6) UNIX: A case Study

Introduction and overview of UNIX :-

UNIX is one of the powerful operating system. UNIX was popular because of its efficiency to handle the complicated tasks of machine hardware and software. UNIX was created using C-Language

✗ Features of UNIX :-

* Multi-user
* Multi-tasking
* Programming Facility
* Security
* Extensive Tool kit, System calls, Libraries and enhanced GUI
* Portability
* Communication
* Distributed processing capabilities

✗ Major components of UNIX :-

* Kernel :- It schedules tasks and manages storage and resources. It is loaded when the system is booted. Following are its main functions :-

① Allocating memory to different processes
② CPU Job scheduling
③ Managing the shell and allowing the programmer to write and execute programs.
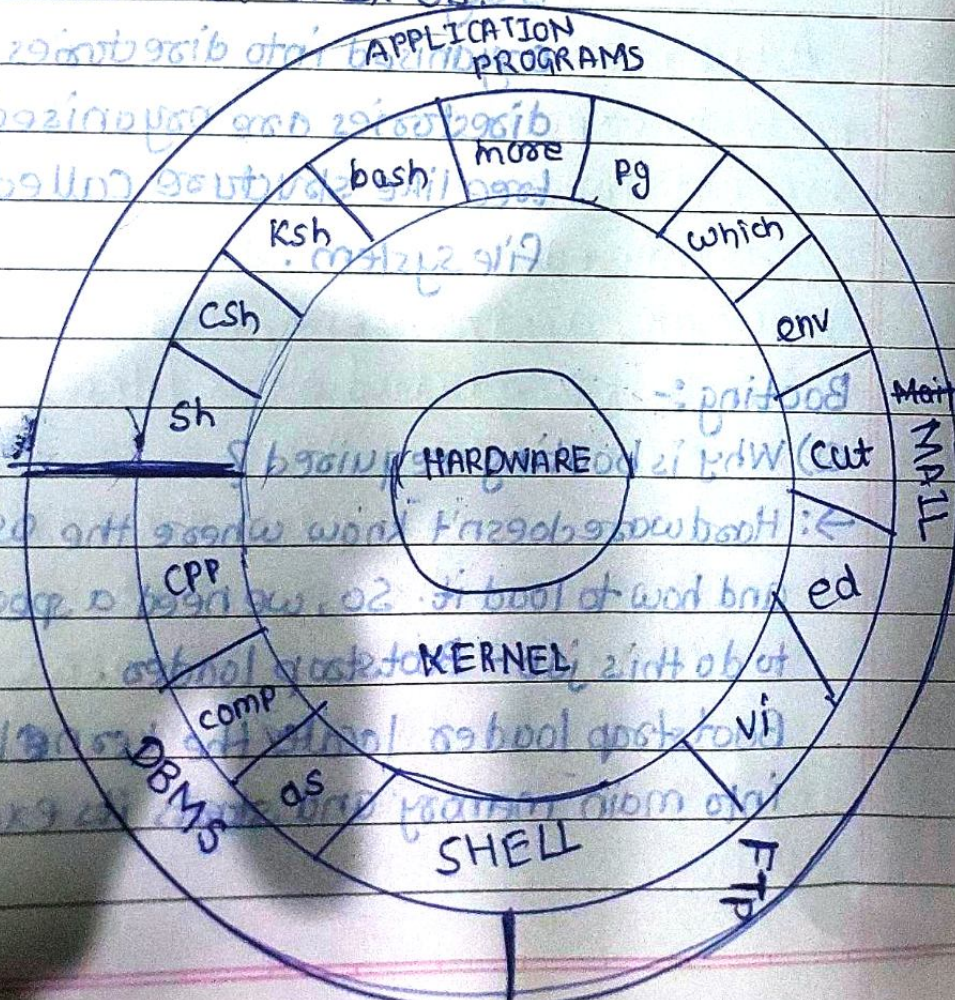④ File permission and security
⑤ Device and process management.

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* Shell (Command Interpreter) :- It connects and interprets users' commands, call programs from memory, and executes them. C shell, Bourne shell and Korn shell are most famous shells.

* Tools and application (Utilities) :- It offer additional functionality of OS as shown below:

① Support for programming
② Editing and storing the file
③ General maintainence of file
④ Sorting and searching operation on file
⑤ Joining files and printing etc.

Structure of UNIX OS :-

APPLICATION PROGRAMS

bash more pg

Ksh which

Csh env

sh Mail

SHELL Cut MAIL

HARDWARE ed

CPP

comp KERNEL vi

DBMS as FTP

SHELL

UNIX consists of

① A kernel layer
② A shell layer
③ A utilities and application layer

These three layers create a portable, multiuser, multitasking operating system. There are multiple versions of OS, but every version has the exact same structure. UNIX has the ability to perform many tasks simultaneously.

— (Write the paragraph of topic Major Components of UNIX) —

① Kernel   ② Shells
③ Tools and applications
④ Files and directories :- All data in UNIX is organised into files. All files are organised into directories. These directories are organised into a tree like structure called the file system.

Booting :-

Q) Why is booting required?

→: Hardware doesn't know where the OS resides and how to load it. So, we need a special program to do this job → Bootstrap loader.

Bootstrap loader locates the kernel, loads it into main memory and starts its execution.

Q) How boot process occurs?

→: Reset event on CPU causes instruction register to be loaded with a predefined memory location. It contains a jump instruction that transfers execution to the location of Bootstrap loader. This program is form of ROM, since RAM is in unknown state at system startup. ROM is convenient as it needs no initialization and can't be affected by virus.

Tasks performed at boot up :

* Run diagnostics test to determine the state of machine. If diagnostics test passes, booting continues.

* Runs a POST (Power On Self Test) to check proper functioning of devices.

* BIOS check a preconfigured list of devices to find bootable device. If it finds no such device, error is given and booting process stops.

* Initializes CPU registers, device controllers and contents of main memory. After this it loads OS.

* On finding bootable device, the BIOS loads and executes its boot sector. In case of a hard drive, this is referred to as MBR (Master Boot Record) which is not OS specific.

* The MBR code checks the partition table for an active partition. If one is found, the MBR code loads that partition's boot sector and execute it.

* The boot sector is often OS specific, however in most of the operating systems, its main function is to load & execute the kernel, which continue start up.

File System of UNIX :-
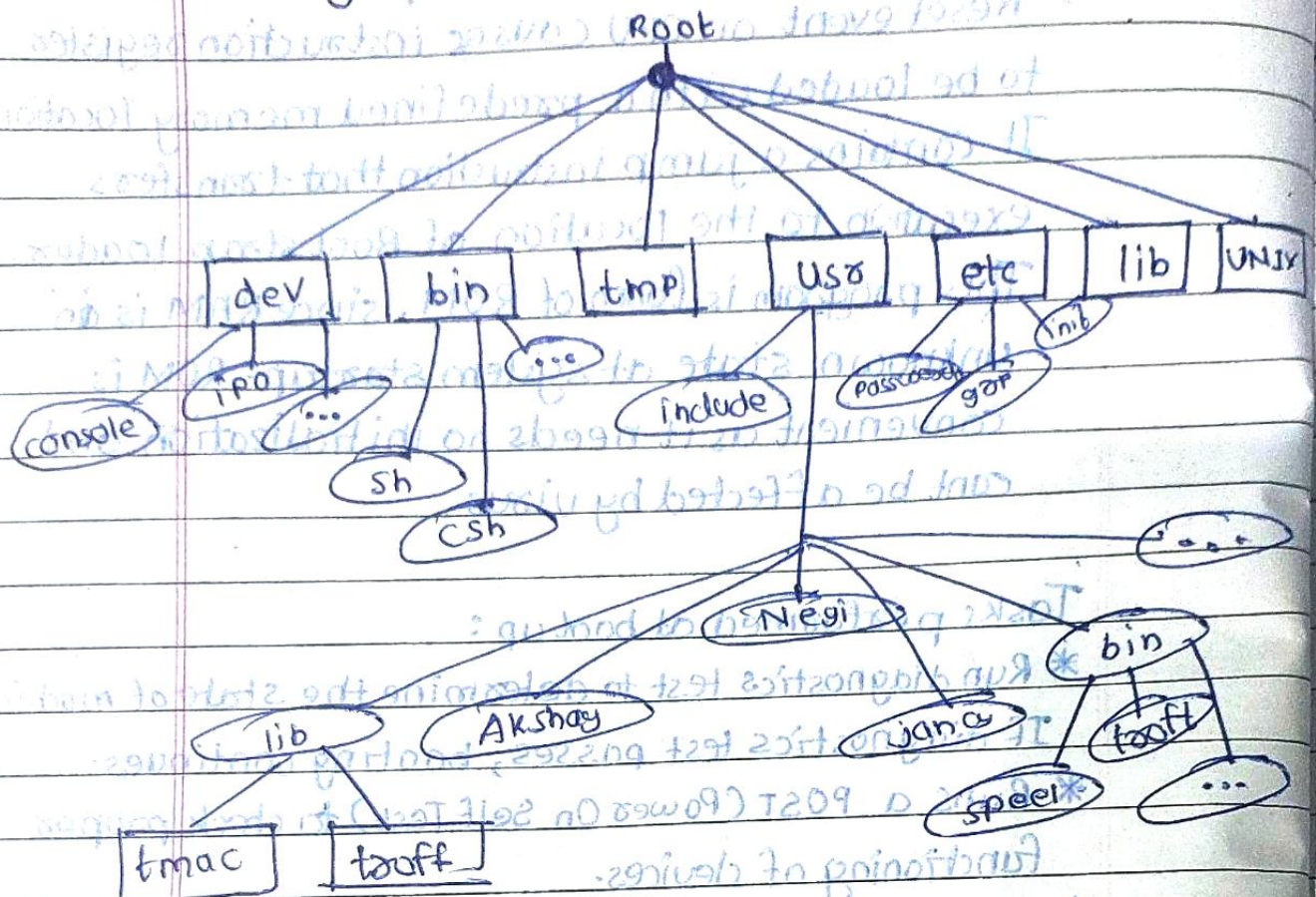
A file in UNIX is a sequence of bytes. Different programs expect different structures, but kernel does not impose and structure on files. Files are organised in tree structured directories. Directories are themselves files that contain information how to find other files.

Ex :- /usr/Akshay/data

The first slash indicates the root directory

usr is a sub-directory in root directory

Akshay is sub-directory of usr

data is a file/directory in directory Akshay

The above figure shows typical UNIX file systems.

Comparison of UNIX and LINUX :-

	UNIX	LINUX
①	It provides GUI called Common Desktop Environment	It provides common GUI like KDE and Gnome
②	It can be distributed through different vendors with same Cost.	It is freely distributed through books, magzines and other sources without any cost.
③	It is not open source	It is open source
④	Security is less as compared to LINUX	Security is more as compared to UNIX.
⑤	Mainly used in universities, colleges and various organisations	Used as stand-alone machine to big business networks
⑥	File System Support :- jfs, gpfs, hfs, hfs+, ufs, xfs format	File System Support :- Ext2, Ext3, Ext4, Jfs, Reiserfs, Xfs, Btrfs, FAT, FAT32, NTFS.
⑦	Ex:- Solaris, BSD, etc.	Ex:- Ubuntu, Red Hat etc.