



Lecture – 6
Section-B

Theoretical concept of Unix
Operating System



Introduction

- Basic concepts of Operating System
- Features of OS
- Architecture of UNIX Operating System
- Features of UNIX Operating System



Basic Concepts of Operating System

- An operating system is a program that manages computer hardware; An operating system is an important part of almost every computer system.
- A computer system can be divided into four components :
 - (A) The Hardware
 - (B) The Operating System
 - (C) The Application Programs
 - (D) And The Users

Computer System: Abstract View

Users

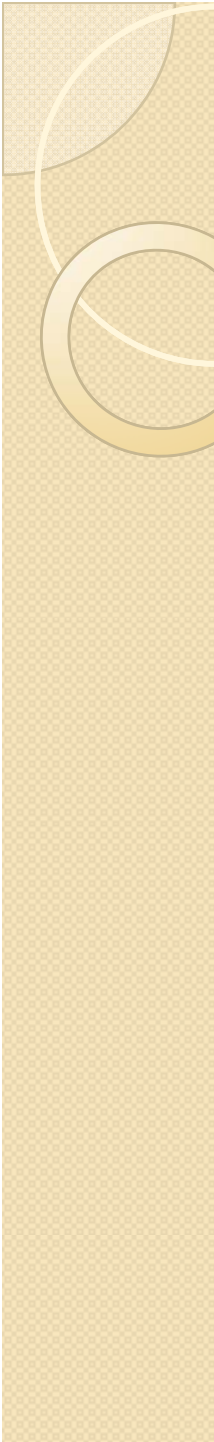


Compiler Assembler ... Text Editor

System and Application Programs

Operating System

Hardware

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- The “hardware” – the central processing unit(CPU), the memory, Input / Output devices provides the basic computing resources.
 - The “application programs” – such as word processors, spreadsheets, compilers and assemblers, web-browsers – ***define the way in which these resources are utilized to solve computing problems of the user.***
 - The “ operating system” – controls & coordinates the use of the hardware among the various application programs for the various users.

Features of an Operating System:

❑ Process Management:

A program does nothing unless its instructions are executed by CPU. A process is a program in execution.

The operating system is responsible for the following activities in connection with process Management:

- **Creating and deleting both user & system processes**
- **Suspending & resuming processes.**

❑ Main Memory management:

The operating system is responsible for the following activities in connection with memory management :

- **Keeping track of which part of memory are currently being used & by whom.**
- **Deciding which processes are to be loaded into memory when memory space become available.**



□ **File Management :**

A file is a collection of related information defined by its creator. Commonly, files represents programs (both source & object forms) & data.

Data files maybe numeric, alphabetic or alphanumeric.

Operating system is responsible for following activities in connection with file management.

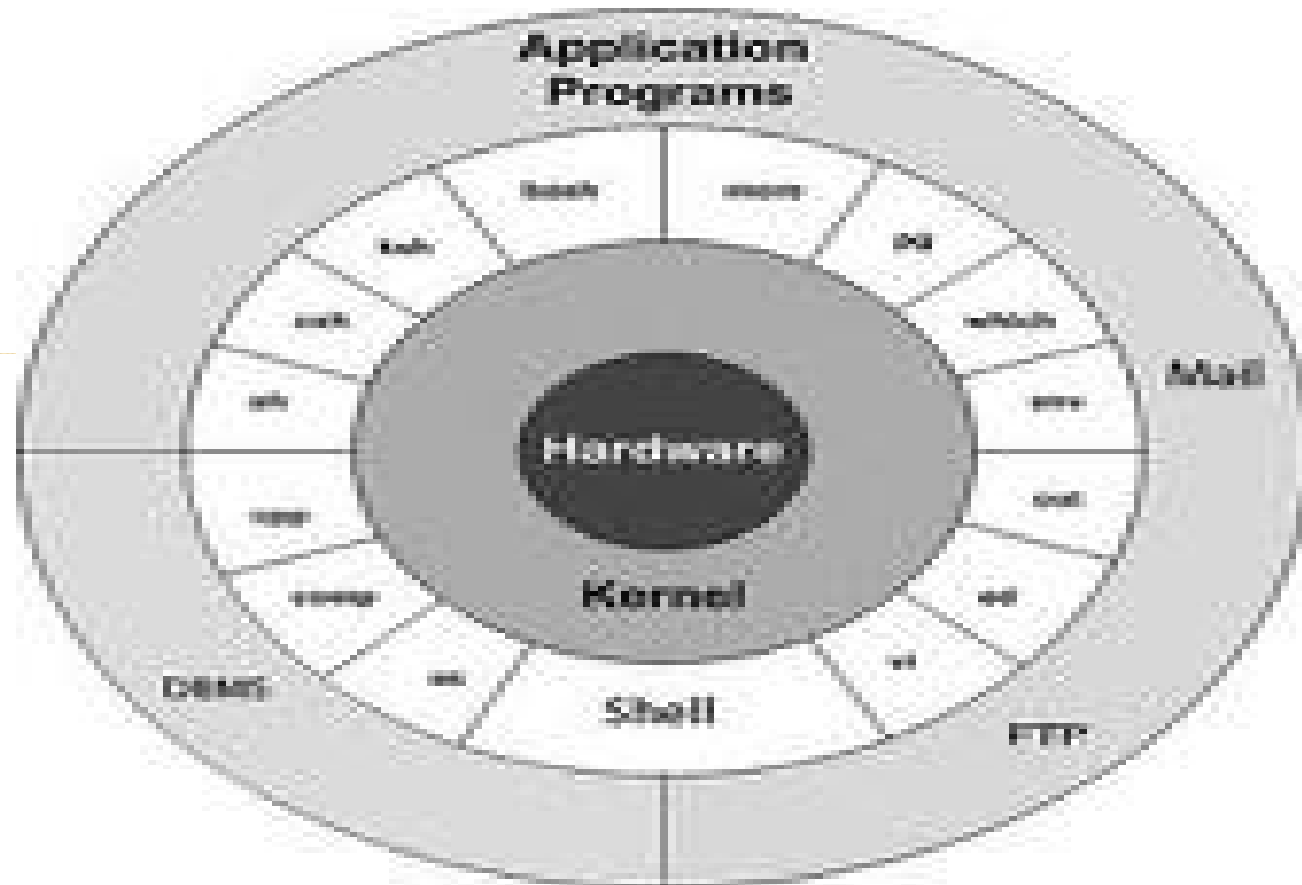
- **Creating & deleting files**
- **Creating & deleting directories.**

□ **Secondary-Storage Management:**

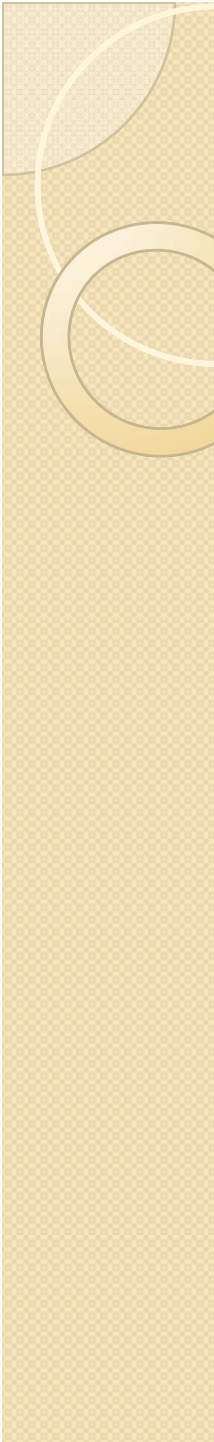
The operating system is responsible for the following activities in connection with disk management:

- Free space management
- Storage allocation
- Disk scheduling.

The Unix Architecture



Pl. Note :Its just a sample architecture: For complete diagram, kindly refer the book...
Sumitabha Das for better understanding of the architecture. During exams I'd be expecting you people to design the architecture available in your book.

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- The “kernel”– is the core of the operating system – its collection of routines mostly written in C.
 - **It is loaded into memory when the system is booted and communicates directly with the hardware.**
 - User Programs(the applications) that need to access the hardware (like the hard-disk or terminal) use the services of the kernel, which performs the job on user’s behalf.



- **General task performed by Kernel**

- manages the system's memory.
- schedules processes
- decide their priorities
- Computers don't have any inherent capability of translating commands into actions. That requires a "command interpreter" a job that is handled by the "outer part" of operating – the shell.
- **Shell** :It is actually the interface between the user & kernel.
- Even though there's only one kernel running on the system, there could be several shells in action – one for each user who is logged in.
- When you enter a command through the keyboard, the shell thoroughly examines the keyboard input for special characters.
- If it finds any, it rebuilds a command line & finally communicates with the kernel to see that the command is executed.

Example:

- Unix allows us to customize the prompt by using following – "\$, #, %" -- all these are Unix prompt.



Features of Unix Operating System:

Unix – A Multi-user System:

Unix is a multi-programming system; it permits multiple programs to run & compete for the attention of the CPU.

This can happen in two ways:

1. Multiple users can run separate jobs
2. A single user can also run multiple jobs.

- In UNIX, the resources are actually shared between all users ; UNIX is also a multi-user system.
- For creating an Illusionary effect, the computers breaks up a unit of time into several segments, and each user is allotted a segment. So at any point in time, the machine will be doing the job of a single user.
- The moment the allocated time expires, the previous job is kept on hold & the next job is taken up.
- The process goes on until the clock has turned full circle & the first user's job is taken up once again.



❑ UNIX – A Multi-tasking system too:

- A single user can also run multiple tasks concurrently; Unix is a multi-tasking system.
- It is useful for a user to edit a file, print another file on the printer, send email to a friend & browse the world wide web – all without leaving any of the applications.
- Kernel is designed to handle user's multiple needs.

❑ Programming Facility:

- The Unix shell is also a programming language; it was designed for a programmer; not a casual end user.
- It has all the necessary ingredients like control structure, loops, variables, that establish.
- It is a powerful programming language in its own right.



❑ Pattern Matching :

- \$ ls

READ ME

chap0

chap1

chap2

chap3

\$ ls chap*

chap0

chap1

chap2

chap3

- Here we listed the chapters of the text by using “ls” command with an unusual argument (chap*) instead of explicitly specifying all file names.
- The * (known as metacharacter) isn’t the only character used by the Unix operating system; there are several others.
- Unix features elaborated pattern matching schemes that use several characters from this meta character set.



Some APPLICATIONS of Unix O.S.

- ❑ It is written in high-level language, 'C' making it easy to port to different configurations.
- ❑ It is a good operating system, especially, for programs. UNIX programming environment is unusually rich and productive. It provides features that allow complex programs to be built from simpler programs.
- ❑ It uses a hierarchical file system that allow easy maintenance and efficient implementation.
- ❑ It uses consistent format for files, the byte stream, making application programs easier to write.
- ❑ It hides the machine architecture from the user, making it easier to write programs that run on different hardware implementation.

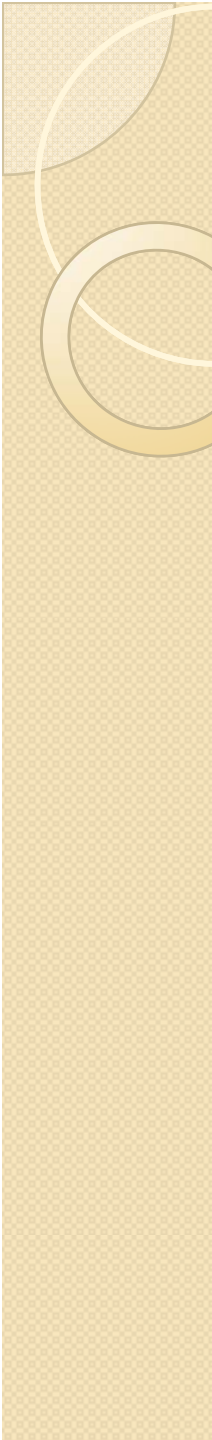


RESEARCH

- Each version of the UNIX **Time-Sharing System** evolved from the version before, with version one evolving from the prototypal **Unics**. Not all variants and descendants are displayed.

Research Unix

- **Ken's new system (→Unix)**
(1969)
- **UNIX Time-Sharing System v1**
(1971)
- **UNIX Time-Sharing System v2**
(1972)
- **UNIX Time-Sharing System v3**
(1973)
- **UNIX Time-Sharing System v4**
(1973)
- **UNIX Time-Sharing System v5**
(1974)
 - **UNSW 01** (1978)
- **UNIX Time-Sharing System v6**
(1974)
 - **MINI-UNIX** (1977)
 - **PWB/UNIX 1.0** (1977)
 - **USG 1.0**
 - **CB Unix 1**
- **UNIX Time-Sharing System v7**
(1979)
 - **Unix System III** (1981)
- **UNIX Time-Sharing System v8**
(1985)
- **UNIX Time-Sharing System v9**
(1986)
- **UNIX Time-Sharing System v10**
(1989)
- After the release of Version 10, the Unix research team at **Bell Labs** turned its focus to **Plan 9 from Bell Labs**, a distinct operating system that was first released to the public in 1993.

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- **AT&T UNIX Systems and descendants**
 - Each of the systems in this list is evolved from the version before, with **Unix System III** evolving from both the **UNIX Time-Sharing System v7** and the descendants of the **UNIX Time-Sharing System v6**.
 - **Unix System III** (1981)
 - **Unix System IV** (1982)
 - **Unix System V** (1983)
 - **Unix System V Release 2** (1984)
 - **Unix System V Release 3.0** (1986)
 - **Unix System V Release 3.2** (1987)
 - **Unix System V Release 4** (1988)
 - **Unix System V Release 4.2** (1992)
 - **UnixWare 1.1** (1993)
 - **UnixWare 1.1.1** (1994)
 - **UnixWare 2.0** (1995)
 - **UnixWare 2.1** (1996)
 - **UnixWare 2.1.2** (1996)
 - **UnixWare 7 (System V Release 5)** (1998)
 - **UnixWare 7.0.1** (1998)
 - **UnixWare 7.1** (1999)
 - **UnixWare 7.1.1** (1999)
 - **UnixWare NSC 7.1+IP** (2000)
 - **UnixWare NSC 7.1+LKP** (2000)
 - **UnixWare NSC 7.1DCFS** (2000)
 - **Open Unix 8** (UnixWare 7.1.2) (2001)
 - **Open Unix 8MP1** (2001)
 - **Open Unix 8MP2** (2001)
 - **Open Unix 8MP3** (2002)
 - **Open Unix 8MP4** (2002)
 - **SCO UnixWare 7.1.3** (2002)
 - **SCO UnixWare 7.1.3 Update Pack 1** (2003)
 - **SCO UnixWare 7.1.4** (2004)