Computer Fundamentals

Lecture 8

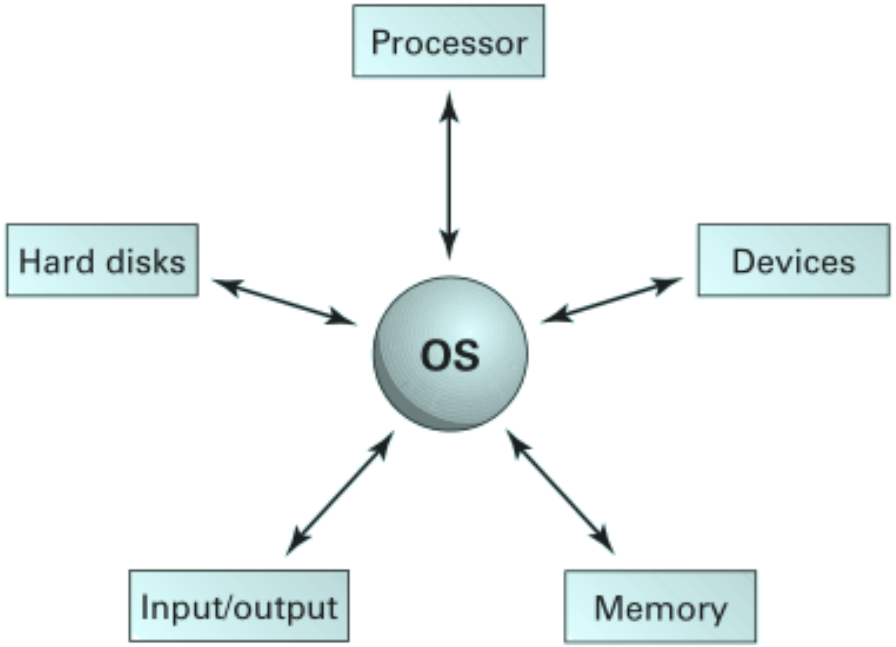
Operating Systems

Operating Systems

- The operating system is the most important program that runs on a computer.
- The **Operating System** (OS) is an interface between a computer user and computer hardware**.**
- It is responsible for the management and coordination of activities and the sharing of the resources of the computer.

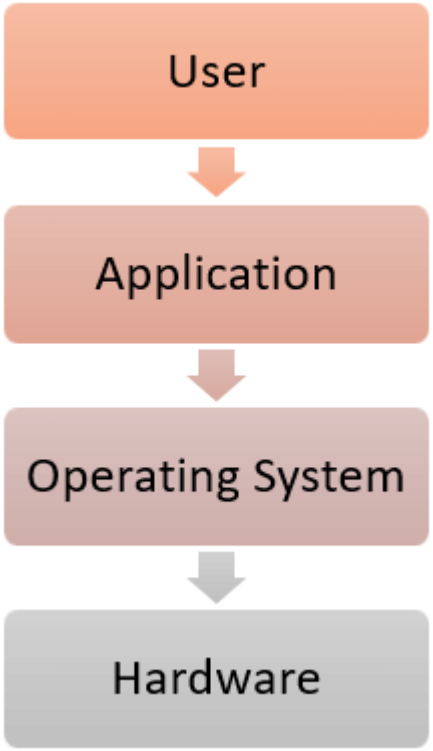
Operating Systems

- An operating system is a set of programs containing instructions that work together to coordinate all the activities among computer hardware resources.



The operating system interacts with hardware

Operating System



OS is an interface between a computer user and computer hardware

Major Functions of Operating System

- An operating system is a software which performs all the basic tasks like:
  - File management
  - Memory management
  - Process management
  - Device Management
  - Providing a user interface

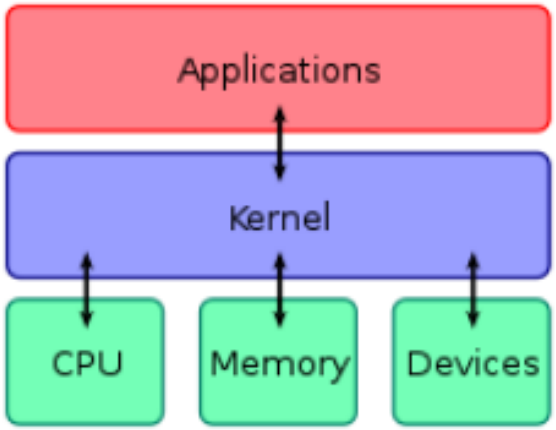
Characteristics of Operating System

The most prominent characteristic features of Operating Systems are as the following:

- **File Management** − Allocates and de-allocates the resources and decides who gets the resources.
- **Memory Management** − Keeps track of the primary memory, i.e. what part of it is in use by whom, what part is not in use, etc. and allocates the memory when a process or program requests it.
- **Device Management** − Keeps track of all the devices. This is also called I/O controller that decides which process gets the device, when, and for how much time.

Starting a Computer

- **Booting** is the process of starting or restarting a computer
- Each time you boot a computer, the **kernel** and other frequently used operating system instructions are loaded, or copied, from storage into the computer's memory (RAM).
- The **kernel** is the core of an operating system that manages memory and devices, maintains the internal clock and runs programs.
- The kernel is **memory resident**, which means it remains in memory while the computer or mobile device is running.



Shutting Down Computers

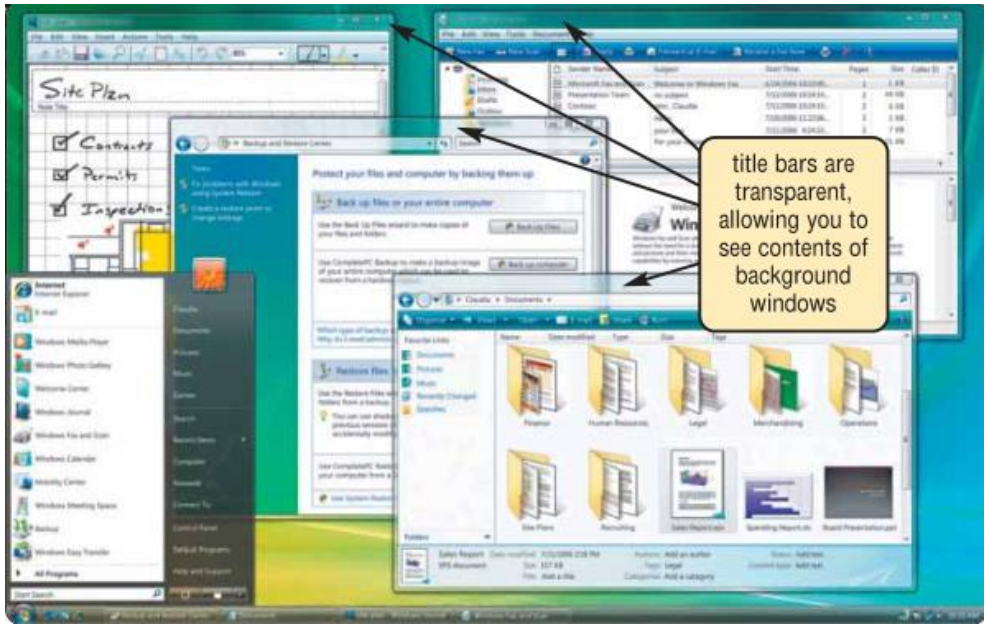
- Shut down options including **powering off** the computer, placing the computer in **sleep mode**, and **hibernating** the computer.
- Both sleep mode and hibernate are designed to save time when you resume working on the computer.
- **Sleep mode** saves any open documents and programs to **RAM**, turns off all unneeded functions, and then places the computer in a low-power state.
- **Hibernate**, by contrast, saves any open documents and programs to a **hard disk** before removing power from the computer.

Providing a User Interface

- You interact with an operating system through its user interface.
- A **user interface** (UI) controls how you enter data and instructions and how information is displayed on the screen.
- Two types of operating system user interfaces are:
  - **Graphical user interface** (GUI)
  - **Command line**.

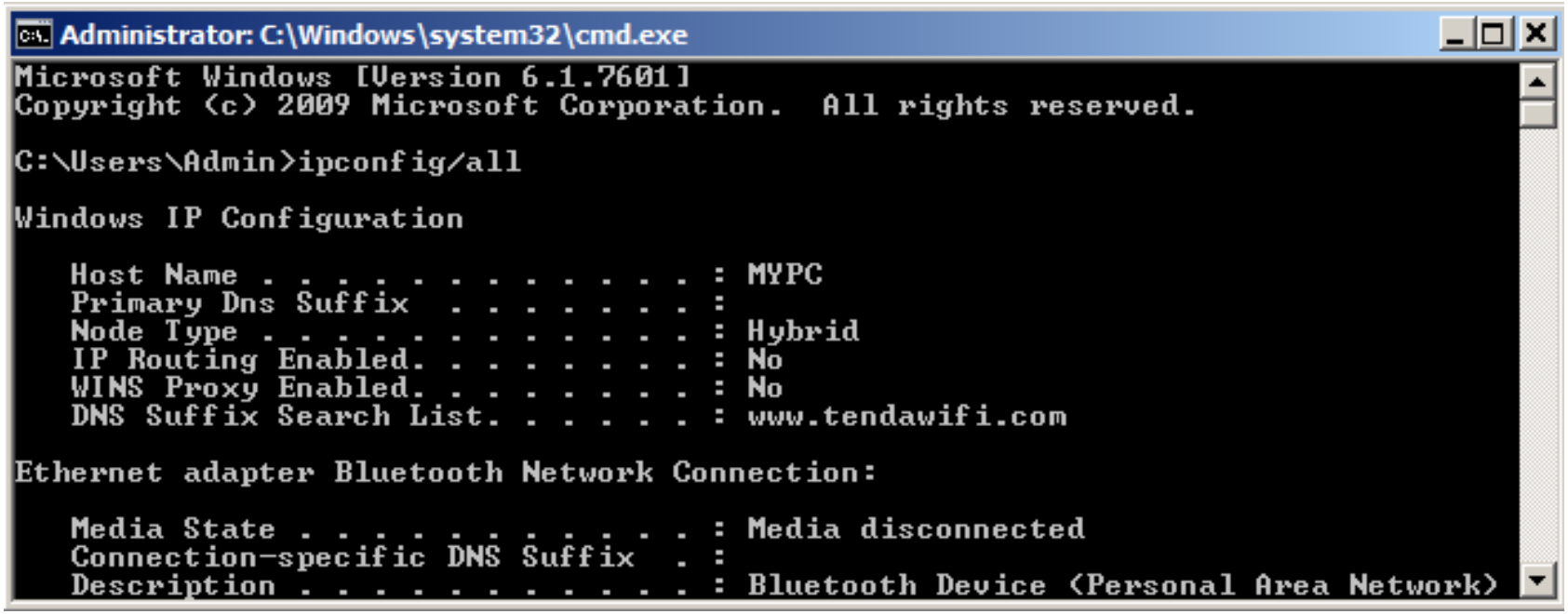
User Interface

- **Graphical User Interface** (GUI) A method by which a person communicates with a computer using graphical images, icons, and methods other than text.
- GUIs allow a user to use a mouse, touchpad, or another mechanism (in addition to the keyboard) to interact with the computer to issue commands.

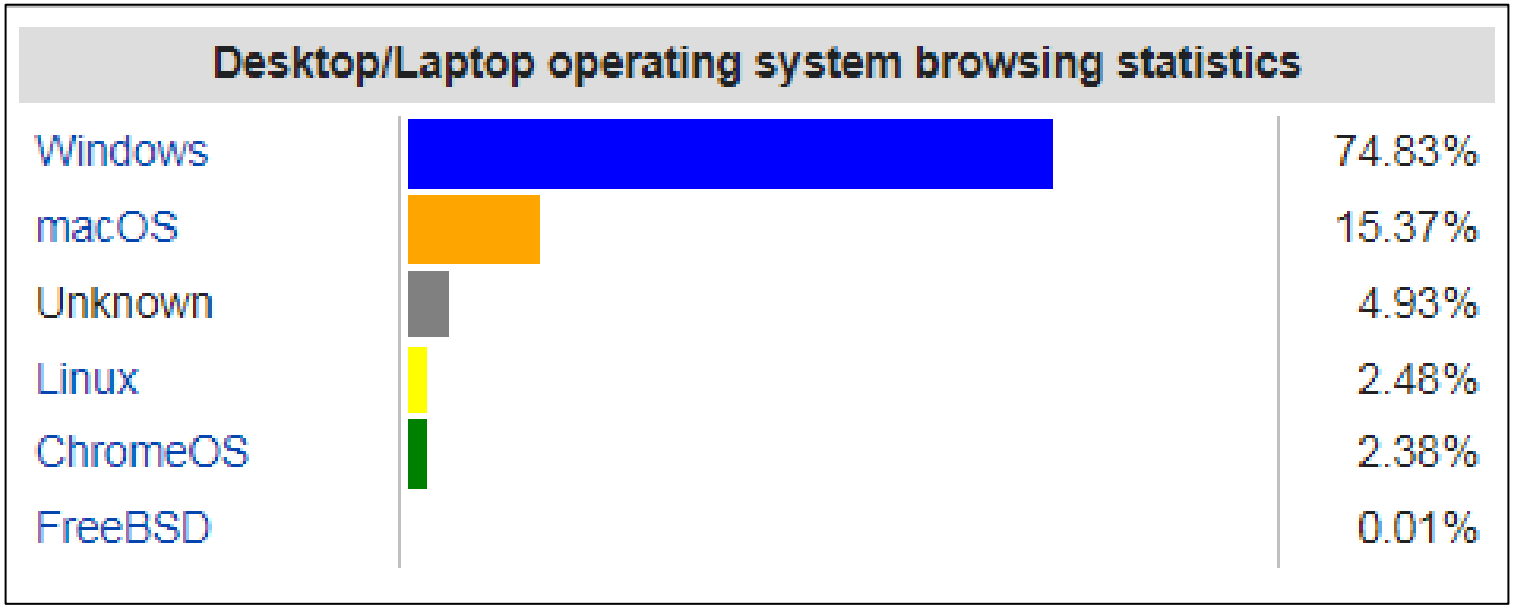


User Interface

- A command-line interface (CLI) is a text-based user interface
- The user can type commands to perform specific tasks.
- The command shell in the Windows operating system are examples of command-line interfaces.



Desktop/Laptop operating system browsing statistics



Desktop OS market share according to StatCounter for April 2022.

Desktop Windows Version Market Share Worldwide

Windows Version	Market Share
Win 10	71.29%
Win 11	15.44%
Win 7	9.61%
Win 8.1	2.45%
Win 8	0.69%
WinXP	0.39%

Desktop Windows Version Market Share Worldwide - Oct 2022

https://gs.statcounter.com/os-version-market-share/windows/desktop/worldwide

Types of Operating System

- There are several different types of operating systems present.
  - Batch OS
  - Multitasking OS
  - Network OS
  - Real-Time OS
  - Multiprocessing Operating System
  - Embedded Operating Systems

Batch OS

- Batch OS is the first operating system for second-generation computers.
- People were used to having a single computer which was called a mainframe.
- In Batch operating system, access is given to more than one person; they submit their respective jobs to the system for the execution.
- The system put all of the jobs in a queue on the basis of first come first serve and then executes the jobs one by one. The users collect their respective output when all the jobs get executed.

Network operating System

- A Network Operating System runs on a server and provides the server the capability to manage data, users, groups, security, applications, and other networking functions.
- Examples of network operating systems include:
  - Microsoft Windows Server
  - UNIX
  - Linux
  - Mac OS X

Real-time Operating System

- Real-time operating systems provide support to real-time systems
- A real-time operating system is an operating system that runs multi-threaded applications and can meet real-time deadlines.

Multiprocessing Operating System

- In Multiprocessing, Parallel computing is achieved.
- There are more than one processors present in the system which can execute more than one process at the same time.
- This will increase the throughput of the system.

Embedded Operating Systems

- An embedded operating system is a special type of computer operating system designed to perform a specific task for a device.
- The hardware running an embedded operating system is usually very limited in resources.
- Examples: operating systems in:
  - **ATM**s
  - **Satellite Navigation systems**
  - **Digital Cameras**