digital

Oracle Rdb7
OpenVMS Mixed Cluster

DIGITAL HiTest Notes

Part Number: EK-HORVX-HN. A01

March 1997

This document describes the interoperability testing performed on an Oracle Rdb7 Data Warehousing environment using OpenVMS V7.1 running on an AlphaServer 8400 system and AlphaServer 4100 system in a CI-based mixed cluster with VAX 6620 systems and HSJ40 Controller subsystems.

Revision/Update Information: This is a new manual

Operating System and Version: OpenVMS V7.1

Digital Equipment Corporation
Maynard, Massachusetts

March 1997

Digital Equipment Corporation makes no representations that the use of its products in the manner described in this publication will not infringe on existing or future patent rights, nor do the descriptions contained in this publication imply the granting of licenses to make, use, or sell equipment or software in accordance with the description.

Possession, use, or copying of the software described in this publication is authorized only pursuant to a valid written license from DIGITAL or an authorized sublicensor.

© Digital Equipment Corporation 1997. All rights reserved.

The following are trademarks of Digital Equipment Corporation: AlphaServer, DECevent, DIGITAL, DIGITAL NAS, OpenVMS, POLYCENTER, ServerWORKS, StorageWorks, VAX, VAXcluster, and the DIGITAL logo.

The following are third-party trademarks:
Oracle is a registered trademark and Oracle Rdb7 is a trademark of Oracle Corporation.

All other trademarks are the property of their respective owners.

Table of Contents

Figures

Tables

Preface

This document provides an overview of DIGITAL HiTest Systems and detailed technical information about interoperability test results for the DIGITAL HiTest Template for Oracle Rdb7 on OpenVMS Mixed Cluster.

Audience

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

Road Map

This document contains the following sections:

1. Introduction — Provides a brief summary of the benefits of DIGITAL HiTest Templates and an overview of the Template covered in this document.

2. Configuration Data — Gives tables of configuration data about the hardware and software components that define the Template, and special configuration rules if any.

3. HiTest System Installation and Setup — Presents information useful when installing and tuning a DIGITAL HiTest System configured from this DIGITAL HiTest Template.

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 Performance Data — Summarizes any system limitations or performance data that were identified during testing.

6. Problems and Solutions — Discusses any problems and solutions that were discovered during testing.

Appendix A: Detailed Hardware Configuration — Contains a more detailed treatment of the hardware and software components listed in the Configuration Data section.

Appendix B: Describes the files that were used to setup, load or run tests on the test database.

Feedback and Ordering Information

What our readers think of this or any other DIGITAL documentation is important to us. If you have any comments, no matter how great or small, we'd appreciate hearing from you. Send your comments to: `reader-comments@digital.com`.

Please reference the document title and part number in your correspondence about this manual.

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

1
Introduction

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 Continuous Computing.

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 AppSet includes the software specific to one class of customer solutions.

Configuring a DIGITAL HiTest Suite is easy. Simply 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.

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 section 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 section 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 (Internet)
```

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 base 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

This AlphaServer 8000 HiTest Template, along with Oracle Rdb7, supports production applications, end-user information management, and transaction processing to provide integration of the enterprise at the information level. This CI-cluster add-on configuration has the power and the flexibility to manage critical business data and production environments demanding 24x365 availability.

2
Configuration Data

Configuration data includes the hardware, software, and firmware components that were tested together. Special configuration rules are explained if required.

Hardware and Software Components

The following tables identify the hardware and software components that can be configured when upgrading an existing VAXcluster used for data warehousing. This upgrade can consist of the Oracle Rdb7 OpenVMS AlphaServer 8400 DIGITAL HiTest Template shown in Table 2-1 or the Oracle Rdb7 OpenVMS AlphaServer 4100 DIGITAL HiTest Template shown in Table 2-2 or both.

The remaining tables list the component revision levels for the AlphaServer systems and installed software.

Table 2-1: Oracle Rdb7 OpenVMS AlphaServer 8400 DIGITAL HiTest Template

Oracle Rdb7 *HiTest Appset* OpenVMS AlphaServer 8400 *HiTest Foundation*				
NOTE: Storage is assumed to be part of the cluster to which this system is attached. For documentation and updates: http://cosmo.tay.dec.com *and* http://www.partner.digital.com:9003 *For hard copy of this Suite's HiTest Notes, order EK-HORVX-HN .A01*				
Line Item	**Description**	**Part Number**	**Tested Range**	
			Min	**Max**
Appset Software				
Call 1-800-ORACLE1 or send Email to infodec@us.oracle.com. Items 2 and 3 were previously marketed separately by DIGITAL as the Database Integrator (DBI) and are now included with Oracle Rdb7.				
1	**Oracle Rdb7 Release 7**	Call	0	1
2	**Oracle SQL/Services**	Included with item 1		
3	**Oracle Parallel Query & Distributed Option**	Included with item 1		
Foundation Hardware				
4	*Select just one base system:* *NOTE: -DA = 60 Hz, 208 V; -DB = 50 Hz, 380/416 V; -DC = 50/60 Hz, 202 V Japan* **AlphaServer 8400 5/440 CPU 2 GB OVMS** **AlphaServer 8200 5/440 CPU 2 GB OVMS** *Hardware includes*: • 2 5/440-MHz CPUs each with 4-MB cache • KFTHA-AA system I/O module • 2 GB Memory • KZPSA-BB FWD SCSI Controller with cable • KZPDA-AA FNS SCSI Controller with cable • DE500-XA Fast Ethernet Adapter • BA660-AB StorageWorks Plug-in unit (PIU) • DWLPB-AA PCI plug in unit • RZ28D-VW 2 GB 3.5 in. SCSI disk • RRDCD 600 MB CD-ROM drive • DWZZB-VW SCSI signal converter • Three-phase power subsystem with cord • 1 H7263-AC or H7263-AD non-BBU capable 48 VDC power regulator • Shielded console cable for console terminal • System cabinet *Software includes*: • OpenVMS base license • DIGITAL Enterprise Integration Package (EIP)	**DY-292FF-DA** **DY-282FF-D9**	1	1
5	**440 MHz CPU SMP upgrade (OpenVMS)**	**756P1-AX**	0	5
6	**2 GB memory module**	**MS7CC-FA**	0	1
7	*Order items 7 and 8 to go beyond 12 PCI slots:* **PCI plug-in unit with one PCI box** ‡	**DWLPB-AA**	0	1
8	**Second PCI expansion box for DWLPB-AA**‡	**DWLPB-BA**	0	1
9	**PCI to CI adapter**	**CIPCA-AA**	1	2
10	*Select one for each CIPCA:* **CI bus cable set (select required length: 10, 20, or 45 m)**	**BNCIA-xx**	1	2
11	**VT525 text terminal**	**VT525-AA**	0	1

Oracle Rdb7 *HiTest Appset* OpenVMS AlphaServer 8400 *HiTest Foundation*				
NOTE: Storage is assumed to be part of the cluster to which this system is attached. *For documentation and updates:* http://cosmo.tay.dec.com *and* http://www.partner.digital.com:9003 *For hard copy of this Suite's HiTest Notes, order EK-HORVX-HN .A01*				
Line Item	**Description**	**Part Number**	**Tested Range**	
			Min	**Max**
Foundation Software				
Order the exact versions and revisions of the software shown below. *Paper documentation can be ordered separately.*				
--	**OpenVMS base license**	Included with item 4		
12	**OpenVMS V7.1 CD-ROM media and doc.**	**QA-MT1AA-H8**	0	1
13	**OpenVMS V7.1 unlimited license**	**QL-MT2AG-AA**	0	1
14	**DIGITAL Enterprise Integration Package (EIP)**	Included with item 4		
For items 15 to 18, Refer to OpenVMS Layered Products CD-ROM (QA-03XAA-H8)				
15	**DEC C for OVMS Alpha V5.5**		0	1
16	**DEC C++ for OVMS Alpha V 5.5**		0	1
17	**DECevent V2.3**		0	1
18	**UCX V4.1 (for PCM use only)**		0	1

Table 2-2: Oracle Rdb7 OpenVMS AlphaServer 4100 DIGITAL HiTest Template

Oracle Rdb7 *HiTest Appset* OpenVMS AlphaServer 4100 *HiTest Foundation*				
NOTE: Storage is assumed to be part of the cluster to which this system is attached. *For documentation and updates:* http://cosmo.tay.dec.com *and* http://www.partner.digital.com:9003 *For hard copy of this Suite's HiTest Notes, order No. EK-HORVX-HN .A01*				
Line Item	**Description**	**Part Number**	**Tested Range**	
			Min	**Max**
Appset Software				
Call 1-800-ORACLE1 or send Email to infodec@us.oracle.com. Items 2 and 3 were previously marketed separately by DIGITAL as the Database Integrator (DBI) and are now included with Oracle Rdb7.				
1	**Oracle Rdb7 Release 7**	Call	0	1
2	**Oracle SQL/Services**	Included with item 1		
3	**Oracle Parallel Query & Distributed Option**	Included with item 1		
Foundation Hardware				
4	*Select just one base system:* **AS4100 5/400 Drawer OVMS** **AS4000 5/400 Drawer OVMS** *Hardware includes*: • 5/400-MHz CPU with 4-MB cache • Integral FNSE SCSI and CD-ROM drive • 1.44 MB diskette drive • 450 watt power supply • 1 GB Memory • PCI 10/100 Mbit fast Ethernet controller • One-port FWSE SCSI Controller • S3 TRIO 1 MB RAM Graphics Adapter • 3-button mouse • Keyboard (Americas and AP orders only) • Integral remote system console *Software includes*: • OpenVMS license • DIGITAL Enterprise Integration Package (EIP)	 **DY-51HAB-FB** **DY-52HAB-FB**	1	1
Where two part numbers or variants are separated by a "/", the first number applies to the Americas and Asia Pacific and the second number applies to Europe.				
5	*Select one enclosure:* **Pedestal kit AS4100/4000** *or* **19 in. RETMA cabinet** *Both include:* • StorageWorks shelf and 4.3 GB hard drive for Americas, AP	 **BA30P-AB/BB** **H9A10-EL/EM**	1	1
6	**400 MHz CPU SMP Upgrade (OpenVMS)**	**KN304-BB**	0	3
7	*Needed with 3 or more CPUs:* **450 watt power supply**	**H7291-AA**	0	1
	This HiTest Template supports a memory range from 1 GB to 4 GB. *The AlphaServer 4100 System Drawer supports up to three additional memory options.*			
8	**1 GB memory option**	**MS330-FA**	0	3
9	**PCI to CI host bus adapter**	**CIPCA-AA**	1	2
10	*Select one for each CIPCA:* **CI bus cable set (select required length: 10, 20, or 45 m)**	**BNCIA-xx**	1	2

Oracle Rdb7 *HiTest Appset* OpenVMS AlphaServer 4100 *HiTest Foundation*				
NOTE: Storage is assumed to be part of the cluster to which this system is attached. *For documentation and updates:* http://cosmo.tay.dec.com *and* http://www.partner.digital.com:9003 *For hard copy of this Suite's HiTest Notes, order No. EK-HORVX-HN .A01*				
Line Item	**Description**	**Part Number**	**Tested Range**	
			Min	**Max**
11	*Select one high resolution color monitor:* **15-in Flat-square with 0.28 dot pitch** **17-in Trinitron aperture grille, 0.26mm** **21-in Diamondtron aperture grille, 0.30mm**	 **VRC15-WA** **VRT17-WA** **VRC21-WA**	0	1
Foundation Software				
Order the exact versions and revisions of the software shown below. *Paper documentation can be ordered separately.*				
--	**OpenVMS base license**	Included with item 4		
12	**OpenVMS V7.1 CD-ROM media and doc.**	**QA-MT1AA-H8**	0	1
13	**OpenVMS V7.1 unlimited license**	**QL-MT2AG-AA**	0	1
14	**DIGITAL Enterprise Integration Package (EIP)**	Included with item 4		
For items 15 to 18, Refer to OpenVMS Layered Products CD-ROM (QA-03XAA-H8)				
15	**DEC C for OVMS Alpha V5.5**	‡	0	1
16	**DEC C++ for OVMS Alpha V 5.5**	‡	0	1
17	**DECevent V2.3**	‡	0	1
18	**UCX V4.1 (for PCM use only)**	‡	0	1

For more details on the hardware configuration, see Appendix A.

The following tables identify component revision levels for the AlphaServer systems and software in the foregoing Templates.

Table 2-3: Component Revision Levels, AlphaServer 8400 System

Hardware Component	Hardware	Firmware	Software
8400 console		4.8-6	
SROM console		3.1	
5/440 MHz CPU OVMS (756P1-AX) (qty 6)		E02	
2 GB memory module (MS7CC-FA) (qty 2)		B01	
2 GB 3.5 in. disk (RZ28D-AA)		B03	
PCI to CI Host Bus Adapter (CIPCA-AA)		1	
System I/O module (KFTHA-AA)		D03	
StorageWorks plug-in unit (BA660-AB)		A01	
PCI plug-in unit (DWLPB-AA) (qty 2)		A02	
PCI plug-in unit (DWLPB-BA)		A02	

Table 2-4: Component Revision Levels, AlphaServer 4100 System

Hardware Component	Hardware	Firmware	Software
SRM console		V4.8-5	
Fast/Wide SCSI Controller (KZPDA-AA)		2	
4.3 GB Fixed Wide Disk (RZ29B-VW)		0016	
400 MHz CPU OVMS (KN304-BB) (qty 4)		2	
1 GB Memory Option (MS330-FA) (qty 4)		0	
Fast Ethernet adapter (DE500-XA)		12	
PCI-CI Host Bus Adapter (CIPCA-AA) (qty 2)		1	

Table 2-5: Component Revision Levels, Installed Software

Software Component	Version/ Revision	Patch Level
OpenVMS	7.1	
DEC C	V5.5	
DEC C++	V5.5	
DECevent	V2.3	
UCX	V4.1	ECO2
Oracle Rdb7	Release 7	ECO1
Oracle SQL/Services	V7.0	
Oracle Parallel Query & Distributed Option	Release 7	

Special Configuration Rules

None

3
Installation and Setup

The following information provides guidelines for system installation and setup.

Setting Up the AlphaServer Systems

Installation of the AlphaServer 8400 and AlphaServer 4100 systems must be performed by authorized Digital Service personnel. Installation procedures are provided with the systems when shipped. Installation manuals are also provided with the options ordered, when appropriate.

Appendix A contains the detailed hardware configuration for the systems that were used for testing. It begins with a detailed graphical view of the test cluster configuration. The slot utilization for the AlphaServer 8400 system can be found in Table 6-1 and Table 6-2. The slot utilization for the AlphaServer 4100 system can be found in Table 6-3 and Table 6-4.

Setting Up Storage

It is understood that a customer's database and disk layout may already exist. The following information describes how the test disk farm was laid out.

POLYCENTER Console Manager (PCM) was used in the test environment for convenience in performing the following functions:

- Shutting down systems
- Rebooting systems
- Running standalone diagnostics
- Installing layered products
- Configuring HSJ controllers
- Monitoring system and HSJ controller status

PCM was also used to manage the test HSJ configuration and capture failure messages, alerting us to the need for repair or replacement of faulty disk drives. Alarm conditions were reported to a single workstation using PCM. HSJ40 consoles were connected to terminal servers, which were reported as nodes to the PCM, simplifying the management of our large configuration of over 300 disk drives.

PCM was used to set up disks as follows:

1. Configured 39 RAID-0 stripesets (four disks per set) for database storage. Refer to *StorageWorks Array Controllers: HS Family of Array Controllers User Guide*, order number EK-HSFAM-UG.
2. Configured two RAID-5 arrays (six disks per array) as OpenVMS VAX and OpenVMS Alpha operating system disks. (Refer to Appendix A for detailed storage maps.)
3. Used the remaining 35 RAID-0 stripesets for temp and sort space during the database load.

Note

Write back cache was enabled for all drives attached to the HSJ40 Controllers.

Installing the Operating System

Install standard OpenVMS VAX V7.1 and OpenVMS Alpha V7.1 operating systems using all the default values.

Installing Layered Products

Install the following layered products, using all the standard defaults.

- DECevent V2.3
- DEC C V5.5
- DEC C++ V5.5
- UCX V4.1
- Oracle Rdb7 Release 7
- Oracle SQL/Services
- Oracle Parallel Query & Distributed Option

Note

POLYCENTER Data Collector and POLYCENTER Performance Advisor would normally have been installed but were not currently supported on OpenVMS V7.1.

Modifying Account Quotas

The following quotas and parameters reflect the values that were used and that proved adequate for testing. Knowledge of system tuning is required before modifying any of these parameters. All testing was conducted from the RDB and SYSTEM accounts.

RDB Account Quotas

```
Maxjobs:             0  Fillm:         300  Bytlm:        65536
Maxacctjobs:         0  Shrfillm:        0  Pbytlm:           0
Maxdetach:           0  BIOlm:         200  JTquota:       8192
Prclm:              10  DIOlm:         200  WSdef:         1024
Prio:                4  ASTlm:         300  WSquo:         2048
Queprio:             4  TQElm:         200  WSextent:     16384
CPU:            (none)  Enqlm:        2000  Pgflquo:     110000
```

SYSTEM Account Quotas

```
Maxjobs:             0  Fillm:         300  Bytlm:        65536
Maxacctjobs:         0  Shrfillm:        0  Pbytlm:           0
Maxdetach:           0  BIOlm:         200  JTquota:       8192
Prclm:              10  DIOlm:         200  WSdef:         1024
Prio:                4  ASTlm:         300  WSquo:         2048
Queprio:             0  TQElm:         200  Wsextent:     16384
CPU:            (none)  Enqlm:        2000  Pgflquo:     300000
```

The following examples of the MODPARAMS.DAT file contain system parameters that were altered to accommodate the database load and query execution.

MODPARAMS.DAT File for AlphaServer 8400

```
!++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
! SYS$SYSDEVICE:[SYS1.SYSEXE]MODPARAMS.DAT
! Created during upgrade to OpenVMS AXP V7.1 29-JAN-1997 11:39:23.59
!
! This is a new file created by the OpenVMS upgrade procedure.  This
! file  was built by using the data found in the following file(s)
! previously used by this system:
!
!      SYS$SYSDEVICE:[SYS1.SYSEXE]ALPHAVMSSYS.PAR
!      SYS$SYSDEVICE:[SYS1.SYSEXE]MODPARAMS.DAT
!
! This/These old file(s) have been renamed to:
!
!      SYS$SYSDEVICE:[SYS1.SYSEXE]ALPHAVMSSYS.PAR_OLD
!      SYS$SYSDEVICE:[SYS1.SYSEXE]MODPARAMS.DAT_OLD
!
! A new
!
!      SYS$SYSDEVICE:[SYS1.SYSEXE]ALPHAVMSSYS.PAR
!
! has been built for you in order to ensure compatibility with this
! release. Previous parameters found to be larger than new defaults
! were retained. Certain other previous parameters were also retained.
!
! Please check the following sections of this file to see what files
! were used in what sequence to create the new APLHAVMSSYS.PAR file.
! Please review and edit this file for possible duplications, additions
! and deletions you wish to make.
!
!------------------------------------------------------------------------
!************************************************************************
```

```
! This section contains System Parameters found in
! SYS$SYSDEVICE:[SYS1.SYSEXE]ALPHAVMSSYS.PAR
! with values that must be preserved when AUTOGEN is run.
!
SCSSYSTEMID=64520
SCSNODE="DEPOT8  "
VAXCLUSTER=2
EXPECTED_VOTES=1
VOTES=1
RECNXINTERVAL=20
DISK_QUORUM="                "
QDSKVOTES=1
QDSKINTERVAL=10
ALLOCLASS=1
LOCKDIRWT=3
NISCS_CONV_BOOT=0
NISCS_LOAD_PEA0=1
NISCS_PORT_SERV=0
MSCP_LOAD=1
MSCP_SERVE_ALL=1
min_NPAGEDYN=50000000   !increased by ESAC eng. on 17-Feb-1997
!+++++++
! set by Oracle Engineering
!
CHANNELCNT=16384
VCC_FLAGS=1
VCC_MAXSIZE=204800
min_GBLPAGES=512000
min_GBLPAGFIL=512000
min_LOCKIDTBL=1100000
min_RESHASHTBL=1000000
min_PQL_DASTLM=16384
min_PQL_MASTLM=16384
min_PQL_DBIOLM=16384
min_PQL_MBIOLM=16384
min_PQL_DDIOLM=16384
min_PQL_MDIOLM=16384
min_PQL_DFILLM=16384
min_PQL_MFILLM=16384
min_PQL_DPRCLM=16384
min_PQL_MPRCLM=16384
min_PQL_DTQELM=16384
min_PQL_MTQELM=16384
min_PQL_DENQLM=16384
min_PQL_MENQLM=16384
min_PQL_DPGFLQUOTA=5000000
min_PQL_MPGFLQUOTA=5000000
```

MODPARAMS.DAT File for AlphaServer 4100

```
!++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
! SYS$SYSDEVICE:[SYS0.SYSEXE]MODPARAMS.DAT
! Created during upgrade to OpenVMS AXP V7.1 29-JAN-1997 11:39:12.22
!
! This is a new file created by the OpenVMS upgrade procedure.  This file
! was built by using the data found in the following file(s) previously
! used by this system:
!
!      SYS$SYSDEVICE:[SYS0.SYSEXE]ALPHAVMSSYS.PAR
!      SYS$SYSDEVICE:[SYS0.SYSEXE]MODPARAMS.DAT
!
! This/These old file(s) have been renamed to:
!
!      SYS$SYSDEVICE:[SYS0.SYSEXE]ALPHAVMSSYS.PAR_OLD
!      SYS$SYSDEVICE:[SYS0.SYSEXE]MODPARAMS.DAT_OLD
!
!
CHANNELCNT=16384
VCC_FLAGS=1
VCC_MAXSIZE=204800
min_GBLPAGES=512000
```

```
min_GBLPAGFIL=512000
min_PQL_DASTLM=16384
min_PQL_MASTLM=16384
min_PQL_DBIOLM=16384
min_PQL_MBIOLM=16384
min_PQL_DDIOLM=16384
min_PQL_MDIOLM=16384
min_PQL_DFILLM=16384
min_PQL_MFILLM=16384
min_PQL_DPRCLM=16384
min_PQL_MPRCLM=16384
min_PQL_DTQELM=16384
min_PQL_MTQELM=16384
min_PQL_DENQLM=16384
min_PQL_MENQLM=16384
min_PQL_DPGFLQUOTA=500000
min_PQL_MPGFLQUOTA=500000
```

Creating and Loading the Database

The Oracle Rdb7 OVMS HiTest System was designed such that a series of custom .COM, .SQL, and other supporting files could be used to set up and configure the test system. These files were not part of a stock system but were created by Oracle Corporation. Descriptions of these files are provided in Appendix B.

These files performed the following functions.

1. Allocating host storage
2. Creating the database storage files
3. Compiling and linking flat file builder program
4. Generating 24 or 72 input streams
5. Loading the database
6. Creating indexes and journals (needed for VLM)
7. Creating the query catalog (see note below)
8. Executing queries

Note

In this implementation of Oracle Rdb7, two separate databases were created. These were for the 1994 and 1995 data. In cases where setup files are year specific, the year (94 or 95) appears in the file name.

Unless otherwise specified, the command files, SQL scripts, or supporting files shown below are located in the top level [RDB] account directory.

Step 1: Allocating database storage

In this particular test, the AlphaServer 4100 (DEPOT7) was used to hold the 1994 database and the .TMP2 files were created for this particular system as were the .SRT2 file shown below. The AlphaServer 8400 (DEPOT8) was used to create and own the 1995 database.

The database was not automatically brought on-line at boot time. When bringing the system up for the first time, the following command files were executed from the RDB account:

```
$ @INIT DISKS.9x                        (where x = the year to set up)
$ @INIT DISKS.SRT (and DISKS.SRT2)
$ @INIT DISKS.ROO
$ @LOGICALS DISKS.9x
$ @LOGICALS DISKS.SRT
$ @LOGICALS DISKS.SRT2
$ @LOGICALS DISKS.ROO
```

Note

DISKS.SRT and DISKS.SRT2 started out with a list of 8 disks to initially build the database. Only 3 disks were needed to actually run the queries, so this file was modified after the initial build.

If the system needed to simply be rebooted after it was set up, the MOUNT.COM file was used in place of the INIT.COM shown above.

For use in initial creation of the database only, the following was executed:

$ @INIT DISKS.TMP (and DISKS.TMP2)
$ @LOGICALS DISKS.TMP (and DISKS.TMP2)

The above commands created and initialized the TEMP space needed to hold the flat file data.

To establish the search list logicals, the following was executed:

```
$ @CPG.COM
```

Step 2: Creating the database storage files

For each AlphaServer system, the following command was used to create the files for an empty database:

```
$ SQL @CPG94.SQL          on AlphaServer 4100
$ SQL @CPG95.SQL          on AlphaServer 8400
```

Note

The preceding commands also created the small (empty) dimension tables in addition to the sales facts table. The schema design for the database was influenced by the queries in that they performed by year query comparisons for an item (i.e., channel) to a group, and unioned the two result sets together. As all queries are by year, for a given channel or product, partitioning by year, channel and product was chosen. This was the initial design chosen. Future schema design would be probably given more testing and analysis time.

Step 3: Compiling and linking flat file builder

These files were located in the [.LOAD] subdirectory.

There were two variants for this: the original and the binary version. The RMU load utility could read a binary or ASCII file. If ASCII was used, RMU would have to convert it to binary, so the more efficient method was to use the binary loader. Using a binary input stream also resulted in a 25% space savings (55 bytes vs. 72 bytes input record length) and reduced use of CPU resources. These savings were needed in order to fit 3 months data per temp device. In all, 8 temp devices were used to represent 2 years worth of data (24 months).

The ASCII and binary flat file builder programs were

```
FACT_FILE_BLD.C          (ASCII)
FACT_FILE_BIN.C          (binary)
```

The following commands compiled and linked either of these:

```
$ CC file_name
$ LINK file_name
```

Step 4: Generating the input streams

These files were located in the [.LOAD] subdirectory.

Just as with the flat file builders, there were two versions of the load programs. Either loader program was executed and used the FACT_FILE_Bxx.EXE generated in step 3. The loader programs were:

```
$ @LOADER          (ASCII loader)
$ @BINARY          (Binary loader)
```

Either LOADER.COM or BINARY.COM would be used, but not both. BINARY.COM is recommended since it is an improved (faster) version of LOADER.COM and uses less storage space.

These command files called the appropriate FACT_FILE_Bxx file. If BINARY.COM was executed with no parameters, 24 load files (months) would be created by default.

The input to the above command files was the DAILYnn.DAT files that were provided with the CPG database. The above .COM files read the DAILYxx.DAT files (where xx = the month number) and created a DAILYxx.UNL file. The .DAT files were nearly identical to the .UNL files except that the date was in a different format than the original (Oracle7) format. The date format for the RMU Loader enforced a 4-digit year as in 'YYYYMMDD' format vs. 'DD-MMM-YY' format used by the Oracle7 SQL loader input files.

Step 5: Loading the database

These files were located in the [.LOAD] subdirectory.

The small dimension tables were loaded by executing:

```
$ @LOAD-DIM
```

There was an older, less efficient file called INSERT.SQL that performed the same step. It was basically made obsolete by LOAD-DIM.COM.

There were two variants of command files that were used to load the sales facts table depending on whether binary or ASCII load files were created. These were:

```
$ @RMUBLD.COM (ASCII)
$ @RMUBIN.COM (binary)
```

Again, execute only one of these, not both. The recommended file is RMUBIN.COM. There are multiple variants of the RMUBIN.COM. These variants end in 4, 8, 17, and 41, and represent the number of parallel loader processes to use to load the flat files. Through experimentation, the RMUBIN17.COM file was found to be the most efficient.

Step 6: Creating the indexes and journals

Creating the indexes was done as follows:

```
$ SQL @INDEXES-95.SQL  (For 1995 database on 8400)
$ SQL @INDEXES-94.SQL  (For 1994 database on 4100)
```

Creating the journals was done as follows:

```
$ SQL @JOURNALS-95.SQL (For 1995 database on 8400)
$ SQL @JOURNALS-94.SQL (For 1994 database on 4100)
```

Step 7: Creating the query catalog

The query catalog was used to direct the queries to the appropriate database. It used the Oracle Database Integration software to do this. It was configured by executing the following:

```
$ SQL @DBI.SQL
```

Step 8: Executing the queries

These files were located in the [.QUERIES] subdirectory.

Queries could be executed on either the 1994 database (AlphaServer 4100) or the 1995 database (AlphaServer 8400). They could be executed as an individual query (1-5) or as a single user load (parallel execution of queries 1-5). They could be executed using the following:

```
$ SQL @QUERY-9x-n.SQL                (where x = year and n = query number)
$ @QUERIES.COM                       (parallel execution of queries 1-5)
        or
$ @QUERY_N_USER n 9x                 (where n is the number of users to run)
```

4
Interoperability Tests and Results

This chapter describes the interoperability testing conducted on the test cluster that was set up and installed as described in Chapter 3. The test cluster consisted of an AlphaServer 8400 and AlphaServer 4100 (described in Chapter 2) connected to an existing CI-based VAXcluster. Since customer databases vary widely in size and purpose, a test database was used, the Consumer Packaged Goods (CPG) Database Demo scripts from Oracle Corporation.

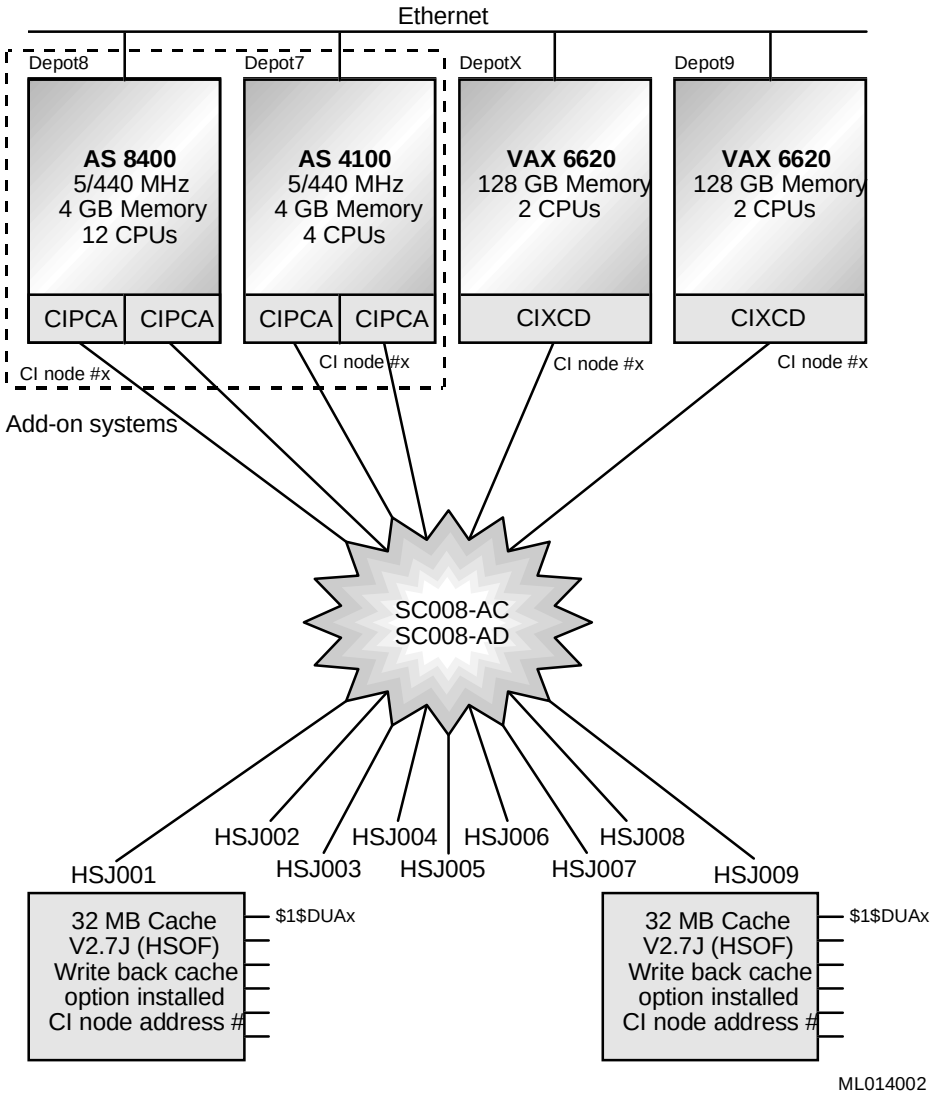
This chapter includes the following topics:

- Test configuration overview
- Test scenarios
- Test database
- Test scripts
- Test results

Test Configuration Overview

The following diagram provides an overview of the cluster as tested.

Figure 4-1: Diagram of the Test Cluster



Major Components

The test cluster included the following major components:

- AlphaServer 8400 base system with 4 GB of memory
- AlphaServer 4100 base system with 4 GB of memory
- Two VAX 6620 systems with 128 MB of memory each
- Nine HSJ40 Controller subsystems
- All interconnected by a CI bus

Storage Subsystem

The storage subsystem consisted of the following components:

Component	Part Number	Qty
Star Coupler, 8 node with cabinet	SC008-AC	1
Star Coupler, 8 node add on	SC008-AD	1
Basic controller shelf for HSJ40 Controller	BA350-MB	9
StorageWorks Array Controller, 6 channel CI, 36-42 devices, 32 MB read cache	HSJ40-CF	9
4.3 GB fixed wide disk	RZ29B-VW	308
Shelf expansion unit	BA356-JC	54
SW800 Data Center Cabinet	SW800-FA	3
8-bit I/O module for BA356 shelf	BA35X-MG	54
SCSI-2 hi-density “a” cable 1.5 m	BN21H-1E	54
CI bus cable 20 m	BNCIA-20	9

Test Scenarios

The following items are the test scenarios that were performed on the test system, along with a brief purpose for each test.

1. Single-user/system parallel tests (cold and warm caches):

Test: Time the parallel execution of queries 1-5 on each system.

Purpose: Highlight the difference in elapsed time between the VAX systems and AlphaServer systems.

Comments The database had to be redirected to the system under test and the VLM cache had to be disabled to run on the VAX system. The test was performed twice (cold cache and warm cache).

2. Multi-user single system parallel tests:

Test: Simultaneously execute queries 1-5 in parallel X number of times to simulate X number of users, where X = 5 and 10.

Purpose: To isolate any bottlenecks..

Comments The database had to be redirected to the system under test and the VLM cache had to be disabled to run on the VAX system.

Test Database

The database was built using the Consumer Packaged Goods (CPG) Database Demo scripts provided by Oracle Corporation. The CPG Database represents typical marketing and sales data for a consumer products manufacturing firm. The data includes two years of sales data in a data warehouse, star schema, optimized for decision support.

The database, constructed in Oracle Rdb7, consists of six tables:

- The SALES_FACTS table, which consists of the bulk of the database
- Five dimension tables: CHANNEL, DAILY_PERIOD, MONTHLY_PERIOD, MARKET, and PRODUCT.

The CPG database consisted of five table spaces:

Table 4-1: The CPG Database

Table Space	Contents	Size
FACTS	SALES_FACTS Table 41 data files (varying sizes)	147.2 MB 2,799,497,440 rows
FACTSINDEX	SF_KEY Index on SALES_FACTs Table 522 data files	147.2 MB
DIMENSION	1 Data File Dimension Tables: CHANNEL DAILY_PERIOD MONTHLY_PERIOD MARKET PRODUCT	316 KB 41 rows 2189 rows 72 rows 1002 rows 522 rows
DIMINDEX	1 Data File Index for Dimension Tables	138 KB
TEMPFILE	24 data files (5.5 MB each) required for SF_KEY index build	137.6 MB

Originally, storage areas were created assuming a uniform distribution of data by channel. The initial database design was to partition by channel for data storage, but to partition indexes by product. This benefited the time, channel, and by product queries. By time queries were supported by yearly partitions handled by the Parallel Query Option.

Initial database loading, however, showed that across the 41 channels, data distribution was not uniform. There were 8 instances each of 5 channel groups (Discount, Drug, Warehouse, Supermarket, Convenience) and 1 “Total” channel. The following table summarizes this distribution and the sizes of per channel datasets in terms of row count, storage page count and MB size.

Table 4-2: Data Distribution Across Channels

Group	Records/Mo.	Pages/Mo.	MB/Mo.	Pages/Yr.	MB/Yr.
Warehouse	433,690	1,456	23	17,470	273
Discount	1,794,528	6,024	94	72,289	1,130
Drug	1,794,528	6,024	94	72,289	1,130
Convenience	2,661,908	8,936	140	107,230	1,675
Supermarket	7,951,376	26,692	417	320,307	5,005
"Total"	1,794,528	6,024	94	72,289	1,130
Total by group (41)	118,882,768	399,082	6,236	4,788,979	74,828
assume 31 days					
Data by year	1,426,593,216	4,788,979	74,828		
assume 31 days					
Index by year	1,426,593,216	4,788,979	74,828		
assume 31 days					
2 year small DBMS	2,853,186,432	9,577,957	299,311		
6 year large DBMS	8,559,559,296	28,733,872	897,934		

Database Queries

The query scripts were run in 3 different buffer configurations:

- With global buffers only (20,000 total, each user having 500 buffers, on AlphaServer systems)
- With global buffers and row cache buffers (on AlphaServer systems)
- With global buffers only (1000 total, each user having 100 buffers, on VAX systems)

The row cache buffers were designed to hold all small tables and all referenced data in the larger tables and indexes as follows:

Table 4-3: Allocation of Row Cache Buffers

Name	Record Length	Cache	Rows	Used	Bytes Allocated	Bytes Used
SYSTEM_CACHE		1,000	500	484	500,000	484,000
CHANNEL*	226	226	41	40	9,266	9,040
C_CHANNEL	960	960	10	2	9,600	1,920
C_CHANNEL_ID	960	960	10	0	9,600	0
C_CHNLGRP	215	216	10	3	2,160	648
DAILY_PERIOD*	70	70	2,189	2,189	153,230	153,230
D_DAY	960	960	100	0	96,000	0
D_MONTH	215	216	100	17	21,600	3,672
D_QUARTER	215	216	100	0	21,600	0
MARKET*	161	164	1,002	140	164,328	22,960
MONTHLY_PERIOD*	52	52	72	0	3,744	0
M_DISTRICT	215	216	100	18	21,600	3,888
M_MARKET	960	960	100	2	96,000	1,920
M_MARKET_ID	960	960	100	0	96,000	0
M_REGION	215	216	100	2	21,600	432
PRODUCT	332	332	522	21	173,304	6,972
P_BRAND	215	216	100	0	21,600	0
P_MFR	215	216	100	0	21,600	0
P_PRODUCT	960	960	100	3	96,000	2,880
P_PRODUCT_ID	960	960	100	0	96,000	0
SALES_FACTS*	55	56	10,000,000	2,394,477	560,000,000	134,090,712
SF_KEY	960	960	1,000,000	38,512	960,000,000	36,971,520
				Totals	**1,521,634,832**	**171,753,794**

* Tables

Test Scripts

Functional verification of the ability to perform query operations was demonstrated using five SQL join scripts. These queries exercised functionality of the RDB7 server, SQL Utility, and Parallel Query components.

The scripts were designed to emulate typical decision support questions about the historical activity of a product sales environment. In most cases the results of these types of queries were used to generate sales trends.

Typical of the kind of question asked was:

"What percentage of product share in dollars and units did a particular product have in a particular area as compared to competitive products in the same area?"

The queries were designed to search the database in varying ways to exercise the database.

Characterization of the Queries

The test process consisted of five queries. Each query was supported by two scripts, one for the 1994 database (for example, QUERY-94-1.SQL) and one for the 1995 database (for example, QUERY-95-1.SQL).

Query 1

Query 1 asked *"What was the product share of a specific brand of cereal as compared to other cereals in the same product category, in a particular state in a particular type of store."* The information was grouped by month to show market trends.

The business question asked was:

"How did 20 oz. Wheat Flakes do as compared to all types of wheat flakes in supermarkets in the state of Connecticut?"

Script for Query 1 (QUERY-9x-1.SQL)

```
set dialect 'oracle level1';

/*  1.  Star -- Product Share of Brand   */

SELECT 'All Wheat Flakes' Product, AL2.MONTH,
       sum(AL5.UNIT_SALES) UNITS, sum(AL5.DOLLAR_SALES) DOLLARS, count(*),
       DISTRICT, CHANNEL_GROUP CHNL
  FROM PRODUCT AL4,
       SALES_FACT AL5,
       CHANNEL AL1,
       DAILY_PERIOD AL2,
       MARKET AL3
 WHERE (AL5.PRODUCT_ID=AL4.PRODUCT_ID
       AND AL5.MARKET_ID=AL3.MARKET_ID
       AND AL5.CHANNEL_ID=AL1.CHANNEL_ID
       AND AL5.DAY=AL2.DAY)
       AND (district='Connecticut'
       AND CHANNEL_GROUP in('Supermarket')
       AND BRAND in ('Quellogs Wheat Flakes')
       AND YEAR=x)                        (where x = year, 1994 or 1995)
 GROUP
    BY DISTRICT, CHANNEL_GROUP, Product, AL2.MONTH

UNION

SELECT '20 Oz Wheat Flakes' Product, AL2.MONTH,
       sum(AL5.UNIT_SALES) UNITS, sum(AL5.DOLLAR_SALES) DOLLARS, count(*),
       DISTRICT, CHANNEL_GROUP CHNL
  FROM PRODUCT AL4,
       SALES_FACT AL5,
       CHANNEL AL1,
       DAILY_PERIOD AL2,
       MARKET AL3
 WHERE (AL5.PRODUCT_ID=AL4.PRODUCT_ID
       AND AL5.MARKET_ID=AL3.MARKET_ID
       AND AL5.CHANNEL_ID=AL1.CHANNEL_ID
       AND AL5.DAY=AL2.DAY)
       AND (district ='Connecticut'
       AND CHANNEL_GROUP in('Supermarket')
       AND PRODUCT='QLGS WHT FLK 20 OZ'
       AND YEAR=x)                        (where x = year, 1994 or 1995)
 GROUP
    BY DISTRICT, CHANNEL_GROUP, product, AL2.MONTH;
```

Query 2

Query 2 compared the sales of a specific product, in a particular outlet in a region, against the sales of the same product through all channel outlets. The information was grouped by month to show market trends.

The business question asked was:

"What percentage of sales of 15 oz. Wheat Flakes were made in the Safeway stores in NY and PA as compared to all outlets in the NY and PA areas?"

Script for Query 2 (QUERY-9x-2.SQL)

```
set dialect 'oracle level1';

/*  2. Star -- Channel share of all channels  */

SELECT 'All Channels' CHNL,  AL2.MONTH,
       sum(AL5.UNIT_SALES) Units, sum(AL5.DOLLAR_SALES) Dollars, count(*),
       'NY + PA' DISTRICT, PRODUCT
  FROM PRODUCT AL4,
       SALES_FACT AL5,
       CHANNEL AL1,
       DAILY_PERIOD AL2,
       MARKET AL3
 WHERE (AL5.PRODUCT_ID=AL4.PRODUCT_ID
       AND AL5.MARKET_ID=AL3.MARKET_ID
       AND AL5.CHANNEL_ID=AL1.CHANNEL_ID
       AND AL5.DAY=AL2.DAY)
       AND DISTRICT in ('New York', 'Pennsylvania')
       AND CHANNEL_GROUP in ('Supermarket','Convenience',
       'Warehouse','Drug','Discount')
       AND PRODUCT= 'QLGS WHT FLK 15 OZ'
       AND YEAR=x                          (where x = year, 1994 or 1995)
 GROUP
    BY CHANNEL, PRODUCT , AL2.MONTH

UNION

SELECT CHANNEL CHNL,  AL2.MONTH,
       sum(AL5.UNIT_SALES) Units, sum(AL5.DOLLAR_SALES) Dollars, count(*),
       'NY + PA' DISTRICT , PRODUCT
  FROM PRODUCT AL4,
       SALES_FACT AL5,
       CHANNEL AL1,
       DAILY_PERIOD AL2,
       MARKET AL3
 WHERE (AL5.PRODUCT_ID=AL4.PRODUCT_ID
       AND AL5.MARKET_ID=AL3.MARKET_ID
       AND AL5.CHANNEL_ID=AL1.CHANNEL_ID
       AND AL5.DAY=AL2.DAY)
       AND DISTRICT in ('New York' , 'Pennsylvania')
       AND CHANNEL='Safeway'
       AND PRODUCT='QLGS WHT FLK 15 OZ'
       AND YEAR=x                          (where x = year, 1994 or 1995)
 GROUP
    BY CHANNEL, PRODUCT, AL2.MONTH;
```

Query 3

Query 3 compared the market share of a product in a particular type of store, in a particular market location, to sales of all types of outlets in the region. The information was grouped by month to show market trends.

The business question asked was:

"How are 10 oz. Wheat Flakes doing in convenience stores in Bridgeport Connecticut as compared to the entire northeast region?"

Script for Query 3 (QUERY-9x-3.SQL)

```
set dialect 'oracle level1';

/*  3.  Star Market share of Region  */

SELECT 'Northeast Total' MARKET,  AL2.MONTH,
       sum(AL5.UNIT_SALES) Units, sum(AL5.DOLLAR_SALES) Dollars, count(*),
       CHANNEL_GROUP, PRODUCT
  FROM PRODUCT AL4,
       SALES_FACT AL5,
       CHANNEL AL1,
       DAILY_PERIOD AL2,
       MARKET AL3
 WHERE (AL5.PRODUCT_ID=AL4.PRODUCT_ID
       AND AL5.MARKET_ID=AL3.MARKET_ID
       AND AL5.CHANNEL_ID=AL1.CHANNEL_ID
       AND AL5.DAY=AL2.DAY)
       AND (REGION='Northeast'
       AND CHANNEL_GROUP in ('Convenience')
       AND PRODUCT= 'QLGS WHT FLK 10 OZ'
       AND YEAR=x)                        (where x = year, 1994 or 1995)
 GROUP
   BY  MARKET, CHANNEL_GROUP, PRODUCT , AL2.MONTH

UNION

SELECT MARKET, AL2.MONTH,
       sum(AL5.UNIT_SALES) Units, sum(AL5.DOLLAR_SALES) Dollars, count(*),
       CHANNEL_GROUP, PRODUCT
  FROM PRODUCT AL4, SALES_FACT AL5,
       CHANNEL AL1, DAILY_PERIOD AL2, MARKET AL3
 WHERE (AL5.PRODUCT_ID=AL4.PRODUCT_ID
       AND AL5.MARKET_ID=AL3.MARKET_ID
       AND AL5.CHANNEL_ID=AL1.CHANNEL_ID
       AND AL5.DAY=AL2.DAY)
       AND (MARKET='Bridgeport'
       AND CHANNEL_GROUP in ('Convenience')
       AND PRODUCT='QLGS WHT FLK 10 OZ'
       AND YEAR=x)                        (where x = year, 1994 or 1995)
 GROUP
    BY MARKET, CHANNEL_GROUP, PRODUCT, AL2.MONTH;
```

Query 4

Query 4 compared the market share of a particular product, in a particular type of store, in a particular market location to all sales of competitive products in the same market location. The information was grouped by month to show market trends.

The business question asked was:

"What was the market share of 20 oz. Wheat Flakes in Connecticut supermarkets?"

Script for Query 4 (QUERY-9x-4.SQL)

```
set dialect 'oracle level1';

/*  4.  Star -- Product share of SubCategory -all competitive prods */

SELECT 'All Wheat Products' Product, AL2.MONTH,
       sum(AL5.UNIT_SALES) Units, sum(AL5.DOLLAR_SALES) Dollars, count(*),
       DISTRICT, CHANNEL_GROUP CHNL
  FROM PRODUCT AL4,
       SALES_FACT AL5,
       CHANNEL AL1,
       DAILY_PERIOD AL2,
       MARKET AL3
 WHERE (AL5.PRODUCT_ID=AL4.PRODUCT_ID
       AND AL5.MARKET_ID=AL3.MARKET_ID
       AND AL5.CHANNEL_ID=AL1.CHANNEL_ID
       AND AL5.DAY=AL2.DAY)
       AND (district='Connecticut'
       AND CHANNEL_GROUP in('Supermarket')
       AND BRAND IN ('Quellogs Wheat Flakes', 'Boast Weeties', 'Boast Oatey
Rounds',
       'Quellogs Wheaten Rye')
       AND YEAR=x)                        (where x = year, 1994 or 1995)
 GROUP
   BY  DISTRICT, CHANNEL_GROUP, Product, AL2.MONTH

UNION

SELECT '20 Oz Wheat Flakes' Product, AL2.MONTH,
       sum(AL5.UNIT_SALES) Units, sum(AL5.DOLLAR_SALES) Dollars, count(*),
       DISTRICT, CHANNEL_GROUP CHNL
  FROM PRODUCT AL4,
       SALES_FACT AL5,
       CHANNEL AL1,
       DAILY_PERIOD AL2,
       MARKET AL3
 WHERE (AL5.PRODUCT_ID=AL4.PRODUCT_ID
       AND AL5.MARKET_ID=AL3.MARKET_ID
       AND AL5.CHANNEL_ID=AL1.CHANNEL_ID
       AND AL5.DAY=AL2.DAY)
       AND (district ='Connecticut'
       AND CHANNEL_GROUP in('Supermarket')
       AND PRODUCT='QLGS WHT FLK 20 OZ'
       AND YEAR=x)                        (where x = year, 1994 or 1995)
 GROUP
    BY DISTRICT, CHANNEL_GROUP, Product, AL2.MONTH;
```

Query 5

Query 5 compared the product share of a given product, combining several areas, to total sales across the same areas.

The business question asked was:

"What was the market share of 20 oz. Wheat Flakes across 10 test market areas?"

Script for Query 5 (QUERY-9x-5.SQL)

```
set dialect 'oracle level1';

/*  5.  Star -- Product share of brand in 10 test markets aggregated */
/* include the star hint - 1/29/97 JMM */

SELECT 'All Wheat Flakes' Product, AL2.MONTH,
       sum(AL5.UNIT_SALES) Units, sum(AL5.DOLLAR_SALES) Dollars, count(*),
       CHANNEL_GROUP CHNL, '10-States'
  FROM PRODUCT AL4,
       SALES_FACT AL5,
       CHANNEL AL1,
       DAILY_PERIOD AL2,
       MARKET AL3
 WHERE (AL5.PRODUCT_ID=AL4.PRODUCT_ID
       AND AL5.MARKET_ID=AL3.MARKET_ID
       AND AL5.CHANNEL_ID=AL1.CHANNEL_ID
       AND AL5.DAY=AL2.DAY)
       AND (district in ('Connecticut',
'Delaware','Maine','Pennsylvania','New York',
       'Oregon', 'Alaska', 'CA North', 'CA South','Washington')
       AND CHANNEL_GROUP in('Supermarket')
       AND BRAND IN ('Quellogs Wheat Flakes')
       AND YEAR=x)                        (where x = year, 1994 or 1995)
 GROUP
    BY Product, AL2.MONTH, CHANNEL_GROUP

UNION

SELECT '20 Oz Wheat Flakes' Product, AL2.MONTH,
       sum(AL5.UNIT_SALES) Units, sum(AL5.DOLLAR_SALES) Dollars, count(*),
       CHANNEL_GROUP CHNL, '10-States'
  FROM PRODUCT AL4, SALES_FACT AL5,
       CHANNEL AL1, DAILY_PERIOD AL2, MARKET AL3
 WHERE (AL5.PRODUCT_ID=AL4.PRODUCT_ID
       AND AL5.MARKET_ID=AL3.MARKET_ID
       AND AL5.CHANNEL_ID=AL1.CHANNEL_ID
       AND AL5.DAY=AL2.DAY)
       AND (district in ('Connecticut',
'Delaware','Maine','Pennsylvania','New York',
       'Oregon', 'Alaska', 'CA North', 'CA South','Washington')
       AND CHANNEL_GROUP in('Supermarket')
       AND PRODUCT='QLGS WHT FLK 20 OZ'
       AND YEAR=x)                        (where x = year, 1994 or 1995)
 GROUP
    BY Product, AL2.MONTH ,CHANNEL_GROUP;
```

Test Results

Initial tests on the high-end VLM platform verified the ability to process queries, in which all query data resides on the local system, in a single database. The set of five SQL join scripts, as described above, was executed.

Test One: SQL Queries in Parallel

This test performed the five SQL queries in parallel. This test was run twice, once with cold cache and once with a warm cache.

The following table summarizes the runtime results on the test systems with cold cache conditions.

Table 4-4: Cold Cache Test Results

	AlphaServer 4100 (hr:min:sec)	**AlphaServer 8400** (hr:min:sec)	**VAX 6620** (dy hr:min:sec)
Query 1	22:34.78	25:21.98	0 17:06:26.47
Query 2	54:18.35	1:04:33.08	0 11:45:53.00
Query 3	4:12.27	4:30.56	1 04:12:25.36
Query 4	2:12:05.37	2:12:37.48	3 14:10:57.90
Query 5	56:23.80	1:04:01.48	3 14:54:11.68

It was readily apparent by the VAX runtimes that it could not compete with the AlphaServer systems due to the AlphaServer VLM capabilities. It was also thought that there would be no significant difference between the cold and warm cache tests on the VAX (due to the small amount of memory available on the VAX), nor was there time during this project to run them, so no warm or multi-user VAX times are shown.

Note

Query 5 failed on the VAX system due to Virtual Address Space Full error.

The following table summarizes the runtime results on the test systems with warm cache conditions.

Table 4-5: Warm Cache Results

(min:sec)	**AlphaServer 4100**	**AlphaServer 8400**	**VAX 6620**
Query 1	2:14.60	1:51.39	
Query 2	2:53.75	2:33.83	
Query 3	2:55.49	2:34.44	
Query 4	6:50.20	6:24.68	
Query 5	44:58.33	51:28.96	

Test Two: 5- and 10-User Load Tests

This test consisted of 5- and 10-user load tests.

The following table shows the runtime results of the 5- and 10-user load tests run on the AlphaServer 4100 system. The 5-user test was comprised of a total of 25 queries issued simultaneously with 5 users each issuing 5 queries. The 10-user test is comprised of a total of 50 queries issued simultaneously with 10 users each issuing 5 queries.

Table 4-6: AlphaServer 4100 System 5- and 10-User Load Test Results

(hr:min:sec)	5 Users		10 Users	
	Min	**Max**	**Min**	**Max**
Query 1	8:27.07	9:42.60	18:36.31	28:13.32
Query 2	12:16.60	12:54.20	23:28.13	2:16:27.37
Query 3	12:14.74	12:41.63	24:28.24	2:12:34.27
Query 4	22:16.84	23:09.78	44:44.32	2:17:08.82
Query 5	1:24:15.83	1:26:44.10	2:33:15.61	3:50:22.09

The following table gives the runtime results of the 5- and 10-user load tests run on the AlphaServer 8400 system. The 5-user test was comprised of a total of 25 queries issued simultaneously with 5 users each issuing 5 queries. The 10-user test was comprised of a total of 50 queries issued simultaneously with 10 users each issuing 5 queries.

Table 4-7: AlphaServer 8400 System 5- and 10-User Load Test Results

(hr:min:sec)	5 Users		10 Users	
	Min	**Max**	**Min**	**Max**
Query 1	4:27.57	4:51.04	9:46.18	16:32.51
Query 2	7:07.49	7:09.63	12:49.59	19:27.09
Query 3	7:15.78	7:19.69	13:08.93	17:19.72
Query 4	12:12.50	12:29.01	23:26.26	24:12.26
Query 5	5:33.42	6:04.91	1:28:05.00	2:07:25.43

5
System Limits and Performance Data

The tests demonstrated the interoperability of the AlphaServer systems in a VAXcluster.

In the tests of SQL queries in parallel, the cold cache test times for the AlphaServer systems ranged from about 2 min. to 2 hr. 12 min. while the VAX systems ranged from over 11 hr. to over 3 days.

In the 5- and 10-user load tests, the test times for the AlphaServer systems ranged from 4 min. 27 sec. to 3 hr. 50 min. The load tests were not run on the VAX systems because comparably long runtimes were expected.

When comparing VAX and AlphaServer architectures, we performed a simple query on a VAX node, only to realize that the comparison was so overwhelmingly in favor of the AlphaServer nodes that any further testing was considered unnecessary for comparison purposes. (See Table 4-4 for actual data.)

The test configuration was not optimized for performance. A tuning effort would have obtained better runtime results. The 64-bit and VLM capabilities of the AlphaServer systems were clearly evident with the runtimes that were observed.

In conducting the tests on the VAX and AlphaServer systems, certain architectural differences were uncovered, the primary one being the difference in memory addressing between a 32-bit system (VAX system) and a 64-bit system (AlphaServer system).

In designing the database buffering schemes for both platforms, these differences had to be taken into account. The Oracle Rdb7 database provides several different buffer management styles to support 32- and 64-bit systems.

These buffer styles are:

- Conventional process sharing local buffers (available on VAX and AlphaServer systems). This scheme is limited to a process' 32-bit address space.
- Conventional process sharing global buffers (available on VAX and AlphaServer systems). This scheme is limited to a process' 32-bit address space (1 GB).
- System sharing global buffers (available on AlphaServer systems only). This scheme is limited to a system's 32-bit address space (1.8 GB).
- System sharing row cache (available on AlphaServer systems only). This scheme is limited to a system's 32-bit address space (1.8 GB).
- Large memory system sharing row cache (for example, VLM, available on AlphaServer systems only). This scheme is limited to a system's 64-bit address space or amount of physical memory available on the system.

The first three buffering styles are additive and must all reside within the limits of conventional 32-bit addressing. The latter two options are only available on 64-bit AlphaServer systems and account for a vast performance difference between the platforms.

6
Problems and Resolutions

The following problems were identified during testing. They were categorized according to the aspect of the project in which the problems were encountered: Oracle Rdb7 database, system/storage hardware, and OpenVMS operating system.

Problems of various kinds were encountered during this systems integration effort. Some of them could cause a significant disruption if encountered during an installation in a customer environment. They are documented here for the purpose of disseminating valuable information uncovered during testing.

Oracle Rdb7 Database

The following problems were related to setup and use of the Oracle database.

1. Problem Adding one or more AlphaServer systems into a VAXcluster may degrade database performance due to flooding the lock manager with lock requests.

Resolution Ensure that the AlphaServer systems own the locks by setting SYSGEN parameter LOCKDIRWT higher for the AlphaServer systems than the VAX systems.

2. Problem Excessive database creation time (24 hours). Observed a high split transfer rate during database creation.

Resolution Initialize the drives with /NOHIGHWATER to prevent Oracle Rdb7 from doing a time-intensive security erase. As a result, the database was created in about 2 hours.

3. Problem Partitioning the database by channel results in uneven data distribution.

Resolution Identify and distribute “hot channels” across stripesets on different HSJ40 controllers based on a month’s worth of data.

4. Problem The one-user cold cache test aborted on the AlphaServer 8400 system due to insufficient System Page Table Entries (SPTEs).

Resolution Reduce the size of the buffer cache from 50 KB buffers down to 20 KB.

DIGITAL System/Storage Hardware

The following problems were related to the AlphaServer hardware.

1. Problem Saturated a single CI while trying to load the database (11.4 MB/sec. @220 I/O/sec). Maximum CI speed is 9.8 MB/sec @ 400 I/Os/sec.

Resolution Add a second CI to each system (CIPCA for AlphaServer systems, CIXCD for VAX systems).

2. Problem Experienced various CLUEXIT bugchecks on the AlphaServer 8400 system during the database load. One of the CIPCAs on the AlphaServer 8400 system exceeded its retry count and brought the port offline.

Resolution The system was configured such that process quotas were at maximum on the SYSTEM and RDB accounts. Under heavy load, this resulted in processes running with these quotas to have little to no limits on system resource consumption. An LED was found to be on for one of the memory modules. The module was reseated. The 4x4 8400 was replaced with another 12x4 8400 during all of this, so it was undetermined as to which specific action resolved the problem, but the problem did not reoccur after the 8400 swap.

3. Problem Errors (file inconsistency) were reported while accessing the database from the AlphaServer 4100 system.

Resolution This appears to be a known problem with some AlphaServer 4100 systems. Server Engineering is already investigating the problem. The original AlphaServer 4100 system was swapped with another machine.

4. Problem Media Robot Utility would not see TL812 robot after installation and set up.

Resolution A typographical error in the *Media Robot Utility Version 1.1 Guide to Installation, Connectivity, and Operation* (AA-QTTGB-TE) calls for the robot to be configured as LUN 1 off bus 0 when it is really SCSI ID 0 on bus 0.
The TL812 was removed from the configuration due to hardware and software support issues with OpenVMS V7.1.

5. Problem Database went offline and became corrupted.

Resolution Replaced a defective RZ29B disk in stripeset 1DUA74 and rebuilt database.

OpenVMS Operating System

The following problem was noted during the course of testing with OpenVMS V7.1.

Problem One-user load test failed on the VAX system (DEPOTX).

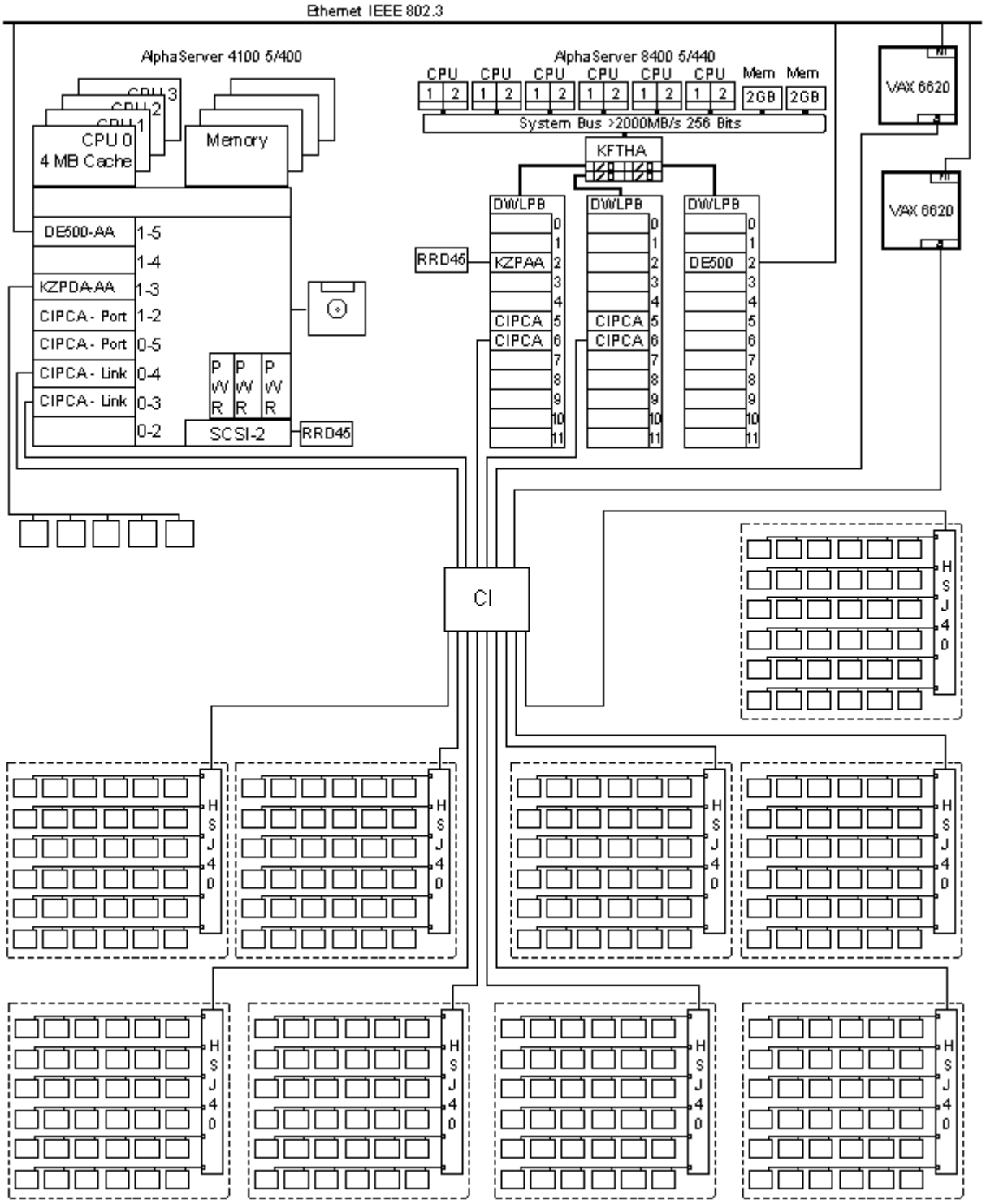
Resolution By default, Oracle Rdb7 uses the SYSTEM account quotas to start the Rdb7 monitor process. In this test, the process consumed nearly 200 KB of page file quota. SYSTEM quota PGFLQUOTA was increased from 110 KB to 300 KB and the page file was increased from 300 KB to 2 GB.

A
Detailed Hardware Configuration

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

- Graphic overview (Golden Egg-like)
- AlphaServer 8400 slot usage
- AlphaServer 4100 slot usage
- Database storage setup
- Database storage maps

Graphic Overview (Golden Egg-like)



AlphaServer 8400 Slot Usage

The following tables describe system bus and I/O shelf usage.

Table 6-1: AlphaServer 8400 System Bus Usage

Location	Part Number	Description
Slot 0	756P1-AX	CPU module (dual CPU)
Slot 1	756P1-AX	
Slot 2	756P1-AX	
Slot 3	756P1-AX	
Slot 4	756P1-AX	
Slot 5	756P1-AX	
Slot 6	MS7CC-FA	2 GB memory module
Slot 7	MS7CC-FA	
Slot 8	KFTHA	I/O module (4 ports)

The system used for testing contained three PCI backplanes connected to three I/O ports or hoses.

Table 6-2: AlphaServer 8400 I/O Shelf Usage

PCI Number	Connections
1	CIPCA, KZPSA
2	CIPCA
3	DE500

AlphaServer 4100 Slot Usage

The following illustration and table identify the components plugged into the PCI motherboard.

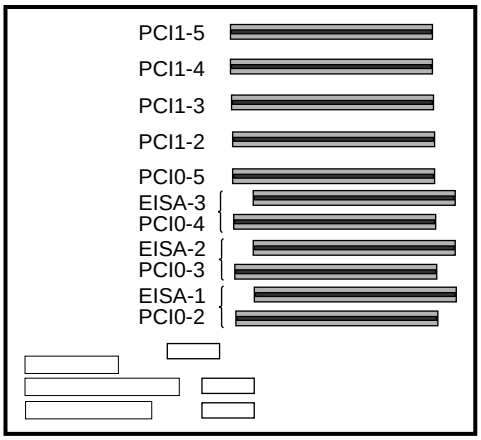


Table 6-3: AlphaServer 4100 PCI Motherboard Usage

Slot	Part Number	Description
PCI1-5	DE500-XA	PCI 10/100-Mbit fast Ethernet controller
PCI1-4	open	
PCI1-3	KZPDA-AA	Fast Wide Single-ended SCSI controller
PCI1-2	CIPCA-AA	Port - PCI to CI host bus adapter
PCI0-5	CIPCA-AA	Port
EISA-3/ PCI0-4	CIPCA-AA	Link
EISA-2/ PCI0-3	CIPCA-AA	Link
EISA-1/ PCI0-2	open	

The following illustration and table identify the components plugged into the system motherboard. The configuration is similar for the AlphaServer 4000 system.

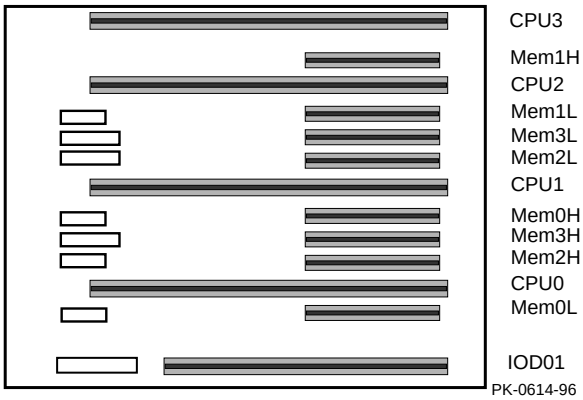


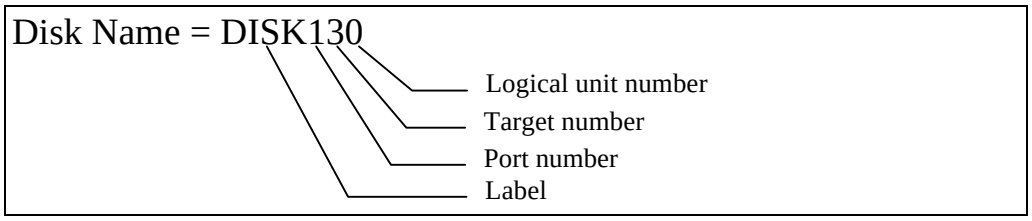
Table 6-4: AlphaServer 4100 System Motherboard Usage

Slot	Part Number	Description
CPU3	KN304-BB	400 MHz CPU
Mem1H	MS330-FA	1 GB memory option
CPU2	KN304-BB	400 MHz CPU
Mem1L	MS330-FA	1 GB memory option
Mem3L	MS330-FA	1 GB memory option
Mem2L	MS330-FA	1 GB memory option
CPU1	KN304-BB	400 MHz CPU
Mem0H	MS330-FA	1 GB memory option
Mem3H	MS330-FA	1 GB memory option
Mem2H	MS330-FA	1 GB memory option
CPU0	KN304-BB	400 MHz CPU
Mem0L	MS330-FA	1 GB memory option
IOD01	open	

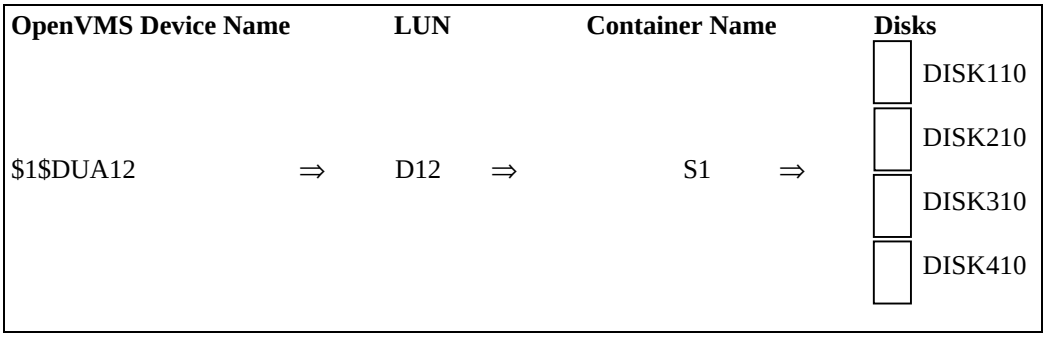
Database Storage Setup

Data was distributed across 9 HSJ controllers located in 3 SW800 cabinets. Each cabinet housed 3 HSJ40 controllers and 18 BA356 shelves such that each controller supported 6 shelves. 308 RZ29B-VW disks were evenly distributed across the six ports of each HSJ40 Controller.

Each disk was given a disk name that consisted of a label, port number, target number, and logical unit number (LUN).



Disks were grouped into stripesets and RAIDsets that spanned several ports of each controller. Each set was assigned a container name such as S1 (stripeset) or R2 (RAIDset) that corresponded to an OpenVMS device name such as 1DUA12 and an HSJ LUN such as D12.



Database Storage Maps

The following tables map the OpenVMS device names to the physical devices in each stripeset (RAID-0) or RAIDset (RAID-5).

Table 6-5: Database Storage Map for HSJ001

OpenVMS Device Name	Volume Label	Volume Description	HSJ LUN	HSJ Container Name [1]	HSJ Physical Devices	Chunk Size (blocks)
1DUA12	DISK1D	95 database data disk	D12	S1	DISK110 210 310 410	128
1DUA11	VAXVMS071	VAX system disk	D11	R1	DISK100 200 300 400 500 600	256
1DUA13	DISK1I	95 database index	D13	S2	DISK120 220 510 610	128
1DUA14	DISK9D	94 database data disk	D14	S4	DISK130 230 330 430	128
1DUA15	See note 2		D15	S5	DISK140 240 530 630	128
1DUA16	DISK9I	95 database index disk	D16	S7	DISK150 250 350 450	128
1DUA17	See note 2		D17	S3	DISK320 420 520 620	128
1DUA18	See note 2		D18	S6	DISK340 440 540 640	128

[1]S1, S2, … = stripeset, R1, R2, … = RAIDset.

[2]Used for temp and sort disks during the database build.

Table 6-6: Database Storage Map for HSJ002

OpenVMS Device Name	Volume Label	Volume Description	HSJ LUN	HSJ Container Name [1]	HSJ Physical Devices	Chunk Size (blocks)
1DUA21	ALPHASYS071	AlphaServer system disk	D21	R1	DISK100 200 300 400 500 600	256
1DUA22	DISK2D	95 database data disk	D22	S1	DISK110 210 310 410	128
1DUA23	DISK2I	95 database index disk	D23	S2	DISK120 220 510 610	128
1DUA24	DISK10D	94 database data disk	D24	S4	DISK130 230 330 430	128
1DUA25	See note 2		D25	S5	DISK140 240 530 630	128
1DUA26	DISK10I	94 database index disk	D26	S7	DISK150 250 350 450	128
1DUA27	See note 2		D27	S3	DISK320 420 520 620	128
1DUA28	See note 2		D28	S6	DISK340 440 540 640	128

[1] S1, S2, … = stripeset, R1, R2, … = RAIDset.

[2] Used for temp and sort disks during the database build.

Table 6-7: Database Storage Map for HSJ003

OpenVMS Device Name	Volume Label	Volume Description	HSJ LUN	HSJ Container Name [1]	HSJ Physical Devices	Chunk Size (blocks)
1DUA31	DISK3D	95 database data	D31	S1	DISK100 200 300 400	128
1DUA32	DISK3I	95 database index	D32	S2	DISK110 210 500 600	128
1DUA33	See note 2		D33	S4	DISK120 220 320 420	128
1DUA34	DISK11D	94 database data disk	D34	S5	DISK130 230 520 620	128
1DUA35	DISK11I	94 database index disk	D35	S7	DISK140 240 340 440	128
1DUA36	See note 2		D36	S6	DISK330 430 530 630	128
1DUA37	See note 2		D37	S3	DISK310 410 510 610	128
1DUA38	See note 2		D38	S8	DISK150 250 540 640	128
1DUA39	See note 2		D39	S9	DISK350 450 550 650	128

[1]S1, S2, … = stripeset, R1, R2, … = RAIDset.

[2]Used for temp and sort disks during the database build.

Table 6-8: Database Storage Map for HSJ004

OpenVMS Device Name	Volume Label	Volume Description	HSJ LUN	HSJ Container Name [1]	HSJ Physical Devices	Chunk Size (blocks)
1DUA41	DISK4D	95 database data disk	D41	S1	DISK100 200 300 400	128
1DUA42	DISK4I	95 database index disk	D42	S2	DISK110 210 500 600	128
1DUA43	See note 2		D43	S4	DISK120 220 320 420	128
1DUA44	DISK12D	94 database data disk	D44	S5	DISK130 230 520 620	128
1DUA45	DISK12I	94 database index disk	D45	S7	DISK140 240 340 440	128
1DUA46	See note 2		D46	S8	DISK150 250 540 640	128
1DUA47	See note 2		D47	S3	DISK310 410 510 610	128
1DUA48	See note 2		D48	S6	DISK330 430 530 630	128
1DUA49	See note 2		D49	S9	DISK350 450 550 650	128

[1]S1, S2, … = stripeset, TEMPDR1, R2, … = RAIDset.
[2]Used for temp and sort disks during the database build.

Table 6-9: Database Storage Map for HSJ005

OpenVMS Device Name	Volume Label	Volume Description	HSJ LUN	HSJ Container Name [1]	HSJ Physical Devices	Chunk Size (blocks)
1DUA51	DISK5D	95 database data disk	D51	S1	DISK100 200 300 400	128
1DUA52	DISK5I	95 database index disk	D52	S2	DISK110 210 500 600	128
1DUA53	See note 2		D53	S4	DISK120 220 320 420	128
1DUA54	DISK13D	94 database data disk	D54	S5	DISK130 230 520 620	128
1DUA55	DISK13I	94 database index disk	D55	S7	DISK140 240 340 440	128
1DUA56	See note 2		D56	S8	DISK150 250 540 640	128
1DUA57	See note 2		D57	S3	DISK310 410 510 610	128
1DUA58	See note 2		D58	S6	DISK330 430 530 630	128
1DUA59	See note 2		D59	S9	DISK350 450 550 650	128

[1]S1, S2, … = stripeset, R1, R2, … = RAIDset.

[2]Used for temp and sort disks during the database build.

Table 6-10: Database Storage Map for HSJ006

OpenVMS Device Name	Volume Label	Volume Description	HSJ LUN	HSJ Container Name [1]	HSJ Physical Devices	Chunk Size (blocks)
1DUA61	DISK6D	95 database data disk	D61	S1	DISK100 200 300 400	128
1DUA62	DISK6I	95 database index disk	D62	S2	DISK110 210 500 600	128
1DUA63	See note 2		D63	S4	DISK120 220 320 420	128
1DUA64	DISK14D	94 database data disk	D64	S5	DISK130 230 520 620	128
1DUA65	DISK14I	94 database index disk	D65	S7	DISK140 240 340 440	128
1DUA66	See note 2		D66	S8	DISK150 250 540 640	128
1DUA67	See note 2		D67	S3	DISK310 410 510 610	128
1DUA68	See note 2		D68	S6	DISK330 430 530 630	128
1DUA69	See note 2		D69	S9	DISK350 450 550 650	128

[1]S1, S2, … = stripeset, R1, R2, … = RAIDset.

[2]Used for temp and sort disks during the database build.

Table 6-11: Database Storage Map for HSJ007

OpenVMS Device Name	Volume Label	Volume Description	HSJ LUN	HSJ Container Name [1]	HSJ Physical Devices	Chunk Size (blocks)
1DUA71	DISK7D	95 database data disk	D71	S1	DISK100 200 300 400	128
1DUA72	DISK7I	95 database index disk	D72	S2	DISK110 210 500 600	128
1DUA73	See note 2		D73	S4	DISK120 220 320 420	128
1DUA74	DISK15D	94 database data disk	D74	S5	DISK130 230 520 620	128
1DUA75	DISK15I	94 database index disk	D75	S7	DISK140 240 340 440	128
1DUA76	See note 2		D76	S8	DISK150 250 540 640	128
1DUA77	See note 2		D77	S3	DISK310 410 510 610	128
1DUA78	SORT0	95 database sort disk	D78	S6	DISK330 430 530 630	128
1DUA79	SORTC	94 database sort disk	D79	S9	DISK350 450 550 650	128

[1]S1, S2, … = stripeset, R1, R2, … = RAIDset.

[2]Used for temp and sort disks during the database build.

Table 6-12: Database Storage Map for HSJ008

OpenVMS Device Name	Volume Label	Volume Description	HSJ LUN	HSJ Container Name [1]	HSJ Physical Devices	Chunk Size (blocks)
1DUA81	DISK8D	95 database data disk	D81	S1	DISK100 200 300 400	128
1DUA82	DISK8I	95 database index disk	D82	S2	DISK110 210 500 600	128
1DUA83	See note 2		D83	S4	DISK120 220 320 420	128
1DUA84	DISK16D	94 database data disk	D84	S5	DISK130 230 520 620	128
1DUA85	DISK16I	94 database index disk	D85	S7	DISK140 240 340 440	128
1DUA86	See note 2		D86	S8	DISK150 250 540 640	128
1DUA87	See note 2		D87	S3	DISK310 410 510 610	128
1DUA88	SORT1	95 database sort disk	D88	S6	DISK330 430 530 630	128
1DUA89	SORTB	94 database sort disk	D89	S9	DISK350 450 550 650	128

[1]S1, S2, … = stripeset, R1, R2, … = RAIDset.

[2]Used for temp and sort disks during the database build.

Table 6-13: Database Storage Map for HSJ009

OpenVMS Device Name	Volume Label	Volume Description	HSJ LUN	HSJ Container Name [1]	HSJ Physical Devices	Chunk Size (blocks)
1DUA91	SORT2	95 database sort disk	D91	S1	DISK100 200 300 400	128
1DUA92	SORTA	94 database sort disk	D92	S2	DISK110 210 500 600	128
1DUA93	See note 2		D93	S4	DISK120 220 320 420	128
1DUA94	See note 2		D94	S5	DISK130 230 520 620	128
1DUA95	ROOT0	root disk 94/95	D95	S3	DISK310 410 510 610	128
1DUA96	STORAGE	??	D96	S6	DISK330 430 530 630	128

[1] S1, S2, … = stripeset, R1, R2, … = RAIDset.

[2] Used for temp and sort disks during the database build.

B
Operational Command and Supporting Files

The following files were used to set up, load, or run tests on the CPG database. Details about file contents are available upon request.

BINARY.COM

A DCL command procedure to create binary input load files. BINARY.COM created twelve files, each 5.5 GB per month, that constituted a year's worth of sales data.

CACHES.SQL

An SQL script to create VLM row caches. This script is included in the CPGxx.SQL script (where "xx" is the year number).

CPG.COM

A DCL command procedure to create RMS search list logicals for all keys directories (i.e., CPG - all database storage directories, TMP - all temporary files, SRT - all sort devices, AIJ - all after image journal files).

CPG94.SQL

An SQL script to create the 1994 database using SQL$CPG94 as the root name.

CPG95.SQL

An SQL script to create the 1995 database using SQL$CPG95 as the root name.

DBI.SQL

An SQL file that creates the query catalog used to direct the queries to the appropriate database.

DISKS.93

A device list file detailing the devices comprising the 1993 database.

DISKS.94

A device list file detailing the devices comprising the 1994 database.

DISKS.95

A device list file detailing the devices comprising the 1995 database.

DISMOUNT.COM

A DCL command procedure to dismount files.

INDEXES-94.SQL

Creates the indexes for the 1994 database on the AlphaServer 4100 system.

INDEXES-95.SQL

Creates the indexes for the 1995 database on the AlphaServer 8400 system.

INIT.COM

A command file that initializes the database after a system boot.

JOURNALS-94.COM

Creates the journals for the 1994 database on the AlphaServer 4100 system.

JOURNALS-95.COM

Creates the journals for the 1995 database on the AlphaServer 8400 system.

LOAD-DIM.COM

A command file that loads the small dimension tables.

LOADER.COM

A DCL command procedure to create ASCII input load files. LOADER.COM created twelve files, each 6.8 GB per month, that constituted a years worth of sales data.

LOGICALS.COM

A DCL command procedure to define device logical names.

LOGIN.COM

A login command procedure to establish the VMS$MENU logical names.

MOUNT.COM

A DCL command procedure to mount disk devices.

RMU-COPY95.COM

A DCL command procedure to perform an RMU copy of the 1995 database.

RMUBIN.COM

A DCL command file that serially loads the sales facts table from binary load files.

RMUBIN17.COM

A DCL command file that loads the sales facts table in parallel using 17 threads.

RMUBLD.COM

A DCL command file that loads the sales facts table from ASCII load files.

SF_KEY-94.SQL

An SQL script used for contingencies to build the index on the sales facts table for 1994.

SF_KEY-95.SQL

An SQL script used for contingencies to build the index on the sales facts table for 1995.