COMPAQ

Software Product Description

PRODUCT NAME: Compaq OpenVMS Operating System for Alpha and VAX, Versions 7.2, 7.2-1, 7.2-1H1, and 7.2-2. **SPD 41.87.08**

Important:
Please read the HP Software Technical Support section before you proceed further.

This SP includes infor ation on the new features and hardware supported in pen S lpha ersion . . The hardware infor ation is listed in the S ST S S PP T section and ppendi .

Note:

This SP describes o pa *OpenVMS* peratin Sys te software for the lpha and co puter fa ily. cept where e plicitly noted the features described in this SP apply e ually to both lpha and sys te s. pen S lpha and pen S operatin syste licenses and part nu bers are architecture spe cific Please refer to the rderin nfor ation section of this SP for further details.

DESCRIPTION

pen S is a eneral purpose ultiuser operatin syste that runs in both production and de elop ent en iron ents. pen S lpha supports o pa o puter orporation s lpha series co puters while pen S supports icro station and ser er series co puters. pen S soft ware supports industry standards facilitatin application portability and interoperability. pen S pro ides sy etric ultiprocessin S P support for ultiprocess in lpha and syste s. The pen S lpha oper atin syste pro ides support for bit irtual e ory addressin and ery ar e e ory .

The pen S operatin syste can be tuned to perfor well in a wide ariety of en iron ents. This includes co binations of co pute intensi e intensi e client ser er real ti e and other en iron ents. ctual syste perfor ance depends on the type of co puter a ailable physical e ory and the nu ber and type of acti e dis and tape dri es.

The pen S operatin syste has well inte rated networ in distributed co putin client ser er ulti processin and windowin capabilities. t contains e tensi e features that pro ote ease of use i pro e the producti ity of pro ra ers and facilitate syste an a e ent.

pen S lpha ersion . has been desi ned as a follow on release to replace both pen S lpha ersion . and pen S lpha ersion . H . pen S ersion . is the ersion o pa reco ends for coe istence with pen S ersion . in i ed ersion pen S luster syste s.

pen S lpha ersion . includes all the capa bilities of its predecessors and introduces new features and hardware support. So e new features ha e al ready been released in update its for certain software odules and syste inte rated products. ther new features are a ailable in pen S lpha ersion . .

The a or new features and hardware supported in pen S lpha ersion . are

S P perfor ance enhance ents that include i pro ed process schedulin faster loc in operations and a dedicated P ode for loc in

lphaSer er S syste s support for us in lphaSer er odules and odules in the sa e syste

inicopy support in host based olu e shadowin

ibre hannel tape support

Support for the pen S lpha ersion . e istry Ser er

Support for erberos Security lient ersion . for pen S based on T erberos ersion e lease . . .

ew S co ands ualifiers and para eters

ew docu entation on writin syste du p file off the syste dis

Support for the P H and P H P based T adapters

e edial fi e throu h pril

ow with ersion . of o pa print Super isor PS for pen S the ri ht to use all PS prod ucts ase pen and Plus is bundled with the pen S peratin Syste license. edia docu entation and ser ices are sold separately.

USER ENVIRONMENT

sers can access the pen S software by usin the n lish li e T o and an ua e the co and lan ua e for pen S that is supplied with the syste . co ands pro ide infor ation about the syste and initiate syste utilities and user pro ra s. co ands ta e the for of a co and na e followed by para eters and ualifiers ith the co and P P indi idual operations can be connected usin a li e co and synta . pen S pro pts users to enter re uired para eters a in it easy for no ice users.

sers can enter co ands at a ter inal or include the in co and procedures. These co and proce dures can be run interacti ely or sub itted to a batch ueue for later processin .

nfor ation on and pen S utilities is a ailable on line throu h the pen S Help syste . nline help includes su ary infor ation on all aspects of syste operation.

The followin tools and utilities are inte rated into the pen S operatin syste .

Text Processing

The tensible ersatile ditor one of se eral te t editors supplied by o pa is the default editor for pen S. allows users to insert chan e and delete te t uic ly. ritten in the T Te t Process in tility TP lan ua e is a full screen ed itor that allows users to scroll throu h te t on a ter inal screen. pro ides an T style eypad allowin T users to o e easily to .

Mail Utility

The ail utility allows users to send essa es to any other user on the syste . ultinode operation is a ail able if a net or T P P product is installed and li censed on each participatin node on the networ .

Command-Level Programming

o and le el pro ra in allows users to create special files called co and procedures that contain a series of co ands. hen users e ecute a co and procedure the syste processes the co ands in the co and procedure consecuti ely. sers can also use special co ands to

ssi n sy bolic na es

aluate nu erical and lo ical e pressions

ccept para eters

o unicate interacti ely with the user in o in the co and procedure

Perfor conditional TH S and branchin T lo ic

Handle error conditions

User Environment Tailoring

sers can custo i e the co putin en iron ent with lo in co and procedures shorthand co ands bindin of co ands to function eys and co and recall and editin .

Terminal Fallback Facility (TFF)

This facility allows o pa bit ter inals to input and output the o pa ultinational character set S . Specifi tables allow con ersion for a nu ber of differ ent bit ational eplace ent haracter sets to S such as rench er an Spanish and Swedish. T also allows character co position on ter inals that do not ha e the co pose ey.

National Character Set (NCS) Utility

This utility allows users to defin non S strin collat in se uences and to defin con ersion functions. on ersion functions use con ersion al orith s to chan e an input strin for e a ple to chan e lowercase characters to uppercase. S also allows pen S ecord ana e ent Ser ices S inde ed file to be collated usin user specifie collatin se uences.

PROGRAM DEVELOPMENT ENVIRONMENT

pen S includes a co prehensi e set of tools for de elopin pro ra s includin run ti e libraries T s a lin er a librarian and a sy bolic debu er. The asse bly le el lan ua e is supplied with pen S . n addition the a a S pro ides an en iron ent in which to de elop and deploy a a applications on pen S lpha. The followin tools are a ailable to the pen S pro ra er.

Java 2 Software Development Kit

The a a S is a set of buildin bloc s containin basic de elop ent tools and a rich set of class libraries.

Language and Run-Time Library Support

pen S includes se eral T s that pro ide

Strin anipulation

Parallel processin support

routines

con ersion

Ter inal independent screen handlin

ate and ti e for attin routines

Hi hly accurate athe atical functions

Si nalin and condition handlin

ther eneral purpose functions

ith pen S these routines can be called fro pro ra s written in such lan ua es as o pa da o pa S SS ple entation an ua e o pa o pa o pa o pa ortran o pa Pascal and P .

ith pen S lpha these routines can be called fro pro ra s written in such lan ua es as o pa da o pa S o pa o pa o pa o pa or tran o pa Pascal a a and o pa P .

lso included in pen S lpha are lan ua e support libraries. hile each lan ua e is different all pro ide support for se uential fil and ost support direct and inde ed fil . an ua e T s also pro ide sup port for for attin error handlin and in o pa ortran the ability to read unfor atted file that contain data fro other endors.

T s are pro ided to support translated i a es created fro user ode i a es built on pen S ersion . throu h ersion . . ependin on the ethod used to create the i a e these T s can be use ful for i a es built on later ersions of pen S which do not use features that were de eloped since pen S ersion . .

Translated i a e T s are used to support a few ar chitectural features that differ between and lpha syste s such as floa and H float They also support pro ra s con erted to run on lpha syste s before nati e lpha co pilers were a ailable for partic ular pro ra in lan ua es.

any o pa lan ua es adhere to the co on call in standard. This eans that routines written in any of these lan ua es can directly call routines written in any other lan ua e. e elop ent of applications usin ultiple lan ua es is si ple and strai htforward.

ll user accessible routines in the T s follow the pen S lpha or pen S callin standard and condition handlin con entions and ost are contained within shareable i a es.

t a lower le el pro ra s can call syste ser ices di rectly for security e ent fla asynchronous syste trap lo ical na e record and fil process control ti er ti e con ersion condition handlin loc ana e ent and e ory ana e ent. ain syste ser ices use the pen S or pen S lpha callin standard and condition handlin con entions.

pen S supports the e ecution of user ode i a es created on earlier ersions of pen S. Typically re co pilin and relin in are not re uired.

MACRO Compiler (Alpha Only)

or i ration purposes the co piler is sup plied with the pen S lpha software.

ith inor odifications sources can be co piled for e ecution on lpha.

Compaq POSIX Threads Library (Formerly Named DECthreads)

pen S includes a user ode ultithreadin capa bility called o pa P S Threads ibrary. o pa P S Threads ibrary pro ides a P S . standard style threads interface. dditionally o pa P S Threads ibrary pro ides an interface that is the pen S i ple entation of istributed o putin n iron ent threads as define by The pen roup.

o pa P S Threads ibrary is a library of run ti e routines that allows the user to create ultiple threads of e ecution within a sin le address space. ith o pa P S Threads ibrary ernel Threads fea tures enabled o pa P S Threads ibrary pro ides for concurrent processin across all P s in a sy etric ultiprocessor syste by allowin a ulti threaded application to ha e a thread e ecutin on e ery P . n an asy etric e. . syste a sin le process can ha e a thread e ecutin on all proces sors in the process s ho e . ultithreadin allows

co putation acti ity to o erlap acti ity. Synchro ni ation ele ents such as ute es and condition ari ables are pro ided to help ensure that shared resources are accessed correctly. or schedulin and prioriti in threads o pa P S Threads ibrary pro ides ul tiple schedulin policies. or debu in ultithreaded applications o pa P S Threads ibrary is sup ported by the pen S ebu er. o pa P S Threads ibrary also pro ides Thread ndependent Ser ices T S which assist in the de elop ent of thread safe P s.

Visual Threads

isual Threads is a new tool that lets you analy e your ultithreaded applications. ou can use it to debu po tential thread related lo ic proble s e en those hard to fin proble s that only occur due to sli ht ti in dif ferences. ou can also use isual Threads to pinpoint bottlenec s and perfor ance proble s by usin its rule based analysis statistics capabilities and isuali ation techni ues.

isual Threads can be used with any application that uses a P S threads P P S or P or is written in a a.

isual Threads features include the followin

etects iolation conditions based on the application of particular rules in your application. Se eral pre define rules loo for deadloc conditions pro ra in errors and perfor ance issues.

ets you use te plates to defin your own rules to specify criteria for iolation conditions.

ecords e ents to a trace fil so that you can play bac and analy e the later.

yna ically displays e ents as they occur with con trols for searchin and filterin

Suspends e ecution of the application when it de tects iolation conditions. ou can choose fro se eral options at this point includin in o in the de bu er in the appropriate conte t for your application.

yna ically onitors ultithreadin ob ects threads ute es and so on in real ti e.

Pro ides easy access to ob ect le el statistics and current state infor ation includin use of resources for e a ple the ute es a particular thread holds .

uto atic analysis of loc contention and loc ran ularity statistical hotspots and processor utili ation.

isuali es thread state o er ti e le el of contention and ob ect le el usa e statistics.

Librarian Utility

The ibrarian utility per its stora e of ob ect odules i a e files acros help te t or any eneral record oriented infor ation in central easily accessible files b ect odule and i a e fil libraries are searched by the lin er when the lin er find a reference it cannot resol e in one of its input files lpha acro libraries are searched by the co piler and asse bler when either find a acro na e that is not define in the input file acro libraries are searched by the asse bler when the as se bler find a acro that is not define in the input.

Hypersort

Hypersort is a portable library of user callable routines that pro ide a hi h perfor ance sortin capability for lpha syste s.

Traceback Facility

hen an application is co piled and lin ed with trace bac infor ation the Tracebac facility translates stac fra e addresses into routine na es and line nu bers and displays a sy bolic tracebac whene er a runti e error occurs in that application.

Debugger

The pen S ebu er allows users to trace pro ra e ecution as well as display and odify re ister con tents usin the sa e sy bols that are present in the source code.

The debu er contains a Heap naly er feature that displays a raphic iew of e ory allocations and deal locations in real ti e.

Alpha System-Code Debugger

The pen S lpha Syste ode ebu er is a er nel code debu er. t allows a syste code de eloper to trace the e ecution of nonpa eable syste code at any nterrupt Priority e el P . ased on the pen S lpha ebu er the syste code debu er uses the sa e interface and ost of the sa e co and set.

System Dump Analyzer (SDA) Utility

n the e ent of a syste failure pen S writes the contents of e ory to a preallocated du p file This du p fil can later be analy ed usin Syste u p naly er S . Syste du ps can either be full e ory du ps where all e ory is written or selecti e e ory du ps where only portions of e ory in use at the ti e of the syste failure is written. The du p fil can be located on any locally connected dis . n lpha only du p co pression allows both full and se lecti e du ps to be written to s aller file than re uired for unco pressed du ps. ull e ory du ps if not co pressed re uire a du p fil bi enou h to hold all

e ory. Selecti e e ory du ps write as uch of the e ory in use at the ti e of the syste failure that will fi into the du p file

Spinlock Tracing Utility

The Spinloc Tracin tility pro ides a echanis for characteri in spinloc usa e and can collect perfor ance data for a i en spinloc on a per P basis. The Spinloc Tracin tility is supported on pen S lpha ersion . H and abo e.

Process Dumps

hen an application fails a copy of its re isters and e ory can be written to a data file which can be e a ined usin the P SS utility. This utility uses the sa e interface and co ands as the pen S ebu er to allow re isters and e ory to be e a ined. n lpha only another process can initi ate the writin of the e ory du p.

RMS File Utilities

ecord ana e ent Ser ices S fil utilities allow users to analy e the internal structure of an S fil and tune the e ory space and perfor ance pa ra eters of the file The S fil utilities can also be used to create load and reclai space in an S file efer to the peratin Syste n iron ent section of this SP for ore infor ation on S.

File Differences Utility

This utility co pares the contents of two file and lists those records that do not atch.

Translated Image Environment (TIE) (Alpha Only)

pen S lpha pro ides an array of ser ices that allow the operation of pro ra s which ha e under one binary translation fro pen S i a es. These pro ra s perfor irtually all user ode func tions on pen S lpha and operate in co bination with other pro ra s i a es that ha e been translated fro pen S or ha e been built usin nati e co pilers on pen S lpha. ithout re uirin spe cial source code the T resol es differences between the and lpha architectures includin floatin point re isters condition codes e ception handlin and STs. The T included with pen S lpha can run i a es that ha e been translated elsewhere.

SYSTEM MANAGEMENT ENVIRONMENT

pen S pro ides a ariety of features that aid the sys te ana er in confi urin and aintainin an opti al syste . The followin features are a ailable to syste ana ers.

Compaq Availability Manager Version 2.0

o pa ailability ana er is a syste ana e ent tool that fro either an pen S lpha or a in dows node enables you to onitor one or ore pen S nodes on an e tended local area networ . This tool helps syste ana ers and analysts tar et a specifi node or process for detailed analysis. The ailability ana er collects syste and process data fro ultiple pen S nodes si ultaneously. t analy es the data and displays the output usin a nati e a a . t is included in the pen S distribution it.

The ailability ana er tool e ol ed fro the pen S only a ds product and its otif raphical user inter face . ecause the ailability ana er ata n aly er re uires a run ti e en iron ent it does not run on pen S which does not support a a. To perfor real ti e syste onitorin on syste s one should use a ds.

nstallation of a a ersion . . or later is re uired for the ailability ana er ersion . client on an pen S syste . o pa reco ends usin at a in i u the followin hardware confi uration H lpha processor with of e ory. The ail ability ana er ersion . it for pen S includes the ata naly er and ata ollector

The a a ata naly er can be installed only on pen S lpha ersions . . . . . ariants and . .

The ata ollector can be installed on pen S and lpha ersions . . . . . ariants and . .

n a indows syste o pa reco ends usin at a ini u either of the followin hardware confi ura tions

indows T or H ntel Pentiu pro cessor with of e ory

indows T H lpha processor with of e ory

ou can install the ailability ana er ata naly er on any syste runnin indows T . SP or later or on indows . Please note that you ust rein stall ailability ana er ersion . after up radin to indows .

DECamds Version 7.2-1B

a ds ersion . is a ailable on the pen S distribution it. a ds is a separately installable real ti e hi h perfor ance ultisyste onitorin util ity. t is supported on any syste runnin pen S ersion . or hi her. ith pen S ersion . the ri ht to use a ds was included under the ter s and conditions of the pen S operatin syste base license for both lpha and . a ds is the pre decessor of the newer application ailability ana er.

a ds pro ides syste resource onitorin in es ti ation aid and correction capability. This enables sys te ana ers to proacti ely and effecti ely ana e ultiple syste s fro a centrali ed windows dis play. a ds software includes an pen S de ice dri er which is installed on e ery node on the that is to be onitored. The software includes a otif application that allows a syste ana er to perfor onitorin functions. The otif application can be installed on any pen S lpha or wor station. a ds is currently in aintenance ode. ll new syste ana e ent functionality re uested for a ds will be directed to the ailability ana er product.

Compaq Management Agents for OpenVMS Version 2.2

o pa ana e ent ents for pen S ersion . consists of a web ser er for syste ana e ent with ana e ent a ents that allow you to co unicate with de ices on your pen S syste s o er the nternet or intranet. o pa ana e ent ents for pen S utili es eb based enterprise ana e ent ar chitecture. This is an architecture that allows one to use a web browser to onitor any de ices that are connected to a networ . e ices can be co puter sys te s networ ed printers or networ co ponents such as router. uses a three tiered architecture that includes a ana e ent ser er de ices ana ed by web a ents and a web browser.

o pa ana e ent ents for pen S use S P and T P P protocols that allow the ana e ent ser er to co unicate with pen S de ices. The ana e ent a ents use co on web enablin co ponents to pro ide re istration disco ery HTTP co unications and a ho e pa e for the ana ed de ices. The ana e ent a ents can send infor ation directly to the ana e ent ser er or they can create an HT fil to co unicate directly with a browser.

o pa ana e ent ents for pen S utili e o pa nsi ht ana er on an T ser er as the ana e ent ser er application. ith the introduc tion of o pa nsi ht ana er on an T ser er ana e ent of all your o pa platfor s inclusi e of pen S fro a sin le T ser er beco es a possibil ity. o pa nsi ht ana er which is an e a ple of a ana e ent ser er application is a web based interface that enables you to loo across a hetero e neous co putin ser ices en iron ent and access in for ation about de ices connected to the networ . s in the nsi ht ana er one can obtain infor a tion about the confi uratio of pen S syste s and their co ponents or peripherals. o pa ana e ent ents for pen S is an e a ple of a o pa n si ht ana er web a ent. ana e ent ents for pen S pro ides the eans of co unication be tween pen S de ices and the web browser. The o pa nsi ht ana er ana e ent ser er pro ides a sin le reference point for data fro all de ices. The ana e ent ser er uses its connection with the web browser to display de ice data to the user.

OpenVMS Management Station Version 3.0

pen S ana e ent Station is a powerful icrosoft indows T based ana e ent tool for syste an a ers and others who perfor syste ana e ent tas s on pen S syste s. pen S ana e ent Station features a powerful intuiti e user interface. Sys te ana ers and help des staff no lon er need to re e ber co plicated synta or co and proce dures to ana e their pen S syste s. pen S ana e ent Station a es syste ana e ent uch easier.

Three functional areas are now i ple ented in pen S ana e ent Station user account ana e ent printer ueue ana e ent and stora e confi uratio ana e ent. or user account ana e ent pen S ana e ent Station supports account creation odification and deletion as well as rena in ac counts and displayin account attributes. Printer ueue ana e ent a es it possible for syste ana ers to ana e all printers print ueues and obs in their en iron ent usin a centrali ed indows . This in cludes onitorin one or ore printers addin or re o in printers and their associated ueues e a inin and odifyin ueue and printer attributes and re ueuin or deletin obs.

The current release of pen S ana e ent Station adds stora e ana e ent support. pen S an a e ent Station now a es it easy for one to ana e their dis stora e de ices across ultiple pen S luster syste s and pen S odes. ith pen S ana e ent Station one no lon er needs to aintain co plicated co and file to control their stora e en iron ent. ne can create delete and ana e stor a e fro an easy to use indows interface. t pro ides a persistent database that can auto atically deter ine and confi ur your syste s stora e confi uratio at syste startup.

pen S ana e ent Station is now based on the icrosoft ana e ent onsole . The icrosoft ana e ent onsole pro ides a co on ana e ent fra ewor for arious ad inistration pro ra s. pen S ana e ent Station is i ple ented as an snap in and includes all of the co ponents you need.

eatures include

Stora e onfi uratio ana e ent ou can cre ate delete and ana e a dis olu e under one interface. i ards a e it easy to add syste s to be ana ed create a olu e and so forth.

onfi uratio ontrol er eboots f you allow it to pen S ana e ent Station preser es the dis confi uratio across reboots. pen S an a e ent Station can ount and aintain your stor a e confi uratio without inter ention. nd pen S ana e ent Station ounts olu es uch faster than is possible with or co and pro cedures so perfor ance is enhanced.

oe istence with stablished n iron ent ou do not ha e to chan e your e istin co and pro cedures if you don t want to. ou can use the display capabilities of pen S ana e ent Station with out ha in to use the auto ated ount feature. n this way you can i e pen S ana e ent Sta tion as little or as uch control as you are co fort able with.

e ote ana e ent Supported ou can use pen S ana e ent Station to re otely an a e your pen S syste s. nce you establish a T P P S connection you can then use pen S ana e ent Station to ana e your pen S syste s fro ho e or on the road.

Note:

The ersion of included in this basele el re uires file pro ided by icrosoft nternet plorer. ersion . or later of nternet plorer ust be present on the syste . The pen S ana e ent Station client sup ports only T P P connections for pri ary ser ers so at least one pen S syste ust be runnin T P P. f you are runnin ersion . of pen S and plan to ana e shadow olu es re edial its are re uired. dditional T P P stac s for pen S ha e not been tested. Howe er T P P stac s that are co pli ant with the interface for o pa T P P Ser ices for pen S should also wor . ontact your T P P endor for additional infor ation and support issues.

Enterprise Capacity and Performance (ECP) Data Collector and ECP Performance Analyzer

P ata ollector and P Perfor ance naly er ersion . en ineered and supported by o pa is licensed with the pen S operatin syste and is a ailable fro the pen S Syste ana e ent web pa e at

http www.open s.co pa .co open s syste ana e ent.ht l

P ata ollector and P Perfor ance naly er are licensed with the pen S lpha and peratin Syste ersion . to ersion . .

P ata ollector is a hi hly efficient detailed per for ance data collector and P Perfor ance naly e pro ides raphic historical reportin of pen S per for ance para eters. Satisfyin the needs of nter prise ana e ent P ata ollector also contains an P that pro ides an interface for the access of col lected perfor ance data. This interface con erts the contents of the . P data fil enerated by the data collector into a for atted co a separated S fil that can then be used for perfor ance analysis and re portin pro ra s.

The P ata ollector pro ides

obust data collection set t collects ore syste etrics than other endors for e a ple o er S perfor ance para eters .

le ible data collection The sa plin rate of data can be tuned down to sub second inter als.

ow o erhead udited production syste s now runnin ha e routinely shown that the collector has less than . i pact on P .

The P Perfor ance naly er pro ides

ati e pen S product runnin under otif

iewin of perfor ance data in raphical for at

naly ed data includin P e ory and

ser selected sa plin rate

Software Support Ser ice for these products is sold sep arately. Please contact your o pa Ser ices repre sentati e for further details.

Batch and Print Queuing System

pen S pro ides an e tensi e batch and print capa bility that allows the creation of ueues and the setup of spooled de ices to process noninteracti e wor loads in parallel with ti esharin or real ti e obs.

The pen S batch and print operations support two types of ueues eneric ueues and e ecution ueues. eneric ueue is an inter ediate ueue that holds a ob until an appropriate e ecution ueue beco es a ail able to initiate the ob. n e ecution ueue is a ueue throu h which the ob either print or batch is actually processed.

The syste ueues batch obs for e ecution. The sys te ana er can re ulate the nu ber of ueues and the nu ber of strea s per ueue the nu ber of batch obs in the ueue that can e ecute concurrently .

oth eneric and e ecution batch ueues can ha e dif ferent attributes such as the a i u P ti e per itted wor in set si e and priority. acilities are pro ided for startin and stoppin ueues and for startin and stoppin obs in a ueue. ecause ultiple e e cution ueues can be associated with a eneric ueue pen S enables load balancin across a ailable P s in an pen S luster syste increasin o er all syste throu hput.

Print ueues both eneric and e ecution to ether with ueue ana e ent facilities pro ide ersatile print ca pabilities includin support for arious print fil for ats.

The a i u nu ber of process identifier for ueuin re uests is .

Accounting Utility

or accountin purposes pen S eeps records of syste resource usa e. These statistics include pro cessor and e ory utili ation counts print sy biont line counts i a e acti ation counts and process ter ination records. The pen S ccountin utility allows you to enerate arious reports usin this data.

Audit Analysis Utility

or security auditin purposes pen S selecti ely records critical security rele ant e ents in the syste security audit lo file These records contain the date and ti e the e ent occurred the identity of the asso ciated user process and infor ation specifi to each e ent type. This infor ation helps the syste ana er aintain syste security and deter possible intruders. The pen S udit nalysis utility allows you to en erate arious reports fro this data.

Autoconfigure/AUTOGEN Utilities

The utoconfi ur and T utilities auto atically confi ur the a ailable de ices in the syste tables and set syste para eters based on the peripheral and e ory architecture. This eli inates the need for a tra ditional syste eneration process when the hardware confi uratio is e panded or otherwise odified

The pen S T co and procedure sets se eral syste para eters auto atically by detectin the de ices installed in a confi uration feedbac op tion allows you to enerate a report of reco ended para eter settin s based on pre ious usa e patterns.

Backup Utility

The ac up utility pro ides both full olu e and incre ental fil bac ups for file structured ounted olu es and olu e sets. ndi idual files selected directory structures or all file on a olu e set can be bac ed up and restored. iles can be selected by arious dates such as creation or odification and can be bac ed up to a netic tape a netic dis or rite nce ead any optical dis . The ac up utility can also be used to restore a sa e set or list the contents of a sa e set.

P P has been added for in o in bac up routines fro an e ecutable procedure.

The ac up ana er for pen S pro ides a screen oriented interface to the ac up utility that assists users in perfor in routine bac up operations. The ac up ana er is enu dri en and pro ides

- ccess to the sa e restore and list operations with out ha in to understand ac up co and synta
- The ability to create odify recall and delete ac up ana er te plates that describe the ac up sa e operations

The ac up ana er wor s on all supported pen S confi uration with a ideo ter inal. t uses the Screen ana e ent S T routines to pro ide a window li e user interface. The software does not assu e any pri ile e on the part of its user beyond access to the file and de ices bein operated upon.

Standalone BACKUP Utility (VAX Only)

Standalone P pro ides a echanis for syste ana ers to bac up and restore syste dis s. This utility can also be used durin the installation of the pen S operatin syste .

Analyze Disk Structure Utility

The naly e is Structure utility co pares the struc ture infor ation on a dis olu e with the contents of the dis prints the structure infor ation and per its chan es to that infor ation. t can also be used to re pair errors detected in the fil structure of dis s.

Monitor Utility

The onitor utility enables the syste ana er to onitor different classes of syste wide perfor ance data includin process acti ity acti ity e ory ana e ent acti ity ector processin acti ity only and two phase co it transaction acti ity at specifie inter als. The data can be displayed as it is athered or sa ed in a fil for later use.

License Management Facility (LMF)

The icense ana e ent facility allows the syste ana er to enable software licenses and to deter ine which software products are licensed on an pen S syste .

System Management Utility (SYSMAN)

The Syste ana e ent utility allows syste an a ers to defin a ana e ent en iron ent in which operations perfor ed fro the local pen S syste can be e ecuted on all other pen S syste s in the en iron ent. The en iron ent can include pen S lpha and syste s confi ure in an pen S luster or ultiple syste s networ ed throu h net or net Plus.

Operations

pen S allows for aryin le els of pri ile e to be assi ned to different operators. perators can use the pen S Help essa e utility to recei e online descriptions of error essa es. n addition syste enerated essa es can be routed to different ter inals based on their interest to the console operators tape li brarians security ad inistrators and syste ana ers.

Security

Kerberos

erberos Security lient ersion . for pen S based on T erberos ersion elease . . is now supported on pen S lpha ersion . . er beros docu entation pro ided by T is included on the pen S docu entation in HT for at.

erberos is a networ authentication protocol desi ned to pro ide stron authentication for client ser er appli cations by usin secret ey crypto raphy.

The erberos for pen S authentication syste based upon wor done by assachusetts nstitute of Technolo y T is pro ided in three separate co po nents

ey istribution enter ser er

lient subsyste

Two application pro ra in interfaces one written to co ply with the eneric Security Ser ice ppli cation Pro ra in nterface SS P speci ficatio as define by . The second P presents the erberos interface to the users. oth P s are deli ered as sharable i a es on pen S.

erberos was created by the assachusetts nstitute of Technolo y as a solution to networ security proble s. The erberos protocol uses stron crypto raphy so that a client can pro e its identity to a ser er and ice ersa across an insecure networ connection. fter a client and ser er ha e used erberos to pro e their identity they can also encrypt all of their co unications to as sure pri acy and data inte rity.

eneral infor ation about erberos is a ailable fro the followin orld ide eb address
http web. it.edu erberos www

Per-Thread Security Profiles

Thread le el security allows for si plifie ultiprofil application de elop ent and i pro es o erall perfor ance while aintainin a hi h le el of security. This feature allows each e ecution thread of a ultithreaded process to run an independent security profil without i pactin the security profile of other threads in the process.

This feature nown as Per thread security profiles in cludes a new security structure nown as the Persona Security loc PS which supersedes any process wide structures and field includin the user na e and account infor ation PH pri ile e bits and the P T cell.

new S S para eter S PP T has been added to allow syste ana ers to control the le el by which the current security data in the PS will be bac ported to these old pri ile e data cells. There are four le els of support ran in fro S PPP T to S PP T .

External Authentication

ternal authentication is an optional feature that en ables pen S syste s to authenticate desi nated users within a ana er do ain usin their ana er user na e and password.

f you want to enable e ternal authentication on your syste you need windows ersion . or later and any re uire ents outlined in the *Compaq Advanced Server for OpenVMS Server Installation and Configuration Guide* and the *Compaq PATHWORKS for OpenVMS Server Installation and Configuration Guide*. See these anuals and the *OpenVMS Guide to System Security* for detailed infor ation about usin e ternal au thentication. or additional infor ation on d anced

Ser er for pen S and P TH S for pen S refer to the ssociated Products section of this SP .

sers who are e ternally authenticated by their ana er need only re e ber a sin le user na e password co bination to ain access to their pen S and ana er accounts. n addition the pen S co and S T P SS has been enhanced to update the user s password in the ana er do ain database as well as optionally syn chroni e the S S password .

or e ternally authenticated users the nor al syste authori ation database S S . T is used to con struct the pen S process profil pri ile es uotas and so on and to apply specifi lo in restric tions. Howe er there are two ey differences between e ternally authenticated users and nor al pen S users. or e ternally authenticated users

The password stored in the S S is not the pass word used to erify the user at lo in ti e.

The S S user na e selected to be used for pen S process identificatio ay not be the sa e as the ana er user na e that was used to authenticate the user at lo in. The syste an a er specifie the ana er to pen S user na e appin for each user.

Security APIs

Security P s for intrusion detection pro y access and i personation ser ices are a ailable on both the l pha and platfor s to pro ide better security in client ser er applications.

The Security Persona ser ices pro ide the ability to sup port alternate security odels. pen S security per sona ser ices allow pen S applications the ability to attach T or any other on pen S security creden tials to an pen S security profile

Government Security Ratings

s the followin table illustrates pen S is co it ted to consistently deli erin rated security in our base products.

Version	Rating	Evaluation Date
pen S lpha . H		
pen S lpha .		
S S lpha .		
pen S .		
S S .		
pen S .		
S S .		
S .		
urrently in TS atin		

These ratin s represent the ational o puter Secu rity enter alidation of the desi n of the pen S and S S operatin syste s a ainst *DoD 5200.28-STD Department of Defense Trusted Computer System Evaluation Criteria*. To obtain an e aluation su ary please isit the S S at Trusted Product aluation Pro ra TP P ho epa e at

http www.radiu .ncsc. il tpep epl historical.ht l

pen S pro ides a rich set of tools to control user ac cess to syste controlled data structures and de ices that store infor ation. pen S e ploys a reference onitor concept that ediates all access atte pts be tween sub ects such as user processes and security rele ant syste ob ects such as files pen S also pro ides a syste security audit lo fil that records the results of all ob ect access atte pts. The audit lo can also be used to capture infor ation re ardin a wide ariety of other security rele ant e ents.

The syste ana er aintains user account infor a tion in the syste user authori ation fil S S . hen creatin user accounts with the uthori e utility the syste ana er assi ns the pri ile es and uotas associated with each user account. The syste an a er also assi ns a user na e password and uni ue user identificatio code to each account. ddi tional identifier can be assi ned to each account al lowin users to belon to ultiple o erlappin roups or pro ects. The syste ana er can li it account use by the ti e of day day of wee and type of access such as local re ote networ or batch.

To lo in and ain access to the syste the user ust supply a alid user na e and password. The pass word is encoded and does not appear on ter inal dis plays. sers can chan e their password oluntarily or the syste ana er can specify how fre uently pass words chan e alon with ini u password len th and the use of rando ly enerated passwords.

pen S pro ides a password dictionary filte that screens password choices for co on words and a user password history filte that pre ents users fro re usin passwords that they ha e used within the past year. n addition to these built in filters a site can desi n and install its own filte to screen passwords accordin to a site specifi password policy.

The syste password hash al orith can also be re placed with a pri ate al orith for those sites that ha e contractual obli ations to use specifi public or pri ate password encryption al orith s. The syste ana er can enable this feature on a per user per password ba sis.

o in security includes brea in detection which dis ables ter inals when password uessin is detected. sers retain a secure lo in path which can thwart Tro an horse attac s a ainst local ter inals. dditionally the syste ana er can associate a syste password with dial in ter inal lines to pre ent the display of any operatin syste specifi identificatio that i ht yield clues to possible attac ethods. hen a user lo s in the syste displays a essa e statin when the last lo in for the account occurred and the nu ber of failed atte pts since the last successful lo in.

ery security rele ant syste ob ect is labeled with the of its owner alon with a si ple protection as . The owner consists of two fields the user fiel and a roup field Syste ob ects also ha e a protec tion as that allows read write e ecute and delete access to the ob ect s owner roup pri ile ed syste users and to all other users. The syste ana er can protect syste ob ects with access control lists s that allow access to be ranted or denied to a list of in di idual users roups or identifiers s can also be used to audit access atte pts to critical syste ob ects.

pen S applies full protection to the followin syste ob ects

apabilities only

o on e ent fla clusters

e ices

iles

roup lobal sections

o ical na e tables

atch print ueues

esource do ains

Security classes

Syste lobal sections

olu es S

olu es S

pen S pro ides security attribute defaults in the for of security profil te plates. These te plates are referenced whene er a new ob ect is created and pro ide a eans of associatin default security infor ation with each syste ob ect class e cept for files Protec tion infor ation for file is inherited fro the pre ious ersion of an e istin file the parent directory or the default protection of the creatin process.

ata sca en in protection can be enabled in the for of hi h water ar in and erase on delete attributes. These attributes ensure that the contents of a fil can not be read after the fil has been deleted. The syste ana er can enforce fil erasure on a per olu e basis. The syste ana er can also replace the dis erasure pattern with a pri ate pattern for those sites that ha e contractual obli ations to use a specifi pattern.

Security auditin is pro ided for the selecti e recordin of security related e ents. This auditin infor ation can be directed to security operator ter inals alar s or to the syste security audit lo fil audits . ach au dit record contains the date and ti e of the e ent the identity of the associated user process and additional infor ation specifi to each e ent.

pen S pro ides security auditin for the followin e ents

o in and lo out

o in failures and brea in atte pts

b ect creation access deaccess and deletion se lectable by use of pri ile e type of access and on indi idual ob ects

uthori ation database chan es

etwor lo ical lin connections for net for pen S net Plus windows P and S S

se of identifier or pri ile es

nstalled i a e additions deletions and replace ents

olu e ounts and dis ounts

se of the etwor ontrol Pro ra P utility

se or failed use of indi idual pri ile es

se of indi idual process control syste ser ices

Syste para eter chan es

Syste ti e chan es and recalibrations

Note: ecause no syste can pro ide co plete se curity o pa cannot uarantee co plete syste se curity. Howe er o pa continues to enhance the security capabilities of its products. usto ers are

stron ly ad ised to follow all industry reco ni ed secu rity practices. pen S reco ended procedures are included in the *OpenVMS Guide to System Security*.

OPERATING SYSTEM ENVIRONMENT

OpenVMS VAX Processes and Scheduling

The basic unit of e ecution in pen S is the pro cess. process consists of indi idual address space and re isters nown as conte t and code called an e ecutable i a e. The conte t identifie the process and describes its current state. ecutable i a es consist of syste pro ra s and user pro ra s that ha e been co piled and lin ed.

The a i u nu ber of concurrent processes is per pen S syste .

Processes recei e ti e to e ecute their i a es based on the priority. Thirty two priorities are reco ni ed on pen S and priorities are reco ni ed on pen S lpha. Priorities to are for ti esharin processes and applications four is the typical default for ti esharin processes . Priorities to on and to on lpha are for real ti e processes.

ach ti e an e ent such as an interrupt occurs the syste ser ices the e ent firs and then passes control to the hi hest priority process ready to e ecute. The syste auto atically ad usts the priorities of processes in the ran e of to to fa or bound and interacti e processes. Howe er the syste does not ad ust the priority of a process in the ran e of to for or to for lpha.

eal ti e processes can be assi ned hi her priorities to ensure that they recei e processor ti e whene er they are ready to e ecute. eal ti e processes are sched uled pree pti ely that is if a real ti e process is ready to e ecute it is i en to the processor i ediately un less a process with a hi her priority is ready to e ecute.

pen S uses pa in and swappin to pro ide suf ficien irtual e ory for concurrently e ecutin pro cesses. Pa in and swappin are also pro ided for processes whose e ory re uire ents e ceed a ail able physical e ory. The a i u wor in set si e is of e ory for and for lpha.

Pro ra ers can control e ory ana e ent fro within an i a e. n i a e e ecutin in a real ti e pro cess for e a ple can inhibit pa in or swappin of critical code and data.

Peripheral de ices can be ana ed by the syste or al located by indi idual processes. t least one dis ust be a syste dis . ther dis s can be desi nated as data dis s for the eneral use of all users lo in in to the syste or for a specifi roup of users. The syste controls interacti e ter inals and one or ore printers.

OpenVMS Alpha Processes and Scheduling

The basic unit of e ecution in pen S lpha is the ernel thread. ernel thread consists of indi idual ad dress space and re isters nown as conte t and code called an e ecutable i a e. The conte t identifie the ernel thread and describes its current state. ach pro cess can ha e up to ernel threads. ecutable i a es consist of syste pro ra s and user pro ra s that ha e been co piled and lin ed.

The a i u nu ber of concurrent processes is per pen S lpha syste .

ernel threads recei e processor ti e to e ecute their i a es based on the priority of the process. Thirty two priorities are reco ni ed on pen S and priorities are reco ni ed on pen S lpha. Priorities to are for ti e sharin processes and applications four is the typical default for ti esharin processes . Priorities to on and to on lpha are for real ti e processes.

ach ti e an e ent such as an interrupt occurs the syste firs ser ices the e ent and then passes con trol to the hi hest priority ernel thread ready to e e cute. The syste ad usts the priorities of ernel threads whose base priority is in the ran e of to to fa or bound and interacti e processes. Howe er the sys te does not ad ust the priority of a ernel thread in the ran e of to for or to for lpha.

eal ti e processes can be assi ned hi her priorities to ensure that they recei e processor ti e whene er they are ready to e ecute. eal ti e processes are sched uled pree pti ely that is if a real ti e process is ready to e ecute it is i en to the processor i ediately un less a hi her priority process is ready to e ecute.

pen S uses pa in and swappin to pro ide suf ficien irtual e ory for concurrently e ecutin pro cesses. Pa in and swappin is also pro ided for pro cesses whose e ory re uire ents e ceed a ailable physical e ory.

Pro ra ers can control e ory ana e ent fro within an i a e. n i a e e ecutin in a real ti e pro cess for e a ple can inhibit pa in or swappin of critical code and data.

Peripheral de ices can be ana ed by the syste or al located by indi idual processes. t least one dis ust be a syste dis . ther dis s can be desi nated as data dis s for the eneral use of all users lo in in to the syste or for a specifi roup of users. The syste controls interacti e ter inals and one or ore printers.

64-Bit Virtual Addressing (Alpha Only)

The pen S lpha operatin syste pro ides sup port for bit irtual e ory addressin . This capa bility a es the T irtual address space define by the lpha architecture a ailable to the pen S lpha operatin syste and to application pro ra s. uture hardware i ple entations will pro ide reater capacity. pen S lpha co pilers and applications ta e ad anta e of bit processin by usin bit data types. efer to the SP s for the pen S lpha co pilers for further details. ote that the application irtual address space defaults to a bit i ple entation for co pati bility and i ration purposes.

Very Large Memory (VLM) Features (Alpha Only)

pen S lpha pro ides the followin additional e ory ana e ent features beyond those pro ided by bit irtual addressin

e ory resident lobal sections

ast for lobal sections

Shared pa e tables

pandable lobal pa e table

eser ed e ory re istry

Memory-resident global sections allow a database ser er to eep lar er a ounts of hot data cached in physical e ory. The database ser er then accesses the data directly fro physical e ory without perfor in read operations fro the database file on dis . ith faster access to the data in physical e ory run ti e perfor ance increases dra atically.

s of pen S lpha ersion . applications that share a lar e e ory resident cache can use ast for e ory shared by processes throu h lobal sec tions. ast i pro es the ability of a application such as a database ser er to handle lar er capacities and hi her data throu hput rates. y reducin the P costs per re uest ast and e ory resident lobal sections dra atically increase perfor ance for critical database ser er operations.

Shared page tables allow that sa e database ser er to reduce the a ount of physical e ory consu ed within the syste . ecause ultiple ser er processes share the sa e physical pa e tables that ap the lar e database cache an pen S lpha syste can sup port ore ser er processes. This increases o erall sys te capacity and decreases response ti e to client re uests.

lso with shared pa e tables the database ser er startup ti e is dra atically reduced because ser er pro cesses can ap e ory resident lobal sections hun dreds of ti es faster than traditional lobal sections. ith a ultiple i abyte lobal database cache the ser er startup perfor ance ains can be si nificant

The syste para eters *GBLPAGES* and *GBLPAGFIL* are dyna ic para eters. sers with the pri ile e can chan e these para eter alues on a runnin syste . ncreasin the alue of the P S para eter allows the lobal pa e table to e pand on de and up to the new a i u si e.

The *Reserved Memory Registry* supports e ory resident lobal sections and shared pa e tables. Throu h its interface within the S S utility the e ser ed e ory e istry allows an pen S syste to be confi ure with lar e a ounts of e ory set aside for use within e ory resident sections or other pri i le ed code. The eser ed e ory e istry also allows an pen S syste to be properly tuned throu h T thus accountin for the preallocated reser ed e ory.

Extended Physical Addressing (VAX Only)

Physical address space is bits. The pen S operatin syste can pro ide . of physical e ory and . of and adapter space. This enables lar e applications and wor loads to access the lar e a ounts of physical e ory that they re uire. The fol lowin table lists the processors that support this e tended physical addressin

System	Accessible Physical Memory	I/O and Adapter Space
odel	.	.
series	.	.
series	.	.

Vector Processing (VAX Only)

sin le data ite with only one alue is nown as a scalar alue. roup of related scalar alues or ele ents with the sa e data type is nown as a ector.

n e tension to the architecture define an op tional desi n for inte rated ector processin that has been adopted by se eral syste s. The ec tor architecture includes si teen bit ector re isters throu h each containin ele ents ector control re isters ector function units and a set of ec tor instructions. ector instructions transfer data between the ector re isters and e ory perfor inte er and floatin poin arith etic and e ecute processor control functions.

ore detailed description of the ector architec ture ector re isters and ector instructions appears in the *VAX MACRO and Instruction Set Reference Manual*.

The pen S operatin syste pro ides fully shared ultipro ra in support for ector pro cessin syste s. y default pen S loads ec tor support code when initiali in ector present sys te s but does not load it when initiali in ector absent syste s. Syste ana ers can control this beha ior by usin the T P syste para eter.

The presence of ector support code in a syste has little effect on processes runnin in a scalar only sys te or scalar processes runnin in a ector present syste . f any processes ust co pete si ultane ously for ector processor resources the syste an a er can aintain ood perfor ance by ad ustin sys te resources and process uotas.

The pen S operatin syste a es the ser ices of the ector processor a ailable to syste users by eans of a software abstract nown as a capabil ity. syste ana er can restrict the use of the ector processor to users holdin a particular identifie by as sociatin an entry with the T ob ect.

The ector nstruction ulation acility is a standard feature of the pen S operatin sys te . t allows ectori ed applications to be written and debu ed in a syste in which ector processors are not a ailable. e ulates the ector pro cessin en iron ent includin the nonpri ile ed ector instructions and the pen S ector sys te ser ices. se of is restricted to code in user ode.

DECdtm Services

The dt ser ices e bedded in the pen S oper atin syste support fully distributed databases usin a two phase co it protocol. The dt ser ices pro ide the technolo y and features for distributed process in ensurin both transaction and database inte rity across ultiple o pa resource ana ers. pdates to distributed databases occur as a sin le all or nothin unit of wor re ardless of where the data physically re sides. This ensures the consistency of distributed data.

dt ser ices allow applications to defin lobal transactions that can include calls to any nu ber of o pa data ana e ent products. e ardless of the i of data ana e ent products used the lobal transaction either co its or aborts. pen S is uni ue in pro idin transaction processin functionality with base operatin syste ser ices.

dt features include

bedded pen S syste ser ices that support the tp architecture pro idin the features and technolo y for distributed transaction processin .

bility for ultiple dis oint resources to be updated auto atically. These resources can be either physi cally dis ointed on different clusters at separate sites or lo ically dis ointed in different databases on the sa e node.

obust application de elop ent. pplications can be written to ensure that data is ne er in an incon sistent state e en in the e ent of syste failures.

bility to be called usin any o pa TP onitor or database product. This is useful for applications usin se eral o pa database products.

Interprocess Communication

pen S pro ides the followin facilities for applica tions that consist of ultiple cooperatin processes

ailbo es as irtual de ices that allow processes to co unicate with ueued essa es.

Shared e ory sections on a sin le processor or an S P syste that per it ultiple processes to access shared address space concurrently.

ala ywide sections on a ala y platfor that per it ultiple processes in ultiple instances to access shared address space concurrently.

o on e ent fla that pro ide si ple synchro ni ation.

loc ana er that pro ides a ore co prehen si e en ueue de ueue facility with ultile el loc s alues and asynchronous syste traps STs .

ntracluster co unication ser ices throu h which two processes runnin on the sa e syste or on dif ferent pen S luster nodes can establish a con nection and e chan e data.

o ical na es throu h which one process can pass infor ation to other processes runnin on the sa e syste or on different pen S luster nodes.

etwor interprocess co unication is a ailable ia T P P Ser ices and net P S product li censes are re uired .

Symmetric Multiprocessing (SMP)

pen S pro ides sy etric ultiprocessin S P support for both lpha and ultiprocessor sys te s. S P is a for of ti htly coupled ultiprocessin in which all processors perfor operations si ultane ously. ll processors perfor operations in all pen S access odes user super isor e ecuti e and ernel.

pen S S P confi uration consist of ultiple P s e ecutin code fro a sin le shared e ory address space. sers and processes share a sin le copy of pen S lpha or pen S address space. S P also pro ides si ultaneous shared access to co on data in lobal sections to all processors. pen S S P selects the P where a process will run based on its priority and in special cases as directed by the application. pen S uses a speciali ed schedulin al orith when runnin a nonunifor e ory access platfor .

S P support is an inte ral part of pen S and is pro ided to the user transparently. ecause an S P syste is a sin le syste entity it is confi ure into a networ and pen S luster confi uration as a sin le node.

Networking Facilities

pen S pro ides de ice dri ers for all o pa local area networ adapters listed in the ptions section of ppendi of this SP . pplication pro ra ers can use the syste ser ice to co unicate with other syste s connected ia the usin either thernet or nstitute of lectrical and lectronics n i neers . pac et for at. Si ultaneous use of o pa thernet and the . protocols are supported on any o pa adapter.

pen S supports the standards define by the T oru s ersion . specification for e u lation o er an T networ . y i ple entin an e u lated o er an T networ you enable a roup of T stations to act li e a traditional . e ulated o er an T networ allows you to run your e istin ap plications basically unchan ed while the co puters on which your applications are runnin are connected to the T networ .

net Plus offers tas to tas co unications fil ana e ent downline syste and tas loadin net wor co and ter inals and networ resource shar in capabilities as define in the T etwor r chitecture Phase protocols. net Plus pro ides the newest net features such as e tended addressin and downline load perfor ance enhance ents. net Plus inte rates net and S pro tocols and now pro ides a lin a e to T P P usin e uest for o ents and . net and S applications can now be run o er net SP S S and T P P transports.

net for pen S and lpha offers the net wor in capabilities as define in the T etwor rchitecture Phase . or ore infor ation re fer to the net Plus and net Software portion of the ssociated Products section of this SP .

Terminal Server Products

o pa s ter inal ser er products pro ide ter inal ser er access to pen S. hen used in an pen S luster en iron ent ter inal ser ers distribute users across the a ailable lpha and syste s at lo in ti e.

pen S can also establish a connection to other de ices such as printers attached to such ter inal ser ers.

Reliability

pen S handles hardware errors as transparently as possible while aintainin data inte rity and pro idin sufficien infor ation to dia nose errors. The syste li its the effects of an error by firs deter inin if the error is fatal. f the error occurs in syste conte t the current pen S syste shuts down. f the error is not fatal the syste reco ers actions pertinent to the error and continues the current operation.

n all cases infor ation rele ant to the error is written to the error lo fil for later analysis. Hardware errors include the followin cate ories

Processor errors. These include processor soft errors processor hard errors processor achine chec s and adapter errors.

Memory errors. These can be unreco erable hard errors or reco erable soft errors. The syste e a ines e ory at startup ti e and does not use any bad pa es. urin syste operation the sys te corrects all sin le bit e ory errors for those syste s with error correction code e ory. n pen S an unreco erable error causes the e ory pa e on which the error occurred to be added to the bad pa e list. f the pa e has not been odified syste operation continues with a new copy of the pa e.

Correctable memory errors. pri ary cause of these correctable e ory errors is alpha particle radiation. n so e processors when correctable e ory errors occur the e ory controller corrects only the data returned to the P or controller. The actual data in e ory is left with the error intact. Subse uent read operations cause correction cycles to occur and in ost cases an interrupt to report the error. n any of these processors pen S onitors the occurrence of correctable e ory er rors and in al ost all cases is able to re o e the er ror condition by rewritin the data in e ory. ewrit in the data causes the data to be corrected in that e ory location. n pen S if the cause of the error is not transient and the error condition persists the operatin syste atte pts to o e the data fro the e istin pa e which contains the error

to a new pa e. The ori inal pa e is then retired fro use.

ther failures include

peratin syste errors syste detected inconsis tencies or architectural errors in syste conte t

ser errors

errors

The syste lo s all processor errors all operatin syste errors detected throu h internal consistency chec s all double bit e ory errors and a su ary of corrected sin le bit e ory errors and ost er rors.

f the syste is shut down because of an unreco erable hardware or software error a du p of physical e ory is written. The du p includes the contents of the processor re isters. The pen S Syste u p n aly er S utility is pro ided for analy in e ory du ps.

Power Failures (VAX Only)

f the power fails the syste shuts down auto atically. hen power is restored the syste restarts auto ati cally and resu es processin at the point of interruption under these circu stances

f the syste has a ti e of day cloc and a e ory battery bac up unit

f the contents of e ory are still alid

f the syste is set to per it auto atic rebootin

The syste restarts de ice and co unication lines and all operations in pro ress includin a netic tape operations. n re uest pro ra s can be noti fie of power restoration. n optional battery operated hardware cloc resets the date and ti e of day when the syste restarts. f the syste does not ha e a bat tery bac up unit or if the e ory contents are not alid on power restoration the syste reboots auto atically if it is set to per it auto atic rebootin .

f for any reason after a power failure the syste dis does not co e bac on line within a specifi ti e after the P re ains power the syste shuts down.

Input/Output

The syste ser ice and other related ser ices pro ide a direct interface to the operatin syste s routines. These ser ices are a ailable fro within ost pen S pro ra in lan ua es and can be used to perfor low le el operations efficientl with a ini al a ount of syste o erhead for ti e critical appli cations.

e ice dri ers e ecute instructions to transfer data to and fro a de ice and to co unicate directly with an de ice. ach type of de ice re uires its own dri er. o pa supplies dri ers for all de ices sup ported by the pen S operatin syste and pro ides syste ser ice routines to access the special fea tures a ailable in any of these de ices.

pen S supports a ariety of dis and tape periph eral de ices as well as ter inals networ s and ail bo es irtual de ices for interprocess co unication and ore eneral de ices.

ith pen S lpha users can write dri ers for de ices that do not ha e inherent pen S support. pen S lpha allows de ice dri ers to be written in o pa and . ocu entation is a ail able that describes how to write pen S lpha de ice dri ers and how to con ert e istin pen S dri ers to run on pen S lpha syste s. The o pa co piler for pen S lpha is an optional lay ered product.

ith pen S users can write their own dri ers in for de ices that do not ha e inher ent pen S support as described in the appropriate docu entation.

I/O Performance Features

ast pro ides a suite of additional syste ser ices that applications can use to i pro e throu hput. The fast ser ices ini i e the P resources re uired to perfor .

ast Path pro ides a strea lined ainline code path throu h the subsyste to i pro e both uniprocessor and ultiprocessor perfor ance. n ultiprocessor syste s ast Path allows all P processin for spe cifi adapters to be handled by a specifi P . This can si nificantl lower the de ands on the pri ary P and increase the throu hput on ultiprocessor sys te s with ultiple ports. The port and S dis dri ers ha e been enhanced to ta e ad anta e of the ast Path capability. o user application chan es are needed to ta e ad anta e of ast Path. ast Path can be utili ed by the syste ser ice or the ast ser ices.

Virtual I/O Cache

pen S pro ides a standalone or clusterwide file oriented dis cache. pplications benefi fro the ad anta es of the irtual cache without any special codin . The irtual file cachin al orith is chosen based on the type of clusterwide access currently in pro ress. irtual cachin reduces current and po tential bottlenec s within pen S syste s. t re duces the nu ber of s to the dis subsyste thereby reducin syste wide bottlenec s.

Record Management Services (RMS)

S is a set of ser ices that helps application pro ra s to process and ana e file and records. l thou h it is intended to pro ide a co prehensi e soft ware interface to ass stora e de ices S also sup ports de ice independent access to unit record de ices.

S supports se uential relati e and inde ed fil or ani ations in fi ed len t and ariable len th record for ats. S also supports byte strea for ats for se uential fil or ani ation.

S record access odes pro ide access to records in four ways

Se uentially

irectly by ey alue

irectly by relati e record nu ber

irectly by record fil address

S also supports bloc operations for ari ous perfor ance critical applications that re uire user define fil or ani ations and record for ats.

S pro otes safe and efficien fil sharin by pro idin ultiple fil access odes and auto atic record loc in where applicable . S offers the options of enablin lobal buffers for buffer sharin by ultiple pro cesses.

S utilities aid fil creation and record aintenance. These utilities con ert file fro one or ani ation and for at to another restructure inde ed file for stora e and access efficiency and reclai data structures within inde ed files These utilities also enerate appropriate reports.

or syste s that ha e net for pen S and lpha or net Plus installed S pro ides a sub set of fil and record ana e ent ser ices to re ote networ nodes. e ote fil operations are enerally transparent to user pro ra s.

o ands such as T T P T P and P T allow users to anipulate S records within S file at the co and le el.

Disk and Tape Volumes

The syste ana er can or ani e dis olu es into olu e sets. olu e sets can contain a i of dis de ice types and can be e tended by addin olu es. ithin a olu e set file of any or ani ation type can span ultiple olu es. iles can be allocated to the set as a whole the default or to specifi olu es within the set. ptionally the syste ana er can allocate portions of inde ed file to specifi areas of a sin le dis or to specifi olu es in a olu e set.

The syste ana er can place uotas on a dis to con trol the a ount of space indi idual users can allocate. uota assi n ent is ade by and can be controlled for each indi idual olu e set in the syste or for each indi idual olu e if the olu e is not part of a set .

The syste ana er can cache dis structure infor ation in e ory to reduce the o erhead re uired for fil ana e ent ser ices. lthou h not re uired to do so users can preallocate space and control auto atic allocation. or e a ple a fil can be e tended by a i en nu ber of bloc s conti uously or noncon ti uously for opti al fil syste perfor ance.

The syste applies software alidity chec s and chec su s to critical dis structure infor ation. f a dis is i properly dis ounted because of user error or syste failure the syste rebuilds the dis s structure infor a tion auto atically the ne t ti e the dis is ounted. The syste detects bad bloc s and pre ents their reuse once the file to which the bloc s were allocated are deleted. n T Stora e rchitecture S dis s the dis controller detects and replaces bad bloc s au to atically.

The syste pro ides le els of na ed directories and subdirectories whose contents are alphabetically ordered. e ice and fil specification follow o pa con entions. sers can use lo ical na es to abbre i ate the specification and to a e application pro ra s de ice and fil na e independent. sers can assi n a lo ical na e to an entire specification to a portion of a specification or to another lo ical na e.

pen S supports ulti olu e a netic tape file with transparent olu e switchin . ccess positionin is done either by fil na e or by relati e fil position.

OpenVMS Alpha Support for New AlphaServer GS Series Systems

pen S ersion . pro ides support for o pa s lphaSer er S S and S syste s. This support includes

pen S support for hard and soft partitions ala y on lphaSer er S S and S syste s

pen S esource ffinit o ain support for applications

pen S Support for P nline eplace

OpenVMS Support for Hard and Soft Partitions

Hard partitionin is a physical separation of co put in resources by hardware enforced access barriers. t is i possible to read or write across a hard partition boundary. There is no resource sharin between hard partitions.

Soft partitionin is a separation of co putin resources by software controlled access barriers. ead and write access across a soft partition boundary is controlled by the operatin syste . pen S ala y is an i ple entation of soft partitionin .

The way that custo ers choose to partition their sys te s depends on their co putin en iron ents and ap plication re uire ents. or ore infor ation about us in hard partitions and pen S ala y see the *OpenVMS Alpha Partitioning and Galaxy Guide*.

OpenVMS Application Support for Resource Affinity Domains (RADs)

The lar e a ount of physical e ory in the l phaSer er S syste s pro ides opportuni ties for e tre ely lar e databases to be co pletely in e ory. The nonunifor e ory access sys te architecture of the new lphaSer er S syste s pro ides the bandwidth to efficientl access this lar e a ount of e ory. is an attribute of a syste in which the access ti e to any i en physical e ory is not the sa e for all P s.

pen S lpha ersion . includes aware ness in pen S e ory ana e ent and process schedulin . This capability application support for re source affinit do ains ensures that applications run nin in a sin le instance of pen S on ultiple uad buildin bloc s s can e ecute as efficientl as pos sible in a en iron ent.

The operatin syste treats the hardware as a set of **resource affinity domains (RADs)**. is a set of hardware co ponents P s e ory and with co on access characteristics. n lphaSer er S syste s a corresponds to a uad build in bloc in an lphaSer er S S or S syste .

or ore infor ation about usin the pen S support for application features see the *OpenVMS Alpha Partitioning and Galaxy Guide*.

E-BUSINESS TECHNOLOGIES

The o pa pen S e usiness nfrastructure Pac a e pro ides ey nternet and e usiness software tech nolo y that enhances the pen S lpha operatin syste . ll of the co ponents are supported on pen S lpha ersion . and hi her. These technolo ies are licensed as part of the o pa pen S l pha peratin Syste and are pro ided on the pen S e usiness nfrastructure order nu ber H . dditional details can be found in the pen S e usiness nfrastructure Pac a e Software Product escription SP . . . ost of these technolo ies can also be downloaded fro http www.open s.co pa .co ebusiness inde .ht l

Java 2 Software Development Kit for OpenVMS Alpha

The a a Software e elop ent it S pro ides an en iron ent in which to de elop and deploy a a applications on pen S lpha. a a applications can be written once and run on any operatin syste that i ple ents the a a run ti e en iron ent which con sists pri arily of the a a irtual achine .

The a a S is a set of buildin bloc s containin basic de elop ent tools and a rich set of class libraries includin

- a a o piler
- a a irtual achine
- a a lass ibraries
- a a pplet iewer
- a a ebu er and other tools
- P S threads pthreads i ple entation that pro ides increased perfor ance on ultiprocessor sys te s
- le ible options for representin directory and fil specification on pen S syste

Ser ices for the a a S for pen S lpha are pro ided under e istin pen S peratin Syste ser ice a ree ents.

Compaq Secure Web Server for OpenVMS Alpha

o pa Secure eb Ser er for pen S lpha S S pro ides a powerful fle ibl web ser er based on the popular pache eb Ser er . . fro the pache Software oundation and pro ides the follow in features

- HTTP . co pliance
- ll standard pache e tensions odules
- Perl support od perl
- a a support od ser
- Secure Soc ets ayer SS support od ssl usin penSS and S rypto S
- i ital certificate fro eriSi n nc.

Ser ices for o pa Secure eb Ser er for pen S lpha are pro ided under e istin pen S peratin Syste ser ice a ree ents.

Attunity Connect "On Platform" Package

ttunity onnect is ob ect oriented iddleware that fa cilitates the de elop ent of applications that access in te rate and update data fro ultiple hetero eneous sources across a wide ran e of operatin syste plat for s.

The ttunity onnect n Platfor pac a e for pen S pro ides the and client P s and and racle i adapters for accessin data sources. dditional data adapters for pen S lpha and ttunity onnect are a ailable directly fro ttunity.

The full ttunity onnect product pro ides and client P s and adapters for a lar e nu ber of relational and nonrelational data sources and support for a lar e nu ber of popular plat for s includin indows pen S Tande and ainfra es.

Ser ices for the ttunity onnect n Platfor Pac a e for pen S lpha are pro ided under e istin pen S peratin Syste ser ice a ree ents.

Extensible Markup Language (XML) Technology

sin open source software fro pache Software oundation an parser and an S T stylesheet processor are pro ided that i e applications the ability to parse enerate anipulate alidate and transfor docu ents and data.

Ser ices for the Technolo y for pen S lpha are pro ided under e istin pen S peratin Sys te ser ice a ree ents.

Compaq OpenVMS Enterprise Directory for e-Business (LDAPv3/X.500)

The o pa pen S nterprise irectory for e usiness based on the . standard deli ers ro bust and scaleable directory ser ices across intranets e tranets and the nternet to custo ers suppliers and partners. t co bines the best of both the industry stan dard P and . capabilities. The for er allows access by a yriad of i htwei ht irectory ccess Pro tocol P clients user a ents and applications and the latter brin s ery hi h perfor ance resilience ad anced access controls and easy replication across the enterprise.

ertifie with ntrust P this directory ensures at si n on that all users ay be authenticated with ero latency and that each ains access only to those re sources they are authori ed to use.

The pen S nterprise irectory for e usiness ay contain infor ation on anythin of interest includin people syste s networ resources applications au thentication certificate and databases. t is desi ned to be accessed by indi idual users applications and soft ware de elopers. oth the established P interface and the P interface ay be accessed si ultane ously by disparate applications thereby deli erin full inte ration with e istin en iron ents.

The pen S nterprise irectory for e usiness is a ailable on the pen S e usiness nfrastructure . t is also a ailable on the pen S lpha Software ayered Products ibrary. Software Support Ser ice for this product is sold separately. or further infor ation refer to the o pa pen S nterprise irectory for e usiness Software Product escription SP . .

Reliable Transaction Router

eliable Transaction outer T is fault tolerant transactional essa in iddleware used to i ple ent lar e distributed applications usin client ser er tech nolo y. eliable Transaction outer enables co putin enterprises to deploy distributed applications on pen S lpha and syste s.

Software Support Ser ice for this product is sold sep arately. efer to the eliable Transaction outer for pen S Software Product escription SP . . for additional infor ation.

Compaq BridgeWorks

o pa rid e or s is a distributed application de el op ent and deploy ent tool for pen S appli cations. o pa rid e or s consists of a de el op ent tool on the indows T des top a ser er an a er co ponent on pen S and e tensi e online help. o pa rid e or s pro ides de elopers with an easy eans to create distributed applications usin pen S as the enterprise ser er and indows T as the depart ental ser er. o pa rid e or s enables software de elopers to de elop co ponents that encap sulate selected functionality in pen S applica tions usin an interacti e P en iron ent. t enerates all the necessary file and code to build these co po nents into a three tier distributed connection. o po nents enerated by o pa rid e or s use estab lished standard technolo ies internally includin P and .

o pa rid e or s does not directly assist with the de elop ent of the clients it pro ides the code that e poses the routine as a co ponent. The client can be de eloped usin any capable tool such as i sual asic isual and any scriptin tools.

Software Support Ser ice for this product is sold sepa rately.

Compaq COM for OpenVMS

o ponent b ect odel is a technolo y fro icrosoft that allows de elopers to create distributed networ ob ects. o pa o puter orporation and icrosoft ointly de eloped the specification irst released by icrosoft on indows T as etwor b ect in in and beddin et and then re na ed istributed the specifica tion now includes networ ob ects.

is used to create distributed applications ade up of reusable ob ects. locates ob ects locally or in a networ and uses the e ote Procedure all P wire protocol to co unicate between these ob ects across the networ .

on pen S deli ers connecti ity and interoper ability between pen S and indows T syste s. ith o pa for pen S pro ra ers write distributed applications that run across a hetero eneous en iron ent of syste s. o pa for pen S is based on the icrosoft shipped on indows T . SP and i ple ents any of the features of i crosoft includin acti ation auto ation oni ers Type ibraries and structured stora e on pen S.

on pen S re uires pen S lpha ersion . or hi her.

The binary it for both de eloper it and run ti e ships on the pen S e usiness nfrastructure . is not a ailable on . Software Sup port Ser ice for this product is sold separately. or ore infor ation see the o pa for pen S Soft ware Product escription SP . . .

Netscape FastTrack Server for OpenVMS Alpha

etscape astTrac Ser er ersion . for pen S lpha is a eneral purpose eb ser er for creatin buildin publishin and ser in eb pa es and ap plications.

etscape astTrac Ser er is bein replaced by o pa Secure eb Ser er based upon pache for pen S lpha. astTrac will continue to be supported un til une on pen S ersion . and ersion . syste s.

Ser ices for the etscape astTrac Ser er for pen S lpha are pro ided under e istin pen S ser ice a ree ents.

ASSOCIATED PRODUCTS

The products in this section are not licensed as part of the o pa pen S peratin Syste and re uire a separate license.

Compaq Advanced Server for OpenVMS Alpha

o pa d anced Ser er for pen S is supported on pen S lpha syste s only. o pa d anced Ser er . and . for pen S are supported on pen S lpha ersion . . The d anced Ser er for pen S product e ol ed fro the P TH S for pen S d anced Ser er .

d anced Ser er is an pen S based networ oper atin syste S co patible with icrosoft networ in technolo y. The software lets you establish o pa pen S syste s as ser ers to pro ide indows des top users easy and efficien access to pen S fil and print ser ices. es top users can use icrosoft products and utilities such as indows plorer to ac cess these resources shared o er the networ .

d anced Ser er for pen S co bines the networ in stren ths and rich application set of indows T with the pro en a ailability scalability and security of pen S. The software supports the indows T in te ration features of pen S lpha ersion . and is co patible with indows T and indows ser ers runnin in the sa e networ .

d anced Ser er for pen S can function as a fil and print ser er for a s all isolated co unity of users or as the foundation of a lar e networ distributed o er a wide eo raphical area. The d anced Ser er software also pro ides a fle ibl syste for networ ad inistra tion and security for both wide area networ s s and local area networ s s .

Compaq PATHWORKS for OpenVMS (Advanced Server)

o pa P TH S for pen S d anced Ser er also nown as P TH S d anced Ser er runs on pen S lpha and syste s. oth ersions . and . of o pa P TH S for pen S d anced Ser er are supported on pen S er sion . . P TH S d anced Ser er as with d anced Ser er for pen S is an pen S based networ operatin syste co patible with and enhanc in the icrosoft networ in technolo y and pro idin fil and print ser ices for indows des top users. t is co patible with indows T ser ers runnin in the sa e networ .

Compaq Galaxy Software Architecture on OpenVMS Alpha

o pa ala y Software rchitecture on pen S l pha is a ailable as a separately licensed Syste nte rated Product S P .

y runnin ultiple instances of pen S in a sin le co puter or hard partition an pen S ala y co putin en iron ent i es you uantu i pro e ents in

o patibility istin applications run without chan es.

ailability Presents opportunities to up rade soft ware and e pand syste capacity without downti e.

Scalability ffers scalin alternati es that i pro e perfor ance of S P and cluster en iron ents.

daptability Physical resources can be dyna ically reassi ned to eet chan in wor load de ands.

ost of ownership ewer co puter syste s reduce syste ana e ent re uire ents floo space and ore.

or co panies loo in to i pro e their ability to an a e unpredictable ariable or rowin T wor loads pen S ala y technolo y pro ides a fle ibl way to dyna ically reconfi ur and ana e syste resources.

n pen S ala y co putin en iron ent is ideal for hi h a ailability applications such as

atabase ser ers

Transaction processin syste s

ata warehousin

ata inin

nternet ser ers

ith pen S lpha ersion . and hi her you can create an pen S ala y co putin en iron ent that allows you to run ultiple instances of pen S on lphaSer er syste s and also allows you to

eassi n P s between instances

Perfor independent bootin and shutdown of in stances

se shared e ory for inter instance co unica tion

reate a shared e ory dis with o pa ra for pen S lpha ersion .

luster instances within an pen S ala y usin the shared e ory cluster interconnect

luster instances with non ala y syste s

reate applications usin pen S ala y P s for resource ana e ent e ent notification loc in for synchroni ation and shared e ory for lobal sec tions

se the ala y onfi uratio tility to iew and con trol the pen S ala y en iron ent

un a sin le instance pen S ala y on any l pha syste for application de elop ent

o pa ala y Software rchitecture on pen S l pha re uires pen S lpha ersion . or later.

or ore infor ation about pen S ala y licensin re uire ents refer to the ala y Software rchitecture on pen S lpha Software Product escription SP . . .

or ore infor ation about how to create ana e and use an pen S ala y co putin en iron ent refer to the *OpenVMS Alpha Partitioning and Galaxy Guide*.

Compaq OpenVMS Cluster Software

o pa pen S luster software is a ailable for l pha and syste s as a separately licensed Syste nte rated Product S P . t pro ides a hi hly inte rated pen S co putin en iron ent that is distributed o er ultiple syste s containin up to nodes.

pen S luster syste s and stora e co unicate usin a co bination of the followin interconnects

e ory hannel

T Stora e Syste s nterconnect SS

iber istributed ata nterface

thernet

S all o puter Syste nterface S S

Shared e ory luster nterconnect S ala y only

ibre hannel Stora e nly ersion . and abo e

n addition when confi ure with suitable brid es pen S luster confi uration can use S T and asynchronous transfer ode T networ in infras tructures.

pplications runnin on one or ore nodes in an pen S luster syste share resources in a coor dinated anner. hile updatin data the pen S luster software synchroni es access to shared re sources pre entin ultiple processes on any node in the cluster fro uncoordinated access to shared data. This coordination ensures data inte rity durin concur rent update transactions. pplication pro ra s spec ify the le el of pen S luster fil sharin that is re uired access is then coordinated by the e tended processor P and ecord ana e ent Syste S .

The pen S ueue ana er controls the pen S luster batch and print ueues which can be accessed by any node in the pen S luster. atch obs sub itted to pen S luster ueues are routed to any a ailable P so that the batch load is shared.

The oc ana er pro ides synchroni ed ser ices be tween syste s in a cluster for use by both syste co ponents such as S and P and also for direct use by applications.

Two or ore lpha and co puters connected to the sa e e ory hannel SS or S S interconnect ust be confi ure as e bers of the sa e pen S luster syste . i ed architecture and i ed ersion clusters that contain both lpha syste s and sys te s are supported.

pen S luster syste s pro ide a unifor co put in en iron ent that is hi hly scalable hi hly a ailable and secure. pen S luster software i ple ents a sin le security en iron ent within a cluster confi ura tion. The security subsyste ensures that all cluster isible ob ects aintain consistent security profile and that syste security auditin controls operate cluster wide.

efer to the o pa pen S luster Software Prod uct escription SP . . for ore infor ation.

Compaq Volume Shadowing for OpenVMS

o pa pro ides olu e Shadowin for pen S l pha and products for perfor in dis irrorin op erations usin a redundant array of independent dis s stora e strate y.

o pa olu e Shadowin for pen S is a ailable for lpha and syste s as a separate licensed Sys te nte ration Product S P . olu e Shadowin for pen S pro ides hi h data a ailability for dis de ices by ensurin a ainst data loss that results fro edia deterioration or controller or de ice failure. This pre ents stora e subsyste co ponent failures fro in terruptin syste or application tas s.

The syste dis and iles n is Structure S S data dis s can be olu e shadowed.

olu e Shadowin for pen S supports the cluster wide shadowin of o pa S S and S stora e sys te s. olu e Shadowin for pen S also supports shadowin of all S P ser ed S dis s and o pa S S dis s. ll dis s in a sin le shadow set ust ha e the sa e nu ber of lo ical bloc s. Shadow set e bers can be located on a sin le syste or anywhere in an pen S luster syste . is s can be confi ure on any S P or o pa S S co pliant controller.

olu e Shadowin for pen S pro ides fault toler ance resultin fro dis edia errors or controller errors across the full ran e of lpha and processors and confi urations Shadow set e ber units can be lo cated on different controllers and pen S lpha and pen S S P ser ers pro idin confi uratio fle ibilit and a hi h de ree of data a ailability.

olu e Shadowin for pen S supports up to sin le e ber shadow sets and up to de ices in ultiple e ber two or three e ber shadow sets on a standalone or pen S luster syste .

The binary it for olu e Shadowin ships with the pen S lpha and distribution its. To run the software custo ers ust purchase a license. efer to the o pa *Volume Shadowing for OpenVMS Software Product Description (SPD 27.29.xx)* for ore infor a tion.

Compaq TCP/IP Services for OpenVMS

o pa T P P Ser ices for pen S ersion . and lpha is o pa s industry standard i ple entation of the T P P and S networ in protocols on the pen S platfor . o pa T P P Ser ices for pen S is inte rated with the pen S operat in syste installation. o pa T P P Ser ices for pen S pro ides interoperability and resource shar in a on syste s runnin pen S indows T and other operatin syste s that support T P P. ersion . pro ides a co prehensi e suite of functions and applications that support industry standard proto cols for hetero eneous networ co unications and resource sharin . T P P Ser ices ersion . incor porates the T P P protocols stac fro o pa Tru ersion . .

o pa T P P Ser ice for pen S ersion . pro ides enhance ents such as S the ability to run S o er T P and an nti SP relay for S TP ail. This release also contains nternet Protocol er sion P support for Trans ission ontrol Proto col T P ser ata ra Protocol P raw soc ets and P support for co ands and utilities. This support is for those custo ers who want to start usin P today and for those who want to test or e peri ent with P . This support is in addition to the P support already in T P P Ser ices for pen S.

o pa T P P Ser ices for pen S pro ides a full T P P protocol suite includin P ulticastin yna ic oad alancin lo in P networ fil access re ote ter inal access re ote co and e ecution re ote printin ail application de elop ent Post f fic Protocol P P S P tensible a ent eS P and in er tility.

o pa T P P Ser ices for pen S ersion . ensures transparent bac ward co patibility with earlier

ersions of T P P Ser ices for pen S and is sup ported on pen S lpha ersions . and . and pen S ersions . and . .

Compaq DECnet-Plus and DECnet Software

o pa net for pen S and lpha software is a Syste nte rated Product S P that is licensed separately fro the pen S operatin syste . efer to the o pa net for pen S and lpha Software Product escription SP . . for further infor ation on supported co unications de ices and software features.

o pa net Plus for erly net S is li censed separately fro the pen S operatin sys te . The license for o pa net for pen S and lpha also rants the ri hts to use net Plus. ote that only one ersion of net can be acti e on a sin le syste at any one ti e. efer to the o pa net Plus for pen S lpha Software Product escription SP . . and the o pa net Plus for pen S Software Product e scription SP . . for further infor ation on sup ported hardware confi uration and software features.

Compaq RMS Journaling for OpenVMS

o pa pro ides the S ournalin for pen S l pha and products as separately licensed S Ps that enable a syste ana er user or application to ain tain the data inte rity of S file in the e ent of a nu ber of failure scenarios. These ournalin products protect S fil data fro beco in lost or inconsis tent.

S ournalin pro ides the followin three types of ournalin

After-image journaling. llows users to reapply odification that ha e been ade to a file This type of ournalin allows users to reco er file that are inad ertently deleted lost or corrupted. S ournalin reco ers the fil by applyin the ournaled odification to a bac up copy thereby restorin its fina state. pplication odification are not neces sary to use after i a e ournalin .

Before-image journaling. llows users to re erse odification that ha e been ade to a file This type of ournalin allows users to return a fil to a pre i ously nown state. This is useful if a fil is updated with incorrect or bad data. pplication odification are not necessary to use before i a e ournalin .

Recovery-unit journaling. llows users to aintain transaction inte rity. transaction can be define as a series of fil updates on one or ore files f any failure occurs durin the transaction reco ery unit ournalin rolls bac the partially co pleted transac tion to its startin point. This allows co ple transac tions to be co pleted as an ato ic e ent partially co pleted transactions can be a oided. eco ery unit ournalin re uires application odification

The binary it for S ournalin ships with the pen S lpha and distribution its. To run the software custo ers ust purchase a license and doc u entation. efer to the o pa S ournalin for pen S Software Product escription SP . . for ore infor ation.

Compaq DECram for OpenVMS

o pa ra for pen S is a dis de ice dri er that i pro es perfor ance by allowin an pen S syste ana er to create pseudo dis s dis s that reside in ain e ory. re uently accessed data can be accessed uch faster fro a ra de ice than fro a physical dis de ice. These dis s can be accessed throu h the fil syste ust as physical dis s are accessed re uirin no chan e to application or syste software.

ecause ain e ory is allocated for the ra de ice e tra e ory is enerally re uired. The pen S syste ana er can desi nate the a ount of e ory dedicated to the ra de ice s and the file that will be stored on it.

n o pa ra for pen S ersion . ra s capability is e tended to use pen S ala y shared e ory to create a S shared e ory dis . This will allow custo ers to ta e ad anta e of pen S ala y shared e ory with no odification to any of their applications.

o pa ra for pen S ersion . is sup ported on pen S lpha ersion . H or hi her. o pa ra for pen S ersion . will con tinue to be a ailable and supported on pen S lpha ersions . and . and pen S ersion . or hi her.

ra ersion . cannot run on an pen S syste howe er the dis can be accessed by pen S syste s in an pen S luster sys te .

efer to the o pa ra for pen S Software Product escription SP . . for ore infor a tion.

Compaq DECwindows Motif for OpenVMS

o pa offers a separately licensed layered product called windows otif for pen S. This product pro ides support for both S otif a standards based raphical user interface and the user interface in a sin le run ti e and de elop ent en iron ent.

windows otif displays the S otif user inter face. ecause both otif and are based on onsortiu s indow Syste applications written on either tool it will run re ardless of which en iron ent the user selects. efer to the o pa windows otif for pen S Software Product escription SP . . for ore infor ation.

o pa windows otif ersion . for pen S lpha and hi her deli ers the ew es top en iron ent for pen S lpha syste s which is deri ed fro the o on es top n iron ent technolo y. pro ides and define a consistent user interface for end users and a consistent de elop ent en iron ent for ap plication de elopers across ultiple platfor s.

The pen S software installation procedure contains an optional step to install the windows otif for pen S wor station and font support which is re uired to run the windows otif for pen S lay ered product. efer to the *OpenVMS Alpha Version 7.2 Upgrade and Installation Manual* or *OpenVMS VAX Version 7.2 Upgrade and Installation Manual* for details concernin the optional installation of the windows otif for pen S de ice support.

CONFORMANCE TO STANDARDS

pen S is based on the followin public national and international standards.

Distributed Computing Environment (DCE) Support

The o pa for the pen S product fa ily pro ides a set of the distributed co putin features spec ifie by The pen roup s as well as tools for application de elopers. ith The pen roup has established a standard set of ser ices and inter faces that facilitate the creation use and aintenance of client ser er applications. o pa for pen S ser es as the basis for an open co putin en i ron ent where networ s of ulti endor syste s appear as a sin le syste to the user. ecause a es the underlyin networ s and operatin syste s trans parent application de elopers can easily build portable interoperable client ser er applications. sers can lo cate and share infor ation safely and easily across the entire enterprise. o pa for pen S supplies syste ana ers with a set of tools to consistently an a e the entire distributed co putin en iron ent while assurin the inte rity of the enterprise.

o pa for pen S currently consists of the followin products

un ti e Ser ices for pen S which is re uired for all syste s participatin in the cell. The un ti e Ser ices include client functions as well as ad inistration tools. un ti e Ser ices allow client ser er applications to interoper ate o er net T P P and P P networ pro tocols.

pplication e elopers it for pen S which is re uired for de elopers of distributed appli cations but is optional for other users. The p plication e elopers it pro ides pro ra ers with an nterface efinitio an ua e an easy to use S based lan ua e for writin re ote pro cedure calls.

ell irectory Ser ice S one of which is re uired for each cell. The S is a central repository that contains infor ation about the loca tion of resources in the cell. t allows access to resources by a sin le na e re ardless of their physical location.

o pa Security Ser er one of which is re uired for each . The Security Ser er pro tects resources fro ille al access and pro ides se cure co unications within and between cells.

The ri ht to use the un ti e Ser ices is included with the pen S operatin syste base license. ll other products are a ailable as separate layered products. efer to the o pa istributed o putin n iron ent for pen S Software Product e scription SP . . for ore detailed infor ation.

Support for OSF/Motif and X Window System Standards

windows otif pro ides support for S otif a standards based raphical user interface. windows otif also pro ides support for the onsortiu s indow Syste ersion elease ser er and the ersion elease client.

Standards Supported by OpenVMS

The pen S operatin syste is based on the fol lowin public national and international standards. These standards are de eloped by the erican a tional Standards nstitute S .S. ederal o ern ent responsible for PS nstitute of lectrical and lectronics n ineers and the nternational r ani ation for Standardi ation S . The followin in for ation ay be useful in deter inin responsi eness to stated confor ance re uire ents as enabled in par ticular co ercial and or o ern ent procure ent so licitation docu ents.

S . erican Standard ode for nfor ation nterchan e

S . ecorded a netic Tape P

S . ile Structure and abelin of a netic Tapes for nfor ation nterchan e

S . i ited support.
nfor ation Technolo y T ttach ent nterface T

S . ecorded a netic Tape P P

S . nrecorded a netic Tape

S . ode tension Techni ues for se with bit S

S . epresentation of u eric alues in haracter Strin s

S . ecorded a netic Tape P

S . S S S all o puter Syste nterface

S . S S S all o puter Syste nterface

S . o ical in ontrol

S . arrier Sense ultiple ccess with ollision etection

PS ode for nfor ation nterchan e ts epresentations Subsets and tensions

Note: includes S . PS S . PS S . PS and PS .

PS S . ecorded a netic Tape nfor ation nterchan e P

PS S . it Se uencin of the ode for nfor ation nterchan e in Serial by it ata Trans ission

Note: ST adopts PS .

PS S . Synchronous Si nalin ates etween ata Ter inal and ata o uni cation uip ent

Note: ST adopts PS .

PS S . ecorded a netic Tape for nfor ation nterchan e P Phase n coded

PS S . Synchronous Hi h Speed ata Si nalin ates etween ata Ter inal uip ent and ata o unication uip ent

Note: ST adopts PS .

PS S . ecorded a netic Tape for nfor ation nterchan e P P roup oded ecordin

PS S . a netic Tape abels and ile Structure for nfor ation nterchan e

PS S . dditional ontrols for se with erican ational Standard ode for n for ation nterchan e

Note: ther PS are not applicable.

Note: nfor ation re ardin interchan eability of S and standards with PS is contained in P Teleco unications Standards nde uly published and aintained by the eneral Ser ices d inistration.

S S bit oded haracter Set for nfor ation chan e

S ile Structure and abelin of a netic Tapes for nfor ation nterchan e

S nfor ation Processin trac . in wide a netic tape for infor ation inter chan e recorded at rp rpi

S nfor ation Processin nrecorded . in wide a netic tape for infor ation in terchan e ftp ftpi ftp ftpi phase encoded and ft ftpi

S ode tension Techni ues for se with S

S epresentations of Ti e of the ay

S nfor ation Processin trac . in wide a netic tape for infor ation in terchan e recorded at rp rpt phase encoded

S it ode for nfor ation nterchan e Structure and ules for ple entation

S ecorded a tape

S ontrol unctions for oded haracter Sets

S S S S all o puter Syste nterface

S nfor ation Processin olu e and fil structure of for infor ation e chan e

S S S S all o puter Syste nterface

INSTALLATION

pen S lpha is distributed as a binary it on . Procedures for settin up the syste dis fro edia and for preparin the syste for day to day operations are pro ided. The procedures use the P T Software nstallation utility to confi ure and install the pen S lpha operatin syste . These procedures are described in the *OpenVMS Alpha Version 7.2 Upgrade and Installation Manual*.

pen S is distributed as binary its on and tape. pen S ersion . is the last pen S release for which T and a netic tape edia will be distributed. uture pen S releases will be distributed on only. Procedures for settin up the syste dis fro a it and for preparin the sys te for day to day operations are pro ided. The proce dures are described in the *OpenVMS VAX Version 7.3 Upgrade and Installation Manual*. o puter specifi in for ation is contained in the up rade and installation supple ents for each fa ily of co puters.

POLYCENTER Software Installation

The P T Software nstallation utility si plifie the installation and ana e ent of pen S products. t is used to install confi ure reconfi ure and dein stall software products that ha e been prepared with the utility. n addition the P T utility pro ides a database to trac the installation reconfi uration and deinstallation of software. or products installed with other installation technolo ies the P T util ity pro ides a echanis for addin infor ation about the into the product database. The P T utility also pro ides the ability to ana e dependencies between products durin the installation process.

or software pro iders the P T Software n stallation utility si plifie the tas of pac a in software by pro idin a si ple declarati e lan ua e for describ in aterial for the installation it and definin how it is installed. The P T utility handles the func tions while the de eloper instructs the utility what to do. This si nificantl reduces the co ple ity and ti e to de elop installation procedures. The lan ua e allows the de eloper to easily specify dependencies on other software ana e ob ects in the e ecution en iron ent such as file and directories and anticipate and re sol e conflic before it occurs. The P T util ity also si nificantl si plifie the pac a in of ultiple software products into one lo ical product suite.

or pen S lpha you use the P T Soft ware nstallation utility to install the operatin syste and to install layered products that are co pliant with the P T utility.

or pen S you use the P T Soft ware nstallation utility to install layered products that are co pliant with the P T utility.

VMSINSTAL

pen S includes the S ST facility to handle the installation of optional o pa supplied software products that ha e not been con erted to use the P T Software nstallation utility. pen S also includes the S ST facility to auto ate oper atin syste software updates.

Test Package and Diagnostics

pen S includes a ser n iron ent Test Pac a e TP which erifie that the pen S operatin sys te is properly installed and ready for use on the cus to er s syste s.

ou can run dia nostics on indi idual de ices durin nor al syste operation. ertain critical co ponents can operate in de raded ode.

OpenVMS Alpha DISK SPACE REQUIREMENTS

Operating System Disk Space Requirements

The dis space re uire ents for pen S lpha ary accordin to which options are installed

File Category	Space Used	Running Total
ini u pen S file		
ptional pen S file		
windows Support		
Pa in fil re uired		
Swap fil su ested		
u p fil optional		
eco pressed Help file optional		
ull windows otif ersion . optional		
Safe uard for up radin		

Note: The ini u pen S file listed in the table will allow you to run with ini al functionality. ot all pen S co ands and utilities will function fully as docu ented in this ini u confi uration ot all o pa and other layered products will wor in this ini u confi uration

The ini u pen S file are for a syste confi uration where all optional features ha e been declined durin the initial installation. or ost applications this is not a realistic pen S en iron ent.

The pa in swap and du p fil re uire ents are the ini u for a syste with of ain e ory. dditional e ory in ost cases adds to the space needed for these files as will particular needs of your application. ith careful syste ana e ent it is pos sible to use the pa in fil space as a te porary du p file

or an pen S luster syste dis pa in swap and du p file cannot be shared between nodes so the file ust either be duplicated on the syste dis or located on so e other dis .

Compaq DECwindows Motif for OpenVMS Alpha Disk Space Requirements

To support pen S lpha and windows otif for pen S lpha o pa reco ends a syste dis of reater than . Howe er you can install a sub set of windows otif. The dis space re uired for the installation of windows otif is . The per anent a ount of space used is . n ad ditional is needed to install the windows isplay Ser er and associated files The win dows isplay Ser er and associated file are in cluded in the pen S lpha operatin syste e dia. These dis space re uire ents are in addition to the dis space re uired for the pen S lpha oper atin syste as indicated in the pen S lpha is Space e uire ents table.

nstallation of the windows otif ersion . lay ered product i es custo ers the option of installin any or all of the followin co ponents

Run-time support base kit . This sec tion pro ides support for runnin windows otif for pen S lpha applications on lpha co pute ser ers and is a re uired part of the installation.

New Desktop . This is an optional co ponent that allows use of the ew es top en iron ent. t includes applications and application pro ra in interfaces P s .

DECwindows desktop . This co ponent is also optional but you should install either the ew es top or the windows des top to create a us able syste . The windows des top is the user interface that was included in pre ious ersions of windows otif and includes the windows Session ana er ile iew and the otif indow ana er.

Programming support . This section includes support for the o pa o pa o pa ortran and Pascal pro ra in lan ua es. f you install a subset of lan ua es the a ount of dis space re uired will be less.

Example files appro i ately .

Translated image support appro i ately .

Layered Product Disk Space Requirements

n addition to the dis space used directly by o pa or third party layered products there ay be additional space used to store infor ation fro those products in pen S help libraries co and tables ob ect li braries and elsewhere. The a ount of additional dis space re uired cannot be e actly predicted due to the possibility of reco erin unused space already e istin in those library files nusually lar e odules con tributed by layered products can also affect the a ount of space re uired for up radin to a new ersion of the pen S lpha operatin syste .

OpenVMS VAX DISK SPACE REQUIREMENTS

Disk Space Requirements (Block Cluster Size = 3)

To support the co plete pen S syste o pa reco ends a syste dis of reater than . hen you use a s aller dis additional tailorin is re uired before installin so e of the pen S op tions. This does not include the du p fil space. efer to the *OpenVMS VAX Version 7.2 Upgrade and Installation Manual* for infor ation on tailorin .

Operating System Disk Space Requirements

The dis space re uire ents for pen S ary accordin to which options are installed.

File Category	Space Used	Running Total
ini u pen S file	.	.
ptional pen S file	.	.
windows Support	.	.
Pa in fil after installa tion	.	.
Swap fil su ested	.	.
u p fil optional	.	.
eco pressed Help file optional	.	.
Safe uard for up radin	.	.
ariable additional space additional files .S S etc.	.	.

Note: The ini u pen S file listed in the table will allow you to run with ini al functionality. ot all pen S co ands and utilities will function fully as docu ented in this ini u confi uration ot all o pa and other layered products will wor in this ini u confi uration

The data in the table was created fro an installation on a ser er with of e ory and an dis .

dditional e ory adds to the space re uired for pa e swap and du p files and the ariable additional space increases with lar er e ory and dis .

Compaq DECwindows Motif for OpenVMS VAX Disk Space Requirements

To support pen S and the windows o tif for pen S layered product o pa reco ends a syste dis of reater than . The dis space re uired for the installation of windows o tif is . The per anent a ount of space used is . n additional are needed to install the windows isplay Ser er and associated files The windows isplay Ser er and associated file are included in the pen S ersion . e dia. These dis space re uire ents are in addition to the dis space re uired for the pen S ersion . operatin syste as indicated in the pen S is Space e uire ents table.

nstallation of the windows otif ersion . lay ered product i es custo ers the option of installin any or all of the followin co ponents

Run-time support files base kit . This sec tion pro ides support for runnin windows o tif for pen S applications on co pute ser ers and is a re uired part of the installation. t includes the windows des top applications and libraries.

Programming support . This section in cludes support for the o pa o pa o pa ortran Pascal and pro ra in lan ua es. f a subset of lan ua es is installed the a ount of dis space re uired is less.

Example files appro i ately .

ote that the indi idual si es add up to ore than the total because so e co ponents are shared by ultiple portions of the en iron ent.

MEMORY SPACE REQUIREMENTS

OpenVMS Alpha Memory Space Requirements

The ini u a ount of e ory re uired to install boot and lo in to an pen S lpha syste is . dditional e ory ay be re uired to ensure sat isfactory perfor ance for either of the followin

Particular applications or nu ber of users

Particular hardware confi uration

efer to specifi layered product docu entation for their e ory re uire ents.

OpenVMS VAX Memory Space Requirements

The ini u a ount of e ory re uired to install boot and lo in to an pen S syste is . To ensure satisfactory perfor ance for particular appli cations or nu ber of users additional e ory ay be re uired. efer to specifi layered product docu enta tion for their e ory re uire ents.

DISTRIBUTION AND BACKUP MEDIA

OpenVMS Alpha

pen S lpha is a ailable on only. The pen S lpha ersion . inary con tains the operatin syste binaries and selected docu entation in both te t and PostScript for at. n nfoS er er or local dri e is re uired for up rades and syste dis bac ups.

The pen S lpha operatin syste is also a ail able as part of the pen S lpha Software Products ibrary offerin .

OpenVMS VAX

pen S is a ailable on T or trac P a netic tape edia. The trac P a netic tape edia is a ailable only throu h the pen S edia and hardcopy docu entation up date ser ice.

The T strea in tape contains the pen S ersion . sa e sets and pen S ersion . standalone P.

The trac P a netic tape contains the pen S ersion . sa e sets.

The pen S ersion . inary con tains the pen S ersion . sa e sets pen S ersion . standalone P and se lected pen S docu entation in te t and PostScript for at.

The pen S operatin syste is also a ailable as part of the pen S Software Products ibrary offerin .

DOCUMENTATION

or pen S ersion . docu entation is a ailable in the followin for ats

Printed Books

pen S printed docu entation is a ailable in two sets the pen S ull ocu entation Set and the pen S ase ocu entation Set.

The ull ocu entation Set is for users who need e tensi e e planatory infor ation on all a or pen S resources co plete reference infor ation on syste routines and utilities detailed e a ples pen S luster uidelines pro ra in concepts a aster in de and infor ation on the Help essa e utility. This set eets the needs of syste ana ers and of sys te and application pro ra ers. t includes the ase ocu entation Set.

The ase Set includes the ost co only used pen S anuals addressin the needs of eneral users and syste ana ers of s all standalone sys te s. anuals such as the elease otes ew ea tures and the ictionary are included in the ase Set.

ach boo in these sets is also separately orderable.

Online Books

nline docu ents are pro ided on the pen S er sion . ocu entation an S for at that can be ounted and read on pen S indows and acintosh syste s. This contains the entire pen S docu entation set and docu entation sets for associated products in HT for at. Selected product docu ents are pro ided in PostScript Te t and P for ats. pen S archi ed anuals are in P for at.

GROWTH CONSIDERATIONS

The ini u hardware and software re uire ents for any future ersion of this product ay be different fro the re uire ents for the current ersion.

SOURCE LISTINGS

pen S lpha and peratin Syste Source istin s are a ailable on . These discs contain source listin file and the lpha specifi debu sy bol file that a e up the pen S operatin syste . o pa pro ides source listin s for ey odules of the pen S operatin syste that are appropriate for end users or application de elopers. The debu sy bol file S on the pen S lpha Source istin s contain infor ation used by the pen S lpha Syste ode ebu er. ertain co pany confidentia source listin s and debu sy bol files howe er are e cluded fro the .

The orderable it includes the license re uired to iew these file on a standalone syste or an pen S luster syste . f users want to a e these file a ailable to another syste possibly at a re ote site they ust purchase another it.

ORDERING INFORMATION

Alpha Software Licenses

T	pen S lpha peratin Syste ase icense
T	pen S lpha peratin Syste ase pdate icense
T	pen S lpha peratin Syste Sy etric ultiprocessin S P ase tension icense
T	pen S lpha peratin Syste Sy etric ultiprocessin S P ase tension pdate icense
T	pen S lpha ndi idual ser i cense o on er ailable...order the oncurrent se icense or nli ited ser icense
T	pen S lpha nli ited ser icense
T	pen S lpha ndi idual ser pdate icense
T	pen S lpha istributed nter acti e ser icense o on er ailable...order the oncurrent se icense
T	pen S lpha istributed nterac ti e ser pdate icense
T	pen S oncurrent se icense
T	pen S oncurrent se pdate icense

VAX Software Licenses

	S peratin Syste icense and pdate icense for pen S
	pen S peratin Syste ase icense
	pen S peratin Syste ase pdate icense
	pen S peratin Syste Sy etric ultiprocessin S P ase tension icense

	pen S peratin Syste Sy etric ultiprocessin S P ase tension pdate icense
	pen S ndi idual ser i cense o on er ailable...order the oncurrent se icense or nli ited ser icense
	pen S nli ited ser i cense
	pen S nteracti e ser pdate icense
S	pen S istributed nter acti e ser icense o on er ailable...order the oncurrent se icense
S	pen S istributed nteracti e ser pdate icense
T	pen S oncurrent se icense
T	pen S oncurrent se pdate icense

Alpha and VAX CD–ROM Media and Online Documentation

T H	pen S lpha software and online docu entation
T H	pen S lpha ersion . H software and online docu entation . This includes ersion . H and ersion . H . T H . . is re uired
T H	pen S lpha ersion . H software and online docu entation . T H . . is re uired
T H	pen S lpha ersion . software and online docu entation
T T H	pen S lpha ersion . software and online docu entation
T H	pen S lpha ersion . software and online docu entation
H	pen S software and online docu entation
T H	pen S lpha software and online docu entation
T	pen S lpha online docu entation

VAX Media and Hardcopy Documentation

S H	pen S Software and ase ocu entation Set
S H	pen S Software T and ase ocu entation Set
H	pen S Software and ull ocu entation Set
H	pen S Software T and ull ocu entation Set

Hardcopy Documentation Sets

S	pen S ase ocu entation Set
	pen S ull ocu entation Set

Source Listings Kits

T	pen S lpha istin s it and icense
	pen S istin s it and icense

OpenVMS Alpha Software Products Library CD–ROM Offerings

	pen S lpha Software ayered Products and peratin Syste ibrary Software ayered Product bi naries only no online docu entation co plete peratin Syste it
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SOFTWARE LICENSING

The pen S operatin syste software is furnished under the licensin pro isions of o pa o puter orporation s Standard Ter s and onditions.

Software License Information (Alpha Only)

The pen S lpha operatin syste license includes the ri ht to use pen S lpha licenses for ultiple in stances of pen S on the firs and then once a ain on each subse uent hard partition of a sin le lphaSer er S syste .

The pen S lpha operatin syste license includes the ri ht to use o pa print Super isor PS for pen S products ase pen and Plus . The print Super isor PS for pen S has sep arate docu entation edia it and ser ice products. efer to the o pa print Super isor for pen S Software Product escription SP . . for ore infor ation.

The ri ht to use the un ti e Ser ices is included with the pen S base operatin syste license. e fer to the o pa istributed o putin n iron ent Software Product escription SP . . for ore detailed infor ation on the for pen S product fa ily.

The ri ht to use o pa apacity n e and for pen S is included with the pen S base oper atin syste license.

The followin technolo ies are licensed as part of the pen S lpha operatin syste

Product Name	Related Software Product Description (SPD)
ttunity onnect n Plat for Pac a e for pen S lpha	SP . .
o pa for pen S lpha	SP . .
o pa rid e or s	SP . .
o pa Secure eb Ser er for pen S lpha	SP . .
P ata ollector for pen S	SP . .
P Perfor ance naly er for pen S	SP . .
tensible ar up an ua e Technolo y	SP . .
a a Software e elop ent it for pen S lpha	SP . .
etscape astTrac Ser er for pen S lpha	SP . .
pen S nterprise irec tory for e usiness P .	SP . .
eliable Transaction outer lpha and	SP . .

The followin are separately licensed products

Product Name	Related Software Product Description (SPD)
o pa d anced Ser er for pen S	SP . .
o pa net Plus for pen S	SP . .
o pa net Plus for pen S lpha	SP . .
o pa net for pen S and lpha	SP . .
o pa ra for pen S	SP . .
o pa windows otif for pen S	SP . .
o pa ala y Software rchitecture on pen S lpha	SP . .
o pa P TH S for pen S d anced Ser er	SP . .
o pa pen S luster Software	SP . .
o pa S ournalin for pen S	SP . .
o pa T P P Ser ices for pen S	SP . .
o pa olu e Shadowin for pen S	SP . .

Software License Information (VAX Only)

The pen S operatin syste uses one of two different cate ories of licenses dependin on the hard ware and software confi uration used and currently supported. This infor ation is also pro ided in the ap plicable country s Price ist.

These are the two cate ories of operatin syste li censes for pen S

S icensin

pen S icensin

System Support Services

o pa pro ides the proper license type with the pur chase of the syste . ot all license types are a ailable for e ery syste odel.

VAX VMS License Information

Note: ffecti e ebruary the S P licenses no lon er include the ri hts for the racle db un Ti e option for pen S and do not per it use of db un ti e on prior ersions of pen S .

ach of the followin licenses are for a specifie hard ware syste which is either the syste the license was ori inally shipped with or the syste on which the li cense was firs used

peratin Syste ase icense

peratin Syste ser icense for pen S

Traditional icense for pen S

There are four types of S licenses

ll use the Product a e of S.

. Traditional icense

This type of license pro ides unli ited use to the users on a define syste . S traditional licenses are si ed to capacity accordin to syste type.

. ulti ser icense

This type of license pro ides use accordin to a spec ifie nu ber of concurrent users. This is an acti ity based license. The ulti ser icense pro ides the cus to er with the ri ht to use the operatin syste up to the li it of users specifie in the license. n operatin syste user is a person who is lo ed in to the syste and is usin the syste interacti ely. This license is only a ailable on li ited syste odels pri arily icro and syste s.

The custo er can increase interacti e use of sys te s licensed with the ulti ser icense by the ad dition of pen S ser icenses for one or ore users . efer to the section on rderin nfor ation for further infor ation.

. S or station icense

This type of license pro ides use for a sin le user on a wor station. This license type allows one direct lo in for the sin le user and one additional lo in for sys te ana e ent purposes only.

dditional interacti e use of wor stations licensed with the S or station icense re uires the ad dition of an pen S ser icense for one or ore users . efer to the section on rderin nfor ation for further infor ation.

. ile and pplication Ser er icense

This type of license pro ides for the noninteracti e use of pen S.

pen S based ser er syste s are sold with a ile and pplication Ser er icense. The intent of an pen S based ser er is to pro ide file print ap plication and co pute ser ices to clients who ha e sub itted their re uests re otely for e a ple ia networ re ote sub it batch obs and so forth . This license type also allows one direct lo in for syste ana e ent purposes only.

dditional interacti e use of pen S ser er sys te s licensed with the ile and pplication Ser er i cense re uires the addition of an pen S ser i cense for one or ore users . efer to the section on rderin nfor ation for further infor ation.

These licenses rant the ri ht to use the sa e ersion of the operatin syste software as per itted for the correspondin peratin Syste ase icense at the ti e when the ser icense is installed.

Notes: ot all S license types are a ailable for all ersions of S pen S or all odels.

The pen S ndi idual se icenses are not supported by the S or pen S operatin sys te releases prior to ersion . .

OpenVMS VAX License Information

There are fi types of pen S licenses

. pen S peratin Syste ase icense

Product a e S S

pen S peratin Syste ase icense rants the ri ht to unrestricted noninteracti e use of the pen S operatin syste for the e ecution of re otely sub itted re uests for batch print application and co putin ser ices on a desi nated sin le proces sor. This license authori es one direct lo in for syste ana e ent purposes only.

The pen S ase icense does not include the license ri ht for the racle db un Ti e ption for pen S .

The peratin Syste ase icense is a prere uisite for all nteracti e ser icenses and all S P ase tension icenses.

nteracti e use of syste s licensed with an pen S peratin Syste ase icense re uires the ad dition of an pen S ser icense for one or ore users . efer to the section on rderin nfor ation for further infor ation.

This license rants the ri ht to use the sa e ersion of the operatin syste software as per itted for the correspondin peratin Syste ase icense at the ti e when the ser icense is installed.

The pen S peratin Syste ase icense also includes the license for print Super isor for pen S . The print Super isor for pen S has separate docu entation edia its and ser ice products. efer to SP . . for further details.

. Sy etric ultiprocessin S P ase tension icense

Product a e S S

S P ase tensions e tend the peratin Syste ase icense to enable sy etric ultiprocessin ca pability on a select nu ber of pen S syste s supportin S P. S P ase tensions are per anently tied to the peratin Syste ase icense and cannot be separated fro the peratin Syste ase icense if an S P board is re o ed fro the syste .

S P tensions rant the ri ht to use the sa e ersion of the operatin syste software as per itted for the correspondin peratin Syste ase icense at the ti e when the S P tension is ranted.

. pen S ndi idual ser icense

Product a e S S

The pen S ndi idual ser icense pro ides the ri ht to interacti ely use the operatin syste by the specifie or unli ited nu ber of concurrent users on a desi nated sin le processor. user is an indi idual who is lo ed in to a processor and is interacti ely us in the operatin syste software by eans other than a lo in. n pen S peratin Syste ase i cense or one of the fi types of S icenses is a prere uisite for the pen S ser icense.

This license rants the ri ht to use the sa e ersion of the operatin syste software as per itted for the correspondin peratin Syste ase icense at the ti e when the ser icense is installed.

The pen S peratin Syste ase the S P ase tension and nteracti e ser licenses are not supported by the S or pen S operatin sys te releases prior to pen S ersion . .

. pen S istributed nteracti e ser icense S

Product a e S

This license rants the ri ht to interacti e use of the pen S operatin syste pro ided the appro priate peratin Syste ase icense or one of the fi types of S icenses has been pre iously installed on a syste . The istributed nteracti e

ser licenses are concurrent use licenses and are a ail able in any uantity e cept unli ited. istributed n teracti e ser licenses are obile and can be redesi nated and ay be installed and used on a sin le pen S processor or shared in a sin le pen S cluster.

distributed interacti e user is define as an indi id ual who is lo ed in to an pen S processor or pen S cluster syste or is interacti ely usin the operatin syste software by eans other than a lo in.

This license rants the ri ht to use the sa e ersion of the operatin syste software as per itted for the correspondin peratin Syste ase icense at the ti e when the ser icense is installed.

. pen S oncurrent se icense for both and lpha T

Product a e P S PH

This license rants the ri ht to interacti e use of the pen S operatin syste pro ided the appropriate pen S peratin Syste ase icense is installed on an pen S processor or on an pen S lpha processor or on pen S processors if one of the fi types of S icenses has been pre iously installed on a syste . The pen S oncurrent se icenses are a ailable in any uantity desired e cept unli ited. pen S oncurrent se i censes are obile and can be redesi nated and ay be installed and used on a sin le pen S or pen S lpha processor or shared in a sin le pen S cluster a sin le pen S luster or shared in a i ed pen S luster.

user that enables a oncurrent se icense is de fine as an indi idual who is lo ed in to an pen S processor or an pen S lpha processor or an pen S cluster or an pen S luster or a i ed pen S luster and or is interacti ely us in the pen S operatin syste software by eans other than a lo in.

hen an pen S S P Syste up rade is per for ed the S P tension to the pen S lpha p eratin Syste icense per its the use of all e istin istributed nteracti e ser icenses on the up raded syste .

The peratin Syste ase icense pro ides the ri ht to use only the pen S features of the current or prior ersions of the pen S operatin syste .

This license rants the ri ht to use the sa e ersion of the operatin syste software as per itted for the correspondin peratin Syste ase icense at the ti e when the ser icense is installed.

OpenVMS Alpha License Information

There are fi types of pen S licenses a ailable on lpha processors

. peratin Syste ase icense T

Product a e pen S PH

This license rants the ri ht to noninteracti e use of the re ote batch print application and co putin ser ices of the pen S lpha operatin syste on a sin le processor. This license authori es one direct lo in for syste ana e ent purposes only. or dual processor syste s o pa lphaSer er and the l phaSer er S S and S the base license for these specifi syste s rants the ri ht to noninter acti e use of the re ote batch print application and co putin ser ices of the pen S lpha operatin syste on a dual processor.

The peratin Syste ase icense is a prere uisite for pen S ser icenses and S P ase tension icenses.

The peratin Syste ase icense pro ides the ri ht to use only the pen S features of the current or prior ersions of the pen S peratin Syste .

. Sy etric ultiprocessin S P ase tension icense T

Product a e pen S PH

S P ase tensions e tend the peratin Syste ase icense to enable sy etric ultiprocessin ca pability on those pen S lpha syste s supportin S P. S P ase tensions are per anently tied to the peratin Syste ase icense and ay not be sep arated fro the peratin Syste ase icense if an S P board is re o ed fro the syste .

S P tensions rant the ri ht to use the sa e ersion of the operatin syste software as per itted for the correspondin peratin Syste ase icense at the ti e when the S P tension is ranted.

. ndi idual ser icense T

o on er ffered

Product a e pen S PH S

This license rants the ri ht to interacti e use of the pen S lpha operatin syste pro ided the appro priate peratin Syste ase icense has been pre iously installed on the pen S lpha syste . The ndi idual ser icenses are a ailable in any uantity desired or as an unli ited user license.

ndi idual ser icenses can be redesi nated and ay be installed and used on a sin le pen S lpha processor only. They ay not be shared in a sin le pen S luster en iron ent. user is define as an indi idual who is lo ed in to an pen S lpha processor or is interacti ely usin the operatin syste software by eans other than a lo in.

This license rants the ri ht to use the sa e ersion of the operatin syste software as per itted for the correspondin peratin Syste ase icense at the ti e when the ser icense is installed.

. pen S lpha istributed nteracti e ser icense T

o on er ffered

Product a e pen S PH

This license rants the ri ht to interacti e use of the pen S lpha operatin syste pro ided the appro priate peratin Syste ase icense has been pre iously installed on an lpha syste . The nter acti e ser icenses are concurrent use licenses and are a ailable in any uantity desired e cept unli ited. nteracti e ser icenses can be redesi nated and ay be installed and used on a sin le pen S lpha processor or shared in a sin le pen S luster en iron ent.

distributed interacti e user is define as an indi idual who is lo ed in to an pen S lpha processor or pen S luster or is interacti ely usin the operatin syste software by eans other than a lo in.

This license rants the ri ht to use the sa e ersion of the operatin syste software as per itted for the correspondin peratin Syste ase icense at the ti e when the ser icense is installed.

. pen S oncurrent se icense for both and lpha T

Product a e P S PH

This license rants the ri ht to interacti e use of the pen S operatin syste pro ided the appropriate pen S peratin Syste ase icense in installed on an pen S processor and or on an pen S lpha processor or on pen S processors if one of the fi types of S icenses has been pre iously installed on a syste . The pen S oncurrent se icenses are a ailable in any uantity desired e cept unli ited. pen S oncurrent se icenses are obile can be redesi nated and ay be installed and used on a sin le pen S or pen S lpha processor or shared in a sin le pen S cluster a sin le pen S luster or shared in a i ed pen S luster.

user that enables a oncurrent se icense is de fine as an indi idual who is lo ed in to an pen S processor or an pen S lpha processor or an pen S cluster or an pen S luster or a i ed pen S luster and or is interacti ely us in the pen S operatin syste software by eans other than a lo in.

hen an lpha S P Syste up rade is perfor ed the S P ase tension to the pen S lpha perat in Syste icense per its the use of all e istin ser icenses on the up raded syste .

This license rants the ri ht to use the sa e ersion of the operatin syste software as per itted for the correspondin peratin Syste ase icense at the ti e when the ser icense is installed.

License Management Facility Support

The pen S operatin syste supports the o pa icense ana e ent acility .

f an pen S license is not re istered and acti ated usin only a sin le lo in is per itted for sys te ana e ent purposes throu h the syste console P .

Se eral of the S and pen S license types are based on the nu ber of concurrent users called an acti ity license. ery product has the option to defin an acti ity as related to the . pen S nteracti e ser and nteracti e ser icenses de fin the nu ber of concurrent users who ha e acti ity licenses as define by the . pen S define ac ti ities so eti es referred to as an pen S user as follows

ach re ote ter inal connection is considered an acti ity. This is true e en if users set host to their local nodes S T H ST .

ach connection fro a ter inal ser er is considered an acti ity.

ultiple window session on a wor station is con sidered one acti ity re ardless of the nu ber of win dows.

batch ob is not considered an acti ity.

re ote networ connection a connection other than a re ote ter inal connection is not considered an acti ity.

or ore infor ation about o pa s licensin ter s and policies contact your o pa ccount epresen tati e.

SOFTWARE PRODUCT SERVICES

ariety of ser ice options are a ailable fro o pa . Syste Support Ser ices pro ides inte rated hardware and software re edial support telephone ad isory sup port and the ri ht to use new ersion of ernel soft ware. or ore infor ation contact your local o pa ccount epresentati e.

SYSTEMS SUPPORTED

Alpha Systems Supported

This section lists the lpha syste s that are supported by pen S lpha ersion . . efer to the appro priate pa e at the followin website for details concern in lpha hardware confi uration and options http www.co pa .co alphaser er confi ure.ht

EISA Bus-Based Systems

odels

TURBOchannel Bus-Based Systems

odels

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odels S

odels S

odels

odels S

odels

DSSI Bus-Based Systems

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XMI Bus-Based Systems

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PCI Bus-Based Systems

lphaSer er ll chip speeds

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o pa lphaStation S

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o pa lphaStation P

The followin are the o pa se iconductor icro processor de elop ent reference boards supported by pen S lpha

lpha P reference board

lpha P reference board

lpha P reference board P

Laptop Sytems

Tadpole PH boo

Compaq Modular Computing Component

lpha P S

lpha P S

lpha P S

lpha P S

o pactP S

VAX Systems Supported

This section of the SP lists the syste s that are supported by pen S ersion . . efer to the *Systems and Options Catalog* and the *Network and Communications Buyers Guide* for details concernin hardware confi uration and options.

Q–bus Based Systems

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XMI Bus-Based Systems

Series odels

Series odels

Series odels

Series odels

Series odels

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odels

VAX-BI Bus-Based Systems

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ser er ser er

SBI Bus-Based Systems

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Special System-Specific Internal Bus

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station odels

station

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odels P P P P

ector processor P

System Restrictions

DECwindows Restrictions

The followin list describes ersion specifi restrictions. The windows otif en iron ent is not supported on these syste s.

MicroVAX I and VAXstation I Systems

OpenVMS Restrictions

The fina ersion of pen S that supports the followin syste s is S ersion . .

pen S ersion . was the fina ersion to sup port the followin

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station

pen S ersion . is the fina ersion to support the followin

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station P station SS

station station P station

icro

APPENDIX A

This appendi describes o pa o puter orpora tion ter inals dis s tapes controllers raphics and networ options. So e restrictions for specifi de ices are listed if applicable.

o pa reser es the ri ht to chan e the nu ber and type of de ices supported by pen S lpha pen S o pa net for pen S and lpha o pa net Plus for pen S o pa T P P Ser ices for pen S and o pa pen S luster Software. The ini u hardware re uire ents for future ersions and updates of these software prod ucts ay be different fro current hardware re uire ents. or confi uratio details about lpha or hardware refer to the *Systems and Options Catalog* and the *Network and Communications Buyers Guide*.

efer to the followin SP s for detailed product infor ation o pa net for pen S SP . . o pa net Plus for pen S SP . . . . o pa T P P Ser ices for pen S SP . . o pa luster Software SP . . and o pa pen for pen S lpha SP . . .

Terminals and Terminal Line Interfaces

To pre ent input fro o erflowin a buffer ter inals use the S control characters and for syn chroni ation as define by the o pa ST e ision . T windowin ter inals support standard S applications and indows usin the T trans port protocol.

The followin table lists the ter inals supported by pen S lpha

T series T series T series

T series T series

The followin table lists the ter inals supported by pen S

T T series series

T series T series P

T series T series

Ter inals on Professional ainbow and ate syste s e ulate T ter inals.

nly li ited support is a ailable for the T . The T when runnin an application operates in bloc ode. hen interactin with pen S and as sociated utilities the T operates only in T or interacti e ode and not in bloc ode.

Note: The T is a onochro e windowin ter i nal that supports standard S applications and the indow Syste . The transport protocol supported is T for S. The product supports inch and inch onitors.

Disks

The firs colu n lists the dis dri e. The second col u n describes the de ice. The third colu n lists the bus the de ice is supported on. The fourth colu n lists the ini u re uired ersion of pen S lpha that supports these de ices. The fift colu n lists the in i u re uired ersion of pen S that supports these de ices. S stands for ot Supported.

Disk Drive	Description	Bus	Alpha Version	VAX Version
EF51R[3]	107 MB solid state	DSSI	NS	5.5-2
EF52R[4]	205 MB solid state	DSSI	NS	5.5-2
EF53[4]	267 MB solid state	DSSI	NS	5.5-2
ESE-20[3]	120 MB solid state	SDI	NS	
ESE-52[3]	120 MB solid state	SDI	1.0	5.5-2
ESE-56	600 MB solid state	SDI	1.5	5.5-2
ESE-58	960 MB solid state	SDI	1.5	5.5-2
EZ31	134 MB solid state	SCSI	6.2-1H3	NS
EZ32	268 MB solid state	SCSI	6.2-1H3	NS
EZ51R[3]	100 MB solid state	SCSI	1.5	5.5-2
EZ54R	467 MB solid state	SCSI	1.5	5.5-2
EZ58R	855 MB solid state	SCSI	1.5	5.5-2
EZ64	475 MB solid state	SCSI	6.2-1H3	5.5-2
EZ69	950 MB solid state	SCSI	6.2-1H3	5.5-2
DS-EZ41	134 MB solid state	SCSI	6.2-1H3	6.2-1H3
DS-EZ42	268 MB solid state	SCSI	6.2-1H3	6.2-1H3
DS-EZ705	536 MB solid state	SCSI	6.2-1H3	6.2-1H3
DS-EZ711	1.07 GB solid state	SCSI	6.2-1H3	6.2-1H3
DS-EZ716	1.6 GB solid state	SCSI	6.2-1H3	6.2-1H3
PBXRW-JC	2 GB wide fixed disk	UltraSCSI	6.2-1H3	
PBXRW-NB	4 GB wide fixed disk	UltraSCSI	6.2-1H3	
PBXRW-SA	9 GB wide fixed disk	UltraSCSI	6.2-1H3	
PBXRZ-JC	2 GB narrow fixed disk	SCSI	6.2-1H3	
PBXRZ-NB	4 GB narrow fixed disk	SCSI	6.2-1H3	
PBXRZ-SA	9 GB narrow fixed disk	SCSI	6.2-1H3	
RA60[4]	205 MB removable	SDI	NS	6.1
RA70	280 MB fixed	SDI	NS	6.1
RA71	700 MB fixed disk	SDI	NS	5.4-2
RA72	1 GB fixed disk	SDI	1.0	5.4-2
RA73	2 GB fixed disk	SDI	1.0	5.5-2
RA80[3]	128 MB fixed disk	SDI	NS	6.1
RA81	456 MB fixed disk	SDI	NS	6.1
RA82	622 MB fixed disk	SDI	NS	6.1
RA90	1.2 GB fixed disk	SDI	1.0	6.1
RA92	1.5 GB fixed disk	SDI	1.0	6.1
RC25[3]	2 disks each 26 MB (1 fixed and 1 removable) disk drive with shared spindle	Q–bus	NS	6.1
RD32[3]	VAX 42 MB fixed disk	Q–bus	NS	
RD51[3]	10 MB fixed disk	Q–bus	NS	6.1
RD52[3]	31 MB fixed disk	Q–bus	NS	6.1
RD53[3]	71 MB fixed disk	Q–bus	NS	
RD54[4]	159 MB fixed disk	Q–bus	NS	
RF30[4]	150 MB fixed disk	DSSI	NS	6.1
RF31	381 MB fixed disk	DSSI	1.5	
RF31F[1]	200 MB fixed disk	DSSI	NS	5.4-2
RF31T	381 MB fixed disk	DSSI	1.5	5.5-2
RF35	800 MB fixed disk	DSSI	1.0	5.5
RF36	1.6 GB fixed disk	DSSI	6.1	6.0
RF71	400 MB fixed disk	DSSI	1.5	6.1
RF72	1 GB fixed disk	DSSI	1.5	5.5-2
RF74	3.5 GB fixed disk	DSSI	6.1	6.0
RK06[3]	14 MB removable disk	UNIBUS	NS	
RK07[3]	28 MB removable disk	UNIBUS	NS	
RL02[3]	10 MB removable disk	UNIBUS	NS	
RRD40[3]	600 MB read-only optical disk drive	Q–bus and SCSI	NS	
RRD42	600 MB read-only optical disk drive	SCSI	1.0	5.4-2
RRD43	680 MB read-only optical disk drive	SCSI	6.1	5.5-2
RRD44	680 MB read-only optical disk drive	SCSI	6.1	
RRD45	600 MB 4x read-only optical disk drive	SCSI	6.1	6.1
RRD46	600 MB 12x read-only optical disk drive	SCSI	6.2-1H3	5.5-2H4

Disk Drive	Description	Bus	Alpha Version	VAX Version
RRD47	600 MB 32x read-only optical disk drive	SCSI	6.2-1H3	6.2-1H3
RRD50[3]	600 MB read-only optical disk drive	Q–bus	NS	
RWZ01	594 MB optical removable disk drive	SCSI	1.0	
RWZ53	2.6 GB magneto optical disk drive	SCSI	6.1	6.1
RX02[3]	512 KB diskette	UNIBUS	NS	
RX23	1.47 MB diskette	SCSI	NS	
RX23L	1.44 MB diskette drive	SCSI	6.2-1H3	NS
RX26	2.8 MB diskette drive	I82077	1.5-1H1	
RX26	2.8 MB diskette drive	SCSI	1.0	5.5
RX33[3]	1.2 MB diskette drive, requires minimum RQDX3 microcode of Version 3.0	Q–bus	NS	
RX50[3]	400 KB diskette	Q–bus	NS	
RV20[3]	2 GB Write Once Read Many optical disk drive	Q–bus, UNIBUS, VAXBI	NS	
RV64[3]	2 GB Write Once Read Many optical disk subsystem	Q–bus, UNIBUS, VAXBI	NS	
RZ1BB	2 GB wide fixed disk	UltraSCSI	6.2-1H3	
RZ1CB	4 GB wide fixed disk	UltraSCSI	6.2-1H3	
RZ1DB	9 GB wide fixed disk	UltraSCSI	6.2-1H3	
RZ22[3]	52 MB fixed disk	SCSI	NS	
RZ23[3]	104 MB fixed disk	SCSI	NS	
RZ23L[3]	121 MB fixed disk	SCSI	1.5	5.4-1
RZ24[1]	209 MB fixed disk	SCSI	1.5	6.1
RZ24L	245 MB fixed disk	SCSI	1.0	5.4-3
RZ25	425 MB fixed disk	SCSI	1.0	5.4-3
RZ25L	500 MB fixed disk	SCSI	1.5	5.5-2
RZ25M	540 MB fixed disk	SCSI	6.1	6.1
RZ26	1.05 GB fixed disk	SCSI	1.0	5.5-2
RZ26B	1.05 GB fixed disk	SCSI	1.5	6.0
RZ26L	1.0 GB fixed disk	SCSI	1.5	5.5-2
RZ26N	1.0 GB fixed disk	SCSI	6.2	5.5-2H4
RZ28	2.1 GB fixed disk	SCSI	1.5	5.5-2
RZ28B	2.1 GB fixed disk	SCSI	1.5	6.0
RZ28D	2.1 GB fixed disk	SCSI	6.2	6.2
RZ28L	2 GB narrow fixed disk	SCSI	6.2-1H3	5.5-2H4
RZ28M	2.1 GB fixed disk	SCSI	6.2-1H3	5.5-2H4
RZ29B	4.3 GB fixed disk	SCSI	6.1	5.5-2H4
RZ29L	4 GB narrow fixed disk	SCSI	6.2-1H3	5.5-2H4
RZ35	852 MB fixed disk	SCSI	NS	5.4-3
RZ40	9 GB narrow fixed disk	SCSI	Version 6.2-1H3	6.1
RZ55	332 MB fixed disk	SCSI	1.0	6.1
RZ56	665 MB fixed disk	SCSI	1.0	6.1
RZ57[2]	1 GB fixed disk	SCSI	1.5	5.4-3
RZ58	1.35 GB fixed disk	SCSI	1.0	5.5
RZ73	2 GB fixed disk	SCSI	1.0	6.0
RZ2CC	4 GB fixed disk	SCSI	7.1-1H2	
RZ2DC	9 GB fixed disk	SCSI	7.1-1H2	
RZ1EF	18 GB fixed disk	SCSI	7.1-1H2	

ote The precedin list is not co plete in ter s of currently shippin dis and tape de ices as that list chan es fre uently. urrently supported dis and tape de ices are reflecte in the lphaSer er Supported ptions ists that can be found at the indi idual l phaSer er pa es

http www.co pa .co alphaser er ser ers.ht l

fter clic in on the re uested lphaSer er one can access lin s fro the left hand colu ns under Technical nfor ation under Supported ptions. ro there you can sort by type of option and ha e it display dis s tapes etc.

Disk Options Supported by Compaq's Services Enterprise Integration Center (SEIC) (VAX Only)

re o able dis SS
re o able dis SS
re o able dis SS
re o able dis SS

Specif c tailorin is re uired to use this de ice as an pen S lpha or syste dis with the windows otif en iron ent.

ini u re ision fir war is .

e ice cannot be used as an pen S syste dis .

e ice cannot be used as an pen S syste dis with windows otif en iron ent.

TS is not supported in ersion . . ast ersion supported was lpha ersion . .

optical re o able S S ersion dis .

Tapes

The firs colu n lists the de ice na e. The second colu n describes the de ice. The third colu n lists the bus the de ice is supported on. The fourth colu n lists the ini u re uired ersion of pen S lpha and the fift colu n lists the ini u re uired ersion of pen S that supports these de ices. S stands for ot Supported.

Tape	Description	Bus	Alpha Version	VAX Version
TA78	1600/6250 BPI, STI TU78	STI	1.0	
TA79	STI TU79	STI	NS	
TA81	145 MB tape drive	STI	1.0	
TA90	1.2 GB tape cartridge subsystem. (5-inch 200 MB cartridge)	STI	1.0	
TA90E	1.2 GB tape cartridge subsystem. Compacts data records automatically	STI	NS	
TA91	High-performance tape drive	STI	NS	5.4-2
TE16	9-track magnetic tape drive	M-BUS	NS	
TF70	290 MB TK70 tape cartridge drive	DSSI	NS	5.4-2
TF85	2.6 GB streaming tape cartridge drive	DSSI	6.1	5.5-2
TF857	18.2 GB tape cartridge loader	DSSI	6.1	5.5-2
TF86	6.0 GB DLT tape cartridge	DSSI	6.1	6.1
TF867	42 GB DLT tape loader	DSSI	6.1	6.1
TK50	95 MB, 5 1/4-inch streaming tape cartridge drive	Q–bus and SCSI	NS	
TK70	296 MB, 5 1/4-inch streaming tape cartridge drive	Q–bus	NS	
TKZ09	5.0 GB, 8mm tape drive	SCSI	1.5	NS
TKZ9E	1-14 GB, 8mm tape drive	SCSI	6.2-1H3	5.5-2
TKZ15	Exabyte 8505 8mm tape drive	SCSI	6.1	6.1
TKZ20	2 GB, DC2000 tape drive	SCSI	6.1	6.1
TKZ60	200/400 MB, 3480 /3490 tape drive	SCSI	1.0	5.5-2
TKZ61	4.4 GB, 3480/3490 tape loader	SCSI	6.1	5.5-2
TKZ62	24 GB, 3480/3490 /3490E tape loader	SCSI	6.1	5.5-2
TL893	18.4 TB, 4mm, DAT tape drive	SCSI	6.2-1H3	NS
TL894	3.3 TB, 4mm, DAT tape drive	SCSI	6.2-1H3	NS
TL896	12.3 TB, 4mm, DAT tape drive	SCSI	6.2-1H3	NS
TLZ04	1.2 GB, 4mm, DAT tape drive	SCSI	1.0	
TLZ06	4 GB, 4mm, DAT tape drive	SCSI	1.0	6.1
TLZ07	8 GB, 4mm, DAT tape drive	SCSI	6.1	6.1
TLZ08	5.25-inch, 2 GB, 8mm tape drive	SCSI	NS	
TLZ09	4 GB, DAT tape drive	SCSI	6.1	5.5-2H4
TLZ10	12/24 GB, DAT tape drive	SCSI	6.2-1H3	5.5-2
TLZ6L	4 GB, 3.5-inch, 4mm DAT tape loader	SCSI	6.1	
TLZ7L	8 GB, 3.5-inch, 4mm DAT tape loader	SCSI	6.1	6.1
TLZ9L	32/64 GB, 3.5-inch, 4mm DAT tape loader	SCSI	6.2-1H3	
TL812	1.92 TB, DLT tape library	SCSI	6.2-1H3	6.2-1H3
TL822	10.4 TB, DLT tape library	SCSI	6.2-1H3	6.2-1H3
TL826	7.0 TB, DLT tape library	SCSI	6.2-1H3	6.2-1H3
DS-TL890	1.12 TB, DLT tape library	SCSI	6.2-1H3	6.2-1H3
DS-TL891	700 GB, DLT tape library	SCSI	6.2-1H3	6.2-1H3
DS-TL893	18.4 TB, DLT tape library	SCSI	6.2-1H3	6.2-1H3
DS-TL894	3.3 TB, DLT tape library	SCSI	6.2-1H3	6.2-1H3
DS-TL895	6.7 TB, DLT tape library	SCSI	6.2-1H3	6.2-1H3
DS-TL896	12.3 TB, DLT tape library	SCSI	6.2-1H3	6.2-1H3
TS05	9-track magnetic tape drive	Q–bus	NS	
TS11	9-track magnetic tape drive	UNIBUS	NS	
TSZ05	1600 bits/in tape drive	SCSI	1.5	
TSZ07	1600/6250 BPI tape drive	SCSI	1.0	5.4-1
TU77	9-track magnetic tape drive	M-BUS	NS	

Tape	Description	Bus	Alpha Version	VAX Version
TU78	9-track magnetic tape drive	M-BUS	NS	
TU80	9-track magnetic tape drive	UNIBUS	NS	
TU81	9-track magnetic tape drive	UNIBUS	NS	
TU81-Plus	Streaming 9-track magnetic tape drive	Q–bus, UNIBUS, VAXBI	NS	
TZ30	95 MB, half-height DLT tape drive	SCSI	1.0	
TZ85	2.6 GB DLT tape drive	SCSI	1.0	
TZ857	18 GB, DLT tape loader	SCSI	1.0	
TZ86	6.0 GB, DLT tape drive	SCSI	1.5	
TZ867	42 GB, DLT tape loader	SCSI	1.5	
TZ87	20 GB, DLT tape drive	SCSI	6.1	6.1
TZ875	100 GB, DLT tape loader	SCSI	6.1	6.1
TZ877	140 GB, DLT tape loader	SCSI	6.1	6.1
TZ88	20/40 GB, DLT tape drive	SCSI	6.2	5.5-2H4
TZ88N	40/80 GB, DLT tape drive	SCSI	6.2	5.5-2H4
TZ89N	35/70 GB, DLT tape drive	SCSI	6.2-1H3	5.5-2H4
TZ885	40/80 GB, DLT tape loader	SCSI	6.2-1H2	5.5-2H4
TZ887	40/80 GB, DLT tape loader	SCSI	6.2-1H2	5.5-2H4
TZK08	2.2 GB 8mm, tape drive	SCSI	6.1	
TZK10	320/525 MB, QIC tape drive	SCSI	1.0	
TZK11	2.0 GB, QIC tape drive	SCSI	6.1	
TZS20	25/50 GB, AIT 8mm, tape drive	SCSI	7.1	
ESL9326	40/80 GB, DLT tape library family	SCSI	7.2	
ESL9198	40/80 GB, DLT tape library family	SCSI	7.2	

ote The precedin list is not co plete in ter s of currently shippin dis and tape de ices as that list chan es fre uently. urrently supported dis and tape de ices are reflecte in the lphaSer er Supported ptions ists that can be found at the indi idual l phaSer er pa es

http www.co pa .co alphaser er ser ers.ht l

fter clic in on the re uested lphaSer er one can access lin s fro the left hand colu ns under Technical nfor ation under supported options. ro there you can sort by type of option and ha e it display dis s tapes etc.

Networks Storage Servers

HS	Stora e or s	Stora eSer er
HS	Stora e or s	Stora eSer er
HS	Stora e or s	Stora eSer er
HS	Stora e or s	Stora eSer er
HS	Stora e or s	Stora eSer er
S	Stora e or s	Stora eSer er
nfoSer er	n inte rated hardware and software syste that sits directly on the thernet to pro ide hard dis a neto optical and tape access to pen S clients in a . t supports up to S S de ices and can be used for software distribution and initial syste load S . or ore infor ation refer to the nfoSer er Software Product escription SP . . .	

Enterprise Storage Arrays

S S	Stora e or s nterprise Stora e rray	
S	Stora e or s rray	

Controllers and Adapters

HS	Hierarchical stora e controller for S P ser ed dis s and T S P ser ed tapes. HS software ust be at ini u ersion . . efer to SP . . for supported confi urations
HS	Hierarchical stora e controller for S P ser ed dis s and T S P ser ed tapes. HS software ust be at ini u ersion . . efer to SP . . for supported confi urations
HS	Hierarchical stora e controller for S P ser ed dis s and T S P ser ed tapes. HS software ust be at ini u ersion . . efer to SP . . for supported confi urations
HS	Hierarchical stora e controller for S P ser ed dis s and T S P ser ed tapes. HS software ust be at ini u ersion . . efer to SP . . for supported confi urations

HS	Hierarchical stora e controller for S P ser ed dis s and T S P ser ed tapes. HS software ust be at ini u ersion . . efer to SP . . for supported confi urations
HS	Hierarchical stora e controller for S P ser ed dis s and T S P ser ed tapes. HS software ust be at ini u ersion . . efer to SP . . for supported confi urations
HS	Hierarchical stora e controller for S P ser ed dis s and T S P ser ed tapes. HS software ust be at ini u ersion . . efer to SP . . for supported confi urations
HS	SS to S S S Stora e or s bus adapter. ir ware ust be at ini u ersion .
HS	SS to S S S Stora e or s bus adapter
HS	SS based Stora e or s controller that supports up to three S S S ports. HS fir war ust be at ini u ersion .
HS	SS based Stora e or s controller that supports up to si S S S ports. HS fir war ust be at ini u ersion ersion . .
HS	based Stora e or s controller that supports up to three S S S ports. HS fir war ust be at ini u ersion .
HS	based Stora e or s controller that supports up to si S S S ports. HS fir war ust be at ini u ersion .
HS	based Stora e or s controller that supports up to si S S S ports. HS fir war ust be at ini u ersion ersion . or later.
HS	based Stora e or s controller that has ache and dual Host Ports. HS fir war ust be at ini u S ersion . or later.
HS	ast wide differential S S based Stor a e or s controller that supports up to three S S S ports. lpha only
HS	ast wide differential S S based Stor a e or s controller that supports up to si S S S ports. HS fir war ust be at ini u ersion . . lpha only
HS	ast wide differential S S based Stor a e or s controller that supports up to si S S S ports. HS fir war ust be at ini u ersion ersion . lpha only
HS	ltraS S wide differential based Stor a e or s controller that supports up to si ltraS S wide sin le ended de ice ports and one host port. lpha only
HS	ltraS S wide differential based Stor a e or s controller that supports up to si ltraS S wide sin le ended de ice ports and two host ports. lpha only
HS	ltraS S wide differential based Stor a e or s controller that supports up to two ltraS S wide sin le ended de ice ports and two host ports. lpha only
HS	ibre hannel based Stora e or s con troller that supports up to two ltraS S wide sin le ended de ice ports and two host ports. lpha only ersion . and hi her
HS	ibre hannel based Stora e or s con troller that supports up to si ltraS S wide sin le ended de ice ports and two host ports. lpha only ersion . and hi her
HS	ibre hannel based Stora e or s irtuali in controller that supports ibre hannel ati e de ice ports and two host ports. lpha only ersion . and hi her
	o pa Stora e or s odular ata outer for connectin S S tape de ices to a switch. lpha only
	ass stora e controller for syste s with ei ht S ports.
S	ass stora e controller for S syste s with one SS port. lpha only
S	ass stora e controller for S syste s with one SS port. lpha only
S	ass stora e controller for syste s with two SS ports. lpha only
PS	ass stora e controller for P syste s with one SS port. lpha only ersion . H ini u support
S	ac plane controller for S syste s with one S S S port. lpha only
S	ac plane controller for S syste s with three S S S ports. lpha only
S	ass stora e controller for syste s with two S S ports. i ited S S support lpha only

P	ass stora e adapter for P syste s with one S S S port. lpha only
P	ass stora e adapter for P based ser ers with one ltraS S port. Sin le host support in ersion . H and ersion . H and hi her. lpha only
P	ass stora e adapter for P based ser ers with two ltraS S ports. Sin le host support in ersion . H and ulti host support in ersion . H and hi her. lpha only
P	ass stora e adapter for P syste s with one S S S port. lpha only
table row	P ass stora e adapter for P based ser ers with two ltra S S ports. Sin le host support only. Support for ersion . and hi her. lpha only
PS	ass stora e adapter for P syste s with one S S port. lpha only per syste a i u with ersion . H and ersion .
PS	ac plane controller for P sys te s with one S S S port. lpha only
PS	ac plane controller for P sys te s with three S S S ports. lpha only
P	ne and two channel ac plane controller for P syste s. lpha only
P	ass stora e networ adapter for P syste s with one S S S port an thernet port to connect to . local area networ s. lpha only ersion . H ini u support
P	ass stora e adapter for P based ser ers with one ltraS S ltra port . lpha only
PS	ass stora e adapter for P based ser ers with one ibre hannel port. lpha only ersion . and hi her
TS	ass stora e adapter for T channel syste s with one S S port. lpha only
P H S	ass stora e controller for S syste s with one S S port. i ited S S support. lpha only on syste s with no reater than of e ory.
P	ass stora e adapter for T channel syste s with two S S S ports. lpha only
P	ass stora e adapter for T channel syste s with two fast S S S ports. lpha only

Hubs and Switches

H	port S S hub
H	port S S hub
S	port ibre hannel switch

Controllers (VAX Only)

HS	S S based Stora e or s controller that supports up to two S S ports.
	nte rated is ontroller for and syste s.
T	nte ral is and Tape ontroller for and syste s.
P	icroprocessor controller for laboratory ac uisition de ices acco odatin up to two one one two s and fi de ices. ne P controller is supported per S and a a i u of two are supported per syste .
	bus S P dis controller. The dis controller supports up to four of the followin dri es and .
	S P dis controller. The dis controller supports up to four of the followin dri es and .
S	bus to SS bus adapter. This adapter allows up to se en SS stora e de ices to attach to the SS bus. Si SS stora e de ices are allowed in a ulti host confi uration.
S	bus S and tape con troller for the T Plus or .
	bus controller for the co pact disc reader.
S	bus to S S bus adapter. This adapter allows up to se en S S stora e de ices to attach to the S S bus. Supported only for and specifi tape de ices.
	odel SS bus adapter. This adapter allows up to se en SS stora e de ices to attach to the SS bus. Si SS stora e de ices are allowed in a ulti host confi uration.
	odel SS bus adapter. This adapter allows up to se en SS stora e de ices to attach to the SS bus. Si SS stora e de ices are allowed in a ulti host confi uration.
P	S parallel hi h speed line printer controller for the P printers.

P	bus parallel hi h speed line printer controller.
	S dis controller for dis dri es.
	S dis controller for the dis dri e.
	bus dis controller for icro and station syste s. There is an and an controller. The dis controller supports as any as four dis units with each dis ette dri e countin as two units. ue to controller li itations the syste supports a a i u of four de ices the nu ber of de ices the syste supports depends on the enclosure. The dis controller is re uired for the and the dri es.
	S dis ette controller for two dri es. ne dis ette controller is supported per syste .
	S dis ette controller for dri es. ne dis ette controller is supported per syste .
T	SS S tape controller for the T and T a netic tape dri es.
T	bus trac tape controller only with lar e record support.
T	SS S tape controller for the T a netic tape dri e.
T	bus tape controller for the T cartrid e tape dri e.
T	bus tape controller for the T cartrid e tape dri e.
TS	S tape controller for the TS a netic tape dri e.
T	bus tape controller for the T cartrid e tape dri e.
T	bus tape controller for the T cartrid e tape dri e.
T	bus tape controller for the T cartrid e tape dri e.
T	S tape controller for the T cartrid e tape dri e. ne T tape controller is supported per syste .
	S S P dis controller. The controller ust ha e a ini u icrocode ersion of . The controller supports up to four of the followin dis dri es and .

Asynchronous Terminal Controllers (Alpha Only)

P	port P asynchronous ter inal controller
P	port P asynchronous ter inal controller
P	port P asynchronous ter inal controller

Asynchronous Terminal Controllers (VAX Only)

line serial ter inal ultiple er
a i u baud rate supported .
o ode control bus

line serial ter inal ultiple er S
a i u baud rate supported .
o ode control bus

line serial ter inal ultiple er S
a i u baud rate supported .
ull ode control bus

H line asynchronous ter inal controller for
a i u baud rate supported .

H line asynchronous ter inal controller
a i u baud rate supported .
o ode control bus

HT line asynchronous ter inal controller
. o ode control icro

H line asynchronous ter inal controller
S or S a i u baud
rate supported . ull ode control
bus

H line asynchronous ter inal controller S
a i u baud rates supported
pen S net .
ull ode control S

H line asynchronous ter inal controller
S or S a i u baud
rates supported pen S
net . ull ode control
bus

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u baud rates supported pen S
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control

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S or S a i u baud
rates supported pen S
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dent on confi uration S

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S or S a i u baud rate
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S

line asynchronous ter inal controller
S or S a i u baud rate
supported . Partial ode control
S

line asynchronous ter inal controller
S or S a i u baud
rate supported pen S
net . Partial ode control
bus

line asynchronous ter inal controller
S or S a i u baud
rate supported pen S
net . Partial ode control
bus

Synchronous Controllers—(Alpha Only)

The . for pen S lpha Syste s software product contains the synchronous de ice dri ers and is re uired when usin synchronous co unications options. e fer to SP . for ore infor ation.

S nte ral Synchronous o unications con troller on syste s

S T port Turbo hannel Synchronous o uni cations controller

S S port S Synchronous o unications controller ersion . H ini u support.

P or port S Synchronous o unications controller

P P or port P Synchronous o unica tions controller

Synchronous Controllers (VAX Only)

The optional ide rea etwor e ice ri ers co ponent of the o pa net Plus for pen S software product contains the synchronous de ice dri ers and is re uired when usin synchronous co unication options. efer to SP . . for ore infor ation.

Point to point synchronous interface.

Hi h speed local point to point synchronous interface retired de ice no lon er offered as an option. S

Point to point or ultipoint synchronous inter face. S

P Point to point or ultipoint synchronous in terface S retired de ice no lon er offered as an option.

e ote point to point synchronous interface S replaces .

Point to point or ultipoint synchronous inter face. bus

P Synchronous line half or full duple point to point co unication interface supportin P H S or S protocols.

S line ultiple protocol synchronous adapter.

SH line synchronous full ode control and line asynchronous no ode control co unications controller for the icro . de ices are supported. a i u baud rates supported pen S . bPS ilobits second . PS for icro etc.

ST Synchronous sin le line support for P up to . bPS full duple for icro syste s. oncurrent use with the HT is not supported.

S Synchronous line half or full duple point to point co unication interface supportin P one or two lines up to bPS .

S controller line synchronous co unications controller desi ned specifi cally for the ft processors supportin P. P is supported at speeds up to bPS per line for a line operation.

Graphics Options

P S oria Syner y raphics option that pro ides acceleration for sup ported P based lpha or stations and Ser ers.

P PowerStor raphics option that pro ides acceleration or acceleration with stereo iewin capa bilities for supported P based lpha or stations and Ser ers.

P abs raphics option that pro ides acceleration for sup ported P based lpha or stations and Ser ers.

pen . supports PowerStor and raph ics accelerators on the followin platfor s

P

P

S

S

S e

S

pen . is included with the pen S lpha oper atin syste distribution it.

or ore infor ation refer to the o pa pen for pen S lpha Software Product escription SP . . and the o pa windows otif Software Product escription SP . .

LAN Options (VAX and Alpha)

T networ adapter that connects T channel syste s to S local area networ s. bits sec

networ adapter that connects T channel syste s to S local area networ s. ot supported as a clus ter interconnect or boot de ice. bits sec

networ adapter that connects sys te s to S local area networ s. bits sec

networ adapter that connects syste s to both the thernet and . local area networ s. bits sec

P networ adapter that connects T channel syste s to both the thernet and . local area networ s. bits sec

LAN Options (Alpha Only)

networ adapter that connects T S syste s to S local area networ s. bits sec

networ adapter that connects S syste s to S local area networ s. bits sec

P networ adapter that connects P syste s to S local area networ s. bits sec

P T wor s networ adapter that connects P syste s to T local area networ s. ersion . H ini u . bits sec

P T wor s networ adapter that connects P syste s to T local area networ s. ersion . H ini u . bits sec

P Syste s H networ adapter that connects P syste s to T local area networ s. ersion . H ini u . bits sec

P Syste s H networ adapter that connects P syste s to T local area networ s. ersion . H ini u . bits sec

networ adapter that connects S S syste s to both the thernet and . local area networ s. ersion . H ini u support or ersion . with P e edial it. bits sec

networ adapter that connects S syste s to both the thernet and . local area networ s. bits sec

hi h perfor ance networ adapter that connects S syste s to both the thernet and . local area networ s. bits sec

hi h perfor ance networ adapter that connects P syste s to both the thernet and . local area networ s. bits sec

networ adapter that connects P syste s to both the thernet and . local area networ s. bits sec

uad channel networ adapter that connects P syste s to both the thernet and . local area networ s. bits sec

networ adapter that connects P syste s to both the thernet and . local area networ s. bits sec

networ adapter that connects P syste s to both the thernet and . local area networ s. ersion . H ini u support. or bits sec

networ adapter that connects P syste s to both the thernet and . local area networ s. ersion . H ini u support. or bits sec

uad channel networ adapter that connects P syste s to both the thernet and . local area networ s. ersion . H ini u support. or bits sec

networ adapter that connects P syste s to both the thernet and . local area networ s. ersion . H ini u support. bits sec

networ adapter that connects P syste s to both the thernet and . local area networ s. ersion . H ini u support. or bits sec

networ adapter that connects P syste s to both the thernet and . local area networ s. ersion . ini u support. or bits sec

networ adapter that connects P syste s to both the thernet and . local area networ s. ersion . ini u support. bits sec

dual channel networ adapter that connects P syste s to both the thernet and . local area networ s. ersion . ini u support. or bits sec

P S networ adapter that connects P syste s to both the thernet and . local area networ s. ersion . ini u support. bits sec

P T networ adapter that connects P syste s to both the thernet and . local area networ s. ersion . ini u support. or bits sec

networ adapter that connects the S bus to a To en in local area networ . or bits sec

P P networ adapter that connects P syste s to a To en in local area networ . ersion . H ini u support. or bits sec

P P networ adapter that connects P syste s to a To en in local area networ . ersion . H ini u support. or bits sec

T networ adapter that connects the T channel syste s to a To en in local area networ . or bits sec

P networ adapter that connects S syste s to both the thernet and . local area networ s. bits sec

LAN Options (VAX Only)

networ adapter that connects S syste s to both thernet and . local area networ s. bits sec

networ adapter that connects S syste s to both the thernet to . local area networ s. The ini u re ision re uired is . bits sec

networ adapter that connects syste s to both the thernet and . local area networ s. bits sec

networ adapter that connects syste s to both the thernet and . local area networ s. bits sec

S n e bedded networ adapter that connects syste s to both the thernet and . local area networ s. bits sec

networ adapter that connects bus syste s to both the thernet and . local area networ s. The ini u re ision le el re uired is . Supported for application use only. ot supported beyond ersion . . bits sec

networ adapter that connects bus syste s to both the thernet and . local area networ s. This is the replace ent for . The ini u re ision le el re uired is . bits sec

S networ adapter that connects bus for S confi uration to both the thernet and . local area networ s. bits sec

networ adapter that connects bus syste s to S local area networ s. bits sec

T T wor s networ adapter that connects Turbo hannel syste s to local area networ s.

thernet adapter for the ft . ini u of two adapters per syste pro idin redun dant connection to the thernet and the SS buses.

CI Options (Alpha Only)

P ati e adapter for P lphaSer er syste s with one port. lpha only ersion . H ini u support

ati e adapter for lpha syste s. ini u icrocode ersion . is re uired.

CI Options (VAX Only)

cluster software can support ultiple adapters per syste . efer to the cluster Software Product escription SP . . for the supported confi ura tions.

adapter for syste s. ini u icrocode ersion . is re uired.

ati e adapter for syste s. ini u icrocode ersion . is re uired.

ati e adapter for syste s. ini u icrocode ersion . is re uired.

P

ati e adapter for syste s. ini u icrocode ersion . is re uired.

ati e adapter for syste s. ini u icrocode ersion . is re uired.

Memory Channel Options (Alpha Only)

P based e ory hannel ontroller

P based e ory hannel ontroller

H e ory hannel Hub ith ine ards

e ory hannel ine ard for use with e ory hannel Hub H

P based e ory hannel ontroller

H e ory hannel Hub with ine ards

e ory hannel ine ard for use with e ory hannel Hub H

Miscellaneous

P Parallel serial port adapter.

P T T channel e tender.

Miscellaneous (VAX Only)

ard reader. ne card reader is sup ported per syste . S

eneral purpose interface. bus

eneral purpose hi h speed interface one interface supported per S.

Hi h perfor ance eneral purpose interface for the . ne interface is supported per syste . This de ice cannot be used in con unction with the .

Hi h perfor ance eneral purpose interface for the and . ne interface is supported per syste . n the and as any as four per syste are per itted pro ided that the is used.

to S adapter.

to adapter also the adapter used to connect the to e pander cabinet.

to adapter.

P loatin point accelerator for the and syste s.

ector processin option for the .

H e ory battery bac up for and syste s. This is re uired for power fail reco ery.

H SS S controller for the and syste s.

S Syste bac plane interconnect and bus for the and syste s.

S plane raphics coprocessor.

S station SP raphics option.

Abbreviations

P P dapti e Partitioned ulti Processin

T T ttach ent ersion

o ponent b ect odel

T i ital inear Tape

SS T Stora e Syste s nterconnect

S tended ndustry Standard nterconnect

iber istributed ata nterface

S ast Sin le nded S S

ast ide ifferential S S

	nte rated e ice or ri e lectronics
	nstitute of lectrical and lectronics n ineers
	ntel P o patible loppy nterface
S P	ass Stora e ontrol Protocol
S	ational haracter Set
P	Peripheral o ponent nterconnect
	uarter nch artrid e
	edundant rray of ndependent is s
	e ote Procedure all
S	ecord ana e ent Ser ices
S	Standard ri e nterface
S P	Sy etric ultiprocessin
ST	Standard Tape nterface
T	Ter inal allbac acility
T	Translated a e n iron ent
T S P	Tape ass Stora e ontrol Protocol
	ery ar e e ory
	ector nstruction ulation acility
	tended e ory nterconnect

SOFTWARE WARRANTY

arranty for this software product is pro ided by o pa with the purchase of a license for the products as define in the Software arranty ddendu to this SP .

P the o pa lo o lpha lphaSer er lphaStation o pa nsi ht ana er net print HS HS HS nfoSer er T pen S Stora e or s Tande Tru S cluster ft S and the T lo o are trade ar s of o pa nfor ation Technolo ies roup .P.

icrosoft isual asic isual indows and in dows T are trade ar s of icrosoft orporation. n tel and Pentiu are trade ar s of ntel orporation. otif S and are trade ar s of The pen roup. ll other product na es entioned herein ay be trade ar s of their respecti e co pa nies.

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HP Software Technical Support

Effective **December 1st, 2014**, the HP OpenVMS products listed in the following table will undergo a support status change from Standard Support to Mature Product Support without Sustaining Engineering.

As a result of the support status change, these products will no longer have active engineering development to produce subsequent versions. This change will affect all the supported versions of the products. For more information on the support available, see http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA2-5741ENW.

HP OpenVMS products undergoing support status change

Affected Product	Replacement and workaround
Distributed Queuing Service (DQS)	- Standard OpenVMS PRINT commands, such as lpr and lpq. With the availability of DECNET over IP, the PRINT command is more comprehensive than DQS. - If you do not want to use DECnet, you can use the telnet Symbiont to access remote queues in addition to lpd. The equivalent commands for telnet Symbiont queues are the standard VMS commands.
Software RAID	Controller RAID or Shadowing
Debug Clients for Windows (also known as Windex)	DECwindows Motif client interface offers similar features as the Windex.
OpenView Operations (OVO) DCE Agent	HP OpenVMS Operations Manager HTTPS Agent and SPI
Management Station (also known as Argus)	DCL syntax or command procedures
Enterprise Capacity and Performance (ECP)	- You can replace ECP Data Collector with Performance Data Collector (TDC). - You can replace ECP Performance Analyzer with TLViz and T4.