**Modern Operating Systems**

Computer is one of the marvels of modern world. The success of computer and its widespread acceptance and its usage is due to the fact that it has very simple interface, multiprocessing ability, excellent graphics and portability. But you know where these features come from? How can multiple applications work at the same time? The answer to both these questions is Operating System (OS). Before going into the details of Operating System let us get an overview of how computer works!

Computer System Structure is divided into four parts based on its functionality:

* Hardware (Keyboard, Mouse, Monitor)
* Operating System 🡪
* Application Programs (Word, Excel, Calculator)
* Users (Human Beings)

🡪Need of OS

Computers can only understand only binary languages (machine language) i.e. 0s and 1s. So, ‘a’ is written as 65(ASCII code) and in binary language 1000001. So, it is very tedious to send instructions in binary language. To avoid this there is a an microprocessor that converts the machine language into x86 code i.e. assembly language code and then it is converted to higher language code(alphanumeric format) that is in human readable format. But they are not capable of multitasking and do not provide GUI.

🡪After having studied why is OS needed, let’s define OS:

Operating System is a program that acts an intermediary between a user of a computer and computer hardware. In short, it acts as a manager for computer. It allocates memory to all the processes, provides time to the process and gives priority to interrupts that is user input.

🡪Let us study a short history of OS:

Initially, Ken Thompson invented MULTICS and later was developed as UNIX. It was an open source and later using UNIX, Linus Torvalds Linux. Many types of OS were developed using UNIX such as Ms-DOS (Made from Unix variant XENIX) and Mac (Made from UNIX variant FreeBSD and NetBSD). These initial OS’s were capable of multiprocessing which was very new at that time and gained popularity, but there was no graphics support. Later in 1960, Doug Engelbart developed GUI, this idea was included in Mac Os and became a huge success and was soon followed by others. Mac uses .dmg, Windows uses .exe as its ISO file that is converted into executable form for installation and Linux runs from its root folder, so it converts into format during runtime.

🡪There are two modes under which OS operates:

1. Kernel Mode or Supervisory Mode

* Complete access to all hardware
* Can execute any instruction that machine is capable of executing

1. User Mode

* Software runs in user mode
* Only subset of machine instructions available
* Shell or GUI runs at lowest level

🡪Multiprocessing of OS

OS makes of use of time slice to increase efficiency so that in the same period of time the processor gets to execute multiple applications. To implement this concept, they make use of multithreading. The critical point for the processor to be able to use time slice is that response time for the applications should be less than a sec to avoid delay to the processes. This can take place when processor has high speeds for processing. Along with time slice, OS also uses multitasking i.e. multiple applications has different memory allocated to different memory. So, it uses both multitasking and multiprocessing for optimum use of its resources. In multitasking the OS allocates different application domain under which application has their instances, and in that domain there are multiple threads that work independently and also multiple applications work independently.