



PeopleSoft Oracle OPS TruCluster PS DIGITAL UNIX AlphaServer 4x00

DIGITAL HiTest Notes

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Table of Contents

1 Introduction

DIGITAL HiTest Suite and Its Advantages.....	1-1
Overview of This DIGITAL HiTest Suite.....	1-2

2 Configuration Data

Hardware and Software Components.....	2-1
Special Configuration Rules.....	2-7

3 System Installation and Setup

Hardware Installation.....	3-1
TruCluster Production Server.....	3-1
HSZ50 Array Controller Setup.....	3-2
Disk Storage Configuration.....	3-2
Operating System Installation.....	3-3
Swap Space.....	3-3
Configuring Additional Swap Space.....	3-3
UNIX Kernel Parameters (/etc/sysconfigtab).....	3-4
TruCluster Production Server.....	3-4
Available Service Environment (ASE) Services.....	3-6
Distributed Raw Disk Service.....	3-6
Network File Systems (NFS) Service.....	3-8
Application Installation.....	3-9
DIGITAL Layered Products.....	3-9
Setting Up Networker Save and Restore (NSR).....	3-9
Oracle Installation.....	3-10
Oracle Initialization Parameters.....	3-11
Enabling Process Limits for the Oracle DBA User Account.....	3-11
Setting Up the Oracle7 Enterprise Backup Utility.....	3-13
Planning the Oracle Database.....	3-15
PeopleSoft Installation.....	3-17
Production Server Environment Failover Setup.....	3-18
Failover Setup for Member Nodes.....	3-18
Failover Setup for Clients.....	3-19

4 Interoperability Tests and Results

Overview of Results.....	4-1
Test Environment.....	4-1

Contents

Test Tools.....	4-1
Test Configuration.....	4-2
Minimum Hardware Configuration	4-2
Maximum Hardware Configuration	4-2
PeopleSoft Financials System Configuration.....	4-3
File System and Database Storage Map	4-3
Tablespace Configurations.....	4-5
Redo Logs.....	4-6
Test Process and Results.....	4-6
Database Load.....	4-6
PeopleSoft Database Creation	4-6
PeopleSoft Financials	4-8
Financial Setup	4-8
Asset Management Tests and Results.....	4-10
Asset Management Test Foundation Tests.....	4-10
Asset Management Volume Tests	4-12
Asset Management Database Query Tests	4-12
Accounts Payable Tests and Results.....	4-13
PeopleSoft Accounts Receivable.....	4-15
PeopleSoft General Ledger (GL).....	4-16
General Ledger Test Foundation Tests	4-17
General Ledger Volume Tests	4-18
Database Backup and Restore.....	4-19
Database Backup	4-19
Database Restore	4-20
Failover Test Process and Results	4-21

5 System Limits and Characterization Data

Automating Data Panel Input Using SQA Robot.....	5-1
Performance for Additional Query Tests.....	5-1
Overall Performance Indications.....	5-2

6 Problems and Resolutions

Foundation Hardware	6-1
I/O Adapter Failure.....	6-1
Shared Storage Availability	6-1
Operating System	6-1
Setting Address Space Unlimited.....	6-1
Application.....	6-2
Oracle7 Database Issues.....	6-2
Multi-Block Read Count Limitation.....	6-2
OEBU Register Operation Fails	6-2
Password Required for Connect Internal Command	6-2
Advanced Network Option (ANO) Partially Installed.....	6-2
Compatibility of Oracle 7.3.3 Control File.....	6-2
Networker Save and Restore	6-2
PeopleSoft Financials Issues	6-3
General Ledger Posting More Than 4290 Journal Lines	6-3
AP Subsystem Unable to Properly Submit COBOL for Processing.....	6-3
Report of Possible Memory Corruption while Accessing Debug Log	6-3
Failed SQR Submission on Server.....	6-3
SQR Depreciation Functions Run on the Client Fail Sometimes	6-3

A Detailed Hardware Configuration

System Diagram A-2
 Configuration Cabling A-2
 AlphaServer 4100 Configurations A-3
 AlphaServer 4100 PCI Slot Usage A-5
 StorageWorks Cabinet SCSI Disks Unit Address Identification A-6
 HSZ50 SCSI Cable Tables A-6

B Test Scripts

Create Database Script B-1
 Create Tablespace Script B-2

Figures

Figure 4-1: Test Environment 4-2
 Figure 4-2: PeopleSoft Financials System Configuration 4-3
 Figure A-1: System Diagram A-2
 Figure A-2: AlphaServer 4000/AlphaServer 4100 Motherboard Layout A-4
 Figure A-3: AlphaServer 4100 PCI Slot Usage A-5
 Figure A-4: SW822 Cabinet Unit Address Identification A-6

Tables

Table 2-1: DIGITAL HiTest Template – AppSet Software and Foundation Hardware 2-2
 Table 2-2: DIGITAL HiTest Template – Foundation Software 2-4
 Table 2-3: System Management Station Template 2-6
 Table 2-4: Component Revision Levels 2-7
 Table 3-1: SCSI Controller Configuration 3-1
 Table 3-2: UNIX Kernel Parameters 3-5
 Table 3-3: DRD Service Configuration 3-7
 Table 3-4: ASE Service Configuration 3-8
 Table 3-5: NSR Server Settings 3-10
 Table 3-6: Oracle Parameter Optimization 3-12
 Table 4-1: File Systems and Database Storage Map 4-4
 Table 4-2: Tablespace Configurations 4-5
 Table 4-3: Redo Logs 4-6
 Table 4-4: Financial Setup Project Function and Test Results Summary 4-8
 Table 4-5: Asset Management Test Foundation Tests and Results Summary 4-10
 Table 4-6: Asset Management Volume Tests and Results Summary 4-12
 Table 4-7: Asset Management Query Tests and Results Summary 4-12
 Table 4-8: Accounts Payable Test Process and Results Summary 4-13
 Table 4-9: Accounts Receivable Test Process and Results Summary 4-15
 Table 4-10: General Ledger Test Process and Results Summary 4-17
 Table 4-11: General Ledger Volume and Query Tests and Results Summary 4-19
 Table 4-12: Database Backup Test Summary 4-20
 Table 4-13: Database Restore Test Summary 4-20
 Table 5-1: Simultaneous Database Access Tests 5-2

Contents

Table A-1: Configuration Cabling	A-2
Table A-2: AlphaServer 4000/AlphaServer 4100 Motherboard (Minimum and Maximum Configurations)	A-4
Table A-3: PCI Slot Usage (Minimum and Maximum Configurations).....	A-5
Table A-4: HSZ50 #1 (Top Front) Connections	A-6
Table A-5: HSZ50 #2 (Bottom Front) Connections.....	A-7
Table A-6: HSZ50 #3 (Back) Connections.....	A-7

Preface

This document provides an overview of DIGITAL HiTest Suites and detailed technical information about interoperability test results for the PeopleSoft Oracle OPS TruCluster PS DIGITAL UNIX AlphaServer 4x00 HiTest Suite.

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.

Road Map

This document contains the following chapters:

1. **Introduction** – Provides a brief summary of the benefits of DIGITAL HiTest Suites and an overview of the Suite covered in this document.
2. **Configuration Data** – Includes tables of configuration data about the hardware and software components that define the Template, and special configuration rules if any.
3. **System Installation and Setup** – Presents useful information for installing and setting up this DIGITAL HiTest Suite.
4. **Interoperability Tests and Results** – Describes how the tests were set up (including database organization), what data and programs were placed on what disks, and how the tests were run.
5. **System Limits and Characterization Data** – Summarizes any system limitations or characterization data that were identified during testing.
6. **Problems and Resolutions** – Discusses any problems and resolutions that were discovered during testing.

Appendix A: Detailed Hardware Configuration – Contains more detailed information about the hardware and software components listed in the Configuration Data chapter.

Appendix B: Test Scripts – Provides a detailed listing of the test script used during test.

Feedback and Ordering Information

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

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DIGITAL HiTest Suite and Its Advantages

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 Enterprises running their financial operations with PeopleSoft Financials.

DIGITAL Product Management and Engineering select the components and design the configurations in each HiTest Suite to ensure high system reliability, application performance, and upgradability. A Suite's hardware and software components have been successfully tested for interoperability.

A HiTest Suite specifies allowed ranges of hardware and software components, as well as each component's part number, description, and revision information. These specifications are listed in the *DIGITAL HiTest Template*.

The components in a HiTest Suite are organized into two groups, the *DIGITAL HiTest Foundation* and the *DIGITAL HiTest AppSet*. The HiTest Foundation includes the hardware, operating system, middleware, and database software. The HiTest Foundation can be used as a base on which any customer-desired applications can be installed. The HiTest AppSet includes the software specific to one class of customer solutions.

Configuring a DIGITAL HiTest Suite is straightforward. 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.

The HiTest Suite is documented in the *DIGITAL HiTest Notes*. The HiTest Notes list the HiTest Foundation and HiTest AppSet components. HiTest Notes also describe the testing of the Suite and include configuration details, installation instructions, tuning parameters, problems encountered and their solutions, and system diagrams.

Some components listed in the HiTest Foundation or AppSet may be optional. If the minimum quantity is zero (0), then the component is optional. If the minimum quantity is one or more, then you must order at least the minimum quantity.

The maximum quantities represent the largest group of components that were tested for interoperability with all the other components in the Suite. Although it may be possible to place more than the specified maximum quantity of a component on a DIGITAL system, extensive interoperability testing was not done at that level and such a system would not be considered a DIGITAL HiTest System.

Introduction

You can select any combination of components with quantities ranging from the minimum to the maximum specified. Occasionally, special configuration rules give further guidance or restrict configurations. These rules appear in the Configuration Data chapter of the HiTest Notes.

A customer can include the Suite-specified hardware and software they need and then layer on additional software. Other types of hardware, called *add-on hardware*, can also be added to a DIGITAL HiTest System. The add-on hardware is specified in the Configuration Data chapter of the HiTest Notes, and in the HiTest Systems Web Pages, available through the following URLs:

<http://cosmo.tay.dec.com> (Intranet)
<http://www.partner.digital.com:9003/cgi-bin/comet> (Internet)
http://cosmo.tay.dec.com/public/configsys/config_systems.htm

Even though the customer may install application software that is not specified in the Suite, the customer and DIGITAL still experience the advantages of knowing that all of the Suite-based hardware and software interoperates correctly. Of course, the full benefit of configuring a system from a HiTest Suite is obtained when the system includes only specified HiTest Foundation and AppSet components.

Overview of This DIGITAL HiTest Suite

The PeopleSoft Oracle TruCluster Production Server DIGITAL UNIX AlphaServer 4x00 HiTest Suite consists of the following software components:

- PeopleSoft Financials V6.0
- Oracle7 V7.3.3
- TruCluster Production Server V1.4A
- DIGITAL UNIX 4.0B

This Suite will meet the needs of enterprises running their financial operations with PeopleSoft Financials.

Configuration Data

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

Hardware and Software Components

Table 2-1 and Table 2-2 identify the range of hardware and software components that can be configured using the PeopleSoft Oracle TruCluster Production Server DIGITAL UNIX AlphaServer 4x00 HiTest Suite. These two tables form the DIGITAL HiTest Template.

Table 2-3 lists the optional System Management Station hardware and software.

Table 2-4 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 PeopleSoft Financials
- Foundation Hardware – Includes the base system, storage, and other hardware options
- Foundation Software – Includes the DIGITAL UNIX operating system, TruCluster Production Server, and Oracle7 software

When ordering an item from a HiTest Template, select a quantity that is within the minimum/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, then order at least the minimum quantity, but not more than 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 Appendix A.

Table 2-1: DIGITAL HiTest Template – AppSet Software and Foundation Hardware

PeopleSoft Oracle OPS HiTest AppSet				
Oracle OPS TruCluster PS DIGITAL UNIX AlphaServer 4x00				
HiTest Foundation Hardware				
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	PeopleSoft Online Financials 6.0	PeopleSoft	1	1
Foundation Hardware				
2	<p><i>Select two of the following base systems:</i></p> <p>AlphaServer 4000 5/466 (1 GB) Drawer, DIGITAL UNIX AlphaServer 4100 5/466 (1 GB) Drawer, DIGITAL UNIX</p> <p><i>Hardware includes:</i></p> <ul style="list-style-type: none"> • 5/466 MHz CPU with 4 MB cache • Appropriate memory option • S3 TRIO64 1 MB Graphics adapter • DE500-AA 10/100 Mbit Fast Ethernet adapter • KZPDA-AA; FWSE SCSI adapter and SCSI cable for connection to BA36R-SB StorageWorks shelf included with the pedestal enclosure • Integral FNSE (internal only SCSI bus) to support removable media drives (CD-ROM and Tapes) • Integral CD-ROM drive • Integral 1.44 MB Diskette drive • 450 Watt autosensing power supply • LK47W-A2 (U.S./English) keyboard • Three-button mouse <p>Note: For European orders, select country-specific keyboard and power cords.</p> <p><i>Software Includes:</i></p> <p>DIGITAL UNIX Operating System (included with Foundation Hardware)</p>	<p>DA-53JEC-FA DA-51JAC-FB</p>	2	2
3	<p><i>Select two enclosures:</i></p> <p>Pedestal Enclosure</p> <p><i>Hardware includes:</i></p> <ul style="list-style-type: none"> • 4.3 GB Wide Disk • Pedestal with one StorageWorks shelf; the pedestal supports up to two more shelves 	BA30P-AB	2	2
4	<p>466 MHz CPU DIGITAL UNIX SMP UPG</p> <p>Note: Up to three additional CPUs may be added to each 4100 System.</p>	KN304-DB	0	6
5	<p>450 Watt Power Supply</p> <p>Note: The power supply included with each system drawer supports two CPUs, memory, and I/O adapters. Add a second supply to support up to four CPUs or for redundancy (N+1) with a two CPU system. Add a third supply for redundancy (N+1) with a four CPU system.</p>	H7291-AA	0	4
6	<p>4.3 GB 7200 RPM UltraSCSI Hard Disk Drive</p> <p>Note: This part replaces RZ29B-VW, which was used for testing this HiTest Suite.</p>	DS-RZ1CB-VW	6	6

PeopleSoft Oracle OPS HiTest AppSet Oracle OPS TruCluster PS DIGITAL UNIX AlphaServer 4x00 HiTest Foundation Hardware				
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
7	1 GB Memory Option 2 GB Memory Option Note: Add 1 GB of additional memory for each CPU added to the 4x00 System drawer.	MS330-FA MS330-GA	0	See Note
8	PCI one port FWD SCSI Controller	KZPSA-BB	4	4
Note: Order one each of items 9, 10, and 11 for each KZPSA-BB ordered. Items 9, 10, and 11 identify cabling, terminators, and adapters used to interconnect KZPSA-BB SCSI controllers with HSZ50 StorageWorks RAID Array controllers in a shared SCSI bus configuration				
9	10 meter 16-bit SCSI cable (external)	BN21K-10	4	4
10	SCSI Y Cable, 68 pin	BN-21W-0B	4	4
11	SCSI Terminator	H879-AA	2	2
Note: When ordering cabinet and options required to configure StorageWorks subsystems, customer should order "Configure to Order" and list SW822 part number (Item 12) first, followed with optional StorageWorks Devices (Items 13 and 14) to be included; otherwise, all hardware will arrive separately.				
12	StorageWorks Storage Array <i>Hardware includes:</i> <ul style="list-style-type: none"> • SW800-GA Cabinet Assembly with Power Controller • SW8XP-BA (Backup) Power Controller • Three BA350-MB Disk Controller Shelves • Three BA35X-HF (Backup) Power Supplies for Disk Controller Shelves • Eighteen BA350-JA Disk Shelves • Eighteen BA35X-HH (Backup) Power Supplies for Disk Shelves 	SW822-GA	1	1
13	StorageWorks RAID Array Dual SCSI Controller <i>Each HSZ52-AJ Controller Option includes:</i> <ul style="list-style-type: none"> • Two HSZ50 256 MB SCSI Controllers • An External Cache Battery Backup Power Supply which is installed in place of a (Backup) power supply in the associated disk storage shelves • Two 2-meter cables to interconnect controllers with external cache batteries • Two H885-AA SCSI Tri-link Connectors, H879-AA SCSI Terminator, and a BN21L-0B cable to interconnect the two SCSI Controllers 	HSZ52-AJ	2	2
14	4.3 GB 7200 RPM UltraSCSI Hard Disk Drive Note: This part replaces RZ29B-VW which was used for testing this HiTest Suite.	DS-RZ1CB-VW	72	72
15	100 MB Memory Channel Hub	CCMHA-AA	2	2
16	Memory Channel Hub Line Cards Note: Order two line cards for each Memory Channel Hub	CCMLA-AA	4	4
17	PCI to Memory Channel Controller	CCMAA-BA	4	4
18	Memory Channel Cable	BC12N-10	4	4
19	DIGITAL TZ89 Fast Wide Single Ended SCSI-2 35/70 GB DLT Drive (Tabletop)	DS-TZ89N-TA	1	1
20	System Management Station	(See Table 2-3)	0	1

Table 2-2: DIGITAL HiTest Template – Foundation Software

PeopleSoft Oracle OPS TruCluster PS DIGITAL UNIX AlphaServer 4x00HiTest Foundation Software						
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		Required By	
			Min	Max	Fnd [†]	App [†]
Foundation Software						
21	<i>Factory installed software and licenses for:</i> DIGITAL UNIX Operating System V4.0B Base license and unlimited Interactive User License (SPD 41.61.18) DIGITAL UNIX Server Extensions, V4.0B (SPD 44.35.14)	Included with item 2	1	1	Yes	Yes
22	DIGITAL UNIX Operating System, Version 4.0C Software Media Kit (SPD 41.61.18) Note: DIGITAL UNIX V4.0C installs as V4.0B on this system. Note: Software, media, and documentation required for first system on site.	QA-MT4AA-H8	1	1	See Note	See Note
23	DIGITAL CD-ROM Software Product Library for DIGITAL UNIX Systems Layered Products Note: Software, media, and documentation required for first system on site.	QA-054AA-H8	1	1	See Note	See Note
24	TruCluster Production Server for DIGITAL UNIX V1.4	QB-3RLAG-AA	1	1	Yes	Yes
25	HSZ50 Array Controller Operating Software (HSOF), V5.1 Platform Software Kit <i>Includes:</i> <ul style="list-style-type: none"> • StorageWorks Solutions Command Console SW V1.1 • HSZ50 Array Controller Operating Software (HSOF), V5.1 Platform Software Kit 	QB-5JCAB-SA	1	1	Yes	Yes
Note: A separate copy of the HSOF Software (Item 26) must be installed in each HSZ50 controller module in the Storage subsystem. Order additional HSOF Software modules as required.						
26	HSZ50 Array Controller Operating Software (HSOF), V5.1 Platform Software Kit	QB-5CJAB-SB	3	3	Yes	Yes
27	StorageWorks PLUS <i>Which includes:</i> <ul style="list-style-type: none"> • Networker Save and Restore for DIGITAL UNIX, V4.3 (SPD 50.98.11) • LSM, V4.1 • AdvFS, V4.0B 	QB-5RYAG-AA	1	1	Yes	Yes

PeopleSoft Oracle OPS TruCluster PS DIGITAL UNIX AlphaServer 4x00HiTest Foundation Software						
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		Required By	
			Min	Max	Fnd [†]	App [†]
28	Oracle7 Server for DIGITAL UNIX V7.3.3 <i>Including:</i> <ul style="list-style-type: none"> • Oracle7 Enterprise Backup Utility (OEBU) • Parallel Query Option • SQL*Net • Oracle Protocol Adapter for TCP/IP • PL/SQL • SQL*Plus Oracle contacts: Phone: 1-800-ORACLE1, E-mail: infodec@us.oracle.com	Oracle	1	1	Yes	Yes
29	Developers ToolKit for DIGITAL UNIX, V4.0B <i>Select a License:</i> Traditional License Concurrent Use License	QL-MT5AG-AA QL-MT5AM-3B	1	1	Yes	Yes
30	DEC C++ V5.4 for DIGITAL UNIX Systems (SPD 41.91.07) <i>Select a License:</i> Traditional License Concurrent Use License	QL-MTRAG-AA QL-MTRAG-3B	1	1	Yes	Yes
31	DEC COBOL V2.4 for DIGITAL UNIX Systems (SPD 51.16..05) <i>Select a License:</i> Traditional License Concurrent Use License	QL-2BZAG-AA QL-2BZAM-3B	1	1	Yes	Yes
32	Micro Focus COBOL Compiler and Development Tools, V4.0A for DIGITAL UNIX (SPD 52.83.06) <i>Select one:</i> Micro Focus COBOL Developer Suite Package Micro Focus COBOL Application Server	QP-5S9AM-3B QP-5SAAM-3B	1	1	Yes	Yes
33	<i>Select additional user licenses to meet the needs of Micro Focus COBOL users.</i> Micro Focus COBOL Compiler and Development Tools, V4.0A for DIGITAL UNIX (SPD 52.83.06) Note: Micro Focus OSX User Additional License; variant (*) denotes number of users.	QL-2NQAM-3*	1	1	Yes	Yes

PeopleSoft Oracle OPS TruCluster PS DIGITAL UNIX AlphaServer 4x00HiTest Foundation Software						
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		Required By	
			Min	Max	Fnd [†]	App [†]
34	DEC FUSE V3.0 for DIGITAL UNIX 4.0 Systems (SPD 44.71.04)	QL-092AM-3B	1	1	Yes	Yes
35	Networker Save and Restore Database Module for Oracle V2.0 License (SPD 64.46.03)	QL-3P4AG-AA	1	1	Yes	Yes
36	Networker Save and Restore Database Module for Oracle V2.0 Media and Doc Kit (SPD 64.46.03)	QA-3P4AA-H8	1	1	Yes	Yes
37	Networker Save and Restore for DIGITAL UNIX V4.3 (SPD 50.98.11)	QL-04VAL-3B	1	1	Yes	Yes
† Fnd = Foundation, App = AppSet						

Table 2-3: System Management Station Template

PeopleSoft Oracle OPS HiTest AppSet System Management Station				
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
Management Station Hardware				
Note: This HiTest Suite supports the use of a system management station. When the management station 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.				
1	DIGITAL PWS Personal Workstation for Windows NT <i>Hardware includes:</i> <ul style="list-style-type: none"> • 200 MHz CPU with 256 Kbyte cache • 64 MB memory • Matrox Millenium 3D graphics • 10BaseT/10Base2 Ethernet • 2.0 GB UW disk • EIDE CD-ROM • 1.44 MB floppy • PS/2 style keyboard • two-button PS/2 compatible mouse Note: A functionally equivalent 80 x 86 system may be substituted without invalidating this HiTest Template.	SN-B3KAP-EL	0	1
2	21" Monitor Note: The 17" (SN-VRCX7-WA) or 15" (SN-VRCX5-WA) monitor may be substituted if desired.	SN-VRCX1-WA	0	1
Software Installed on Management Station				
3	Windows NT V4.0	Included with item 1	0	1

PeopleSoft Oracle OPS HiTest AppSet				
System Management Station				
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
4	Windows NT Service Pack 3	Microsoft	0	1
5	Exceed V5.1.3	Hummingbird	0	1
6	ServerWORKS Manager V2.2A (QB-4QYAA-SA)	Included with the AlphaServer	0	1
7	StorageWorks Solution Command Console V1.1 (QB-5GZAA-SA)	Included with StorageWorks Platform Kit	0	1
8	BMC PATROLWATCH for ServerWORKS	Included with the AlphaServer	0	1
Software Installed on Managed Systems				
9	Base UNIX systems management tools	Included with DIGITAL UNIX	0	1
10	BMC PATROL Agent	Included with the AlphaServer	0	1
11	BMC Operating System Knowledge Module	QB-5KLAA-WC	0	1
12	BMC Knowledge Module Middleware/Messaging Internet/Intranet	QB-5KWAA-WC	0	1
0 Indicates that geography-specific part number variants are available. Check the appropriate price book for details.				

Table 2-4: Component Revision Levels

Hardware Component	Hardware	Firmware	Software
SRM console	–	V1.21-18	V4.9-1
SCSI host adapter (KZPDA-AA)	0002	–	–
FWD SCSI controller (KZPSA-BB)	0000	A10	–
Array controller (HSZ52-AJ)	A01	HSOF V5.1Z-0	–
4.3 GB disks (RZ29B-VW)	–	00016	–
466 MHz CPU (KN304-DB)	A03	–	–
Memory (MS330-FA)	A03	–	–
Fast Ethernet adapter (DE500-AA)	C01	–	–
StorageWorks Shelf Power Supply (BA35X-HH)	B01 or Greater	–	–
PCI-FDDI Adapter (DEFPA-AB)	B02	V3.1	–
PCI-Memory Channel Adapter (CCMAA-BA)	–	–	–
Memory Channel Hub (CCMHA-AA)	D02	–	–
Memory Channel Hub Line Card (CCMLA-AA)	–	–	–

Special Configuration Rules

There are no special configuration rules for the PeopleSoft Oracle OPS TruCluster PS DIGITAL UNIX AlphaServer 4x00 HiTest Suite.

System Installation and Setup

This chapter presents information that is useful when installing and setting up a DIGITAL HiTest System configured from this DIGITAL HiTest Suite. System preparation includes installation of the hardware, operating system, and applications.

Hardware Installation

The hardware was installed and interconnected as shown in Appendix A.

TruCluster Production Server

There are specific hardware rules and restrictions that govern TruCluster Production Server configurations. Overall, set up the configuration as follows:

1. Set the `boot_reset` variable to on:


```
>>> set boot_reset on
```
2. Ensure the KZPSA adapters in each system that are attached to the shared SCSI buses have different SCSI ID numbers and are set to operate at fast SCSI speeds. The SCSI controllers in the first node were set to SCSI ID 7. Using Table 3-1 as a reference:
 - a. Set the appropriate controllers in the second 4x00 to SCSI ID 6.
 - b. If necessary, enable fast SCSI bus speed for each KZPSA adapter.

Table 3-1: SCSI Controller Configuration

Step	Action	Result
1	<pre>>>> show KZPSA*</pre>	<pre>KZPSA0_fast 1 KZPSA0_host_id 7 KZPSA0_termprw 1 KZPSA1_fast 1 KZPSA1_host_id 7 KZPSA1_termprw 1</pre> <p>If any values need to be changed, refer to the next steps.</p>
2	<pre>>>> set KZPSA0_host_id 6 >>> set KZPSA1_host_id 6</pre>	Changes the SCSI ID of the KZPSA-BB controllers from 7 to 6. This was done on the second AlphaServer 4x00 system.
3	<pre>>>> set KZPSA0_fast 1 >>> set KZPSA1_fast 1</pre>	Fast SCSI mode is enabled when the value is set to 1 (0 = slow mode). Set this value for the controllers on both systems.

HSZ50 Array Controller Setup

To set up the HSZ50 Array Controllers, do the following:

1. Set the number of SCSI target IDs (0 through 3):

```
CLI > SET THIS_CONTROLLER ID = ( 0, 1, 2, 3 )
```
2. Set failover to place the controllers in a dual-redundant configuration.

```
CLI > SET FAILOVER COPY=THIS_CONTROLLER
```
3. Restart both controllers by pressing the OCP reset (//) button or entering the following commands:

```
CLI > RESTART OTHER_CONTROLLER  
CLI > RESTART THIS_CONTROLLER
```
4. Enter the following command to determine whether the preceding parameters are set correctly:

```
CLI > SHOW THIS_CONTROLLER FULL  
CLI > SHOW OTHER_CONTROLLER FULL
```
5. Set preferred paths to balance the load and improve the performance of the HSZ array controller pair:

```
CLI > SET THIS_CONTROLLER PREFERRED_ID = ( 0, 1 )  
CLI > SET OTHER_CONTROLLER PREFERRED_ID = ( 2, 3 )
```
6. Run the CONFIG program to locate and add devices to the array controller's configuration:

```
CLI > RUN CONFIG
```
7. Set up the RAIDsets using the following commands:

```
CLI > ADD RAIDSET name POLICY=BEST_PERFORMANCE  
RECONSTRUCTION=NORMAL disk disk disk disk
```
8. Initialize the RAIDsets.

```
CLI > INITIALIZE name CHUNKSIZE = 16
```

(Refer to the Disk Storage Configuration section for more information.)
9. If a host-accessible logical unit needs to be created from the RAIDset, do the following:

```
CLI > ADD UNIT "unit name" "RAIDset name" WRITEBACK_CACHE
```

Disk Storage Configuration

Use the StorageWorks HSZ50 Array Controller Utility for DIGITAL UNIX to configure the HSZ50 controllers and disks as follows:

1. Configure the disks attached to the HSZ50 controllers as RAID-5 sets. There are 16 RAIDsets (each RAIDset consists of four 4.3 GB disks).
2. Compute the chunk size for the Oracle7 database using the following equation:

$$\frac{(db_block_size)*(\#_of_db_blocks_per_chunk)}{512} = chunk_size$$

$$\frac{(8192)*(1)}{512} = 16 \text{ disk blocks}$$

3. Set chunk size to 16 as calculated in Step 2 (based on a 8K db_block_size and having 1 db_blocks_per_chunk).
4. Enable the write-back cache option in the HSZ50 array controller. The write-back cache allocates cache memory to both read and write operations. This allows the I/O to report completion faster.

In this HiTest Suite, the database consists of distributed raw devices. Each volume is a four disk RAID-5 stripeset, on one of three HSZ50 Array Controller pairs. Configure the distributed raw devices to provide a primary path across three HSZ50 Array Controller pairs for data files, and a primary path across the remaining three HSZ50 Array Controller pairs for the index files. This configuration maximizes I/O access paths, while minimizing I/O contention for data load and data retrieval.

Operating System Installation

This section describes how to install the DIGITAL UNIX Version 4.0B operating system with all kernel options. Install DIGITAL UNIX, all appropriate DIGITAL UNIX subsets and the TruCluster software for TruCluster Production Server operation. Refer to the *DIGITAL UNIX Installation Guide* (order number: AA-QTLGA-TE).

Swap Space

Inadequate swap space might cause the Oracle application and many other system operations to function improperly, because DIGITAL UNIX maps the active virtual pages of each process to swap space. The response time and throughput of the system degrades rapidly if swapping occurs during processing.

Use the Deferred Swap Mode when installing DIGITAL UNIX, to reduce the amount of swap space required, and to reduce the system overhead required for mapping the address space during the creation of processes:

```
mv /sbin/swapdefault /sbin/swapdefault.old
```

Configuring Additional Swap Space

When installing DIGITAL UNIX, the primary swap space defaults to partition b, at the required size of *exactly* 128 MB. If you set the primary swap space to any other size, crash dumps will not be generated properly. A secondary swap space can be assigned during installation to enable complete crash dumps when using 8 GB of memory.

Create primary and secondary swap spaces on each system appropriate for your configuration. Configuring swap space greater than 2 GB is discussed in detail in *DIGITAL UNIX Release Notes*, for DIGITAL UNIX Version 4.0B (order number: AA-PS2BF-TE, July 1995).

Allocate swap space equal to one-to-three times the system physical memory space.

Assign additional swap space by including entries in `/etc/fstab` as the following example shows:

```
/dev/rz0b swap1 ufs sw 0 2
```

For this HiTest Suite, a secondary swap space of 1024 MB was assigned prior to installing DIGITAL UNIX. After installation, a third swap space of 3072 MB was added.

UNIX Kernel Parameters (/etc/sysconfigtab)

Table 3-2 lists the parameter settings used for the UNIX kernel. The settings listed are based on settings suggested in the *Oracle7 Server for Digital UNIX Installation and Configuration Guide* or refer to the *System Tuning and Performance Management Guide* (order number: AA-Q0R3E-TE) for the minimum (2 GB) and maximum (8 GB) memory configurations tested.

Use the DIGITAL UNIX `vmstat` and `iostat` commands and the ORACLE `utlbstat.sql` and `utlestat.sql` (based on V\$ views) to gather memory and I/O statistics as a guide for tuning DIGITAL UNIX.

The most significant areas of operating system tuning are as follows:

- Semaphores
- Unified buffer cache (UBC)
- Swap space allocation
- Shared memory

The essential parameters listed in Table 3-2 are as follows:

Virtual Memory (VM) Parameters

- These parameters control the allocation of pages in physical memory and track the pages being swapped. VM UNIX is used to set up physical memory limit. The UBC parameters hold the actual file data and file system activities. UBC and the VM subsystem share and compete for all the main memory and use the same physical pages.
- The UBC is separate from the ORACLE database buffer cache. If the UBC grows too big, the ORACLE database buffer cache will then be swapped. This has a significant performance impact.
- The UBC is dynamic and potentially uses all physical memory. The parameter values of *ubc-minpercent* and *ubc-maxpercent* are set to control the amount of physical memory the UBC can use.

TruCluster Production Server

Install and set up the TruCluster Production Server as follows:

1. Register the TruCluster Production Server Software Version 1.4 software license (TCR-UA).
2. Load and mount the Associated Products Volume 2 CD-ROM to `/mnt`.
3. Use the `setld -l /mnt/TCR141` command to load the TruCluster Production Server Software subsets. The installation procedure starts after the subsets are loaded.
4. Install all mandatory and optional subsets.
5. Enter the IP name and address for the cluster interconnect (Memory Channel).
6. Ensure that the system is in ASE 0 and enable the ASE logger.
7. Rebuild the kernel (automatically rebuilt).
8. Identify the shared SCSI buses.
9. Move the new kernel to the root file system.
10. Reboot the systems and use `asemgr` to add the ASE members.
11. Install TCR141 Patches (PATCHES.OSF_TCR1.4A-18SEP1997.TAR).

Table 3-2: UNIX Kernel Parameters

Parameter	Minimum Configuration Value	Maximum Configuration Value	Description
vm parameters			
vm-maxvas	1073741824	4292967296	Maximum virtual address space for user maps
vm-mapentries	400	400	Maximum # virtual map entries a user can have
ubc-minpercent	1	1	Minimum percentage of memory at which page-stealing from UBC is prohibited
ubc-maxpercent	2	2	Maximum percentage of memory that UBC can consume
new-wire-method	0	0	Set to off
gh-chunks	0	0	Zero disables gh_chunks
vm-page-lock-count	64	64	Controlling the virtual memory page lock handling
rt parameters			
aio-max-num	1024	1024	Maximum # of concurrent asyc I/O requests that the can be outstanding at any time
aio-max-percent	2	2	Maximum percentage of physical memory for the asyc I/O that database can occupy
proc parameters			
max-proc-per-user	1024	1024	Maximum limit of process a user can create
max-threads-per-user	1024	1024	Maximum limit of threads a user can create
max-per-proc-data-size	1073741824	42924967296	Maximum data size per process
max-per-proc-address-space	1073741824	42924967296	Maximum address space per process
ipc parameters			
shm-max	2139095040	2139095040	Maximum size of shared memory segment
shm-seg	32	32	Maximum attached shared segment per process
msg-max	8192	8192	Maximum size of single System V message
msg-mnb	16384	16384	Maximum size in bytes of single message queue
msg-mni	1024	1024	Maximum # of message queues at any point in time
msg-tql	4096	4096	Maximum # of messages that can be queued
sem-aem	16384	16384	Maximum adjustment can be made to semaphore
sem-mni	256	256	Maximum # of semaphore at any point in time
num-of-sems	200	200	# of semaphore in use
sem-msl	200	200	Maximum # of semaphores can be used by a single process
sem-opm	200	200	Maximum # of operations that can be outstanding
sem-ume	200	200	Maximum # of undo operations that can be outstanding
sem-vmx	32767	32767	Maximum integer value s semaphore is allowed
ssm-threshold	8 MB	8 MB	Minimum threshold to enable use of shared page tables (mutually exclusive with gh_chunks)

Available Service Environment (ASE) Services

The TruCluster Production Server includes the Available Server Environment and extends these features with the addition of the Distributed Raw Disk (DRD) Service. The implementation of a high availability system, as described in this document, requires the use of ASE services. The specific services used in this configuration were DRD and Network File System (NFS).

Distributed Raw Disk Service

The shared storage on which the common database resides is provided by the Distributed Raw Disk (DRD) service of DIGITAL UNIX TruCluster software. DRD service allows an application such as Oracle Parallel Server (OPS) to provide high-performance, parallel access to Oracle database storage media with fast failover from multiple cluster member systems. OPS is designed to take advantage of DIGITAL clustering technology for better scalability and availability than the single system product.

The requirements of DRD for the amount of overall storage required to support application, system, and database processes depend on the peak load of the critical applications and the expected growth with expansion for the future. The `asemgr` facility is provided to help assign physical storage (device/partition level) to DRD entity and node location of a DRD service.

When setting up the DRD service, consider the following:

- Plan to place data that is accessed by different instances on different DRD services. This can reduce memory channel traffic and Oracle PCM lock requirements.
- Use a symbol link to assign meaningful names to all the DRD devices to improve manageability.

Set up DRD services for cluster members using `asemgr`.

Table 3-3 lists the full DRD service configuration.

Table 3-3: DRD Service Configuration

DRD Service Name	Placement Policy	DRD Device Special File	Underlying Storage
rrz8	mcdepot4	/dev/rdrd/drd1	/dev/rrz8b
rrz8	mcdepot4	/dev/rdrd/drd3	/dev/rrz8c
rrz8	mcdepot4	/dev/rdrd/drd36	/dev/rrz8d
rrzb8	mcdepot5	/dev/rdrd/drd6	/dev/rrzb8c
rrzb8	mcdepot5	/dev/rdrd/drd12	/dev/rrzb8b
rrzb8	mcdepot5	/dev/rdrd/drd18	/dev/rrzb8a
rrzb8	mcdepot5	/dev/rdrd/drd31	/dev/rrzb8d
rrz9	mcdepot5	/dev/rdrd/drd9	/dev/rrz9b
rrz9	mcdepot5	/dev/rdrd/drd33	/dev/rrz9c
rrzb9	mcdepot4	/dev/rdrd/drd4	/dev/rrzb9c
rrzb9	mcdepot4	/dev/rdrd/drd10	/dev/rrzb9b
rrzb9	mcdepot4	/dev/rdrd/drd29	/dev/rrzb9d
rrzb9	mcdepot4	/dev/rdrd/drd39	/dev/rrzb9a
rrz10	mcdepot5	/dev/rdrd/drd8	/dev/rrz10c
rrz10	mcdepot5	/dev/rdrd/drd20	/dev/rrz10b
rrz10	mcdepot5	/dev/rdrd/drd30	/dev/rrz10d
rrz10	mcdepot5	/dev/rdrd/drd38	/dev/rrz10a
rrzb10	mcdepot5	/dev/rdrd/drd15	/dev/rrzb10a
rrzb10	mcdepot5	/dev/rdrd/drd16	/dev/rrzb10d
rrzb10	mcdepot5	/dev/rdrd/drd32	/dev/rrzb10c
rrz11	mcdepot4	/dev/rdrd/drd2	/dev/rrz11c
rrzb11	mcdepot5	/dev/rdrd/drd21	/dev/rrzb11a
rrzb11	mcdepot5	/dev/rdrd/drd23	/dev/rrzb11c
rrzb11	mcdepot5	/dev/rdrd/drd26	/dev/rrzb11d
rrz16	mcdepot4	/dev/rdrd/drd22	/dev/rrz16a
rrz16	mcdepot4	/dev/rdrd/drd24	/dev/rrz16d
rrz16	mcdepot4	/dev/rdrd/drd34	/dev/rrz16c
rrzb16	mcdepot4	/dev/rdrd/drd5	/dev/rrzb16c
rrzb16	mcdepot4	/dev/rdrd/drd11	/dev/rrzb16a
rrzb16	mcdepot4	/dev/rdrd/drd14	/dev/rrzb16d

System Installation and Setup

DRD Service Name	Placement Policy	DRD Device Special File	Underlying Storage
rrzc16	mcdepot5	/dev/rdrd/drd43	/dev/rrzc16b
rrzc16	mcdepot5	/dev/rdrd/drd44	/dev/rrzc16c
rrzc16	mcdepot5	/dev/rdrd/drd45	/dev/rrzc16d
rrz17	mcdepot5	/dev/rdrd/drd7	/dev/rrz17c
rrz17	mcdepot5	/dev/rdrd/drd17	/dev/rrz17d
rrz17	mcdepot5	/dev/rdrd/drd37	/dev/rrz17a
rrzc17	mcdepot5	/dev/rdrd/drd46	/dev/rrzc17b
rrz18	mcdepot5	/dev/rdrd/drd13	/dev/rrz18a
rrz18	mcdepot5	/dev/rdrd/drd19	/dev/rrz18d
rrz18	mcdepot5	/dev/rdrd/drd35	/dev/rrz18c
rrz19	mcdepot4	/dev/rdrd/drd40	/dev/rrz19b
rrz19	mcdepot4	/dev/rdrd/drd41	/dev/rrz19c
rrz19	mcdepot4	/dev/rdrd/drd42	/dev/rrz19d
rrzb19	mcdepot5	/dev/rdrd/drd25	/dev/rrzb19c
rrzb19	mcdepot5	/dev/rdrd/drd27	/dev/rrzb19a
rrzb19	mcdepot5	/dev/rdrd/drd28	/dev/rrzb19d

Network File Systems (NFS) Service

File system space is required by the applications, which are simultaneously executing across nodes, to maintain synchronization of the files used by applications across both nodes and to ensure that the files remain available to the surviving node during node failure cases.

The ASE NFS service provides shared file system services regardless of the underlying host location. The file system can be mounted and shared from both nodes through the ASE NFS service, which transparently migrates the services to an available host node. For more information on the NFS Service, refer to the *TruCluster Production Server Software Cluster Administration Guide* (AA-QL8NB-TE).

Table 3-4 shows the ASE Service Configuration information.

Table 3-4: ASE Service Configuration

Service Name	Placement Policy	NFS Exports	Underlying Storage
fs600_ase	balanced	/fs600	/dev/rrzb17c
oracle_ase	balanced	/oracle	/dev/rrzb18c

Application Installation

This section describes installing the Foundation Software and Appset Software including middleware, database software, and PeopleSoft Financials application software.

DIGITAL Layered Products

The full list of DIGITAL layered products in the PeopleSoft Oracle OPS TruCluster PS HiTest Appset appears in Table 2-1. Install these products using standard defaults.

Install system management products NetWorker Save and Restore (NSR) for DIGITAL UNIX and NSR Database Module for Oracle (DMO).

NSR must be installed before DMO; otherwise there is no preferred sequence for installation of these products. Follow the installation instructions for each product as well as the additional information provided in this section.

Note

To have the proper privileges, the user who performs the restores using the Oracle7 Enterprise Backup Utility must be included in the Operator Group set in `/etc/passwd`.

Setting Up NetWorker Save and Restore (NSR)

Use the NetWorker Administrator's utility, `nwadmin`, to set up NSR according to the *NetWorker Save and Restore Database Module for Oracle Administrator's Guide* (Order No. AA-QV9BB-TE).

- **Setting Up NetWorker Directives**

Set the NetWorker Directives for Oracle using the Directives window of the Customize pull-down menu in the NetWorker Administrator window.

To set Oracle directives, create the following directive named Oracle:

```
<</>>
forget
ignore
+obkasm:*
```

The Oracle directive will be associated with the client performing the backup/restore. The `obkasm` is a DMO-specific program that specifies how a set of files is to be backed up and recovered. This directive instructs the client to run `obkasm` on all files specified in the backup/restore.

The Oracle directive's instructions inform the process to:

<</>>	Start at root
forget	Forget previous directives
ignore	Ignore directives in the file system (.nsr files)
+obkasm:*	Run <code>obkasm</code> on all files under root (the + indicates all subdirectories)

System Installation and Setup

- **Setting Up a NetWorker Group**

Set up a single NetWorker Group for Oracle from the Groups window of the NetWorker Administrator Customize pull-down menu, according to the *DMO Administrator's Guide*. For example, set up one Group called Oracle to correspond with the environment variable NSR_GROUP used by the client processes using Oracle7 Enterprise Backup Utility.
- **Setting Up a NetWorker Client**

Set up NetWorker Clients for Oracle7 database backup from the Clients window of the Client Setup pull-down menu.

In the configuration tested, NetWorker Save and Restore and the database resided on a single system; therefore, it was defined using NetWorker Administrator. Depot 5 was specified as the client system name (this is where the database resides); and Oracle was specified as the directive; and as the group.
- **Setting Up Backup Schedules**

Set up backup schedules for NetWorker Save and Restore.
- **Setting Up NetWorker Volume Pools**

Set up a volume pool to include all tape volumes.
- **Setting Up NetWorker Save and Restore Server**

Set up the NetWorker Save and Restore Server to correspond with the settings in *Oracle Enterprise Backup Utility (OEBU)* for parallelism of five, according to the *NetWorker Administrator's Guide, UNIX Version* (Digital Equipment Corporation, Order No: AA-QH5CC-TE).

Table 3-5 shows the NSR Server Settings set up for a parallelism of two.

Table 3-5: NSR Server Settings

Item	Setting
Parallelism	2
Active Devices	1
Sessions per Device	2

Oracle Installation

This section describes Oracle installation. Be sure to install the Oracle Server software on a disk separate from the disk where DIGITAL UNIX is installed to eliminate I/O contention.

1. Install Oracle7 Server V7.3.3, the Parallel Query Option, PL/SQL, SQL*Plus, SQL*Net, and Oracle7 Enterprise Backup Utility using the Oracle Installer from the Oracle7 Server CD using standard defaults. Refer to *Oracle7 Installation Guide for DIGITAL UNIX* (order number: A44212-1).
2. Install the following Oracle patch on the Server:

Patch #510127 - TNS Authentication

Applying this patch allows the OEBU target database to be registered successfully as discussed in Chapter 6.

Oracle Initialization Parameters

The Oracle database instance is started using the parameter file to setup the System Global Area (SGA), database-wide defaults, database limit, control file structures, and to define various operating system parameters. In general, this initialization parameter file is named INIT.ORA or INITsid.ORA.

Table 3-6 shows the optimizations made to the Oracle7 server and database for PeopleSoft 6.0 Financial DEMO Database. The following are primary optimization parameters affecting tuning of Oracle performance:

- **db_block_size**

This parameter defines the size of an Oracle database block. In decision-support system applications, 32K block size would be a good choice. In online applications, a smaller block size should be chosen. DIGITAL chose 8K for block size.

- **db_block_buffers**

This parameter specifies the numbers of database buffers allocated to the database instance. The size of buffer cache is determined by multiplying db_block_size and db_block_buffers. Large buffer cache substantially reduces disk I/O and improves performance. Using the available memory to enlarge the buffer cache is usually good for performance. However, it is critical to leave 5% free memory on the system during peak load. If all memory on the system is used, the performance is likely to grind to a halt. The value of SGA is also decided by the number of database buffers. This is a significant tuning parameter.

- **shared_pool_size**

This parameter is used for storing shared SQL texts, PL/SQL blocks and data dictionary details. To tune the dictionary, set this value large enough to accommodate information about the dictionary, shared SQL statements, and session information; setting this value too large will hinder performance.

- **sort_area_size**

This is the memory that is allocated to each user process for sorting. This value will affect the performance of applications during query processing. Make sure this value is not increased to the point where swapping occurs. In general, sorting to disk is bad for performance. If temporary tablespace needs to be created for sorting, specify large table extents to allow sort_area_size of memory to be written to disk without throwing multiple extents. Usually the sort_area_size is set to 32K or 64K.

- **System Global Area**

The most important shared memory consideration is SGA. As mentioned previously, the size and number of database block buffers and the size of the Oracle shared pool affect the Oracle SGA. The other factors contributing to the SGA include the size of the data that will be cached into memory and database buffer cache hit ratio, which is the percentage of time that the request for data is resolved by memory versus reading from disk.

Enabling Process Limits for the Oracle DBA User Account

Edit the Oracle DBA User Account Process Settings to enable the use of larger parameter process values that are required for the Oracle 64-bit Option. For more information, see *Oracle7 Server for DIGITAL UNIX*. The following settings are an example using C shell. Refer to *Oracle7 Installation Guide for DIGITAL UNIX* (order number: A44212-1) for other shells.

System Installation and Setup

Using the UNIX C Shell, set each Oracle DBA user account .login file as follows:

```
limit datasize unlimited
limit stacksize unlimited
limit memoryuse unlimited
limit addresspace unlimited
```

Table 3-6: Oracle Parameter Optimization

Parameter	Minimum Configuration Value	Maximum Configuration Value	Description
db_block_size	8192	8192	Size of the Big Oracle Block (BOB).
db_block_buffers	16000	64000	This number should be maximized to provide the highest cache hit ratio without adversely affecting the memory requirements of other Oracle and system processes.
async_write	1	1	Enables the DIGITAL UNIX asynchronous I/O feature which allows the DB writer to perform multiple writes to multiple disks simultaneously without waiting for previous writes to finish.
sort_area_size	32768	32768	Memory area allocated to each process/thread performing sorts. This parameter should be maximized during intensive sort operations, such as index creation on large tables. This is highly sensitive to the parallel degree of the tables being sorted, as each thread will allocate this space.
sort_direct_writes	true	true	Setting this parameter will allocate memory in addition to the sort area to perform sort writes directly to disk, bypassing the buffer cache. Setting this parameter to auto disables the sort_write_buffer_size parameter.
sort_write_buffer_size	32768	32768	When sort_direct_writes is set to true, this parameter must be set to a value between 32768 and 131072, that is a multiple of 32768.
cache_size_threshold	1600	1600	This parameter controls the buffer cache space reserved for table scans. Tables with this or fewer Oracle blocks will be cached in the SGA during full table scans.
ccf_io_size	4194304	4194304	Determines the number of bytes per write when creating a contiguous file.
db_file_multiblock_read_count	16	16	Due to an Oracle limit of 128 KB per I/O, this parameter was set to 16: the maximum based on the formula $\text{max_io_size}/\text{db_block_size}$ (128 KB/8 KB).
shared_pool_size	419430400	419430400	This parameter affects the performance of the library cache (shared SQL and PL/SQL areas) and the dictionary cache. This parameter may be reduced if the cache hit ratio is not adversely affected. If cache misses are prevalent, the open_cursors parameter may need to be increased.
log_checkpoint_interval	100000000	100000000	Set sufficiently large number to disable time based checkpoints forcing checkpoints only to occur on log switches.

Setting Up the Oracle7 Enterprise Backup Utility

This section describes how to set up the Oracle7 Enterprise Backup Utility.

Before installing the Oracle7 Enterprise Backup Utility (OEBU), it is necessary to create a database to store the backup catalog as follows:

1. Setup SQL*NET for the catalog database BKCT and the target database FSDMO.
OEBU uses SQL*NET; therefore, appropriate entries must be made in tnsnames.ora and listener.ora.

The following are the entries in tnsnames.ora and listener.ora for the catalog database, BKCT, and the target database, FSDMO.

```
$ORACLE_HOME/network/admin/tnsnames.ora
```

```
FSDMO2.world=
  (DESCRIPTION=
    (ADDRESS=
      (PROTOCOL=TCP)
      (HOST=depot5)
      (PORT=1521)      )
    (CONNECT_DATA=
      (SID=PSF2)
      (GLOBAL_NAME=PSFT.world)      )      )
```

```
FSDMO.world=
  (DESCRIPTION=
    (ADDRESS=
      (PROTOCOL=TCP)
      (HOST=depot4)
      (PORT=1521)      )
    (CONNECT_DATA=
      (SID=PSF1)
      (GLOBAL_NAME=PSFT.world)      )      )
```

```
BKCT.world=
  (DESCRIPTION=
    (ADDRESS=
      (PROTOCOL=IPC)
      (HOST=depot5)
      (KEY=BKCT)      )
    (CONNECT_DATA=
      (SID=BKCT)
      (GLOBAL_NAME=BKCT.world)      )      )
```

```
*** /etc/listener.ora (depot5)***
```

```
LISTENER =
  (ADDRESS_LIST =
    (ADDRESS =
      (PROTOCOL = TCP)
      (Host = depot5)
      (Port = 1521)      )
    (ADDRESS =
      (PROTOCOL = IPC)
      (key = BKCT)      )      )
```

System Installation and Setup

```
STARTUP_WAIT_TIME_LISTENER = 0
CONNECT_TIMEOUT_LISTENER = 10
TRACE_LEVEL_LISTENER = 16
trace_directory_listener=/tmp
SID_LIST_LISTENER =
  ( SID_LIST =
    (SID_DESC =
      (SID_NAME = PSF2)
      (ORACLE_HOME = /oracle/app733)
      (PROGRAM=oracle)      )
    (SID_DESC =
      (SID_NAME = BKCT)
      (ORACLE_HOME = /oracle/app733)
      (PROGRAM=oracle)      ) )

*** $ORACLE_HOME/network/admin/listener.ora (depot4)***

LISTENER =
  (ADDRESS_LIST =
    (ADDRESS =
      (PROTOCOL = TCP)
      (Host = depot4)
      (Port = 1521)      ) )
STARTUP_WAIT_TIME_LISTENER = 0
CONNECT_TIMEOUT_LISTENER = 10
TRACE_LEVEL_LISTENER = 16
trace_directory_listener=/tmp
SID_LIST_LISTENER =
  ( SID_LIST =
    (SID_DESC =
      (SID_NAME = PSF1)
      (ORACLE_HOME = /oracle/app733)
      (PROGRAM=oracle)      ) )
```

2. Start the SQL*Net listener:

```
lsnrctl start
```
3. Create database BKCT to store the backup catalog.
4. Install the OEBU executables using the Oracle Installer. Do this after NSR and DMO are installed because it has to link against them. During installation, select "Legato NetWorker" as the third-party media management software vendor and enter /usr/shlib as the directory path for the NetWorker API library.
5. Register the target database in the catalog using the OBACKUP REGISTER operation. For a full discussion of installing OEBU, see *Oracle7 Enterprise Backup Utility™ Installation Guide for DIGITAL UNIX, Release 2.1.0.1.2* (January 1996, Oracle Corp., Part No. A45307-1).

Planning the Oracle Database

Implementation of a shared database using the Oracle Parallel Server (OPS) on a DIGITAL UNIX TruCluster requires some special considerations to ensure the proper and efficient use of the application. Consider the following when planning the database:

- Distributed Raw Disk Ownership

Distributed Raw Disk (DRD) ownership is critical to OPS. Oracle users on each node must own the DRDs.

- Raw Disk Handling Considerations

Oracle OPS requires the use of raw devices: implementing the database using raw devices takes advantage of DIGITAL UNIX and Oracle asynchronous I/O capability. The amount of overall disk storage required to support PeopleSoft applications depends on the volume of data in the database, the database processes during peak load, as well as the expected growth and expansion over time. When using an Oracle application, it is advisable to spread Oracle database files over as many disks as possible.

Consider the following when setting up the raw disk:

- Use RAID controllers. This Suite had the disks set up as RAID-5 sets at the hardware level using the HSZ50 array controllers. RAID-5 provides disk striping with distributed parity, but provides only the capacity of $n-1$ devices, where n = Number of RAIDset members. For example, four 4.3 GB drives have a 12.9 GB RAID-5 capacity.
- When possible, spread system disk, database tables, indexes, and Oracle redo logs across physically separate raw disks.
- Plan to place data to raw disks on different SCSI Buses and HSZ controllers. This reduces I/O contention.
- Do not place backup on the same disk that was used to store database files.
- Based on the growth rate, minimize the number of extents (less than 5) in the storage clauses to improve performance and to avoid disk fragmentation.
- Use a symbol link to assign meaningful names to all the raw disks to improve manageability.
- Watch all the symbol links for all the disk partitions and make sure that there are no duplications for any disk partitions.
- During database creation, or when altering tablespace and datafiles once the database is created, make sure that the symbolic link does not point to a disk partition that is already being used. Oracle knows the file by the link name and will not detect any overwriting of data to the same file (raw device), which can corrupt existing database datafiles.

An example of how the raw disk was setup and partitioned is shown in Chapter 4.

- Tablespace Configurations

Separating table and indexes helps performance by allowing concurrent reads of indexes and their associated table data while minimizing I/O contention. Placing the indexes in their own tablespaces allows the assignment of Parallel Cache Management (PCM) locks specific to data files in that tablespace. This helps to reduce possible block pinning.

System Installation and Setup

Consider the following when configuring tablespaces:

- For better performance, place the tablespaces on separate disks.
- Balance the I/O load by storing some heavily accessed tables in the same tablespace as some of those less commonly accessed.
- Place each tablespace into a single data file and make sure the data file is contiguous on the disk.
- Put indexes in a tablespace separate from data.
- Try to put the tablespaces for an index on a different disk from the one that holds the index's table.
- Spread a large table across multiple raw disks if randomly accessed to reduce I/O contention.
- Base logical data separations on a business function to evenly distribute workload and I/O across the system.

An example of tablespaces created for this HiTest Suite is presented in Chapter 4.

- Temporary Tables

Temporary tables are used for sorting. Consider the following when creating temporary tables:

- Create tablespace for temporary tables on its own disk
- Increase `sort_area_size` to support large sort operations

- Redo Logs

Each instance must have a unique set of redo logs, but they must be accessible by the other nodes in the Parallel Server to maintain integrity during an instance or node failure. One of the remaining instances will detect the failure and apply the failed instance's redo log to the database to provide consistency across the shared database. Hence, the redo logs for both instances must be placed on DRDs of the shared storage.

Each instance is assigned a thread number and each redo log group is enabled for a specific thread. There is a slight performance benefit in using local DRDs when configuring for a given instance, so each node is the server for DRDs used for the instance's redo logs.

The commands for adding the redo threads for an additional instance are as follows:

```
alter database add logfile thread 2
    '/oracle/links/LOGA_2' size 50M reuse,
    '/oracle/links/LOGB_2' size 50M reuse,
    '/oracle/links/LOGC_2' size 50M reuse;
alter database enable public thread 2;
```

Consider the following when setting up redo logs:

- A minimum of two redo log files per instance is required, but will get the best performance if three redo logs are created.
- Place all redo log files on their own disk and controller.
- Do not put a redo log file on the same disk as a database file. If your system does not have a spare disk to hold the log files, place the redo log file on the same disk as the index data files.

There is usually no advantage in having the three redo log files on separate disks unless you are running in archive log mode and experiencing I/O bottlenecks on the redo log disk. Then, you may benefit from placing the log files on different disks so that one file is being written while another is being archived.

The redo logs for this HiTest Suite are presented in Chapter 4.

- **Rollback Segments**

Rollback segments are created in the tablespace and assigned to the instance using Oracle initialization parameter `ROLLBACK_SEGMENTS` (in `INIT.ORA`), which should be in the instance-specific Oracle parameter file.

Consider the following when setting up rollback segments:

- Every rollback segment created must have at least two extents.
- To cache rollback segments, make them small. Creating many small rollback segments for online applications will provide better performance.
- Consider dropping and recreating (many small segments) before online processing.
- Batch job and transactions that are long running or change a lot of data need a larger rollback segment.
- To hold rollback segments using a raw disk, place the rollback tablespace in its own disk and controller.

The creation of one tablespace per instance (node) is not a requirement, but was used in testing this HiTest Suite to allow each instance private rollback segments that would produce only local DRD access. This slightly more optimal I/O path is likely to produce benefits in an update-intensive environment. One tablespace for each instance is created to hold rollback segments using a local DRD. Then, rollback segments are created in the tablespace and assigned to the instance using the Oracle initialization parameter `ROLLBACK_SEGMENTS` (in `INIT.ORA`), which should be in the instance-specific Oracle parameter file.

- **Control Files**

The control files need to be accessed by all instances in the Oracle Parallel Server Environment. To meet this requirement, distribute files across two separate DRDs, that are served by different cluster nodes and use two unique storage controllers. A minimum of two files should exist per database.

- **Database Creation**

The process used to create the database for this HiTest Suite is discussed in Chapter 4.

PeopleSoft Installation

Install the following PeopleSoft software and Windows 95 software on the PC using instructions in the *Installation and Administration for Oracle*:

- PeopleSoft Financials V6.0
- PeopleTools V6.01 (includes PeopleSoft Edition SQA Robot V5.1)
- SQA Test Foundation for Financials V6.0

Production Server Environment Failover Setup

The TruCluster Production Server software automatically reassigns services being provided by an original node (member node currently providing services) to a surviving node (another member node within the TruCluster Production Server Environment), whenever a significant failure is detected on the original node. This automatic reassignment is called *failover*. All Production Server Environment member nodes and the clients must be setup for *failover* to execute properly.

Failover Setup for Member Nodes

The following procedure outlines the steps necessary for setting up ASE member nodes for *failover* operation:

1. Create Oracle and application file systems on shared disk storage allowing NFS to access these file systems from both nodes. This is required to implement failover.
2. Ensure that the group id for the Oracle accounts on both hosts in the cluster are configured identically.

Note

Steps 3 and 4 allow the Oracle listener to be started correctly during a service relocation/failover.

3. Copy the listener.ora file of the NFS Shared Volume (depot4) to /etc/listener.ora of the surviving (depot5) node through the Oracle shared disk as follows:

```
cp $ORACLE_HOME/network/admin/listener.ora /etc/listener.ora
```

4. Edit/modify the /etc/listener.ora file as follows to reflect surviving local node, which sets the host name to the surviving local node:

```
LISTENER =
  (ADDRESS_LIST =
    (ADDRESS =
      (PROTOCOL = TCP)
      (Host = depot5)
      (Port = 1521)))
STARTUP_WAIT_TIME_LISTENER = 0
CONNECT_TIMEOUT_LISTENER = 10
TRACE_LEVEL_LISTENER = 16
trace_directory_listener=/tmp
SID_LIST_LISTENER =
  (SID_LIST =
    (SID_DESC =
      (SID_NAME = PSF1)
      (ORACLE_HOME = /oracle/app/oracle/product/7.3.2)
      (PROGRAM=oracle)))
```

By default, the listener will use the following file when it starts up on depot4:

```
$ ORACLE_HOME/network/admin/listener.ora
```

This allows depot4 to correctly start the listener; however, if consistency is desired, this file can be copied to /etc/listener.ora on depot4.

Failover Setup for Clients

The following procedure provides the setup and configuration instructions needed to make failover work for the PeopleSoft clients. Both the Oracle Server and the PeopleSoft Clients must be configured.

1. On the Oracle side, the database name for the original node (depot4) is fsdmo. Create the database alias name fsdmo2 for the surviving node (depot5) in the psdbowner table on the ASE Oracle Parallel Server using the following SQLPLUS command:

```
insert into psdbowner value ('fsdmo2','ps');
commit;
```

2. Edit tnsnames.ora and add the following entry for the new fsdmo2 alias name as follows:

```
cd $ORACLE_HOME/network/admin
```

```
Fsdmo2.world=(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)
(HOST=depot5)(PORT=1521)(CONNECT_DATA=(SID=PSF1)
(GLOBAL_NAME=PSFT.world)
```

Note

Steps 3 and 4 build two connection entries into tnsnames.ora file in the following directory:

```
C:\ORAWIN95\NETWORK\ADMIN
```

3. On the PeopleSoft client, click SQLNet Easy Configuration from Windows 95. To build a connection to the original node (depot4), enter the following using the SQL*Net Easy Configuration window:

Add Database Alias:	FSDMO
Choose Protocol:	TCP/IP
Choose TCP/IP Hostname:	DEPOT4
Database Instance:	PSF1

4. Build a connection to the surviving node (depot5) by entering the following from the SQL*Net Easy Configuration window:

Add Database Alias:	FSDMO2
Choose Protocol:	TCP/IP
Choose TCP/IP Hostname:	DEPOT5
Database Instance:	PSF1

5. Configure the Signon window for the PeopleSoft client as follows:

a) Click PeopleSoft PT 6 - Oracle ➔ Configuration Manager.

b) Enter the Database Name as FSDMO or FSDMO2 to setup for the Signon Window in the next step.

System Installation and Setup

6. Make the PeopleSoft Signon Window a shortcut to run:
C:\FS600\bin\pstools.exe.
7. Choose Database Name as FSDMO2 to log into surviving node (depot5) and enter Database Name FSDMO for the original node (depot4).
8. Restart the PeopleSoft workstation before running the PeopleSoft Signon window for logging into the ASE Oracle server.

Interoperability Tests and Results

This chapter describes how the tests were set up (including database organization), what data and programs were placed on what disks, and how the tests were run.

This chapter describes:

- Test Environment
- Test Tools
- Test Configuration
- Test Process and Results

Overview of Results

Interoperability testing was performed successfully on the PeopleSoft Oracle OPS TruCluster PS DIGITAL UNIX AlphaServer 4100 HiTest Suite. Within the PeopleSoft Financials, the Asset Management, Accounts Payable, Accounts Receivable, and General Ledger modules were tested. Generally, the tests verified that the business processes functioned as expected. Overall test results and anomalies noted during testing are presented in the comment column of the test summary table associated with each PeopleSoft test.

Additionally, failover testing was performed to demonstrate that the TruCluster Production Server test configuration provided error-free, uninterrupted, system and application performance in the presence of hardware failures. Tests demonstrated successful failover with no impact on system or application performance.

Test Environment

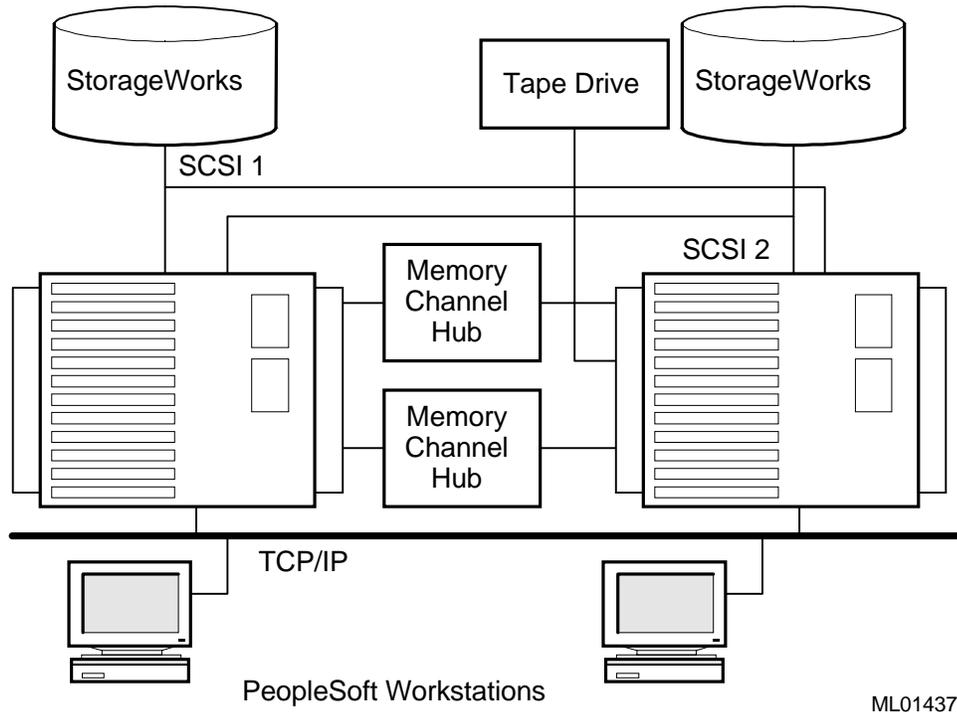
Figure 4-1 shows the PeopleSoft Oracle OPS TruCluster PS DIGITAL UNIX AlphaServer 4x00 test environment. Appendix A shows detailed configuration information.

Test Tools

The tools used for interoperability testing were two PeopleSoft workstations and test scripts. Test scripts were run on the PeopleSoft workstations to load and populate the test database. The PeopleSoft workstations were PCs running Windows 95 with:

- PeopleSoft Online Financials V6.0
- PeopleTools V6.01 (including PeopleSoft Edition, SQA Robot V5.1) and SQA Test Foundation for Financials V6 available through Rational Software Corporation
<http://www.rational.com/products/testfoundation/>
- SQL*Net V2.3
- Microsoft Word V6.0, and Microsoft Excel V6.0

Figure 4-1: Test Environment



Test Configuration

The test load was generated from database creation, benchmark kit load, and client system input (Windows 95 PC). The minimum and maximum hardware configurations each have two AlphaServer 4x00 systems configured as a TruCluster Production Server Environment. PC workstations provide the operator interface for populating the database, performing financial transactions, and initiating financial queries to the database.

Minimum Hardware Configuration

The minimum configuration includes two AlphaServer 4x00 systems, each having a single 466 MHz CPU with 4 MB cache, 1 GB memory, and 21.5 GB of local storage. The systems are connected to database storage (16 RAID-5 sets with four 4.3 GB disks in each set).

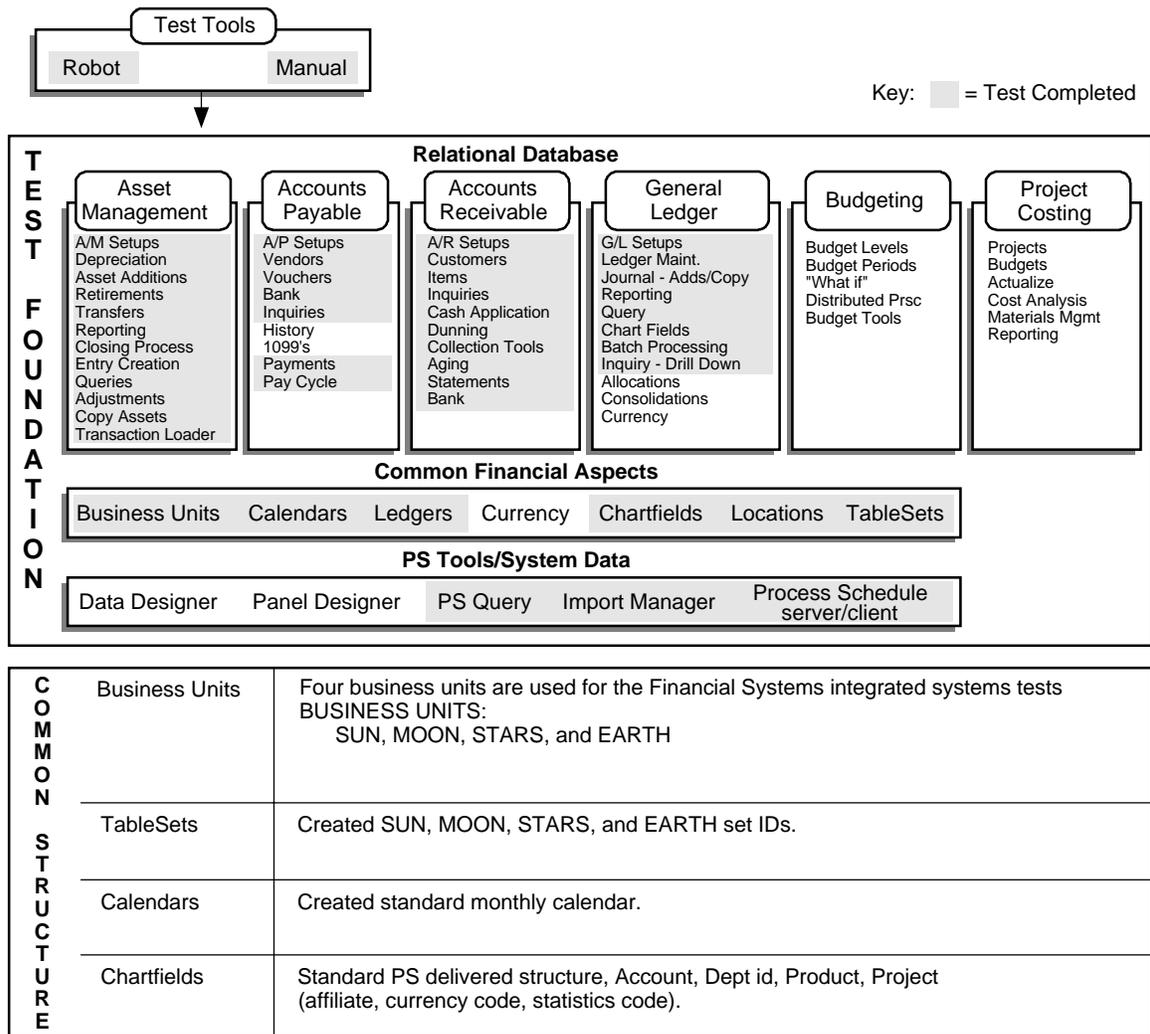
Maximum Hardware Configuration

The maximum configuration includes two AlphaServer 4100 systems, each having four 466 MHz CPUs with 4 MB cache, 4 GB memory, and 21.5 GB of local storage. Both systems are connected to the same amount of database storage (shared) as the minimum configuration.

PeopleSoft Financials System Configuration

Figure 4-2 shows the financial system configuration used for this HiTest template. Shaded areas indicate areas tested.

Figure 4-2: PeopleSoft Financials System Configuration



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File System and Database Storage Map

The file system and database storage map for the maximum and minimum configurations tested is shown in Table 4-1. Performance considerations discussed in Chapter 3 guided the placement of the data files. The database consists of distributed raw devices. Each volume is a four disk RAID-5 stripeset, on one of two HSZ50 Array Controller pairs.

As shown in Table 4-1, the data files are primary pathed across two HSZ50 Array Controller pairs, while the index files are primary pathed across a separate set of two HSZ50 pairs. All file space is evenly dispersed across all HSZ50 Array Controller pairs. This configuration maximizes I/O access paths, while minimizing I/O contention for data load and data retrieval.

Table 4-1: File Systems and Database Storage Map

SYSTEM SCSI BUS	
System Controller	
/dev/rrc8c:	/backup
/dev/rz24a:	SYSTEM DISK
/dev/rz24b:	/usr
/dev/rz24c:	/var
/dev/rz43c:	/Oracle
SCSI BUS #1	
HSZ50 Controller 1	
/dev/rrz8b:	SYSTEM
/dev/rrz8c:	PSTEMP
/dev/rrzb8a:	INLARGE
/dev/rrzb8c:	ARAPP
/dev/rrzb8d:	BDAPP
/dev/rrz9c:	PSINDEX
/dev/rrzb9c:	AMAPP
/dev/rrzb9d:	BIAPP
/dev/rrz10d:	OMLARGE
/dev/rrc8c:	/backup
HSZ50 Controller 2	
/dev/rrz10c:	ARAPP
/dev/rrz10a:	CTL-2
/dev/rrzb10c:	FSAPP1
/dev/rrzb10a:	FSLARGE
/dev/rrzb10d:	GLAPP
/dev/rrzb11a:	PCAPP
/dev/rrzb11c:	POAPP
/dev/rrz11c:	PSRBS
/dev/rrzb11d:	PTAPP
SCSI BUS #2	
HSZ Controller 1	
/dev/rrzb16d:	FSAPP
/dev/rrz16c:	GLLARGE
/dev/rrz16a:	PCLARGE
/dev/rrz16d:	POLARGE
/dev/rrzb17c:	FS600
/dev/rrz17a:	CTL-1
/dev/rrz17c:	APLARGE
/dev/rrzb16a:	BILARGE
/dev/rrzb16c:	AMLARGE
HSZ Controller 2	
/dev/rrz19b:	REDO1 LOGA_1
/dev/rrz19c:	REDO1 LOGB_1
/dev/rrz19d:	REDO1 LOGC_1
/dev/rrz18c:	ARLARGE
/dev/rrz18a:	BDLARGE
/dev/rrz17d:	INAPP
/dev/rrz18d:	OMAPP
/dev/rrzb18c:	ORACLE
/dev/rrzb19a:	PTPRC
/dev/rrzb19c:	PSIMAGE
/dev/rrzb19d:	PTTBL

Tablespace Configurations

Based on the raw disk handling considerations and tablespace configuration considerations discussed in Chapter 3, the tablespaces for Asset Management (AM), Accounts Payable (AP), Accounts Receivable (AR), General Ledger (GL), other financial applications (BI, PC, BD, PO, IN, OM), and associated indexes were created to the partitions of the raw disks.

Separating tablespaces and indexes helps performance by allowing concurrent reads of indexes and their associated table data while minimizing I/O contention. Table 4-2 lists the tablespace name, symbolic link name and the size of the Oracle database files.

Table 4-2: Tablespace Configurations

Tablespace	Datafile Name (link)	Size (MB)
SYSTEM	/oracle/links/SYSTEM	200
SYSTEM secondary entry	/oracle/links/SYSTEM2	1000
PSRBS	/oracle/links/PSRBS	750
PSRBS2 secondary entry	/oracle/links/PSRBS2	1000
AMAPP	/oracle/links/AMAPP	90
AMLARGE	/oracle/links/AMLARGE	50
PSTEMP	/oracle/links/PSTEMP	600
APAPP	/oracle/links/APAPP	50
APLARGE	/oracle/links/APLARGE	50
ARAPP	/oracle/links/ARAPP	50
ARLARGE	/oracle/links/ARLARGE	80
BIAPP	/oracle/links/BIAPP	50
BILARGE	/oracle/links/BILARGE	50
BDAPP	/oracle/links/BDAPP	80
BDLARGE	/oracle/links/BDLARGE	50
FSAPP	/oracle/links/FSAPP	200
FSAPP!	/oracle/links/FSAPP1	150
FSLARGE	/oracle/links/FSLARGE	50
GLAPP	/oracle/links/GLAPP	140
GLLARGE	/oracle/links/GLLARGE	90
GLLARGE2 secondary entry	/oracle/links/GLLARGE2	3000
INAPP	/oracle/links/INAPP	50
INLARGE	/oracle/links/INLARGE	50
OMAPP	/oracle/links/OMAPP	150
OMLARGE	/oracle/links/OMLARGE	50
PCAPP	/oracle/links/PCAPP	50
PCLARGE	/oracle/links/PCLARGE	50
POAPP	/oracle/links/POAPP	50
POLARGE	/oracle/links/POLARGE	50
PTPRC	/oracle/links/PTPRC	50
PTAPP	/oracle/links/PTAPP	100
PSIMAGE	/oracle/links/PSIMAGE	500
PTTBL	/oracle/links/PTTBL	1200
PSINDEX	/oracle/links/PSINDEX	2500
TRAPP	/oracle/links/TRAPP	50
CPAPP	/oracle/links/CPAPP	50
MGAPP	/oracle/links/MGAPP	90

Interoperability Tests and Results

Redo Logs

A minimum of two redo log files per instance is required; however, three redo logs provide the best performance. The redo logs listed in Table 4-3 were created using the guidelines discussed in Chapter 3.

Table 4-3: Redo Logs

File name (link)	Size (MB)
/oracle/links/LOGA_1	50
/oracle/links/LOGB_1	50
/oracle/links/LOGC_1	50
/oracle/links/LOGA_2	50
/oracle/links/LOGB_2	50
/oracle/links/LOGC_2	50

Test Process and Results

Interoperability testing of the PeopleSoft Financials with Oracle, TruCluster ASE, DIGITAL UNIX, and AlphaServer 4x00 systems included:

- Creating the PeopleSoft Database
- Populating the Asset Management Database (Database Load)
- PeopleSoft Asset Management (AM) Tests
- PeopleSoft Accounts Payable (AP) Tests
- PeopleSoft Accounts Receivable (AR) Tests
- PeopleSoft General Ledger (GL) Tests
- Failover Tests

In each of these test sequences, the appropriate functions were executed, then queries were made to the database to verify the functions executed as expected. Printouts resulting from each of the queries demonstrate test performance.

Additionally, failover testing was performed to verify that the TruCluster Production Server Environment functioned as required to maintain operational status through physical system failures. Several tests were performed to demonstrate failover capability.

Database Load

To create a PeopleSoft database means to create either a Demo database or a SYS database. The SYS database is a complete application and contains only the default, such as PeopleSoft chartfield tables, Account, DeptID, Product, ProjectID, panels, reports and so forth. The Financial Systems Demonstration Database (FSDMO) is a database with demonstration data included.

PeopleSoft Database Creation

Based on all the considerations on DIGITAL UNIX and Oracle configuration and setup, the major steps used to create the PeopleSoft FSDMO database were as follows:

1. Database scripts were created on the PeopleSoft workstation. The database creation scripts used are detailed in Appendix B.
2. The database creation scripts were transferred to the Oracle server.

3. The FSDMO database was created with various tables on the Oracle server using the database creation scripts.

Note

The Data Mover executes SQL statements against the PeopleSoft database, archives PeopleSoft tables or databases, and moves PeopleSoft databases across systems, database platforms, and hardware platforms.

4. The Data Mover scripts generated in Step 1 were run on the PC client to create the database structures and populate the appropriate tables with the following procedure:
 - a) Run PSDMT.EXE from C:\FS600\BIN directory.
 - b) Run the FSDMOORA.DMS script from C:\FS600\SCRIPTS directory.

Note

It takes about an hour with this DIGITAL HiTest system to create the PeopleSoft FSDMO database tables on the DIGITAL UNIX Oracle server.

5. The operator name and password (VP1/VP1) were defined and setup on the PC to signon to the FSDMO database.
6. The batch Micro Focus COBOL and SQR were compiled and setup on the Oracle server. For most of the background processes such as GL batch jobs, PeopleSoft uses Micro Focus COBOL and SCRIBE Structure Query Report Writer (SQR). SQR is a flexible SQL reporting language.
7. The Process Scheduler was setup on the Oracle server. The Process Scheduler provides a set of database tables and online panel, which users can use to define all of their offline batch processing programs and jobs (such as GL posting, GL editing and SQR). These functions allow the Process Scheduler to integrate with the online system, allowing the end users to have control of the reports and offline update processes. Instruction for setting up and starting the Process Scheduler are as follows:

- a) Go to home directory:
`cd $PS_HOME/bin`

- b) Setup the pspt.in file as follows:
ORACLE
FSDMO
VP1
VP1
PSUNX

- c) Start the process scheduler using the following command:

```
./pspt
```

PeopleSoft Financials

The SQA Test Foundation for PeopleSoft Financials V6 was used extensively for implementing and testing PeopleSoft applications.

The Financial Setup (FS) project of the SQA Test Foundation for PeopleSoft Financials sets up the common financial data for the financial applications required for testing each of the PeopleSoft Financials applications.

The SQA Test Foundation for PeopleSoft Financials includes a Financial Setup project and individual projects for each of the four main applications tested: Asset Management (AM), Accounts Payable (AP), Accounts Receivable (AR), and General Ledger (GL). The Test Foundation project provides a start to finish set up and feature test of each PeopleSoft financial application.

The transaction and processing flow of these projects were designed to simulate the normal monthly or other period processing. This flow follows a simple transaction, process, report, and verification structure. Records are entered (journals, vouchers, and so on) using PeopleSoft panels or import SQR as they are in your business environment, and then processing is verified with several types of tests (queries), including report tests.

Financial Setup

The FS project was used to set up setids, business units (Sun, Moon, Stars, and Earth), chartfields (departments, products and projects), calendars, account templates, and the other common data required for testing each of the PeopleSoft Financials applications. The functions performed by the Financial Setup project and results of the tests conducted are presented in Table 4-4.

Table 4-4: Financial Setup Project Function and Test Results Summary

Process	Function	Task	Comment
Financial Setup	Define General Options	Establish Tableset Id Set Record Group Controls Establish Business Units	Successful - Established General Ledger Business Units: Sun, Moon, Stars, and Earth. Established "Actuals" Ledger for Sun, Moon, Stars, and Earth.
		Define Operator ID Source Preferences	Successful - Seven different journal source codes defined: AM, AP, AR, INV, PC, PO, and BI.
	Chartfields	Define Statistical Codes	Successful - Defined Codes DAY, FLS, and WS.
		Establish General Ledger Chart of Accounts	Successful.
		Add four Interunit Open Item Accounts and Assign to each Business Unit	Successful.
		Establish five different Office/Physical Locations	Successful - Defined Locations: CA, FLA, MA, NY, and TX.
		Establish Projects and Project Codes	Successful.
		Establish Products and Product Codes	Successful.
		Establish Departments/Cost Centers and Assign Responsible Managers	Successful.
		Create Calendar and Expand to Year 2050	Successful.

Interoperability Tests and Results

Process	Function	Task	Comment
Financial Setup (Continued)	Asset Management Business Setup	Establish two Books, Corp & Federal, for the Asset Management Application	Successful - Corporate and Federal books established.
		Establish four Asset Management Business Units	Successful - Established Sun, Moon, Stars, and Earth business units.
	Accounts Payable Business Setup	Link Data Designer to Structure Procurement Options	Successful.
		Add Accounting Entry Templates for Standard and Alternate Accounts	Successful.
		Define Payment Handling Codes	Successful.
		Link Structure Procurement Options to Manage Bank Accounts	Successful.
		Define all Records to Bank Accounts and Payment Methods	Successful.
		Add Bank Credit Ratings. (Moody's/S&P)	Successful.
		Link Manage Banks to Define General Options	Successful.
		Define Bank Locations	Successful.
		Link Define General Options to Manage Banks	Successful.
		Define Banks Accounts/Payment Methods	Successful.
		Link manage banks to define general options	Successful.
		To define Journal Generator Templates for A/P Accruals, Pmts, Close, Cash Clear, Re-value, Cancel payments	Successful.
		Define Journal Generator Templates for A/P Accruals	Successful.
		Define Journal Generator Templates for A/P Payments	Successful.
		Define Journal Generator Templates for A/P Closures	Successful.
		Define Journal Generator Templates for A/P Cash Clearing	Successful.
		Define Journal Generator Templates for A/P Re-value	Successful.
		Define Journal Generator Templates for A/P Canceled payments	Successful.
		Define Accounting Entry Template	Successful.
		Link General Options to Define Business Units	Successful.
		Define Payables acctg options for Sun, Moon, Stars, and Earth	Successful.
Setup Business Units in A/P for Sun, Moon, Stars, and Earth	Successful.		

Interoperability Tests and Results

Process	Function	Task	Comment
Financial Setup (Continued)	Acct Rec Business Setup	Links Data Designer to AR to establish BU	Successful.
		Establish AR business units	Successful - Established Sun, Moon, Stars, and Earth business units.
	Panel Test Setup	Link Panels to Design Chartfields	Successful.
		Perform Account Panel Property Tests	Successful.
		Perform Department Panel Property Tests	Successful.
		Perform Product Panel Property Tests	Successful.
		Perform Project Panel Property Tests	Successful.

Asset Management Tests and Results

The Asset Management project of the SQA Test Foundation for PeopleSoft Financials was used to set up the common financial data for the Asset Management project functions. Then, Asset Management functionality was tested using DIGITAL Scripts and queries to execute volume tests to add, copy, adjust, transfer, retire, reinstate, and depreciate assets. Then Queries of the database were executed to process the data and generate reports.

Asset Management Test Foundation Tests

Testing performed by the Asset Management Project is outlined in Table 4-5.

Table 4-5: Asset Management Test Foundation Tests and Results Summary

Process	Function	Task	Comment
SQA Test Foundation	Asset Management Setup	Load Depreciable Asset Category Tables	Successful - Created accounts for automobiles, building, furniture and fixtures, leasehold improvements, machinery and equipment, and computers.
		Load Non-depreciable Asset Category Tables	Successful - Created account for Land.
		Load Asset Class Tables	Successful - Created accounts for truck, car, hardware, and software.
		Load Asset Profile Tables	Successful - Defined financial properties of each asset: value method, depreciation method, asset life, and so on.
		Define Capital Planning Project Types	Successful - Created capital and expense accounts.
		Load Capital Planning Plans	Successful - Loaded projected costs for hardware, software, building improvements, training, relocation, office supplies, and so on.
		Load General Generator Templates	Successful - Provided user interface panels to be used to add, adjust, retire, transfer, recategorize, and depreciate assets.
		Load Account Entry Templates	Successful - Provided mapping of GL accounts to AM Asset Types.
		Establish Asset Mgt Run Control	Successful.

Interoperability Tests and Results

Process	Function	Task	Comment
SQA Test Foundation (Continued)	Transaction Processing (Loads Historical Data)	Set Date Defaults for Historical Data	Successful.
		Perform an Express Add using each Profile	Successful - Added asset information (ID, cost, department, product and project information) to each asset profile.
		Perform an Express Add to Add General Assets	Successful - Created 59 asset variants based on asset information for each asset profile.
		Perform an Express Add to Add Assets with Accumulated Depreciation	Successful - Loaded depreciation information for each asset profile.
		Reset date for ongoing processing and process depreciation for all assets	Successful.
		Sets up Verification	Successful - Checked defaults of one asset. Checked depreciation of one asset (corporate) and verified the tax depreciation.
	Asset Maintenance (Monthly Transaction Processing)	Add Assets via Express Adds	Successful.
		Integrate Asset Retirements	Successful.
		Perform Chartfield Level Transfers	Successful.
		Perform Business Unit Transfers	Successful.
		Perform Cost Adjustments	Successful.
		Perform Copy Add Functions Copy a Historic Asset Copy a New Asset	Successful.
		Add and Asset with CAP	Successful.
	Add Parent/Child Assets Add Parent Shell Add Child Shell Add Child Assets	Successful.	
	Transaction Processing (Perform Processes and Closing)	Process Depreciation	Successful.
		Process Accounting Entries	Successful.
		Process AM Depreciation Close	Successful.
		Run Year End Reports Acquisitions Report Net Book Value Query Tax Net Book Value Verify Acquisition Rpt Verify Net Book Value Verify Tax Report	Successful.

Interoperability Tests and Results

Asset Management Volume Tests

DIGITAL Test scripts were used for volume tests of asset management functions to add, copy, adjust, transfer, retire, reinstate, and depreciate assets. Results of these tests are summarized in Table 4-6.

Table 4-6: Asset Management Volume Tests and Results Summary

Process	Function	Task	Comment
AM Volume Tests	Asset Maintenance	Add Assets	Successful - On-Line express adds: 200 assets added.
		Add Assets with Accumulated Depreciation	Successful - On-Line express adds: 160 assets added with accumulated depreciation.
		Copy Assets	Successful - 200 Assets copied.
		Adjust Asset Cost	Successful - 150 Assets adjusted down.
		Transfer Assets	Successful - 150 Assets transferred within same business unit.
		Transfer Assets to another Business Unit	Successful - 150 Assets transferred to different business units.
		Retire Assets	Successful - 150 Assets retired.
	Depreciation Processing	Run Depreciation on Client	Successful - 2616 Transactions processed: depreciation processed for all assets, all business units.

Asset Management Database Query Tests

SQA Test Foundation for Financials was used to generate asset management closing reports. A description of the asset management queries performed and results summary are shown in Table 4-7.

Table 4-7: Asset Management Query Tests and Results Summary

Process	Function	Task	Comment
AM Queries	Inquiry on Add Assets added with accumulated depreciation	160 line, 5 column, 2 record join query	Successful - Run Time: Approx 2.5 sec
	Inquiry on Copied Assets	200 line, 5 column, 2 record join query	Successful - Run Time: Approx 2.8 sec
	Inquiry on Adjustments (asset cost adjustment)	150 line, 5 column, 1 record query	Successful - Run Time: Approx 2.0 sec
	Inquiry on Transfers Department Transfers Same Business Unit	24 line, 5 column, 2 record join, 2 item sort query	Successful - Run Time: Approx 1.2 sec
	Inquiry on Express Add Assets	200 line, 5 column, 1 record query	Successful - Run Time: Approx 2.7 sec
	Inquiry on Interunit Transfer	150 line, 7 column, 1 record join, 1 item sort query	Successful - Run Time: Approx 3.0 sec
	Inquiry on Retired Assets	150 line, 5 column, 2 record join query	Successful - Run Time: Approx 2.8 sec

Accounts Payable Tests and Results

The PeopleSoft Accounts Payable project of the SQA Test Foundation was used to setup and test Accounts Payable functionality. Additionally, extended tests were performed using DIGITAL Scripts and queries to test volume processing capabilities. Testing performed by the accounts Payable project and additional tests conducted to provide volume testing and queries of the Accounts Payable functionality are detailed in Table 4-8.

Table 4-8: Accounts Payable Test Process and Results Summary

Process	Function	Task	Comment	
Accounts Payable Financial Setup	Adds Remainder of AP Setup after Business Unit Setup	Link Data Designer to Structure Procurement Options	Successful	
		Add Speed Charts	Successful	
		Add Combination Edits Definition	Successful	
		Link Structure Procurement Options to Design ChartFields	Successful	
		Add combination Edits Rule	Successful	
		Add combination Edit Group	Successful	
		Link Design Chart Fields To Structure Procurement Options	Successful	
		Define Sales/Use Tax Authorities	Successful	
		Define Sales/Use Tax Rate Codes	Successful	
		Define EFT Payment Form at Codes	Successful	
		Define Contract Set Controls	Successful	
		Define Vendor set Controls	Successful	
		Define Vouchering Origins	Successful	
		Define Vendor Pay Group Codes	Successful	
		Link Structure Procurement Options to define Business Units	Successful	
		Define Payables Vouchering & Payment Options	Successful	
		Link Business Unit Definition to Vouchers	Successful	
		Create Voucher Posting Run Control	Successful	
		Link Vouchers to Payments	Successful	
		Create Payment Processing Run Control	Successful	
		Create Payment Posting Run Control	Successful	
		Link Payments to Journal Generator	Successful	
		Create Journal Generator Run Control	Successful	
		Link Journal Generator to Maintain Vendors	Successful	
		Adds Vendors	Add 50 Vendors	Successful
			Add a Vendor	Successful
			Link Maintain Vendors to Voucher Information	
	Adds Various Voucher Types	Create Voucher that Tests Voucher Balancing	Successful	
		Create Voucher & Correct that Voucher	Successful	
		Creates Voucher that Tests for Duplicate Invoice	Successful	

Interoperability Tests and Results

Process	Function	Task	Comment
Accounts Payable Financial Setup (Con't)		Create Vouchers with Various Discounts	Successful
		Creates Vouchers with Manual Payment	Successful
		Create Vouchers that Test Sales Tax	Successful
	Create Vouchers that Test Speed Charts	Create Vouchers Using a CSV file	Successful - 50 Vouchers Created
	Process Voucher and Payment Posting	Run Voucher Post	Successful
		Link Vouchers to Payments	Successful
		Run Voucher Payments	Successful
		Run Voucher Posting of Payments	Successful
		Link Payments to Journal Generator	Successful
		Run AP Journal Generator	Successful
		Link Journal Generator to Voucher	Successful
	Adds Various Voucher Types	Create a Voucher that does InterUnit	Successful
		Creates a Voucher and Test for Duplicate	Successful
		Creates a Voucher that Tests Freight	Successful
		Create Vouchers that Test Various Payment Terms	Successful
		Create Vouchers that Test Statistical Codes	Successful
		Create Vouchers that Test Statistical Accounts	Successful
		Link Vouchers to Contracts	Successful
		Create Voucher Master Contract	Successful
		Create Recurring Vouchers	Successful
		Link Contract to Vouchers	Successful
	Add, Unpost, Delete, and Close Voucher	Add a Voucher	Successful
		Run Voucher Post	Successful
		Run Voucher Unpost	Successful
		Run Voucher Delete	Successful
		Run Voucher Close	Successful
		Link Vouchers to Payments	Successful
	Processes Inquiries on Payments	Payment Inquiry	Successful
		Link Payments to Maintain Vendors	Successful
		Vendor Inquiry	Successful
		Link Maintain Vendors to Voucher Information Voucher Inquiry	Successful
		Link Voucher to Payments	Successful

Process	Function	Task	Comment
Accounts Payable Financial Setup	Create Print Run Controls	Create Payment Report Run Control	Successful
		Link Payments to Maintain Vendors	Successful
		Create Vendor Report Run Control	Successful
		Link Maintain Vendors to Voucher Information	Successful
		Create Voucher Report Run Control	Successful
		Link Voucher to Payments	Successful
	Compare Reports to Master Report	Verify Payment Reports	Successful
		Link Payments to Maintain Vendors	Successful
		Verify Vendor Reports	Successful
		Link Maintain Vendors to Voucher Information	Successful
		Verify Voucher Reports	Successful
	Create Case Report Master Files	Create Case Report Master Files	Successful

PeopleSoft Accounts Receivable

The PeopleSoft Accounts Receivable project of the SQA Teat Foundation and DIGITAL Scripts were used to setup and test Accounts Receivable functionality. The functions that would normally be performed in Accounts Receivable were tested to demonstrate that these processes performed as expected in this HiTest Suite. Table 4-9 summarizes the PeopleSoft Accounts Receivable test structure and provides general test results.

Table 4-9: Accounts Receivable Test Process and Results Summary

Process	Function	Task	Comment
AR Setup & Transactions	AR Tables setup (Establishes AR General Options)	Define Accounting Entries	Successful
		Enable Automatic Numbering	Successful
		Link Journal Generator Template	Successful
		Set Operator Preference Default	Successful
	Establish AR Processing Options	Enter Processing Options: Aging Definition Collection Status Sales Person Collector Credit Analyst Deposit Type Distribution Code Group Type Origin Type Statement ID Letter Code Dunning Definition Entry Type & Reasons Item Entry Type Automatic Entry Type System-Defined History User-Defined History Predictor Method Add Process Default	Successful

Interoperability Tests and Results

Process	Function	Task	Comment
	Establish AR Business Units Options (SHELL)	Enter SubCustomer Qualifier 1	Successful
		Enter SubCustomer Qualifier 2	Successful
		Establish Receivables Definition for Sun, Moon, Stars, and Earth Business Units	Successful
		Establish Receivables Options for Sun, Moon, Stars, and Earth Business Units	Successful
AR Maintenance	Object Property Test 1 Customer Maintenance	Link Data Designer to Maintain Customers	Successful
		Customer Adds	Successful
		Customer Contacts Adds	Successful
		Customer Credit Profiles	Successful
		Customer Bill To	Successful
AR Transaction Processing	Object Property Test 2 Add Transactions	Link - Maintain Customers --> Enter Receivables	Successful
		AR Processing	Successful
		AR Update (Process Scheduler)	Successful
	AR Verification Reports	Link Enter Receivables to Collect Receivables	Successful
		Run Aging Report	Successful
		Compare Aging Reports	Successful
	AR Payment Processing	Link Collect Receivables to Apply Payments	Successful
		Accounts Receivable Deposits	Successful
	AR Worksheets	Payment Work Sheet Application	Successful
		Payment Work Sheet Action	Successful
Payment Update (Process Scheduler)		Successful	
Accounts Receivable Volume Tests	Add Invoices	Add 1000 Invoices to Database	Successful
		Post 1000 Invoices to Database	Successful
Accounts Receivable Queries	Run Queries and Reports	Query 1:	Successful
		Query 2:	Successful
		Query 3:	Successful

PeopleSoft General Ledger (GL)

The PeopleSoft General Ledger enters journals online or in batch to maintain a flexible chart of accounts and many ledgers. It provides outstanding financial reporting and report summarization by using PeopleSoft trees. The GL supports open item and interunit accounting, allocations for flexible distribution of expense, multiple currencies, average daily balance calculations, consolidations to combine information of multiple financial entities. It also maintains budgets and year-end close processing. GL is the foundation of all the financial modules.

General Ledger Test Foundation Tests

The PeopleSoft General Ledger Test Foundation was used to verify that the business processes function as expected in this HiTest Template. Table 4-10 lists a summary of the tests performed and test results.

Table 4-10: General Ledger Test Process and Results Summary

Process	Function	Task	Comment
General Ledger Test Setup	GL Setup	Copy .prn files from GL\GL\DATAFILES\ to C:\TEMP\	Successful
		Log onto PeopleSoft, change Operator Security for Process Scheduler, log out and back into PeopleSoft	Successful
		Create Elimination Business Unit, ELMN	Successful
		Adjust Sun, Moon, Stars, Earth, and ELMN Setids for G/L Consolidations from Sun to ELMN	Successful
		Create DeptId Tree	Successful
		Creates Consolidation Tree	Successful
		Change SetIds for Tree and Nodes to Sun Setid	Successful
		Create a Query from the Ledger Table called ""Ledger""	Successful
		Create a Join Query from the Journal Header and Journal Line Table called ""JRNLDETAIL""	Successful
		Set-up Close Criteria	Successful
		Link Consolidations to Data Designer	Successful
		Establish G/L Account Combination Edit	Successful
		Establish G/L Combination Rules	Successful
		Set-up all the Necessary Run Controls in G/L	Successful
		Set-up Sun Business Unit Allocation and Run Control	Successful
		Set-up Interunit Allocation	Successful
		Copy Sun Business Unit Rent Allocation, called Rentaloc	Successful
		Link Allocations Panel to Process Journals	Successful
General Ledger Tests	GL Test	Property & Object Test on Express Journal Panels and Data	Successful
		Property & Object Tests on Interunit Journal Panels and Data	Successful
		Property & Object Tests on Journal Upload Panels and Data Values	Successful
		Upload the Beginning Balance for Sun Business Unit via the ""Load Journals"" function in G/L	Successful
		Change Adjustment Journal Entry Period from 1997 to 1996 in Sun Business Unit	Successful
		Edits the imported/uploaded journal that contains the beginning balances for SUN business unit	Successful
		Post the Edited Journal that contains the Beginning Balances for Sun Business Unit	Successful
		Re-Run Year End Close for 1996	Successful
		Re-Open Period 1/97 thru 12/98	Successful
		Upload and verify the ""upload.prn"" file uploaded	Successful
		Uploads a Multifunction Journal called ""Upload1.prn"" Containing Statistical, Projects and Product Information	Successful

Interoperability Tests and Results

Process	Function	Task	Comment	
General Ledger Tests (Cont'd)	GL Test (Cont'd)	Edit the Files, upload.prn and upload1.prn, and verify that they edited.	Successful	
		Post the Files, upload.prn and upload1.prn	Successful	
	GL Monitor	Create On-Line Express Journal entry for Sun, Moon, Stars, Earth, Business Units	Successful	
		Create an On-Line Express Rent Journal entry for Sun Business Unit	Successful	
		Create an Express Journal Entry via a CSV file	Successful	
		Creates an On-Line Express Journal in Sun Business Unit with Errors	Successful	
		Create an On-Line Express Statistical Journal in Sun Business Unit	Successful	
		Create an Interunit Journal Entry	Successful	
		Edit all Journals	Successful	
		Correct Journal in Sun Business Unit that Contains Errors	Successful	
		Re-edit all Journals	Successful	
		Post all Journals	Successful	
		Run Sun Business Unit Allocation	Successful	
		Run Interunit Journal Allocation	Successful	
		Edit Allocation Journals	Successful	
		Posts Allocation Journals	Successful	
		Property & Object Tests on Copy Journals Panels and Data Values	Successful	
		Copy Journals and use a CSV File for New Journal Ids	Successful	
		Edit Copied Journals	Successful	
		Posts copied journals	Successful	
		Mark Journals for Unposting and Unpost them from the Ledger	Successful	
		Close Period 7 and Open Period 8 Only	Successful	
		Process Month End Close	Successful	
		Inquiry	Link Data Designer to Process Journals for Inquiry	Successful
			Inquire and View Actual Journals On-Line	Successful
	Inquire and Views Statistical Journals On-Line		Successful	
	Query	Run ""Ledger"" and ""JrnlDetail"" Queries to List Box and Excel	Successful	
		Runs ""Ledger"" Query to Crystal	Successful	
		Create Excel Spread Sheet Journal from the Template	Successful	
		Create Account Tree	Successful	
		Establish Consolidation Criteria	Successful	
		Format ""Ledger"" Query in Crystal	Successful	

General Ledger Volume Tests

DIGITAL Scripts and the SQA Test Foundation for Financials were used to perform volume testing of the GL functionality and execute queries necessary to validate results. Table 4-11 provides a summary of the tests and results.

Table 4-11: General Ledger Volume and Query Tests and Results Summary

Process	Function	Task	Comment
General Ledger Volume Tests	Log On	Log on to PeopleSoft and setup to process batch jobs	Successful
	Open Ledger	Open Actuals Ledger for Business Units, SUN, MOON, STARS, EARTH, and ELIM.	Successful
	Load Journal	Upload 100 journals into PeopleSoft	Successful - 17,160 journal lines entered
		Edit and Post Loaded Journals separately to Business Units (Compensates for system limitations (PC or AlphaServer) which do not allow more than 4,290 journal lines to be posted at one time)	Successful
	Add Journal Entries	Add an express SUN Journal entry 100 times (Run Time: Approx 1min, 28 sec each time)	Successful - 600 Journal Lines Added
		Add an express MOON Journal entry 100 times (Run Time: Approx 1min, 18 sec each time)	Successful - 600 Journal Lines Added
		Add an express STARS Journal entry 100 times (Run Time: Approx 1min, 13 sec each time)	Successful - 600 Journal Lines Added
		Add an express EARTH Journal entry 100 times (Run Time: Approx 1min, 15 sec each time)	Successful - 600 Journal Lines Added
		Add a Statistical Journal entry 100 times (Run Time: Approx 2min, 07 sec each time)	Successful - 700 Journal Lines Added
		Add a Interunit Journal entry 100 times (Run Time: Approx 1min, 27 sec each time)	Successful - 1,000 Journal Lines Added
	Edit Journals	Edit all Journals in SUN, MOON, STARS, and EARTH Business Units	Successful
	Post Journals	Post all Journals in SUN, MOON, STARS, and EARTH Business Units Note: Unable to complete because process monitor would derive an error message due to the limitation of the PC or AlphaServer which does not allow more than 4,290 journal lines to be posted at one time. This test was trying to post 21,260 Journal Lines (700 Journals).	Unable to Complete, too many Journal Lines for system
	Queries	Executed Queries to all Journals 24 Line Query with total Journal Lines of 21,090, Total Amount of \$1,025,111,506.52, and Total Journals of 995	Successful - Approx 1.2 sec per Query

Database Backup and Restore

Database backup and restore and restore operations were executed to demonstrate interoperability.

Database Backup

Off-line database backup using NSR and OEBU was executed to demonstrate interoperability. Additional tests were run with varying degrees of parallelism (i.e., tape devices x I/O streams) and with local and remote DRD access. The backup I/O rates are greatly effected by the storage layout of tablespaces and data files. Also of importance is the sequence in which the tablespaces and data files are created (or added) to the database. OEBU determines the order of backup streams by ordering the tablespaces by create date. All data files associated with a tablespace are then ordered by their create dates before the next tablespace in chronological order is chosen. Therefore, not only the placement of data files, but the order in which data files are added during database build, must be considered to achieve maximum fan-out of the OEBU I/O streams for optimal performance.

Interoperability Tests and Results

Table 4-12 shows the results of the backup tests performed. Backup rates are based on the actual size of the database that is being saved. Actual data written to tape may vary depending on compression.

Table 4-12: Database Backup Test Summary

Parallelism	Devices	DRDs	Elapsed Time	Backup Rate
1	1	100% remote	3314 sec	13.44 GB/hr
1	1	93% remote	3052 sec	14.59 GB/hr
1	1	local	2662 sec	16.73 GB/hr
2	1	local	2210 sec	20.15 GB/hr *
2	1	local	1697 sec	26.24 GB/hr
3	1	local	1484 sec	30.01 GB/hr
4	1	local	1165 sec	38.22 GB/hr
4	2	local	1091 sec	40.82 GB/hr
8	2	local	910 sec	48.94 GB/hr
* DRD <i>failover</i> occurred during test				

As shown in Table 4-12, significant improvement in the backup rate is achieved when all DRD's are local to the backup node. The results also reveal a continuous improvement in the backup rate with additional degrees of parallelism independent of the number of tape drives. This behavior is most likely a consequence of the significant amount of unused space in the database, which results in a high degree of compression. In this special case the speed of the tape device does not become the limiting factor and an increased number of parallel streams will increase the backup throughput. This is essentially the reason that the addition of a second tape drive does not significantly improve backup performance. However, as the space utilization of the database grows the amount of data written to the tape device will increase, which will bring the speed of the tape device into consideration and quickly limit the degree of parallelism.

During one of the backup tests (single tape - parallelism 2), a DRD *failover* operation did not interrupt the backup job. The I/O failure was detected and the DRDs migrated to the non-local host, which allowed the backup to be successfully completed without interruption, but at a slightly slower rate.

Database Restore

Interoperability was further demonstrated by the execution of full database restores using NSR and OEBU. The results for the restore operation tests is provided in Table 4-13.

Table 4-13: Database Restore Test Summary

Parallelism	Devices	DRDs	Elapsed Time	Restore Rate
4	1	local	4170 sec	10.68 GB/hr
4	1	local	3962 sec	11.24 GB/hr
8	2	local	2661 sec	16.74 GB/hr

Failover Test Process and Results

The TruCluster Production Server software will detect and respond to the following failure events:

- Member node failure (host down)
- Critical SCSI path failure
- Device failure
- Network partition failure (Two Available Server Environment member nodes cannot communicate with each other over the cluster interconnect.)

Failover of both the NFS and DRD services was successfully demonstrated by the simultaneous execution of queries on both cluster members, when the node providing the services was shutdown normally or power failed. In all cases the services being provided were successfully migrated to the surviving cluster member, without interruption to the database availability or the queries running on this node.

The following hardware failures were tested and the results are explained in the following paragraphs:

- Routine shutdown of the member node that the DRD or NFS service was running on
- Power failure of one member node
- Machine halt on one member node
- Disconnection of network connections on one member node
- Hotswapping of a single disk

During the Disk hotswap test, one member of a four-member RAIDset was pulled out. The RAIDset automatically pulled in a spare disk and rebuilt it.

There are limitations to *failover* and availability. The system keeps running only if you have levels of redundancy greater than or equal to the number of failures. For example, if two nodes crash simultaneously, then the service becomes unavailable.

After the original node (favor member, depot4) failed, the surviving node (depot5) would continue the Oracle database and PeopleSoft application. After the successful *failover*, the only change the PeopleSoft Window 95 client has to make is as follows:

Note

The following test results were obtained using the procedure documented summary information as specified in detail in Failover Test Setup.

1. Click PeopleSoft PT 6 - Oracle ➔ Configuration Manager to setup the default database name to FSDMO2 and restart the system. Use the PeopleSoft Signon Window (Run c:\FS600\bin\pstools.exe) as defined in step 2.
2. Enter the following signon information:

Database Name: FSDMO2

FSDMO2 is the database alias for FSDMO (database name of the original node depot4) configured by the Oracle SQLNet.

Interoperability Tests and Results

3. Restart the PeopleSoft workstation before signon.

After signon to the surviving node (depot5), users are able to query, insert, update, and delete rows from the PeopleSoft data panel to access the Oracle database without problems.

The case where the Oracle database and PeopleSoft application fails over to the original node (depot4) from the surviving node (depot5) was also tested. For this test case, the user chooses FSDMO as follows:

1. Click PeopleSoft PT 6 - Oracle ➔ Configuration Manager to setup the default database name to FSDMO and restart the system. Use the PeopleSoft Signon Window (Run c:\FS600\bin\pstools.exe) as defined in step 2.
2. Enter the following signon information:

Database Name: FSDMO

3. Restart the PeopleSoft workstation before signon.

After signon to the original node (depot4), the user can also access the database successfully.

System Limits and Characterization Data

This chapter describes any system limits that may have been determined as a result of the testing, along with information about the system characterization during testing. Areas covered include:

- Automating data panel input using SQA Robot
- Performance summary

Automating Data Panel Input Using SQA Robot

A database can be populated on a PeopleSoft PC Client using SQA Robot. The SQA Robot can read Comma Separated Values (CSV) data files to populate a PeopleSoft database as indicated in Chapter 4. By building test cases for the input data panel, SQA Robot can also be used to verify the following:

- Panel opens correctly
- Field values have been saved to the database correctly
- Panel works correctly through the panel group
- Data base values are displayed correctly
- Database transaction is successful

These features would help a new PeopleSoft user to convert smoothly from an old database to a new PeopleSoft database and also provide data integrity. In addition, these features can also automate the time-consuming and routine data panel input procedures.

Performance for Additional Query Tests

The SQA Robot volume queries that were shown in Chapter 4 were used to perform simultaneous testing of the shared database. In each of two tests, each node simultaneously executed one of the query procedures (AM,AP,AR,GL). The combinations of simultaneous query scenarios that were tested are listed in Table 5-1.

In all query scenarios, performance was unaffected by the simultaneous execution or selection of node executing the queries.

Table 5-1: Simultaneous Database Access Tests

Test 1		Test 2	
Depot4	Depot5	Depot4	Depot5
AM	AR	AR	AM
AM	GL	GL	AM
AM	AP	AP	AM
AP	GL	GL	AP
AP	AR	AR	AP
AR	GL	GL	AR
AM	AM	AM	AM
AP	AP	AP	AP
AR	AR	AR	AR
GL	GL	GL	GL

Overall Performance Indications

Observations and results from the various tests executed provide the following insights into the characteristics of this system:

- User response time is affected by the speed of the client PC. In our tests, two different speed client PCs were used and the results indicated that with lightly loaded network and servers the results varied in relation to the speed of the client PC, which was used to execute the test. The client contribution to the overall response time should not be overlooked when configuring the solution.
- User response time is also affected by the performance of the network providing communication between the server and the clients. The test environment utilized did not provide an isolated network. Occasionally, despite concerted efforts to prevent it, contention would occur on this shared network and user response times would be significantly impacted. The network is a significant component of the user response time and requirements around the speed and utilization of the network should be taken into consideration.
- Approximately 2 MB memory is required for each user process; an application with 1000 users to stay connected at the same time needs 2 GB of memory. Since sorting and other processing also requires memory, inadequate memory will significantly reduce the performance due to heavy swapping of the user processes. Memory configurations having a large memory capacity is required to support large numbers of concurrent database users. A Very Large Memory (VLM) having 4 GB or more addressable physical memory is always helpful in this type environment, provided the memory is being effectively configured and tuned for better performance.
- The following UNIX parameters have to be increased to support a large volume of users. They are required to support the Oracle login from the PeopleSoft clients. For example, the max processes and max threads per user must be increased to 4096 as follows:

max-proc-per-user=4096

max-threads-per-user=4096

- Maximum configuration with more memory results in better performance. The larger the database, the more beneficial it is to performance. Ideally, when database buffers can cache all the tables and indexes of a database, it will minimize the number of I/O to disk providing best possible performance. Adding memory to the database buffers will improve performance to a certain degree; beyond that, the memory will be wasted by caching unnecessary data.
- The amount of memory (sort_area_size) allocated to support sort/merge database activity has to be considered. This is a per process parameter, so the number of processes actively doing sorting should be considered.

Problems and Resolutions

This chapter describes any problems that may have been encountered during the testing. Where appropriate, a solution for each problem is given which provides the system manager or user with a fix or workaround.

The following problems were identified during testing:

Foundation Hardware

I/O Adapter Failure

Problem	PCIA error panics cause system crashes under heavy I/O load.
Resolution	Two KSPSA-BB adapters were found to be defective and were replaced.

Shared Storage Availability

Problem	Shared storage can become unavailable when certain hard errors are reported on a shared SCSI bus due to a defective DZPSA-BB adapter. The adapter failure may cause the SCSI bus to hang on other cluster nodes, resulting in a single point of failure.
Resolution	Replace faulty adapter. The use of host-based mirroring spanning across SCSI buses might overcome the availability issue, but this workaround has not been tested.

Operating System

Setting Address Space Unlimited

Problem	Cannot set "Limit Address Space Unlimited" in C-Shell on the 4 GB memory configuration.
Resolution	Set limit-h address 4117776K, then issue the "Limit Address Space Unlimited" command until a kernel rebuild can be done. Then edit the /sys/conf/nodename file and change the value for maxdsize to the memory size and then do a kernel rebuild.

Application

Oracle7 Database Issues

Multi-Block Read Count Limitation

- Problem** There is an undocumented limitation on multi-block read count. Due to a maximum of 128 KB per I/O, the maximum setting is 4 according to the formula: $\text{maximum db_file_multiblock_read_count} = \text{max_io_size}/\text{db_block_size}$ (128 KB/32KB).
- Resolution** This parameter was set to 4 because 32K (db_blocks) was used, the maximum based on the formula.

OEBU Register Operation Fails

- Problem** OEBU register operation fails with an error:
ORA-12641: TNS: authentication service failed to initialize
- Workaround** Install Oracle patch 510127 as indicated in Chapter 3 or disable authentication by adding this line to sqlnet.ora: `sqlnet.authentication_services=(NONE)`. However, this workaround will cause a “connect internal” problem.

Password Required for Connect Internal Command

- Problem** The Connect Internal command in the svrmgr1 requires a password.
- Resolution** Install Oracle patch 510127 as indicated in Chapter 3 or remove disabling of authentication by removing this line in sqlnet.ora:
`sqlnet.authentication_services=(NONE)`
However, this will cause a TSN authentication error with OEBU.

Advanced Network Option (ANO) Partially Installed

- Problem** The ANO is partially installed although not selected during Oracle product installation.
- Workaround** Install the ANO option, then de-install the ANO option.

Compatibility of Oracle 7.3.3 Control File

- Problem** Startup of the database fails after initial database creation with the following error:
ORA-0021: control file version 7.3.3.0.0
incompatible with ORACLE version 7.0.1.2.0.0
- Workaround** Include the following parameter in the Oracle initialization file: `compatible=7.3.3`

Networker Save and Restore

- Problem** Use of NSR_DEBUG causes backup operation to hang and fully consume all CPU resources (brtp processes) after writing approximately 300 MB of data to tape.
- Resolution** Disable NSR_DEBUG.

PeopleSoft Financials Issues

General Ledger Posting More Than 4290 Journal Lines

Problem Attempts to post more than 4290 journal lines, which are usually in multiple journal files, at one time will fail with an error message from process monitor.

WorkAround This is a limit acknowledged by PeopleSoft and the lines can be posted by processing the journals in separate jobs that combine to less than 4290 lines.

AP Subsystem Unable to Properly Submit COBOL for Processing

Problem The AP subsystem was unable to properly submit COBOL for processing on the server and resulted in an error calling the prcs_bat shell procedure.

WorkAround Until the root cause of this problem is identified, the workaround is to submit all AP processing to run on the client, which will enable all work to be completed.

Report of Possible Memory Corruption while Accessing Debug Log

Problem Attempts to use the client front end reported a possible memory corruption while accessing the Debug log.

Resolution This problem was the result of a full hard drive on the client and was resolved by providing free space on the disk drive where the logs reside.

Failed SQR Submission on Server

Problem The submission of any SQR on the server fails because the server fails to contain any explicit paths to the SQR directory on the server. The process logs will show the file not found error.

WorkAround Two possible workarounds exists for this problem, which is believed to have resulted from an install without specifying the SQR directory.

1. Only run SQR locally on the client.
2. Edit the SQR/SQC file to fully path the SQR/SQC to include file specifications.

SQR Depreciation Functions Run on the Client Fail Sometimes

Problem Running the SQR depreciation functions on the client can sometimes fail with an array element out of range message.

WorkAround Re-running the procedure a second time will allow the SQR to complete successfully.

A

Detailed Hardware Configuration

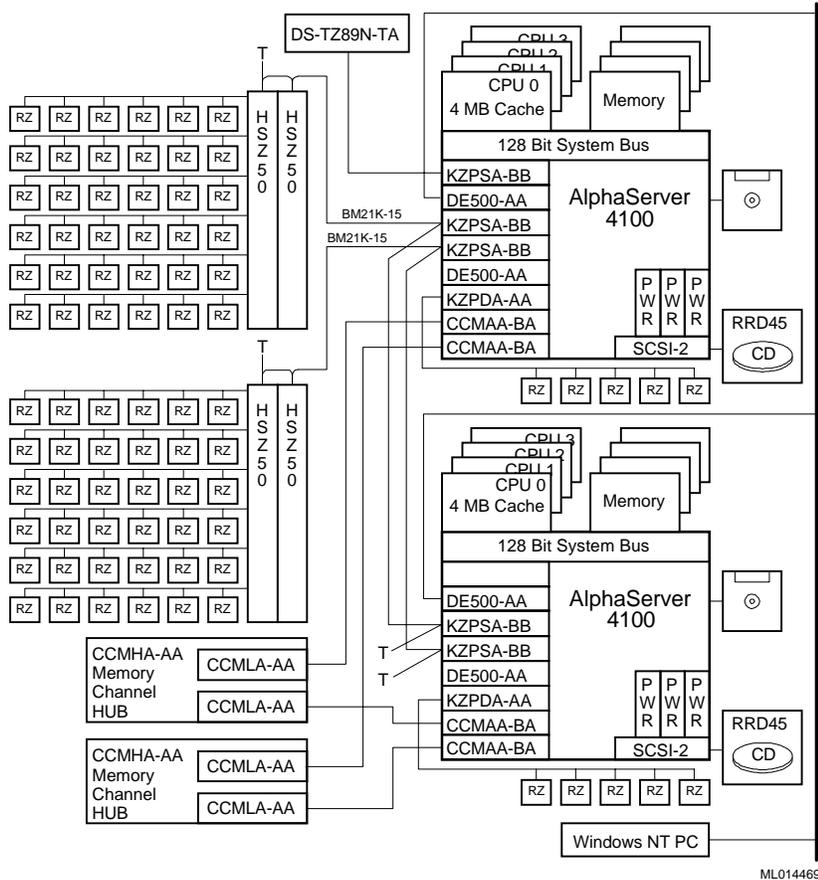
This appendix describes the minimum and maximum hardware configuration for the following:

- System Diagram
- AlphaServer 4x00 configurations, including:
 - System motherboard
 - PCI backplanes (slot usage)
- Configuration Cabling

System Diagram

Figure A-1 shows a diagram of the entire HiTest Suite.

Figure A-1: System Diagram



Configuration Cabling

Table A-1 lists the major cables in the HiTest Template. Use this table with Figure A-1 to interconnect the computing and storage hardware for the TruCluster Production Server.

Note

Ensure that the Internal KZPSA SCSI termination resistors on each KZPSA modules are disabled. The internal termination resistors (Z1, Z2, Z3, Z4, and Z5) on each KZPSA-BB must be removed.

Table A-1: Configuration Cabling

Part Number	Qty	Description	From	To
BN21W-0B	1	SCSI Y Cable, 68 pin	–	First KZPSA-BB in AlphaServer System #1
BN21W-0B	1	SCSI Y Cable, 68 pin	–	Second KZPSA-BB in AlphaServer System #1
BN21W-0B	1	SCSI Y Cable, 68 pin	–	First KZPSA-BB in AlphaServer System #2
BN21W-0B	1	SCSI Y Cable, 68 pin	–	Second KZPSA-BB in AlphaServer System #2
H879-AA	2	SCSI Terminator	–	SCSI Y cables attached to KZPSA-BB in AlphaServer System #2
BN21K-10	2	10 meter SCSI cable	SCSI Y cables attached to KZPSA-BBs in AlphaServer System #2	SCSI Y cables attached to KZPSA-BBs in AlphaServer System #1
BN21K-10	1	SCSI bus cables	SCSI Y cable attached to first KZPSA-BB in AlphaServer System #1	H885-AA on HSZ50 in Controller Shelf #1 in StorageWorks Cabinet
BN21K-10	1	SCSI bus cables	SCSI Y cable attached to second KZPSA-BB in AlphaServer System #1	H885-AA on HSZ50 in Controller Shelf #2 in StorageWorks Cabinet
BN21K-10	1	SCSI bus Cable	Third KZPSA-BB in AlphaServer System #1	TZ89 Tape Unit
BN12N-10	4	Memory Channel cables	Memory Channel Adapters CCMAA-BA in the AlphaServer Systems	Memory Channel Line Cards CCMLA-AA in each Memory Channel Hub (See Diagram)
Note: The following cables, connectors, and terminators are supplied as part of the HSZ52-AJ controller option and are used to interconnect the HSC controller pairs.				
H885-AA	4	Tri-link connectors	–	Each HSZ50 Controller
BN21L-0B	2	Shared SCSI bus cable	H885-AA on HSZ50	H885-AA on HSZ50
H879-AA	2	SCSI bus terminators	–	H885-AA on HSZ50

AlphaServer 4100 Configurations

Figure A-2 and Table A-2 show the AlphaServer 4000 and AlphaServer 4100 system motherboard and describe the minimum and maximum hardware configurations used in this HiTest Template.

Figure A-2: AlphaServer 4000/AlphaServer 4100 Motherboard Layout

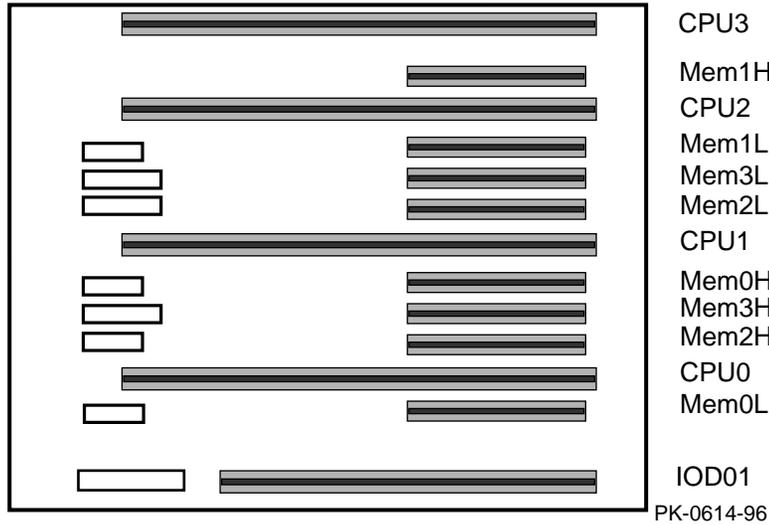


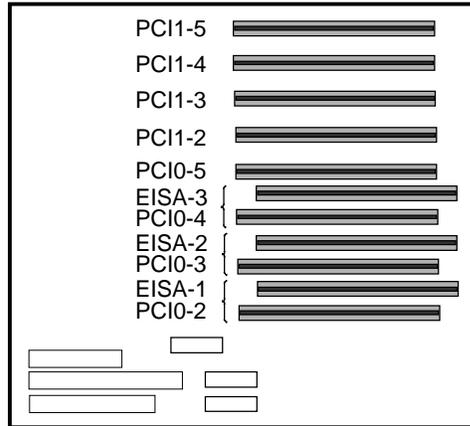
Table A-2: AlphaServer 4000/AlphaServer 4100 Motherboard (Minimum and Maximum Configurations)

Slot	Minimum Configuration Options	Maximum Configuration Options	Description
CPU3	–	KN304-DB	466 MHz CPU 4 MB cache
Mem1H	–	MS330-FA	Memory pair 1 (2 of 2)
CPU2	–	KN304-DB	466 MHz CPU 4 MB cache
Mem1L	–	MS330-FA	Memory pair 1 (1 of 2)
Mem3L	–	MS330-FA	Memory pair 3 (1 of 2)
Mem2L	–	MS330-FA	Memory pair 2 (1 of 2)
CPU1	–	KN304-DB	466 MHz CPU 4 MB cache
Mem0H	MS320-FA	MS330-FA	Memory pair 0 (2 of 2)
Mem3H	–	MS330-FA	Memory pair 3 (2 of 2)
Mem2H	–	MS330-FA	Memory pair 2 (2 of 2)
CPU0	KN304-DB	KN304-DB	466 MHz CPU 4 MB cache
Mem0L	MS320-FA	MS330-FA	Memory pair 0 (1 of 2)
IOD01	Bridge	Bridge	System Bus to PCI bus bridge module

AlphaServer 4100 PCI Slot Usage

Figure A-3 and Table A-3 show the PCI slot usage for the minimum and maximum configurations of this HiTest Template.

Figure A-3: AlphaServer 4100 PCI Slot Usage



ML013980

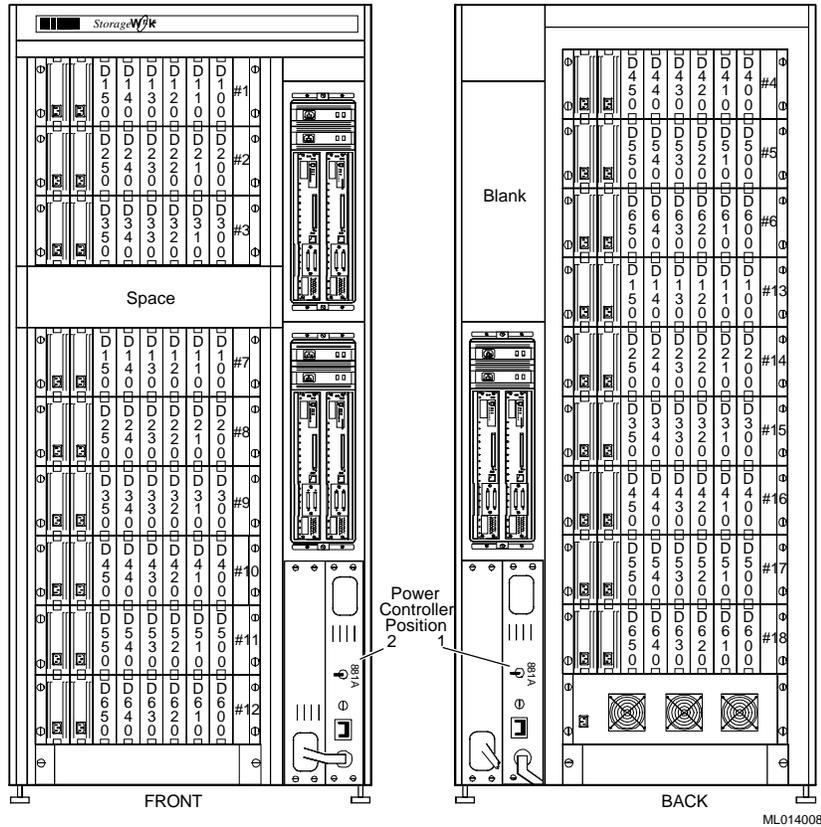
Table A-3: PCI Slot Usage (Minimum and Maximum Configurations)

Slots	Minimum Configuration Options	Maximum Configuration Options	Description
PCI1-3	KZPSA-BB	KZPSA-BB	FWD SCSI controller
PCI1-2	KZPSA-BB	KZPSA-BB	FWD SCSI controller
PCI1-1	KZPDA-AA	KZPDA-AA	FWD SCSI controller
PCI0-5	DE500-AA	DE500-AA	Ethernet controller
EISA-3/ PCI0-4	KZPSA-BB	KZPSA-BB	FWD SCSI controller
EISA-2/ PCI0-3	CCMAA-BA	CCMAA-BA	PCI to Memory Channel Controller
EISA-1/ PCI0-2	CCMAA-BA	CCMAA-BA	PCI to Memory Channel Controller
PCI0-1	-	-	-

StorageWorks Cabinet SCSI Disks Unit Address Identification

Figure A-4 shows front and back views of the SW822 StorageWorks cabinet.

Figure A-4: SW822 Cabinet Unit Address Identification



HSZ50 SCSI Cable Tables

Table A-4, Table A-5, and Table A-6 define the point-to-point SCSI cable connections to be used between the HSZ50 ports and the BA350 Modular Storage shelves of the SW822 cabinet.

Table A-4: HSZ50 #1 (Top Front) Connections

Source	Destination	Part Number	Length
Port 1	BA356 #1 (Front)	BN21H-01	1 m
Port 2	BA356 #2 (Front)	BN21H-01	1 m
Port 3	BA356 #3 (Front)	BN21H-01	1 m
Port 4	BA356 #4 (Rear)	BN21H-02	2 m
Port 5	BA356 #5 (Rear)	BN21H-02	2 m
Port 6	BA356 #6 (Rear)	BN21H-02	2 m

Table A-5: HSZ50 #2 (Bottom Front) Connections

Source	Destination	Part Number	Length
Port 1	BA356 #7 (Front)	BN21H-01	1 m
Port 2	BA356 #8 (Front)	BN21H-01	1 m
Port 3	BA356 #9 (Front)	BN21H-01	1 m
Port 4	BA356 #10 (Front)	BN21H-01	1 m
Port 5	BA356 #11 (Front)	BN21H-01	1 m
Port 6	BA356 #12 (Front)	BN21H-01	1 m

Table A-6: HSZ50 #3 (Back) Connections

Source	Destination	Part Number	Length
Port 1	BA356 #13 (Rear)	BN21H-02	2 m
Port 2	BA356 #14 (Rear)	BN21H-02	2 m
Port 3	BA356 #15 (Rear)	BN21H-02	2 m
Port 4	BA356 #16 (Rear)	BN21H-02	2 m
Port 5	BA356 #17 (Rear)	BN21H-02	2 m
Port 6	BA356 #18 (Rear)	BN21H-02	2 m

Note

Each HSZ50 pair is cascaded using BN21L-0B cables and H885 Tri-link connectors, giving the cabinet a total of six (6) HSZ50s. An H885 Tri-link connector and BN21L-0B cable is supplied as part of each HSZ52-AJ option.

B

Test Scripts

Test scripts were used to build the databases (tables, tablespace, and indexes), perform the database test queries, and execute failover tests. This appendix provides the actual scripts used.

Create Database Script

The following script was used to create the database.

```
REM * Set terminal output and command echoing on; log output of this script.
REM *

set termout on
set echo on
spool bld01_ps01.lis
connect internal
startup nomount pfile=$ORACLE_HOME/dbs/initPSF1_0.ora

create database FSDMO

maxdatafile      1000

maxinstances     3
maxlogfiles      40
maxlogmembers    4
character set    "US7ASCII"
datafile
    '/oracle/links/SYSTEM' size 110m
logfile
    '/oracle/links/LOGA_1' size 50m,
    '/oracle/links/LOGB_1' size 50m,
    '/oracle/links/LOGC_1' size 50m;

REM - Creates data dictionary views.
@$ORACLE_HOME/rdbms/admin/catalog.sql

REM - Scripts for procedural option
@$ORACLE_HOME/rdbms/admin/catproc.sql

REM - Grant public access to all views used by the char-mode SQLDBA.
@$ORACLE_HOME/rdbms/admin/utlmontr.sql

spool create2
set echo on

REM * Create additional rollback segment in SYSTEM before creating tablespace.
REM *
create rollback segment r00 tablespace system
storage (initial 16k next 16k minextents 2 maxextents 20);
```

Test Scripts

```
REM * Use ALTER ROLLBACK SEGMENT ONLINE to put r00 online without shutting
REM * down and restarting the database.
REM *
alter rollback segment r00 online;

REM * Create a tablespace for rollback segments.
REM * Rollback segment configuration guidelines:
REM * 1 rollback segments for every 4 concurrent xactions.
REM * No more than 50 rollback segments.
REM * All rollback segments the same size.
REM * Between 2 and 4 homogeneously-sized extents per rollback segment.
REM * Attempt to keep rollback segments to 4 extents.
REM *
create tablespace PSRBS datafile
    '/oracle/links/PSRBS' size 750M
default storage (
    initial 1M
    next 1M
    pctincrease 0
);
REM *
create tablespace PSTEMP datafile
    '/oracle/links/TEMP1' size 6000M
default storage (
    initial 1M
    next 1M
    pctincrease 0
);
REM *
```

Create Tablespace Script

The following script was used to create the tablespaces.

```
Remark * This script is used to create tablespaces for the PeopleSoft 6 Financial
Remark * Products. Use the 'Remark' statement to "comment out" tablespaces
Remark * That are not required for the products that you are installing.
Remark * Users of Oracle 7.2 and higher can choose to use the autoextending
Remark * tablespace feature. Syntax is remarked at the end of this script.
```

```
spool fsddl_psf1.lis
```

```
Remark * The AMAPP tablespace is required for ALL products
```

```
CREATE TABLESPACE AMAPP DATAFILE '/oracle/links/AMAPP' SIZE 90M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
```

```
/
```

```
Remark * The AMLARGE tablespace is required for the following products:
```

```
Remark * AM (Asset Management)
```

```
Remark * GL (General Ledger)
```

```
Remark * PC (Project Costing)
```

```
Remark * PO (Purchasing)
```

```
CREATE TABLESPACE AMLARGE DATAFILE '/oracle/links/AMLARGE' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
```

```
/
Remark * The APAPP tablespace is required for the following products:
Remark *     AP (Payables)
Remark *     PO (Purchasing)
```

```
CREATE TABLESPACE APAPP DATAFILE '/oracle/links/APAPP' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
```

```
/
Remark * The APLARGE tablespace is required for the following products:
Remark *     AM (Asset Management)
Remark *     AP (Payables)
Remark *     AR (Receivables)
Remark *     PC (Project Costing)
```

```
CREATE TABLESPACE APLARGE DATAFILE '/oracle/links/APLARGE' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
```

```
/
Remark * The ARAPP tablespace is required for ALL products
```

```
CREATE TABLESPACE ARAPP DATAFILE '/oracle/links/ARAPP' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
```

```
/
Remark * The ARLARGE tablespace is required for the following products:
Remark *     AP (Payables)
Remark *     AR (Receivables)
Remark *     BI (Billing)
Remark *     PC (Project Costing)
Remark *     PO (Purchasing)
```

```
CREATE TABLESPACE ARLARGE DATAFILE '/oracle/links/ARLARGE' SIZE 80M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
```

```
/
Remark * The BIAPP tablespace is required for the following products:
Remark *     AR (Receivables)
Remark *     BI (Billing)
Remark *     PC (Project Costing)
```

```
CREATE TABLESPACE BIAPP DATAFILE '/oracle/links/BIAPP' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
```

```
/
Remark * The BILARGE tablespace is required for the following product:
Remark *     BI (Billing)
```

Test Scripts

```
CREATE TABLESPACE BILARGE DATAFILE '/oracle/links/BILARGE' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

```
Remark * The BDAPP tablespace is required for the following products:
Remark *      BD (Budgeting)
Remark *      AR (Receivables)
Remark *      GL (General Ledger)
```

```
CREATE TABLESPACE BDAPP DATAFILE '/oracle/links/BDAPP' SIZE 80M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

```
Remark * The BDLARGE tablespace is required for the following product:
Remark *      BD (Budgeting)
Remark *      AR (Receivables)
Remark *      GL (General Ledger)
```

```
CREATE TABLESPACE BDLARGE DATAFILE '/oracle/links/BDLARGE' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

```
Remark * The FSAPP tablespace is required for ALL products
```

```
CREATE TABLESPACE FSAPP DATAFILE '/oracle/links/FSAPP' SIZE 200M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

```
Remark * The FSAPP1 tablespace is required for ALL products
```

```
CREATE TABLESPACE FSAPP1 DATAFILE '/oracle/links/FSAPP1' SIZE 150M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

```
Remark * The FSLARGE tablespace is required for the following products:
Remark *      AM (Asset Management)
Remark *      AP (Payables)
Remark *      BI (Billing)
```

```
CREATE TABLESPACE FSLARGE DATAFILE '/oracle/links/FSLARGE' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

```
Remark * The GLAPP tablespace is required for ALL products
```

```
CREATE TABLESPACE GLAPP DATAFILE '/oracle/links/GLAPP' SIZE 140M
```

```
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
```

```
/
```

```
Remark * The GLLARGE tablespace is required for the following products:
```

```
Remark *      AR (Receivables)
```

```
Remark *      GL (General Ledger)
```

```
Remark *      PC (Project Costing)
```

```
Remark *      PO (Purchasing)
```

```
CREATE TABLESPACE GLLARGE DATAFILE '/oracle/links/GLLARGE' SIZE 90M
```

```
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
```

```
/
```

```
Remark * The INAPP tablespace is required for the following products:
```

```
Remark *      IN (Inventory)
```

```
Remark *      GL (General Ledger)
```

```
Remark *      PC (Project Costing)
```

```
Remark *      PO (Purchasing)
```

```
CREATE TABLESPACE INAPP DATAFILE '/oracle/links/INAPP' SIZE 50M
```

```
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
```

```
/
```

```
Remark * The INLARGE tablespace is required for the following products:
```

```
Remark *      IN (Inventory)
```

```
Remark *      PC (Project Costing)
```

```
Remark *      PO (Purchasing)
```

```
CREATE TABLESPACE INLARGE DATAFILE '/oracle/links/INLARGE' SIZE 50M
```

```
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
```

```
/
```

```
Remark * The OMAPP tablespace is required for the following products:
```

```
Remark *      IN (Inventory)
```

```
Remark *      OM (Order Management)
```

```
Remark *      AR (Receivables)
```

```
Remark *      GL (General Ledger)
```

```
CREATE TABLESPACE OMAPP DATAFILE '/oracle/links/OMAPP' SIZE 150M
```

```
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
```

```
/
```

```
Remark * The OMLARGE tablespace is required for the following products:
```

```
Remark *      IN (Inventory)
```

```
Remark *      OM (Order Management)
```

```
Remark *      AR (Receivables)
```

Test Scripts

Remark * GL (General Ledger)

```
CREATE TABLESPACE OMLARGE DATAFILE '/oracle/links/OMLARGE' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

Remark * The PCAPP tablespace is required for the following product:

Remark * PC (Project Costing)

```
CREATE TABLESPACE PCAPP DATAFILE '/oracle/links/PCAPP' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

Remark * The PCLARGE tablespace is required for the following product:

Remark * PC (Project Costing)

```
CREATE TABLESPACE PCLARGE DATAFILE '/oracle/links/PCLARGE' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

Remark * The POAPP tablespace is required for the following products:

Remark * AP (Payables)

Remark * AR (Receivables)

Remark * IN (Inventory)

Remark * PC (Project Costing)

Remark * PO (Purchasing)

```
CREATE TABLESPACE POAPP DATAFILE '/oracle/links/POAPP' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

Remark * The POLARGE tablespace is required for the following products:

Remark * PC (Project Costing)

Remark * PO (Purchasing)

```
CREATE TABLESPACE POLARGE DATAFILE '/oracle/links/POLARGE' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

Remark * The PSIMAGE tablespace is required for ALL products

```
CREATE TABLESPACE PSIMAGE DATAFILE '/oracle/links/PSIMAGE' SIZE 500M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

Remark * The PTAPP tablespace is required for ALL products

```
CREATE TABLESPACE PTAPP DATAFILE '/oracle/links/PTAPP' SIZE 100M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

Remark * The PTPRC tablespace is required for ALL products

```
CREATE TABLESPACE PTPRC DATAFILE '/oracle/links/PTPRC' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

Remark * The PTTBL tablespace is required for ALL products

```
CREATE TABLESPACE PTTBL DATAFILE '/oracle/links/PTTBL' SIZE 1200M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

Remark * The PSINDEX tablespace is required for ALL products

```
CREATE TABLESPACE PSINDEX DATAFILE '/oracle/links/PSINDEX' SIZE 2500M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

Remark * The TRAPP tablespace is required for the following products:

Remark * The TRAPP tablespace is required for ALL products

```
CREATE TABLESPACE TRAPP DATAFILE '/oracle/links/TRAPP' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

Remark * The CPAPP tablespace is required for the following products:

Remark * The CPAPP tablespace is required for ALL products

```
CREATE TABLESPACE CPAPP DATAFILE '/oracle/links/CPAPP' SIZE 50M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

Remark * The MGAPP tablespace is required for the following products:

Remark * The MGAPP tablespace is required for ALL products

```
CREATE TABLESPACE MGAPP DATAFILE '/oracle/links/MGAPP' SIZE 90M
DEFAULT STORAGE (INITIAL 64K NEXT 128K MAXEXTENTS 110 PCTINCREASE 0)
/
```

