stopping process: $proc_string processid: $pids"
      kill -KILL $pids
    fi
   fi
}
nfs_wait_loop () {
# function, to wait for a clean umount of mount points
# parameters proc_string, interval
  proc_string=$1; interval=$2; is_running=0
  while [ $is_running -eq 0 ]
  do
    mount | grep -w "$proc_string" | grep -v grep
    is_running=$?
    if [ $is_running -eq 1 ]
    then
      break
    else
      /sbin/umount -f $proc_string
      kill_proc_on  $proc_string
      sleep $interval
      is_running=0
    fi
  done
}
db_action () {
# function for specific database actions (ORACLE, INFORMIX, ADABAS)
# during start and stop actions
# parameters $1=DB_TYPE, $2=start,stop
       case $1 in
       ORACLE)
              case $2 in
              start)
                  TNS_ADMIN=`su - ${ORAUSER} -c 'echo ${TNS_ADMIN}'`
                  print - "ASE-Info: starting the oracle listener on ${HOSTNAME}"
                   su - ${ORAUSER} -c "lsnrctl status" > /dev/null
                   if [ $? -eq 0 ]
                   then
                       print - "ASE-Info: listener is already running"
                   else
                       su - ${ORAUSER} -c "umask 0;lsnrctl start" > /dev/null
                       case $returncode in
                          0) print - "ASE-Success: startup of oracle listener ok"
```

```
                          ;;
                          *) print - "ASE-Error: startup of oracle listener faild"
                           /var/ase/sbin/nfs_ifconfig ${HOSTNAME} stop
${DB1_ALIAS_HOST}
                             exit 1
                          ;;
                       esac
                    fi
                   if [ -f ${SGADEF}.dbf -o -f ${SGADEF}.ora ]
                   then
                   print - "ASE-Info: ${SGADEF} exists - start DB with startup recover"
                    print - "connect internal;\nstartup recover;\nexit;\n"| \
                   su - ${ADMUSER} -c "sqldba lmode=y"
                   returncode=$?
                   case $returncode in
                   0) print - "ASE-Success: startup recover succeeded"
                   ;;
                   *) print - "ASE-Error: startup recover failed"
                   MAIL_ADMIN ${DB1_START_LOG}
                  /var/ase/sbin/nfs_ifconfig ${HOSTNAME} stop  ${DB1_ALIAS_HOST
exit 1
                   ;;
                   esac
                     fi
               ;;
               stop)
                /usr/bin/ipcs -m | grep ${ORAUSER} | grep -v grep
               if [ $? -ne 0 ]
                      the
                 print - "ASE-Info: no more shared memory for ${ORAUSER} present"
               else
                  /usr/bin/ipcs -m | grep ${ORAUSER} | grep -v grep |\
                    while read m id rest
                    do
                     echo $id
                      /usr/bin/ipcrm -m $id
                      case $? In
                      0)   print - "ASE-Warning: not deleted, shared memory still set ";;
                      *)   print - "ASE-Success: shared memory successfully deleted";;
                      esac
                    done
               fi
               ;;
               esac
       ;;
       ADABAS)
               case $2 in
                start)
                i=0
                while [ $i -ne $2 ]
                do
                      su - ${ADMUSER} -c "x_server stop"   > /dev/null
                      sleep $2
                      su - ${ADMUSER} -c "x_server start"  > /dev/null
                      if [ $? -eq 0 ]
                         then
                                print - "ASE-Action: x_server successfully started"
                                break
                         else
                                print - "ASE-Warning: x_server start failed, try it again"
                                i=`expr $i + 1`
                      fi
                done
               ;;
               stop)
               ;;
               esac
       ;;
       INFORMIX)
       ;;
esac
}
restart_of_appl(){
       if [ ${AS1_SERV} != " " ]
       then
```

```
               print - " "
               print - "ASE-Action: Execute sleep 50;/usr/sbin/asemgr -r ${AS1_SERV}"
               ${ASEDIR}/bin/execwrap "sleep 50;/usr/sbin/asemgr -r ${AS1_SERV}"
               print - "ASE-Info: done"
       fi
}
restart_of_external_appl(){
    set $EXTERNAL_INSTANCES
    while [ "X$1" != "X" ]
    do
      print - " "
      print - "ASE-Action: ping/check for hostname ${1} if alive"
      /usr/sbin/ping -c 1 ${1} >/dev/null
      returncode=$?
      case $returncode in
      0) print - "ASE-Info: ${1} is responding over the net"
         print - "ASE-Action: Trigger the restart of application instance ${2} "
         print - "            on server $1 using ${ASEDIR}/${RESTART_SCRIPT}"
         ${ASEDIR}/bin/execwrap "${ASEDIR}/bin/tcp_client_ipc ${1}
${RESTART_SCRIPT}"
         returncode=$?
          case $returncode in
          0) print - "ASE-Success: restart of instance ${2} on $1 successfully triggered"
             ;;
          *) print - "ASE-Error: restart of instance ${2} on $1 failed"
             MAIL_ADMIN ${DB1_START_LOG}
             ;;
          esac
         ;;
      *) print - "ASE-Info: ${1} is not responding over the net"
         print - "ASE-Warning: restart of instance $2 not possible"
        ;;
      esac
      shift;shift
    done
}
stop_second_database () {
        print - " "
        print - "ASE-Action: check if instance ${DB2_INSTANCE} is running"
        PID=`ps -o pid,command -A|grep "${DB2_SAPSYSTEMNAME}" | \
        grep -v grep|awk '{print $1}'`
        if [ "X${PID}" != "X" ]
        then
                print - "ASE-Action: stop local database server ${DB2_INSTANCE}"
                print - "            with su - ${DB2USER} -c ${DB2_STOPSAP}"
                proc_timeout ${DB2_STOPSAP} ${TIMEOUT} 10 &
                su - ${DB2USER} -c "${DB2_STOPSAP}" > /dev/null
                returncode=$?
                case $returncode in
                0) print - "ASE-Success: Database stop command ${DB2_STOPSAP} succeeded"
                   print - "ASE-Action: Check if
${DB2_SAPSYSTEMNAME}_${DB2_INSTANCE} is really down"
                   PID=`ps -o pid,command -A|grep
"${DB2_SAPSYSTEMNAME}_${DB2_INSTANCE}" | \
grep -v grep|awk '{print $1}'`
                   if [ "X${PID}" != "X" ]
                   then
                        print - "ASE-Action: Kill SAP Instance
${DB2_SAPSYSTEMNAME}_${DB2_INSTANCE}"
                        /bin/kill -KILL  ${PID}
                   fi
                   print - "ASE-Success: ${DB2_SAPSYSTEMNAME}_${DB2_INSTANCE} is
really down"
                ;;
                *) print - "ASE-Error: ${DB2_STOPSAP} failed"
                   MAIL_ADMIN ${DB2_STOP_LOG}
                ;;
                esac
        else
                print - " "
                print - "ASE-Info: second database server is not running"
        fi
}
################################################################################
```

Page 47

We did not put the `/oracle/stage` directory to shared disks because this directory is temporary and used only for Oracle upgrade purposes which is not the design for high availability.

Ignore `/oracle/stage/stage_723`

Page 48

In tnsnames.ora
1. The virtual hostname is vtcr001 (db virtual hostname)
2. The value (Port = 1527) is only used once.

Page 49

1. Delete also the mountpoints for Oracle and SAP in the `/etc/fstab` of the application server.

2. We did not put the `/oracle/stage` directory to shared disks because this directory is temporary and used only for Oracle upgrade purposes which is not the design for high availability.

There is no need to add `/oracle/stage` to the disk service.

Page 55

2.4.4.2 you must order a second SAP License to get the Application Server to run as the virtual Database Server.
On tcr002 (hostname of the Application server)
`<sid>adm> saplicense -get`
FAX the string to SAP to get a valid License as you did it with the original one.

Page 58

Answer the question:

```
Enter the disk service name ('q' to quit): vtcr001
```

(You can choose any service name you want, but this name makes more since to the service. Also modify the `rc_serv.conf` if you want to use another name.)

Page 61

Answer the question:

```
b)    Balanced Service Distribution
f)    Favor Members
r)    Restrict to favored Members
x)    exit the Service Configuration

Enter your choice (r): f

Selecting an Automatic Service Placement (ASP) Policy

Select the favored member(s) IN ORDER for service 'vtcr001':
```

```
    1)  tcr001
    2)  tcr002
    x)  No favored members              ?)  Help

Enter a comma-separated list [x]: 1 2

Selecting an Automatic Service Placement (ASP) Policy

Do you want ASE to relocate this service to a more highly
favored member if one becomes available while this service is
running (y/n/?): n

Enter 'y' to add Service 'vtcr001' (y/n): y
Adding service...
Starting service...
Service vtcr001 successfully added...
```

Page 62

As the name for the User-defined service, we chose vtcr002. So you can easily differ between the diskservice vtcr001 which is running on tcr001 under normal circumstances and vtcr002 which is running on tcr002.

Page 63

2.7 Transactions and tests to check the R/3 system:
- SM59

You do not have to add any system name. This is done automatically since R/3 version 3.0F (with kernel patch).

Page 63

- DPMON

This is a SAP executable which you can run as `<sid>adm`.
But be careful, you need some basic knowledge to use it.

Example Installation of DECsafe in the R/3 Environment

Now you will see our installation of DECsafe in the R/3 environment. Use it as a pathfinder to your installation:

```
tcr001>
tcr001> asemgr
        TruCluster Available Server (ASE)
                ASE Main Menu

    a)  Managing the ASE         -->
    m)  Managing ASE Services    -->
    s)  Obtaining ASE Status     -->

    x)  Exit                            ?)  Help

Enter your choice: m

                Managing ASE Services

    c)  Service Configuration    -->
    r)  Relocate a service
   on)  Set a service on line
  off)  Set a service off line
```

```
  res)  Restart a service
    s)  Display the status of a service
    a)  Advanced Utilities       -->

    x)  Exit to the Main Menu            ?)  Help

Enter your choice [x]: c

               Service Configuration

    a)  Add a new service
    m)  Modify a service
    d)  Delete a service
    s)  Display the status of a service

    x)  Exit to Managing ASE Services    ?)  Help

Enter your choice [x]: a

        Adding a service

Select the type of service:

    1)  NFS service
    2)  Disk service
    3)  User-defined service
    x)  Exit to Service Configuration    ?)  Help

Enter your choice [1]: 2

You are now adding a new disk service to ASE.
A disk service consists of a disk-based application and disk configuration that
are failed over together.  The disk configuration can include UFS filesystems,
AdvFS filesets, LSM volumes, or raw disk information.

                   Disk Service Name

The name of a disk service must be a unique service name.  Optionally, an IP
address may be assigned to a disk service.  In this case, the name must be a
unique IP host name set up for this service and present in the local hosts
database on all ASE members.

Enter the disk service name ('q' to quit): vtcr001

Assign an IP address to this service? (y/n): n

                    Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
    For example:        Device special file:      /dev/rz3c
                        AdvFS fileset:           domain1#set1
                        LSM volume:              /dev/vol/dg1/vol01

To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage
for this service (press 'Return' to end): sapmnt_dom#top_fs

ADVFS domain `sapmnt_dom` has the following volume(s):

     /dev/vol/sapdg/SAP06

Is this correct (y/n) [y]: y

 Following is a list of device(s) and pubpath(s) for disk group sapdg:
```

```
        DEVICE  PUBPATH

        rz17c   /dev/rz17c
        rz18c   /dev/rz18c
        rz19c   /dev/rz19c
        rz20c   /dev/rz20c
        rz25c   /dev/rz25c
        rz26c   /dev/rz26c
        rz27c   /dev/rz27c
        rz28c   /dev/rz28c
        rzb17c  /dev/rzb17c
        rzb18c  /dev/rzb18c
        rzb19c  /dev/rzb19c
        rzb20c  /dev/rzb20c
        rzb25c  /dev/rzb25c
        rzb26c  /dev/rzb26c
        rzb27c  /dev/rzb27c
        rzb28c  /dev/rzb28c
        rzc17c  /dev/rzc17c
        rzc18c  /dev/rzc18c
        rzc19c  /dev/rzc19c
        rzc25c  /dev/rzc25c
        rzc26c  /dev/rzc26c
        rzc27c  /dev/rzc27c

Is this correct (y/n) [y]: y

                    Mount Point

The mount point is the directory on which to mount `sapmnt_dom#top_fs`.
If you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

                    Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:    Device special file:      /dev/rz3c
                        AdvFS fileset:            domain1#set1
                        LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage for
this service (press 'Return' to end): sapmnt_dom#mnt_fs

                  Mount Point

The mount point is the directory on which to mount `sapmnt_dom#mnt_fs`.
If you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

                    Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:    Device special file:      /dev/rz3c
                        AdvFS fileset:            domain1#set1
                        LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
```

```
Enter a device special file, an AdvFS fileset, or an LSM volume as storage
for this service (press 'Return' to end): sapmnt_dom#usr_fs

                  Mount Point

The mount point is the directory on which to mount `sapmnt_dom#usr_fs`.
If you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

                     Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:    Device special file:      /dev/rz3c
                        AdvFS fileset:            domain1#set1
                        LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage
for this service (press 'Return' to end): sapmnt_dom#trans

                  Mount Point

The mount point is the directory on which to mount `sapmnt_dom#trans`.
If you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

                     Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:    Device special file:      /dev/rz3c
                        AdvFS fileset:            domain1#set1
                        LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage
for this service (press 'Return' to end): sapdat_dom#sapdata1_fs

ADVFS domain `sapdat_dom` has the following volume(s):  /dev/vol/sapdg/SAP01
Is this correct (y/n) [y]:y

                  Mount Point

The mount point is the directory on which to mount `sapdat_dom#sapdata1_fs`.
If you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

                     Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:   Device special file:      /dev/rz3c
                        AdvFS fileset:            domain1#set1
                        LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage or
this service (press 'Return' to end): sapdat_dom2#sapdata2_fs

ADVFS domain `sapdat_dom2` has the following volume(s): /dev/vol/sapdg/SAP02
Is this correct (y/n) [y]:y

                  Mount Point
```

```
The mount point is the directory on which to mount `sapdat_dom2#sapdata2_fs`.
If you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

                    Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:     Device special file:      /dev/rz3c
                       AdvFS fileset:            domain1#set1


               LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage for
this service (press 'Return' to end): sapdat_dom3#sapdata3_fs

ADVFS domain `sapdat_dom3` has the following volume(s): /dev/vol/sapdg/SAP03
Is this correct (y/n) [y]:y

                  Mount Point

The mount point is the directory on which to mount `sapdat_dom3#sapdata3_fs`.
If you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

                    Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:    Device special file:      /dev/rz3c
                       AdvFS fileset:            domain1#set1
                       LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage for
this service (press 'Return' to end): sapdat_dom4#sapdata4_fs

ADVFS domain `sapdat_dom4` has the following volume(s): /dev/vol/sapdg/SAP04
Is this correct (y/n) [y]: y

                  Mount Point

The mount point is the directory on which to mount `sapdat_dom4#sapdata4_fs`.
If you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

                    Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:   Device special file:      /dev/rz3c
                       AdvFS fileset:            domain1#set1
                       LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage for
this service (press 'Return' to end): sapdat_dom5#sapdata5_fs

ADVFS domain `sapdat_dom5` has the following volume(s): /dev/vol/sapdg/SAP09
Is this correct (y/n) [y]:y

                  Mount Point
```

```
The mount point is the directory on which to mount `sapdat_dom5#sapdata5_fs`.
If you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

                    Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:    Device special file:      /dev/rz3c
                       AdvFS fileset:            domain1#set1
                       LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage for
this service (press 'Return' to end): sapidx_dom#sapdata6_fs

ADVFS domain `sapidx_dom` has the following volume(s):  /dev/vol/sapdg/SAP07
Is this correct (y/n) [y]:y

                  Mount Point

The mount point is the directory on which to mount `sapidx_dom#sapdata6_fs`.
If you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

                    Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:    Device special file:      /dev/rz3c
                       AdvFS fileset:            domain1#set1
                       LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage for
this service (press 'Return' to end): sapidx_dom2#sapdata7_fs

ADVFS domain `sapidx_dom2` has the following volume(s):  /dev/vol/sapdg/SAP10
Is this correct (y/n) [y]:y

                  Mount Point

The mount point is the directory on which to mount `sapidx_dom2#sapdata7_fs`.
If you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

                    Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:    Device special file:      /dev/rz3c
                       AdvFS fileset:            domain1#set1
                       LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage for
this service (press 'Return' to end): saplg1_dom#origlogA_fs

ADVFS domain `saplg1_dom` has the following volume(s): /dev/vol/sapdg/SAP05
Is this correct (y/n) [y]:y

                  Mount Point
```

```
The mount point is the directory on which to mount `saplg1_dom#origlogA_fs`. If
you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

                    Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:    Device special file:      /dev/rz3c
                        AdvFS fileset:            domain1#set1
                        LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage for
this service (press 'Return' to end): saplg2_dom#origlogB_fs

ADVFS domain `saplg2_dom` has the following volume(s):  /dev/vol/sapdg/SAP11
Is this correct (y/n) [y]:y

                  Mount Point

The mount point is the directory on which to mount `saplg2_dom#origlogB_fs`.
If you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

                    Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:   Device special file:      /dev/rz3c
                        AdvFS fileset:            domain1#set1
                        LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage for
this service (press 'Return' to end): saparc_dom#saparch_fs

ADVFS domain `saparc_dom` has the following volume(s):  /dev/vol/sapdg/SAP08
Is this correct (y/n) [y]:y

                  Mount Point

The mount point is the directory on which to mount `saparc_dom#saparch_fs`.
If you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

                    Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:    Device special file:      /dev/rz3c
                        AdvFS fileset:            domain1#set1
                        LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage for
this service (press 'Return' to end): saparc_dom#sapreorg_fs

                  Mount Point

The mount point is the directory on which to mount `saparc_dom#sapreorg_fs`.
If you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

                    Specifying Disk Information
```

```
Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:    Device special file:      /dev/rz3c
                        AdvFS fileset:            domain1#set1
                        LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage for
this service (press 'Return' to end): saparc_dom#sapbackup_fs

                 Mount Point

The mount point is the directory on which to mount `saparc_dom#sapbackup_fs`.
If you do not want it mounted, enter "NONE".
Enter the mount point or NONE: NONE

Specifying Disk Information

Enter one or more device special files, AdvFS filesets, or LSM volumes to define
the disk storage for this service.
For example:    Device special file:      /dev/rz3c
                        AdvFS fileset:            domain1#set1
                        LSM volume:               /dev/vol/dg1/vol01
To end the list, press the Return key at the prompt.
Enter a device special file, an AdvFS fileset, or an LSM volume as storage for
this service (press 'Return' to end): <Return>

Modifying user-defined scripts for `vtcr001`:
    1)  Start action
    2)  Stop action
    3)  Add action
    4)  Delete action

    x)  Exit - done with changes

Enter your choice [x]: 1

Modifying the start action script for `vtcr001`:
    a)  Add a start action script
     )  Edit the start action script
     )  Modify the start action script arguments []
     )  Modify the start action script timeout [60]
     )  Remove the start action script

    x)  Exit

Enter your choice [x]: a

Full pathname of your startscript: default
Argument list of your startscript: NONE
Time-out in seconds: 300

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# @(#)$RCSfile: startAction.sh,v $ $Revision: 1.2.2.2 $ (DEC) $Date: 1995/01/27
22:53:32 $
#
#  A skeleton example of a start action script.
#
PATH=/sbin:/usr/sbin:/usr/bin
export PATH
ASETMPDIR=/var/ase/tmp
if [ $# -gt 0 ]; then
        svcName=$1              # Service name to start
else
        svcName=

fi
/usr/local/ase/db_serv.ksh start
#
#  Any non zero exit will be considered a failure.
#
exit 0
:wq
"/tmp/ase_sh_start_837" 44 lines, 1753 characters


Modifying the start action script for `vtcr001`:
    f)  Replace the start action script
    e)  Edit the start action script
    g)  Modify the start action script arguments []
    t)  Modify the start action script timeout [300]
    r)  Remove the start action script
    x)  Exit - done with changes

Enter your choice [x]: x

Modifying user-defined scripts for `vtcr001`:
    1)  Start action
    2)  Stop action
    3)  Add action
    4)  Delete action

    x)  Exit - done with changes

Enter your choice [x]: 2

Modifying the stop action script for `vtcr001`:
    a)  Add a stop action script
     )  Edit the stop action script
```

```
     )  Modify the stop action script arguments []
     )  Modify the stop action script timeout [300]
     )  Remove the stop action script
    x)  Exit - done with changes

Enter your choice [x]: a

Full pathname of your startscript: default
Argument list of your startscript: NONE
Time-out in seconds: 300

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# *                                                              *
# ****************************************************************
# @(#)$RCSfile: startAction.sh,v $ $Revision: 1.2.2.2 $ (DEC) $Date: 1995/01/27
22:53:32 $
#
#  A skeleton example of a stop action script.
#
PATH=/sbin:/usr/sbin:/usr/bin
export PATH
ASETMPDIR=/var/ase/tmp
if [ $# -gt 0 ]; then
        svcName=$1              # Service name to stop
else
        svcName=
fi
#
# This script runs when the service is stopped, and also when the ASE
# is initializing on a member as it boots.  You can test the context:
#
case "${MEMBER_STATE}" in
BOOTING)        # Stopping ${svcName} as ASE member boots.


;
RUNNING)        # This is a true stop of ${svcName}.
/usr/local/ase/db_serv.ksh stop
        ;;
```

```
esac
#
#  exit 0  = success - service stopped successfully
#  exit 1  = failure - could not stop service
#  exit 99 = failure - could not stop service (service busy)
#
exit 0
:wq
"/tmp/ase_sh_stop_837" 65 lines, 2291 characters


Modifying the stop action script for `vtcr001`:
    f)  Replace the stop action script
    e)  Edit the stop action script
    g)  Modify the stop action script arguments []
    t)  Modify the stop action script timeout [300]
    r)  Remove the stop action script
    x)  Exit - done with changes

Enter your choice [x]:x

Modifying user-defined scripts for `vtcr001`:
    1)  Start action
    2)  Stop action
    3)  Add action
    4)  Delete action

    x)  Exit - done with changes

Enter your choice [x]: x

Selecting an Automatic Service Placement (ASP) Policy
Select the policy you want ASE to use when choosing a member to run this
service:
    b)  Balanced Service Distribution
    f)  Favor Members
    r)  Restrict to Favored Members

    x)  Exit to Service Configuration    ?)  Help

Enter your choice [b]: f

Selecting an Automatic Service Placement (ASP) Policy
Select the favored member(s) IN ORDER for service 'vtcr001':
    1)  tcr001
    2)  tcr002

    x)  No favored members               ?)  Help

Enter a comma-separated list [x]: 1 2

Selecting an Automatic Service Placement (ASP) Policy
Do you want ASE to relocate this service to a more highly favored member if one
becomes available while this service is running (y/n/?): n
Enter 'y' to add Service 'vtcr001' (y/n): y
Adding service...
Starting service...
Service vtcr001 successfully added...

               Service Configuration
    a)  Add a new service
```

```
    m)  Modify a service
    d)  Delete a service
    s)  Display the status of a service

    x)  Exit to Managing ASE Services    ?)  Help

Enter your choice [x]: a

        Adding a service

Select the type of service:
    1)  NFS service
    2)  Disk service
    3)  User-defined service

    x)  Exit to Service Configuration    ?)  Help

Enter your choice [1]: 3

You are now adding a new user-defined service to ASE.

                 User-defined Service Name

The name of a user-defined service must be a unique service name within the ASE
environment.

Enter the user-defined service name ('q' to quit): vtcr002

Modifying user-defined scripts for `vtcr002`:
    1)  Start action
    2)  Stop action
    3)  Add action
    4)  Delete action
    5)  Check action

    x)  Exit - done with changes

Enter your choice [x]: 1

Modifying the start action script for `vtcr002`:
    f)  Replace the start action script
    e)  Edit the start action script
    g)  Modify the start action script arguments [vtcr002]
    t)  Modify the start action script timeout [60]
    r)  Remove the start action script
    x)  Exit - done with changes

Enter your choice [x]: e

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# ******************************************************************
# @(#)$RCSfile: startAction.sh,v $ $Revision: 1.2.2.2 $ (DEC) $Date: 1995/01/27
22:53:32 $
#
#  A skeleton example of a start action script.
#
PATH=/sbin:/usr/sbin:/usr/bin
export PATH
ASETMPDIR=/var/ase/tmp
if [ $# -gt 0 ]; then
        svcName=$1              # Service name to start
else
        svcName=
fi
/usr/local/ase/as_serv.ksh start
#
#  Any non zero exit will be considered a failure.
#
exit 0
:wq
"/tmp/ase_sh_11058_1" 44 lines, 1753 characters


Modifying the start action script for `vtcr002`:

    f)  Replace the start action script
    e)  Edit the start action script
    g)  Modify the start action script arguments [vtcr002]
    t)  Modify the start action script timeout [60]
    r)  Remove the start action script

    x)  Exit - done with changes

Enter your choice [x]: t

Enter the timeout in seconds for the start action script [60]: 300

Modifying the start action script for `vtcr002`:
    f)  Replace the start action script
    e)  Edit the start action script
    g)  Modify the start action script arguments [vtcr002]
    t)  Modify the start action script timeout [300]
    r)  Remove the start action script

    x)  Exit - done with changes

Enter your choice [x]:  x

Modifying user-defined scripts for `vtcr002`:
    1)  Start action
    2)  Stop action
    3)  Add action
```

```
    4)  Delete action
    5)  Check action

    x)  Exit - done with changes

Enter your choice [x]: 2

Modifying the stop action script for `vtcr002`:
    f)  Replace the stop action script
    e)  Edit the stop action script
    g)  Modify the stop action script arguments [vtcr002]
    t)  Modify the stop action script timeout [60]
    r)  Remove the stop action script

    x)  Exit - done with changes

Enter your choice [x]: e

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# ****************************************************************
# @(#)$RCSfile:stopAction.sh,v $ $Revision:1.2.4.3 $ (DEC) $Date:1994/10/28
18:14:28 $
# This script runs when the service is stopped, and also when the ASE
# is initializing on a member as it boots.  You can test the context:
#
PATH=/sbin:/usr/sbin:/usr/bin
export PATH
ASETMPDIR=/var/ase/tmp
if [ $# -gt 0 ]; then
        svcName=$1              # Service name to start
else
        svcName=
fi
#
#  A skeleton example of a start action script.
#
case "${MEMBER_STATE}" in
BOOTING)        # Stopping ${svcName} as ASE member boots.
        ;;
```

```
RUNNING)        # This is a true stop of ${svcName}.
/usr/local/ase/as_serv.ksh stop
        ;;
esac
exit 0
:wq
"/tmp/ase_sh_11058_2" 56 lines, 2138 characters

Modifying the stop action script for `vtcr002`:
    f)  Replace the stop action script
    e)  Edit the stop action script
    g)  Modify the stop action script arguments [vtcr002]
    t)  Modify the stop action script timeout [60]
    r)  Remove the stop action script
    x)  Exit - done with changes

Enter your choice [x]: t

Enter the timeout in seconds for the start action script [60]: 300


Modifying the stop action script for `vtcr002`:
    f)  Replace the stop action script
    e)  Edit the stop action script
    g)  Modify the stop action script arguments [vtcr002]
    t)  Modify the stop action script timeout [300]
    r)  Remove the stop action script

    x)  Exit - done with changes

Enter your choice [x]: x

Modifying user-defined scripts for `vtcr002`:
    1)  Start action
    2)  Stop action
    3)  Add action
    4)  Delete action
    5)  Check action

    x)  Exit - done with changes

Enter your choice [x]: x

Selecting an Automatic Service Placement (ASP) Policy
Select the policy you want ASE to use when choosing a member to run this
service:
    b)  Balanced Service Distribution
    f)  Favor Members
    r)  Restrict to Favored Members

    x)  Exit to Service Configuration    ?)  Help

Enter your choice [b]: f

Selecting an Automatic Service Placement (ASP) Policy

Select the favored member(s) IN ORDER for service 'vtcr002':
    1)  tcr001
    2)  tcr002

    x)  No favored members              ?)  Help
```

```
Enter a comma-separated list [x]: 2 1

Selecting an Automatic Service Placement (ASP) Policy
Do you want ASE to relocate this service to a more highly favored member if one
becomes available while this service is running (y/n/?): n

Enter 'y' to add Service 'vtcr002' (y/n): y

Adding service...
Starting service...
Service vtcr002 successfully added...


               Service Configuration
    a)  Add a new service
    m)  Modify a service
    d)  Delete a service
    s)  Display the status of a service

    x)  Exit to Managing ASE Services    ?)  Help

Enter your choice [x]: x

               Managing ASE Services
    c)  Service Configuration    -->
    r)  Relocate a service
   on)  Set a service on line
  off)  Set a service off line
  res)  Restart a service
    s)  Display the status of a service
    a)  Advanced Utilities       -->

    x)  Exit to the Main Menu            ?)  Help

Enter your choice [x]: s

        Service Status

Select the service whose status you want to display:
    1)  vtcr001 on tcr001
    2)  vtcr002 on tcr001

    x)  Exit to previous menu            ?)  Help

Enter your choice [x]: 1

        Status for DISK service `vtcr001`

 Status:             Relocate:  Placement Policy:       Favored Member(s):
 on tcr001           no         Favor Member(s)         tcr001

        Storage configuration for DISK service `vtcr001`

Mount Table (device, mount point, type, options)
 saparc_dom#sapbackup_fs NONE advfs NONE
 sapidx_dom#sapdata7_fs NONE advfs NONE
 sapmnt_dom#usr_fs NONE advfs NONE
 sapmnt_dom#trans NONE advfs NONE
 sapdat_dom#sapdata1_fs NONE advfs NONE
 sapdat_dom2#sapdata2_fs NONE advfs NONE
 sapdat_dom3#sapdata3_fs NONE advfs NONE
 sapdat_dom4#sapdata4_fs NONE advfs NONE
 sapidx_dom2#sapdata7_fs NONE advfs NONE
```

```
 sapmnt_dom#top_fs NONE advfs NONE
 sapmnt_dom#mnt_fs NONE advfs NONE
 saplg1_dom#origlogA_fs NONE advfs NONE
 saplg2_dom#origlogB_fs NONE advfs NONE
 saparc_dom#saparch_fs NONE advfs NONE
 saparc_dom#sapreorg_fs NONE advfs NONE
 sapdat_dom5#sapdata5_fs NONE advfs NONE
 sapidx_dom#sapdata6_fs NONE advfs NONE

Advfs Configuration

 Domain:          Volume(s):
 sapdat_dom       /dev/vol/sapdg/SAP01
 sapdat_dom2      /dev/vol/sapdg/SAP02
 sapdat_dom3      /dev/vol/sapdg/SAP03
 sapdat_dom4      /dev/vol/sapdg/SAP04
 sapidx_dom2      /dev/vol/sapdg/SAP10
 sapmnt_dom       /dev/vol/sapdg/SAP06
 saplg1_dom       /dev/vol/sapdg/SAP05
 saplg2_dom       /dev/vol/sapdg/SAP11
 saparc_dom       /dev/vol/sapdg/SAP08
 sapdat_dom5      /dev/vol/sapdg/SAP09
 sapidx_dom       /dev/vol/sapdg/SAP07

LSM Configuration

 Disk Group:      Device(s):
 sapdg            rz17c rz18c rz19c rz20c rz25c rz26c rz27c rz28c rzb17c rzb18c
rzb19c rzb20c rzb25c rzb26c rzb27c rzb28c rzc17c rzc18c rzc19c rzc25c rzc26c
rzc27c

Press 'Return' to continue:

        Service Status

Select the service whose status you want to display:
    1)  vtcr001 on tcr001
    2)  vtcr002 on tcr001

    x)  Exit to previous menu           ?)  Help

Enter your choice [x]: x

                Managing ASE Services

    c)  Service Configuration    -->
    r)  Relocate a service
   on)  Set a service on line
  off)  Set a service off line
  res)  Restart a service
    s)  Display the status of a service
    a)  Advanced Utilities       -->

    x)  Exit to the Main Menu           ?)  Help


Enter your choice [x]: x

        TruCluster Available Server (ASE)
```

```
                ASE Main Menu
    a)  Managing the ASE         -->
    m)  Managing ASE Services    -->
    s)  Obtaining ASE Status     -->

    x)  Exit                             ?)  Help

Enter your choice: x
tcr001>
```