

**Software for Integrating Personal Computers**

VMS Services for PCs software is a DECnet application that enables VAX and MicroVAX computers to act as application, data, and resource servers to large groups of personal computers. By using these server systems, personal computers are able to share applications, data, and resources; access information from remote systems on the network; and apply that information to industry-standard applications.

VMS Services for PCs, with personal computers and related networking products, implements Digital's Personal Computing Systems Architecture (PCSA).

The Personal Computing Systems Architecture is an extension of Digital's systems and networking architecture, which merges the VMS and DOS environments. PCSA provides a framework for integrating personal computers into an organization's total information system so that different types of users can share information, large system resources, and network services across the entire enterprise. PCSA offers performance, integration, network management, security capabilities, and growth potential that extend far beyond those of conventional PC LANs.

Any VAX system—anywhere on the DECnet/OSI network—can act as a server to any PC in the network, whether in the same room, same building, same city, or on the other side of the world.

### Highlights

- Truly integrates personal computers into the departmental and enterprise-wide computing environment
- Provides personal computer users with direct, system-wide access to information and resources
- Allows sharing of personal computer files and applications—even terminal users can access personal computer files
- Provides simplified management of end-user computing, including the ability to boot PCs over the network
- Permits simplified, centralized management of personal computing resources—without sacrificing the benefits of standalone personal computing
- Enhances organizational and individual productivity
- Accommodates flexible, incremental growth of PC Local Area Networks (LANs)
- Minimum of 512 Kbytes memory available to run applications



*The DECstation family of powerful, industry-standard personal computers is an extension of Digital's PC integration products.*

More than a PC LAN solution, PCSA offers PC users an enhanced work environment that encompasses the computing resources of the entire enterprise.

PCSA is based on a "server/client" model. VMS Services for PCs, a layered VMS and DECnet application, is the server software. The complementary software for personal computers is called client software.

The DECnet PCSA Client for DOS software consists of PC networking software, terminal emulation, a PCMAIL utility, windowing software, on-line information, and DOS utility software. It also supports the MS-Windows® user interface and ALL-IN-1 Mail. All of these components make it easy for personal computer users to take advantage of the network and its power while using the DOS applications they are familiar with and receiving the response at the desktop that they have come to expect.

DECnet, Digital's leadership networking software, is the foundation that provides a single, complete network from PC to mainframe. With DECnet, each PC is treated as a true peer in the network. Unlike hierarchical PC networking schemes, a PC in the DECnet network can communicate directly with any other system on the local area or wide area network. No need to route information through costly, performance-robbing "communications servers" to achieve network integration.

### The Server/Client Relationship

In a server/client relationship, DOS software resides on the VAX or MicroVAX server and executes on the client personal computers. This approach allows one set of operating system, applications, and data files to be shared by every client system. And, other systems to which the server system is networked can also access the same files.

The server software, VMS Services for PCs, allows PCs to become part of the network. The client software, DECnet PCSA Client for DOS, establishes the network connection and can reside entirely on the server, allowing for the PCs to start up from the network (remote boot).

Once the network link is established, the user accesses all files required for personal computing—including operating system, applications, and data files—from virtual devices on a server system, located anywhere on the network. These DOS applications execute on the PCs after being loaded in the PC's RAM. The virtual drives appear to the user as standard DOS disk drives (I:, J:, etc.).

Using VMS-based server systems in a DECnet environment, VMS Services for PCs enables you to create a single data environment that is accessible from both VAX systems and DOS personal computers.

VMS Services for PCs software provides:

- High-performance file, disk, and print services for PCs
- VAX-based management for PC resources
- Application and information sharing among PCs—as well as among PCs and departmental and corporate systems
- Network management and control services, including optional remote management of multiple PC LANs from a single point
- VMS-level security for files and network services
- Broadcast utility to notify PC users of important operational events
- Capability to boot PCs remotely

The components of the DECnet PCSA Client for DOS software are:

- Network software—support for the basic file and print services of the Microsoft® LAN Manager, DECnet-DOS, and NETBIOS™ interface; VMS NETBIOS support for task-to-task and multitask communication
- Additional DOS operating system utilities (PC-DOS or MS-DOS® is a prerequisite)
- PCMAIL utility (compatible with VMS MAIL)
- SEDT, a screen-oriented text editor
- MS-Windows support
- PC DECwindows Display Facility (DOS X-Server)
- VT220 and VT320 terminal emulation
- On-line User Information System

### PCSA Server Software

#### File Services

VMS Services for PCs software provides a remote DOS file system which appears as a transparent extension of the client system's local disk or PC. Users share DOS files contained on the server disk through concurrent as well as sequential usage of the files.

Because DECnet communications protocols are used to provide PCSA file services, client PCs can access files on servers located anywhere on the DECnet LAN or WAN (Wide Area Network). The system administrator can allocate public and private disk space as needed.

Individual users control which of their files are accessible by others.

The DOS files residing on the VAX server are stored as an RMS stream or sequential fixed-length record (512 Kbytes) VMS file. Thus, PCSA file services make DOS files accessible to VMS users and applications that can interpret the content and organization of the files created by the DOS application. Similarly, DOS applications can read files written by VMS applications.

With PCSA file services, users of video terminals, workstations, and personal computers can access the same files residing on the server. Data sharing between the large-systems world and the personal-computing world has never been simpler.

#### Disk Services

The disk services provided by VMS Services for PCs give PCSA clients access to high-performance DOS-formatted virtual disks, located on VAX servers and local area networks. This capability provides PC users with the best of both worlds: complete applications and data sharing among PCs on the local area network, along with performance that rivals standalone hard-disk systems.

The low-overhead, high-performance communications protocols employed by PCSA disk services can make access to virtual disks as fast as using a local hard disk. PCSA disk services are ideal for the PC operating system software, DOS applications and utilities, and other DOS files that do not need to be shared by VMS users or applications. Users who want to make such files available to VAX systems can copy the files using the DOS COPY command to a virtual drive, provided by PCSA file services.

These DOS-formatted virtual disks can also be accessed across wide area networks, using the Network Device Utility.

The virtual disks available through PCSA disk services are established at the time of their creation. Disk sizes range from 360 Kbytes to 32 Mbytes. Disk management can be performed from the VAX or remotely from the personal computer.

#### *Print Services*

PCSA print services enable PC and VAX system users to share printers. From the PC user's perspective, this is no different from using a local printer. PCSA clients can send files to remote printers directly from DOS, MS-Windows, or PC applications; or from VMS, using a PC-based terminal emulator.

PCSA print services allow the printing of PC output on printers attached directly to the network, to a terminal server or VAX server, including a VAXcluster, located anywhere in the DECnet local area or wide area network. Typical shared-resource printers are Digital's Companion Color printers (LJ250 and LJ252), laser printers such as the LN03 PLUS, and laser printers based on POSTSCRIPT®, the page description language from

Adobe Systems, Inc., the LN03R ScriptPrinter, and the high-performance PrintServer departmental laser printing system.

#### *Network Management and Control Services*

In addition to network computing functions for personal computer users, VMS Services for PCs software provides a complete range of menu-driven services for managing and controlling the network. These services provide functions such as allowing individual clients to connect to a server, providing access control to the system administrator, and returning server-resource utilization information.

The server software also provides control over the number of simultaneous client connections, which allows management of system resources, tracking the use of applications, and ensuring compliance with software licensing agreements. In addition, the software can impose other restrictions on the use of the server to help meet performance and security goals. The system administrator can monitor and adjust these parameters as necessary.

Menu-driven administrator's utilities enable the system administrator to register clients, list resources, and specify PC clients for remote booting. Other system management utilities can record network and server events in a file whenever the server is running—including useful information such as when network connections are opened or closed—or enable the system administrator to broadcast a message to the PC users who are on the server's network.

#### *Security Services*

Access to network file, disk, and print resources can be limited by the use of passwords. When the server offers a file directory or a printer for use, a password can be associated with the directory or printer. Only users who know the password can access the service. A greater

measure of control is provided by access control lists that bring VMS-level security to users of PC files. When a server offers a resource (file, disk, printer) to a client, a list that specifies privileges assigned to users can be associated with the resource. Service and file access control is supported across a VAXcluster.

#### *Remote Boot Services*

Through VMS Services for PCs disk services, PCs can be booted over the local area network by server systems. The DECnet PCSA Client for DOS software required to establish network connections may reside entirely on the PCSA server. The remote boot capability permits better and simplified management of PC data, applications, and resources shared by networked PCs.

### **PCSA Client Software**

#### *Client Network Software*

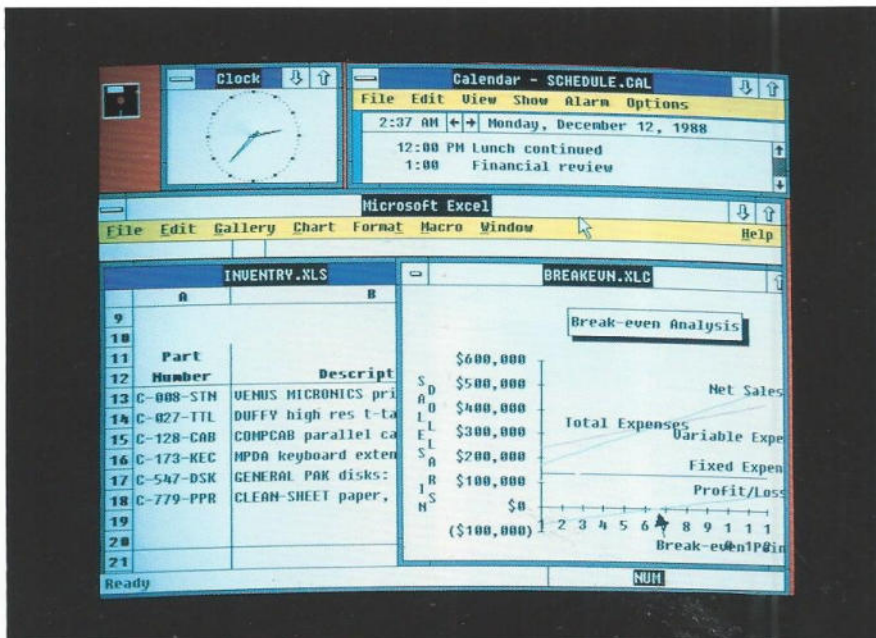
The DECnet PCSA Client for DOS networking software provides networking support for local and wide area networks. It provides utilities for remote file procedures, management, and troubleshooting for the DOS node, network command terminal operation, and remote resource allocation. In addition, a network interface library offers the programmer the ability to implement distributed applications through program-to-program communication.

DECnet PCSA Client for DOS networking software integrates the basic file and print services of Microsoft's LAN Manager with DECnet through a network session interface. Microsoft's Redirector program is used to direct input and output from DOS applications to virtual drives and remote printers located on the network.

DECnet PCSA Client for DOS software also supports the NETBIOS programming interface, an emerging standard, providing transparent communications and complete compatibility with applications written for a variety of PC networks. DOS applications adhering to the NETBIOS interface standard can be used with DECnet PCSA Client for DOS software without modification. And because Digital supports a single, unified network architecture, the same NETBIOS applications can run on both local area and wide area DECnet networks. DECnet/PCSA NETBIOS applications can even communicate with other DECnet applications, such as DECnet-VAX applications. DECnet PCSA Client for DOS software also supports the VMS NETBIOS interface, which allows task-to-task and multitask communication.

#### File Transfer Services

In some instances, personal computer users may need to transfer files between the personal computer and a system on the network that is not running the same operating system software as the server system (for example, a PDP-11 or DECSYSTEM-20). PCSA file transfer services enable PC users to transfer sequential ASCII and binary files between a PC and any other DECnet Phase IV node (except a DOS node). A DOS node may invoke the Permit utility, which enables that node's disk resources to be accessible at the exclusion of other activities on that node. File transfer services can be invoked



VMS Services for PCs software supports MS-Windows and PC DECwindows, and enables VAX and MicroVAX computers to act as application, data, and resource servers to large groups of personal computers.

from the DOS command line, or from a menu-driven program under MS-Windows. File transfer services can run from MS-Windows and can operate concurrently with other MS-Windows applications. Additional facilities offered by PCSA file transfer services include file concatenation, deletion, spooling of files for printing, and submitting and executing command files, provided that the remote node supports these functions. Directory listings are also supported.

#### DOS Operating System Enhancements

PCSA client systems employ MS-DOS or PC-DOS as their native operating system, enabling users to develop and run industry-standard software applications, and to manage their diskettes, files, and directories.

MS-DOS or IBM® PC-DOS is a pre-

requisite for IBM personal computers or compatibles. Digital provides several operating system enhancements:

- Backup and restore facilities for networked systems
- Loadable text and graphic fonts
- Loadable country-specific data tables
- "Print Screen" capabilities for text, graphics displays on Digital's LA75, LA75P, LA210, LJ250, and the IBM Proprinter™ and Graphics Printer

DECnet PCSA Client for DOS software integrates the IBM PC-DOS operating systems, and versions of MS-DOS for selected PC-compatibles into Digital's PCSA.

### *PCMAIL Utility*

The PCMAIL utility enables PC users within the network to communicate with each other. It also enables PC users to communicate with VMS MAIL users and supports the full range of VMS MAIL functionality, including folders for mail storage and forwarding capabilities. PCMAIL also includes the SEDT full-screen editor to compose and edit messages; however, it also supports most standard DOS word processing applications.

### *MS-Windows Interface*

The DECnet PCSA Client for DOS software supports the MS-Windows interface (versions 2.03 and 2.1/286) to provide an easy-to-use, highly visual interface to the operating system, network, and applications. MS-Windows can split the display screen into multiple windows and allow several programs to appear on the screen at the same time. With MS-Windows, PC users can run the following DECnet/PCSA utilities:

- VT320 Terminal Emulator
- DOS utilities for managing and troubleshooting the DOS node
- On-line Information System

Several third-party, industry-standard printer drivers are supplied with MS-Windows but are not supported by Digital.



*With Digital's PC integration products, you use the same DOS commands or MS-Windows interface with your networked PC as you did with your standalone PC.*

### *PC DECwindows Display Facility*

Included with the DECnet PCSA Client for DOS software is the PC DECwindows Display Facility, which provides an X Window System™ interface. This DOS application allows a DECwindows application executing on a remote VMS or ULTRIX system with DECnet to be displayed on and receive keyboard and mouse input from the personal computer. For example, a PC user can display a DECwindows application executing on a remote VMS system in one window and display a DECwindows application executing on a remote ULTRIX system in another window.

PC DECwindows enables PC users to use a VAX system as a shared computer resource for powerful interactive graphic applications or applications that require more capacity than most dedicated PCs.

### *Terminal Emulation*

The DECnet PCSA Client for DOS terminal emulation software allows PC users to establish multiple terminal sessions under MS-Windows with any VAX or MicroVAX system on the DECnet network, or other host systems. Sessions can be established using either a serial communications port or the Ethernet local area network port.

Terminal emulation is also provided outside of MS-Windows for users who want to establish terminal sessions to host systems. This capability, called SETHOST, provides access to the rich computing resources of large systems for remote program development and other tasks.

SETHOST allows users of DECnet PCSA Client for DOS software to establish multiple virtual terminal connections to remote systems. A single keystroke switches among the active terminal sessions or acts as a "hot-key" to DOS.

A script processing language for all supported terminal emulators enables users to automate frequently executed terminal functions, such as logging into remote systems and performing tasks for retrieving information.

The DECnet PCSA Client for DOS software also enables virtual disk emulation for new, high-density storage formats.

#### *On-line User Information System*

In an easy-to-use format with quick access to specific topics, the DECnet PCSA Client for DOS software contains information on how to use personal computers in the PCSA environment.

#### **VMS Services for PCs Configurations**

##### *VAX Servers in Digital Networks*

A VMS-based server provides a high level of system management and control, such as file protection, security, and access control capabilities that are not available for DOS-based networks.

Digital offers VAX systems in special networked PC LAN server configurations that can function as dedicated "applications dispensers" for groups of PCs. This offers system managers greater ease of administration.

But using a VAX system as a server for PCs doesn't mean giving up its other computing capabilities, because VAX servers need not be dedicated to PC file, application, and printer services. VAX servers can run VMS applications, too.

With a VAX or MicroVAX system as the server, a PC user can tap into the full capabilities of the Digital network and supporting hardware, VAXclusters, DECnet/SNA gateways, Message Routers, LAN Bridges, as well as VMS and DECnet applications.

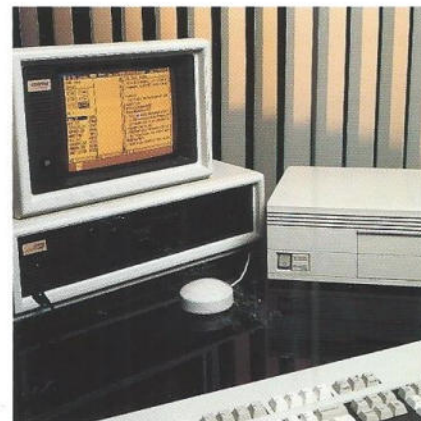
VMS Services for PCs supports a wide variety of network topologies, from small to large. And because the DECnet-VAX license includes the right to use VMS Services for PCs, every networked VAX system is server-ready. The combination of DECnet and VMS Services for PCs is ideal for any network—even a world-wide network—and illustrates Digital's ability to provide integration at every level of computing.

Network flexibility at the organizational level is one of Digital's greatest strengths: the ability to tie together computer devices of all kinds, from video terminals, personal computers, and workstations, to VAX systems and clusters—all in one powerful, seamless network.

You need not purchase DECnet PCSA Client for DOS software for each PC—only a license is required for every PC. The single-use license for DECnet PCSA Client for DOS software is included in Digital's PC Network Integration packages (DEPCA-xx) and is also available separately. Only one copy of the DECnet PCSA Client for DOS software media is needed for the whole network.

#### **Service**

Digital's PCSA DECstart Service provides implementation support for installing VMS Services for PCs and DECnet PCSA Client for DOS software. In Europe, this start-up consulting service is called MS-DOS SERVERstart. Time and materials consulting is also available.



*Digital's PC Integration products integrate the leading, industry-standard PC compatibles from a variety of vendors.*

Digital provides one of the most comprehensive portfolios of services in the industry, designed to support customers throughout the computing life-cycle—planning and design, implementation, and ongoing maintenance. Services range from traditional on-site hardware and software services to multivendor and network maintenance support to facility construction and recovery services.

You may tailor the type and amount of support necessary to meet your needs. Whatever the service solution, you benefit from a single point of contact.



Digital's service offerings vary by country. For more information on these service offerings, please contact your local Digital office.

When you buy from Digital, you are backed by one of the largest service and support organizations in the world. The depth and breadth of Digital service means more up-time and greater productivity for your network systems, whether you are responsible for a few personal computers in a workgroup, or for hundreds around the world.

#### **For More Information**

For more information about Digital's PCSA, VMS Services for PCs, DECnet, PC Network Integration packages, PCLAN/Server packages, or how Digital can make you and your personal computing systems more productive, please contact your local Digital office today.

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