COMPAQ

Configuration and Tuning of Oracle7 for NetWare on Compaq Servers

Compaq TechNote

Includes information on:

- Specific tuning suggestions for the Compaq ProLiant Family of Servers and NetWare
- New features available in Oracle7, version 7.1
- Management considerations for mission-critical systems

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Configuration and Tuning of Oracle7 for NetWare on Compaq Servers

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Chapter 1
About This TechNote

This TechNote provides configuration and performance-tuning information for Oracle7 on NetWare on the Compaq ProLiant Family of Servers. The information presented in this TechNote is based on both Oracle7 versions 7.0 and 7.1 for NetWare versions 3.11, 3.12 and SFT3.11. Since there is an abundance of information available concerning the generic tuning of Oracle7, much of the discussion focuses specifically on Compaq and NetWare tuning. Wherever possible, references are made to other useful tuning documentation.

This TechNote also provides:

- Overview of the Oracle architecture and the new features of Oracle7, version 7.1.
- Recommendations on tuning your system for the best performance possible which includes basic tuning, input/output tuning, memory tuning, user capacity considerations, and network tuning.
- Discussion on management considerations for mission-critical systems.

Chapter Organization

This chapter is intended to help you use this TechNote; therefore, each chapter is summarized as follows:

- ***Chapter 1*** -- Introduces the TechNote with a brief summary of each chapter, general information about conventions used, and additional resources you can use to find more information on Oracle7 and the Compaq test environment used.
- ***Chapter 2*** -- Provides an overview of the Oracle architecture which describes an Oracle instance consisting of System Global Area (SGA) structures, the Oracle background processes, the control and configuration files, the database files, and the redo log files.

- ***Chapter 3*** -- Describes how to optimally tuning your system which includes discussing items such as basic tuning, input/output tuning, memory tuning, user capacity considerations, and network tuning.
- ***Chapter 4*** -- Discusses management considerations for mission-critical systems which include proactive monitoring by using such products as Oracle Server Manager, DB General, and Compaq Insight Manager.
- ***Appendix A*** -- Provides information on how to order printed Compaq TechNotes, including pricing information, 1 (800) telephone numbers, and a list of the latest TechNotes available. This information also includes the TechNotes available on the Internet.

Notational Conventions

Table 1-1 defines the text conventions used within this TechNote.

Table 1-1
Notational Conventions

Convention	Use
Enter	When instructed to enter information, type the information in using your keyboard.
FILENAMES	Names of files appear in uppercase italic in the DOS and other environments.
items of importance	Presents important or specific points of information. These items appear in italics in all chapters of this TechNote.
Key + **Key**	When you see a plus sign between two keys, hold down the first key while you simultaneously press the second key. For example, "Press the **Ctrl** + **Z** keys" means to press the **Ctrl** key while you simultaneously press and release the **Z** key.

continued

Notational Conventions *continued*

Convention	Use
Keys	Keys on your keyboard appear in boldface.
"new terms" and "prompts"	The first occurrence of a technical term, prompts, or references to a word other than a command appears in quotes.
PROGRAMS, COMMANDS, UTILITIES, DIRECTORY NAMES, and DRIVE NAMES	These items appear in uppercase in the DOS and other environments.
Select *item* → *item*	Items separated by arrows indicate items you select in a sequence.
Set, Get	Screen button labels appear in bold initial caps.
screen selections and *variables*	These items appear in italics in all chapters of this TechNote.
user input and screen display	Information you type exactly as it appears on the screen.
USER INPUT	Information you type exactly as it appears is shown in uppercase.
CAUTION	Indicates that failure to follow directions could result in damage to equipment or loss of information.
! IMPORTANT	Presents clarifying or specific points of information.
NOTE:	Presents commentary, sidelines, or interesting points of information.

Additional Resources to Use

Use the following list of resources, which are used throughout this TechNote, for more information on configuring and tuning Oracle7 for NetWare on Compaq servers:

- Compaq TechNote, *Configuring Compaq RAID Technology for Database Servers*, P/N: 184206-001.
- Compaq TechNote, *Configuration and Tuning of Oracle7 for SCO UNIX on Compaq Servers*, P/N: 184329-001.
- Oracle Documentation, *Oracle7 Server Administrator's Guide*, P/N: 6694-70-1292.
- Oracle Documentation, *Oracle7 Server Application Developer's Guide*, P/N: 6695-70-1292.
- Oracle Documentation, *Installation and Configuration Guide for Oracle7 on NetWare*, P/N: A10159-2.
- Oracle Documentation, *Oracle7 Server Concepts Manual*, P/N: Unknown.
- O'Reilly and Associates Documentation, *Oracle Performance Tuning*, P/N: Unknown.
- Bradmark Technologies, Inc. Documentation, *DB General*, P/N: Unknown.
- Internet

  This service is available to interact with other users and support engineers or to get product information.

  - To access the Compaq home page on the Internet: *http:// www.compaq.com*
  - To access the Novell home page on the Internet: *http://www.novell.com*
  - To access the Oracle home page on the Internet: *http://www.oracle.com*

Chapter 2
Architecture

An Oracle instance consists of the System Global Area (SGA), the Oracle background processes, the control and configuration files, the database files, and the redo log files. Table 2-1 displays the SGA is a memory construct that contains the following information:

Table 2-1
SGA Structures

Structure	Description
Database Buffers	Contains most recently used database blocks
Shared Pool	Contains shared SQL areas and data dictionary cache
Redo Log Buffers	Logs the changes made to the database
Cursors	Handles for memory associated with specific statements

Table 2-2 list the background processes:

Table 2-2
Background Processes

Process	Description
Database Writer (DBWR)	Writes database blocks to disk.
Log Writer (LGWR)	Writes the redo log entries to disk.
Process Monitor (PMON)	Responsible for the management of Oracle Processes.
System Monitor (SMON)	Performs instance recovery and cleanup.
Recovery Process (RECO)	Resolves failures with the distributed option.

continued

Process	Description
Archival Process (ARCH)	Copies full online redo log files to the archive device (if in ARCHIVELOG mode).
Dedicated Checkpoint Process (CKPT)	Signals DBWR to perform updates on all data and control files of the database. If not present LGWR performs this process.

A shadow process is a separate dedicated server process which acts on behalf of a particular user. One is created for each user that connects to the database. Any requests that a user has for the database is done through the shadow process for that user. When a shadow process wants to read from the database, it checks to see if the data exists in the SGA, if it does it reads from the memory. If the data is not found in memory the process goes directly to the datafiles and reads the data into the SGA. When a process wants to write to the database, the shadow process writes into the SGA only, and at a later time DBWR writes this “dirty” data out to disk.

The redo log is used to keep a history of all transactions. This history allows the database to perform an instance recovery. A minimum of two redo logs is required and more can be used. When a redo log fills, a log switch occurs. At log switch time all new redo information goes to the next redo log file in line. If the system is running in ARCHIVELOG mode, which is recommended, the previous log file is copied out to an archive log file.

With a recent backup, the redo log files and the redo log archive files, the database can be recovered, if needed. The control and configuration files are used to store information of the state layout of the database as well as system parameters. A more in depth discussion of the Oracle7 architecture can be found in the *Oracle7 Server Concepts Manual.*

New Features in Oracle7 Version 7.1

Although Oracle7 version 7.1 is primarily a maintenance release, there are several new features briefly outlined in Table 2-3. For more details on these new features, refer to the Oracle7 Server Documentation Addendum Release 7.1.

Table 2-3
New Features in Oracle7 Version 7.1

Feature	Description
Server Manager	A new administration tool for Oracle7. It has a line mode interface on the NetWare console. Soon, Server Manager will have a Graphical User Interface (GUI) using Microsoft Windows. Server Manager provides all the features previously available in SQLDBA plus additional configuration and performance monitoring information.
Procedural Option	Provides features previously limited to users of PL/SQL, such as stored procedures and triggers, to all users. Also allows multiple triggers of the same type on a single table.
Symmetric Replication	Allows multiple, updateable copies of data at different sites in a distributed environment. This facility will be available on a different schedule from version 7.1. More information will be provided on the topic of Replicated Servers as it becomes available.
Consistent Snapshot Refresh	Allows multiple related snapshots to be kept consistent to any point in time.
Enhancements to SQL and PL/SQL	Oracle7 version 7.1 conforms to entry level ANSI SQL92 standard requirements. SQL has been enhanced to allow PL/SQL user defined functions to be called from within SQL.

continued

Feature	Description
Read Only Tablespaces	Allows the creation of read-only tablespaces. This reduces backup and recovery because these tablespaces do not require backup. In addition, this allows read only media such as CD-ROM and WORM drives to store data.
Parallel Recovery	Allows multiple processes to perform the recovery, thereby decreasing the database recovery time. On multiprocessor machines the performance improvement should be significant. Parallel recovery allows more threads of operation which achieves better disk throughput and allows more system processor utilization.
Improved Security When Connecting to a Remote Database	Passwords are now encrypted when they are sent over the network.
Parallel Query	Improves performance on bulk operations such as data loading, queries, and index creation is greatly improved by taking advantage of multiple CPU process threads. During complex queries where parallelism can be used the time it takes to do each query should be reduced.
SQL*Net Oracle Names	Allows a database link without providing a connect string to the database. Uses Oracle Network Manager to provide connection information to all the machines on the network.

Chapter 3
Tuning Your System

To achieve the best performing system possible, you must review several factors. These include optimizing your hardware, the Oracle server, the operating system, and the application software. This TechNote focuses on the hardware, the Oracle Server, and the operating system. Although it is also important to tune the application, this topic is beyond the scope of this TechNote.

An optimally tuned Oracle7 on a NetWare system will have the following characteristics.

- There will be little or no waiting on I/O. This indicates that the CPUs always have some work to do while there are outstanding I/Os. This can be verified by looking at the NetWare Monitor utility's Current Disk Requests field.
- Most system processor utilization is allocated to the user processes and not the background processes. NetWare's Monitor utility breaks down the CPU utilization based on processes. Make sure that the user's shadow process threads are getting the majority of the system processor utilization.
- Users needs good response times. A system that appears to be tuned well and is experiencing poor response times could have an inefficient statement in the application or could be having excess latencies in the I/O subsystem or network. Since well tuned database applications are system processor bound, a processor with more horsepower will improve response times.

NOTE: Keep in mind that tuning is an iterative process that evolves as user and work loads change on your system.

Basic Tuning

To run Oracle7 on NetWare servers, load the necessary NLMs. These NLMs are the first 5 NLMs listed below.

If you are running NW3.11 or NetWare Runtime v3.11, load *PATCHMAN*, *BIGRFIX*, and *SPXFIX2* NLMs as well. These are all shipped with the Oracle7 for NetWare package.

Novell's NetWare SFTIII and NetWare 3.12 only require the first 5 Novell NLMs listed in Table 3-1. See the Oracle7 Server for NetWare Installation User's Guide for version information on the NLMs listed here. Oracle7 must use the versions listed in the table or later versions of these NLMs.

Table 3-1
NLMs

NLM	SOURCE	NW3.11 version	NW3.12
STREAMS	NetWare Install	v3.11	v3.12
MATHLIB	NetWare Install	v3.11	v3.12
AFTER311	Oracle 7/NetWare	v3.0.5	v3.0.5
DIRECTFS	Oracle 7/NetWare	v1.08	v1.08
CLIB	Oracle 7/NetWare	v3.11d	v3.12
BIGRFIX	Oracle 7/NetWare	v1.00	N/A
SPXFIX2	Oracle 7/NetWare	v2.00	N/A
PATCHMAN	Oracle 7/NetWare	v2.30	N/A

Setting The Minimum Packet Receive Buffers

The most important NetWare parameter to keep track of for performance of the Oracle7 server is:

MINIMUM PACKET RECEIVE BUFFERS (set in STARTUP.NCF).

Packet receive buffers are used by NetWare to buffer up the incoming requests from the network while the processor is busy servicing other requests. Set this value high enough to avoid having buffers dynamically allocated during run time. A starting value of around 200 is usually sufficient for 50 users or less. Watch the NetWare Monitor screen during peak load times, making sure that the number never increases above 200.

NW_USEDFS (set in CONFIG.ORA) -- This parameter determines which file service routines Oracle is going to use. The default value of TRUE will enable Oracle to use the DIRECTFS (direct file services) routines whenever possible. Setting this to FALSE will force Oracle to use the CLIB (NetWare's C Library) routines. Oracle performs better when using the DIRECTFS routines, so keep this parameter set to TRUE.

Setting The Maximum Receive Packet Size

Parameters that will allow you to free up more memory from the NetWare Operating System for the SGA and PGA include:

MAXIMUM RECEIVE PACKET SIZE (set in STARTUP.NCF) -- Set this to the largest packet size supported by your protocol and network interface boards.

Larger numbers will simply be a waste of memory because the packets will not be utilizing that memory space, but the operating system will still have it allocated to the packet buffers. Setting this value too small will increase the traffic on the network, by increasing the number of packets required to transmit the same amount of information. Examples of packet sizes are:

- Ethernet: 1130
- Token Ring (4Mb/s): 2154 (NetFlex can do 4202 if the client hardware can support it)
- Token Ring (16Mb/s): 4202

Setting The Volume Block Size

When you are setting **VOLUME BLOCK SIZE**, set at volume creation time in *INSTALL.NLM*. For dedicated database servers, set this to the maximum possible (64K).

This parameter defines the minimum block size that the NetWare file system can allocate to a particular file. Since Oracle bypasses the NetWare file system's CLIB routines increasing this value will not affect performance. It will minimize the amount of memory NetWare will use for caching the directory structures, leaving the system with more RAM for the Oracle memory structures.

You should always run your Oracle application on a dedicated application server. However, please note, if you are using the NetWare file system for file sharing, maximizing of the **VOLUME BLOCK SIZE** can be detrimental to the performance of the system as a file sharing system. This is not recommended.

Setting Cache Buffer Size

CACHE BUFFER SIZE (set in STARTUP.NCF) -- This parameter is the size of the NetWare cache buffer blocks. Since the DIRECTFS routines bypass the NetWare cache you can leave this at a value of 4096. However, increasing it to 16384 will give you a boost in performance during tablespace creation, because Oracle does use the CLIB routines to create new files.

I/O Tuning

In most well-tuned Oracle systems, I/O will not be the limiting factor. To assure that this is not a problem, verify the following factors.

- Sequential I/O's are isolated to their own controller volume.
- Random I/O's are balanced across all drives allocated to data and indexes.
- Physical disk I/O rate capacities are not exceeded.

Separate Sequential and Random I/O's

In order to achieve maximum performance on data files being accessed sequentially, the disk(s) need to be dedicated to this purpose. Of primary importance is the Oracle transaction log files, which are accessed in a sequential, write-only fashion. Other partitions with little I/O activity can share the disk(s) with the redo logs, such as the operating system partition.

In typical, multiuser database systems file access is random. Spread out these files over as many physical disks as necessary to achieve random I/O rates that do not exceed recommendations. This is best achieved by using the disk striping available with the Compaq SMART SCSI Array Controller. The Compaq SMART Controller ensures that the load is balanced equally across disks in a volume and allows a high degree of parallelism to occur on accesses. For more information on optimizing array configurations, refer to *Configuring Compaq RAID Technology for Database Servers*.

Layout of Tables and Files

To improve performance where disk I/O is a problem, consider the following:

- Redo Log access is 100 percent sequential I/O and needs to be isolated if possible. The speed of the redo log is essential to system performance. If possible, these drives should be fault tolerant. Hardware fault tolerance provides the maximum performance and reliability. For more information on fault tolerance in a database server, refer to the Compaq TechNote *Configuring Compaq RAID Technology for Database Servers*.
- Redo log archive files also are 100 percent sequential I/O and should be isolated for maximum performance.

- Data file access is usually random and needs to be spread across as many drives as necessary. By increasing the number of physical drives, you can achieve greater I/O rates. Using a striped array assures good I/O distribution.
- When configuring NetWare partitions, be sure to start all partitions on a physical disk boundary. Do this by altering the hotfix redirection area. Use the utility *CPQDAOPT.NLM* to determine the correct setting for HOT FIX.

Because Oracle7 performs all of its disk I/O in 2Kbytes blocks, aligning the disk partition to start on a disk boundary assures that a 2Kbytes I/O will not span multiple disks. The Compaq IDA, IDA-2, and SMART array stripe in 16Kbyte chunks. If a partition starts on an odd boundary, a 2Kbyte I/O takes the first 1Kbyte from the last 1Kbyte of a 16Kbyte stripe and 1Kbyte from the beginning of the next 16Kbyte stripe. The controller will need to issue two separate requests to retrieve the information (one to each drive). This is inefficient and should be avoided.

Don’t Exceed I/O Limits

Do not to overload the disks with random I/Os. Compaq recommends random I/Os not exceed 50 I/Os per second per drive for 2GB drives and not exceed 40 I/Os per second per drive for 1GB and 500MB drives. To do this, determine the number of I/O’s per second to each logical volume.

The I/O’s per second can be measured using the SQL*DBA MONITOR FILEIO command, which gives you the number of physical reads and writes per second on a file by file basis. Once you have this take these numbers and sum them up for each file on a logical volume. The total is your number of read I/O’s and write I/O’s per second per volume.

To calculate the number of I/O’s per physical disk based on the fault tolerance level of that particular logical volume, use the formulas found in the Compaq TechNote *Configuring Compaq RAID Technology for Database Servers*. Third-party NetWare and database utilities are also available to calculate the reads and writes per second per logical volume.

Be aware that In any case, if the number of I/O's per second exceeds recommended rates adding more physical disks should improve performance.

As shown in Table 3-2, the data: drive has a total of 310 I/O's per second. If it is a NFT set of 7 drives we can divide the total I/O's by 7 and get 44.3 I/O's per second per drive, an acceptable number for 2GB drives, but we would want to add more drives if they were 1GB drives.

Table 3-2
Configuration and Tuning Documentation

Data File	Reads/second	Writes/second
SYS:SYSTEM.DBF	0	0
SYS:RBS.DBF	1.6	2
DATA:DATA.DBF	150	150
DATA:HIST.DBF	0	10
DATA:INDEX.DBF	0	0

Memory Tuning

This section of the TechNote discusses Oracle DB Block Buffers and Block Size as well as SGA size.

Oracle DB Block Buffers

To reduce excess I/O, tune the Oracle data cache to provide maximum use of the resources available. The Oracle buffers are tuned with the parameter **DB_BLOCK_BUFFERS**. The key is to utilize as much memory for the buffer cache as possible, while leaving enough for the background and users' shadow processes. The Oracle processes and shadow processes might take anywhere from 400KB to 2MB of RAM on the server. You can calculate the amount of memory required by your various applications. This is done by viewing the RESOURCE UTILIZATION screen in NetWare's *MONITOR.NLM*. Record the number of bytes in the Cache Non-Movable Memory pool both before and during the running of the application. The amount that this number increases while an application is running is how much memory that particular application requires.

Oracle DB Block Size

The default **DB_BLOCK_SIZE** is 4096. The value that this parameter needs to be depends upon the type of transaction load that you have when performance is the most critical. If performance is most crucial during applications that primarily access the database in a random fashion (small reads or updates scattered throughout the database), then you should use a block size of 2048. On the other extreme if most of the applications are sequentially accessing the database when performance is most crucial, then you need a block size of 8192. If you are uncertain of the transaction load or have an even split of random and sequential access during this critical time, then use a block size of 4096.

SGA Size

Since the Oracle SGA resides in server memory, this memory is allocated at the startup of the instance. The SGA is made up of the following components:

Fixed Size + Variable Size + DB Buffers + Redo Buffers = Size of SGA

Fixed Size is determined by the Oracle products that you have installed.

- Variable Size is determined by init.ora parameters.
- DB Buffers is determined by **DB_BLOCK_BUFFERS*DB_BLOCK_SIZE** parameters.
- Redo Buffers is determined by the **LOG_BUFFERS** parameter. **LOG_BUFFERS** is specified in bytes.
- **NW_SGA_MAX_ALLOC:** The maximum size of each block (in K) in the SGA (default 256).

This parameter represents the largest block of contiguous memory that Oracle can request from the NetWare memory pools. Some of the SGA structures are required to be in a contiguous block of memory. The largest of these is the _DB_BLOCK_MULTIPLE_HASHCHAIN_LATCHES. Leaving **NW_SGA_MAX_ALLOC** at the default with the **DB_BLOCK_SIZE** set to 2048 will allow you to get an SGA size of around 25MB, depending upon the setting of other INIT.ORA parameters. If you get an ORA00064 error message during the startup of an Oracle instance, you need to increase the **NW_SGA_MAX_ALLOC**. The amount that you need to set it to will be shown in the error message along with the section of the SGA that is requiring the larger block of memory. In the error message, the size will be given to you in bytes, but when you set it in CONFIG.ORA you need to convert it to kilobytes. An example of the error message is, “ORA00064: object too large to allocate on this O/S (372166, _db_block_multiple_hashchain_latches).” For this example you need to either set the **NW_SGA_MAX_ALLOC** to approximately 372, or figure out some way to reduce the size of the _db_block_multiple_hashchain_latches.

User Capacity Considerations

There are a few tuning areas you might need to adjust, based on the number of users that you want to connect. For example, you might need to adjust the Oracle parameters; they allow a specified number of connections into the database engine. You might also need to tune several areas of the operating system, based on your configuration.

PGA Size

A Program Global Area (PGA) is allocated by Oracle when a user process connects and a session is created. The PGA is a region of memory that contains data and control information for a single process (server or background). This memory must be available at the connect time for a particular user, therefore the amount of free server memory is a limitation to the number of concurrent connections. Each user's PGA could allocate anywhere from 400KB to 2MB of server memory, depending upon the application. The PGA's size is affected by the following parameters:

- OPEN_LINKS
- DB_FILES
- LOG_FILES

The **NW_PGA_MAX_ALLOC** parameter exists to govern the size of the memory blocks that the PGA can allocate. **NW_PGA_MAX_ALLOC:** The maximum size of each block of memory for the PGAs (in K). The default value of two times the **NW_SGA_MAX_ALLOC** is sufficient in most cases.

Processes

The init.ora parameter **PROCESSES** must be adjusted. This parameter specifies the number of processes that Oracle can create. This number also needs to include the Oracle background processes. The number of Oracle background processes will typically be 6. Therefore the number must be at least the maximum concurrent connections plus 6 background processes. The background processes include any or all of the processes listed in the Oracle architecture section of thisTechNote.

Network Tuning

This section of the TechNote discusses SPX/IPX and TCP/IP.

SPX/IPX

To increase the number of users that can be connected through SPX/IPX, the parameter **SPX_MAX_CLIENTS** must be tuned in the *CONFIG.ORA* file. Set the parameter to the maximum number of concurrent user connections required. If more connections attempt to get in once the current connections are equal to this parameter, the application receives the following SQL*NET error message:

```
ORA-06452 NETSPX: SPX connection failure
```

The user license is still a limit to the number of connections into the database.

An Oracle listener is a thread within the SQL*NET process that monitors the network for connection requests from client applications and other Oracle servers (in a distributed database environment). When a listener process receives a connection request, it spawns a background (shadow) process on the server that performs all of the communication functions with the connected client process. By default Oracle has 5 SPX listener threads. If you are attempting multiple simultaneous connections and some of them are receiving SPX time-outs before establishing a connection, you may need to increase the parameter **SPX_LISTENERS**.

Both of the parameters **SPX_MAX_CLIENTS** and **SPX_LISTENERS** are set in the *CONFIG.ORA* file.

TCP/IP

The TCP/IP protocol can be used by itself on a server or with the SPX/IPX protocol for connecting to an Oracle database. Under normal loads, TCP/IP usually does not need tuning.

Chapter 4
Management Considerations

Management of the operating system, the database, and the hardware is a great concern. If the system is used in a mission-critical role, it is especially important to notify the administrator about any faults in the system and to take corrective action as quickly as possible. In the past few months several new products have been introduced to help with this task. These products are listed in the following sections.

- Oracle Server Manager
- DB General
- Compaq Insight Manager

Oracle Server Manager

Oracle Server Manager is delivered as part of the Oracle7 version 7.1 release. Server Manager has a line mode interface on the NetWare console. There will soon be a windows based graphical interface for it. It can be used to administer the database functions as well as gather some performance information from the database. Server Manager operates over SQL*Net, therefore eliminating the need to execute these functions locally.

DB General

DB General from Bradmark provides an Microsoft Windows-based tool that uses SQL*Net to monitor various parameters in the Oracle7 database. The console runs on Microsoft Windows but can connect to Oracle7 databases on any operating system.

Compaq Insight Manager

Compaq Insight Manager is a Windows-based utility that uses SNMP in conjunction with the operating system and Driver Agents on the server to report hardware failures and system degradation due to a hardware problem. Insight Manager can be configured to page the system administrator if a component is failing. Using Compaq Insight Manager pre-failure warranty allows a hardware component to be replaced under warranty before it fails. Insight Manager monitors system hardware and a few operating system components. This utility can be found on the Compaq SmartStart product.

Appendix A
Multivendor Integration from Compaq

To help you successfully integrate and optimize your network or multivendor system, Compaq has developed a library of systems integration TechNotes for the NetWare, Microsoft Windows NT, SCO UNIX, and OS/2 operating system environments. TechNotes provide you with important information on topics such as network performance management, server management, and operating system interconnectivity.

To get a copy of a particular TechNote in electronic format, you can access:

- Downloadable files from the Internet at:

  http:// www.compaq.com

- Online files from the SmartStart CD

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Current TechNotes

The current TechNotes available are listed in Table A-1.

Table A-1
Compaq TechNotes

TechNote Name	Available on SmartStart	Part Number
Compaq Insight Management		
Integrating Compaq Insight Manager with Enterprise Management Platforms (8/95)	√	145806-003
Integrating Compaq Insight Manager with Microsoft Systems Management Server (8/95)	√	184720-001
Integrating Compaq Insight Manager with ManageWise (8/95)	√	182074-001
NetWare		
Performance Management in a NetWare v3.1x Environment (4/93)		133399-002
NetWare Tape Backup Management Using ARCserve from Compaq (4/93)	√	137535-001
NetWare 4 Performance Management (7/94)	√	137989-001
ORACLE Server Planning in a NetWare v3.11 Environment (5/93)		145143-001
NetWare Server Management (9/92)		145231-001
Compaq IDA-2 Configuration for NetWare (12/92)		145536-001
Compaq ProSignia Configuration Guidelines for NetWare v3.x (12/92)		145537-001
Compaq Answers to Technical Support Questions for NetWare Environments (2/95)		145710-002
NetWare SFT III v3.11 Installation (9/93)		145905-001
NetWare Migration from 2.x to 3.12 (6/94)	√	181069-001

continued

Compaq TechNotes *continued*

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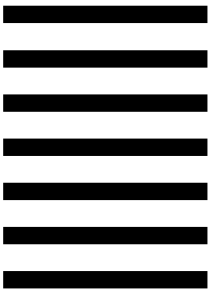

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