

COM 510 Lecture Schedule 11
Introduction to Operating Systems
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What is an Operating System?

- An operating system is a group of programs that manage all activities on the computer.
- Operating system is a system software.
- It is an interface between the users and computer.
- It is a set of programs, which is used to operate the systems.

An operating system manages all

- input - getting information into the computer from an external source such as the keyboard, a mouse, a scanner, or a disk.
- processing - after receiving input, the computer manipulates or alters the data.
- output - once the input has been processed, it is output to a monitor, printer, disk or sent via email or the Web.

Define Operating System

An operating system is a layer of software, which takes care of technical aspects of a computer's operation and shields the user from the low-level details of the machine's operation and provides frequently needed facilities.

Examples

- Unix
- Disk Operating System (DOS)
- Windows OS
- Mac OS
- Linux OS
- Solaris

Functions/Features of Operating system – Operating system performs three functions:

1. **Convenience:** An OS makes a computer more convenient to use.
2. **Efficiency:** An OS allows the computer system resources to be used efficiently.
3. **Ability to Evolve:** An OS should be constructed in such a way as to permit the effective development, testing, and introduction of new system functions at the same time without interfering with service.
4. **Throughput:** An OS should be constructed so that It can give maximum **throughput** (Number of tasks per unit time).

Major Functionalities of Operating System:

- **Resource Management:** When parallel accessing happens in the OS means when multiple users are accessing the system the OS works as Resource Manager, Its responsibility is to provide hardware to the user. It decreases the load in the system.

- **Process Management:** It includes various tasks like **scheduling**, **termination** of the process. OS manages various tasks at a time. Here **CPU Scheduling** happens means all the tasks would be done by the many algorithms that use for scheduling.
- **Storage Management:** The **file system** mechanism used for the management of the storage. **NIFS**, **CFS**, **CIFS**, **NFS**, etc. are some file systems. All the data stores in various tracks of Hard disks that all managed by the storage manager. It included **Hard Disk**.
- **Memory Management:** Refers to the management of primary memory. The operating system has to keep track, how much memory has been used and by whom. It has to decide which process needs memory space and how much. OS also has to allocate and deallocate the memory space.
- **Security/Privacy Management:** Privacy is also provided by the Operating system by means of passwords so that unauthorized applications can't access programs or data. For example, Windows uses **Kerberos** authentication to prevent unauthorized access to data.
- **I/O System Management –**
The module that keeps track of the status of devices is called the I/O traffic controller. Each I/O device has a device handler that resides in a separate process associated with that device.

Every computer must have an operating system to run other programs. The operating system coordinates the use of the hardware among the various system programs and application programs for various users. It simply provides an environment within which other programs can do useful work.

The operating system is a set of special programs that run on a computer system that allows it to work properly. It performs basic tasks such as recognizing input from the keyboard, keeping track of files and directories on the disk, sending output to the display screen, and controlling peripheral devices.

OS is designed to serve two basic purposes:

1. It controls the allocation and use of the computing System's resources among the various user and tasks.
2. It provides an interface between the computer hardware and the programmer that simplifies and makes it feasible for coding, creation, debugging of application programs.

The Operating system must support the following tasks:

1. Provides the facilities to create, modification of programs and data files using an editor.
2. Access to the compiler for translating the user program from high-level language to machine language.
3. Provide a loader program to move the compiled program code to the computer's memory for execution.
4. Provide routines that handle the details of I/O programming.

History of Operating system

The operating system has been evolving through the years. The following table shows the

history of OS.

Generatio

n	Year	Electronic device used	Types of OS Device
First	1945-55	Vacuum Tubes	Plug Boards
Second	1955-65	Transistors	Batch Systems
Third	1965-80	Integrated Circuits(IC)	Multiprogramming
Fourth	Since 1980	Large Scale Integration	PC

Types of Operating System

Operating systems are classified into eight different categories:

- o Single User Operating System - Support only one user can use the OS at any given time
- o Single Tasking Operating System - Execute only one single task or application at any given time.
- o Multi-tasking Operating System execute more than one task at the same time, a task being a program.
- o Multi User Operating System - Support more than one user at the same time.
- o Multiprocessing Operating System - Supports more than one processor
- o Timesharing Operating System - Provides direct access to a large number of users where CPU time is divided among all the users on scheduled basis.
- o Real time Operating System intended to serve real-time application requests.
- o Distributed Operating System software over a collection of independent, networked, communicating, and physically separate computational nodes

Examples of Operating System are –

- Windows (GUI based, PC)
- GNU/Linux (Personal, Workstations, ISP, File and print server, Three-tier client/Server)
- macOS (Macintosh), used for Apple's personal computers and workstations (MacBook, iMac).
- Android (Google's Operating System for smartphones/tablets/smartwatches)
- iOS (Apple's OS for iPhone, iPad, and iPod Touch)