digital™

Software Product Description

PRODUCT NAME: Digital UNIX® Operating System, Version 3.2G **SPD 41.61.15**

DESCRIPTION

The Digital UNIX Operating System 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. Digital UNIX is Digital Equipment Corporation's implementation of the Open Software Foundation ™ (OSF®) OSF/1 R1.0, R1.1, and R1.2 technology, and the Motif® R1.2.3 graphical user interface and programming environment.

Under the X/Open UNIX branding program, Digital has received the UNIX brand for the Digital UNIX operating system, and is licensed to use the UNIX trademark in conjunction with the Digital UNIX product. To reinforce the UNIX Brand and to better reflect the true nature of Digital's standards-compliant UNIX product, the operating sytem name has been changed from DEC OSF /1 to Digital UNIX. This name change will be gradually phased into the product binaries and documentation.

Digital UNIX provides symmetric multiprocessing (SMP), realtime 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 5 (X11R5) from the X Consortium are supported and an Advanced Development Kit of Release 6 (X11R6) is provided.

Digital UNIX complies with numerous other standards and industry specifications, including X/Open™'s XPG4 and XTI, POSIX®, FIPS, and System V Interface Definition (SVID). By providing support for the SVID, Digital UNIX supports System V applications. To ensure a high level of compatibility with Digital's ULTRIX Operating System, the Digital UNIX Operating System is compatible with Berkeley 4.3 and System V programming interfaces. Digital UNIX conforms with the OSF Application Environment Specification (AES) that specifies an interface for developing portable applications that will run on a variety of hardware platforms.

STANDARDS

X/Open

Digital UNIX conforms to XPG4 at the Base level, and includes support for the following areas of the Common Application Environment (CAE) Issue X/Open 4: Internationalized System Calls and Libraries, Commands and Utilities, and C Language. In addition to the three Base profile components, the following Digital UNIX components are XPG4 branded: X Window Display, X Window System Application Interface, Terminal Interfaces, and NFS®.

UNIX 93 Brand and Single UNIX Specification (SPEC 1170)

Digital is licensed under the X/Open UNIX branding program to use the UNIX trademark in conjunction with its Digital UNIX product. Digital UNIX V3.2G is an X/Open UNIX 93 branded product.

Digital UNIX provides most of the Application Programming Interfaces (APIs), with the exception of SVR4 curses, defined in the Single UNIX Specification which enables software developers to produce products that are portable to any version of the UNIX operating system that supports the specification. Digital is fully compliant with the Single UNIX Specification and has obtained X/Open's UNIX 95 Brand with Digital UNIX V4.0.

SVID

Digital UNIX has been tested using the System V Verification Suite and conforms to the Base System as specified in SVID2, and the Base System and Kernel Extensions as specified in SVID3 (Volume 1). Digital UNIX provides more than 400 commands and interfaces that are compatible with SVID3/SVR4.

POSIX

Digital UNIX provides all the interfaces required by the IEEE 1003.1-1990 (also known as ISO/IEC 9945-1:1990) standard and is certified with the National Institute of Standards and Technology (NIST) Federal Information Processing Standards (FIPS) 151-2.

Digital UNIX provides all the commands and utilities as specified by the IEEE POSIX 1003.2 standard.

Digital UNIX provides many of the interfaces required by the IEEE POSIX 1003.1b-1993 (formerly 1003.4 Draft 14) standard for realtime.

OSF AES

Digital UNIX conforms to the OSF Operating System Application Environment Specification (AES/OS) Revision A.

Motif

Digital UNIX supports the OSF/Motif® Application Environment for Motif R1.2.3. The Digital UNIX supplied Motif R1.2.3 is the default graphical user interface certified by the Open Software Foundation.

Motif R1.2.3 complies with IEEE POSIX 1295.

Digital UNIX also provides the Motif R1.1.3 libraries to ensure binary compatibility with applications that link against those libraries.

The Motif R1.1.3 libraries retired in Digital UNIX V4.0.

Common Desktop Environment

The Common Desktop Environment (CDE) Advanced Development Kit (ADK) is provided to allow application programmers to begin porting to this emerging X /Open UNIX desktop standard. CDE provides a consistent user interface for end users and a consistent development environment for application developers across multiple platforms.

CDE is based on the X Window System™ (X11) Release 5 and Motif R1.2.3, and supplies the following desktop services and applications:

Services:	Window Management, Workspace Management, Session Management, Help Management, File Management, Style Management, Data Typing/Actions, Tooltalk™ Messaging System, and Internationalization support
Applications:	Calendar, Clock, Calculator, MIME capable Mail, Text Editor, Icon Editor, Terminal Emulator, Application Builder, Print Queue Manager, and Windowing ksh

This CDE ADK is not intended as a replacement user interface in production environments in the V3.2* platforms. CDE is the default desktop interface in Digital UNIX V4.0.

X11R6 Advanced Developer's Kit

Digital UNIX includes an Advanced Developer's Kit (ADK) for the X Window System, Version 11, Release 6 (X11R6). This ADK provides a complete X11R6 development environment for application programmers, as well as an X11R6 version of the Digital UNIX dynamically loadable X Window System Server.

Internet

The Digital 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 RFC's 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
954	RPC	NICNAME/WHOIS (Obsoletes RFC 812)
959	FTP	File Transfer Protocol

RFC	Protocol	Name
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
1084	BOOTP	BOOTP protocol (Obsoletes RFC 1048)
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	TCP/IP Header Compression on Serial Lines
1155	SMI	Structure of Management Information
1156	MIB	Management Information Base
1157	SNMP	Simple Network Management Protocol
1188	IP-FDDI	Transmision of IP over FDDI (Obsoletes RFC 1103)
1212	——	Concise MIB
1213	MIB-II	Management Information Base II (Set operations are not supported)
1225	POP3	Post Office Protocol, Rev. 3
1231	——	IEEE 802.5 Token Ring MIB (Set operations are not supported)
1282	——	BSD rlogin
1285	——	FDDI Management Information Base (Set operations are not supported)
1288	FINGER	Finger Protocol (Obsoletes RFC 1196)
1321	MD5	The MD5 Message Digest Algorithm
1332	IPCP	The PPP Internet Protocol Control Protocol (Obsoletes RFC 1172)
1334	PAP /CHAP	PPP Authentication Protocols
1323	TCP-HIPER	TCP Extensions for High Performance (Window Scale option only)
1340	——	Assigned Numbers
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 RFC1048, 1084, 1395); Updates RFC 951
1514	–	Host Resources MIB (Set operations are not supported)
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
1577	——	Classical IP over ATM (except multiple LIS support)
1661	PPP	The Point-to-Point Protocol PPP (obsoletes RFC 1548, 1331, and 1171) (asynchronous IP only)
1700	–	Assigned Numbers (obsoletes RFC 1340, etc.)
1813	NFS	Network File System Version 3 Protocol

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
- 4.3BSD 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

System V Compatibility

Digital UNIX enhances System V compatibility by means of a habitat mechanism. In those few cases where a given command or interface may behave differently under OSF/1, SVID 2, or SVID 3, the habitat mechanism permits the user to specify which behavior is preferred.

System V Release 3.2 (SVR3)

SVID, Issue 2:

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

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

Additional commonly used SVID 2 base commands have been added by the SVID 2 habitat.

System V Release 4.0 (SVR4)

SVID, Issue 3:

Digital UNIX has been tested using the System V Verification Suite 4 (SVVS4) and conforms to the Base System as specified in Issue 3.

A significant number of commands and interfaces compatible with SVID3 have been added to Digital UNIX.

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

The SVR4 /proc file system that provides the capability of accessing processes using file semantics is implemented in Digital UNIX.

SVR4 style terminal devices are supported in Digital UNIX. This allows for increased number of terminal connections. Support for BSD tty name will be retired (removed from the Digital UNIX distribution) in a future major functional release, no sooner than January, 1997.

Digital 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.

Additional features defined as part of the SVID 3 standard are included in Digital UNIX, such as RPC (SVID 3) and sockets.

Symmetric Multiprocessing (SMP)

Symmetric multiprocessing (SMP) enables systems containing 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 will tag the failing CPU and automatically reboot the system, without enabling the defective CPU.
- Stop/Start CPU - Ability to stop/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.

Realtime

Digital UNIX provides a kernel option to enhance the performance of realtime applications conforming to the POSIX 1003.1b-1993 (formerly 1003.4 Draft 14) standard. These realtime kernel options make it possible for the operating system to guarantee that an application has access to resources in a timely and predictable manner.

In addition to a fully preemptive kernel, features enabled with the realtime kernel provide the following POSIX capabilities:

- Asynchronous I/O
- Fixed-priority scheduling policies
- Realtime priorities
- Process memory locking
- Realtime clocks and timers
- Semaphores
- Shared memory
- Process communications facilities
- Message passing interfaces
- Thread safe implementation of realtime libraries

The realtime kernel, which supports POSIX 1003.1b functionality and kernel preemption, was previously installed as an option during base system installation. Now, the POSIX 1003.1b portions are included in the kernel automatically and a separate kernel is not needed. Preemption capabilities are disabled by default, but can be selected by the user and enabled when the kernel is configured and built.

Obsolete functionality from earlier drafts of the 1003.4 specification has been retired. Asynchronous I/O functionality has been upgraded to provide many of the interfaces required by POSIX 1003.1b-1993. To preserve compatibility with earlier drafts, a compile-time constant (POSIX_4D11) has been added. This functionality retired in Digital UNIX V4.0.

Shared Libraries

Digital 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. Digital UNIX provides the following shared libraries:

Library	Description
libDXm	Digital Motif Extensions library
libMrm	Motif Resource Manager library
libots	Digital 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
libXimp	X Image display services 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	X Video extension client side run-time library
libaud	C2 security auditing library
libbkr	Motif help system library
libc	C library
libc_r	Threads version of libc
libcda	CDA run-time library
libcdrom	Rock Ridge extensions to CDFS library
libchf	CDA/Imaging signal handling routines
libcmalib	DECthreads library - CMA interface
libcurses	Curses screen control library
libdnet_stub	DECnet library
libdps	Adobe® Display PostScript™ client-side run-time libraries
libdpstk	Adobe Display PostScript toolkit
libdvr	CDA run-time viewer library
libdvs	CDA run-time layout library
libiconv	Development environment routines
libids	Image display services library
libids_nox	Image display services not dependent on X
libimg	Image processing routines
libips	Image processing routines
liblwkDxm	LinkWorks run-time library *
libm	Digital Portable Math library
libmach	Mach library
libmxr	Library used by mxr, the ULTRIX binary interpreter for OSF/1
libpsres	Adobe Display PostScript resources utilities
libpthreads	DECthreads library - draft POSIX interface
libsecurity	C2 security library
libsys5	System V Compatibility library
libdxterm	DECterm widget library
libextAccessX	Accessibility Extension library
libextMITMisc	MIT Misc extension library
libextMultibuf	Multibuffering Extension library
libextScrnSvr	Screen Saver library
libextSync	Synchronization library
libextkme	Mode switching Extension library
libextshape	Shape Extension library
libextshm	Share Memory Extension library
libextxtest	Xtest Extension library
libtli	TLI library
libxti	XTI library

Digital UNIX also provides static versions of these libraries.

* Note: The LinkWorks Developers' Toolkit V1.0 and the LinkWorks Run-time Library is not the same product as LinkWorks V2.1 Client/Server Groupware application.

The LinkWorks Run-time library retired in Digital UNIX V4.0.

DEC Fortran Run-time Libraries

The DEC Fortran run-time support libraries (libfor, libfutil, libUfor) are provided to enable users to run previously compiled programs that require the Digital Fortran libraries at run-time. These libraries support FORTRAN program functions in the areas of input and output, intrinsic functions, data formatting, data conversion, miscellaneous math functions, FORTRAN bindings to common operating system services, and more.

DEC C++ Run-time Libraries

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

DEC COBOL Run-time Libraries

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

DEC Pascal Run-time Libraries

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

DEC Ada Run-time Libraries

The DEC Ada run-time support libraries (libada.a and libada.so) are provided to enable users to run previously compiled programs which require the DEC Ada libraries at run-time. These libraries support Ada program functions in areas including Tasking, Exceptions, Timer Services, and Miscellaneous Computations.

Digital Portable Math Library

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

Threads

Digital UNIX provides software developers the ability to write multithreaded programs using DECthreads. DECthreads provides a pthreads interface that complies with both the POSIX 1003.4a Draft 4 semantics and DCE semantics.

Memory Mapped File Support

Digital 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

Digital UNIX provides the following shells:

- C Shell
- Bourne Shell from System V
- Korn Shell

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

Dynamic Loader

Digital UNIX uses a SVR4 compatible loader to load shared libraries dynamically. This loader provides the following enhanced features:

- SVR4 symbol resolution semantics, including symbol preemption

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

Loadable Subsystems Framework

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

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 busses:
  - — TURBOchannel
  - — EISA
  - — PCI
  - — SCSI peripheral devices

Mail Agents

Digital UNIX provides the traditional mail (binmail).

Digital UNIX provides the enhanced mailx/Mail command. This command is compatible with SVID 2, XPG4, and the Berkeley Enhanced mailer (/usr/bin/ucb/mail).

Digital UNIX provides the MH 6.7.1 Mail User Agent, developed by the RAND Corporation, as an interface to the mail system. The MH mail agent provides commands that allow the user to send, read, and handle mail, as well as determine the form of all drafts and mail messages that are sent.

Digital UNIX provides dxmail, a mail graphical user interface to MH.

FILE SYSTEMS

The Digital 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 abstract layer interface into files regardless of the file systems in which the file resides.

Digital UNIX supports the following file system types:

- POLYCENTER Advanced File System (AdvFS)
- UNIX File System (UFS) - based on the Berkeley Fast File system
- Network File System (NFS)
- Memory File System (MFS)
- ISO 9660 Compact Disk File System (CDFS)
- File-on-File Mounting File System (FFM)
- /proc File System

POLYCENTER Advanced File System (AdvFS)

The POLYCENTER 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 such as a power failure. AdvFS journaling also provides increased file system integrity. AdvFS provides greater flexibility by allowing filesets (file systems) to share a single storage pool, and enabling hard and soft fileset quotas in addition to user and group quotas. AdvFS supports a maximum file size of 128 GB. The root/boot device can be optionally configured to use AdvFS during installation.

The right to use the POLYCENTER Advanced File System is granted by the Digital UNIX Operating System license. In addition, a separately licensed, optional layered product, the POLYCENTER Advanced File System Utilities, can be ordered. 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. UFS allows a pathname component to be 255 bytes, with the fully qualified pathname length restriction of 1023 bytes. The Digital UNIX implementation of UFS supports a maximum file size equivalent to the largest supported file system (that is, 128 GB).

Network File System (NFS)

Digital UNIX NFS V2 allows transparent file access over TCP/IP networks. In addition, 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. The maximum size of a file that is accessible through NFS V2 is 2 GB.

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. The maximum supported size of a file that is accessible through NFS V3 is 128 GB.

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, enabling connectivity from PC-NFS V5.1a, 5.1, 4.0 and 3.5 clients.

Memory File System (MFS)

The Digital UNIX MFS is a memory-based UFS. The MFS has the same file system structure characteristics 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 Digital 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. Digital UNIX CDFS is based on the following levels of ISO 9660:

- Level 2 of Interchange
- Level 1 of Implementation, which enables the user to do the following:
  - — 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 8 levels)
- File time stamps

XCDR extensions - X/OPEN Preliminary Specification (1991) CD-ROM Support Component (XCDR). XCDR extensions allow the user to examine selected ISO 9660 attributes through defined utilities and shared libraries. In addition, functionality is provided to allow a system administrator to substitute different file protections, owners, and file names for CD-ROM files.

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 Digital UNIX allows running processes to be accessed and manipulated as files by ordinary system calls, open, close, read, write, seek and ioctl.

Logical Storage Manager (LSM)

Digital UNIX Logical Storage Manager V1.2 (LSM) is an integrated host- based solution to data storage management. Basic LSM functionality, including disk spanning and concatenation, is provided with the base operating system. Additional features, including 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. Refer to the *OPTIONAL SOFTWARE* section of this SPD and the LSM SPD for more information.

Logical Volume Manager (LVM)

The Logical Volume Manager (LVM) will be replaced by the Logical Storage Manager (LSM). A migration utility is provided to allow LVM users to migrate their LVM volumes to LSM as early as possible. Support for LVM retired in Digital UNIX V4.0.

Networker SingleServer Save and Restore

SingleServer is a graphical utility that provides automated backup and recovery of files on a single local system to a local tape or loader. A subset of the optional POLYCENTER NetWorker Save and Restore (NSR) layered product, the SingleServer is licensed free of charge with the Digital UNIX Operating System, and provides functionality similar to NSR, except that SingleServer supports only a single, local client.

Features of the SingleServer include:

- Support for unattended backups
- Easy to use preconfigured settings
- Five preconfigured policies for managing backups
- Five preconfigured backup schedules
- Label templates for electronically labeling tapes
- Easy file recovery

SECURITY

The Digital UNIX Operating System is designed to meet or exceed the requirements of the C2 evaluation class of DoD 5200.28-STD *Trusted Computer System Evaluation Criteria*, also called *The Orange Book*.

The following C2 security functionality is included in Digital UNIX:

- Auditing
- Identification and Authentication
- Object Reuse
- Discretionary Access Controls
- Digital UNIX allows distribution of extended C2 security profiling information over the network via the network information services (NIS).

NETWORKING

TCP/IP

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

Sockets

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

STREAMS

Digital 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).

Data Link Bridge (DLB)

Digital UNIX provides an 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 one part of a comprehensive network security plan.

Packetfilter

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

The Digital UNIX Packetfilter supports two filtering models: the original CMU/Stanford model, as 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.)

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

Data Link Interface (DLI)

Digital 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.

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 also extensible, allowing software developers to add MIBs to the agent, and participate in the SNMP.

The SNMP agent contains the following base system functionality:

- Full SNMP V1.0 agent capabilities
- MIB implementations for managing Internet MIB-2 objects, FDDI objects, and Token Ring objects

The POLYCENTER Common Agent and Common Agent Developer's Kit retired in Digital UNIX V4.0.

Point to Point Connections

The Digital UNIX system supports point-to-point connections using SLIP (Serial Line Internet Protocol) and PPP (Point to Point Protocol). The PPP subsystem is asynchronous and supports only IP. It provides authentification with PAP (Password Authentification Protocol) and CHAP (Cryptographic Authentification Protocol). *Distributed Computing Environment (DCE)*

Digital UNIX provides the framework to support the Distributed Computing Environment (DCE). DCE is a separate layered product and provides users with access to resources, regardless of their location on the network. It extends system level services to allow applications to interoperate with one another, port to other platforms, and be distributed over the network.

Open Network Computing (ONC)

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

Asynchronous Transfer Mode (ATM)

The Digital UNIX Asynchronous Transfer Mode (ATM) subsystem supports the ATM Forum's User-Network Interface (UNI) V3.0 specification, including the Interim Local Management Interface (ILMI) protocol for registration of a single address, UNI signalling for point-to-point connections, and Quality of Service (QOS) class 0 with best effort delivery. Digital UNIX does not support the UNI V3.0 specifications for full ATM Simple Network Management Protocol (SNMP) Managaement Information Bases (MIBs), multiple address registration, point-to-multipoint connections, Operations and Maintenance (OAM) flows, and QOS classes 1 through. The Digital ATM subsystem also supports the Classical IP and ARP over ATM (RFC 1577) specification, with the exception of multiple Logical IP Subnetwork (LIS) support.

Fast Ethernet

Digital UNIX supports Fast Ethernet (IEEE 802.3 100Base-TX). Refer to the OPTIONAL HARDWARE section for specific hardware supported. *FDDI*

Digital UNIX provides FDDI fiber optic support. Refer to the *OPTIONAL HARDWARE* section for specific hardware supported.

Token Ring

Digital UNIX supports Token Ring with source routing support for multi-ring networks. Refer to the *OPTIONAL HARDWARE* section for specific hardware supported.

IP Multicast

Digital 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 multiprotocol environments.

The Digital UNIX implementation also provides kernel routines for encapsulating IP tunnels to enable wide area IP Multicast routing. These routines support application software that implements the Distance Vector Multicast Routing Protocol, such as the publically available *mrouted* (revisions 1.3 and later, Copyright 1989 by the Board of Trustees of Leland Stanford University).

Name Services

Digital UNIX supports the Domain Name System as described in RFC 1034 and RFC 1035, providing a host name and address lookup service for the Internet network. The Digital UNIX implementation of the Domain Name System is based on BIND version 4.9.3. The user can use BIND to replace or supplement the host's database. Digital UNIX also supports Sun's 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)

Digital UNIX provides the Network Time Protocol (NTP) V2 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)

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

Local Area Transport (LAT)

Digital 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 a service node, and allows host applications to initiate connections to server ports (designated as application ports) to access remote devices such as printers. Digital UNIX supports 1500 logins using LAT.

LAT/Telnet Gateway

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

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 Digital UNIX CAM implementation is highly compatible with ANSI X3.131-1986, Level 2 and supports SCSI-2 based CAM.

INTERNATIONALIZATION

Digital UNIX provides an internationalization environment and tools as well as the localization features to enable the development and execution of internationalized software, without the need to re-engineer the user application.

The following single byte and multibyte character sets are supported:

Single Byte Character Sets - Languages (Locales):

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

Multibyte Character Sets - Languages (Locales):

Chinese/PRC (4)	Japanese (4)	Korean (2)
Hong Kong (4)	Thai (4)	

Digital UNIX base operating system functionality includes:

- 32-bit wide character support
- XPG4 Worldwide Portability Interfaces (WPI)
- Internationalized commands
- Internationalized Curses library (libcurses)
- iconv library (libiconv, an International Codeset Conversion Library)
- Locale utilities
- Codeset for supported character sets
- Date and time formats in the native languages
- Local currency symbols
- Local numeric formatting
- Character Classification - Is upper, is lower, is cntrl, is * functions
- Collation - Character sort order of the codeset
- Yes and No response in the native language
- System messages in the native language
- Fonts for supported character sets
- TTY Drivers - Support for various input functionalities for the native languages
- Support for all Language Variants using the U.S. keyboard
- Translated UID files and additional functionality in the Motif applications
- 8-bit mail support when one or more of the language variants is installed
- Printing in the native languages
- Conversion of data from one codeset to another

Disk Space Requirements

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

The language variant components are structured in such a way that there is a common part as well as individual part for each language variant. The common part is a prerequisite for any individual language component listed below.

Common Part:

Mandatory for base O/S	0.45MB
Optional for base O/S	0.10MB
Mandatory for workstations*	6.71MB
Optional for workstations	3.80MB

* Mandatory for Workstations is required for enabling the workstation/windowing functionality.

Individual Part:

Language	Mandatory Base Subsets	Optional Base Subsets	Mandatory Wrk-stn. Subsets	Optional Wrkstn. Subsets	Total
Chinese/PRC	1.52MB	23.93MB	20.81MB	1.38MB	47.64MB
Czech	0.00	2.48	6.79	3.07	12.76
Danish	0.73	0.00	0.00	0.00	0.73
Dutch	0.73	0.00	0.00	0.00	0.73
Finnish	0.73	0.00	0.00	0.00	0.73
German	0.73	0.00	3.21	2.65	6.59
French	0.73	0.00	3.21	2.62	6.56
Greek	0.00	3.81	0.96	0.49	5.59
Hong Kong	3.10	36.89	38.33	5.51	83.83
Hungarian	0.00	2.48	6.71	3.11	12.71
Icelandic	0.73	0.00	0.00	0.00	0.73
Hebrew	0.06	1.31	2.39	0.61	4.50
Italian	0.73	0.00	3.25	2.63	6.61
Japanese	6.28	54.49	19.45	9.58	93.64
Korean	1.37	15.97	8.99	1.35	27.68
Norwegian	0.73	0.00	0.00	0.00	0.73
Polish	0.00	2.48	6.81	3.08	12.79
Portugese	0.73	0.00	0.00	0.00	0.73
Russian	0.00	1.62	5.23	3.10	10.36
Slovak	0.00	2.48	6.52	3.03	12.45
Spanish	0.73	0.00	3.21	2.62	6.56
Swedish	0.73	0.00	3.03	2.47	6.23
Taiwan	2.92	35.68	22.08	4.19	64.87
Thai	0.38	14.66	3.23	1.22	19.49
Turkish	0.00	5.36	3.14	0.49	9.31

Memory Requirements

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 will require additional memory for satisfactory performance.

License Management Facility (LMF)

Digital's License Management Facility (LMF) provides on-line checking of software licenses and enables easier software management. LMF incorporates support for two types of licenses, availability and activity. LMF is limited to single node capability.

GRAPHICS

Digital UNIX includes the DECwindows Motif graphical user interface. DECwindows incorporates the OSF/Motif user interface as the design center for the DECwindows applications. As such, the Motif user interface defines a powerful model for interacting with the Digital UNIX Operating System by using a point-and-click metaphor.

Based on the X Window System, Version 11, Release 5, and OSF/Motif R1.2.3, DECwindows Motif supports the following X Window System standards:

- X11 protocol
- Base set of workstation fonts
- Xlib programming library
- X Toolkit Intrinsics library
- X Server
- X Imaging Extensions XIE V5

Digital UNIX supports the X Image Extension (XIE) V5.0 which was announced by the X Consortium as part of the X11R6 distribution.

Digital UNIX also provides XIE V3.0 to ensure compatibility with applications written to use this extension, since the protocol between versions 3.0 and 5.0 have diverged.

XIE V3.0 retired in Digital UNIX V4.0.

A license for Motif and for the X Window System is included with Digital UNIX.

In addition, Digital UNIX supports the Adobe Display PostScript System X server extension and client library.

- Display PostScript X server extension

  The Display PostScript extension to the Digital UNIX X server provides a Level 1 display functionality that is fully compatible with PostScript language printers as well as a device-independent imaging model that frees an application programmer from concerns about the details of displaying information (text and graphics) on a screen.

- Display PostScript client library

  The Display PostScript client library from Adobe Systems is a collection of procedures that provides an application program with access to the PostScript interpreter (resident in the X server Display PostScript extension). The client library includes procedures for creating, communicating with, and destroying PostScript execution contexts.

The license to use the Adobe Display PostScript X server extension and client library is included with Digital UNIX.

The Licensee agrees to only execute Display PostScript on those Digital computer systems listed in Tables 1 and 2 in this Software Product Description (SPD), and that in any event licensee agrees not to make use of the Display PostScript software, directly or indirectly, to print bitmap images with print resolutions greater than 150 dots/per/inch (DPI), or to generate fonts or typefaces for use other than with the Digital computer systems identified in this SPD. However, the foregoing limitation shall not be deemed to prohibit the printing of images of greater than 150 DPI resolution when such images are used solely for incidental or illustrative purposes.

DECwindows Motif Environment

The DECwindows Motif environment has two basic components:

- A user environment
- A programming environment

User Environment

The DECwindows Motif user environment has three basic components: the Session Manager, Window Manager, and xterm or, optionally, DECterm terminal emulator.

- Session Manager

The Session Manager provides the top-level user interface to a Digital UNIX workstation. A Session Manager component (xdm) provides a dialog-oriented login window for controlled access to the workstation.

- Window Manager

  The Window Manager provides user control for managing windows. The Motif Window Manager (mwm) is provided as the default Window Manager.

- Terminal Emulators

  Digital UNIX supports xterm and DECterm terminal emulators, both of which provide workstation users with a traditional character-cell interface to the additional Digital UNIX applications and features.

In addition, Digital UNIX supports the following set of integrated DECwindows Motif desktop applications:

- Bookreader
- Calculator
- Calendar
- Cardfiler
- Clock
- Compound Document Viewer
- LinkWorks Manager
- Mail
- Notepad Text Editor
- Paint, bitmap editor
- Printscreen
- Visual File Comparator

Digital UNIX also supports the standard set of X Window System, Version 11, Release 5 based applications as well as an X Window System, Version 11, Release 5 based GNU Emacs. *Programming Environment*

The DECwindows 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)

In addition, Digital UNIX provides the OSF/Motif and X11 programming examples, which are intended as illustrations of various Motif and X11 programming techniques. Note that many of the examples are not fully implemented by the Open Software Foundation but do provide valuable programming information. A README file is included with each example and outlines the features and limitations of the particular application.

SYSTEM MANAGEMENT

Installation

Digital UNIX is classified as Customer Installable. However, Installation Services are available for those customers who would like an experienced Digital Software Specialist to install the software.

Update Installation

Digital UNIX provides an Update Installation procedure for systems running either Digital UNIX V3.2, V3.2A, or V3.2B to Digital UNIX V3.2C. Digital UNIX also provides the setld procedure to update V3.2C systems to V3.2F. Both update installation procedures preserve appropriate system files and the existing user customized files.

Support Tools

Digital UNIX provides a Verifier and Exerciser Tool (VET) that contains a set of system exercisers and an online diagnostic monitor.

SOURCE MATERIALS OPTIONS

Source Code Distribution

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, Digital does not warrant the ability to build a binary kit. Limited supporting documentation is also provided. Digital does not warrant the results of using the source kit to change selected portions of the system.

Customers who are appropriately licensed by the Open Software Foundation (OSF) and by UNIX System Laboratories (USL) 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 and every distribution (initial distribution or revision) of source materials:

- Customers must be currently licensed by the Open Software Foundation (OSF) to use OSF/1 R1.2 source code on a designated CPU for which source materials are to be ordered. OSF must verify to Digital that the customer's OSF/1 source license is valid.
- Customers must be currently licensed by the Open Software Foundation (OSF) to use Motif R1.2.3 source code on a designated CPU for which source materials are to be ordered. OSF must verify to Digital that the customer's Motif source license is valid.
- Customers must be currently licensed by UNIX System Laboratories (USL) 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. USL must verify to Digital that the customer's UNIX source license is valid.
- Customers must have signed Digital's Software Program Sources License Agreement for the facility or site where the CPU is located.

Source kits provided by Digital do not necessarily contain all source files used by Digital to build object code kits. Digital provides these source kits on a reference-only basis. Digital does not provide support for source code as part of the standard 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 OSF/1 source license from the OSF and the UNIX source license from USL, 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 Digital) which has a Single-Use License for the object code.

The source code distribution 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 OSF/1 source license from the OSF and the UNIX source license from USL, 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 Digital) which has a Single-Use License for the object code and is also listed on the Source License for this product.

HARDWARE REQUIREMENTS

The Digital UNIX Operating System can execute on valid Digital Alpha systems and must include the minimum system configuration as described in the *SUPPORTED HARDWARE* section of this SPD. The actual amount of work supported at one time, with good performance, depends on the types of processing performed as well as on the physical memory and secondary storage available.

- Digital UNIX requires the minimum component of main memory to be 24 MB.
- Based on testing, system configurations are limited to 128 physical volumes (disks). The maximum logical volume size supported is 128 GB.
- Digital UNIX supports up to 2,048 simultaneous logged in users. This number can vary depending on hardware configurations and user workloads.

The following maximum number of logins are supported:

RLOGIN:	2,048
Telnet:	2,048
LAT:	1,500

- Digital UNIX requires a system disk capable of holding the supported software subsets. For a Basic Installation (mandatory subsets only), a minimum of 425 MB disk (such as RZ25) is required. For an Advanced Installation selecting all BASE software subsets, a 680 MB disk (such as RZ56) is required.

Note: Due to additional functionality being planned, a future functional release (no sooner than January, 1996), will require a larger disk space capacity for the advanced type of installation with all base subsets.

- Depending on the software currently installed on the system, and how the disk partitions are defined, the Update Installation procedure from a Digital UNIX V3.2, V3.2A, or V3.2B to V3.2C requires the following MINIMUM amount of disk space (before Update Administration Utility is run):

File System	V3.2/V3.2A Mandatory and Optionals	V3.2C Update	Incremental Space Needed
/	45MB	42MB	-3MB
/usr	321MB	285MB	-35MB
/var	6MB	6.7MB	0.7MB

File System	V3.2/V3.2A Mandatory Only	V3.2C Update	Incremental Space Needed
/	33MB	31MB	-2MB
/usr	163MB	151MB	-12MB
/var	0.5MB	0.6MB	0.1MB

File System	V3.2B Mandatory and Optionals	V3.2C Update	Incremental Space Needed
/	45MB	42MB	0MB
/usr	322MB	285MB	0MB
/var	6MB	6.1MB	0.1MB

File System	V3.2B Mandatory Only	V3.2C Update	Incremental Space Needed
/	33MB	31MB	0MB
/usr	163MB	152MB	0MB
/var	0.5MB	0.6MB	0.1MB

- Systems which have more subsets installed than the Basic Installation, but fewer subsets than the Full Installation, will require varying minimum disk space for an update installation. Refer to the Installation Guide for a list of subset sizes to help determine the disk space requirements for an update installation on such systems.
- The setld procedure is used to update from V3.2C to V3.2G. To do so, the setld update procedure requires the following MINIMUM amount of disk space:

For Mandatory and Optional Subsets:

File System	Delta of Growth, V3.2C to V3.2D-1
/	0.2MB
/usr	2.8MB
/var	0.01MB

For Mandatory Subsets Only:

File System	V3.2D-1 Delta	Total
/	0.32MB	32MB
/usr	1.2MB	153MB
/var	0.1MB	0.75MB

- The setld installation procedure is used to update V3.2C, V3.2D-1, V3.2D-2, V3.2E-1, V3.2E-2, V3.2F to V3.2G.

For Mandatory and Optional Subsets:

File System	Delta C to G	Delta D1 to G	Delta D2 to G	Delta F to G	Total V3.2G
/	2.4MB	.3MB	.3MB	.05MB	44.4MB
/usr	6.7MB	2.1MB	1.8MB	.2MB	304MB
/usr	0	0	0	0	6.4MB

For Mandatory Subsets Only:

File System	Delta C to G	Delta D1 to G	Delta D2 to G	Delta F to G	Total V3.2G
/	2.0MB	.3MB	.3MB	.05MB	33MB
/usr	3.6MB	1.0MB	.85MB	.15MB	156.5MB
/var	0MB	0MB	0MB	0MB	.7MB

- Digital UNIX supports the backup devices listed in the *OPTIONAL HARDWARE* section of this SPD.
- The supported load devices include CD-ROM readers (such as RRD44) or a variety of network interfaces.
- Digital UNIX requires one console terminal with ASCII capability or one Digital graphics display console for Alpha systems.
- Digital UNIX supports multiscreen on the following systems:

  DEC 2000 Model 300—maximum 4 screens

  DEC 3000 Model 300—maximum 3 screens

  DEC 3000 Model 400—maximum 3 screens

  DEC 3000 Model 500—maximum 7 screens

  DEC 3000 Model 500X—maximum 6 screens

  DEC 3000 Model 600—maximum 3 screens

  DEC 3000 Model 800—maximum 6 screens

OPTIONAL HARDWARE

Additional memory and/or secondary storage may be required depending upon the usage of the Digital 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*.

Hardware options supported by Digital UNIX are listed in tables in the *SUPPORTED HARDWARE* section of this SPD. All device drivers contained in Digital UNIX for these hardware units are warranted by Digital.

Digital UNIX supports the following third party printers on platforms that have parallel ports:

- Epson FX-80 and FX-1050
- HP® LaserJet® (Models IIP, IIIP, IIID, 4)
- IBM® Proprinter®
- NEC SilentWriter® Model 290

OPTIONAL SOFTWARE

Digital UNIX Developers' Toolkit provides application programmers with the software tools for general programming, including source code control tools, kit generation, programming development and debugging utilities, and graphical application development tools. (SPD 44.36.xx)

Digital UNIX C Developers' Extensions provides application programmers with the Digital UNIX C compiler in addition to the development tools found in the Digital UNIX Developers' Toolkit. (SPD 44.36.xx)

The Digital UNIX Server Extensions provides system managers with the ability to set up and perform network installations using Digital's Remote Installation Service (RIS), and includes support for dataless configurations. (SPD 44.35.xx)

The Digital UNIX Logical Storage Manager 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 online, without disrupting users or applications. (SPD 51.24.xx)

DECsafe Available Server significantly reduces downtime due to system hardware or software failures. It provides multihost access to SCSI disks and a generic failover mechanism for network-based services and applications. (SPD 44.17.xx)

The POLYCENTER 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, defragment files, balance percentage of space used on volumes, undelete files using trashcans, stripe files, and clone files for hot backup. (SPD 44.52.xx)

The System V Environment for Digital UNIX provides System V Release 4 (SVR4) system administration utilities, developer tools, and general user commands that extend the SVR4 functionality inherent in the Digital UNIX operating system. The System V Environment for Digital UNIX is compliant with the System V Interface Definition, Issue 3 (SVID3) Volumes 1-3. (SPD 46.16.xx)

DEC Open3D for Digital UNIX provides support for the ZLX-E, ZLX-M, ZLX-L, ZLXp-E, and ZLXp-L families of graphics accelerators on Alpha workstations running the Digital UNIX operating system, plus an extensive set of programming libraries for use by developers of new applications. (SPD 45.07.xx)

The DDX and other drivers to support PXG-type devices will be retired in the next major functional release of Digital UNIX, no sooner than January, 1996. The retirement of PXG support in DEC Open3D occurred in June, 1995, and the device has been moved to support-only mode.

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

POLYCENTER Hierarchical Storage Management (HSM) for Digital UNIX is automatic and unattended file migration and storage management software that allows the extension of magnetic file systems to rewritable optical jukeboxes. Gigabytes of reliable storage are accessible via a few SCSI addresses. In addition, system managers can concentrate on time-critical issues, rather than on mundane file migration that is easily handled by HSM. (SPD 50.71.xx)

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

CD-ROM

ORDERING INFORMATION

The Digital UNIX Operating System license provides a licensed user the right to use the software as described within this Software Product Description. Separate licenses are available for the right to use development tools and the C compiler, and separate licenses are available for the right to use the Remote Installation Service. Refer to the SPD's for the Digital UNIX Developers' Extensions (SPD 44.36.xx) and the Digital UNIX Server Extensions (SPD 44.35.xx) for details.

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

The Software Documentation Kit is a complete hardcopy documentation set for Digital UNIX, excluding the reference pages. The hardcopy reference pages can be ordered separately. The Software Documentation Kit contains versions of the documentation found online via the CD-ROM, as well as additional documentation published by companies other than Digital. Most documentation provided with Digital UNIX that is published

by companies other than Digital is available in hardcopy only.

The *Digital UNIX Technical Overview* provides a detailed description of the Digital UNIX Operating System, and is available both online and in hardcopy with the End User Documentation.

Digital UNIX Operating System

Software 2-User Base Licenses: QL-MT4A*-**

Software Interactive User Licenses: QL-MT7A*-**

Software Product Services: QT-MT4A*-**

Software Media Kit: QA-MT4AQ-H8

Software Documentation:
Full Documentation Kit (excluding Reference Pages): QA-MT4AQ-GZ
Reference Pages Documentation Kit: QA-MT4AG-GZ

The full documentation kit contains the following:
End User Documentation: QA-MT4AB-GZ
Documentation for Digital UNIX Developer's Toolkit and Digital UNIX C Developers' Extensions: QA-MT5AA-GZ
Documentation for Digital UNIX Server Extensions: QA-MT6AA-GZ

Language variant documentation in English (AA-Q4F9B-TE) includes the DECwindows/Hebrew Motif Programmer's Supplementary Guide, as well as Supplemental guides for Japanese, Korean, Thai, Simplified Chinese, and Traditional Chinese support.

Source Distribution:
Source License/Distribution: QB-MT4AA-E8
Update Source License/Distribution: QB-MT4AE-E8
Education Source License/Distribution: QB-MT4BA-E8
Education Update Source License/Distribution: QB-MT4BE-E8

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

SOFTWARE LICENSING

The Digital UNIX Operating System software is furnished under the licensing of Digital Equipment Corporation's Standard Terms and Conditions.

There are four types of Digital UNIX Operating System licenses available on Alpha processors:

Operating System Base License (QL-MT4A*-6*)

LMF Product Name: OSF-BASE

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

This license also authorizes up to two concurrent interactive users of the system (see Interactive User below). The two interactive users authorized as part of the Operating System Base License are additive with Interactive User License quantities, but may not be separated from the Operating System Base License.

In addition to the two interactive users, login as root is also authorized for system management purposes only. If a Digital 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 Interactive User Licenses, Unlimited Interactive User 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 Digital 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.

Interactive User License (QL-MT7A*-B*) or Concurrent Use Licenses (QL-MT7AM-3*)

LMF Product Name: OSF-USR

An Operating System Base License is a prerequisite for Interactive User and/or Concurrent Use Licenses on the same system.

These licenses grant the right to interactive use of the Digital UNIX Operating System. The Interactive User and Concurrent Use Licenses are 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.

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

An interactive user, either a person or device, is one that is logged in to a Digital 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 License for interactive users on the same system.

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

An Unlimited License for interactive users 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 Digital. For more information, contact your local Digital office.

SOFTWARE WARRANTY

Warranty for this software product is provided by Digital with the purchase of a license for the product as defined in the applicable Digital Standard Terms and Conditions.

SUPPORTED HARDWARE

The following tables list supported hardware for Digital UNIX. Combinations of hardware options are subject to limitations such as bandwidth, physical configuration constraints, and electrical load and power supply.

The content of this hardware configuration section is intended to specify the device limitations and provide a general guide. It does not describe all possible hardware configurations or circumstances. Any particular configuration should be discussed with Digital. Contact Digital for the most up-to-date information on possible hardware configurations.

Digital reserves the right to change the number and type of devices supported by Digital UNIX. The minimum hardware requirements for future versions and updates of Digital UNIX may be different from current hardware requirements. For configuration details about Alpha systems, refer to the *Digital Systems and Options Catalog* and the *Networks and Communications Buyer's Guide.*

Embedded and Realtime Boards

An Embedded and Realtime OEM is a hard goods /capital equipment manufacturer that utilizes Digital's products embedded in the OEM's own products. The Digital products act as a specialized controller of specific functions in the OEM's product, not as a general purpose computer.

Digital products may be physically embedded within the OEM's product (e.g. a CPU board and software inside a Telephone Switch) or may be functionally integrated into the solution (e.g. a system box and software controlling a flight simulator). The Digital product is perceived by the end customer to be an integral and dedicated component of the Embedded and Realtime OEM's product, NOT a general purpose computer.

Table 1
DEC 2000 Model 300 and Model 500

CD-ROM Drive:	RRD42	RRD43 RRD44
Disks:	RZ24L[1] RZ25 RZ25L RZ26 RZ26L	RZ28 RZ28B RZ55[1] RZ56 RZ58
Diskettes:	RX26	
Tapes:	TLZ06 TLZ07 TSZ07 TKZ60	TKZ08 TKZ09 TZK10 TZK11
SCSI Adapters:	PB2HA-SA[2]	
Network Adapters:	DW300 (EISA Token Ring) DEFEA (EISA FDDI)	DE422 (EISA Lance Ethernet) DE425 (EISA Tulip Ethernet)
Communications:	PC4XD-AA (Par/Ser)[3]	PC4XD-AB (Dual/Ser)
Keyboards:	PCXAL-XX	
Graphics Subsystems:	PB2GA-AA	
Mouse:	PCXAS-AA	
Serial Printers:	LA36 LA50 LA70 LA75 LA75 TURBO LA100 LA120 LA210 LA324 LCG01 LF01R	LG02 LG06 LG12 LJ250 LJ252 LN03 LN03R DEClaser 1100/1500[4] DEClaser 2100/2150[4] DEClaser 2200/2250[4] DEClaser 3200/3250[4] DEClaser 5100[4]
Monitors:	VRC16-HA VRC16-H4	PC7XV-DE PC7XV-DG
Modems:	PCXBF-AA (2400/9600)[5] PCXCF-AA (9600/9600)[5]	PCXDF-AA (14400/9600)[5]

[1] Data device only.

[2] G2 minimum firmware requirement.

[3] Only the serial port is supported.

[4] Support for these printers is at DEC ANSI level 1.

[5] Modem support only - no FAX available.

Table 2

DEC 3000 Models 300, 300L, 300X, 300LX, 400, 400S, 500, 500S, 500X, 600, 600S, 700, 800, 800S, 900

CD-ROM Drive:	RRD42 RRD43	RRD44	RRD45
Disks:	RZ24L[1] RZ25 RZ25L RZ25M RZ26 RZ26L RZ26J	RZ26N RZ28 RZ28B RZ28D RZ28L RZ28M RZ29B	RZ55[1] RZ56 RZ58 RZ73 RZ74
Diskettes:	RX23	RX26	
Tapes:	TLZ04 TLZ06 TLZ07 TKZ08 TKZ09	TKZ60 TSZ07 TZ30 TZ85	TZ86 TZ87 TZ88 TZK10 TZK11
TURBOchannel Adapters:[2]	DEFTA (FDDI) DEFZA (FDDI) DETRA (Token Ring) DGLTA (ATM)[3]	PMAD (Thickwire Ethernet) PMAZB (Dual Slow SCSI) PMAZC (Dual Fast SCSI) KZTSA (FWD SCSI)	
RAID Controller:	HSZ10[4]	HSZ40[5]	
Keyboards:	LK401	LK421	
Graphics Subsystems:	PMAG	PMAGB (HX, TX)	ZLX-E1/8-plane
Tablet/Mouse:	VSXXX-AA VSXXX-AB	VSXXX-FA	VSXXX-GA
Asynchronous Terminals:	VT100 VT102 VT200 VT220	VT240 VT300 VT320	VT340 VT420 VT510
Serial Printers:	LA36 LA50 LA70 LA75 LA75 TURBO LA100 LA120 LA210	LA324 LCG01 LF01R LG02 LG06 LG12 LJ250 LJ252	LN03 LN03R DEClaser 1100/1500[6] DEClaser 2100/2150[6] DEClaser 2200/2250[6] DEClaser 3200/3250[6] DEClaser 5100[6]
Monitors:	VRM17 VRM20 VR319	VR320 VRT16 VRT17	VRC16 VRC19 VRC21
Modems[7]:	DF02	DF03	DF296

[1] Data device only.

[2] The DEC 3000 Models 300L and 300LX have no available TURBOchannel slots. Each supports the same options as the DEC 3000 Model 300 except those requiring a TURBOchannel to be configured.

[3] Only one (1) DGLTA adapter is supported per system.

[4] HSZ10 is supported on DEC 3000 systems running PMAZC or KZTSA. HSZ10 support requires the StorageWorks RAID Array 110 utility for Digital UNIX.

[5] HSZ40 supported on DEC 3000 (except for Models 300X and 300LX) systems running PMAZC or KZTSA.

[6] Support for these printers is at DEC ANSI level 1.

[7] Digital UNIX will support any Digital modem that understands Digital Modem Command Language (DMCL).

Table 3
DEC 4000 Models 6xx and 7xx

CD-ROM Drive:	RRD42	RRD43
Disks:	RZ25 RZ26 RZ28 RZ55[1]	RZ56 RZ58 RZ73 RZ74
Diskettes:	RX23	RX26
Tapes:	TKZ08 TKZ09 TLZ04 TLZ06 TLZ07 TSZ07	TZ30 TZ85 TZ86 TZ88 TZK10 TKZ60
Network Adapters:	DEFAA (FBUS+ FDDI)	
Asynchronous Terminals:	VT100 VT102 VT200 VT220 VT240	VT300 VT320 VT340 VT420 VT510
Serial Printers:	LA36 LA50 LA70 LA75 LA75 TURBO LA100 LA120 LA210 LA324 LCG01 LF01R	LG02 LG06 LG12 LJ250 LJ252 LN03 LN03R DEClaser 1100/1500[2] DEClaser 2100/2150[2] DEClaser 2200/2250[2] DEClaser 3200/3250[2] DEClaser 5100[2]
Modems[3]:	DF02 DF03	DF296

[1] Data device only.

[2] Support for these printers is at DEC ANSI level 1.

[3] Digital UNIX will support any Digital modem that understands Digital Modem Command Language (DMCL).

Table 4
DEC 7000 Models 6xx and 7xx; DEC 10000 Models 6xx and 7xx

Memory:	1 GB [1]	14 GB[1]	
CD-ROM Drive:	RRD42	RRD43	RRD44
Controller:	KDM70, CIXCD-AC[2]		
I/O Servers:	HSC40[3] HSC50[3]	HSC65[3] HSC70[3]	HSC90[3] HSC95[3]
Disks:	RA60[4] RA71 RA72 RA73	RA81 RA82 RA90 RA92	
Tapes:	TA78 TA79	TA90 TA91	
Controller:	KZMSA[5]		
Disks:	RZ26 RZ26L RZ26J RZ28 RZ28B	RZ28L RZ28M RZ29B	RZ73 RZ74
Tapes:	TLZ06 TLZ07 TKZ09	TKZ60 TZ85 TZ86	TZ87 TZ88 TSZ07
RAID Controller:	HSZ40[6]		
Network Adapters:	DEMFA (XMI FDDI)	DEMNA (XMI Ethernet)	DEFAA (FBUS+ FDDI)
Asynchronous Terminals:	VT100 VT102 VT200 VT220	VT240 VT300 VT320 VT340	VT420 VT510
Serial Printers:	LA36 LA50 LA70 LA75 LA75 TURBO LA100 LA120	LA210 LA324 LCG01 LF01R LG02 LG06 LG12	LJ250 LJ252 LN03 LN03R DEClaser 1100/1500[7] DEClaser 2100/2150[7] DEClaser 2200/2250[7] DEClaser 3200/3250[7]
Modems[8]:	DF02	DF03	DF296

[1] If a KDM70 is configured with either a DEC 7000 or a DEC 10000 machine, the maximum amount of main memory supported is 1 GB. When a KDM70 is not configured, the maximum amount of main memory supported is 14 GB.

[2] One CIXCD controller per system.

[3] The k.scsi requestor is not supported.

[4] Data device only.

[5] Up to 16 controllers supported (last 8 are data only).

[6] HSZ40 supported on DEC 7000 and DEC 10000 running KZMSA.

[7] Support for these printers is at DEC ANSI level 1.

[8] Digital UNIX will support any Digital modem that understands Digital Modem Command Language (DMCL).

Table 5
AlphaServer 1000 4/200, 4/233, 4/266; AlphaServer 1000A 4/233, 4/266

CD-ROM Drive:	RRD43	RRD44
Disks:	RZ26L RZ26J RZ26N RZ28	RZ28B RZ28D RZ28L RZ28M RZ29B
Diskettes:	RX23	RX33
Tapes:	TKZ09 TKZ60 TLZ06	TLZ07 TSZ07 TZK11
SCSI Adapters:	KZPAA (PCI SCSI) KZPSA (PCI FWD SCSI)	KZESC (EISA RAID) KZPSC (PCI RAID)[1]
Network Adapters:	DEFEA (EISA FDDI) DW300 (EISA Token Ring) DE422 (EISA Lance Ethernet) DE425 (EISA Tulip Ethernet)	DEFPA (PCI FDDI) PBXNP (PCI Token Ring) DGLPB (PCI ATM)[2] DE434, 435, 436, 450 (PCI Ethernet) DE500 (PCI Fast Ethernet)
Keyboards:	PCXAL-XX	
Graphics Subsystems:	PB2GA-AA PB2GA-FB	PB2GA-HA
Mouse:	PC7XS-CA (3 button)	
Serial Printers:	LA36 LA50 LA70 LA75 LA75 TURBO LA100 LA120 LA210 LA324 LCG01 LF01R	LG02 LG06 LG12 LJ250 LJ252 LN03 LN03R DEClaser 1100/1500[2] DEClaser 2100/2150[2] DEClaser 2200/2250[2] DEClaser 3200/3250[2] DEClaser 5100[2]
Monitors:	VRC15 VRC16	VRC21 VRT17
Modems:	PBXDF	

[1] Only one KZPSC can be used at a time.

[2] Only one DGLPB can be used at a time.

Table 6

AlphaServer 2000 4/200, 4/233, 4/275, 5/250, 5/300; AlphaServer 2100 4/200, 4/233, 4/275, 5/250, 5/300; AlphaServer 2100A 4/275, 5/250, 5/300

Memory:	Limited to 2 GB		
CD-ROM Drive:	RRD42 RRD43	RRD44	RRD45
Disks:	RZ25L RZ26 RZ26L RZ26J	RZ26N RZ28 RZ28B RZ28D	RZ28L RZ28M RZ29B
Diskettes:	RX26	RX33	
Tapes:	TKZ09 TZK10 TZK11 TZ86	TZ87 TZ88 TLZ06 TLZ07	TZK60 TSZ07
Adapters:	PB2HA-SA: Adaptec 1742A (EISA)[1] KZESC (EISA RAID)	KZPAA (PCI SCSI) KZPSA (PCI FWD SCSI)	KZPSC (PCI RAID)
RAID Controller:	HSZ40		
Network Adapters:	DEFEA (EISA FDDI) DW300 (EISA Token Ring) DE422 (EISA Lance Ethernet)[5]	DE425 (EISA Tulip Ethernet)[5] DEFPA (PCI FDDI) DGLPB (PCI ATM)[2]	DE434, 435 (PCI Ethernet) DE500 (PCI Fast Ethernet)
Keyboards:	PCXAL-XX		
Graphics Subsystems:	PB2GA-AA PB2GA-JB[6]	PB2GA-FB PBXGA-AA[7]	PBXGA-AB[7] PBXGA-AC[7]
Serial Printers:	LA36 LA50 LA70 LA75 LA75 TURBO LA100 LA120 LA210	LA324 LCG01 LF01R LG02 LG06 LG12 LJ250 LJ252	LN03 LN03R DEClaser 1100/1500[3] DEClaser 2100/2150[3] DEClaser 2200/2250[3] DEClaser 3200/3250[3] DEClaser 5100[3]
Monitors:	VRC15 VRC16	VRT17 VRC21	
Modems[4]:	DF02	DF03	DF296

[1] G2 minimum firmware requirement; maximum of one. Not supported on AlphaServer 2100A.

[2] Only one DGLPB can be used at a time and only supported in a single processor (CPU) configuration.

[3] Support for these printers is at DEC ANSI level 1.

[4] Digital UNIX will support any Digital modem that understands Digital Modem Command Language (DMCL).

[5] Not supported on AlphaServer 2100A.

[6] Supported on AlphaServer 2100A only.

[7] Not supported on AlphaServer 2100A.

Table 7
AlphaServer 4100 5/300, 5/300E

Memory:	Limited to 4 GB	
CD-ROM Drive:	RRD42 RRD43	RRD44 RRD45
Disks:	RZ25L RZ26 RZ26L RZ26J RZ26N	RZ28 RZ28B RZ28D RZ28L RZ28M RZ29B
Diskettes:	RX26	RX33
Tapes:	TKZ09 TZK10 TZK11 TZ86 TZ87	TZ88 TLZ06 TLZ07 TZK60 TSZ07
Adapters:	KZESC (EISA RAID) KZPAA (PCI SCSI)	KZPSA (PCI FWD SCSI) KZPSC (PCI RAID)
RAID Controller:	HSZ40	
Network Adapters:	DW300 (EISA Token Ring) DEFPA (PCI FDDI) DGLPB (PCI ATM)[1]	DE434, 435 (PCI Ethernet) DE500 (PCI Fast Ethernet) PBXNP-AA (PCI Token Ring)
Keyboards:	PCXAL-XX	
Graphics Subsystems:	PB2GA-JB[2]	
Serial Printers:	LA36 LA50 LA70 LA75 LA75 TURBO LA100 LA120 LA210 LA324 LCG01 LF01R	LG02 LG06 LG12 LJ250 LJ252 LN03 LN03R DEClaser 1100/1500[3] DEClaser 2100/2150[3] DEClaser 2200/2250[3] DEClaser 3200/3250[3] DEClaser 5100[3]
Monitors:	VRC15	VRT17 VRC21
Modems[4]:	DF02 DF03	DF296

[1]Only one DGLPB can be used at a time and only supported in a single processor (CPU) configuration.

[2]Only supported on PCI Bus 0.

[3]Support for these printers is at DEC ANSI level 1.

[4]Digital UNIX will support any Digital modem that understands Digital Modem Command Language (DMCL).

Table 8
AlphaServer 8200 5/300; AlphaServer 8400 5/300

Memory:	1 GB [1]	14 GB[1]	
CD-ROM Drive:	RRD42 RRD43	RRD44 RRD45	
Controller:	KDM70, CIXCD-AC[2]		
I/O Servers:	HSC40[3] HSC50[3]	HSC65[3] HSC70[3]	HSC90[3] HSC95[3]
Disks:	RA60[4] RA71 RA72	RA73 RA81 RA82	RA90 RA92
Tapes:	TA78 TA79	TA90 TA91	
SCSI Devices Disks:	RZ26 RZ26J RZ26L RZ26N	RZ28 RZ28B RZ28L RZ28M	RZ29B RZ73 RZ74
Tapes:	TLZ06 TLZ07 TKZ09 TKZ60	TKZ09 TZ85 TZ86 TZ87	TZ88 TSZ07
RAID Controller:	HSZ40[5]		
Network Adapters:	DEMFA (XMI FDDI) DEMNA (XMI Ethernet) DEFAA (FBUS+ FDDI)	DE425 (EISA Ethernet) DW300 (EISA Token Ring) DEFPA (PCI FDDI)	PBXNP (PCI Token Ring) DE434, 435, 436, 450 (PCI Ethernet) DE500 (PCI Fast Ethernet)
Adapters:	KZPSA-BB (PCI FWD) KZPSC-AA (PCI RAID)[6]	KZPSC-BA (PCI RAID) KZPAA (PCI SCSI)	KZMSA[7] KFE70-AA (EISA Bridge)
Multifunctional Adapter:	KFTIA (ITIOP)		
Asynchronous Terminals:	VT100 VT102 VT200 VT220	VT240 VT300 VT320	VT340 VT420 VT510

[1] If a KDM70 is configured with either a AlphaServer 8200/8400 machine, the maximum amount of main memory supported is 1 GB. When a KDM70 is not configured, the maximum amount of main memory supported is 14 GB.

[2] One CIXCD controller per system.

[3] The k.scsi requestor is not supported.

[4] Data device only.

[5] HSZ40 supported on AlphaServer 8200/8400 running KZMSA or KZPSA.

[6] Check KZPSC documentation for device limitations.

[7] Up to 16 controllers supported (last 4 are data only).

Table 8 (Cont.)
AlphaServer 8200 5/300; AlphaServer 8400 5/300

Serial Printers:	LA36	LA210	LJ250
	LA50	LA324	LJ252
	LA70	LCG01	LN03
	LA75	LF01R	LN03R
	LA75 TURBO	LG02	DEClaser 1100/1500[8]
	LA100	LG06	DEClaser 2100/2150[8]
	LA120	LG12	DEClaser 2200/2250[8]
			DEClaser 3200/3250[8]
Modems[9]:	DF02	DF03	DF296

[8]Support for these printers is at DEC ANSI level 1.

[9]Digital UNIX will support any Digital modem that understands Digital Modem Command Language (DMCL).

Table 9
AlphaStation 200 4/100, 4/166, 4/233; AlphaStation 250 4/266; AlphaStation 400 4/233

CD-ROM Drive:	RRD43	RRD44 RRD45
Controller:	KZPAA (PCI SCSI 2)	
Disks:	RZ25F RZ25L RZ25M RZ26L RZ26L RZ26N	RZ28 RZ28B RZ28D RZ28L RZ28M RZ29B
Diskettes:	RX23	RX33
Tapes:	TKZ09 TKZ60 TLZ06	TLZ07 TSZ07 TZK11
Network Adapters:	DEFPA (PCI FDDI) DE434, 435, 436, 450 (PCI Ethernet) DE500 (PCI Fast Ethernet) PBXNP (PCI Token Ring)	DE203, 204, 205 (ISA Ethernet) DW110 (ISA Token Ring) DGLPB (PCI ATM)[1]
Keyboards:	PCXAL-XX	
Tablet:	PBXWT-A (CalComp Drawingboard III Model 3400)	
Graphics Subsystems:	PB2GA-FA (ATI Mach 64 CX)[2]	
Serial Printers:	LA36 LA50 LA70 LA75 LA75 TURBO LA100 LA120 LA210 LA324 LCG01 LF01R	LG02 LG06 LG12 LJ250 LJ252 LN03 LN03R DEClaser 1100/1500[3] DEClaser 2100/2150[3] DEClaser 2200/2250[3] DEClaser 3200/3250[3] DEClaser 5100[3]
Monitors:	VRC15 VRC16	VRC21 VRT17
Modems[4]:	PCXDF	

[1] Only one DGLPB can be used at a time.

[2] Supported on 100 Model only.

[3] Support for these printers is at DEC ANSI level 1.

[4] Modem support only - no FAX available.

Table 10
AlphaServer 400 4/166, 4/233

CD-ROM Drive:	RRD43	RRD44
Controller:	KZPAA (PCI SCSI 2)	
Disks:	RZ25L RZ25M RZ26L RZ26J RZ26N	RZ28 RZ28B RZ28D RZ28L RZ28M RZ29B
Diskettes:	RX23	RX33
Tapes:	TLZ06 TLZ07	TZK11
Network Adapters:	DEFPA (PCI FDDI) DE500 (PCI Fast Ethernet) DE434, 435, 436, 450 (PCI Ethernet)	DE203, 204, 205 (ISA Ethernet) DW110 (ISA Token Ring) PBXNP (PCI Token Ring) DGLPB (PCI ATM)[1]
Keyboards:	PCXAL-XX	
Graphics Subsystems:	PBXGA (ZLXp-E)	PB2GA-FB
Serial Printers:	LA36 LA50 LA70 LA75 LA75 TURBO LA100 LA120 LA210 LA324 LCG01 LF01R	LG02 LG06 LG12 LJ250 LJ252 LN03 LN03R DEClaser 1100/1500[2] DEClaser 2100/2150[2] DEClaser 2200/2250[2] DEClaser 3200/3250[2] DEClaser 5100[2]
Monitors:	VRC15 VRC16	VRC21 VRT17
Modems[3]:	PCXDF	

[1]Only one DGLPB can be used at a time.

[2]Support for these printers is at DEC ANSI level 1.

[3]Modem support only - no FAX available.

Table 11
AlphaStation 500 5/400; AlphaStation 600 5/266, 5/300, 5/333

CD-ROM Drive:	RRD43	RRD44 RRD45
Controller:	KZPAA (PCI SCSI 2)	
Disks:	RZ25L RZ25M RZ26L RZ26N RZ26J	RZ28 RZ28B RZ28D RZ28L RZ28M RZ29B[1]
Diskettes:	RX23L	RX26
Tapes:	TLZ06 TLZ07	TZK11 TZ87
Network Adapters:	DEFEA (EISA FDDI) DW300 (EISA Token Ring) DE425 (EISA Ethernet) DE434, 435, 436, 450 (PCI Ethernet)	DEFPA (PCI FDDI) DGLPB (PCI ATM)[2] PBXNP (PCI Token Ring) DE500 (PCI Fast Ethernet)
SCSI Adapters:	KZPAA	P2SE (2 QLogic 1 Tulip)
Keyboards:	PCXAL-XX PBXWS-AA	LK411 LK450
Tablet:	PBXWT-A (CalComp Drawingboard III Model 3400)	
Graphics Subsystems:	PBXGA (ZLXp-E)	
Serial Printers:	LA36 LA50 LA70 LA75 LA75 TURBO LA100 LA120 LA210 LA324 LCG01 LF01R	LG02 LG06 LG12 LJ250 LJ252 LN03 LN03R DEClaser 1100/1500[3] DEClaser 2100/2150[3] DEClaser 2200/2250[3] DEClaser 3200/3250[3] DEClaser 5100[3]
Monitors:	VRC14 VRC15	VRC17 VRC21 VRT17
Modems[4]:	PCXDF	

[1] 0014 is the minimum firmware required.

[2] Only one DGLPB can be used at a time.

[3] Support for these printers is at DEC ANSI level 1.

[4] Modem support only - no FAX available.

Table 12
Embedded & Realtime Boards: AXPpci 33; AXPpci 33S, Digital Modular Computing Components EBM43-AZ, EBM44-AZ[1]

CD-ROM Drive:	RRD42 RRD43	RRD44 RRD45
Controller:	KZPAA (PCI SCSI 2)	
Disks:	RZ24L[2] RZ25 RZ25L RZ25M RZ26 RZ26L RZ26J RZ26N	RZ28 RZ28B RZ28D RZ28L RZ29B RZ55[2] RZ56 RZ58
Diskettes:	RX23	RX26
Tapes:	TZK10 TZK11 TZK60	TKZ08 TKZ09 TLZ06 TSZ07
Network Adapters:	DEFPA (PCI FDDI) DE434 (PCI Tulip Ethernet) DE435, 450 (PCI Tulip Ethernet)	DE203, 204, 205 (ISA Ethernet) DW110 (ISA Token Ring) PBXNP (PCI Token Ring)
Keyboards:	PCXAL-XX	
Mouse:	PCXAS-AA	
Graphics Subsystems:	PBXGA (ZLXp-E)	PB2GA-FA (ATI PCI mach 64 CX) PB2GA-JA (TRIO 64 PCI Card)[6]
Serial Printers:	LA36 LA50 LA70 LA75 LA75 TURBO LA100 LA120 LA210 LA324 LCG01 LF01R	LG02 LG06 LG12 LJ250 LJ252 LN03 LN03R DEClaser 1100/1500[3] DEClaser 2100/2150[3] DEClaser 2200/2250[3] DEClaser 3200/3250[3] DEClaser 5100[3]
Monitors:	VRC16-HA VRC16-H4	PCXBV-PC
Modems[4]:	DF02 DF03	DF296 PCXDF[5]

[2]Data device only.

[3]Support for these printers is at DEC ANSI level 1.

[4]Digital UNIX will support any Digital modem that understands Digital Modem Command Language (DMCL).

[5]Modem support only - no FAX available.

[6]Supported only in the secondary PCI slots on Digital Modular Computing Components EBM43-AZ and EBM44-AZ.

[1] Refer to Embedded and Realtime Boards information in the SUPPORTED HARDWARE section of this SPD.

Table 13
Embedded & Realtime Boards: AXPvme 64, 100, 160, and 230; ALPHAvme 4/224, 4/288[1]

CD-ROM Drive:	RRD42 RRD43	RRD44 RRD45
Disks:	RZ24L[2] RZ25 RZ25L RZ25M RZ26 RZ26L RZ26J RZ26N	RZ28 RZ28B RZ28D RZ28L RZ28M RZ29B RZ55[2] RZ56 RZ58
Diskettes:	RX23	RX26 RX33
Tapes:	TKZ08 TKZ09 TLZ06 TLZ07	TZK10 TZK11 TKZ60 TSZ07
Network Adapters:	DEFPZ (PMC FDDI)	DE520 (PMC Fast Ethernet)
Graphics Subsystems:	TGA8M[5]	
Asynchronous Terminals:	VT100 VT102 VT200 VT220 VT240	VT300 VT320 VT340 VT420 VT510
Serial Printers:	LA36 LA50 LA70 LA75 LA75 TURBO LA100 LA120 LA210 LA324 LCG01 LF01R	LG02 LG06 LG12 LJ250 LJ252 LN03 LN03R DEClaser 1100/1500[3] DEClaser 2100/2150[3] DEClaser 2200/2250[3] DEClaser 3200/3250[3] DEClaser 5100[3]
Modems[4]:	DF02 DF03	DF296

[2]Data device only.

[3]Support for these printers is at DEC ANSI level 1.

[4]Digital UNIX will support any Digital modem that understands Digital Modem Command Language (DMCL).

[5]ALPHAvme 4/224 and 4/288 only.

[1] Refer to Embedded and Realtime Boards information in the SUPPORTED HARDWARE section of this SPD.

Table 14
Alpha VME 2100 (190 MHz, 275 MHz)

Memory:	Limited to 1 GB	
CD-ROM Drive:	RRD42 RRD43	RRD44
Disks:	RZ25L RZ26 RZ26L	RZ28 RZ28B RZ29B
Diskettes:	RX26	RX33
Tapes:	TZK10 TZK11 TZ86 TZ87	TLZ06 TLZ07 TZK60 TSZ07
Adapters:	KZPAA (PCI SCSI)	KZPSA (PCI FWD SCSI)
RAID Controller:	HSZ40	
Network Adapters:	DEFPA (PCI FDDI) DGLPB (PCI ATM)	DE434, 435, 436 (PCI Tulip Ethernet)
Keyboards:	PCXAL-XX	
Graphics Subsystems:	PB2GA-AA	
Serial Printers:	LA36 LA50 LA70 LA75 LA75 TURBO LA100 LA120 LA210 LA324 LCG01 LF01R	LG02 LG06 LG12 LJ250 LJ252 LN03 LN03R DEClaser 1100/1500[1] DEClaser 2100/2150[1] DEClaser 2200/2250[1] DEClaser 3200/3250[1] DEClaser 5100[1]
Monitors:	VRC15 VRC16	VRT17
Modems[2]:	DF02 DF03	DF296

[1] Support for these printers is at DEC ANSI level 1.

[2] Digital UNIX will support any Digital modem that understands Digital Modem Command Language (DMCL).

Table 15
EB66+, EB64+, EB164, AlphaPC64; Alpha PCI 64-275, Alpha PCI 164-266, Alpha PCI 164-300

SCSI Adapter:	KZPAA (PCI SCSI 2)	
CD-ROM Drive:	RRD42	RRD43
Disks:	RZ26L	RZ28 RZ28B
Diskettes:	RX23 RX26	RX33
Tapes:	TLZ06 TLZ07	TZK11
Network Adapters:	DE434, 435 (PCI Tulip Ethernet) PBXNP (PCI Token Ring)	DE203, 205, 205 (ISA Ethernet)
Keyboards:	PCXAL-XX	
Graphics Subsystems:	PBXGA (ZLXp-E)	
Mouse:	PCXAS-AA	
Serial Printers:	LA36 LA50 LA70 LA75 LA75 TURBO LA100 LA120 LA210 LA324 LCG01 LF01R	LG02 LG06 LG12 LJ250 LJ252 LN03 LN03R DEClaser 1100/1500[1] DEClaser 2100/2150[1] DEClaser 2200/2250[1] DEClaser 3200/3250[1] DEClaser 5100[1]
Monitors:	VRC16-HA VRC21-H4	PCXBV-PC
Modems[2]:	DF02 DF03	DF296 PCXDF[3]

[1]Support for these printers is at DEC ANSI level 1.

[2]Digital UNIX supports any Digital modem that understands Digital Modem Command Language (DMCL.)

[3]Modem support only - no FAX available.

Table 16
Local Language Variant Optional Hardware

The following devices support input and output of local language data.

Language	Terminals	Keyboards	Printers	Printers, Cont.
Czech (C)/ Slovak (S):	VT42D-PV (C) VT42D-PZ (S) VT510-DX VT510-EX VT510-FX VT510-KX	LK401-BV LK401-CZ LK411-BV (C) PCXAL-HV (C) LK411-CZ (S) PCXAL-JZ (S)	LA70-CC LA65-CC LA75S-CB + LA75Y-CF LA310-CB + LA31X-CA LA424-CC + LA24X-CL and LA24X-CS	LA600-CB LG06-DB LG12-DA LN06 + LNXX-FE LN07 + LNXX-FE
Traditional Chinese:	VT382-D*	LK401-D*	CP382-D*	
Simplified Chinese:	VT382-C*	LK401-C*	LA88-C*	LA380-C*
Greek:	VT420-NH/PH VT510-*X	LK401-BH LK411-BH	LA70-CC LA310-CB LA75S-CB	LA424-** + LA24X-CJ LA600-CB
Hebrew:	VT420-AT	LK401-AT	LA70-AT	LA424-AT LA600-AT
Hungarian:	VT42D-PQ VT510-*X	LK401-BQ LK411-BQ PCXAL-HQ	LA70-CC LA75S-CB LA310-CB LA424-CC + LA24X-CL	LG01-** LG02-** LG06-**
Japanese:	VT282-F* VT286-F* VT382-F* VT383-F*	LK401-*J LK421-*J	LA84-B* LA86-A* LA88-A* LA90-A* LN10 (DEClaser 2400)	LA280-A* LA380 LN03S-JA LN05S-AJ LN82R
Korean:	VT382-K*	LA401-K*	LA380-K*	DLP5100
Polish:	VT42D-PP VT42D-QP VT42D-RP VT510-*X	LK401-BQ LK411-BP PCXAL-HP	LA70-CC LA75S-CB + LA75Y-CF LA310-CB + LA31X-CA LA424-CB + LA24X-CL LPS20 LPS32	LG06-CB LN07 LN08 DECLaser 1152 DECLaser 3250
Russian:	VT42D-PT VT510-*X	LK401-BT LK411-BT PCXAL-HT	LA70-CC LG01-** LG02-** LG06-**	LA424-CC + LA24X-CL LA75S-CB + LA75Y-CF LA310-CB + LA31X-CA
Thai:	VT382-T*	LA401-T*	As recommended by local office	
Turkish:	VT420-UU/XU VT420-PU/YU VT420-WU/VU VT420-QU/ZU VT510-*X	LK401-BU LK401-BW LK402-BW LK411-BU LK411-BW LK412-BW	LA70-CC LA310-CB LA75S-CB LA424-** + LA24X-CK LA424-** + LA24X-CM	

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