Software Product Description

PRODUCT NAME: Tru64™ UNIX® Operating System Version 5.0 (formerly DIGITAL UNIX) **SPD 70.70.01**

DESCRIPTION

The Compaq Tru64 UNIX Operating System Version 5.0 (formerly DIGITAL UNIX), is a 64-bit advanced kernel architecture based on Carnegie-Mellon University's Mach V2.5 kernel design with components from Berkeley Software Distribution (BSD) 4.3 and 4.4, UNIX System V, and other sources. Tru64 UNIX is the Compaq Computer Corporation implementation of The Open Group's ™ OSF/1® R1.0, R1.1, and R1.2 technology, and the Motif® graphical user interface and programming environment.

Tru64 UNIX provides symmetric multiprocessing (SMP), real-time support, and numerous features to assist application programmers in developing applications that use shared libraries, multithread support, and memory-mapped files. The full features of the X Window System™, Version 11, Release 6 (X11R6) from The Open Group are fully supported. Selected features of Release 6.3 (X11R6.3) are also supported.

Tru64 UNIX complies with numerous other standards and industry specifications, including the The Open Group™ XPG4 and XTI, POSIX®, FIPS, and System V Interface Definition (SVID). By providing support for the SVID, Tru64 UNIX supports System V applications. The Tru64 UNIX Operating System is compatible with Berkeley 4.3 programming interfaces. Tru64 UNIX conforms to The Open Group Application Environment Specification (AES) that specifies an interface for developing portable applications that will run on a variety of hardware platforms.

SYSTEM MANAGEMENT

Tru64 UNIX System Management (SysMan) consists of a suite of tools for installing, configuring, and managing a Tru64 UNIX system in a simple, straightforward manner. SysMan provides a single point for administration (via the 'sysman' command) to all of the system management tasks. Tru64 UNIX system management provides a set of features that allow for the automation of system installations and configurations.

In Tru64 UNIX Version 5.0, the SysMan tools and applications provide multiple user interface types which allow management of a Tru64 UNIX system from a variety of display domains. A Java based interface is provided for managing via the Web (or from a PC), an X windows-based interface is provided for graphical interfaces, a curses interfaces is provided for character-cell environments, and a command-line interface is provided for scripting, automation, and the auditing of system configurations.

The SysMan environment also provides a facility for allowing users to perform privileged actions without the need to know the root password. This feature is provided via the Division of Privileges (DoP) utility.

SysMan also includes a comprehensive event management mechanism for posting, subscribing, and viewing all of the system events, both hardware and software.

Installation

Tru64 UNIX has the flexibility to be installed from either a CD-ROM or from a remote installation server. Installation Services are available for those customers who would like an experienced Compaq Software Specialist to install the software.

Full Installation

The full installation procedure will install Tru64 UNIX operating system onto the Alpha Server system. Full installations may repartition the system drives and remove all existing information. During installation, the Advanced File System (AdvFS), which is a journal file system, is the default file system type. However, Tru64 allows the UNIX file system to be chosen at installation, if that file system type is preferred. In addition, the Logical Storage Manager (LSM) can be configured on the system disks during the initial system installation which eliminates the need to reconfigure the system after the installation is complete.

Worldwide Language software can be selected and installed within the base operating system during initial installation. The full installation procedure uses a "wizard" interface that walks the administrator through the required steps to install and track the progress of the installation procedure.

Update Installation

An update installation procedure will update the operating system from Tru64 UNIX Version 4.0D, and Version 4.0F to Tru64 UNIX Version 5.0, while preserving appropriate system files and existing user-customized files. Your system must be running Version 4.0D or 4.0F of the operating system in order to update to Version 5.0. The *Installation Guide* shows the successive update paths to reach Version 5.0 if your system is running a version of the operating system other than Version 4.0D or 4.0F. The Update Installation process can be performed through a graphical user interface.

Updating Worldwide Language Support (WLS) software is performed automatically during an Update Installation of the base operating system. It is not necessary to remove WLS software before the operating system is updated or to update WLS software as a separate task.

The Update Installation can be invoked with the optional -u flag to run the Update Installation in unattended mode. Unattended means that barring any problems with the update, there is no user interaction required. The only exception to this is the switching of CD-ROMs if WLS software is being updated. The -u flag builds a kernel with all kernel components and does not provide the chance to archive obsolete files.

At the beginning of the Update Installation process, a Tru64 UNIX system will analyze for the following:

- Layered products that prevent the Update from continuing
- Layered products that should be reinstalled after the Update
- Fatal and nonfatal file system type conflicts
- Available disk space

If layered products or nonfatal file type conflicts are discovered, you can resolve them directly from the Update user interface; there is no need to exit the Update, resolve the conflict, and restart the Update. In addition, if your system does not have enough available disk space for new software and room for Update processing, disk space recovery options are presented immediately.

Configuration

To perform an initial system configuration after a full installation, SysMan provides a wizard-like application (Quick Setup) that guides the user through the essential and most commonly performed configuration steps.

Quick Setup provides a fast, user-friendly way to set up your system with a basic system configuration. The resulting system can be used "as is" or it can be augmented with settings accessible in the full-featured configuration applications. The Quick Setup application is available from the System Setup application that is displayed automatically the first time you log in as root.

In addition to a basic configuration that can be performed with the Quick Setup application, a user can perform a complete configuration installation with the Customer Setup option that is available from the "System Setup" application.

System Cloning

Cloning provides the ability to take a snapshot of a fully installed and configured system and at a later time automatically install and configure other systems without the need to go through the set of installation and configuration steps. This configuration cloning option provides a thorough ability to clone entire systems. Once a systems configuration has been saved, it can be applied to other systems manually or automatically.

When system cloning is combined with user defined scripts (an installation feature that allows administrators to execute customized scripts during different phases of the installation process); this provides the ability to have a complete unattended installation and configuration of a system. This can also be used for repetitive installations and configurations on multiple systems. Configuration cloning can also be used to save a system's configuration so that it can be restored at a later time if configuration changes were made that are no longer desired (or no longer work). Performing a cloned installation alleviates the need to answer most questions during the installation procedure.

System Management Menu (SysMan)

The SysMan Menu provides a framework for organizing various system management tasks. Each task represents a small application that is launched from the SysMan Menu. All the tasks on the SysMan Menu can be performed from an X11-capable display, a personal computer running Windows 95, Windows 98, or Windows NT, or a character-cell terminal.

System Management Station (SMS)

The SysMan Station provides a graphical representation of the system and enables system management from a personal computer. The System Management Station (SMS) is the Java tool that is fully integrated with TruCluster Server Version 5.0. SMS allows for remote management from anywhere and from any machines — PCs clients, UNIX workstations, and any Alpha system.

The Event Manager (EVM)

As one of the system utilities, Event Manager provides a centralized means of gathering, distributing, storing, and reviewing event information, regardless of how the events are posted. Event Manager makes event information more accessible and provides an event infrastructure that is flexible and adaptable. Applications can be customized to take advantage of this system data.

Monitoring and Tuning

Kernel Tuner — An application to display and change parameters of the kernel subsystem.

Class Scheduler — An application to allow the system manager to prioritize jobs and tasks.

Process Tuner — An application to display, monitor, and manage the system processes. A number of sort and filter options are provided to manage the way information is displayed.

Performance Manager — A real-time performance manager that provides tools for detecting and correcting performance problems.

Environmental Monitoring — This functionality is a means to monitor the thermal, fan, and redundant power supply of AlphaServer systems that have prerequisite hardware sensor support. The functionality includes methods to set user-defined script, temperature levels, the collection rate and shutdown grace period, and to start or stop the environmental monitoring state.

Compaq Insight Manager (CIMXE)

Tru64 UNIX Version 5.0 provides Web Based Enterprise Management (WBEM) capabilities by integrating the Compaq Insight Manager Agents, insight_manager(5). Insight Manager enables Web-based device monitoring and fault management of local and remote system hardware and software resources. These Web-enabled features can be accessed from any browser via the Compaq dedicated 2301 HTTP port, or after discovery from CIMXE, the Compaq next-generation Management Console, replacing ServerWorks.

Compaq Insight Manager for Tru64 UNIX includes SNMP-based subagents and WBEM capabilities for presenting SNMP date in a format viewable by a Web browser. It provides a rich view of the managed data using HTML 2.0 and JavaScript in the form of Web pages. The SNMP subagents implement a rich set of Compaq Enterprise MIBs, providing hardware information, status, and statistics of system hardware components such as CPU and memory boards, I/O devices, SCSI-based storage devices, Network Interface Cards, and Environmental devices such as temperature sensors, fans and power supplies.

The Insight Manager agents are part of the Tru64 UNIX manditory subset. The agents are enabled by default with anonymous access. If, for security reasons, it is not desired to have the Web agents enabled by default, the default settings can be configured with the Insight Manager Configuration application from the SysMan Menu, under the Monitoring and Tuning branch.

Compaq Insight Manager Agents for Tru64 UNIX also prodvide a level of integration with the System Management suite of tools, whereas the Tru64 UNIX System Management Home Page, System Management Menu, System Management Stations, and the UniCensus Configuration reports could be easily accessed through the Insight Manager 2301 Home Page.

Storage Management

NetWorker™ — An application that provides automated backup and recovery of files on a local system. This is a subset of the optional NetWorker Save and Restore (NSR) layered product purchased separately from Legato Software. This SingleServer version is licensed free of charge with Tru64 UNIX and provides functionality similar to NSR, except that SingleServer supports only a single, local client.

Tru64 UNIX Logical Storage Manager (LSM) - is an integrated host-based solution for data storage management. Basic LSM functionality, including disk spanning and concatenation, is provided with the base operating system. Additional features, disk striping, mirroring, and a graphical user interface are available with a separate license. LSM is RAID Advisory Board (RAB) certified for RAID Levels 0 and 1, 0 +1 and 5. Refer to the OPTIONAL SOFTWARE section of this SPD and the LSM SPD 51.24.xx for more information.

Bootable Tape is an application to create and recover a disk image from a system. This feature allows complete system installs from a directly attached tape device.

Service Tools

Tru64 UNIX provides graphical presentation of the iostat (I/O statistics), netstat (network statistics), systemmessages (system messages), vmstat (virtual memory statistics), and the who command. Tru64 UNIX provides the following service tools — DECevent, Compaq Analyze, UniCensus, and Sys_check.

Tru64 UNIX supports *DECevent* (dia utility), which provides error reporting and binary-to-text translation capabilities. DECevent provides system directed diagnostic capability for the AlphaServer 8200, 8400 EV6 platforms; the AlphaServer GS60, and AlphaServer GS140.

Tru64 UNIX supports *Compaq Analyze* on selected platforms, a rules-based hardware fault management diagnostic tool that provides error event analysis and translation. The multi-event correlation analysis feature of Compaq Analyze provides the capability to analyze events stored in the system's event log file. A graphical user interface in Compaq Analyze enables the user to set program and configuration parameters and to review event information.

Tru64 UNIX supports *UniCensus*, a tool used to collect and archive system configuration information. UniCensus uses sys_check(8) to produce an HTML report showing system configuration information, revision levels, storage subsystem configuration, and other information. UniCensus is the collector used by the Compaq Services tool called RCM (Revision and Configuration Management). UniCensus can be configured to transport system configuration information to the RCM server in Compaq Services. It can also be configured to run on system reboot.

Tru64 UNIX provides *Sys_check*, which is a data gathering and reporting tool. This tool gives the current state of a system including configuration information, microcode information and Tru64 UNIX parameter settings.

FILE SYSTEMS

The Tru64 UNIX file system architecture is based on OSF/1 Virtual File System (VFS) which is based on the Berkeley 4.3 Reno Virtual File System. VFS provides an interface into files regardless of the file system in which the file resides.

Tru64 UNIX supports the file system types described in this section.

Advanced File System (AdvFS)

The Advanced File System (AdvFS) is a journaled, local file system that provides higher availability and greater flexibility than traditional UNIX file systems. Using transaction journaling, AdvFS recovers file domains in seconds rather than hours after an unexpected restart, and provides increased file system integrity. The AdvFS defragment utility reduces file fragmentation that can impact I/O performance. AdvFS provides greater flexibility by allowing filesets (file systems) to share a single, dynamically resizable storage pool, and enabling hard and soft fileset quotas in addition to user and group quotas.

The AdvFS root/boot, /usr, and /var devices are configured during installation. The salvage utility is available for retrieving lost files and file domains and allows the saving of data to tape devices. The AdvFS on-disk structure analysis tools work with clones and striped files. The AdvFS verify utility validates domains up to and including 767 filesets. AdvFS supports direct I/O, which allows applications to avoid the unified buffer cache (UBC), thus achieving near disk performance.

AdvFS supports a maximum fileset and file size of 16 TB minus 512 K, a maximum of 255 active file domains for each system, and a maximum of 256 volumes for each domain. Compaq recommends that you use a maximum of eight volumes in a file domain.

Although Tru64 UNIX supports an unlimited number of filesets per system, only 767 filesets can be mounted at one time. The maximum number of files in a fileset is 2^31 and is limited by the tag that is used to uniquely identify a file in a filesets. Although AdvFS can support a page size larger than 13 bits, the maximum size of an AdvFS file and fileset is 16 TB - 512 K (2^32 * 2^31), with a 13-bit page size and a 31-bit page number.

The right to use the Advanced File System is granted by the Tru64 UNIX Operating System license. Advanced File System Utilities is a separately licensed, optional layered product. Refer to the OPTIONAL SOFTWARE section of this SPD for more information.

UNIX File System (UFS)

UFS is compatible with the Berkeley 4.3 Tahoe release. For configuring a UNIX File System (UFS) the following is important to note. Theoretically, a UFS file system could be 1TB (2^31 * 2^9); however, Tru64 UNIX supports only 128 GB.

Tru64 UNIX supports up to 2,147,483,647 UNIX File System (UFS) and Memory File System (MFS) mounts. The max-ufs-mounts attribute controls the maximum number of UFS and MFS mounts. The default value is 1000.

Network File System (NFS)

Tru64 UNIX NFS V2 allows transparent file access over TCP/IP networks. The Network Information System (NIS), formerly Yellow Pages (YP), is provided for centralized system management of files. The automounter service automatically mounts and unmounts NFS file systems. The NFS locking service allows advisory and record locks to be used with remotely mounted files.

An NFS V3 server and client protocol implementation is provided in addition to V2. NFS V3 includes 64-bit support for file access, exclusive create semantics, negotiable transfer sizes, safe asynchronous writes, added support for access checking, and other changes designed to increase efficiency and performance. NFS file systems can use either the UDP or TCP transport protocols.

Network Lock Manager (NLM) V4 includes support for files larger than 2 GB. Support for additional over-the-wire error code is also provided. NLM V3 is supported for NFS V2 compatibility.

V2 PC-NFS server support is provided to enable connectivity from PC-NFS V5.1a, 5.1, 4.0, and 3.5 clients.

Memory File System (MFS)

The Tru64 UNIX MFS is a memory-based UFS. The MFS has the same file system structure as the UFS, but resides in virtual memory. No permanent file structures or data are written to disk, so the contents of an MFS file system are lost on reboot, unmount, or power failure. An MFS is useful for temporary files or for read-only files that are loaded into it after it is created.

ISO 9660 Compact Disk File System (CDFS)

The Tru64 UNIX implementation of CDFS is based on ISO 9660, a standard for a volume and file structure for the interchange of information using CD-ROM. Tru64 UNIX CDFS is based on the following levels of ISO 9660:

Level 2 of Interchange
Level 1 of Implementation, which enables the user to:
Mount single volume CD-ROMs which are formatted in compliance with ISO 9660, as a local file system
List and examine files using standard UNIX utilities and programs
Read files and directories using the standard POSIX system interface
NFS export mounted ISO 9660 file systems
Support the High Sierra Group extensions which provide compatibility with older format CD-ROMs

CDFS also supports CD-ROMs recorded using the Rock Ridge Interchange Protocol, Revision 1.09, August 1991. Rock Ridge specifies the use of the extension fields that are defined by ISO 9660:1988, and it uses those extensions to provide the following information:

File owner, file group, file permissions
Additional file types (symbolic links, device special files, named pipes)
setuid, setgid, and sticky bits
Hard link counts
POSIX file names (mixed case names, unstructured names, and longer names than ISO-9660:1988 allows)
Deep directory hierarchies (greater than eight levels)
File time stamps

X/Open Preliminary Specification (1991) CD-ROM Support Component (XCDR). XCDR extensions allow users to examine selected ISO 9660 attributes through defined utilities and shared libraries. A system administrator can substitute different file protections, owners, and file names for CD-ROM files.

CDFS supports the organization of multiple sessions on one CD-ROM volume. The maximum number of CDFS mounts is 512. Note that the contents of all sessions are available as one file system and are not separately available. DVD disks can be accessed using the CDFS file system.

File-on-File Mounting File System (FFM)

The File-on-File Mounting File System (FFM) allows regular, character, or block-special files to be mounted over regular files, and is primarily used by the SVR4-compatible system calls fattach and fdetach of a STREAMS-based pipe (or FIFO).

File-Based Pipes

A file-based pipe implementation replaces the socket-based pipes implementation for improved performance.

/proc File System

The SVR4-compatible /proc file system for Tru64 UNIX allows running processes to be accessed and manipulated as files by ordinary system calls, open, close, read, write, seek and ioctl.

NETWORKING

TCP/IP

Tru64 UNIX allows for TCP/IP network communications over supported network devices. The TCP/IP protocol suite is implemented in the socket framework.

Sockets

Tru64 UNIX provides sockets that are based on the Berkeley UNIX Operating System structure, which provides a framework for I/O over a network.

STREAMS

Tru64 UNIX provides SVR4-compatible STREAMS. Like sockets, STREAMS provides a framework for character I/O to and from user space to kernel networking protocols.

X/Open Transport Interface (XTI)

X/Open Transport Interface (XTI) is an extension to the System V STREAMS user space interface called Transport Level Interface (TLI). This interface is thread-safe.

Data Link Bridge (DLB)

Tru64 UNIX provides a DLPI-compatible interface into the non-STREAMS (BSD) driver environment. This interface does not support complete DLPI semantics. The DLB interface is the preferred interface for STREAMS modules to access the BSD-based datalink services.

screend

When the system is operating as an IP router, screend provides flexible per-packet access controls for forwarded packets. This can be used as part of a comprehensive network security plan. Tru64 UNIX also provides interface access filtering to reinforce the system security against IP spoofing attacks.

Packetfilter

The Packetfilter software interface allows an application to send and receive packets directly to or from a LAN (Ethernet or FDDI). The Packetfilter provides flexible filtering of incoming packets, so that many such applications can run simultaneously.

The Tru64 UNIX Packetfilter supports two filtering models: the CMU/Stanford model supported in ULTRIX, and the BSD Packet Filter (BPF), which provides more flexible and efficient filtering. BPF was developed by the University of California, Lawrence Berkeley Laboratory. The packetfilter pseudo-driver can support up to 255 simultaneous open filters (each filter is usually mapped to one instance of an application program).

Several public domain applications that use the Packetfilter are integrated in Tru64 UNIX, including rarpd, tcpdump, tcpslice, nfswatch, and nfslogsum.

Simple Network Management Protocol (SNMP)

The SNMP agent allows management of the Internet, FDDI, system resources, and network resources using the SNMP. The agent is extensible, allowing software developers to add MIBs to the agent and to participate in the SNMP.

The SNMP agent contains the following base system functionality:

Full SNMP V2.c agents fully compatible with V1.0 MIB implementations for managing Internet MIB-2 objects, FDDI objects, and Token Ring objects. Support for AgentX is provided in V5.0.

Dynamic Host Configuration Protocol (DHCP)

Tru64 UNIX includes a complete DHCP server/client solution for centralizing and automating IP address administration using a graphical interface.

Point-to-Point Connections

The Tru64 UNIX system supports point-to-point connections using Serial Line Internet Protocol (SLIP) and Point-to-Point Protocol (PPP). The PPP subsystem supports/implements PPP V2.3.1 which supports asynchronous point-to-point connections and IP. It provides authentification with Password Authentification Protocol (PAP) and Cryptographic Authentification Protocol (CHAP).

Open Network Computing (ONC)

Tru64 UNIX supports Open Network Computing (ONC) V4.2 including: Network File System V2 and V3, PCNFSd, Lock Manager, Status Monitor, NFSportmon, Network Information Service (NIS), automount, and user level RPC.

Asynchronous Transfer Mode (ATM)

The Tru64 UNIX Asynchronous Transfer Mode (ATM) subsystem supports the ATM Forum's User-Network Interface (UNI) V3.0 and V3.1 specifications, including the Interim Local Management Interface (ILMI) protocol for registration of up to 32 addresses per interface, UNI signaling for point-to-point connections, and best-effort and CBR VCs for AAL5 PDUs. Also, per-VC cell pacing (to limit the rate at which an end-system transmits) is supported.

The ATM subsystem supports Classical IP (RFC 1577), including support for multiple IP subnets, per-VC MTU negotiation, and packetfilter access to data into and out of the host.

LAN Emulation over ATM is supported (Ethernet and IEEE 802.3 frames only), for carrying IP and LAT protocols. Support is based on the ATM Forum V1.0 specification. Packetfilter access is provided to emulated LAN data into and out of the host.

Tru64 UNIX provides limited support for IP switching over ATM, based on the Ipsilon Networks Inc. reference model (RFC 1953 and 1954). Only one IP switching network device is supported per host, and an ATM adapter used for IP switching cannot simultaneously support ATM Forum UNI or ILMI protocols.

The ATM subsystem (except IP switching and PVCs) can be configured with the atmsetup utility to start automatically at boot time. The current form of the atmsetup utility will be replaced in the next major functional release of the operating system with a version that is part of the System Management application suite.

Tru64 UNIX does not support the UNI V3.0 and V3.1 specifications for full ATM Simple Network Management Protocol (SNMP) Management Information Bases (MIBs), point-to-multipoint connections, Operations and Maintenance (OAM) flows, VBR VCs, AAL1, AAL3/4, or raw AAL.

Fast Ethernet

Tru64 UNIX supports Fast Ethernet (IEEE 802.3 100Base-TX) in full and half duplex.

Gigabit Ethernet

Tru64 UNIX supports Gigabit Ethernet IEEE 802.3z Gigabit Ethernet Standard, IEEE 802.3x Pause Frame Flow control (X-on/X-off), both symmetric and asymmetric, and is Jumbo frame capable.

Fiber Distributed Data Interface (FDDI)

Tru64 UNIX provides FDDI fiber optic support based on all relevant ANSI and IEEE standards, including SMT revision 7.2.

Token Ring

Tru64 UNIX supports Token Ring (IEEE 802.5) with source routing support for multiring networks. Support also includes 4 and 16 MLps over STP and UTP media.

NetRAIN

NetRAIN support is provided for Ethernet, Gigabit Ethernet, FDDI, and ATM controllers (LANE only). NetRAIN allows for failover of communications from one controller to another in the event a fault is detected in the communications path.

IP Multicast

Tru64 UNIX supports the Level 2 end-system IP Multicast functionality, specified in RFC 1112, on Ethernet and FDDI. The implementation provides integrated multicast address management for multi-protocol environments.

The Tru64 UNIX implementation also provides kernel routines for encapsulating IP tunnels to enable wide area IP Multicast routing.

These routines include kernel code from public domain Multicast support Version 3.5 and mrouted (Version 3 Copyright 1989 by the Board of Trustees of Leland Stanford University), which provides the Distance Vector Multicast Routing Protocol (DVMRP).

Name Services

Tru64 UNIX supports the Domain Name System (DNS) as described in RFC 1034 and RFC 1035, providing a host name and address lookup service for the Internet network. The Tru64 UNIX implementation of the Domain Name System is based on BIND Version 8.1.2. The user can use BIND to supplement the host's database.

Tru64 UNIX also supports the Sun® Network Information Service (NIS), formerly known as Yellow Pages (YP). NIS can be used to replace or supplement hosts, aliases, group, networks, password, protocols, rpc, and services databases.

Network Time Protocol (NTP)

Tru64 UNIX provides the Network Time Protocol (NTP) V3 to synchronize and distribute the time for all machines in a network environment. The time synchronization daemon, xntpd, is used to distribute time to all machines in a network.

Time Synchronization Protocol (TSP)

Tru64 UNIX provides Berkeley's Time Synchronization Protocol (TSP) to synchronize the time of all machines in a network without ensuring the accuracy of the time that is provided.

Local Area Transport (LAT)

Tru64 UNIX provides a STREAMS-based implementation of the Local Area Transport (LAT) that serves terminals to one or more service nodes on a local area network (LAN). LAT allows a host to function as both a service node and a server node. It also enables host applications to initiate connections to server ports (designated as application ports) to access remote devices such as printers.

LAT/Telnet Gateway

The LAT/Telnet gateway service supported in Tru64 UNIX provides a gateway from a LAT terminal server to allow connections to TCP/IP nodes using intermediate LAT hosts.

Number of Logins

The following number of logins has been tested:

RLOGIN: 7,043*
Telnet: 12,395*
LAT: 4,575*

*These numbers can vary depending on hardware configurations and user workloads.

Netscape

Tru64 UNIX includes the Netscape Communicator V4.5.1 Internet Client World Wide Web browser. The software license for this bundled version of the Netscape Communicator Internet client is included with the Tru64 UNIX base license. Support for several language fonts, like Japanese, Korean, Unicode, Simplified Chinese, and Western, is included.

Tru64 UNIX also includes the Netscape FastTrack V3.01 Internet World Wide Web server. The software license for this bundled version of the Netscape FastTrack V3.01 is included with the Tru64 UNIX base license

RFC Standards

The Tru64 UNIX Operating System implements the following Internet RFC (Request for Comment) and Non-RFC standards:

RFC	Protocol	Name
678	______	Standard File Formats
768	UDP	User Datagram Protocol
791	IP	Internet Protocol as amended by RFCs 922 and 950
792	ICMP	Internet Control Message Protocol
793	TCP	Transmission Control Protocol
821	SMTP	Simple Mail Transfer Protocol
822	MAIL	Format of Electronic Mail Messages
826	ARP	Address Resolution Protocol
854	TELNET	Telnet Protocol
855	______	Telnet option specifications
856	______	Telnet binary transmission
857	______	Telnet echo option
858	______	Telnet Suppress Go Ahead option
859	______	Telnet status option
868	TIME	Time Protocol
893	______	Trailer Encapsulations
894	IP-E	Internet Protocol on Ethernet Networks
903	RARP	Reverse Address Resolution Protocol
904	EGP	Exterior Gateway Protocol
919	______	Broadcast Datagram over IP
922	______	IP Broadcast Datagrams with Subnets
950	______	IP Subnet Extension
951	BOOTP	The Bootstrap Protocol
954	RPC	NICNAME/WHOIS (Obsoletes RFC 812)
959	FTP	File Transfer Protocol
1014	XDR	External Data Representation
1034, 1035	DOMAIN	Domain Name System
1042	IP-IEEE	Internet Protocol on IEEE 802
1049	______	Content-Type Field for Internet Messages
1050	RPC	Sun Remote Procedure Calls
1055	SLIP	Serial Line Internet Protocol
1057	______	Portmapper
1058	RIP	Routing Information Protocol
1094	NFS	Network File System Protocol
1112	______	Host Extensions for IP Multicast
1116	______	Telnet Line Mode Option
1119	NTP	Network Time Protocol minus authentication
1122	______	Requirements for Internet Hosts Communication Layers (Must Level)
1123	______	Requirements for Internet Hosts Applications and Support (Must Level)
1144	CSLIP	Compressing TCP/IP Headers for Low-Speed Serial Links
1155	SMI	Structure of Management Information
1156	MIB	Management Information Base
1157	SNMP	Simple Network Management Protocol
1188	IP-FDDI	Transmission of IP over FDDI (Obsoletes RFC 1103)
1191	______	Path MTU Discovery (router specification, host specification
1212	______	Concise MIB definitions
1213	MIB-II	Management Information Base II (supersedes RFC 1158 and 1156)
1231	______	IEEE 802.5 Token Ring MIB (set operations are not supported)
1253	______	OSPF Version 2 Management

		Information Base
1256	ICMP	Router Discovery Messages
1282	______	BSD rlogin
1285	______	FDDI Management Information Base (set operations are not supported)
1288	FINGER	Finger Protocol (obsoletes RFC 1196)
1305	NTP	Network Time Protocol V3.0
1321	MD5	The MD5 Message Digest Algorithm
1323	TCP-HIPER	TCP Extensions for High Performance (Window Scale option, Time stamp option and PAWS.)
1332	IPCP	The PPP Internet Protocol Control Protocol (obsoletes RFC 1172)
1334	PAP/ CHAP	PPP Authentication Protocols
1350	TFTP	Trivial File Transfer Protocol (obsoletes RFC 783)
1483	______	Multiprotocol Encapsulation over ATM AAL5 (routed protocol encapsulation only)
1497	BOOTP	BOOTP Vendor Information Extensions (obsoletes RFC 1048, 1084, 1395; updates RFC 951)
1514	______	Host Resources MIB (set operations are not supported)
1518	CIDR	An architecture for IP Address Allocation with CIDR
1521	______	MIME support as stated in Appendix A of this RFC
1533	DHCP	DHCP options and BOOTP vendor extensions
1534	______	Interoperation between DHCP and BOOTP
1541	DHCP	Dynamic Host Configuration Protocol
1542	______	Clarifications and Extensions for the Bootstrap Protocol (obsoletes RFC 1532; updates RFC 951)
1547	IS-PPP	Requirements for an Internet Standard Point-to-Point Protocol
1571	______	Telnet Environment Option Interoperability Issues
1572	______	Telnet Environment Option
1577	______	Classical IP over ATM
1583	OSPF	OSPF V2 (obsoletes RFC 1247)
1589	______	A Kernel Model for Precision Time-keeping (the support to discipline the system clock to an external precision timing source is not supported)
1626	______	Default MTU for IP over ATM
1633	______	Integrated Services
1652	SMTP	Service Extension for 8bit-MIME transport
1661	PPP	The Point-to-Point Protocol (obsoletes RFCs 1548,1331, and 1171) (asynchronous IP only)
1700	______	Assigned Numbers (obsoletes RFC 1340, and so forth)
1755	______	Signaling for IP of ATM
1813	NFS	Network File System Version 3 Protocol
1869	SMTP	Service Extensions
1870	SMTP	Service Extension for Message Size Declaration
1891	SMTP	Service Extension for Delivery Status Notification
1892	______	Multipart/ Report Content Type for the Reporting of Mail System Administrative Messages
1893	______	Enhanced Mail System Status Codes
1894	______	Extensible Message Format for Delivery Status Notifications
1939	POP3	Post Office Protocol, Rev. 3
1953	IFMP	Ipsilon Flow Management Protocol Specification for IPv4
1954	______	Transmission of Flow Labeled IPv4 on ATM Data Links
1985	SMTP	Service Extension for Remote Queue Starting
2001	______	TCP Slow Start, Congestion Avoidance, Fast Retransmit, Fast Recovery Algorithms
2018	SACK	Selective Acknowledgement
2060	IMAP4	Internet Message Protocol, Version 4 rev. 1
2205	RSVP	Resource Reservation Protocol for FDDI and ethernet.
2211	______	Controlled Load Services

Non-RFC Standards

4.3BSD and 4.4BSD Socket Interface
4.3BSD inetd
4.3BSD lpd
4.3BSD netstat
4.3BSD ping
4.3BSD rcp
4.3BSD rexecd
4.3BSD rlogin
4.3BSD rmt
4.3BSD rsh
4.3BSD Sendmail V5.65 with IDA enhancements
4.4BSD Sendmail V8.8.8 (default)
4.3BSD syslog
uucp Basic Networking Utilities (HoneyDanBer)

X/Open Transport Interface (XTI)
Sun Open Network Computing (ONC) 4.2
New rdist command packaged as optional nrdisk
BSD Packet Data Compression (for PPP)

SECURITY

The Tru64 UNIX Operating System, running Enhanced Security, is designed to meet, and in some cases, exceed the requirements of the C2 evaluation class of DoD 5200.28-STD "Trusted Computer System Evaluation Criteria", also known as the Orange Book.

Tru64 UNIX supports various configurations and setup scripts, which allow selection of desired Enhanced Security features such as extended passwords, audit, and access control lists (ACLs).

System administrators can choose between command-line interfaces or GUIs.

Network Information Service (NIS) Compatibility

Support is provided for accessing NIS distributed databases while running Enhanced Security. NIS can also be used to distribute the Enhanced Security protected password database. The number of simultaneous logins allowed depends on the configuration.

Security Integration Architecture

All security mechanisms on Tru64 UNIX are part of the Security Integration Architecture (SIA), which isolates security-sensitive commands from the specific security mechanisms, which eliminates the need to modify the security-sensitive commands for each new security mechanism.

The following C2 security functionality is included in Tru64 UNIX:

Discretionary Access Controls (DAC) — Allows users to define how the resources they create can be shared. Optional ACLs provide greater granularity of file system object protection at the individual user level than the default DAC protection. The ACL mechanism is designed to POSIX draft 13 with some draft 15 enhancements.

Auditing — Allows users to monitor normal, as well as unauthorized usage of a system with a choice of a GUI or command line interface.

Identification and Authentication — Password length and lifetime are based on the Department of Defense Password Management Guideline (Green Book). Includes extensive login controls, such as automatic account lockout, account vacationing, per terminal settings for delays and maximum consecutive failed logins, password usage history, and system-generated password.

Object Reuse — Ensures that the physical storage that is assigned to shared objects or that is released prior to reassignment to another user does not contain data from previous users.

Integrity — Allows users to validate the correct operation of hardware, firmware, and software components of the Trusted Computing Base (TCB).

System Architecture — A separate execution domain is maintained for the Trusted Computing Base (TCB) components using hardware memory management to protect the TCB while it is executing.

Advanced Printing Software

Advanced Printing Software from Compaq is a new printing system for Tru64 UNIX developed in collaboration with Xerox, and based on PrintXchange technology from Xerox. It is a distributed client/server printing system intended for use in workgroup and enterprise environments. Advanced Printing Software is based on a printing model defined by ISO 10175 and a command set defined by POSIX 1387.4. To provide inter-operation with the default BSD based printing system on Tru64 UNIX, Advanced Printing Software uses inbound and outbound gateways to move print jobs to or from the lpr/lpd print subsystems. Advanced Printing Software supports the printer models included in the hardware tables at the end of this document.

UNIX/ NT INTEROPERABILITY

Data Access – Object Database Connection and Java Database Connection (ODBC and JDBC)

Tru64 UNIX provides the family of INTERSOLV® DataDirect software products to enable ODBC and JDBC connectivity for your applications. This is optional software for use in developing and deploying applications and is licensed as part of the Tru64 UNIX operating system license.

SequeLink ODBC Edition is a universal ODBC client component. DataDirect SequeLink ODBC provides transparent connectivity to almost any type of client, network, server, or database.

For developers working with Java, JDBC provides Java applications to access data sources and databases across platforms. The SequeLink Java Edition is a universal standards-based implementation of JDBC. It is also flexible in design, providing scaleable connectivity from multivendor client, server, and Web environments to industry-leading relational databases. It is optimized and tuned for the Java environment, extending the functionality and performance of existing systems and easily incorporating new technologies.

Common Object Model (COM) for Tru64 UNIX

COM, the Component Object Model, is middleware that Microsoft developed for the Windows platform. COM implements a binary standard that allows two or more applications to work together, regardless of whether they were written by different vendors, in different languages, at different times, on different platforms running different operating systems. DCOM, the Distributed Component Object Model, extends the COM model and provides applications with a way to interact remotely over a network.

COM for Tru64 UNIX implements Microsoft COM as well as the required underlying Windows capabilities for the Compaq Tru64 UNIX platform. The Compaq implementation provides all the basic functions, libraries, and tools that a COM application in a heterogeneous NT client/Tru64 UNIX server environment requires. Programmers who develop only in Windows NT environments will find the same COM Application Programmer Interface (API) and the same behavior in a heterogeneous Windows NT client/Tru64 UNIX server environment.

COM for Tru64 UNIX provides traditional COM and DCOM capabilities for your application. These capabilities conform to the Microsoft ActiveX Core Technology Specification. They include:

- MIDL, the Microsoft Interface Definition Language Compiler that you use to create the component object interface.
- The interfaces and APIs defined by Microsoft as those needed to support COM on non-Windows platforms.
- Support for COM capabilities, such as Monikers, OLE Automation, Uniform Data Transfer (UDT), Connectable Objects, and type libraries.
- Multithreaded apartment threading model (formerly known as free threads).
- RPC, Remote Procedure Call, that provides the mechanism for communication across the network.
- Registry, the database of COM components and relevant configuration information, and Registry tools, such as sermon and regsvr that allow you to modify Registry contents.
- Security in the form of call security that allows a client or server to apply an appropriate security level to method calls, and the Security Support Provider Interface (SSPI) standard that defines security providers, which can be accessible to DCOM applications. Microsoft NT uses the Windows NT Distributed Security Provider (also called NTLM SSP). COM for Tru64 UNIX supports "pass-through" NTLM SSP calls.
- Internationalization capability, including UNICODE support of wide characters.
- Error-handling conventions that allow COM objects in different environments to share status information.

USER INTERFACES

The Tru64 UNIX user interface environment consists of the following interfaces.

Netscape Communicator

Tru64 UNIX includes the Netscape Communicator Internet Client World Wide Web browser. The license for this software is included with the Tru64 UNIX base license. Users of earlier versions of Tru64 UNIX are licensed to use the Netscape Communicator Internet client software when they update to Version 4.0D or later, with an update license or with update services. The Netscape Communicator Internet client supports Japanese fonts.

Common Desktop Environment (CDE)

CDE is the default user interface for Tru64 UNIX.

CDE V1.0 includes Motif and is dependent on the underlying Open Group X Window System, Version 11, Release 6 (X11R6) as described in this document.

CDE V1.0 provides a common user interface that is available across multiple vendor platforms. CDE includes a range of integrated desktop services including the following:

The front panel
Session management
Window management
File Manager
Procedural and object-oriented application integration
Online information
Productivity and collaborative tools
Data interchange
Environment
Visuals
Network services

Tru64 UNIX provides enhancements to CDE, including support for the ImageViewer and Multimedia Services.

Mail User Agents

The graphical mail user agent supplied with CDE, dtmail, provides Multipurpose Internet Mail Extensions (MIME).

Tru64 UNIX also supplies mail and mailx for character-cell systems. The mailx/Mail system is compatible with SVID 2, XPG4, and the Berkeley Enchanced mailer (/usr/bin/ucbmail).

For compatibility with previous Tru64 UNIX releases, the MH 6.7.1 user agent is provided. The RAND Corporation as an interface to the mail system developed the MH mail agent.

Motif

Tru64 UNIX includes the CDE V1.0/Motif V1.2 graphical user interface.

The Motif programming environment provides an extensive set of Window system libraries and tools for use by developers of new applications. Provided in both shareable and static versions, these libraries include:

Motif Toolkit (Xm)
Motif Resource Manager (Mrm)
DIGITAL extensions to the OSF/Motif Toolkit (DXm)
User Interface Language (UIL)
User Interface Language Compiler (UIL)
Widget Meta-Language Compiler (wml) and description files
X Toolkit Intrinsics Library (Xt)
X Library (Xlib)

Tru64 UNIX provides OSF/Motif and X11 programming examples to illustrate various Motif and X11 programming techniques. Many of the examples are not fully implemented by The Open Group but do provide valuable programming information. A README file, included with each example, outlines the features and limitations of the particular application.

X Window System

X11R6

The X Window System, Version 11, Release 6 (X11R6) is fully supported in Tru64 UNIX, and UNIX supports the following Open Group standards:

X Image Extensions (V5)
Inter-Client Communications Conventions Manual Update — Tru64 UNIX supports Version 2.0 of the ICCCM.
Inter-Client Exchange Protocol and Library
X Session Management Protocol and Library
Input Method Protocol
X Logical Font Descriptions (update)
SYNC extension
XTEST extension
BIG-REQUESTS extension
XC-MISC extension

X11R6.1

Tru64 UNIX supports selected Release 6.1 (X11R6.1) features, including the X Keyboard extension (XKB) (Version 0.65) and the double buffering extension (DBE).

STANDARDS

UNIX 95

Under The Open Group's UNIX branding program, Compaq has received the UNIX 95 brand for the Tru64 UNIX Operating System, and is licensed to use the UNIX trademark in conjunction with the Tru64 UNIX product.

UNIX 95 includes the following component brands:

- XPG4 Internationalized System Calls and Libraries Extended
- XPG4 Commands and Utilities V2
- XPG4 C Language
- XPG4 Sockets
- XPG4 Transport Interfaces (XTI)
- XPG4 Internationalized Terminal Interfaces (XCurses)

The UNIX 95 Conformance Statement Questionnaire for Tru64 UNIX is provided on The Open Group Web site at URL: http://www.opengroup.org/csq/

XPG4 UNIX

Tru64 UNIX conforms to XPG4 UNIX, also known as the Single UNIX Specification, or Spec1170. XPG4 UNIX covers the following specifications of the X/Open Common Application Environment (CAE):

- System Interface Definitions, Issue 4, Version 2
- System Interfaces and Headers, Issue 4, Version 2
- Commands and Utilities, Issue Version 4
- Networking Services, Issue 4
- X/Open Curses, Issue 4

XPG4 Common Desktop Environment (CDE)

Tru64 UNIX conforms to the XPG4 Common Desktop Environment. Although the XPG4 Common Desktop Environment specifies only X11R5 components, Tru64 UNIX fully implements X11R6, while maintaining compliance with the XPG4 CDE Standard.

Tru64 UNIX has the XPG4 CDE Profile brand, which includes the XPG4 X Window System Application Interface V2 brand.

The CDE Conformance Statement Questionnaire for Tru64 UNIX is provided on The Open Group Web site at URL: http://www.opengroup.org/csq/

Motif

Tru64 UNIX provides the OSF/Motif Application Environment, which is based on CDE 1.0 (OSF/Motif R1.2.5) and conforms to the IEEE POSIX 1295 specification.

POSIX.1 and FIPS 151-2

Tru64 UNIX conforms to the IEEE Std 1003.1- 1990, POSIX Part 1: System Application Program Interface (API) [C Language], also referred to internationally as ISO/IEC 9945-1:1990, and to the Federal Information Processing Standard, FIPS 151-2.

IEEE Std 1003.1b-1993

Tru64 UNIX conforms to the IEEE Std 1003.1b 1993 (formally known as IEEE P1003.4), Part 1: System Application Program Interface (API) and Amendment 1: real-time Extension [C Language].

IEEE Std 1003.1c-1995

Tru64 UNIX conforms to the IEEE Std 1003.1c-1995, IEEE Standard for Information Technology-Portable Operating System Interface (POSIX) - Part 1: System Application Program Interface (API)-Amendment 2: Threads Extension [C Language].

IEEE Std 1003.1g/D6-1997 (March)

Tru64 UNIX includes support for the POSIX 1003.1g Sockets, as defined in POSIX 1003.1g, March 1997, Part XX: Protocol Independent Interfaces (PII) Section 5: Detailed Network Interface – Socket. There is currently no conformance test for this *draft standard*.

IEEE Std 1003.2-1992

Tru64 UNIX conforms to the IEEE Std 1003.2 1992 - Shell and Utilities, referred to internationally as ISO/IEC 9945-2, and provides the following implementation options

- [POSIX2_C_BIND]
- [POSIX2_C_DEV]
- [POSIX2_CHAR_TERM]
- [POSIX2_LOCALEDEF]
- [POSIX2_SW_DEV]
- [POSIX2_UPE]

SVID

Tru64 UNIX conforms to the base operating system section of the System V Interface Definition Issue 2 (SVID2) and to the base operating system and kernel Extension Sections of the SVID Issue 3 (SVID3). Tru64 UNIX provides more than 400 commands and interfaces that comply with SVID3/SVR4.

System V Release 3.2 (SVR3)

SVID, Issue 2

Tru64 UNIX was tested using the System V Verification Suite 3 (SVVS3) and conforms to the Base System as specified in Issue 2.

A license to use Tru64 UNIX binaries includes the right to use the included System V Release 3.2 derivatives.

System V Release 4.0 (SVR4)

SVID, Issue 3

A significant number of commands and interfaces compatible with SVID3 are included in Tru64 UNIX.

The Tru64 UNIX shared library scheme is patterned on and compatible with the SVR4 shared library scheme.

Tru64 UNIX implements the SVR4 /proc file system, which provides the capability of accessing processes using file semantics.

Tru64 UNIX includes STREAMS compatible with System V Release 4.0. Like sockets, STREAMS provides a framework for character I/O between user space and kernel networking protocols.

Real-Time

Tru64 UNIX provides a real-time user and programming environment. The real-time programming environment conforms to the POSIX 1003.1b-1993 standard for real-time, which allows portable real-time applications to be developed and to run in a POSIX environment.

The Tru64 UNIX real-time programming environment provides a fully preemptive kernel (optionally enabled), and supports the following POSIX 1003.1b features:

Real-time clocks and timers
Real-time queued signals
Fixed-priority scheduling policies
Real-time scheduler priorities
Counting semaphores
Shared memory
Process memory locking
Asynchronous I/O
Synchronized I/O
Process communications facilities
Message passing interfaces
Thread safe implementation of real-time libraries

The compile-time constant (POSIX_4D11) previously provided to preserve compatibility with earlier drafts has been retired.

Threads

Tru64 UNIX provides software developers the ability to write multithreaded programs using DECthreads. DECthreads provides a pthreads interface that complies with the POSIX 1003.1c semantics. In addition, for building libraries whose routines can be called in either a single-threaded or multi-threaded context, DECthreads provides a thread-independent services (TIS) interface.

Shared Libraries

Tru64 UNIX provides a full complement of dynamic shared libraries, based on System V semantics, which increase system performance, reduce minimum hardware requirements, and ease system management. Tru64 UNIX provides the following shared libraries:

libDXm	COMPAQ Motif Extensions library
libMrm	Motif Resource Manager library
libots	COMPAQ Compiled Code Support library
libX11	Xlib library
libXaw	X Athena Widgets run-time library
libXext	X Client-side Extension library
libXie	X imaging extension client side run-time library
libXm	Motif Widgets library
libXmu	X Miscellaneous utilities run-time library
libXt	X Intrinsics library
libXtrap	Client side run-time library for Xtrap
libXv	C Video extension client side run-time library
libaud	C2 security auditing library
libbkr	Motif help system library
libc	C library
libcdrom	Rock Ridge extensions to CDFS library
libcmalib	DECthreads library routines
libcurses	Curses screen control library
libdnet_stub	DECnet library
libesnmp	Extensible SNMP library
libiconv	Codeset Conversion library
libm	COMPAQ Portable Math library
libmach	Mach library
libmxr	Library used by mxr, the ULTRIX binary interpreter for OSF/1
libpthread	DECthreads library POSIX 1003.1c threaded interface
libpthreads	DECthreads library CMA and DCE threaded interfaces
librt	Real-time library (POSIX 1003.1b interface)
libsecurity	C2 security library
libsys5	System V Compatibility library
libdxterm	DECterm widget library
libtli	TLI library
libxti	XTI library
liblCE	Inter-Client Exchange protocol library
libSM	Session Management protocol library
libUil	Callable UIL compiler
libXIE	X Imaging extension V5 client-side run-time library
libXi	X input extension
libXtst	X test extension

Tru64 UNIX also provides static versions of most of these libraries.

DEVELOPMENT ENVIRONMENT

COMPAQ Fortran Run-Time Libraries

The COMPAQ Fortran run-time support libraries (libfor, libfutil, libUfor) enable users to run previously compiled programs that require the DIGITAL Fortran libraries at run time. These libraries support Fortran program function areas including input and output, intrinsic functions, data formatting, data conversion, miscellaneous math functions, Fortran bindings to common operating system services, and more.

COMPAQ C++ Run-Time Libraries

The COMPAQ C++ run-time support libraries (libcxx, libcomplex, libtask) enable users to run previously compiled applications containing COMPAQ C++ code, without having COMPAQ C++ installed on the target system. These libraries support COMPAQ C++ program functions in areas including input and output, complex arithmetic, multitasking, and more.

COMPAQ COBOL

Compaq recommends the use of Micro Focus COBOL, as resold by Compaq, for Tru64 UNIX based COBOL application development. For customers developing COMPAQ COBOL applications on OpenVMS who also want to deliver COMPAQ COBOL based applications on Tru64 UNIX, COMPAQ COBOL run-time libraries are licensed with Tru64 UNIX. The Compaq COBOL compilers are available as a separately licensed layered product.

The COMPAQ COBOL run-time support libraries (libcob, libots2, libisamstub) enable users to run previously compiled programs that require the COMPAQ COBOL libraries at run time. These libraries support COBOL program functions in areas including file input and output, decimal arithmetic, the COBOL ACCEPT/DISPLAY statements, STRING/UNSTRING operations, CALL and CANCEL, and more.

COMPAQ Pascal Run-Time Libraries

The COMPAQ Pascal run-time support libraries (libpas.a, libpas.so, and libpas_msg.cat) enable users to run previously compiled programs that require the COMPAQ Pascal libraries at run time. These libraries support COMPAQ Pascal program functions in areas including input and output, miscellaneous math functions, time and date services, miscellaneous file services, and more.

COMPAQ Portable Math Library

The Portable Math Library (DPML) is a common math library for FORTRAN, C, and Pascal. It provides IEEE single and double floating-point support.

ATOM Run-Time Libraries

Analysis Tool with Object Modification (ATOM) enables software developers to build customized analysis tools. It uses the target application program, an instrumentation file, and an analysis file to create a new executable file which, when executed, collects analysis data for a wide variety of purposes. ATOM includes all of the runtime libraries necessary to execute ATOM-based analysis utilities and tools. The ATOM Run-time Libraries are licensed with Tru64 UNIX. Several useful COMPAQ developed ATOM based analysis tools that facilitate program development are licensed with the Tru64 UNIX Developers' Toolkit.

Java Development Kit

Tru64 UNIX provides the Java™ Development Kit V1.1.7B, which is a port of the Java Development Kit under license from Sun Microsystems, Inc.

The Java Development Kit (JDK) includes the Java compiler (javac), Java debugger (jdb), the Code Generator for interfacing Java programs and C (javah), and the Java Virtual Machine (JVM). The javac, jdb, and javah components make up the basic set of command-line tools needed to develop Java applets and applications. The JVM consists of the Interpreter, the Class Libraries, and Native Methods. Compaq has added the following enhancements:

- Just-In-Time Compiler (JIT) to enhance run-time performance of the JVM
- Implementation of Java threads on native threads to allow the JVM to take advantage of multiple processor hardware using a pthreads interface that complies with the POSIX 1003.1c semantics
- 64-bit support

The JDK V1.1.7B for Tru64 UNIX passes 100% of the tests provided in the Java Compatibility Kit. The JDK is included as part of the Tru64 UNIX Operating System kit, and is subject to the terms of the Base license for Tru64 UNIX, as well as the additional JDK license.

Memory-Mapped File Support

Tru64 UNIX supports the Berkeley mmap function and, therefore, allows an application to access data files with memory operations rather than file input and output operations.

Shells

Tru64 UNIX provides the following shells:

POSIX shell
C shell
Bourne shell from System V
Korn shell

All shells are programmable and allow for a tailorable user environment.

Dynamic Loader

Tru64 UNIX uses an SVR4-compatible loader to dynamically load shared libraries. This loader provides SVR4 symbol resolution semantics, including symbol preemption.

The COFF object file format is supported for all forms of object files.

Data Link Interface (DLI)

Tru64 UNIX provides a Data Link Interface to allow applications to directly use the data link layer services in order to interact directly with the network device drivers.

Loadable Subsystems Framework

Tru64 UNIX includes the configuration manager framework, which allows dynamic loading (and configuring) of kernel subsystems. The framework, composed of a configuration manager daemon (cfgmgr), a kernel loader daemon (kloadsrv), a system configuration database (sysconfigtab), and its management utility (sysconfigdb), allows kernel modules (such as device drivers) to be loaded after the system is booted.

Foreign Device Boot Support

Tru64 UNIX provides the ability for device driver developers to build and deliver single binary drivers that work at installation time. This allows the device to be used during the installation process. This ability is currently only supported for graphics device drivers.

Loadable Drivers Framework

Device driver suppliers may now dynamically load their drivers into the kernel using the configuration manager framework. Functions provided to facilitate integration of third-party device support include:

Autoconfiguration support
Interrupt registration support
Installation support
Loadable driver support for the following buses:
TURBOchannel
EISA
ISA
PCI
SCSI peripheral devices
VMEbus

Common Access Method (CAM)

Common Access Method (CAM) is an ANSI standard for the software drivers that provide the interface between an operating system and a SCSI device. The Tru64 UNIX CAM implementation is highly compatible with ANSI X3.131-1986, Level 2 and supports SCSI-2 based CAM.

Internationalization

The Tru64 UNIX internationalization environment, tools, and localization features enable the development and execution of internationalized software without re-engineering the user application. The following character sets are supported:

Single Byte Character Sets — Languages (Locales)

Catalan (1)	Czech (2)	Danish (1)
Dutch (2)	English (3)	Finnish (1)
French (4)	German (2)	Greek (2)
Hebrew (2)	Hungarian (2)	Icelandic (1)
Italian (1)	Lithuanian (1)	Slovene (1)
Norwegian (1)	Polish (2)	Portuguese (1)
Russian (1)	Slovak (2)	Spanish (1)
Swedish (1)	Thai (1)	Turkish (2)

Multibyte Character Sets — Languages (Locales)

Simplified Chinese (8)	Traditional Chinese (20)
Japanese (6)	Hong Kong (7)
Korean (3)	

Tru64 UNIX base operating system functionality includes:

32-bit wide character support
XPG4 Worldwide Portability Interfaces (WPI)
Multibyte Support Extensions (MSE) of the ISO C standard (ISO/IEC 9899:1990/Amendment 1:1994(E))
Internationalized commands
Internationalized X/Open Curses library (libcurses)
iconv library (libiconv, an International Codeset Conversion Library)
Locale utilities
Date, time, currency, and numeric formats in the native languages
Character Classification — isupper, islower, iscntrl, is* functions
Collation — Character sort order of the codeset
Yes and No response in the native language
Fonts for supported character sets
TTY Drivers — Support for various input functionalities for the native languages
Translated CDE and Motif User Interface
Keymaps for local keyboards
Support for all Language Variants using the North American keyboard
Input method support for Hebrew and Asian languages
Printing in the native languages

Memory Requirements for Asian Language Variants

Applications running under a single Asian language variant can operate within the memory requirements of the base operating system. Running multiple Asian language variants in a single session requires additional memory for satisfactory performance.

Unicode Support

Tru64 UNIX supports the Unicode Version 2.1 and ISO 10646 standards through a set of UCS-4 and UTF-8 based locales. Codeset conversion capability to/from UCS-4, UCS-2 (UTF-16) and UTF-8 formats is provided for all supported codesets. Conversion support from Unicode to and from a number of single-byte PC codepages and from those PC codepages to the ISO Latin codeset is provided. Limited Unicode character transformation support is also provided.

Unicode — Language (Locales)

Catalan (1)	Finnish (1)	Norwegian (1)
Danish (1)	French (4)	Portuguese (1)
Dutch (2)	German (2)	Spanish (1)
English (4)	Italian (1)	Swedish (1)

Euro Currency Support

Tru64 UNIX supports the processing of the new Euro currency symbol through the use of Unicode V2.1. Applications running in the Unicode (UTF-8) locales can display, process, and print the Euro provided the applications have been modified to recognize the Euro character and UTF-8 character set.

OPTIONAL SOFTWARE

Developers' Toolkit

The Developers' Toolkit for Tru64 UNIX provides a robust set of tools that help you write effective applications. The Developers' Toolkit includes:

- An ANSI-compliant C compiler with advanced optimization capabilities
- A state-of-the-art debugger that supports threads services to optimize SMP systems
- In-depth profiling and reordering tools that analyze CPU usage, heap memory, and streamline applications
- Porting tools that reduce the time and cost of moving applications from 32-bit UNIX and OpenVMS systems to 64-bit Tru64 UNIX
- GUI-based development and traditional command-line interfaces
- An extensive library of routines that simplify the process of creating your own development tools

You can improve the quality of your applications, optimize the power of Alpha, and streamline your development timeline. The Developers' Toolkit for Tru64 UNIX is a prerequisite for all Tru64 UNIX development tools. This product is licensed separately from theTru64 UNIX Operating System. (SPD 44.36.xx)

Logical Storage Manager (LSM)

The Tru64 UNIX Logical Storage Manager (LSM) is an integrated, host-based solution to data storage management, providing concatenation, striping, mirroring, and a graphical user interface that allows data storage management functions to be performed on line, without disrupting users or applications. The Logical Storage Manager product is contained in the StorageWorks Software package. The Logical Storage Manager description is in SPD 51.24.xx.

TruCluster™ Server Software V5.0

TruCluster Server Version 5.0 provides highly available and scalable solutions for users in mission-critical computing environments. It delivers easier, more sophisticated UNIX clustering capabilities by adding a fully clustered shared file system to the rich functionality already found in the Compaq TruCluster products.

By combining the advantages of symmetric multiprocessing, distributed computing, and fault resilience, a cluster running TruCluster Server Version 5.0 offers its users high availability while providing scalability beyond the limits of a single system. TruCluster Server also significantly reduces, but does not eliminate, the impact of hardware and software failures. (See SPD 70.79.xx)

Advanced File System Utilities (AdvFS)

The Advanced File System Utilities extend the high availability and flexibility of AdvFS. The AdvFS Utilities provide a graphical user interface (GUI) to ease management tasks and online utilities to dynamically resize file systems, balance the percentage of space used on volumes, undelete files using trashcans, stripe files, and clone files for hot backup. (SPD 44.52.xx).

The Advanced File System Utilities product can also be ordered as StorageWorks Software and StorageWorks Software PLUS.

NetWorker

NetWorker is an integrated product offering that completely addresses the storage management needs of the heterogeneous enterprise environment. Legato NetWorker Save and Restore delivers the manageability, availability, and performance necessary to protect multi-platform environments with one integrated solution. NetWorker single-server version is bundled with Tru64 UNIX. Thus, any directly attached storage to an AlphaSever can use Networker Save and Restore.

For additional information on Legato NetWorker V5.5 and above, networked version, see:

http://www.legato.com/Products/html/legato_networker.html.

StorageWorks Software

The Compaq StorageWorks Software package includes two key storage products: Logical Storage Manager (LSM) and Advanced File System (AdvFS) Utilities. StorageWorks Software delivers high availability, configuration flexibility on line, optimal file system performance, and data protection. The part number for StorageWorks Software is QB-5RXA*-AA..

Advanced Server for Tru64 UNIX (ASU)

Advanced Server for Tru64 UNIX (ASU) provides seamless interoperability between Tru64 UNIX servers, Windows NT servers, and Microsoft Windows clients. The ASU software enables a Tru64 UNIX system to run the services that make it appear as a Microsoft Advanced Server. Through the ASU software, Tru64 UNIX resources are available to Microsoft users without modification to their software.

The ASU server is an evolution of the PATHWORKS Version 6.x for Tru64 UNIX (Advanced Server) product, and provides improvements such as support for mixed-case and long file names and a seamless upgrade procedure. The ASU media and documentation are delivered on the Tru64 UNIX Associated Products Volume 2 CD-ROM. Two clients can use complementary licenses after you install and configure the ASU software. Additional ASU licenses can be purchased and loaded into the License Management Facility (LMF) on the system where the ASU software is installed (SPD 61.56.xx).

Open3D

Compaq Open3D provides a complete development and run-time environment for 2D and 3D applications. Open3D provides support for many graphic accelerators on Alpha systems. All Open3D TURBOchannel devices will be retired in the next major release of Tru64 UNIX. Digital Open3D V4.4 was the last version of Open3D to support the TURBOchannel DDX and graphic adapters. See the Tru64 UNIX V4.0F Release Notes for more information. (SPD 45.07.xx)

Prestoserve™

Prestoserve for Tru64 UNIX, available on most Alpha systems, is a disk write accelerator for disk block device write operations. (SPD 35.11.xx)

Multimedia Services

Multimedia Services for Tru64 UNIX brings audio and video capabilities to Compaq workstations, and provides a full programming library for use by developers of new applications. The Multimedia Services Runtime license is included with the Tru64 UNIX base operating system. (SPD 48.92)

SCSI CAM Layered Components

SCSI CAM Layered Components (CLC) provides device drivers and tools for two types of SCSI devices: robotic medium changers (found in tape and optical libraries), and magneto-optical disk drives (both read-write optical and WORM). Permission to use CLC is granted for use with several applications, which are listed in the CLC Release Notes. Devices supported by CLC are those changer and optical devices supported by these applications. A partial list of supported devices can be found in the CLC Release Notes. (SPD 50.68.09)

Server Extensions for Tru64 UNIX

Compaq Tru64 UNIX Server Extensions is an integrated layered product for the Tru64 UNIX Operating System that provides server services bundled with all AlphaServers. The Server Extensions include remote installation and dataless configuration support. It required a separate license, which is bundled with all Alpha Servers.

Remote Installation Service (RIS)

The Tru64 UNIX Server Extensions includes the Remote Installation Service (RIS). The RIS sets up a framework on a Tru64 UNIX server system, which enables other Tru64 UNIX client systems to perform a full install of the operating system software and the Worldwide Language Support software over the network from the server system. Additional software can be loaded onto the client system from the RIS server system after the client has been installed. BOOTP is the boot protocol used to initiate the installations. Because of the high bandwidth requirements, RIS is supported only in local area network environments.

A RIS client can be booted from the following interfaces:

- Internal Ethernet
- The PMAD TURBOchannel Ethernet option card
- The DE422 and DE425 EISA Ethernet option cards
- The DE203, DE204, and DE205 ISA Ethernet option cards

- The DE434, DE435, and DE436, DE500 PCI Ethernet option cards
- The DEFEA EISA family of FDDI option cards
- The DEFPA PCI family of FDDI option cards
- The DEFTA TURBOchannel family of FDDI option cards
- The DETRA Token Ring option card

RIS supports the installation of a third party or foreign graphics kit into the RIS area. This is useful in the case where the user has installed a new graphics device into the system, which has a driver that needs to be added to the system. With the driver included in the RIS area, the user can use the graphics device during installation.

The server must be a Tru64 UNIX server. Support for installing from an ULTRIX RIS Server to a Tru64 UNIX client has been retired.

The ability to remotely install ULTRIX clients from an ULTRIX server, as well as the ability to remotely install Tru64 UNIX clients from a Tru64 UNIX server will continue to be supported.

Firmware Requirements for RIS Option Cards

Console firmware and all option firmware in the DMS or RIS server and in every client system must be compatible with the version of Tru64 UNIX system software that will be running on that system.

Please see the Release Notes Overview included with the Console Firmware CD-ROM, which is packaged along with the Tru64 UNIX Operating System software kit (QA-MT4AA-H8) to determine the firmware version compatibilities.

Dataless Configurations

The Tru64 UNIX Server Extensions include support to install and operate systems in a dataless configuration. A server system maintains the root, /usr, and /var file systems for all client systems. The server maintains one copy of root for each client. The /usr file system is exported read-only and is shared by all clients registered to the environment. Each client has their own /var file system. Dataless clients access the file systems maintained on the server utilizing NFS. A minimum of one disk drive is required on each client for the purposes of dumping and swapping.

The Dataless Management Utility (dmu) is provided for the Tru64 UNIX server system, enabling the server to register and manage the software areas used by Tru64 UNIX dataless clients. BOOTP is the protocol used to boot the clients and mount the remote file systems.

SOURCE MATERIALS OPTIONS

A source kit is available for users who need to retrieve and modify selected source modules. Although every attempt is made to include accurate source modules, Compaq does not warranty the ability to build a binary kit. Limited documentation is also provided. Compaq does not warranty the results of using the source kit to change selected portions of the system.

Customers who are appropriately licensed by The Open Group (TOG) and by Santa Cruz Operations (SCO™) may obtain optional source material for this software product.

Most users do not require source materials. Sources are used primarily by those with an in-depth knowledge of operating system internals to make highly specialized modifications to the software product.

The following minimum conditions must be satisfied prior to each distribution (initial distribution or revision) of source materials:

Customers must be currently licensed by The Open Group to use Motif R1.2.3 source code on a designated CPU for which source materials are to be ordered. The Open Group must verify to Compaq that the customer's Motif source license is valid.

Customers must be currently licensed by the Santa Cruz Operations (SCO) for the 3B2 implementation of UNIX System V Release 3.2 (or later) source code on a designated CPU for which source materials are to be ordered. SCO must verify to Compaq that the customer's UNIX source license is valid.

Customers must have signed the Compaq Software Program Sources License Agreement for the facility or site where the CPU is located.

Source kits provided by Compaq do not necessarily contain all source files used by Compaq to build object code kits. Compaq provides these source kits on a reference-only basis. Compaq does not provide support for source code as part of the standard Software Product Services (SPS) offerings. These sources are distributed on an "as is" basis.

The source code distribution provides users with a source license and the machine-readable source code for this software product. Subject to the terms and conditions of the Motif R1.2.3 source license from The Open Group and the UNIX source license from SCO, this option gives customers the right to use this source code on any CPU at the facility/location (as specified in the above mentioned agreements with Compaq) that has a Single-Use License for the object code.

The source code distribution update option provides users with the machine-readable source code for a revised version of this software product. Subject to the terms and conditions of the Motif R1.2.3 source license from The Open Group and the UNIX source license from SCO, this option gives users the right to use this revised source code on any CPU at the facility/location (as specified in the above mentioned agreements with Compaq) that has a Single-Use License for the object code and is also listed on the Source License for this product.

HARDWARE REQUIREMENTS

The Tru64 UNIX Operating System can execute on valid Alpha systems and must include the following minimum system configuration:

Tru64 UNIX requires the minimum component of main memory to be 64 MB.

The minimum disk space requirement for installing the Tru64 UNIX Operating System is 1 GB (such as an RZ26 if placed on a single spindle).

The following numbers have been compiled from typical update installations from Version 4.0D and Version 4.0F to Version 5.0. The Additional Space Needed values represent the typical amount of space needed per file system by the update installation procedure during the course of an update. These values take into account the additional processing space for temporary files that the update installation requires and will vary depending on your specific hardware configuration, file system type, and software installed. These values have been determined before the use of the Update Administration Utility and do not include the additional space required to update the Worldwide Language Support product.

File System	File System Type	V4.0D Mandatory Subsets Only (MB)	V5.0 Mandatory Subsets Only (MB)	Additional Space Needed (MB)
/	UFS	41.81	65.87	23.24
/usr	UFS	186.44	291.16	95.86

File System	File System Type	V4.0D All Subsets (MB)	V5.0 All Subsets (MB)	Additional Space Needed (MB)
/	UFS	53.21	73.98	23.60
/usr	UFS	350.23	473.82	122.64
/var	UFS	5.53	6.15	1.00
/	AdvFs	53.28	75.04	26.12
/usr	AdvFS	335.06	458.96	138.94
/var	AdvFS	5.77	7.31	1.00

File System	File System Type	V4.0F Mandatory Subsets Only (MB)	V5.0 Mandatory Subsets Only (MB)	Additional Space Needed (MB)
/	UFS	51.24	66.41	15.63
/usr	UFS	210.61	282.60	62.98

File System	File System Type	V4.0F All Subsets (MB)	V5.0 All Subsets (MB)	Additional Space Needed (MB)
/	UFS	62.28	79.24	15.60
/usr	UFS	370.39	465.26	94.17
/var	UFS	5.29	6.17	1.00
/	AdvFS	62.43	75.67	16.95
/usr	AdvFS	370.10	464.67	108.93
/var	AdvFS	5.60	6.18	1.00

The supported load devices include CD-ROM readers (such as RRD44) or a variety of network interfaces.

Tru64 UNIX requires one console terminal with ASCII capabilities or one DIGITAL graphics display console for Alpha systems.

Hardware Partitioning

Tru64 UNIX Version 5.0 provides the enabling technology to support static hardware partitions on the AlphaServer 8400 and Compaq AlphaServer GS140 only. Please consult the *Systems and Options Catalog* for detailed configuration guidelines. This is located at: http://www.digital.com/info/SOC/

Use of Tru64 UNIX in hardware partitions requires a Tru64 UNIX Hardware Partitioning License for each additional partition. For more information, refer to the Software Licensing section in this document.

Disk Space Requirements for Language Variants

In addition to base Tru64 UNIX disk space requirements, the following amount of disk space is required for language variants.

The language variant components are structured with a common part and an individual part for each language variant. The common part is a prerequisite for any individual language component listed here.

Common Part

- Mandatory for base O/S
- Optional for base O/S
- Mandatory for workstations
- Optional for workstations

Mandatory for workstations is required for enabling windowing functionality.

Language	*Required Base Subsets (MB)*	*Optional Base Subsets (MB)*	*Required Wrkstn Subsets (MB)*	*Optional Wrkstn Subsets (MB)*	*Total (MB)*
Catalan	0.77	00.00	4.02	12.83	17.63
Chinese (PRC)	1.43	18.19	7.37	26.18	53.17
Czech	0.00	2.51	4.48	5.83	12.81
Danish	0.77	0.00	0.00	0.00	0.77
Dutch	0.77	0.00	0.00	0.00	0.77
Finnish	0.77	0.00	0.00	0.00	0.77
French	0.77	0.00	4.00	11.27	16.04
German	0.77	0.00	4.01	11.11	15.89
Greek	0.77	1.39	0.98	1.12	4.26
Hebrew	0.05	1.35	1.26	1.94	4.61
HongKong	3.00	31.35	17.83	48.06	100.24
Hungarian	0.00	2.50	4.40	5.83	12.74
Icelandic	0.77	0.00	0.00	0.00	0.77
Italian	0.77	0.00	4.50	9.12	13.94
Japanese	6.68	42.59	22.87	26.57	98.72
Korean	1.53	6.25	5.53	8.94	22.24
Lithuania	0.00	0.00	.091	3.43	4.34
Norwegian	0.77	0.00	0.00	0.00	0.77
Polish	0.00	2.51	4.52	5.83	12.87
Portuguese	0.77	0.00	0.00	0.00	.077
Russian	0.00	1.67	4.45	4.36	10.48
Slovene	0.00	2.46	0.92	3.40	6.78
Slovak	0.00	2.51	4.74	5.92	13.17
Spanish	0.77	0.00	4.02	12.83	17.63
Swedish	0.77	0.00	3.77	2.44	6.98
Taiwan	2.13	29.96	14.02	24.65	70.76
Thai	0.58	3.40	2.53	1.21	7.72
Turkish	0.77	2.45	1.01	3.27	7.49

OPTIONAL HARDWARE

Additional memory and/or secondary storage may be required depending upon the usage of the Tru64 UNIX Operating System software and/or optional software products.

Combinations of hardware options are subject to limitations such as bandwidth, physical configuration restraints, thermal dissipation, electrical loads, and power supply.

System configuration details are described in the DIGITAL *Systems and Options Catalog*. This is located at: http://www.digital.com/info/SOC/

Hardware options supported by Tru64 UNIX are listed in the Hardware tables at the end of this SPD.

SUPPORTED HARDWARE

Combinations of hardware options are subject to limitations, such as bandwidth, physical configuration constraints, and electrical load and power supply.

The hardware tables in this Software Product Description do not describe all possible hardware configurations or circumstances. Any particular configuration should be discussed with Compaq. Contact Compaq for the most up-to-date information on possible hardware configurations.

Compaq reserves the right to change the number and type of devices supported by Tru64 UNIX. The minimum hardware requirements for future versions and updates of Tru64 UNIX may be different from current requirements. For configuration details about Alpha systems, refer to the DIGITAL *Systems and Options Catalog* located at: http://www.digital.com/info/SOC/

SCSI Device Support

The Tru64 UNIX Operating System supports the ANSI SCSI-3 standard. The SCSI devices listed in Table 2 at the back of this SPD have been certified for use with the Tru64 UNIX Operating System. Refer to appropriate platform *Systems and Options Catalog* for system specific restrictions, located at: http://www.digital.com/info/SOC/

Symmetric Multiprocessing (SMP)

Symmetric multiprocessing (SMP) enables systems with two or more processors to execute the same copy of the operating system, access common memory, and execute instructions simultaneously. The SMP functionality fully exploits the additional compute capabilities of multiple processors. Capabilities include:

Multiple threads from the same or different tasks can run concurrently on different processors.
Process affinity — Allows binding a process to a specific processor.
Unattended reboot — On a hard failure of a nonboot processor, the operating system tags the failing CPU and reboots the system, without enabling the defective CPU.
Stop/Start CPU — Ability to stop and start a specified nonboot processor.
Processor sets — Ability to dedicate a process, or set of processes, to a specific processor or set of processors. Can also be used to partition the available processors among a set of users.

PC Card Support

Tru64 UNIX provides PCMCIA (PC Card) support for the following platforms:

AlphaStation 200, 255, 400, 600
AlphaServer 1000
Personal Workstation au models

The support is limited to:

Support of supplied ISA to PCMCIA adapters
Support of fax/modem PC cards:
MEGAHERTZ XJ2288
MEGAHERTZ XJ1144
AT&T Paradyne KeepinTouch Card
DIGITAL PCMCIA V3.2bis 14,400 Fax
Hot swap capability of PC cards

GROWTH CONSIDERATIONS

The minimum hardware and software requirements for any future version of this product may be different from the requirements for the current version.

DISTRIBUTION MEDIA

Tru64 UNIX is distributed on CD-ROM and is ISO 9660 Level 1 compliant.

ORDERING INFORMATION

The Tru64 UNIX Operating System license provides the right to use the software as described in this SPD. Separate licenses are available for the right to use the development tools and the C compiler (see SPD 44.36.xx for Tru64 UNIX Developers' Extensions), and the Remote Installation Service (see SPD 44.35.xx for Tru64 UNIX Server Extensions).

Tru64 UNIX Operating System

Unlimited User Base Licenses: QL-MT4A*-**

Software Product Services: QT-6ADA*-**/

***** *Denotes variant fields.*

Software Media Kit: Tru64 UNIX Operating System: QA-6ADAA-H8

The Software Media kit includes CD-ROMs containing the operating system binaries and complete Tru64 UNIX online documentation. Hardcopy start-up documentation is also included in the Media kit, including the *Installation Guide, Release Notes,* and *Technical Overview*.

Software Documentation

Documentation for Tru64 UNIX is provided on the Documentation CD-ROM. It is also available on the World Wide Web and in printed form.

The software Media Kit (QA-6ADAA-H8) includes the Documentation CD-ROM and printed versions of the books in the Startup Kit. The Documentation CD-ROM is also separately orderable (QA-6ADAA-G8).

The structure of the printed Tru64 UNIX Documentation kit and its subkits follows. Each kit contains the subkits that are indented below it:

- Tru64 UNIX Documentation Kit (QA-6ADAA-GZ)
    - End User Documentation Kit (QA-6ADAB-GZ)
        - Startup Kit (QA-6ADAC-GZ)
        - System and Network Management Kit (QA-6ADAE-GZ)
        - General User Kit (QA-6ADAD-GZ)
    - Developer's Kit (QA-6ADAF-GZ)

Included in these kits are several books that are published by companies other than Compaq. Those books are available only in printed form. All of the other books in these kits are provided online on the Documentation CD-ROM.

Reference pages for Tru64 UNIX are provided on the operating system CD-ROM, the Documentation CD-ROM, and the World Wide Web. They can also be purchased in printed form in a separately orderable kit (QA-6ADAG-GZ).

The URL to view the Tru64 UNIX documentation is:

http://www.UNIX.digital.com/faqs/publications/pub_page/pubs_page.html

Source Distribution

Source License/Distribution: QB-6ADAA-E8

Update Source License/Distribution: QB-6ADAE-E8

Education Source License/Distribution: QB-6ADBA-E8

Education Update Source License/Distribution: QB-6ADBE-E8

For more information see the Source Materials Options section of this SPD.

For additional information on available licenses, services, and media, refer to the appropriate price book.

SOFTWARE LICENSING

Tru64 UNIX Operating System software is furnished under the licensing of Compaq Computer Corporation's Standard Terms and Conditions.

Five types of Tru64 UNIX Operating System licenses are available on Alpha processors:

LMF Product Name: OSF-BASE

This license grants the right to noninteractive use of the file, application, batch, print, and compute services of Tru64 UNIX Operating System on a single processor.

This license also authorizes up to two concurrent interactive users of the system. An interactive user, either a person or device, is one that is logged in to a Tru64 UNIX processor or is interactively using the operating system software by means other than a login. The two interactive users authorized as part of the Operating System Base License are additive with Concurrent Use License quantities, but may not be separated from the Operating System Base License.

In addition to the two interactive users, login as root is authorized for system management purposes only. If a Tru64 UNIX Base License is not registered and activated using the LMF, then login by root only is permitted for system management purposes.

The Operating System Base License is a prerequisite for Concurrent Use Licenses, Unlimited Interactive User Licenses, Hardware Partitioning Licenses, and SMP Extensions to Base Licenses.

Symmetric Multiprocessing (SMP) Extension to Base License (QL-MT4A9-6*)

LMF Product Name: OSF-BASE

SMP Extensions extend the Operating System Base License to enable symmetric multiprocessing (SMP) capability on those Tru64 UNIX systems supporting SMP. SMP Extensions to Base are permanently tied to the Operating System Base License and may not be separated from the Operating System Base License if an SMP board is removed from the system.

One SMP Extension License is needed for each active processor in the SMP system that is additional to the initial processor authorized by the Operating System Base License.

SMP Extensions grant the right to use the same version of the Operating System software as permitted by the corresponding Operating System Base License at the time when the SMP Extension is installed.

Tru64 UNIX Hardware Partitioning License (QM-MT4AA-AA)

A Hardware Partition extends the Operating System Base License to allow use of a copy of the Tru64 UNIX Operating System in a static hardware partition on systems supporting this feature. The Tru64 UNIX Base License provides the right to enable Tru64 UNIX in a single hardware partition. A Tru64 UNIX Hardware Partition License is required for each additional Tru64 UNIX hardware partition within the same system. For example, a system divided into two (2) Tru64 UNIX partitions requires one (1) Tru64 UNIX Base License and one (1) Tru64 UNIX Hardware Partition License.

Concurrent Use Licenses (QL-MT7AM-3*)

LMF Product Name: OSF-USR

An Operating System Base License is a prerequisite for Concurrent Use Licenses on the same system.

These licenses grant the right to interactive use of the Tru64 UNIX Operating System. The Concurrent Use Licenses are available in various quantities, which can be combined to match any total desired.

Multiple user licenses of the same or different quantities may be installed and used together on a given system to authorize system use by the sum of their quantities. These user licenses authorize users in addition to the two users authorized as part of the Operating System Base License.

Concurrent Use Licenses are redesignatable and can be installed and used only on a single Tru64 UNIX system at a time.

An interactive user, either a person or device, is one that is logged in to a Tru64 UNIX processor or is interactively using the operating system software by means other than a login.

Unlimited Interactive User Licenses (QL-MT7A*-AA)

LMF Product Name: OSF-USR

An Operating System Base License is a prerequisite for an Unlimited Interactive User License for use on the same system.

This license grants the right to use the Tru64 UNIX Operating System by an unlimited number of interactive users on a system.

An Unlimited Interactive User License grants the right to use software versions authorized under the Operating System Base License in effect at the time of the grant of the Unlimited Interactive User License.

SOFTWARE PRODUCT SERVICES

A variety of service options are available from Compaq. For more information, contact your local Compaq office.

YEAR 2000 READY

This product is Year 2000 Ready.

“Year 2000 Ready” products are defined by Compaq as products capable of accurately processing, providing, and/or receiving date data from, into and between the twentieth and the twenty-first centuries, and the years 1999 and 2000, including leap year calculations, when used in accordance with the associated product documentation and provided that all hardware, firmware, and software used in combination with such products properly exchange accurate date data with the products.

For additional information visit the Compaq Year 2000 web site located at:

http://www.compaq.com/year2000/

To ensure that this product is Year 2000 Ready, the following testing process/methods were utilized:

- Code Inspection – All source code modules used to build this product were inventoried and inspected to ensure correct date handling for date data eyond the year 2000.
- System Date Handling – This product was tested to ensure that the system properly handles future time including but not limited to the following dates: December 31, 1999 to January 1, 2000 rollover; February 28, 2000; February 29, 2000; March 1, 2000; and January 1, 2001.
- Regression Testing – This product was tested using a comprehensive suite of regression tests for functional, performance, and standards compliance with system time set to future dates including dates in and beyond the year 2000.

To ensure that this product inter-operates properly with other hardware and software, the following testing process/methods were utilized:

- Year 2000 readiness was tested using supported hardware and firmware.
- This product has been tested for Year 2000 readiness while operating within a computer network of other systems.
- The Associated Products (shipped with the Tru64™ UNIX® media kit) have been tested in conjunction with the operating system for Year 2000 readiness.

SOFTWARE WARRANTY

This software is provided by Compaq with a 90-day conformance warranty in accordance with the Compaq warranty terms applicable to the license purchase.

HARDWARE SUPPORT TABLES

The hardware options supported by Tru64 UNIX are listed in the following tables. These hardware options inlcude information on systems and peripherals.

Table 1[1]
Supported AlphaServer Systems

AlphaServer Models
DEC 2000*, 300, 500
DEC 3000*, 300, 300L, 300X, 300LX, 400, 400S, 500, 500S, 500X, 600, 600S, 700, 800, 800S, 900
DEC 4000*, 6XX, 7XX
DEC 7000*, 6XX, 7XX
AlphaServer 300**, 4/266
AlphaServer 400**, 4/166, 4/233
AlphaServer 800, 5/333, 5/400, 5/500
AlphaServer l000, 4/200, 4/226, 5/300
AlphaServer l000A, 4/233, 4/266, 5/300, 5/333, 5/400, 5/500
AlphaServer 1200, 5/466, 5/533
AlphaServer 2000, 4/200, 4/233, 4/275, 5/250, 5/300, 5/375
AlphaServer 2l00, 4/200, 4/233, 4/275, 5/250, 5/300, 5/375
AlphaServer 2100A,4/275, 5/250, 5/300
AlphaServer 4000, 5/300, 5/300E, 5/400, 5/466, 5/533, 5/600
AlphaServer 4100, 5/300, 5/300E, 5/400, 5/466, 5/533, 5/600
AlphaServer 8200, 5/300, 5/350, 5/440, 5/625
AlphaServer 8400, 5/300, 5/350, 5/440, 5/625
Compaq AlphaServer DS10
Compaq AlphaServer DS20
Compaq AlphaServer ES40
Compaq AlphaServer GS60, GS60E
Compaq AlphaServer GS140

* End of product manufacturing - 1994
** End of product manufacturing - 1997

[1] Refer to the appropriate platform Systems and Options Catalog for system specific restrictions. http://www.digital.com/info/SOC/ or the AlphaServer Web page - http://www.digital.com/info/alphaserver/

Table 1a[1]
Supported Alpha Workstation Systems

Alpha Workstation Models
AlphaStation 200*, 4/100, 4/166, 4/233
AlphaStation 250*, 4/266
AlphaStation 400*, 4/233, 4/266
AlphaStation 255**, 4/233, 4/300
Personal Workstation 433au, 500au, 600au
Ultimate Workstation 533au
AlphaStation 500*** 5/266, 5/333, 5/400, 5/500
AlphaStation 600*** 5/266, 5/30, 5/333
AlphaStation 600A*** 5/500
Compaq Professional Workstation XP100, XP900

* End of product manufacturing - 1996
*** End of product manufacturing - 1997
** End of product manufacturing - 1998

Table 1b[1]
Supported Boards and Components

Boards and Components	Model	Model	Model	Model
Embedded and Real-time Boards/Systems	AlphaVME 4/244 AlphaVME 4/288	AlphaVME 5/352 AlphaVME 5/480	AXPvme 100 AXPvme 230	
Modular Computing Components	EBM43-AZ	EBM44-AZ	EBM21-AZ	EBM23-AZ
Single-Board Computers	AlphaPC 64	AlphaPC 164	AlphaPC164/LX	AlphaPC 164/SX

Table 2[1]

[1] Refer to the appropriate platform Systems and Options Catalog for system specific restrictions. http://www.digital.com/info/SOC/ or the AlphaServer Web page - http://www.digital.com/info/alphaserver/

[1] Refer to the appropriate platform Systems and Options Catalog for system specific restrictions.

Storage Device Support Table

CD-ROM Drives: * Manufacturing ended	RRD42* RRD43*	RRD44* RRD45*	RRD46* RRD47 PCXRN
Disks: **Manufacturing ended	RZ1CF RZ1DD RZ1ED RZ2CC RZ2DC RZ24L RZ25 RZ25F RZ25L RZ25M RZ26** RZ26F** RZ26L** RZ26N** RZ28**	RZ28B** RZ28D** RZ28L** RZ28M** RZ29B RZ29L RZ40 RZ55** RZ56** RZ57** RZ58** RZ73** RZ74** RZ1BB	RZ1BC RZ1CB RZ1CC RZ1CD RZ1DB RZ1DF RZ1EF 30-55981-01 30-55981-02 30-55981-03 30-55981-04 30-55981-05 30-55981-06
Solid State Disks:	EZ31 EZ32	EZ41 EZ42 EZ51 EZ54 EZ58	EZ64 EZ69 EZ705 EZ711 EZ716
Floppy Drives: * Manufacturing ended	RX23	RX26	RX33*
FDI Floppy Drives:	RX23	RX23L	
Tapes: **Manufacturing ended	TLZ04** TLZ06** TLZ07** TLZ09 TLZ10 TKZ08** TKZ09**	TKZ60** TKZ61** TKZ62 TKZ63 TSZ07 TZ30 TZ85**	TZ86 TZ87 TZ88 TZ89 TZK10** TZK11 TZK20** TZS20
RAID Controllers:	HSZ10 HSZ20	HSZ22 HSZ40	HSZ50 HSZ70 HSZ80
ZIP Drives	RX25-AA	PBXRX-CA	IOMEGA ZIP 100

Table 3[1]
Network Adapters

DE203 (ISA Ethernet)**	DEFPA (PCI FDDI)
DE204 (ISA Ethernet)**	DEFTA (TC FDDI)**
DE205 (ISA Ethernet)**	DEFZA (TC FDDI)**
DE422 ((EISA Lance Ethernet)**	DW110 (ISA Token Ring)
DE425 (EISA Tulip Ethernet)**	DW300 (EISA Token Ring)**
DE434 (PCI Ethernet)**	KZPCM (PCI, 2 SCSI, 1 Ethernet)
DE450 (PCI Ethernet)	KZPSM (PCI/ 1 SCSI/ 1 Ethernet)**
DE500 (PCI Fast Ethernet)	P2SE (PCI, 2 SCSI, 1 Ethernet)**
DEFAA (FBUS + FDDI)**	PBXNP (PCI Token Ring)
DEFEA (EISA FDDI)***[1]	PBXNP
DEGPA (Gigabit Ethernet)	3X-DAPBA-FA
DEMFA (XMI Ethernet)***	3X-DAPBA-UA
DGLPB (PCI ATM)	3X-DAPCA-FA
DGLTA (TC ATM)	

Table 4[1]
CI Storage Controllers

HSC40	HSC70
HSC50	HSC90
HSC65	HSC95

Table 5[1]
Storage Adapters and Controllers

CIXCD-AC (XMI CI)	KZPSA (PCI FWD)
KDM70 (XMI CI)	KZPSC (PCI RAID)
KGPSA	KZPSM (PCI, 1 SCSI, 1Ethernet)
KZESC (EISA RAID)**	KZTSA (TC FWD SCSI)**
KZMSA (XMI)	P2SE (PCI, 2 SCSI, 1Ethernet)**
KZPAA (PCI)	PB2HA-SA: Adaptec 1742 (EISA)**
KZPAC (PCI RAID)	PMAZB (TC Dual Slow SCSI)**
KZPBA (PCI)	PMAZC (TC Dual Fast SCSI)**
KZPCM-DA (PCI, 2 SCSI 1 Ethernet)	KZPCA
KZPDA (PCI)**	

** End of product manufacturing – 1997

*** End of product manufacturing - 1998

[1] Refer to the appropriate platform Systems and Options Catalog for system specific restrictions. http://www.digital.com/info/SOC/ or the AlphaServer Web page - http://www.digital.com/info/alphaserver/

Table 6[1]
Miscellaneous Adapters

KFE70-AA (EISA Bridge)
KFTIA (ITIOP)
KFE72-XX

Table 7[1]
ATAPI Devices

IOMEGA ZIP 100	Toshiba XM-6102B
Toshiba XM-5602B	Toshiba XM-6202b
Toshiba XM-5702B	

Table 8[1]
Graphic Subsystems

PB2GA-AA**	PBXGK-XX (ELSA/Comet PCI)
PB2GA-FA (ATI Mach 64 CX)**	PBXWT-A (CALCOMP DB III)**
PB2GA-JX (TRIO 64 PCI Card)**	PMAGC-XX**
PBXGA-Ax/Bx/Cx***	PMAGB-BX**
PBXGB-XX	PMAGB-JX**
PBXGC-XX**	PMAGD-XX**

**End of product manufacturing - 1997

***End of product manufacturing - 1996

Table 9[1]
DSA Disk Drives

RA60*	RA81**
RA71*	RA82**
RA72*	RA90**
RA73*	RA92**

*End of product life 1989

**End of product life 1992

Table 10[1]
DSA Tape Drives

TA78*	TA90**
RA79*	TA91**

*End of product manufacturing - 1989

**End of product manufacturing - 1992

Table 11[1]
DIGITAL Printers

Colormate PS	LA75	LG31
DEClaser 1100	LA100	LGL04plus
DEClaser 1150	LA120	LGL05plus
DEClaser 2100	LA210	LGL08plus
DEClaser 2150	LA324	LGL09plus
DEClaser 2200	LA400	LJ250
DEClaser 2250	LA424	LJ252
DEClaser 3200	LA600	LN03
DEClaser 3250	LG02	LN03 Plus
DEClaser 3500	LG04 *	LN03R ScriptPrinter
DEClaser 5100	LG04plus	LN15
DIGITAL Colorwriter LSR 2000 *	LG05plus	LN17
DIGITAL PrintServer 17 *	LG06	LN17ps
DIGITAL PrintServer 20 *	LG08 *	LN20
DIGITAL PrintServer 32 *	LG08plus	LN40
LA30N	LG09plus	LNC02
LA30W	LG12	
LA50	LG12plus	
LA70	LG14plus	

Table 12[1]
Third-Party Printers

Epson FX-1050	Lexmark 4039 10plus *	Xerox 4215 MRP *
Epson FX-80	Lexmark 4079 plus *	Xerox 4219 MRP *
Hewlett Packard DesignJet 755 CM *	Lexmark Optra C *	Xerox 4220 MRP *
Hewlett Packard Deskjet 680C	Lexmark Optra E *	Xerox 4230 MRP *
Hewlett Packard Deskjet 1120C	Lexmark Optra Lx *	Xerox 4235 MRP *
Hewlett Packard DeskJet 1600 CM *	Lexmark Optra Lxi+ *	Xerox 4510 *
Hewlett Packard LaserJet 4	Lexmark Optra N *	Xerox 4517 *
Hewlett Packard LaserJet 4M Plus	Lexmark Optra Rt+ *	Xerox 4520 *
Hewlett Packard LaserJet 4000 Series *	Lexmark Optra S 1250 *	Xerox 4700II *
Hewlett Packard LaserJet 4Si *	Lexmark Optra S 1650 *	Xerox DocuPrint N17 *
Hewlett Packard LaserJet 5Si *	Lexmark Optra S 2450 *	Xerox DocuPrint N24 *
Hewlett Packard LaserJet 5Si MX	IBM Proprinter	Xerox DocuPrint N32 *
Hewlett Packard LaserJet 6L	NEC Silentwriter 290	Xerox DocuPrint N40 *
Hewlett Packard LaserJet IIP	Sun SPARCprinter E *	Xerox DocuPrint 4050NPS *
Hewlett Packard LaserJet IIID	Xerox DocuPrint 4850NPS *	Xerox DocuPrint 4090NPS *
Hewlett Packard LaserJet IIIP	Xerox DocuPrint 4890NPS *	Xerox DocuPrint 4635 NPS *
Hewlett Packard LaserJet IIISi *	Xerox DocuTech 6135 *	

* Requires Advanced Printing Software (APS) available on the Tru64 UNIX Associated Products CD-ROM.

[1] Refer to the appropriate platform Systems and Options Catalog for system specific restrictions. http://www.digital.com/info/SOC/ or the AlphaServer Web page - http://www.digital.com/info/alphaserver/

Table 13[1]
Worldwide Printers

CP382-D	LA280	LA88
DEClaser 1152	LA380	LA88-C
DEClaser 2300	LA380-CB	LA90
DEClaser 2400	LA380-K	LN03S-JA
DEClaser 2500	LA84	LN82R
DL510-KA	LA86	Epson LQ-1050+

Table 14[1]
Asynchronous Terminals

VT100	VT240	VT340
VT102	VT300	VT420
VT200	VT320	VT510
VT220		

Table 15[1]
Monitors

PC7XV-DE**	VRC16-H4****	VRCX1-W3/W4/WA*
PC7XV-DG**	VRC16-HX****	VRCX5-W3/W4/WA*
PCXAV-F**	VRC16-PA/P4****	VRTX7-W3/W4/WA**
PCXBV-DE/DF/PC**	VRC17-W	VRT16***
VRC14-PA/P4****	VRC21**	VRT17***
VRC15-KA/K4****	VRC21-HA/HB/H4**	VRT17-PA/P4***
VRC15-KX/WX****	VRC21-K4/KA**	VRT17-PX/WX***
VRC15-PA/P4****	VRC21-LA/L4**	VRT17-WA/W3/W4***
VRC15-W****	VRC21-LX/WX**	VRTX7-W3***
VRC15-WA/W3/W4****	VRC21-PA/P4**	VR319*****
VRC16****	VRC21-W**	VR320*****
VRC16-HA****	VRC21-WA/W3/W4**	VRQV5
	VRQP6	VRQP7
	VRQF8	VRQP1

Table 16[1]
Keyboards

PCXAL***	LK421***	LK47W**
PBXWT (CALCOMP DB III)***	LK443***	LK461
LK401	LK444***	LK46W
LK411***	LK46W**	LK471
LK97W*	LKQ47	LKQ97
LK411***	LK47W*	LK471

End manufacturing 1997 **End manufacturing 1996 ** End manufacturing 1995***** End manufacturing 1994

[1] **Refer to the appropriate platform Systems and Options Catalog for system specific restrictions. http://www.digital.com/info/SOC/ or the AlphaServer Web page - http://www.digital.com/info/alphaserver/**

Table 17[1]
Mouse

PBXAS-AA/AB (3 button)	PCXAS-AA
PBXWS-AA (3 button)***	PCXLN-AD
PBXWS-WA (3 button)**	VSXXX-AA**
PBXWT-A (CalComp DB III)	VSXXX-AB**
PC7XS-AA (2 button)***	VSXXX-FA**
PC7XS-CA (3 button)***	VSXXX-GA**
PBQWS	

Table 18
Modems

PCXBF-AA (2400/9600)*	PCXDF-AA/BA (FAX/Modem)
PCXCF-AA (9600/9600)*	DF02*
PCXDF-AA (14400/9600)*	DF03*
PCXDF-BA*	DF296

* End manufacturing 1998 ** End manufacturing 1997 *** End manufacturing 1996

COPYWRITE NOTATIONS

Note: This product includes software developed by the University of California, Berkeley and its contributors.