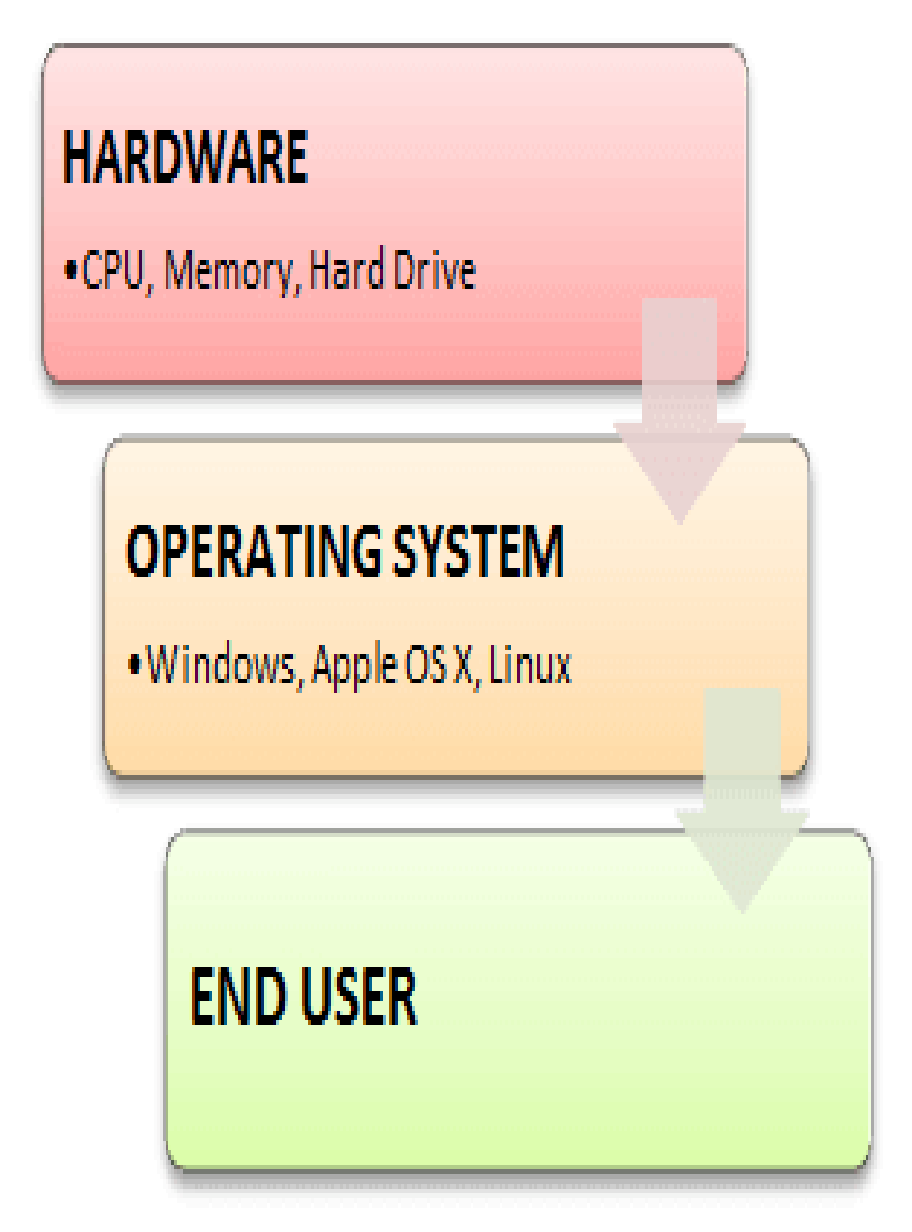
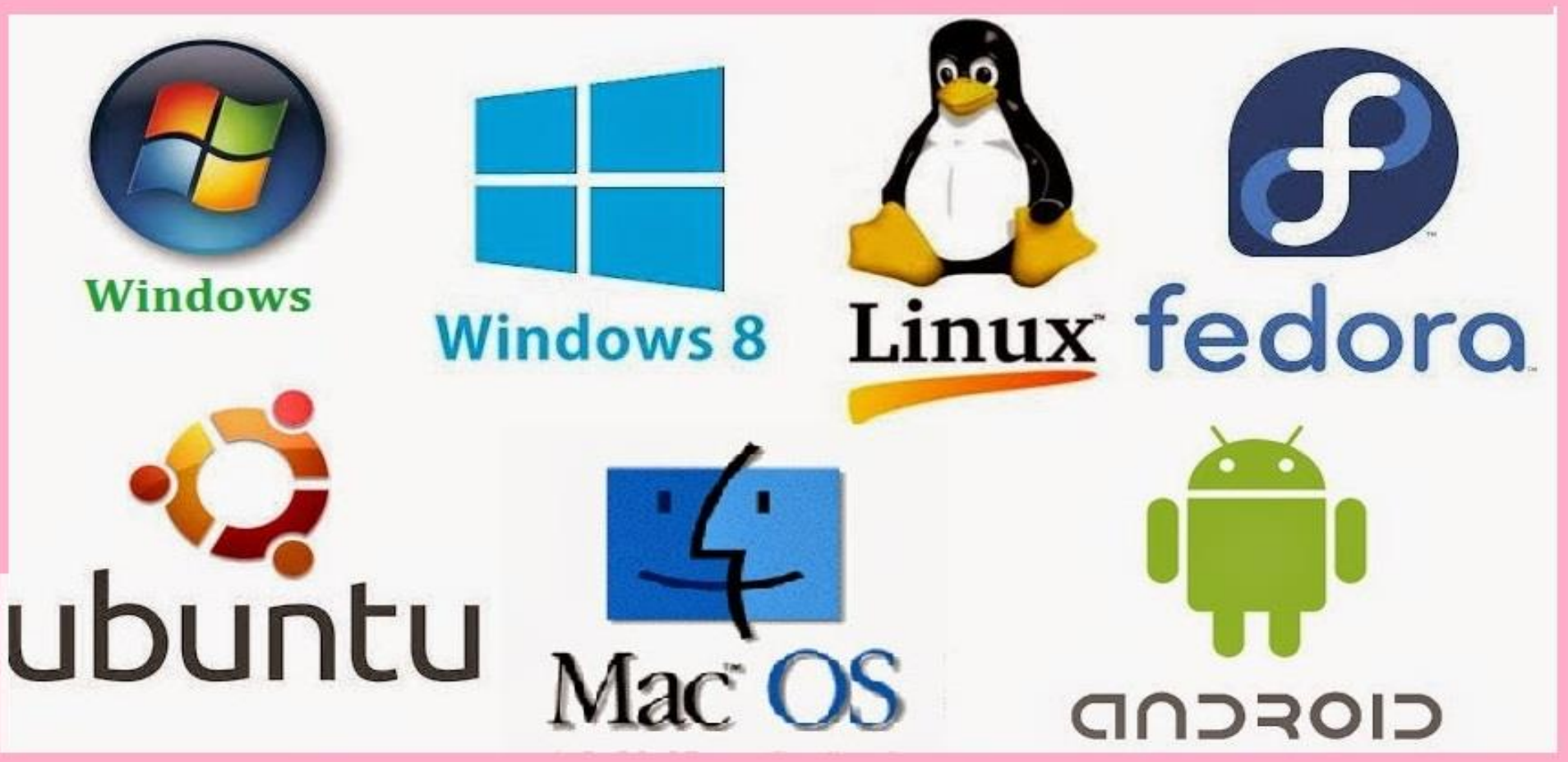
Introduction to Operating System

- An **Operating system (OS)** is a software which acts as an interface between the user & computer hardware.
- Every computer must have at least one OS to run other programs.
- An application like Chrome, MS Word, Games, etc needs some environment in which it will run and perform its task.
- The OS helps you to communicate with the computer without knowing how to speak the computer's language.
- It is **not** possible for the user to use any computer or mobile device without having an operating system.



Types of Operating System



UNIX Introduction →

•The Unix system is a multi-user, multi tasking operating system which means that it allows a single or multiprocessor computer to simultaneously (at same time or together) execute several programs by one or several users.

•it is highly portable (or movable), which means that it is possible to implement a Unix system on almost all hardware platforms.
•UNIX systems also have a Graphical User Interface (GUI) similar to Microsoft Windows which provides an easy to use environment.

•However, knowledge of UNIX is required for operations which aren't covered by a graphical program, or for when there is no windows interface available, for example, in a telnet session.

•It has one or several command interpreters (shell) as well as a great number of commands and many utilities (assembler, compilers for many languages, text processing, email, etc.).

•The first "Unix" system developed in the 1970s by Ken Thompson, Dennis Ritchie, and others in the AT&T Laboratories.
•It was originally meant for programmers developing software rather than non-programmers.

Linux is an open source operating system, which is kind of an adapted clone (or child) of a UNIX operating program.

Linux is a Unix-like computer operating system assembled under the model of free and open source software development and distribution.

The defining component of Linux is the Linux kernel, an operating system kernel first released 5 October 1991 by Linus Torvalds.

Full form of UNIX is
UNiplexed Information Computing System (UNICS),
later known as UNIX.

It is because, when the Unix was first developed, it required the data and address buses to be uniplexed,
i.e they were not multiplexed(involving or consisting of many elements in a complex relationship.), hence it was named so.

DIFFERENCE BETWEEN UNIX AND WINDOWS:-

- Unix file system in hierarchical model, windows file system is flat type.
- Unix is a CLUI (Command Line User Interface) OS and Windows is a GUI OS.
- Unix is the multi user operating and in windows system.windows is single user operating system.
- Unix is more secure than windows.
- In unix we can restrict the permission of each user.

FEATURES OF UNIX:-

1. Multitasking Capabilities
2. Multi-User Capabilities
3. System Portability
4. Inter Process communication
5. Hierarchical File System
6. Pipes & filters
7. Security
8. Open system
9. System calls and libraries
10. Program facility
11. Networking

[1]Multitasking Capability:

This capability allows the system to perform several tasks simultaneously.

For instance, UNIX can print one document, edit another and sort a list of files at the same time.

Multiple tasks can be carried out by placing other tasks in the background while you work on one task at a time.

[1]Multitasking Capability:

The current tasks are said to be in the foreground.

Normally the tasks that do not require active interaction from the user are placed in the background; the lower will be the system response.

[2]Multi-User Capability:

Multi-user operational system permits several users to use the same computer to carry out their job.

Several terminals are connected to a single powerful computer and each user of the terminal can be a programmer, program access files and prints document at the same time.

Features

[3] System Portability:

The UNIX operating system can port itself to another installation without any major changes

This ability to adapt itself to different computers has made UNIX very popular. UNIX runs on the more brands of computers than any other operating system.

Features

[4] Inter Process Communication:

UNIX supports two major types of communication:

1. Communication between different terminals connected to the same computer.

2. Communication between users of the one computer at the specific location to the users of another type and size of a computer located elsewhere. The two computers may be located in different offices or different countries or continents. These types of communication is achieved by a mail system based on wide area and may be connected through telephone lines or satellite.

Features

[5]Hierarchical File System:

UNIX uses a hierarchal file structure to store information. This structure has the maximum flexibility in grouping information in a way that reflects its natural state. It allows for easy maintenance and efficient implementation.

Features

[6]Pipes and Filters:

UNIX has facilities called Pipes and Filters which permit the user to create complex programs from simple programs.

Features

[7]Security:

Unix provide 3 types of security:

1. System level : every user has been allocated user id and password. When system admin open account for user, an entry is created in system password file, called **/etc/passwd.** So to access the resources of the unix system, user has to login in first. Only the authorized user can access the system.

2. Directory level: In unix, every thing is treated as file. Even directories and devices are also considered as file. There are read, write and execute permission to each file, which decided who can access a particular file, who can modify it and who can execute it.

3. File level : there is file encryption. encryption utility encodes your file into an unreadable formates that even if some one succeed in open it, your secret information are safe.

Features

[8]Open system:

Unix has an open architecture. One can add to the tool kit by simply writing a program and storing the executable in a separate area in the file system. Modification of the system is easy because the source code is always available.

Features

[9] System calls and libraries:
Unix is written in C language. There are many commands available in it that handles specialized functions called **system call**.
These calls are built in to the kernel and all library functions and utilities are written using them.
[10] Program facility:
It is highly programmable. It was designed for programmer, not for end user.

Features

[10]

The unix shell programming has all like control structure, loops and variables that establish it as a programming language in its own rights.

Features

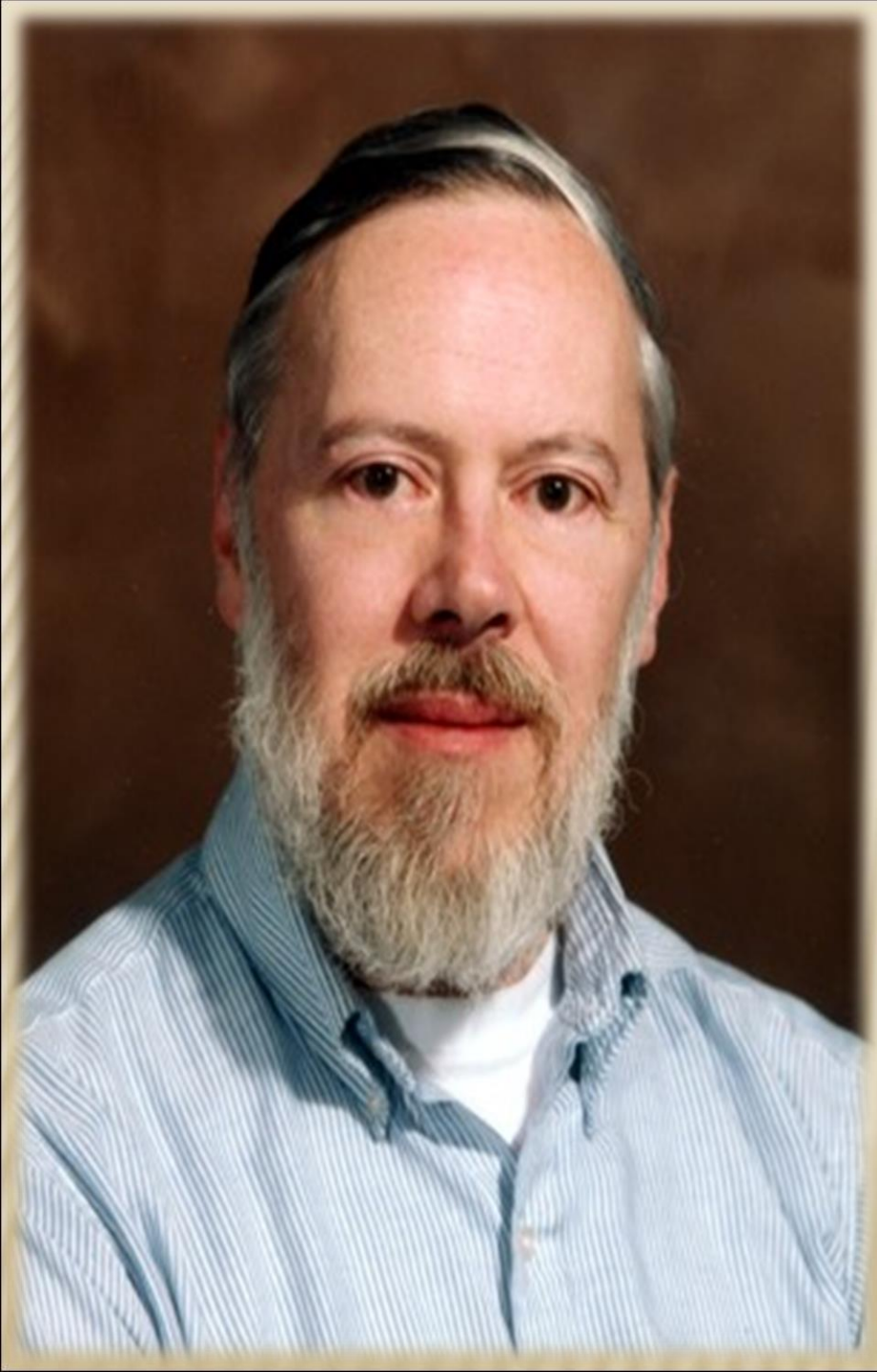
[11] Networking:

Unix was not originally the networking system. This concept was added to unix system after a split between BSD[**BSD Definition**. **BSD** (Berkeley Software Distribution) refers to a group of **Unix**-like operating systems that are descendants of the **BSD UNIX** that was developed at the University of California at Berkeley (UCB) in the 1970s and early 1980s.]

Unix and AT & T Unix.

Both developers incorporated in networking into heart of OS.

Networking allows users at one location to long into system at the other ends and enables user to access the resources of host computers.



FATHER OF UNIX

DENNIS RETICHE

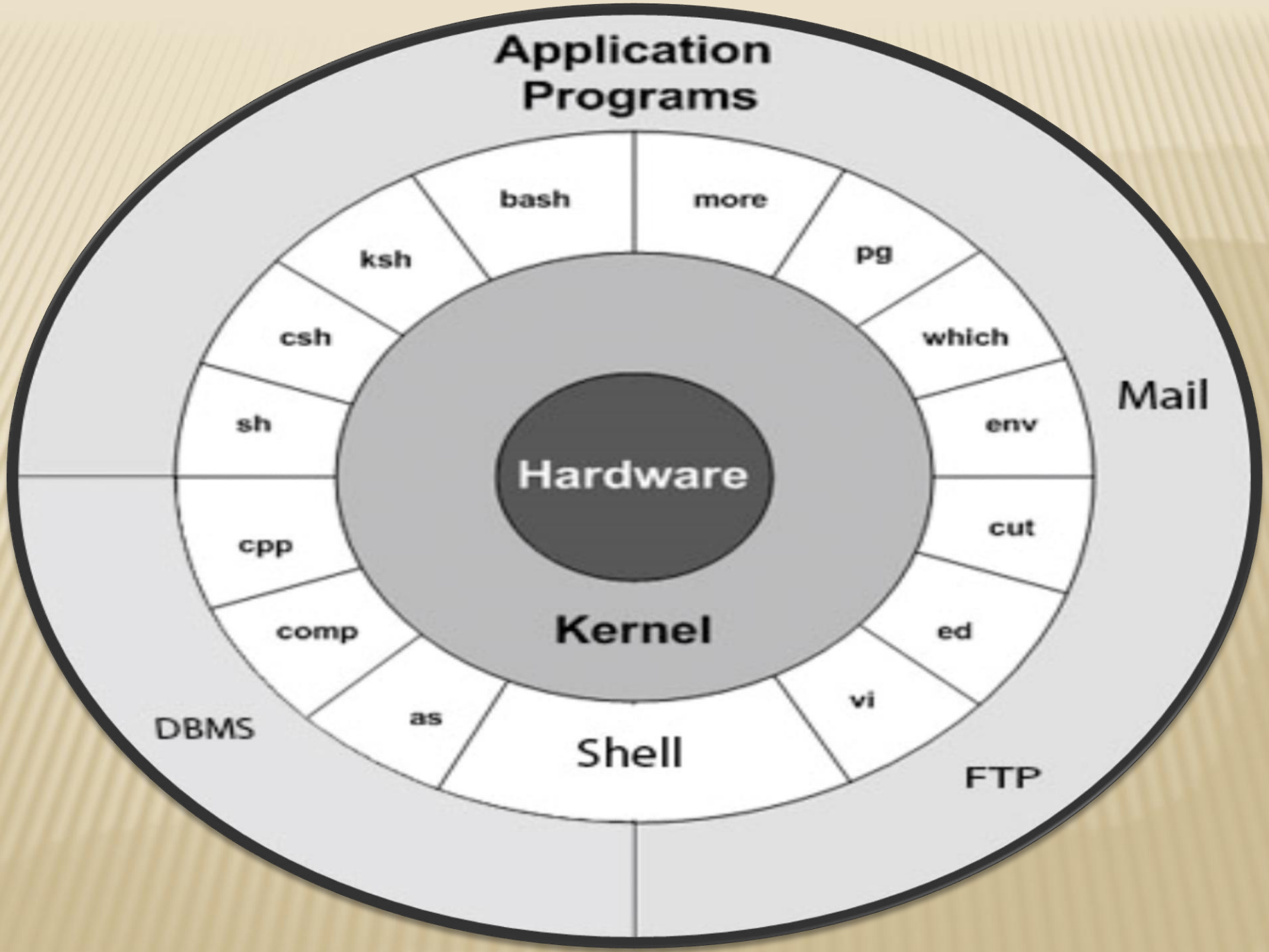
THE UNIX ARCHITECTURE

UNIX IS A MULTI TASKING,MULTIUSER OPEARTING OPERATING SYSTEM DESIGNED FOR EFFECTIVE DEALING.

THE OPERATING SYSTEM CONTROL OVER RESOURCES
(HARD DISK,TAPES,SCREEN,FILESYSTEM etc),

SO THAT AS MANY APPLICATIONS ARE POSSIBLE TO SUPPORT OVER

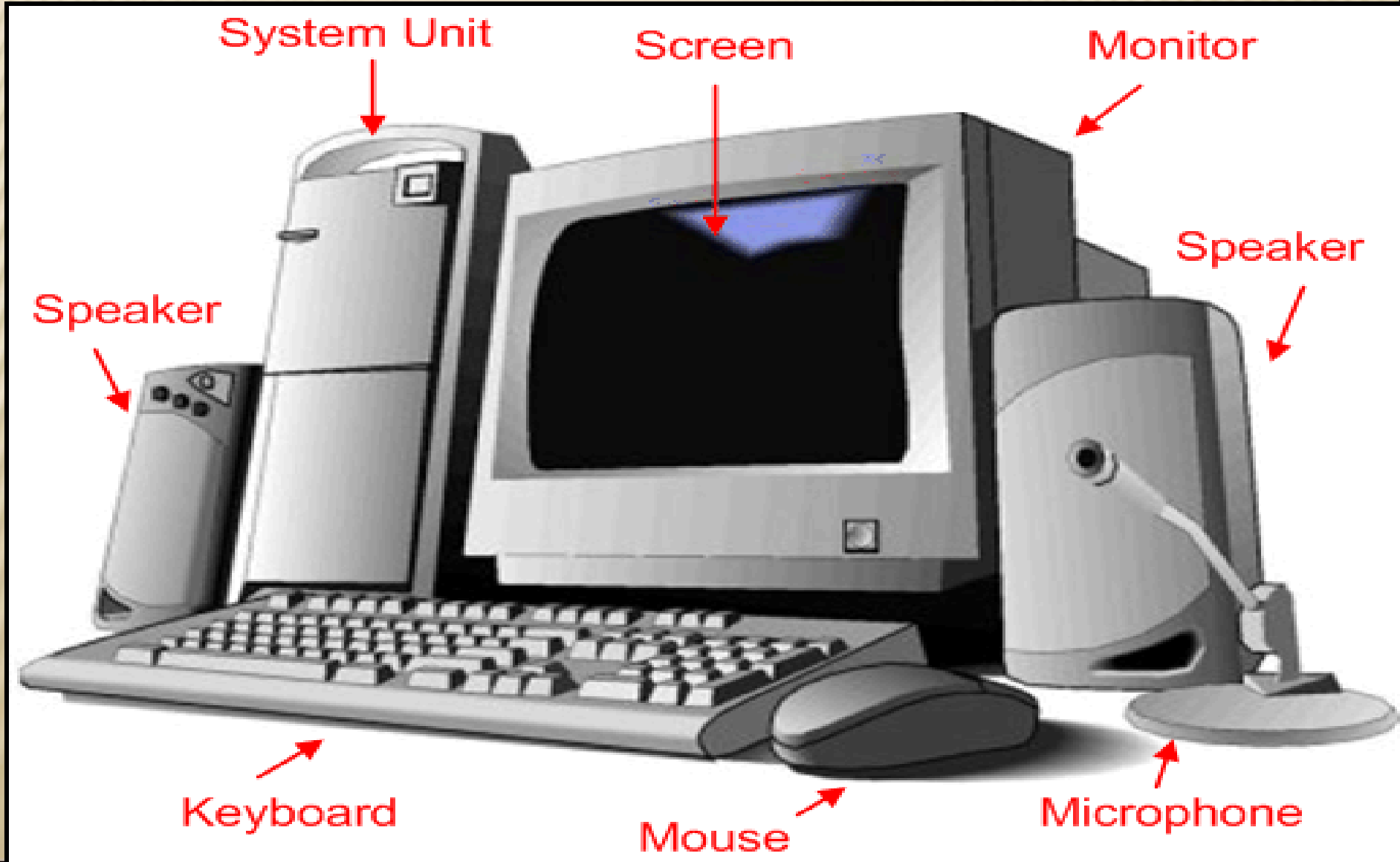
THE SYSTEM CAN RUN CONCURRENTLY,WITHOUT PROBLEM.


Application Programs
bash
more
ksh
pg
csh
which
sh
env
Mail
Hardware
cut
cpp
Kernel
ed
comp
vi
as
DBMS
Shell
FTP

MAIN PARTS IN UNIX ARCHITECTURE

1) HARDWARE
2) KERNEL
3) SYSTEM CALLS
4) SHELL
5) APPLICATION PROGRAMS

1-HARDWARE


System Unit
Screen
Monitor
Speaker
Speaker
Keyboard
Mouse
Microphone

HARDWARE IS THE GENERAL TERM USED TO REPRESENT THE PHYSICAL AND TANGIBLE (touchable) COMPONENTS OF THE COMPUTER ITSELF.

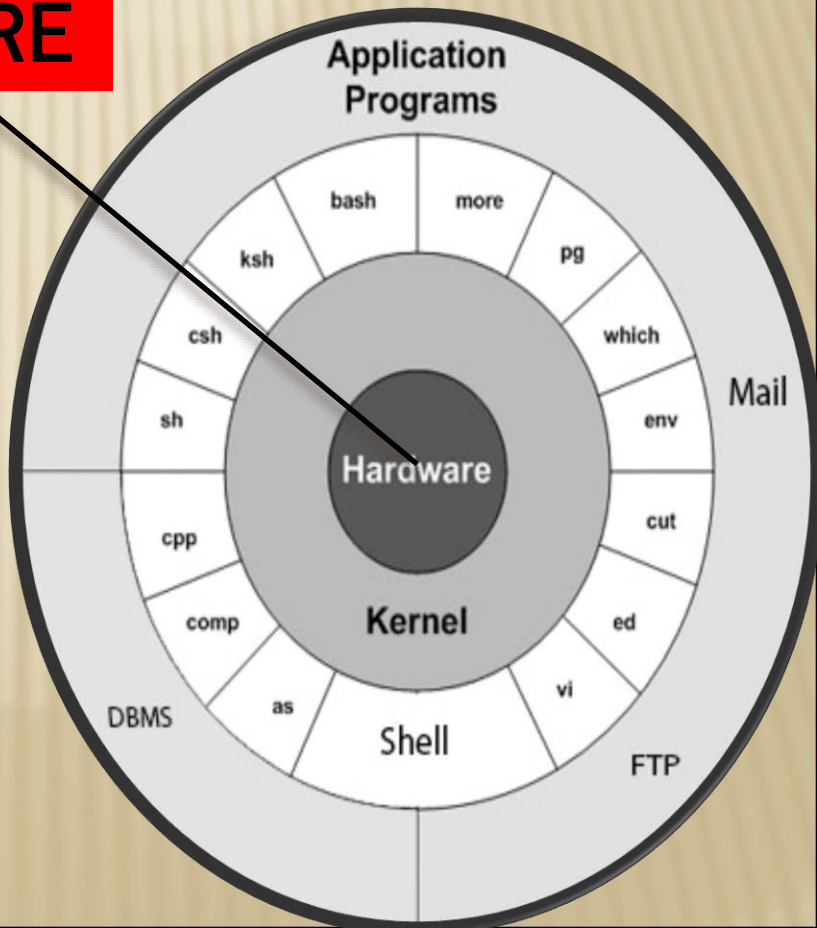
THAT IS ,THOSE COMPONENTS WHICH CAN BE SEEN AND TOCHED.

HARDWARE

IT INCLUDES:-

(1)INPUT DEVICES
(2)OUTPUT DEVICES
(3)CENTRAL PROCESSING UNIT
(4)MEMORY,BACKING STORAGE
(5)COMMUNICATION DEVICES

EG. THE KEYBOARD
THE SCREEN
THE MOUSE
THE SPEAKERS

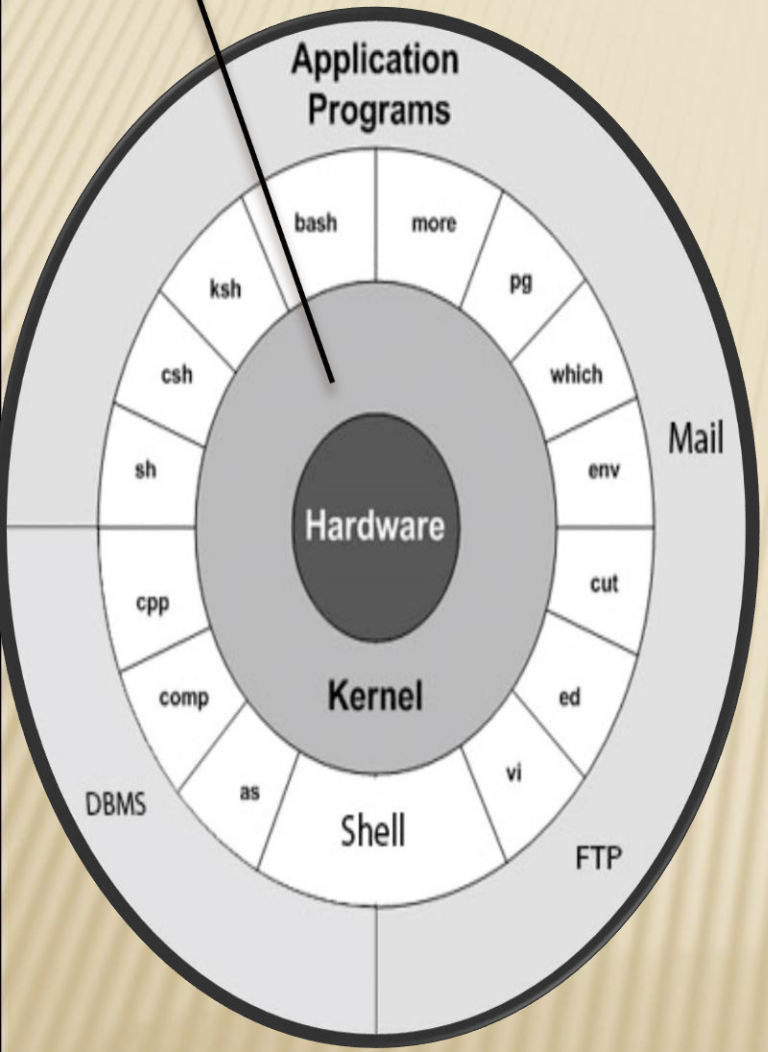


1. IT ALSO INCLUDES THE ELECTRONIC CIRCIUTS CONSISTING OF RESISTORS,CAPACITORS, ICs ETC.
2. ALL INPUT AND OUTPUT DEVICES CONNECTED TO COMPUTER ARE COLLECTIVELY KNOWN AS PERIPHERAL.

Architecture

KERNEL

2-KERNEL

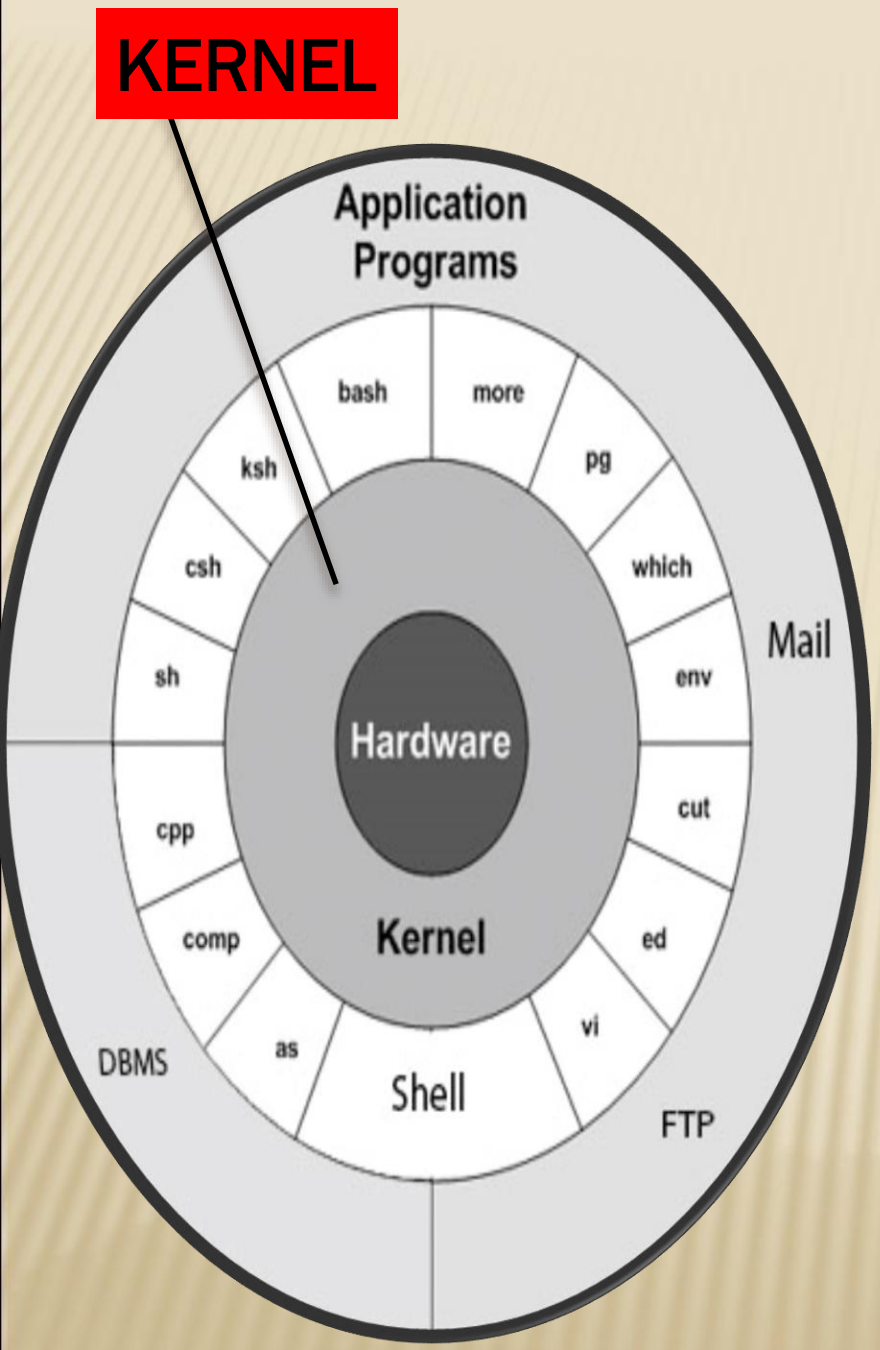


1. THE KERNEL IS THE CORE OF THE OPERATING SYSTEM. A COLLECTION OF ROUTINES MOSTLY WRITTEN IN C. [A **routine** is just a section of code that can be executed by another program - they are often defined as functions or methods in object-oriented languages.]

2. IT IS LOADED INTO MEMORY WHEN THE SYSTEM IS BOOTED AND COMMUNICATE DIRECTLY WITH THE HARDWARE.

3. USER PROGRAMS(THE APPLICATION) THAT NEEDED TO ACCESS THE HARDWARE(LIKE THE HARD DISKS OR TERMINAL) USES THE SERVICES OF KERNEL,WHICH PERFORMS THE WORK ON THE USERS BEHALF

4. THESE PROGRAMS ACCESS THE KERNEL THROUGH A SET OF FUNCTIONS CALLED SYSTEM CALLS



KERNEL MANAGES:

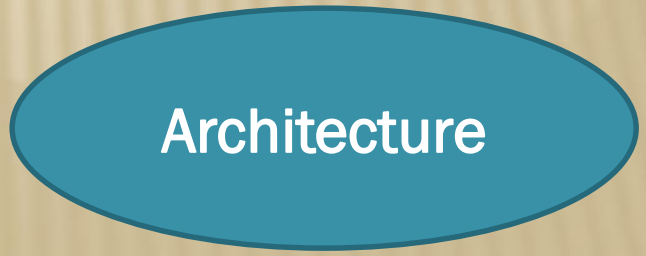
1.MEMORY
2.PROCESSES(Schedule, priority)
3.FILES
4.I/O DEVICES and Performs other tasks.

SYSTEM CALLS

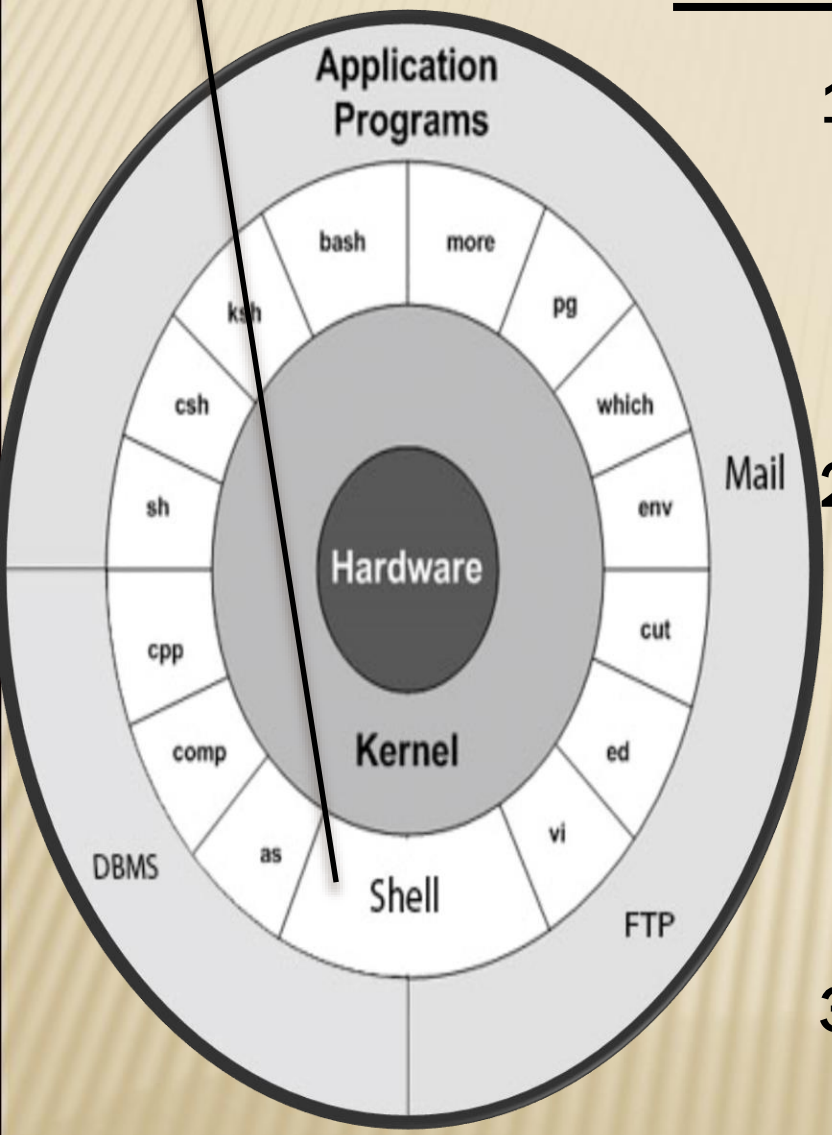
- THE UNIX SYSTEM CONTAIN THE KERNEL,SHELL AND APPLICATION-IS WRITTEN IN C.

- THOUGH THERE ARE OVER A THOUSAND COMMANDS IN THE SYSTEM,THEY ALL USE A HANDFUL OF FUNCTIONS, CALLED SYSTEM CALLS

- C PROGRAMS USE THE STANDARD LIBRARY FUNCTIONS FOR EVERYTHING.
- THE UNIX ENVIORNMENT HAS COMPLETE ACCESS TO THE ENTIRE SYSTEM CALL LIBRARY AS WELL AS THE STANDARD LIBRARY FUNCTIONS.



3-SHELL

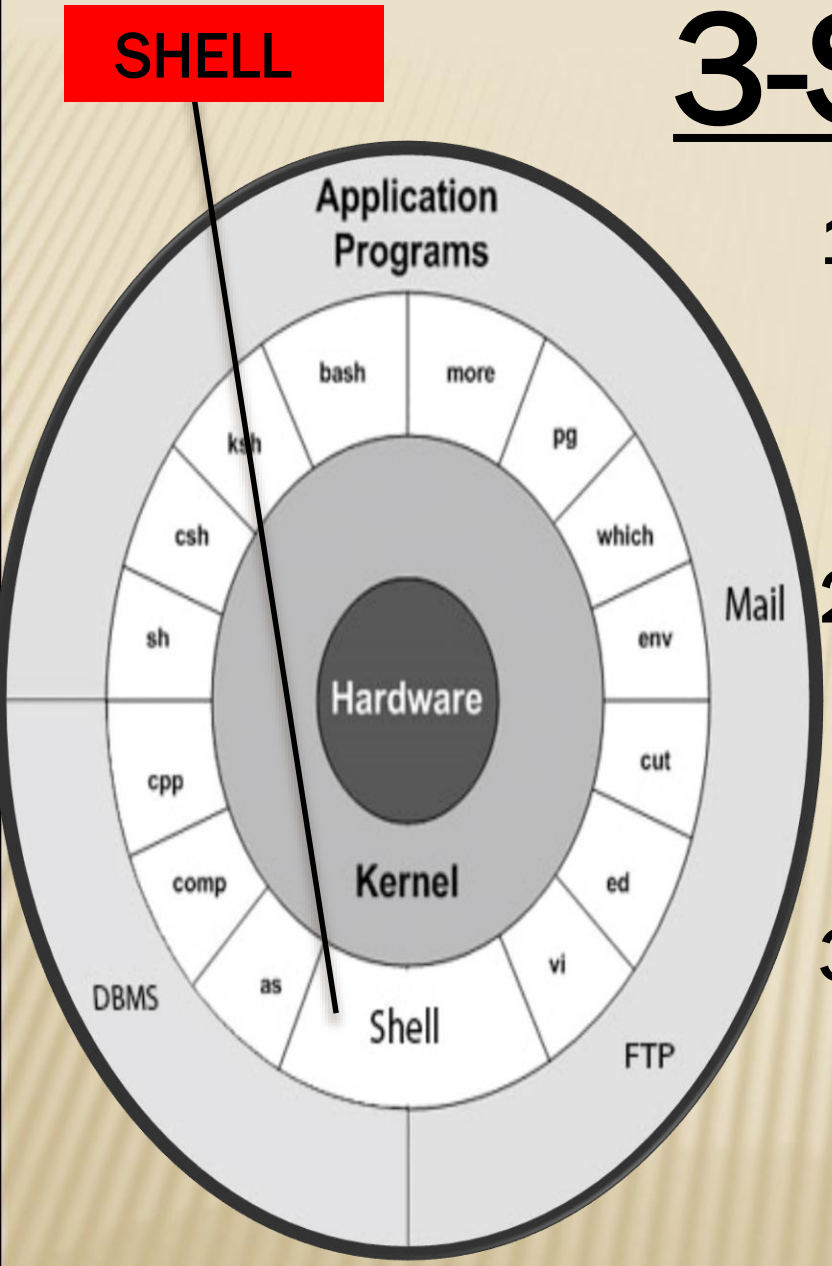


1. COMPUTERS DON'T HAVE ANY INHERENT CAPABILITY OF TRANSLATING COMMANDS INTO ACTION.

2. FOR THIS ,IT REQUIRES A *COMMAND INTERPRETER*,A JOB THAT IS HANDELED BY THE *"OUTER PART"* OF THE OPERATING SYSTEM- THE SHELL

3. SHELL IS THE INTERFACE BETWEEN THE USER AND KERNEL.

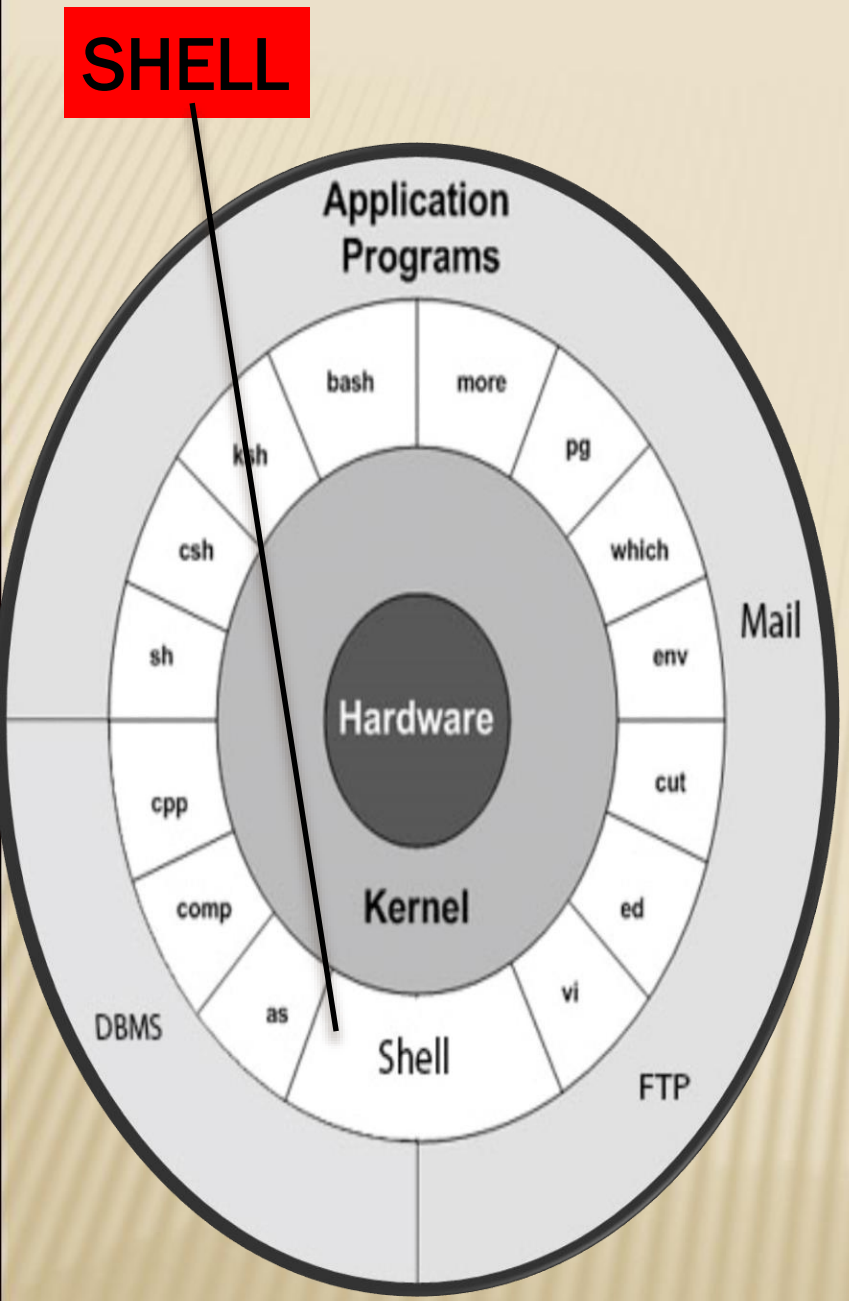
3-SHELL



1. Shell conveys interpreted command to the kernel which executes them.

2. When any user logged in successfully to the UNIX then a shell is allocated to that user.

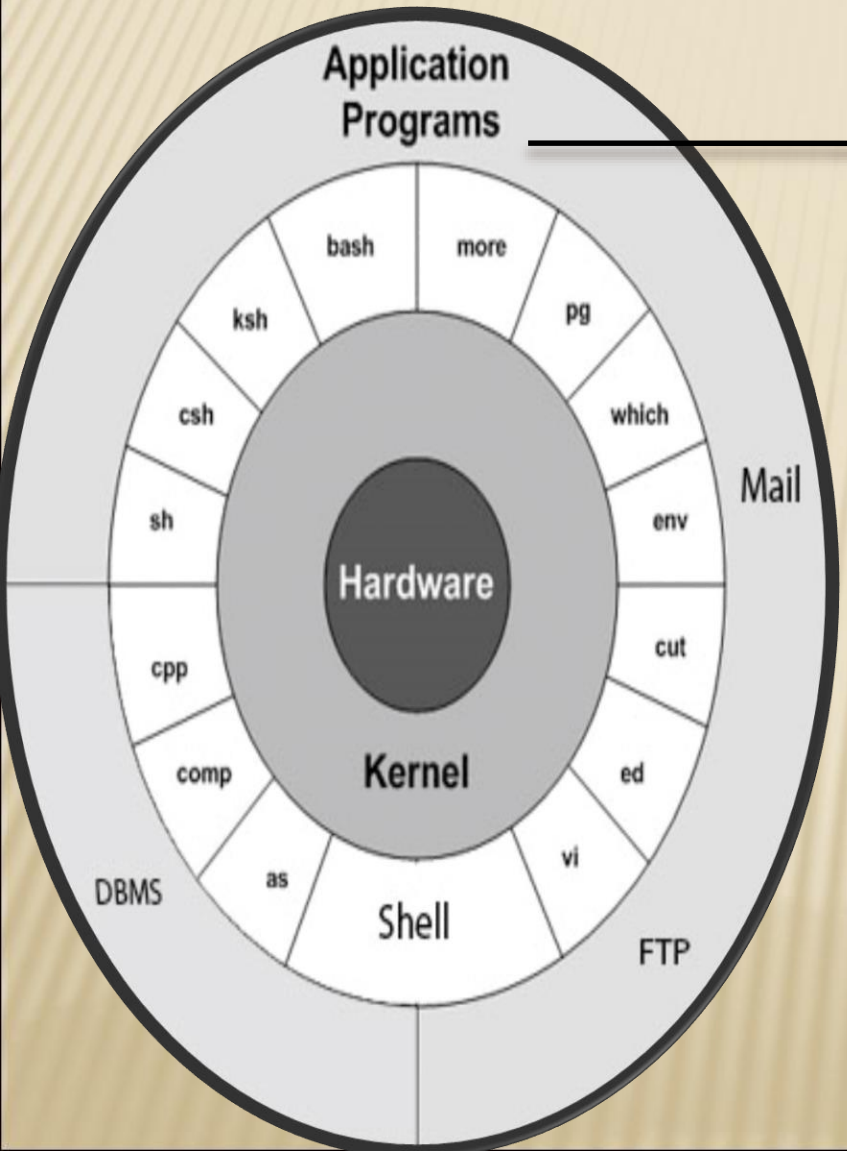
3. Shell offers a prompt through which user issues a command to the UNIX system



1. 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.
2. THUS PROVIDES THE MULTIUSER,MULTITASKING OPERATING SYSTEM.

Architecture

4-APPLICATION PROGRAMS



APPLICATION PROGRAMS

AN APPLICATION PROGRAM IS ANY PROGRAM DESIGNED TO PERFORM A SPECIFIC FUNCTION DIRECTLY FOR THE USER .

EXAMPLES OF APPLICATION

PROGRAMS INCLUDE WORD PROCESSORS; DATABASE PROGRAMS; WEB BROWSERS; DEVELOPMENT TOOLS; DRAWING, PAINT, AND IMAGE EDITING PROGRAMS; AND COMMUNICATION PROGRAMS.

Architecture