UNIX Operating System

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UNIX was developed at Bell Labs in the early 1970s. The first version was written by Ken Thompson in assembler for the PDP- 7 minicomputer. This was soon followed by a version for the PDP-ll **(Programmed Data Processor),** written in a new language called C that was devised and implemented by Dennis Ritchie.. It was originally meant for programmers developing software .Unix and the C were found by AT&T **(American Telephone and Telegraph Company)** and distributed to government and academic institutions, which led to both being ported to a wider variety of machine families. The main focus that was brought by the developers in this operating system was the Kernel. Unix was considered to be the heart of the operating System.

UNIX Versions and its development:

There are multiple versions of the UNIX operating system. Proprietary versions include Sun Microsystem's Solaris, SCO UNIX, IBM's AIX and Hewett Packard's HP-UX. FreeBSD, NetBSD and OpenBSD are open source versions of Unix. While unknown to many mainstream users, Apple OS X is also proprietary version of UNIX. Linux is a UNIX-like operating system. It has the same structure as UNIX, but it was written using none of the original UNIX code base.

University of California at Berkeley was able to modify the system substantially. Foremost among the changes was a port to the V AX minicomputer and the addition of paged virtual memory, the extension of file names from 14 characters to 255 characters, and the inclusion of the TCP/IP networking protocol, which is now used on the Internet. While Berkeley was making all these changes, AT&T itself continued to develop UNIX, leading to System III in 1982 and then **System V in 1984**. By the late 1980s, two different, and quite incompatible, versions of UNIX were in widespread use: Berkeley UNIX and System V. After much bickering(Argument), a standard called POSIX **(Portable Operating System-IX)** was created by the IEEE**(Institute of Electrical and Electronics Engineers)** Standards Board. POSIX is also known by its IEEE Standards number, PlO03. It later became an International Standard.

The POSIX standard is divided into many parts, each covering a different area of UNIX. The first part, PlO03.l, defines the system calls; the second part, PlO03.2, defines the basic utility programs, and so on. The PlO03.l standard defines about 60 system calls that all conformant systems must support. These are the basic calls for reading and writing files, creating new processes, and so on. Nearly all UNIX systems now support the PlO03.l system calls. However many UNIX systems also

support extra system calls, especially those defined by System V and/or those in Berkeley UNIX. Typically these add up to perhaps 100 system calls to the POSIX set. The operating system for the UltraSPARC II is based on System V and is called Solaris. It also supports many of the Berkeley system calls.
A rough breakdown of the Solaris system calls by category is given below. The file and directory management system calls are largest and the most important categories. Most of these come from PIO03.l. A relatively large fraction of the others are derived from System V.

Category	Some examples
File management	**Open, read, write, close, and lock files**
Directory management	**Create and delete directories; move files around**
Process management	**Spawn, terminate, trace, and signal processes**
Memory management	**Share memory among processes; protect pages**
Getting/setting parameters	**Get user, group, process ID; set priority**
Dates and times	**Set file access times; use interval timer; profile execution**
Networking	**Establish/accept connection; send/receive message**
Miscellaneous	**Enable accounting; manipulate disk quotas; reboot the system**

Figure 6-29. A rough breakdown of the UNIX system calls.

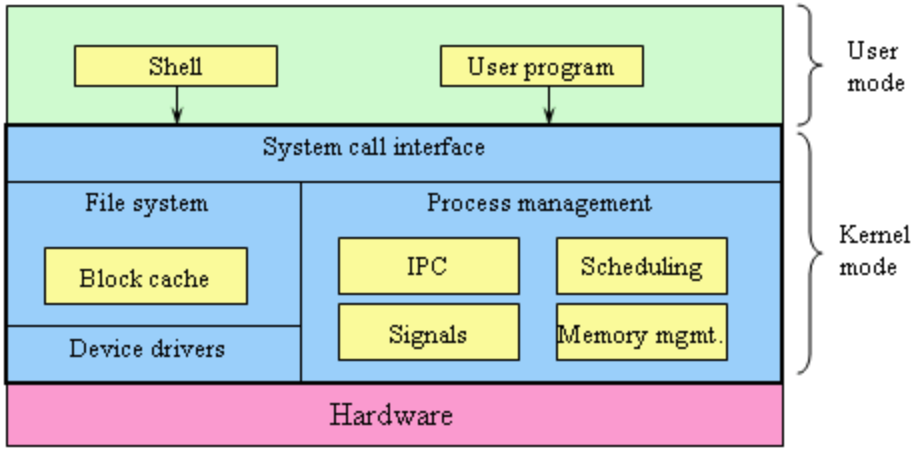


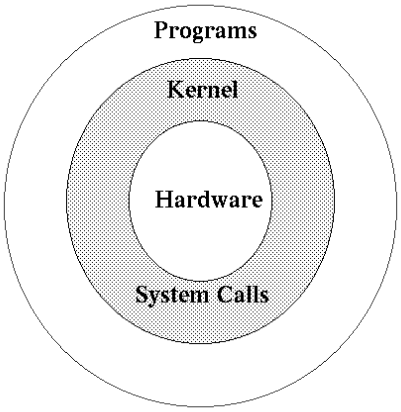
Figure shows: The structure of a typical UNIX system.

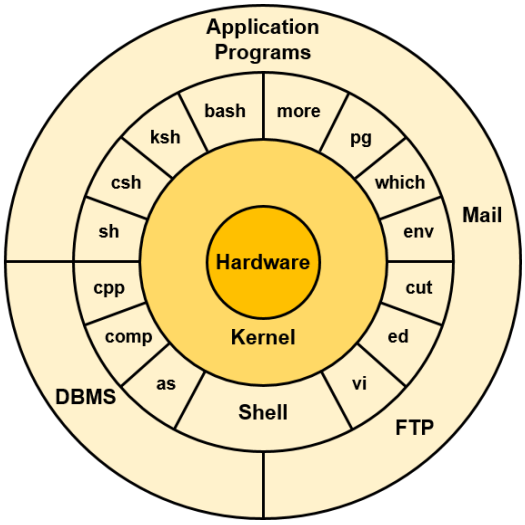
On top of the device drivers comes the file system. It manages file names, directories, disk block allocation, protection, and much more. Part of the file system is a block cache, for holding the blocks most recently read in from disk, in case they are needed again soon. A variety of file systems have been used over the years, including **the Berkeley fast file system, and log-structured file systems** .

The other part of the UNIX kernel is the process management portion. It handles IPC (Inter Process Communication), which allows processes to communicate with one another. The process management code also handles process scheduling, which is based on priorities. Signals, which are a form of (asynchronous) software interrupt.

From its inception, the first versions of UNIX were entirely text-based, using terminals that could display 24 or 25 lines of 80 ASCII**(American Standard Code for Information Interchange)** characters. The user interface was handled by a user-level program called the shell, which offered a command line interface. Since the shell was not part of the kernel, adding new shells to UNIX was easy, and over time a number of increasingly sophisticated ones were invented. Later on, when graphics terminals came into existence, a windowing system for **UNIX, called X Windows**, was developed at M.I.T. Still later, a full-fledged GUI (Graphical User Interface), called Motif, was put on top of X Windows. Nearly all the code of X Windows and Motif runs in user mode, outside the kernel.

Unix is a layered operating system.





Basic structure of UNIX Operating System

Layer-1: Hardware –

It consists of all hardware related information.

Layer-2: Kernel –

It interacts with hardware and most of the tasks like memory management, task scheduling, and management are done by the kernel.

Layer-3: Shell commands –

Shell is the utility that processes your requests. When you type in a command at the terminal, the shell interprets the command and calls the program that you want.

There are various commands like cp, mv, cat, grep, id, wc, nroff, a.out and more.

Layer-4: Application Layer –

It is the outermost layer that executes the given external applications.

Applications of UNIX

One of the biggest reasons for using UNIX is networking capability.

1. With other operating systems, additional software must be purchased for networking.
2. With UNIX, networking capability is simply part of the operating system.
3. UNIX is ideal for such things as worldwide email and connecting to the Internet.
4. UNIX was written in a machine independent language. So UNIX and UNIX-like operating systems can run on a variety of hardware.
5. These systems are available from many different sources, some of them at no cost.
6. Because of this diversity and the ability to utilize the same "user-interface" on many different systems, UNIX is said to be an open system.

The UNIX OS offers several salient features AS FOLLOWING:

(A) Multiuser capability

(I) This means that inherent to UNIX is the idea that there are different users of the system, and that different users may have different sorts of privileges and types of access to different parts of the system. It allows for the idea that some users may want to protect some of their data from being accessed by other users on the system.

(II) UNIX uses a system of login names to identify users and passwords to authenticate that a user is, in fact, who she/he claims to be.

(B)Communication

(i) UNIX has excellent provision for communicating with fellow users. The communication may be within the network for a single main computer or between two or more such computer networks.

(ii) The user can easily exchange mail, data, and programs through such networks.

(C) Security

(i)UNIX allow sharing of data but not indiscriminately. UNIX has three inherent provision for protecting data.

(ii)The first is provided by assigning passwords and login names to individual users ensuring that nobody can come and have access to your work.

(iii)At file level there is a read, write and execution permission to each file which decide who can access particular file.

(iii) Lastly, there is a file encryption. This utility encodes your file into an unreadable format, so that even if someone succeeds in opening it, he/she can't read the content.

(D)Portability

One of the main reason for the universal popularity of UNIX is that it can be ported to almost any computer system.

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