

# **SCO OpenServer™ Release 5**

An SCO® Product Line Overview and  
Technical Background Paper

*June 1997*



# **SCO**

---

<b>WHAT IS SCO OPENSERVER? .....</b>	<b>5</b>
INTRODUCTION .....	5
SCO OPENSERVER IS AN OPERATING SYSTEM.....	5
SCO OPENSERVER IS A UNIX OPERATING SYSTEM .....	6
SCO OPENSERVER IS A PRODUCT FAMILY .....	7
<b>WHAT SOLUTIONS USE SCO OPENSERVER? .....</b>	<b>9</b>
SMALL BUSINESS OFFICE .....	9
DEPARTMENTAL APPLICATION SERVER.....	9
WORKGROUP SERVER .....	10
INTERNET SERVER.....	11
DEVELOPER WORKSTATION.....	11
<b>TECHNICAL FEATURES .....</b>	<b>13</b>
CORE OPERATING SYSTEM.....	13
<i>File Systems</i> .....	13
<i>File System Check and Repair Utility (fsck) Improvements</i> .....	14
<i>Virtual Disks and RAID (Redundant Arrays of Inexpensive Disks)</i> .....	15
<i>Symmetric Multiprocessing (SMP) License</i> .....	16
<i>Fixed Priority Scheduling</i> .....	17
<i>Dynamic Kernel Tables</i> .....	17
<i>Multiple Language Support</i> .....	17
<i>Runtime Libraries, including Dynamically Linked Libraries (DLLs)</i> .....	18
<i>Memory Mapped Files</i> .....	18
<i>High-Performance Database API</i> .....	18
<i>Un-interruptible Power Supply (UPS) Monitoring</i> .....	19
<i>Advanced Power Management (APM)</i> .....	19
NETWORK SERVICES .....	19
<i>Introduction</i> .....	19
<i>UNIX File Services (NFS)</i> .....	20
<i>UNIX Printing Services (LPD)</i> .....	21
<i>Network Information Services (NIS)</i> .....	22
<i>Microsoft Windows File and Print Services</i> .....	22
<i>SCO Gateway for NetWare</i> .....	22
<i>Electronic Mail</i> .....	22
<i>Internet Services</i> .....	23
<i>Calendar Service</i> .....	24
NETWORK PROTOCOLS .....	24
<i>Multi-Protocol Networking - to Integrate Your Networks</i> .....	24
<i>TCP/IP, the Corporate Network Backbone</i> .....	24
<i>IPX/SPX Support - to Integrate Novell Clients</i> .....	26
<i>NetBIOS and NetBEUI</i> .....	26
<i>SNMP and SMUX</i> .....	27
<i>POP3 Support</i> .....	27

GRAPHICAL USER INTERFACE .....	27
<i>The X Window System</i> .....	28
<i>X Server (X11R5)</i> .....	29
<i>Motif 1.2 Application Support and SCO Wintif</i> .....	29
<i>SCO Panner Window Manager</i> .....	29
<i>Desktop Manager</i> .....	30
<i>Toolsheds</i> .....	30
<i>SCO Visual Tcl</i> .....	33
<i>Graphical Help System for Online Documentation</i> .....	33
SYSTEM ADMINISTRATION .....	33
<i>SCOadmin</i> .....	34
<i>SCO ARCserve/Open from Cheyenne</i> .....	36
<i>SCO Doctor</i> .....	37
<b>EXTENDING SERVER FUNCTIONALITY (LAYERED PRODUCTS).....</b>	<b>40</b>
WINDOWS SERVICES .....	40
<i>SCO VisionFS</i> .....	40
<i>SCO Advanced File and Print Server</i> .....	40
<i>SCO Merge</i> .....	40
<i>SCO TermVision</i> .....	41
<i>SCO TermLite</i> .....	41
<i>SCO XVision</i> .....	41
<i>SCO SQL-Retriever</i> .....	41
INTERNET SERVICES .....	42
<i>Netscape Navigator</i> .....	42
<i>Netscape FastTrack Server</i> .....	42
<i>Netscape Proxy Server</i> .....	42
<i>SCO Internet Security Services</i> .....	42
<i>SCO Strong Encryption Utilities</i> .....	43
<i>SCO Internet to NetWare Gateway</i> .....	43
<i>SCO InterScan VirusWall</i> .....	43
RAS SERVICES (RELIABILITY, AVAILABILITY, AND SCALABILITY) .....	43
<i>SCO OpenServer User License Packs</i> .....	43
<i>SCO SMP License</i> .....	44
<i>SCO Virtual Disk Manager</i> .....	44
<i>SCO ARCserve/Open</i> .....	44
<i>SCO Doctor</i> .....	45
DEVELOPER SERVICES .....	45
<i>SCO OpenServer Development System</i> .....	46
<i>SCO Java Development Kit</i> .....	46
<i>SCO POS Configuration Toolkit</i> .....	47
<i>SCO Premier Motif Development Kit</i> .....	47

<b>MEETING STANDARDS.....</b>	<b>48</b>
STANDARDS CONFORMANCE.....	48
COMPATIBILITY .....	49
<b>DESIGNING AN SCO OPENSERVR SYSTEM.....</b>	<b>50</b>
MEMORY USAGE.....	50
SCO OPENSERVR RELEASE 5 SYSTEM REQUIREMENTS TABLE .....	50
DISK .....	50
INSTALLATION MEDIA .....	51
I/O BUS .....	51
NETWORK ADAPTERS .....	51
<b>DEVELOPER UPGRADES OPTIONS FOR OLDER APPLICATIONS .....</b>	<b>52</b>
RUN EXISTING BINARIES ON RELEASE 5. ....	52
RECOMPILE AND/OR RE-LINK APPLICATIONS WITH RELEASE 5 DEVELOPMENT TOOLS AND LIBRARIES.....	52
RE-CODE APPLICATIONS TO TAKE ADVANTAGE OF NEW FEATURES IN RELEASE 5. ....	52
<b>APPENDIX A - LIBRARY NAMES AND DESCRIPTIONS .....</b>	<b>54</b>
SCO STANDARD LIBRARIES: .....	54
GRAPHICAL LIBRARIES: .....	56
CHARACTER LIBRARIES: .....	57
NETWORKING LIBRARIES: .....	57
<b>APPENDIX B - SCO EXPERT SERVICES .....</b>	<b>58</b>
PROFESSIONAL SERVICES .....	58
TECHNICAL SERVICES .....	59
EDUCATION SERVICES .....	59
INFORMATION SERVICES.....	60
SCO SOFTWARE ENHANCEMENT SERVICE .....	60

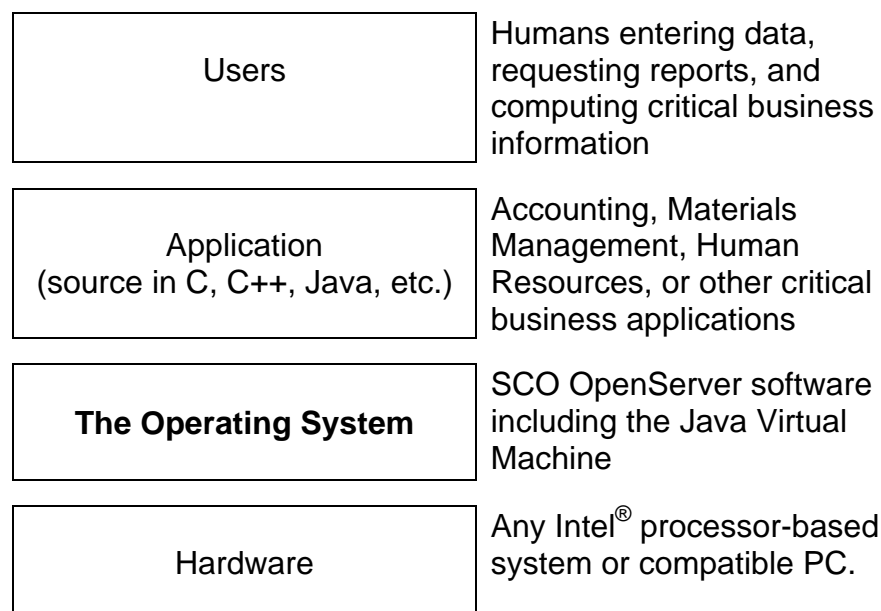
# What is SCO OpenServer?

## *Introduction*

SCO OpenServer is the world's best selling UNIX<sup>®</sup> server operating system. SCO OpenServer systems are designed specifically to run critical day-to-day business operations for businesses of all types. Examples of critical business operations deploying SCO OpenServer systems include Taco Bell restaurants, BMW service centers, the NASDAQ Stock Market, government agencies, and small-to-medium sized businesses of all kinds. Companies typically use SCO OpenServer systems as a reliable way to track business transactions. Common implementations include running a medical manager application in a hospital, managing inventory in a manufacturing company, and running accounting systems in any type or size of business.

## *SCO OpenServer is an Operating System*

An operating system is the software that makes hardware generally usable. Developers write application code to run on a particular operating system or a particular API (such as the Java Virtual Machine). The operating system provides a variety of services to the application. Services include file service, printer service, network access, web services, and much more. The graphic below shows where operating systems fit in the solution.



Applications are designed to solve business problems. The user community selects from the variety of available applications that best meets their computing needs. The selected application is designed to run on an operating system. The combination of the operating system and

hardware represents a level of performance and scalability. The applications are designed to take advantage of power offered by the operating system and hardware.

### ***SCO OpenServer is a UNIX Operating System***

The UNIX industry developed most of today's networking standards including TCP/IP, NFS, Web technologies, Java technology, Domain name services, and more. UNIX systems were originally developed with the network in mind. The competitive environment of the UNIX operating systems is due to the open philosophy of the industry. In this highly competitive environment, innovation is the key to survival. This innovation has led to major advances in network computing. Other operating systems are now benefiting by taking advantage of the technologies developed in the UNIX industry.

The UNIX brand means it is an open standard; an open standard means customers have a choice. A variety of operating systems are available in the market today. Of all the operating systems available in the market today, only one is open to industry influence - the UNIX system. The Open Group, a standards organization with offices around the world and a web site at URL <http://www.opengroup.org>, owns the definition of the UNIX brand. The UNIX vendors - SCO, Sun, DEC, IBM, HP, and so on - all provide input to The Open Group on the future direction of the UNIX operating system. The benefit to the industry is that all companies can create products that meet the definition of a UNIX operating system. Companies compete for business forcing innovation and differentiation. Application developers can build products based upon the standard definition of a UNIX operating system. To customers, it means choice for their operating system vendor.

The various UNIX system vendors have built their businesses and reputations by providing systems with exceptionally high levels of reliability, availability, and scalability. The UNIX operating system was designed as a universal operating system. The UNIX operating system has always provided multi-user and multitasking computing capability. Originally, UNIX systems were deployed to replace proprietary mainframe systems. Due to the openness of the operating system, various hardware vendors were able to build businesses around it while increasing market opportunities for application developers. It meant that while Tandem was building exceptionally reliable solutions, IBM could focus on solutions which could handle a very large volume of transactions and so on. Competition in the industry has forced innovation. Innovation provides choice and value for customers.

A UNIX solution implies stability and high quality. The "abilities" (reliability, availability, and scalability) are the cornerstone of the UNIX system

industry. When organizations look for critical business computing systems, the UNIX operating system is typically selected and embedded in the solution. Solution providers select UNIX systems specifically for the exceptional RAS (Reliability, Availability, and Scalability). The UNIX operating system is the platform that solution providers count on to deliver stable, high quality solutions to their customers.

Flexibility is a key attribute of the UNIX operating system. The UNIX operating system is universal by design. This universality means that it can be easily and quickly applied to almost any type of computing problem. Computing models change over time. As an industry that primarily used a host based computing model (character terminals connected to a server), when the computing paradigm changed to client/server based computing, UNIX applications were altered to meet the market demand. Now as Internet computing becomes popular, UNIX is again able to transform itself providing customers with ability to migrate their data and applications rather than start all over. Whether it is part of a general business computing environment (running traditional database applications - accounting, materials management, human resources, etc.), or embedded in a production line, or used as a workstation, the UNIX operating system can deliver the solution needed.

### ***SCO OpenServer is a Product Family***

The SCO OpenServer product family consists of 4 different operating system configurations and a variety of add-on products. The operating system configurations are as follow:

- SCO OpenServer Enterprise System
- SCO OpenServer Host System
- SCO OpenServer Internet FastStart System
- SCO OpenServer Desktop System

The Enterprise System configuration provides a variety of application and network services for Windows<sup>®</sup> PCs, character terminals, Network Computers, UNIX workstations, and OS/2<sup>®</sup> systems. The Enterprise System supports thousands of business critical applications. The Enterprise System provides a variety of functions including Internet ready e-mail services, calendar services, file and print services for both UNIX and Windows systems, modem services including PPP, and much more. Network services provide a wide range of protocols including TCP/IP, IPX/SPX<sup>™</sup>, NetBIOS, SMTP, POP3, SNMP, and more. The Enterprise System comes with a graphical user interface based on X11 technology. Administration functions are provided via the GUI as well as from the command line interface.

The Host System configuration is designed for serving applications to character terminals. No networking technology is included in this

configuration. The Host System comes with a graphical user interface based on X11 technology. The Host System provides a low cost, highly reliable solution.

The Internet FastStart System configuration is designed specifically for providing Internet or Intranet web services. The system is limited to a single logon user for administrative purposes. The system features the Netscape FastTrack Server™ which provides point and click administered web services. Web pages can be added to the server through the publish function of the Netscape Navigator Gold™ web browser and authoring tool. The Internet FastStart System is excellent for publishing a wide variety of documents from internal procedures on an internal web server to product marketing information on a public web site. The Internet FastStart System includes a graphical user interface based on X11 technology.

The Desktop System configuration is a low cost alternative for traditional RISC workstations. Excellent as a software developer workstation, the Desktop System is also used as a highly reliable commercial workstation. It includes a wide variety of networking technology including internet ready e-mail services, calendar services, modem services including PPP, and much more. Network services provide a wide range of protocols including TCP/IP, IPX/SPX, NetBIOS, SMTP, POP3, SNMP, and more. And, like the rest of the SCO OpenServer product family, the Desktop System includes a graphical user interface based on X11 technology.

The functionality of the SCO OpenServer family of operating systems can be extended by applying any of a variety of add-on products. The add-on products for SCO OpenServer include:

- SCO® Virtual Disk Manager - providing software RAID and disk management services
- SCO Doctor™ - provides server resource monitoring and email or pager notification upon detection of low resources
- SCO® ARCserve®/Open - providing network backup services for a variety of systems including the SCO server
- SCO® Merge™ - to run Windows applications on the UNIX system
- SCO OpenServer SMP™ Licenses - support for additional CPUs to scale systems which have outgrown a single CPU solution
- Various Internet technologies - Netscape Proxy Server™, SCO PPP from Morning Star, SCO® Internet Security Package, SCO® Internet to NetWare® Gateway, and Interscan VirusWall.

Further details of the add-on products and the technologies found in the operating systems are included in later sections of this document.

## **What Solutions Use SCO OpenServer?**

### ***Small Business Office***

The small business office is typically an organization with a single site and 10 to 20 employees. You will find SCO OpenServer solutions in organizations where the employees need common tools to run the business - accounting systems, cash registers, and so on. A few examples of offices where SCO OpenServer solutions are a good fit include health care offices (doctors, dentists, physical therapists, etc.), sales offices (real estate, tele-sales/tele-marketing, distributors, etc.), non-franchise stores (restaurants, retail outlets, etc.), contractor's offices (Plumbers, Electricians, Landscapers, etc.), and many others.

The business' computing objective is simply to efficiently track and run the business. The computing needs of these types of businesses are very similar. The business probably has at least one Windows system and may have either terminals, cash registers, or networked Windows systems. In addition, the server runs the central business software such as accounting, patient tracking, inventory, or other critical business application. In these situations, file and print services are often as important as the central business application.

The Enterprise System, which includes the Windows connectivity technologies and web services, is the premier small business server by supporting both world class, high quality UNIX applications and Windows file and print services. Excellent for small businesses that want and need only one server.

Offices where the solution can be provided by a single server connected to several character terminals can use the Host System. The Host System provides a lower cost solution by eliminating the complexities of networking. For small businesses with simple transaction oriented computing needs or for replicated sites (which can be viewed as series of small businesses that happen to be identical), the Host System provides a competitive advantage by being the lowest total cost of ownership solution.

### ***Departmental Application Server***

Running an aspect of business such as materials management, accounting, human resources, purchasing, retail cash registers, or finance requires a reliable, scalable server to handle the volume of transactions. Around the world, SCO UNIX systems provide the stable server environment for running thousands of these and other critical business functions.

High quality UNIX operating systems running on low cost Intel platforms provides excellent value to any organization. SCO operating systems provide industry leading performance on the Intel platform. This combination even out performs most RISC systems.

The SCO UNIX platform provides organizations with investment protection of application development. Whether your application is an extremely cost effective and reliable character terminal application, or has migrated to the newer client/server style application, or is being migrated to the Internet way of computing, the SCO system will support the continued development of your applications.

Departmental applications are going through the same changes as other applications in the industry. Traditional character based applications are being converted to Web and/or Java™ language-based applications. When your updated application becomes available, you don't want to have to replace your hardware and operating system too! The Enterprise System comes with a full web server and the Java Virtual Machine. This release makes your server ready now so you can update your applications whenever they are ready.

Exceptionally large databases require significant increases in memory. This release supports up to 4GB of memory so customers can get the most out of their database application.

Database reports can now be made available natively to Windows users through the file and print services of SCO VisonFS™. Also, Windows users needing access to UNIX applications can connect via SCO TermLite™.

### ***Workgroup Server***

This solution is designed to improve the efficiency of individuals within an organization rather than improving the efficiency of the business process. The solution is targeted at any size organization where the demands of the users would interfere with the performance of a line of business database server (such as accounting, materials management, sales order entry, etc.).

The business objective is to allow people to work together more efficiently by sharing data and information. The typical environment may have mixed clients including character terminals, Windows PC's, possibly Network Computers, or even UNIX workstations. In addition to their personal work (reports, presentations, etc.), the users may need to connect to a line of business server for either information access or data entry.

The inclusion of file and print technologies gives us a product that can be applied to directly to the workgroup market. This is a market that prior to now, SCO has not aggressively pursued. This is a huge market (shipping over 2 million units in 1996) dominated by NetWare, NT, and OS/2.

Medium and Large organizations are known to have diverse client systems within their workgroups. No other operating system provides support for so many various client systems without additional software needed for the client system.

### ***Internet Server***

Today's typical Internet server solution is a marketing bulletin board. Web technology and the Internet are the hottest new topics in the computer industry. As solution providers figure out how to take advantage of this new technology, SCO has incorporated this technology into its operating system offerings. As the technology improves and application of that technology is applied, solutions such as electronic commerce, interactive marketing, and application service over the Internet will become more common place.

The SCO OpenServer Internet FastStart System provides the core technologies and the high reliability needed to deliver information to the network. The Internet FastStart System is designed as an entry level standalone web server. This product is the lowest cost web server product offered by SCO. This product should be focused at solutions that want/need only web services. It is not designed to support multiple login users. If customers want user login connectivity, then the Enterprise System is the proper product for them.

For Intranets or ISPs (Internet Service Providers), this is an excellent system where multiple workgroups want their own web pages, but don't have the expertise to install, manage, and publish their own sites. The multihoming web server capability can provide every workgroup with their own unique URL to their web pages.

### ***Developer Workstation***

The developer community continues to create applications using various computing models. Each computing model has its own set of advantages and disadvantages. When combined with the SCO OpenServer Desktop System (which includes the Java Development Kit for SCO operating systems), the SCO OpenServer Development System provides the compilers, libraries, and tools necessary to create host-based, client/server, or new Internet based applications.

Developers have been using the SCO OpenServer Development System on their SCO OpenServer Desktop System for creating C and C++

applications. Java is the new focus for application developers. The conversion of existing applications to Java offers the developer the opportunity to develop once and deploy everywhere. The Java Development Kit provides the tools and libraries needed to generate Java applications. The Java Virtual Machine interprets and runs the Java applications.

# Technical Features

## *Core Operating System*

### Filesystems

SCO OpenServer Release 5 introduces two new advanced filesystem types. The Compression File System, also known as the Desktop File System (DTFS™), is optimized for environments where disk space is at a premium. The High Throughput File System (HTFS™) offers high performance and improved filesystem integrity. Both filesystem types support versioning, the transparent maintenance of multiple versions of a file, which allows a previous version of a file to be restored on demand.

High Throughput Filesystem (HTFS). HTFS is a journaling (or “intent logging”) filesystem; that is, instead of writing data to the disk buffers and then flushing those out to the disk, HTFS writes data through the buffers to a journal. This journal is a record of all pending writes to be made to the filesystem. When the disk subsystem goes idle, or when the information is deemed too stale, the journal is played out to the filesystem as a background task. Filesystem journaling is desirable because it increases system reliability and availability by better maintaining filesystem integrity.

HTFS, like other journaling filesystems, recovers from a system failure much more quickly and gracefully than a non-journaling filesystem. Because writes are in journal format, they can be backed out of the filesystem in the event of a crash. This means that **fsck** times are greatly reduced.

HTFS uses checkpointing to update the disk periodically from the buffer cache. Checkpointing reduces the likelihood that the filesystem will need to be checked and repaired when rebooting following a system failure.

Two HTFS formats are provided: HTFS-16 and HTFS-32. HTFS-16 uses the same 16-bit inode format as the Extended Acer® Fast File System (EAFS). HTFS-32 provides 32-bit inodes, which allows for a maximum of 4G files per filesystem. HTFS-32 provides compatibility with other 32-bit inode filesystems.

HTFS has a maximum file size of 2GB and a maximum filesystem size of 512GB. The number of files per filesystem is configurable when the filesystem is created. The maximum number of files is 4G.

Compression Filesystem (DTFS). The Compression File System uses transparent data compression and an efficient media format to increase the storage capacity of disks. It is designed for environments where disk space is at a premium, such as imaging applications and laptop computing environments. A disk space savings of 20% to 60% can be achieved through DTFS's compression, depending on the type of files being compressed.

Like HTFS, DTFS uses checkpointing capabilities to increase system availability and data integrity.

Using a modular filesystem design, DTFS allows advanced system administrators to add new attributes or personalities to a filesystem. These might include better and faster compression algorithms, access control lists for secure computing environments, encrypted file lists, or mandatory access control. Third-party vendors can develop and integrate new personalities in the form of device drivers that will allow users to customize the way DTFS behaves on different filesystems.

DTFS has a maximum file size of 2GB and a maximum filesystem size of 1TB. The number of files per filesystem is configurable when the filesystem is created. The maximum number of files per filesystem is 2G.

Comparison of SCO Filesystems					
Type of File System	Max. Inodes	Max. Size	Compression	Journaling	Config.
EAFS	65,536	2 GB	No	No	No
HTFS	134,217,728	512 GB	No	Yes	No
DTFS	1,073,741,824	1 TB	Yes	No	Yes

#### Filesystem Check and Repair Utility (fsck) Improvements

New with this release, the filesystem check and repair program (**fsck**) automatically processes filesystems in parallel. The program detects which filesystems are on which physical disk drives and starts checking one filesystem on each. As a check is completed, another is started on the same device. This parallelism, along with support for intent logging and checkpointing, results in **fsck** performance that is much-improved over the previous release.

## Virtual Disks and RAID (Redundant Arrays of Inexpensive Disks)

Virtual disks are used to organize data in multi-disk systems. Areas from several discrete hard disks can be assigned to a virtual disk, which is accessible as if it were a single physical disk by applications running on the system.

Virtual disks can support partitions larger than a single disk's physical extent. In addition, virtual disks can be organized so that I/O requests are written to an array of disk drives in parallel. Thus, virtual disks can be used to mirror data (providing increased security against hardware failures), or to stripe data across multiple disk drives (improving performance).

Disk "pieces" can be assigned to virtual disks as needed. Some virtual disk types can use this facility in the event of a hardware failure. A disk piece is brought online from a spare disk drive kept on hot standby, and the lost data is regenerated from the parity information and data stored on the other drives in the array. This permits an array to keep working at near-optimal performance despite isolated hardware failures.

Virtual disks can be administered without taking the system offline, including online reconfiguration, online restore, and online data verification. This capability reduces disk downtime due to storage system reconfiguration and performance tuning.

There are several types of virtual disk. Most are implemented as RAID (Redundant Arrays of Inexpensive Disks) configurations. SCO OpenServer Release 5 software introduces support for:

- RAID 0. Also known as "Striped Array". Disk striping distributes data blocks across pieces stored on multiple disks, in a non-redundant manner. RAID 0 is suited for environments where performance and capacity, rather than reliability, are the primary concerns.
- RAID 1. Also known as "Mirrored Disk". Disk mirroring is the parallel duplication of disk data onto a primary and secondary disk. RAID 1 is suited for database applications, where availability and transaction rate are more important than storage efficiency.

- RAID 4. Also known as “Block-Interleaved Undistributed Parity Array”. This configuration is similar to RAID 0, with the addition of redundancy information (parity) that is stored on a separate disk piece to improve reliability. Note that overall disk performance may be reduced, however, because the single parity disk must be updated on all writes.
- RAID 5. Also known as “Block-Interleaved Distributed Parity Array”. RAID 5 improves on RAID 4 by striping the parity across all disks instead of just one. Thus, for I/O-intensive applications, RAID 5 is preferable because of the improved load balancing over RAID 4.
- RAID 10. Also known as “Striped, Mirrored Array”. RAID 10 configurations are built by striping mirrored disks, which are usually set up on two independent buses for increased reliability (a technique called “duplexing”).
- RAID 53. Also known as “Striped Array of Arrays”. RAID 53 configurations are built by striping arrays, such as those of RAID 5. RAID 53 configurations protect your disks from failure of one of the host adapters, multiple disk drive failures on a single bus, and from multiple drive failures on any bus.

Virtual Disks and RAID technology are available via the “Virtual Disk Manager” Layered Product. See “Extending Server Functionality (Layered Products)” for more information.

#### Symmetric Multiprocessing (SMP) License

Symmetric Multiprocessing takes advantage of system configurations which contain multiprocessing systems, such as dual Pentium<sup>®</sup> systems, and demonstrates SCO’s continued leadership in reliability, availability, and serviceability (RAS). SMP is ideal for increasing the performance of database applications.

The SMP license is a Layered Product that replaces MPX of previous releases, and is already integrated into the base operating system. To activate it, no additional software is required. You need only purchase a license to use it.

See “Extending Server Functionality (Layered Products)” for more information.

## Fixed Priority Scheduling

Fixed priority scheduling allows an application to control the execution flow of the processes that make up that application, instead of using the kernel to share CPU time between all runnable processes. Fixed priority scheduling provides “soft real-time” capabilities, giving application developers greater control of CPU usage at the application level. To access this feature, developers can program to a POSIX compliant Application Programming Interface (API), new in this release.

## Dynamic Kernel Tables

SCO OpenServer operating systems track system resources commonly used by applications. These resources, relating to files, programs, processes and network usage, have traditionally been stored in statically-sized kernel tables. New with SCO OpenServer Release 5 software, these tables are dynamic and grow by usage, and provide greater flexibility and simplicity in managing system resources.

The following table shows, for each dynamic resource, the minimum and maximum configurable values:

<b>Resource</b>	<b>Description</b>	<b>Min</b>	<b>Max</b>
MAX_DISK	# of disk drives attached to system	1	1024
MAX_INODE	# of inode tables allocatable	100	64,000
MAX_PROC	# of process table entries allocatable	50	16,000
MAX_FILE	# of open file table entries allocatable	100	64,000
MAX_REGION	# of region table entries allocatable	500	160,000
MAX_MOUNT	# of mount table entries allocatable	4	4096
MAX_FLCKREC	# of lock table entries allocatable	50	16,000

Note: The default value for each of the above resources is 0, which indicates that the table will grow as needs dictate.

## Multiple Language Support

SCO OpenServer operating systems now provide native support for English, French and German languages. Support for additional languages is built into the system and can be provided by 3<sup>rd</sup> party developers.

## Runtime Libraries, including Dynamically Linked Libraries (DLLs)

All 3 configurations of SCO OpenServer Release 5 now include the linker and runtime libraries. New with this release, many of the libraries now have Dynamically Linked Library (DLL) versions. This new packaging makes it easier and less costly to use third-party products and to deploy applications created with them.

Dynamically linked libraries are routines that are attached to a program at runtime instead of being combined with an application program when it is compiled. Dynamically linked programs save disk storage and system process memory because applications need not contain copies of common library routines. DLLs also simplify bug fix distribution since only the “fixed” library needs to be updated, instead of an entire application. A link-time flag signals the operating system that an application will be built with DLLs rather than statically linked libraries.

For more information, see Appendix A.

## Memory Mapped Files

Memory mapped files offer the ability to map the contents of a file in the virtual memory space of a process. Applications that take advantage of this feature often show improved performance, because a file can be read or written much faster in virtual memory than if it were stored on a (relatively slower) disk.

## High-Performance Database API

The High Performance Database API provides a range of highly-efficient functions designed to improve the performance of database applications. There are three groups of functions:

- Asynchronous I/O allows an application to allocate an area of memory that is dedicated for performing asynchronous I/O. Applications can initiate either single or multiple requests and then poll for their completion. In addition, requests are no longer subject to the 4K size restriction. Any driver that supports traditional asynchronous I/O will operate with this new interface. Drivers can be enhanced to take further advantage of this new functionality.
- POSIX 1003.1 semaphore operations provide a faster method for process synchronization when compared to conventional System V™ semaphores. Both named and unnamed semaphores are provided.
- Also new with this release, a timer can be created that will expire on the basis of either real time or CPU time. When a timer expires,

a signal is delivered to the requesting process. Timers may be programmed to provide a periodic, repeating signal. An application may also determine the overrun that occurred between the timer expiring and the signal being delivered.

### Un-interruptible Power Supply (UPS) Monitoring

UPS monitoring enables the system to perform an orderly shutdown when either low battery status is detected or when a pre-programmed timer has expired, thereby protecting the data integrity of files. Support for controlling American Power Corporation UPS's has been added. In addition, the SCO OpenServer Development System now contains an API that enables developers to create a custom UPS driver that has the ability to control UPS hardware.

### Advanced Power Management (APM)

Some machines (typically laptops and Energy Star or "green" systems) provide facilities for controlling power consumption. On laptops, for example, power management facilities usually provide a report on the battery charge level, permitting you to shut down the machine before the batteries are completely discharged. In addition, advanced power management extends battery life for mobile computing systems such as notebooks and handheld devices. Power management is automatically enabled on installation if the ROM BIOS supports APM.

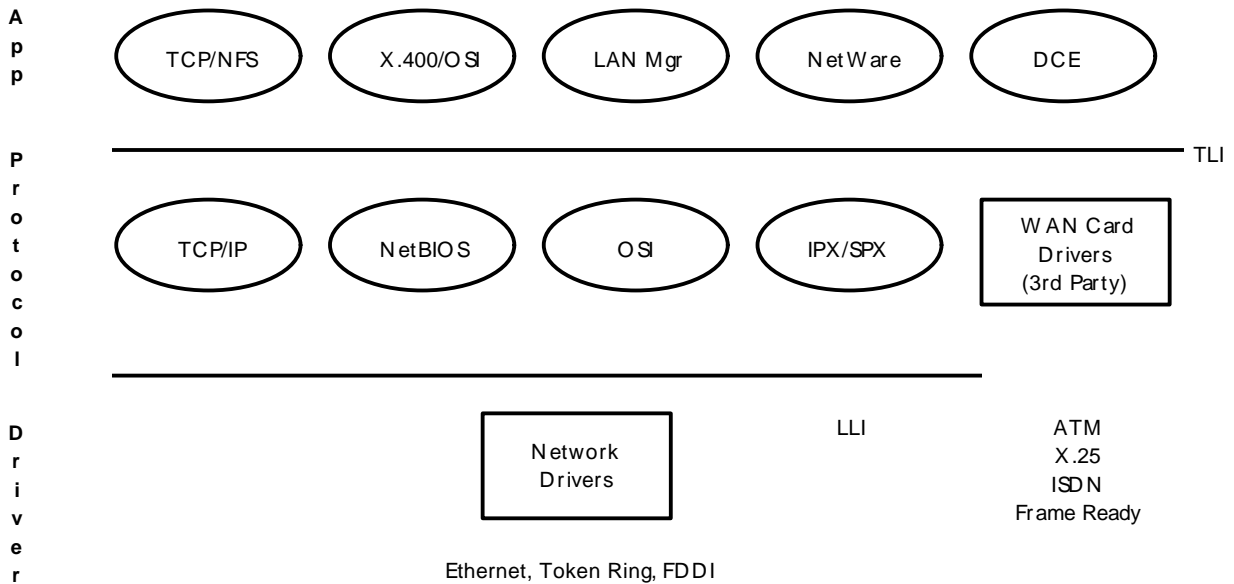
## ***Network Services***

### Introduction

SCO OpenServer systems are designed to provide users with network access to data, applications, and resources throughout the organization – in the department next door or a branch office thousands of miles away.

The SCO open networking architecture is based on building blocks for UNIX system networks, such as STREAMS™, the Transport Layer Interface (TLI), and the Link Layer Interface (LLI). All base operating system products provide a common set of LAN hardware drivers that support any mix of drivers and protocols.

## SCO Network Architecture



This comprehensive approach to networking means users can readily combine the SCO products and third-party hardware and software best suited to their organization's requirements. For special requirements, using separately available software from SCO or third-party vendors, users can connect SCO OpenServer systems to a variety of systems – mainframes, minicomputers, workstations, multi-user systems, X terminals, character-based terminals, PC networks, wide-area networks, point-of-sale devices, and proprietary systems such as the Apple<sup>®</sup> Macintosh<sup>®</sup>.

The SCO OpenServer product line supports dozens of Ethernet and Token Ring cards. Users can install more than one card in a machine, and multiple communications protocols (such as OSI, TCP/IP, and IPX/SPX) can run simultaneously on single or multiple adapters.

Networking services of SCO OpenServer systems allow for more connections and easier management than ever before. New features include improved connectivity with Novell<sup>®</sup> networks through a new SCO<sup>®</sup> Gateway for NetWare and a login connection server, as well as UNIX system to NetWare printing.

### UNIX File Services (NFS)

Network File System (NFS<sup>®</sup>), developed by Sun Microsystems, is the *de-facto* standard for distributed filesystems in UNIX workstation environments. Using NFS within a network composed of machines

running several different operating systems, users can access remote files and applications directly – just as if they resided on their own machines. Long file names up to 256 characters in length are supported, and can be linked over the network with symbolic links.

NFS creates a truly distributed filesystem by mounting remote filesystems. It reduces the need for time-consuming remote logins and eliminates the confusion and wasted disk space that results from having multiple copies of a file on several machines. The NFS lock manager can be used to support standard UNIX advisory locks to resolve file conflicts by locking files that are used both locally and remotely.

The NFS automounter allows remote systems to share a limited number of NFS mount points. This enables more systems to access server files through automatic and transparent mounting and unmounting of remote directories as needed. In addition, alternate machines can be specified for remote directories, so in the event that one server machine goes down, the automounter can automatically mount a duplicate directory from another machine.

PC users with NFS client software such as PC-NFS<sup>®</sup> for MS-DOS<sup>®</sup> can access remote files on a network while running local applications. With SCO OpenServer NFS server capabilities, PC users can access SCO OpenServer filesystems directly and transparently. An SCO OpenServer filesystem can appear to PC users as a separate, local disk drive, while SCO OpenServer resources such as printers can also appear as local resources. And because the SCO OpenServer filesystem and peripherals can be accessed by more than one user on the network at a time, the SCO OpenServer system is an ideal platform for serving multiple PCs in a shared-resource environment.

#### UNIX Printing Services (LPD)

UNIX systems use the LPD (line printer daemon) subsystem to handle print requests. Although the subsystem title refers to “line printers”, a full range of PostScript<sup>®</sup> and PCL printers are supported. Print requests are saved to a spooled area, then sent to printers as the printer becomes available. The benefit of spooling print requests is demonstrated when the printer goes down for maintenance. When the printer comes back on line, the print job picks up where it left off. Many users can send print jobs at about the same time and all jobs are printed appropriately. For high volume printing environments, printers can be grouped in classes. Users can send print jobs to a class of printers, then whenever a printer becomes available, the print job is sent to first available printer.

## Network Information Services (NIS)

Network Information Services (NIS), formerly known as Yellow Pages<sup>®</sup>, simplifies TCP/IP network administration by allowing administrators to use a single server's configuration files to manage a group of systems as if they were a single system. NIS provides an extensible database used by the TCP/IP and NFS network for storing and accessing system information such as hostnames, network addresses, and user names, as well as the necessary database administration tools.

## Microsoft Windows File and Print Services

Integrating Windows systems into your SCO OpenServer network has never been easier. The SCO OpenServer software includes a variety of CIFS compliant technologies which provide native file and print services to Windows desktop systems. For clients running either DOS, Windows 3.1, Windows for Workgroups, Windows 95, Windows NT<sup>®</sup>, or even OS/2, access to SCO OpenServer disk space and printers is as easy as point and click. Windows users click on their network neighborhood icon and map a network drive or select a network printer from print manager.

## SCO Gateway for NetWare

The SCO Gateway for NetWare is a software system that allows a UNIX machine to connect to NetWare servers, interfacing with the data and services of those servers. It also allows access to Novell file and print resources, providing printing services, for requests from a UNIX machine, on printers attached to NetWare servers.

In general, NetWare file servers do not understand most UNIX filesystem operations. However, an NLM (NetWare Loadable Module) is provided that adds UNIX filesystem semantics to NetWare v3.11, v3.12, and v4.01 file servers. Then NetWare filesystems can be accessed from either command line utilities or graphical tools.

The SCO Gateway for NetWare is built upon Novell networking protocols, in particular the NetWare Core Protocol (NCP), which provides the file operations, and the Internetwork Packet eXchange (IPX<sup>™</sup>), which provides the transport between machines. Additionally, it supports a fully-compliant mount style interface and allows NetWare servers to be auto-mounted.

## Electronic Mail

Electronic mail in the SCO OpenServer system is based on the Simple Mail Transport Protocol (SMTP). Components of the system include mail transfer subsystems and user interface programs.

Mail transfer subsystem options include updated MMDF (Multiple Memorandum Distribution Facility) Administration and Configuration managers, and **sendmail**. **Sendmail** has been upgraded to Berkeley version 8.8.5. Both sendmail and MMDF are POP3 enabled which means that any POP3 mail client such as Netscape Navigator, Eudora, and so on, can download mail, reply to their mail while on the road, connect back to the network and send their mail.

The SCO OpenServer mail system provides two graphical mail clients, **SCOMail** and Netscape Navigator™. **SCOMail** is a full-featured graphical mail program that allows users to interactively read, forward, create, and sort their mail files. It is compatible with the SCO Office Portfolio mail system and supports both MMDF and **sendmail** transfer subsystems, and offers full support for Multipurpose Internet Mail Extensions (MIME). Netscape Navigator includes a POP3 based mail reader. The Netscape Navigator mail reader is also MIME compliant.

MIME is a standard for mail exchange that supports graphical, audio, video, and multimedia messages. In addition, it allows inclusion of multiple message parts in a single message, allows inclusion of binary files, and supports non-ASCII character sets and multiple-font messages. The MMDF mail transport agent, described earlier, is MIME-compliant.

## Internet Services

The World Wide Web has taken the computer industry by storm. Server systems need both web server software and web browser software. SCO OpenServer includes both the Netscape FastTrack Server and the Netscape Navigator packages. The Netscape FastTrack Server provides web server functionality. The server can host web pages to any web browser (Netscape Navigator, Microsoft Internet Explorer, Compuserve, and so on) for intranet or Internet use. The Netscape Navigator Gold software provides industry standard web browsing capability and web page creation and publishing tools. New web pages can be published to the Netscape FastTrack Server from Netscape Navigator Gold with a click of a button.

The **http** daemon (Hyper Text Transfer Protocol) enables you to establish your own web site, and serve web pages, both within and outside of your organization. For example, you could provide web access to your customers to enable them to browse, print, or download company, product, and services information via the Internet.

Electronic newsgroups have been around for several years and has standardized on NNTP (Network News Transfer Protocol) for

communications between the client and server. The Netscape Navigator package includes a new reader. Also, an X11 based news reader called **xrn** is included with SCO OpenServer software.

### Calendar Service

The SCO OpenServer operating system comes with calendar server software. The calendar server allows individual and group scheduling of events. The system is typically used to schedule personal agendas and meeting room availability. This service is network ready and comes with both character and X-based graphical clients.

## ***Network Protocols***

### Multi-Protocol Networking - to Integrate Your Networks

SCO systems provide a wide range of protocols to support the most popular applications. These protocols include TCP/IP, IPX/SPX, SMTP, HTTP, SNMP, NetBEUI, NetBIOS, and POP3. Other protocols such as DECnet<sup>®</sup>, X.25, AppleTalk<sup>®</sup>, and SNA products are available from third parties. Most protocols can be simultaneously combined for effective multi-protocol solutions.

### TCP/IP, the Corporate Network Backbone

TCP/IP performance has been improved in this release, and its implementation offers compliance with the latest industry standards.

TCP/IP is an underlying layer of software that connects machines into a local-area network (LAN), and connects LANs across wide-area networks (WANs) to enterprise-wide networks. The Transmission Control Protocol (TCP) and Internet Protocol (IP) are industry- and government-standard communications protocols and are the foundation of many network-based programs. Application programs and system software rely on TCP/IP to send and receive information to and from remote machines.

TCP/IP includes the **rlogin**, **telnet**, and **ftp** utilities, which allow users to log into, and transfer files from, remote machines on a network. The SCO OpenServer system provides for an increased number of concurrent **rlogin** and **telnet** connections and has added RFC 1122 (Request For Comment) compliance. This new RFC specifies requirements for Internet hosts, enumerates many aspects of protocol behavior, and clarifies ambiguities in the original protocol specifications. A significant change is a compatibility switch for interoperability with older systems, and an extended STREAMS interface to allow for more information about

Universal Datagram Packets. Routing changes in RFC 1122 allow for the detection of dead routers and multiple default gateways through the use of the Internet Router Discovery Protocol.

With TCP/IP, users can connect machines locally using fiber optic cable, coax, or twisted pair, or remotely via modems and telephone lines. FDDI, X.25, T1 and other high-speed TCP/IP-capable services for the SCO OpenServer system are available from many vendors.

TCP/IP networking ensures that users can share data and resources on other systems. TCP/IP provides high-performance network connections to a wide variety of computers. Even on networks composed of dissimilar hardware and operating systems, users can quickly and easily log into remote machines and access peripherals or share data. TCP/IP protocols are used by graphical windowing products, such as the X Window System™; distributed file-system products, such as NFS; distributed database products; and many business and scientific applications.

The SCO OpenServer TCP/IP implementation includes support for Serial Line Internet Protocol (SLIP) and point-to-point protocol (PPP) drivers to support asynchronous communication. SLIP and PPP asynchronous connections can be implemented between local machines and across WANs.

TCP/IP supports distributed applications through standard BSD sockets, AT&T TLI, and X/Open transport interface (XTI) interprocess communications interfaces.

The SCO OpenServer product line contains a complete TCP/IP suite, featuring:

- Standard ARPA utilities: **telnet**, **ftp**
- Berkeley R-utilities: **rlogin**, **rnp**, **cmd**, **rsh**, **rwho**, **ruptime**, **finger**, **rdist**
- Berkeley **lpd** printer daemon
- BIND name service (client/server support)
- Gateway and subnetwork support
- Berkeley sendmail
- Simple Mail Transfer Protocol (SMTP)
- Berkeley Socket Library (BSD 4.3-compatible)
- **Routed** and **route**
- **Gated** support for enabling advanced system or network administration routing with support for RIP, HELLO, and EGP routing protocols
- UUCP support for TCP/IP

- Serial Line Internet Protocol (SLIP) for asynchronous gateways and bridges
- Point-to-Point Protocol (PPP) for asynchronous gateways and bridges
- Simple Network Management Protocol (SNMP) support
- STREAMS
- Multithreaded drivers
- Secure TCP via Kerberos

#### IPX/SPX Support - to Integrate Novell Clients

IPX/SPX is the underlying layer of software that connects Novell's NetWare servers and clients over local-area networks. MS-DOS and MS Windows NetWare clients can log into SCO OpenServer systems over IPX/SPX using any terminal emulator that supports *int6B* or *int14h* redirection, allowing them to access and run SCO UNIX system and XENIX® applications. Client/server applications based on products such as ORACLE® can use IPX/SPX between an SCO OpenServer system and an MS-DOS or MS-Windows PC – eliminating the need for software and/or hardware gateways between the UNIX System and Novell environments and dual protocols to run on NetWare clients and servers. The SCO IPX/SPX stack can run concurrently with TCP/IP, DECnet, VINES, OSI, and other stacks on a single network card on the SCO OpenServer system. IPX/SPX uses the AT&T STREAMS based architecture and provides TLI library support for the development of new DOS client to SCO OpenServer applications.

A new program added to the IPX/SPX support allows users to query the local NVT (NetWare Virtual Terminal) server and display all current connections and their status. NVT allows DOS users running only IPX/SPX (the Novell NetWare transport protocols) to login to an SCO UNIX server. This is done without a TCP/IP protocol stack on the DOS client. Users can also build their own client/server applications using NVT as a guideline, allowing powerful UNIX system back-end processing to a DOS or Windows front end.

#### NetBIOS and NetBEUI

The NetBIOS interface allows network applications (such as SCO VisionFS) to send messages over different transports. The NetBIOS that is provided with SCO products is mainly for use with TCP/IP. SCO VisionFS and SCO® Advanced File and Print Server use the NetBIOS protocol to communicate with Windows systems.

The NetBEUI protocol is a derivative of NetBIOS. Where NetBIOS runs over TCP/IP, NetBEUI includes replacement technology for TCP/IP. The

NetBEUI protocol is tailored for single subnet use. It provides high speed LAN connections. SCO Advanced File and Print Server can be configured over NetBEUI as can the Windows systems which connect to it.

### SNMP and SMUX

The SNMP (Simple Network Management Protocol) is a core component of the SCO OpenServer Host and Enterprise systems that provides a standard for monitoring and controlling TCP/IP-based networks. SNMP allows the retrieval and modification of networking information maintained by hosts and routers attached to a network. A network administrator can use SNMP to diagnose and correct network problems from remote hosts.

Agents are used to manage entities called objects. By using a scheme called the Management Information Base (MIB), objects can be placed in a group to allow them to be referenced more easily. One example of a MIB is the Internet TCP/IP MIB, commonly referred to as MIB-II. SCO's implementation of SNMP includes support for network- and systems management of MIB II and for Host MIBs. In addition, support for a variety of new MIBs has been added.

Also included is the SNMP Multiplexing Protocol (SMUX), which provides the ability to manage objects that are not under direct control of an agent, such as those that are not in the same physical environment.

### POP3 Support

SCO OpenServer systems contain a Post Office Protocol (POP) version 3.0 server. This server allows mail applications that use POP3 to access user mailboxes that reside on the SCO server using a LAN or WAN connection. When the POP3 server is running, users of POP3 clients can log in to the server system and pick up or delete mail that has been stored there. In combination with SMTP, a POP3 server makes full duplex mail capabilities (reading, writing, forwarding, and deleting) available.

The POP3 server is provided for use with third party standard e-mail clients, such as Qualcomm Eudora, Unipalm Mail-It, and even Microsoft's Exchange client that ships with Windows 95.

### ***Graphical User Interface***

Graphical and desktop services provide the unifying environment that transparently integrates SCO OpenServer base operating system services, networking services, and user applications. The environment consists of a graphical user interface (GUI), an object-oriented Desktop

Manager, and a collection of graphical user Toolsheds – applications that provide personal productivity and groupware interaction capabilities.

SCO is dedicated to support heterogeneous computing environments, and to simplify user interaction wherever possible. For example, SCO® Wintif®, a key component of the SCO Windows friendly strategy, enables a Motif® application to be given a Windows appearance by relinking the Motif application with the Wintif library. Key components of the SCO Windows friendly strategy include:

- SCO VisionFS
- SCO Advanced File and Print Server
- SCO Merge
- SCO SQL-Retriever
- SCO TermVision
- SCO TermLite
- SCO Wintif
- SCO XVision
- LAN Manager and NetWare gateway services

For information on the SCO Gateway for NetWare, see “Networking Services”. For information on the rest of the above products, see “Extending Server Functionality (Layered Products)”.

SCO OpenServer systems offer a high-productivity graphical environment. Features include support for standard and high-resolution graphics adapters, distributed X Window System support and the ability for users to maintain multiple virtual desktops via the SCO® Panner™ product.

### The X Window System

The X Window System is a distributed, transparently networked, device-independent, multitasking windowing and graphics system. It enables the user to display multiple applications in windows on the same screen, and it lets one application use multiple windows and multiple screens. Unlike Presentation Manager and Windows running native under MS-DOS, X programs are not tied to the home CPU, but can run anywhere there is an X display on a user's network.

The X Window System open architecture enables the user to transparently operate applications residing on any host computer on a TCP/IP network — X applications running on platforms from Sun, DEC, HP, IBM, AT&T, Siemens-Nixdorf, Sony, Olivetti, and Silicon Graphics can be displayed and used on SCO OpenServer systems, and all SCO

OpenServer X-based applications can be displayed and used on those platforms, as well.

### X Server (X11R5)

The X Server is the software that controls a workstation's or X terminal's hardware, such as its physical display, the keyboard, and mouse or other pointing device. The X Server creates windows and draws images and text in them, in response to requests from client programs. The clients and server can reside on the same machine, as they typically do on an SCO OpenServer system console, or they can be separated across a network.

The X Server is based on the X11R5 distribution from MIT (The Massachusetts Institute of Technology).

### OSF/Motif 1.2 Application Support and SCO Wintif

Applications written for OSF/Motif<sup>®</sup> 1.2 will operate on SCO OpenServer systems, which include OSF/Motif 1.2 shared libraries for improved performance and memory usage.

SCO Wintif, an integral part of the Motif 1.2 shared libraries, enables any dynamically-linked OSF/Motif 1.2-compliant application to take on a Windows 3.1 or OSF/Motif 1.2 appearance. Through the use of environment and resource variables, you can control the look-and-feel of each application. SCO Wintif enables each user to use choose the look-and-feel that is most comfortable.

### SCO Panner Window Manager

SCO Panner, a virtual window manager based on the industry standard OSF/Motif Window Manager (Version 1.2), is included in SCO OpenServer systems. Its virtual workspace capabilities let you position windows over an area many times larger than your physical screen.

By using a graphical map of your virtual workspace, you can not only view applications that are running, but you can logically group windows around the workspace to create different, task-oriented areas. If you have important windows that have to be displayed all the time, these can be "nailed" to the screen so they are always visible, regardless of where you move. To move to another area within the map, you simply point and click.

By relieving you of your need to spend time iconifying processes and resizing windows, SCO Panner improves your productivity.

## Desktop Manager

The Desktop Manager, X.Desktop™ 3.6, ties all of the graphical services together by managing the way icons, menus, and objects are represented and manipulated on the screen. The Desktop Manager is used to initiate graphical applications and access UNIX system services, while SCO Panner helps you navigate your desktop. The Desktop Manager eliminates the need for the user to learn unfamiliar UNIX system commands. Instead, icons are dragged-and-dropped onto a desktop action icon. For example, to print a file, a file icon is dragged-and-dropped over the print icon. A file is deleted by dragging-and-dropping a file icon over the trash can icon.

X.desktop is extensible and flexible, with a powerful rules language that defines the appearance and behavior of objects.

## Toolsheds

To allow users to interact and manipulate information easier, SCO OpenServer software includes a number of personal productivity and groupware applications called Toolsheds. There are several categories, and a representative number is shown below:

<b>Accessory</b>	<b>Description</b>
Alarm	Set a time for the alarm to ring
Calculator	Graphical calculator
Calendar	SCOcalendar - a simple and easy-to-use graphical calendar that allows users to manage appointments for entire groups over a network
Clipboard	Allows information to be added or deleted from the clipboard
Clock	Graphical clock
Date	Displays the date and time
Edit	SCOedit - A simple and easy-to-use graphical editor
Find	A utility to help locate files
Help	SCOhelp - An SCO modified version of Mosaic that gives users hypertext access to the online documentation library
Lock	SCOLock - A utility that locks mouse/keyboard activity and display a screen-saver until unlocked via a user-chosen password
Magnifier	Enlarges a portion of the display
Mail	SCOMail - A full-featured graphical mail program that allows users to interactively read, forward, create, and sort their mail files; works with both MMDF and sendmail; Includes MIME support
Paint	SCOpaint - a paint program to create icons and pictures
Remind	SCOREmind - a program that will remind users of events on their calendars
Services (if installed)	Connects users to the SCO Services home page
View	A file viewer

## Controls

Controls are facilities that allow users to “control” their environments by changing the color, background, fonts, mouse, etc.

<b>Control</b>	<b>Description</b>
Host	Graphical front end to <b>xhost</b> , which allows users to set up access control for their displays
Object Builder	Allows users to manipulate the properties of the objects on their desktop. Users can define an object by attaching a picture or program,; and can define rules for mouse click and drop behaviors
Preferences Editor	Objects that change the appearance and behavior of different parts of user's desktop. The user has complete control over the desktop appearance
Preferences Library	A library of different preference settings that allows users to change their desktop appearance to one of the default sets, or create and store their own set of preferences
StartUp	Allows users to specify a collection of apps that automatically start up every time

## Desktop Administration

Desktop Administration tools allow users to administer icons, people objects, and sets of rules on their desktop.

<b>Desktop Administration Tool</b>	<b>Description</b>
Icons	Allows users to examine icon bitmaps
People	Displays the users on the system as objects, and allows users to examine information about specific people
Rules	Allows users to examine desktop rules files currently installed on the system

## System Commands

System commands allow users to run UNIX system commands.

<b>System Command</b>	<b>Description</b>
Command	Enter a system command to execute
Compress	Compress a file
Details	Displays detailed information on the given user
Disk Free	Indicates the amount of free disk space on the system
Disk Usage	Displays the disk usage on the system
Env	Displays your current environment variables
Login	Log in as another user on the system start up a SCOterm as that user
Password	Change your user password
Performance load	Display the system performance load
Processes	Display the processes running
Remote Command	Execute a remote command
Remote Login	Log in to a remote machine, and start up SCOterm on that machine
Shell	Start a shell
UNIX	Start a SCOterm terminal emulator that supports the SCO ANSI console and allows users to access the UNIX system directly to run existing UNIX applications
UNIX Manual Pages	View the UNIX manual pages using the UNIX <b>man</b> utility
Users	Displays info about users on the system
Who	Display the users logged onto the system

## Demonstrations

Demonstrations are collections of objects which allow users to view various examples of icon animation.

## Other Toolsheds

Installing System Administration tools provides a system administration toolshed that gives the user access to a large set of graphical tools which are used to configure user accounts, the network, the kernel, etc. (usually at *root* level).

If a user installs the SCO OpenServer Development System, the development tools toolshed provides a set of graphical front ends to common development tools such as **SCCS**, debuggers, **lint**, **nm**, etc.

## SCO Visual Tcl

SCO Visual Tcl™ technology provides a full-featured, extensible scripting environment for constructing GUI-based tools and applications. Based on U.C. Berkeley's Tool Command Language (Tcl), SCO Visual Tcl technology features command extensions supporting standard OSF Motif, POSIX, and other advanced language functionality. With SCO Visual Tcl technology, multiple GUIs can be generated *from a single script* via a set of GUI display engines, including graphical Motif, character Motif, and Windows via the Wintif libraries. It is packaged with a set of widget commands that offer features such as toolbar and point-help support.

SCO Visual Tcl technology is used by SCO to develop the SCOadmin graphical system administration product. Third party developers can use SCO Visual Tcl technology to provide interfaces that are consistent with the Motif desktop environment. And SCO Visual Tcl technology makes Motif attainable to those who've ruled out GUIs on the basis of programming complexity and character terminal support issues by enabling both environments to be supported simultaneously.

SCO Visual Tcl technology is also ideal for rapid prototyping of GUIs, particularly for usability testing, and for giving programmers the ability to extend the graphical desktop environment by providing a full-featured environment for the development of small-to-medium tools and applications. Its extensibility allows a developer, for example, to add functionality to recognize and process SQL commands through the use of libraries and header files that are included in the SCO OpenServer Development System.

## Graphical Help System for Online Documentation

New with this release, you can view online documentation with **SCOhelp**, an HTML-based (hyper-text markup language) browser derived from **NCSA Mosaic**. Through a system of hotlinks and cross-references, you can now locate the information you need much more efficiently through a series of single clicks of the mouse.

## **System Administration**

SCO systems administration has been improved through the development of the **SCOadmin** framework as well as the addition of two new products - SCO ARCserve/Open Lite from Cheyenne and SCO Doctor Lite™.

## SCOadmin

SCO has redefined systems administration by building a completely new, application-based environment. This environment features a full set of systems management applications (managers), which help configure and maintain local or networked systems. Displayable in both graphical and character modes, these managers are integrated through the use of an object-oriented framework, based on SCO Visual Tcl, described above.

**SCOadmin** is a collection of systems management technologies designed to distribute management function over a networked environment. Highly-integrated graphical administration applications are designed as full Motif applications incorporated into the SCO Desktop. They are arranged in a hierarchy, with a common program to launch the individual pieces. In the X Windows System, these programs appear as icons launched from the **SCOadmin** toolshed. In character mode, programs launch from a menu. Selecting a submenu sends users to groups of like programs. The tools have the same appearance in character and X mode, standardizing the operating environment by allowing users to access the same tools regardless of the interface. The most commonly-useful tools, such as the User Account Manager, are network-enabled, allowing users to manage multiple machines from a single desktop.

The hierarchy of tools includes system configuration managers, filesystem managers, network management tools, software control managers (including the backup manager), peripheral device managers (including the floppy manager and the terminal manager), and printer control programs. A sampling of these tools is described below:

Account Manager. The Account Manager gives the system administrator control over a user's environment, even on multiple machines. All users on a machine and their status can be listed. Various aspects of user and group environments, such as adding and deleting users and groups, modifying home directories and security permission, and changing passwords can be controlled.

Backup Manager. **SCOadmin** provides a full-featured graphical filesystem backup manager, making it much easier to perform day-to-day backup tasks. With Backup Manager, retrieving files is easier than ever, providing file lists (optionally stored online) for point-and-click selection of file restoration. Backup information, including the browsing and creation of filesystem backup schedules, is accessible at a glance.

Taking advantage of the **SCOadmin** framework services, Backup Manager can perform remote backups of files and filesystems across the

network. Backups may optionally be made of a remote machine to the local machine's device. Backup devices are automatically detected and presented to the user for selection.

Printer Management. The Printers file contains the icons for the three printer control programs: HP<sup>®</sup> Network Printer, Printer Manager, and Print Job Manager. Users install and configure HP Laserjet printers using the HP Network Printer program. The Printer Manager provides an easy-to-use, menu-driven interface that gives users total control over their printers. Printer models now conform to a standard paradigm, allowing the system administrator to control many printer functions from a single menu. The Print Job Manager automatically updates the list of jobs in the queues at regular intervals, allowing a system administrator to monitor, in near-real time, the status of their print queues. Users can also delete, hold, resume, promote, and transfer print jobs using this tool.

Software Manager. New with this release is the graphical Software Manager and the introduction of Software Storage Objects (SSO). Products packaged to conform to the SSO architecture, including SCO OpenServer Release 5, give the Software Manager many capabilities, including the ability to remotely push and pull software across the network, to export portions of software to small-footprint clients, and to remotely install software using media devices from other servers. With new software-based **bootp** technology, SCO<sup>®</sup> Open Desktop<sup>®</sup> Release 3.0 clients can be updated over the network from a machine running SCO OpenServer Release 5 software.

Other features of the Software Manager include version and patch support, with the ability to browse, track, and distribute individual updates. Also, it is now easy to perform point-and-click verification of the integrity of applications installed on SCO OpenServer systems.

The Custom Distribution Mastering Toolkit (CDMT), a component of the SCO OpenServer Development System, provides developers the ability to package their product to conform to the new SSO architecture. (CDMT replaces the Software Mastering Toolkit (SMT) of the previous release.)

Installation Query Manager. The installation process has been simplified in SCO OpenServer Release 5 software. The Installation Query Manager is a front-end to the installation process that is designed to minimize user interaction and the time required to install the system. The following functionality has been added:

- Auto-detection to identify hardware in the system. SCO OpenServer software will attempt to locate and precisely identify a variety of expansion cards that are plugged into your system. The auto-detection program reads specific memory locations to gather information about the expansion cards.
- More in-depth system configuration before installation begins. The series of questions on the Installation Checklist has been expanded and reorganized to request all of the information up-front. Once you have entered all of the information, you will not need to intercede until the installation completes.

SNMP Agent Configuration Manager. This graphical application supports easy configuration of the SCO OpenServer SNMP (Simple Network Management Protocol) agent. Complemented by the new SNMP Host Resources MIB (Management Information Base), SCO Open Server is now easier than ever to manage from a central, SNMP based management station. (For more information, see “SNMP and SMUX”, below.)

#### SCO ARCserve/Open from Cheyenne

SCO ships two versions of SCO ARCserve/Open - the “full” version and a “lite” version. The “lite” version is shipped with the operating system product. It does not require a key for installation and use.

Data Management Tool: SCO ARCserve/Open is an easy-to-use, high performance data management product for enterprise networks. Developed by Cheyenne Software, the industry leader in backup and restore technology, SCO ARCserve/Open delivers a bulletproof data management system. SCO ARCserve/Open allows an SCO OpenServer Release 5 system to backup and restore data on other server, workstation and desktop clients within your enterprise computing environment.

Support for a Wide Variety of Systems: SCO ARCserve/Open supports network backup and restore of Windows 95, Windows 3.1, Windows NT, NetWare file servers, as well as leading UNIX client and server operating systems, including SCO OpenServer, SCO<sup>®</sup> UnixWare<sup>®</sup>, Sun SunOS<sup>™</sup> and Solaris<sup>®</sup>, IBM<sup>®</sup> AIX<sup>™</sup>, HP-UX<sup>®</sup> and Silicon Graphics<sup>®</sup> IRIX<sup>™</sup>

Limitations of the Lite Version: SCO ARCserve/Open Lite from Cheyenne is a functionally limited version of SCO ARCserve/Open. It is designed to backup only local filesystems. It is an excellent data management utility for small and medium businesses using either host-based solutions or on networks where each server has its own tape drive.

## SCO Doctor

SCO ships three versions of SCO Doctor - a "lite" version, a "full" version, and a "full networked" version. The "lite" version is shipped with the operating system product. It does not require a key for installation and use.

Pro-Active Remote Systems Management: The SCO Doctor systems management tool is the first of its kind designed to specifically address the wide spectrum of UNIX system configurations in use today. Powered by an "intelligent" inference engine, this highly advanced systems management tool autonomously monitors and manages your system to ensure optimum reliability and performance efficiency.

Systems Management: Effective systems management should be pro-active, not re-active; identifying and solving problems before they become critical. The SCO Doctor tool fulfills this need by incorporating advanced process monitoring, accurate diagnosis and automatic problem correction. Notification of alerts can be communicated to the administrator via pop-ups on the Doctor console, the built-in pager support, or by e-mail notices.

Auto Correction: A powerful inference engine enables the SCO Doctor systems management tool to automatically manage UNIX systems by utilizing built-in rules and reasoning. This "intelligence" reduces the level of human interaction typically required in the management of such systems, thereby substantially reducing the support overhead for administrators. When a system is performing abnormally, an alert is triggered, often before the user is aware of a problem. Alerts, in turn, invoke intelligent action programs to automatically correct the problem or notify the system administrator that intervention is required.

Intelligent Agent: SCO Doctor systems management tool is built upon a client/server architecture and receives, presents and manipulates data supplied by the SCO Doctor dedicated data capture 'agent' program. The SCO Doctor agent collects data from a variety of sources including the UNIX kernel, operating system configuration, the file system, standard UNIX performance monitoring commands and local utilities, as well as third party applications.

Remote Management: SCO Doctor for Networks™ systems management tool is an enhanced version of SCO Doctor that is capable of managing small networks or large installations of several thousand systems over a LAN or WAN. Building upon the intelligent systems management capability of SCO Doctor, SCO Doctor for Networks adds facilities for network-wide monitoring, management, reporting, file transfer, remote command execution, remote login and remote software deployment, even over dial-up lines. This flexible architecture supports a broad range of

management topologies to adapt to local system needs. Regardless of the management topology chosen, SCO Doctor for Networks enables a small central support staff to effortlessly manage a large number of local and remote systems.

The SCO Doctor agent component has a built-in suite of alert and action programs that allow each remote system to manage itself. On the few occasions when intervention is required, the powerful systems management tools in SCO Doctor for Networks ensure that central support staff can remotely diagnose and correct problems at the managed site, analyze trends and determine future network needs. Alert notices and daily management databases are sent to the central management station to keep support personnel apprised of the performance status of all systems on the entire network. If an alert indicates a serious problem, support staff can use the "connect-back" capability of SCO Doctor for Networks for live monitoring of the remote system and perform further diagnosis of problems via the simultaneous log-in facility. Supporting the larger Enterprise management view, SCO Doctor Agent supports SNMP traps and provides extensive system query information through the SCO Doctor enterprise MIB.

Diverse Protocol Support: SCO Doctor for Networks can adapt to almost any network topology. A wide variety of communications protocols are supported, from low-speed async dial-up modems to TCP/IP, PPP, SLIP and e-mail-enabled transports. Doctor for Networks provides uncompromised operation over low-speed phone lines to ensure that the widest range of UNIX systems can, at last, "afford" to be managed. Doctor for Networks includes a full-featured set of facilities for file transfer, remote command execution and remote login facilities. By incorporating powerful remote communications features, the need to purchase a separate communications product is eliminated.

Extensible: By utilizing the industry-standard TCL scripting language, SCO Doctor can be customized to meet a wide range of customer requirements. Views, reports, action programs, alerts, data collection subagents and file transfer programs can easily be customized using TCL scripting commands.

Professional Reports: An extensive suite of views and reports clearly and concisely presents every facet of system performance and provides an invaluable resource for analysis of system performance and historical trends. Each of these views and reports may be customized to suit individual needs or preferences by offering a comprehensive set of formatting options.

Limitations of the Lite Version: SCO Doctor Lite is a functionally limited version of SCO Doctor. SCO Doctor Lite provides live system monitoring which can identify low system resources. This tool provides an excellent visual method for quickly identifying common system problems such as low disk space, low memory, low swap space, and much more. SCO Doctor Lite does not support networks, automatic kernel tuning, pager and email alert notification, and other features in the full or networked versions.

## **Extending Server Functionality (Layered products)**

### ***Windows Services***

The SCO OpenServer Enterprise System comes equipped with PC and PC LAN integration facilities which include Novell IPX/SPX, NetWare and LAN Manager gateway services, Wintif services (provides a Windows appearance for Motif applications), and the industry standard TCP/IP networking protocol. To further enhance the integration of Windows with SCO OpenServer systems, the following add-on Windows Services are available:

#### **SCO VisionFS**

SCO VisionFS file and print sharing installs purely on the server so all PCs on the network gain instant and transparent access to UNIX files and printers. Unlike NFS solutions, there is no need to spend valuable time installing, maintaining and configuring each of the PCs: you just do it once on each UNIX server. SCO VisionFS includes unique, advanced technology that enables workgroups to be shared across the Internet and makes UNIX servers across the Internet appear as if they were on the local network. SCO VisionFS is included in the 5.0.4 release and is also available for older releases. This technology competes with SCO Advanced File and Print Server. If SCO VisionFS is to be installed, SCO Advanced File and Print Server and SCO LAN Manager Client must be removed or at least disabled.

#### **SCO Advanced File and Print Server**

SCO Advanced File and Print Server is an advanced LAN server that delivers Windows NT compatible file and print capabilities for SCO OpenServer systems. SCO Advanced File and Print Server systems allow Windows PC users to run SCO OpenServer business critical applications, and access files, printers, and other resources easily and transparently from their Windows environment. A single user version is included in the 5.0.2 and later releases. This technology competes with SCO VisionFS. Customers may only use one or the other of the products over TCP/IP. If VisionFS is previously installed, it must be removed or at least disabled for SCO Advanced File and Print Server to work properly over TCP/IP. Alternatively, SCO Advanced File and Print Server could be run over NetBEUI.

#### **SCO Merge**

SCO Merge includes an MS-DOS 6.2 license that runs under the SCO OpenServer system. With the additional installation of a standard Microsoft® Windows operating system, users can run multiple, concurrent MS-DOS or Windows applications within an X Window system

environment. SCO Merge supports MS-DOS applications. SCO Merge supports VGA applications in full screen mode and includes Direct Device Attachment (DDA) technology to support MS-DOS and Windows peripherals, eliminating the need to install special UNIX system-based drivers. SCO Merge is available as a Desktop (Single User), or Server (Multi-user) configuration for SCO OpenServer Enterprise, Host and Desktop Systems.

### SCO TermVision

SCO<sup>®</sup> TermVision<sup>™</sup> is a client software package for Windows PCs that allows users to easily access character-based UNIX services and applications, including those available from SCO OpenServer systems. SCO TermVision offers a friendly and convenient environment for users, and a convenient way for system administrators to maintain control of their client-server environments. SCO TermVision offers superior VT320, SCO Console and WYSE<sup>®</sup> terminal emulation that allows users to display multiple UNIX applications alongside Windows programs and includes support for file transfer, copy-and-paste, and local and remote printing.

### SCO TermLite

SCO TermLite is the simple, lightweight Windows terminal emulator from SCO. SCO TermLite allows you to run UNIX programs in a window on your PC, alongside local Microsoft Windows applications. It provides fast emulation of SCO ANSI and VT320 terminals over a Telnet (TCP/IP) or NVT (NetBIOS or NetBEUI) connection. By using NetBEUI, you can create a networked solution based on the SCO OpenServer Host configuration. SCO TermLite supports all versions of Microsoft Windows. SCO TermLite is included in release 5.0.4 and is also available separately.

### SCO XVision

SCO<sup>®</sup> Xvision<sup>®</sup> is a client software package that contains a very efficient PC X Server which allows Microsoft Windows or Windows NT users to connect to UNIX systems or VMS hosts running the X Window System. PC users can display remote character and graphical applications within the familiar Windows environment, and share information between the PC and host. Features of SCO XVision include automated installation, graphics speed optimization, automatic font aliasing, and context sensitive help.

### SCO SQL-Retriever

SCO<sup>®</sup> SQL-Retriever<sup>™</sup> is a client software package that provides a one stop, high performance ODBC solution allowing Microsoft Windows applications to talk to UNIX databases, quickly and easily. SCO SQL-Retriever delivers exceptional plug-and-play compatibility between Windows clients and UNIX servers running ODBC databases like

ORACLE, Informix, and Sybase. Most importantly, SCO SQL-Retriever is fast, because it does away with the need for multiple DLLs and proprietary network interfaces such as Ingres-Net and SQL\*Net. SCO SQL-Retriever is the most flexible, cost-effective, open solution for database access available to Windows PC users today.

## ***Internet Services***

### **Netscape Navigator**

Netscape Navigator and Netscape Navigator Gold are powerful point-and-click Web browsers that provide access to all major Internet resources with a single, easy-to-learn interface. Netscape Navigator offers a host of features such as rich multimedia support, integrated electronic mail and news, FTP file upload capability, and bookmarking. Navigator Gold adds HTML wizards, templates for simple creation, editing and publishing of rich web documents to an already powerful solution. Netscape Navigator is included in release 5.0.4 and is also available for older 5.0.X releases.

### **Netscape FastTrack Server**

Netscape FastTrack Server is an easy-to-use Web server that installs in minutes. Businesses and individuals can quickly establish a presence on the Internet and deploy Intranet solutions. Netscape FastTrack Server includes the award-winning Netscape Navigator Gold for creating and editing rich, web-based documents. Netscape FastTrack Server is an open platform for publishing traditional Internet documents as well as developing and deploying live network-centric and media-rich applications. Netscape FastTrack Server is included in release 5.0.4 and is also available for older 5.0.X releases.

### **Netscape Proxy Server**

Netscape Proxy Server allows replication of Web sites and documents for improved network performance while filtering access to Web content. Netscape Proxy Server intelligently caches frequently accessed documents and Web sites to conserve network bandwidth and dramatically reduce response times for clients accessing the Internet/Intranet.

### **SCO Internet Security Services**

The SCO Internet Security Package is a dynamic network packet filter that provides the ability to control Internet or Intranet access based upon hosts, domains, services, or packet type.

### SCO Strong Encryption Utilities

All Netscape™ client and server products ship with support for 40 bit encryption when using the Secure Socket Layer (SSL) protocol to communicate secured information. However, stronger encryption exists which allows the use of 128 bit encryption between clients and servers. The support for this stronger encryption is found in the SCO Strong Encryption Supplement which is included on your Server Enhancement Products CDROM. Due to U.S. Government regulations only customers in the United States and Canada are allowed to use strong encryption.

### SCO Internet to NetWare Gateway

The SCO® Internet to NetWare® Gateway offers NetWare IPX/SPX users transparent access to the Internet without adding TCP/IP to the clients or changing the standard NetWare configuration.

### SCO InterScan VirusWall

While the SCO Internet Security package will provide protection against intruders SCO® InterScan VirusWall® will protect your network from computer viruses communicated over the Internet. When installed on a UNIX system Internet gateway, InterScan VirusWall intercepts and scans in real time, all e-mail attachments, FTP transfers, World Wide Web downloads/uploads and all movement of data between in-house PCs or LANs and the outside world.

### ***RAS Services (Reliability, Availability, and Scalability)***

SCO OpenServer systems (Enterprise, Host, and Desktop) deliver high levels of reliability, availability, serviceability (RAS) and scalability with such features as Filesystem Journaling, Uninterruptible Power Supply Support (UPS), SNMP with SMUX agents to detect potential hardware failures, instant reboot and fast filesystem recovery, online backup, and support for up to 512 Megabytes of memory. To further enhance SCO OpenServer system reliability and scalability, the following RAS Services are available as Layered Products:

### SCO OpenServer User License Packs

SCO OpenServer User License Packs are activation keys allowing additional users access to the server. The user upgrades come in 10, 25, 100, 500, and unlimited user licenses and installs on only the Enterprise or Host Systems. The licenses are additive so to license your server for 50 users, install two 25 user license upgrades. To increase that server to 100 users, just install two more 25 users license upgrades and so on.

No additional disk space is required to install the upgrade, but with more users accessing the system, you will need to consider the amount of disk space needed for those users.

### SCO SMP License

SCO SMP License is a symmetrical multiprocessing software license which allows SCO OpenServer systems to take advantage of up to thirty 486 or Pentium processor equipped systems. The SCO SMP License features automatic load balancing to distribute system and application processing among all available processors, and requires no changes to applications or drivers. Other advanced features include support for the Intel APIC MP driver which supports the MultiProcessing Specification (MPS); and the standard GPI driver. SCO SMP is ideal for increasing the performance of database application systems and supporting the next generation of multiprocessor platforms. Multiprocessor systems are available from many vendors including ACER/Altos, ALR, AST, AT&T, Compaq, Hewlett-Packard, and Tricord.

### SCO Virtual Disk Manager

SCO<sup>®</sup> Virtual Disk Manager is a Layered Product that utilizes RAID technology to allow multiple disks to be configured to attain higher reliability, availability, performance and flexibility. Supported RAID configurations include: RAID 0, 1, 4, 5, 10, and 53. (See "Virtual Disks and RAID", above).

### SCO ARCserve/Open

SCO ARCserve/Open is an easy-to-use, high performance, comprehensive data management tool for enterprise networks.

Developed by Cheyenne Software, the industry leader in backup and restore technology, SCO ARCserve/Open delivers a business critical data management system. SCO ARCserve/Open brings a unique combination of ease-of-use, automation, high performance, and reliability to the SCO platform. It provides the robust feature set that administrators require and the simplicity necessary for end-users to do their own backups.

Utilizing an intuitive Motif interface, SCO ARCserve/Open makes managing the backup of large servers and heterogeneous networks simple. Ease-of-use is enhanced by the Auto Pilot feature, which provides full automation of the data management process, including tape rotation.

High throughput is provided by an efficient backup engine which optimizes performance of each tape drive, giving every ounce of performance your

device can deliver. Even greater throughput is achieved with the Parallel Streaming feature, which supports simultaneous backup to multiple tape devices.

## SCO Doctor

Effective systems management should be pro-active, not re-active; identifying and solving problems before they become critical. The SCO Doctor tool fulfills this need by incorporating advanced process monitoring, accurate diagnosis and automatic problem correction. Notification of alerts can be communicated to the administrator via pop-ups on the Doctor console, the built-in pager support, or by e-mail notices. A powerful inference engine enables the SCO Doctor systems management tool to automatically manage UNIX systems by utilizing built-in rules and reasoning. This "intelligence" reduces the level of human interaction typically required in the management of such systems, thereby substantially reducing the support overhead for administrators. When a system is performing abnormally, an alert is triggered, often before the user is aware of a problem. Alerts, in turn, invoke intelligent action programs to automatically correct the problem or notify the system administrator that intervention is required.

This highly advanced systems management tool provides a wide variety of management facilities, including:

- Pro-active Performance Monitoring
- Automatic Tuning
- Automatic Problem Detection and Correction
- Automatic Alert Notification
- Multiple Protocol Support
- Low System Overhead
- Historical Analysis
- Comprehensive Report Generation
- Intelligent Inference Engine
- Integrates with SNMP Environments
- Remote Operations

## ***Developer Services***

For application development, SCO offers a range of products to allow developers to develop, debug and deploy SCO OpenServer system-based solutions. The SCO OpenServer Development System layered product provides the C and C++ compilers, utilities and libraries necessary to develop host or client/server applications. The Java Development Kit for SCO systems provides the libraries and tools needed to create Java applications. The SCO POS Configuration Toolkit can be used to tune

SCO OpenServer operating systems for “embedded” Point-Of-Service or Telecommunications environments. Developer Services include the following products:

### SCO OpenServer Development System

The SCO OpenServer Development System is the foundation for software development for SCO OpenServer systems that provides a suite of C compilers, debuggers, an extensive set of networking libraries and services, and comprehensive graphics support to help you develop reliable host and client/server applications. The SCO OpenServer Development System includes support for ELF (Executable and Linking Format) via an industry standard C compiler, optimizing C compiler for Pentium processor systems, a C++ compiler, a suite of debugging tools, dynamically linked library support, graphics, networking and system APIs and protocols. Combined with the SCO OpenServer operating system and third-party development tools such as DBMS development systems, 4GLs, 3GLs, CASE and client/server development environments, the SCO OpenServer Development System is an ideal environment for rapid, cost-effective applications development, debugging and deployment.

### Java Development Kit 1.1-1 for SCO Operating Systems

The Java Development Kit (JDK) enables both the execution and development of Java applications and applets on current and future SCO platforms. The Java technology is an object-oriented, distributed, platform and vendor-independent programming language and execution environment. It is particularly suitable for Internet Way of Computing™. The SCO Java Development Kit is included in release 5.0.4 and is also available for older 5.0.X releases. Product components include:

- Java Virtual Machine
- Java classes
- Source files for public classes
- JavaBeans classes
- Appletviewer
- Java compiler
- Abstract Windowing Toolkit
- Java debugger
- Java class file disassembler
- Java archive tool (JAR files)
- Java documentation, including language spec
- Java Tutorial
- Java documentation generator
- JDBC classes for SCO SQL-Retriever
- Compatibility Modules (libraries) for SCO operating systems

## SCO POS Configuration Toolkit

The SCO POS Configuration Toolkit is an extension to the SCO OpenServer Development system that can be used to produce versions of the SCO OpenServer operating system specially configured for retail client-server environments. The Configuration Toolkit can be used to generate a “small-footprint” of the SCO OpenServer operating system that will operate in limited memory, while still complying to The Open Group UNIX standards. The resultant SCO POS System™ can operate in as little as 2 MB of memory with integrated TCP/IP protocol support, making it ideal for embedded systems such as Point-of-Service devices.

## SCO Premier Motif Development Kit

SCO Premier Motif™ is a complete service for developers including software and support to ensure that you invest your time developing applications rather than debugging or developing Motif itself. We have taken the standard OSF/Motif and added numerous enhancements and bug fixes, many of them not found in any other Motif implementation. We have concentrated on reducing memory leaks and improving performance because many of our customers rate this their top priority. Every release is then run through the OSF Validation Test Suite and our own, more rigorous test procedures.

# Meeting Standards

## **Standards Conformance**

SCO OpenServer systems adhere to the following major open systems standards:

- ANSI X3J11 C-Language Standard
- Department of Defense National Computer Security Center (NCSC)  
C2 Trusted Computing Base
- Federal Information Processing Standard (FIPS) 151-2
- iBCS-2 Intel Family Binary Compatibility Specification Edition 2
- IEEE POSIX 1003.1-1990 (Portable Operating System for UNIX)
- IEEE POSIX 1003.2-1992 (Portable Operating System for UNIX)
- SVID3 (System V Interface Definition, Issue 3)
- Tracking ANSI X3J16 C++ Language Standard
- XPG4 Base Profile (X/Open Portability Guide 4)
- XPG4 UNIX '93 (X/Open UNIX compliant)

Mail and Messaging Standards. To provide greater flexibility in routing electronic mail, all versions of the base operating system include Version II of the Multi-Channel Memorandum Distribution Facility, originally developed at the University of Delaware. MMDF is designed to handle high volumes of incoming and outgoing mail via a variety of gateway channels. Local and UUCP delivery channels are included in the SCO OpenServer Host and Desktop Systems. SMTP (Simple Mail Transfer Protocol) is additionally included with the SCO OpenServer Enterprise System. Other protocols such as X.25, X.400, and DECmail are supported by optional products from SCO and third parties. The SCO OpenServer system also includes the **sendmail** and **execmail** interfaces. Both MMDF and sendmail support the standard SCO mail and graphical SCOMail programs as well as popular third-party and public-domain mailers.

## **Compatibility**

Thanks to SCO's alliances, SCO leads the industry in providing solutions for a broad range of computing needs. SCO's compliance with open systems standards ensures that the growing number of applications (currently over 10,000) available for SCO systems are compatible with SCO OpenServer products.

Binary Compatibility. The SCO OpenServer system offers binary compatibility with the following XENIX and UNIX System environments. Applications originally developed for these environments will run without modification on SCO OpenServer systems:

- SCO® Open Desktop® Releases 1.0, 1.1, 2.0, and 3.0
- SCO UNIX System V/386 Release 3.2 Versions 0, 2, 4, 4.1, and 4.2
- SCO XENIX 386 Releases 2.2 and 2.3
- SCO XENIX 286 Releases 2.1, 2.2, and 2.3
- AT&T UNIX System V/386 Release 3.2
- IBM PC XENIX Releases 1.0 and 2.0
- Microsoft XENIX 386™ Releases 2.2 and 2.3
- Microsoft XENIX 286 System V
- Microsoft XENIX 286 System III
- Under SCO Merge:
  - MS Windows 3.1 applications
  - MS-DOS applications

Source Compatibility. Application source code for the following environments can be recompiled and run on SCO OpenServer systems:

- UNIX System V Releases 2, 3, and 4
- XENIX System V for all architectures
- All X/Open XPG4 conformant UNIX System implementations
- Majority of POSIX conformant UNIX System implementations

# Designing an SCO OpenServer System

## Memory Usage

Memory use on an SCO OpenServer system is application-dependent. Users should consult their application software and hardware vendors for guidelines on specific configurations.

## SCO OpenServer Release 5 System Requirements Table

	SCO OpenServer Host System	SCO OpenServer Enterprise or Internet FastStart System
<b>RAM</b>	16 MB (minimum) 32 MB (recommended minimum) 4 GB (maximum)	16 MB (minimum) 32 MB (recommended minimum) 4 GB (maximum)
<b>Disk Storage</b>	215 MB (minimum)	240 MB (minimum)

Several SCO OpenServer services are memory-intensive. In addition, X Window System and MS-DOS applications may require additional memory.

The base memory requirement is 16 Mbytes. For X Window System applications add 5 - 8 Mbytes per invocation. Applications such as **SCOterm** use minimal memory, while desktop publishing programs such as FrameMaker<sup>®</sup> may use 4 Mbytes or more.

If your native MS-DOS and Windows environment requires "X" Mbytes, you should add "X" Mbytes per each concurrent invocation. Disk buffers should be set at 12-25% of available memory.

After installing a user's system, further fine-tuning of specific memory requirements using performance-monitoring tools such as **sar**, **u386mon**, or third party products can be accomplished. Ideally, an SCO OpenServer system should never swap or wait on STREAMS buffer allocation; in addition, more memory can almost always be used effectively (by additional disk or database buffers for example).

## Disk

While the SCO OpenServer product line supports MFM, RLL, and ESDI controllers, IDE, EIDE and SCSI controllers are more suitable. IDE

controllers are best for simple single- or dual-drive systems; single-user workstations; and small, inexpensive servers. SCSI controllers are generally more flexible. A SCSI controller often allows you to add hard disks, tape drives, CD-ROM drives, SCSI terminal servers, and other SCSI-based devices without using additional slots or drivers. In addition, your system can contain a mix of IDE and SCSI controllers.

### ***Installation Media***

All SCO OpenServer systems are shipped on CD-ROM. A SCSI CD-ROM drive is required for initial installation. Once a server is installed, you may install other systems via the network and a customized boot floppy.

### ***I/O Bus***

PCI, EISA, and MCA are recommended for I/O-intensive applications. Note that with many applications, additional memory dedicated to disk buffers can compensate somewhat for a slower disk and disk interface. For more information about hardware compatibility and availability, refer to the *SCO Hardware Compatibility Handbook*.

### ***Network Adapters***

All SCO OpenServer systems contain a networking support package. The package contains drivers that support multiple, concurrent protocol stacks using a single LAN adapter, as well as multiple LAN adapters per individual protocol stack. Most popular adapters are supported, including those from 3Com, SMC, Novell/Eagle, IBM, Intel, and other leading vendors, over Ethernet and Token Ring.

## Developer Upgrades Options for Older Applications

SCO OpenServer Release 5 software provides facilities that will improve applications from a feature, reliability and performance standpoint. To the application developer, Release 5 provides:

- A simple evolutionary path from previous SCO releases
- Improved application performance and maintenance
- Enhanced features and capabilities for end users and application developers to add value to their products

Application developers have the following options:

### ***Run existing binaries on Release 5.***

SCO has protected user investments with backward binary compatibility for years, and SCO OpenServer Release 5 software is no exception. Applications developed for earlier SCO environments will run on Release 5 with no changes allowing end users and application developers to readily take advantage of improved performance and functionality.

### ***Recompile and/or re-link applications with Release 5 development tools and libraries.***

To further maximize the functionality of SCO product-based applications, developers can recompile and/or re-link with the Release 5 tools and libraries. The core technology of the base compilers have been enhanced, including support for DLLs (Dynamically Linked Libraries), as well as more flexible standards compliance (e.g. XPG4, POSIX, ANSI, etc.). A new Optimizing C compiler takes Pentium processor-powered and Intel 486™ systems to the highest level of performance.

### ***Re-code applications to take advantage of new features in Release 5.***

To gain the most out of Release 5, some capabilities can only be accessed by re-coding.

The following chart summarizes the paths available for each feature. Some features are highlighted in more than one column because API's are available to take further advantage of that feature.

<b>NEW UNIX Kernel</b>	<b>Binary</b>	<b>Recompile</b>	<b>Reprogram</b>
Filesystem Journaling	■		
RAID 0, 1, 5 (striping, mirroring, etc.)	■		
High Throughput File System	■		
1TB Filesystem	■		
UPS Monitoring	■		■
Filesystem Compression	■		
Dynamic Kernel Tables	■		
Memory Mapped Files			■
Advanced Power Management	■		
Fixed Priority Scheduling			■

<b>NEW System &amp; Application Administration</b>	<b>Binary</b>	<b>Recompile</b>	<b>Reprogram</b>
Graphics and Character Interface	■		
Extensible Administration Environment (SCOadmin)			■
Local/Remote/Distributed Management	■		

<b>NEW Networking Technologies</b>	<b>Binary</b>	<b>Recompile</b>	<b>Reprogram</b>
SCO VisionFS Integration	■		■
LAN Mgr./NetWare Gateway Integration	■		■
Open Network Management SNMP(2), SMUX	■		■
Network Install	■		■
UNIX Domain Sockets	■		■
Drivers for new Network Cards	■		■
Improved Failure Recovery	■		
Multi-threaded TCP/IP, NFS, and STREAMS subsystems	■		■

<b>Development Tools</b>	<b>Binary</b>	<b>Recompile</b>	<b>Reprogram</b>
Java Development Kit			■
C Compiler		■	
Intel Optimizing C Compiler		■	
Integrated C++ Compiler		■	
Application Integration Tools	■		■
SCO Visual Tcl		■	■
Dynamic Link Libraries		■	
BSD Functionality		■	
Wintif Libraries		■	

<b>Other NEW Technologies</b>	<b>Binary</b>	<b>Recompile</b>	<b>Reprogram</b>
Motif 1.2, X11R5	■		■
Graphical Mail Tool – MIME-enabled	■		
Online hypertext help system (HTML)	■		■
Netscape Navigator WWW Internet Browser	■		

## Appendix A - Library Names and Descriptions

All 3 configurations of SCO OpenServer Release 5 now include the linker and runtime libraries. They are accessible after a no-fee activation. In previous releases, these libraries were components of the SCO<sup>®</sup> Open Desktop<sup>®</sup> Development System.

This new packaging makes it easier and less costly to use third-party products and to deploy applications created with them. In particular, it enables developers who wish to design and deploy applications using third party compilers and program generators to take advantage of the runtime environment now incorporated in the Base OS. For example, developers writing Ada<sup>®</sup> or Fortran applications can now run them directly on SCO OpenServer operating system products without acquiring the SCO OpenServer Development System.

For more information, see the *SCO OpenServer Development System Release 5 Product Overview and Technical Background Paper*.

Note: Many of the runtime libraries now have Dynamically Linked Library (DLL) versions. These are recognized by their ".so" suffix. For example, in the below table, "*libc.{a, so}*" means that the C library, *libc.a*, also has a DLL version called *libc.so*.

### SCO Standard Libraries:

Category	Description	Name
C Libraries/Math Library/ Linker Support Libraries/ ELF Libraries	Standard C routines	libc.{a, so}
	Math routines	libm.a
	COFF support routines	libld.{a, so}
	Error routines for system calls	libgen.a
	ELF manipulation routines	libelf.a
	Profiled version of ELF routines	libelfprof.a
C++ Libraries	Standard C++ routines	libC.a
	Task routines	libtask.a
	Complex math routines	libcomplex.a
Debugging/Profiling Libraries	Debugger support routines	libg.a
	Profiling support routines	libprof.a

<b>Category</b>	<b>Description</b>	<b>Name</b>
Parsing Libraries	<b>lex</b> routines <b>yacc</b> routines	libl.a liby.a
Memory Management	<b>malloc</b> routines	libmalloc.a
Event Management Libraries	Event driver routines	libevent.a
Security Libraries	Audit trail generation routines Encryption routines Security extensions Crypt routines Internationalized crypt routines	libaudit.a libprot.a libsec.a libcrypt.{a, so} libcrypt_i.{a, so}
Software Storage Objects Library	Software storage object routines	libssso.a
Database Management	Database management routines Database API routines Disk access optimization routines	libdbm.a libndbm.{a, so} libsuds.a
Plotting Libraries	Produce output for <b>tplot</b> filters Diablo300 plot routines Diablo300s plot routines Tektronix 4014 plot routines DASI 450 plot routines	libplot.a lib300.a lib300s.a lib4014.a lib450.a
Miscellaneous Functions Library	Miscellaneous routines	libPW.a
XENIX Libraries	UNIX versions of XENIX functions	libx.a
X/Motif and Graphics Libraries	See “Graphical Technologies and Interfaces”.	
Terminal Management, Character, and Keyboard Support Libraries	See “Character Technologies and Interfaces”.	
Sockets and Streams Libraries	See “Networking Services”.	
Networking Libraries	See “Networking Services”.	

**Graphical Libraries:**

<b>Category</b>	<b>Description</b>	<b>Name</b>
SCO Visual Tcl Technology	Full-featured scripting environment	vtcl
	Tcl library routines	libtcl.a
	Tcl library extension routines	libtclx.a
OSF/Motif User Interface Language	UIL compiler	uil
	UIL library routines	libUil.a
X/Motif Libraries	Font server API	libFS.a
	Motif resource manager routines	libMrm.{a, so}
	Wintif routines	libWXm.{a, so}
	Standard X11R5 core routines	libX11.{a, so}
	X extensions	libXext.{a, so}
	Motif widgets	libXm.{a, so}
	Miscellaneous X utility functions	libXmu.{a, so}
	X toolkit intrinsics	libXt.{a, so}
	Trap extensions	libXTrap.{a, so}
Test extensions	libXtst.{a, so}	
Athena Widget Library	Athena widget routines	libXaw.{a, so}
System Administration Framework	System admin. framework API	libsysadm.a

**Character Libraries:**

Category	Description	Name
Terminal Management Libraries	<b>courses</b> routines	libcurses.a
	Terminal access method routines	libtam.a
	<b>Form</b> manipulation routines	libform.a
	CRT menu routines	libmenu.a
	<b>Panel</b> manipulation routines	libpanel.a
	<b>Windowing</b> terminal routines	libwindows.a
Terminal Character Support Libraries	<b>termcap</b> routines	libtermcap.a
	<b>termlib</b> routines	libtermlib.a
	<b>terminfo</b> routines	libtinfo.a
Keyboard Support Libraries	Scancode routines	libsc.a

**Networking Libraries:**

Category	Description	Name
Socket Library	Socket and RPC routines	libsocket.{a, so}
Transport Layer Interface Libraries	TLI routines	libnsl.{a, so}
	XPG3 transport interface routines	libxti.{a, so}
eXternal Data Representation Libraries	RPC/XDR/name server routines	librpcsvc.{a, so}
File Transfer Protocol Library	File transfer protocol routines	libftp.{a, so}
Simple Network Management Protocol	SNMP routines	libsnmp.{a, so}
	SNMP I/O routines	libsnmpio.{a, so}
	SNMP extensions	libsmux.{a, so}
IPX SAP Service Advertising/Query	IPX/SPX routines	libsaprqsts.a

## Appendix B - SCO Expert Services

There are five categories of *Expert Services* provided by SCO:

### ***Professional Services***

- **Professional Services.** SCO Professional Services are designed to provide developers with specialized assistance and consultation, tailored to specific circumstances.
  - *SCO Technical Expertise and Account Management (TEAM) Services* provide developers with expertise from one of the world's most respected integration teams. Developers can take maximum advantage of the capabilities of SCO Open Systems Software and avoid costly delays by getting the best advice available right from the start. An Assigned Consulting Engineer serves as a technical member of your project and provides you with valuable technical assistance. To establish the foundation for a solid relationship with the SCO technical team, your Assigned Consulting Engineer will visit your site to conduct an initial review of your project requirements, and help to establish the optimum process for communication and escalation. Your consultant will be available to you during normal SCO business hours. In many places, a toll-free number is available to you.
  - *SCO Consulting Services* provide you with customized assistance with your unique project needs. The SCO Consultant assigned to your project works with you at your site to evaluate your organization's needs and to determine how SCO's technologies can best be employed to help you develop and implement an information technology strategy that will keep you at the forefront of competitiveness. These services can be tailored to meet your schedules, priorities, and budgets, and fees are established accordingly.
  - *SCO Engineering Services (ES)* are designed for the organization who wants to take advantage of the latest enhancements to SCO products at the earliest opportunity. You are assigned an Account Manager, a skilled development engineer with extensive knowledge of SCO product internals, who manages your technical relationship with SCO. In addition, you are assigned an ES Account

Coordinator who handles non-technical issues for you such as product availability, technical literature requests, and pre-release software shipment logistics.

- *SCO Custom Engineering Services* are designed for organizations who want to take maximum advantage of SCO's technical design and development expertise. SCO Custom Engineering is equipped to design, develop, deploy and support custom solutions for you that may otherwise overextend your own organization's resources. The SCO Custom Engineers assigned to your project have direct access to the SCO product development engineering team to insure that your custom project is fully integrated and is a "best fit" with SCO OpenServer software. Fees for this service are established on a project basis.

For further information on any of the SCO Professional Services, contact the SCO Professional Services organization:

In the United States and Canada:

Phone: 1-800-SCO-UNIX (1-800-726-8649) or 408-425-7222

In the United Kingdom, call SCO (Europe) Ltd.:

Phone: +44 (0) 1923 816344

### ***Technical Services***

- **Technical Services.** Two technical support programs are offered: SCO Premier, and SCO Expert. Contact SCO or your reseller for more information.

### ***Education Services***

- **Education Services.** SCO Educational Services are designed to provide you with the expertise you need to use your SCO system to its fullest, whether you are a developer, an end user, a system or network administrator, or just want to know more about SCO products.
- *Individual Training Courses* are offered at SCO offices as well as at over 140 Authorized Education Centers (AEC) worldwide. In the U.S., to find out the location of the SCO Authorized Education Center nearest you, contact SCO at 1-

800-SCO-UNIX (1-800-726-8649) or 408-425-7222. In Europe and International, call +44 (0) 1923 816344.

- *The SCO Advanced Certified Engineer (SCO ACE™) Program* provides you with the skills SCO recommends in order to support and administer SCO installations with the objective of achieving maximum system performance. The SCO ACE Program covers four main areas of expertise: SCO UNIX System Administration, Shell Programming for Systems Administrators, SCO TCP/IP and SCO NFS Administration, and SCO System V Communications.

In the U.S., to request detailed guidelines on these certification programs, contact SCO at 1-800-SCO-UNIX (1-800-726-8649) or 408-425-7222. In Europe and International, call +44 (0) 1923 816344.

In the U.S., to register for SCO ACE examinations or to purchase exam preparation guides, contact Drake PROMETRIC, the exam administrators, at 1-800-775-EXAM (775-3926), or 612-820-5900. In Europe and International, call +49 211 500 990.

### ***Information Services***

- **Information Services.** Two services are provided: SCO On-line Support, and the SCO Library. Access information via our web page at <http://www.sco.com>

### ***SCO Software Enhancement Service***

- **SES.** The SCO Software Enhancement Service proactively provides you with maintenance supplements, new releases, product enhancements, and valuable information on new applications and peripherals for SCO systems. Contact SCO for more information.

## **CORPORATE HEADQUARTERS**

SCO  
400 Encinal Street  
P.O. Box 1900  
Santa Cruz, California 95061-1900  
SALES AND INFO: (800) SCO-UNIX (726-8649)  
VOICE: (408) 425-7222  
FAX: (408) 458-4227  
TWX: 910-598-4510 SCO SACZ  
EMAIL: info@sco.COM  
SCO HOME PAGE: <http://www.sco.com>

## **EUROPE, MIDDLE EAST, AND AFRICA HEADQUARTERS**

SCO  
Croxley Business Park, Hatters Lane  
Watford WD1 8YN United Kingdom  
VOICE: +44 (0)1923 816344  
FAX: +44 (0) 1923 817781  
TELEX: 917372 SCOLON G  
EMAIL: info@sco.COM  
SCO HOME PAGE: <http://www.sco.com>

## **ASIA/PACIFIC HEADQUARTERS**

SCO  
171 Chin Swee Road  
#03-05/06 San Centre  
Singapore 169877  
VOICE: +65 536 6606  
FAX: +65 536 6619  
EMAIL: info@sco.COM  
SCO HOME PAGE: <http://www.sco.com>

SCO, SCO ACE, Internet Way of Computing, IWoc, Open Desktop, Panner, SCO Doctor, SCO Doctor for Networks, SCO Doctor Lite, the SCO logos, SCO MPX, SCO OpenServer, SCO POS System, SCO Premier Motif, SCO TermLite, SCO VisionFS, SCO Visual Tcl, The Santa Cruz Operation, and UnixWare are trademarks or registered trademarks of The Santa Cruz Operation, Inc. in the USA and other countries. Wintif and X.Desktop are trademarks or registered trademarks of IXI Limited, a subsidiary of The Santa Cruz Operation, Inc. SQL-Retriever, TermVision, TermLite, and XVision are trademarks or registered trademarks of Visionware Limited, a subsidiary of The Santa Cruz Operation, Inc.

X/Open and UNIX are registered trademarks of The Open Group in the United States and other countries. Cheyenne and ARCserve are registered trademarks of Cheyenne Software, Inc. Netscape, Netscape Navigator, Netscape Proxy Server, Netscape FastTrack Server, and Netscape Navigator Gold are trademarks of Netscape Communications Corporation. NFS was developed by Legent Corporation (formerly Lachman Associates, Inc.) based on LACHMAN SYSTEM V NFS. LACHMAN is a trademark of Legent Corporation. NFS is a trademark of Sun Microsystems, Inc. TCP/IP was developed by Legent Corporation (formerly Lachman Associates, Inc. based on LACHMAN SYSTEM V STREAMS TCP, a joint development of Lachman Associates and Convergent Technologies. MPX was developed by Corollary, Inc. Oracle is a registered trademark of Oracle Corporation, Redwood City, California. Java is a trademark of Sun Microsystems, Inc. All other brand and product names are or may be trademarks of, and are used to identify products or services of, their respective owners.

The SCO documents are provided "as is" and may include technical inaccuracies or typographical errors. The Santa Cruz Operation, Inc. reserves the right to add, delete, change or modify the SCO documents at any time without notice. The SCO documents are for information only. SCO makes no express or implied representation or warranties of any kind.

© Copyright 1997 The Santa Cruz Operation, Inc. All Rights Reserved.

July 1997