

- system software
- manages, operates communication with comp. h/w & S/w
- acts as interface b/w hardware and user.
- controls executⁿ of app. program
- resource manager

Need of OS

- to perform tasks
- keep track of file & directories
- controlling peripheral devices
- heart of computer → CPU
- allocates memory

Objectives of OS

- Convenience
- Efficiency
- Ability to evolve

Functions of OS

- 1) process management
 - ⇒ control access to shared resources
 - ⇒ creation, execution & deletion
 - ⇒ Scheduling of a process
 - ⇒ Synchronization, communication & Deadlock Handling
- 2) memory management
 - ⇒ allocates memory to user & system processes
 - ⇒ reclaim allocated memory
 - ⇒ once used block → free, OS allocates it again.
 - ⇒ monitoring memory usage
- 3) File management
 - ⇒ creation and deletion
 - ⇒ offer service to access files
 - ⇒ keep back up of files
 - ⇒ offers security

Types of OS

- multiuser (Linux, UNIX, WINDOWS 2000, NT)
- multiprocessing (UNIX, WINDOWS 2000)
- multitask (UNIX, WINDOWS 2000)
- multithreading (Linux, UNIX, WINDOWS 2000)
- real time → quick response
WINDOWS & UNIX are not real-time OS.

OS services

- 1) User interface
- 2) Program execution
- 3) I/O opⁿ
- 4) File system manipulation
- 5) Communication
- 6) Error Detection

Types of OS w/ design

- 1) SMP: Symmetric multi-processor
- 2) Multicore OS

- 4) Device management
 - ⇒ drivers are open end, closed, written
 - ⇒ communicates, controls, monitors
- 5) Protection & Security
 - ⇒ Resources are protected by OS
 - ⇒ User authentication
 - ⇒ Read, Write, Encryption of Data
- 6) User Interface
 - ⇒ offers set of commands or GUI
 - ⇒ S/H & H/W interaction
- F) Booting of computer
 - ⇒ process of starting & restarting
 - ⇒ Switched off → turned on → cold booting
 - ⇒ Using OS → Restart → Warm booting.
- 8) Performs basic tasks
 - ⇒ by I/O devices
 - ⇒ Plug & Play → Automatic Recognition

Evolution of OS

- 1) 1970 → mainframes → MULTICS
- 2) 1980 → mini-computer → UNIX
- 3) 1990 → desktop → DOS/MS WINDOWS, UNIX/LINUX
- 4) 2000 → Hand Held computer → WINDOWS XP, WINDOWS 2000, LINUX

OS Structures

- 1) Monolithic System
- 2) Layered System
- 3) Virtual Machine
- 4) Client server model

System Calls

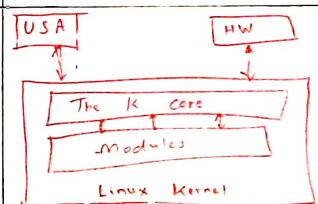
- provides an interface to the services available by OS
- 2 modes
 - user mode (program)
 - system mode (opⁿ)

Adv: Security

Due to S.C, User program ≠ OS

Linux Kernel

- main component
- core interface
- kernel jobs
 - memory mang.
 - process mang.
 - device drivers
 - system calls & security



Monolithic Kernel

- single large process running in single address space.
 - all kernel services exist
 - can invoke 'funcⁿ' directly
- Adv: ⊕ or ⊖ of K. not possible
low or O flexibility

Micro Kernel

- Kernel is broken down in separate processes → servers
 - some run in K. space & some in user space.
 - communicatⁿ done via msg passing.
- Adv: Flexible for changes

Hybrid Kernel

- central part of OS
- manages opⁿ of hardware, memory, CPU time.
- when process → request of the K.
 - ↳ system calls

Shell

- unix term for interactive user interface
- layer of programming → understands & executes
- command interpreter