27/08/24

Morning Activity

* How to approach aptitude topics?

→ • 40 question in CCEE (maybe 60)
• Each question (max 40 sec)
• Accuracy (learn tricks)
• Attempt all the questions. [3 way approach]
[Go for familiar question to save time].

— x — x

* COS 9:30 to 1:30 pm Malkeet Singh

1) OS?

→ • It manages all the hardware resources of the computer system.
• To manage all the ~~tasks~~ task or processes in a computer system
• It is basically an interface between the user and the computer system (hardware).

2) Diff between OS & Appl^n software:-

→ 1) OS manages hardware resources & provide a platform for application software to run. Application software is designed to specific tasks.

2) OS handles system level tasks like,
• process mngmt • memory mngmt • file mngmt

Application focuses on user centric tasks like creating documents, etc

2) OS: Directly interact with the hardware & OS is often tailored to the specific arch of hardware (Hardware dependent).

Application software: relies on the OS to interact with the hardware (Hardware Independent).

3) Components of OS:

→ a) kernel → core part of OS, manages, sys resources: CPU, memory, I/O devices. over sys.
- → operates in kernel space & complete control.

b) Process management:
- → Handles: creation, scheduling & termination of processes
- → Ensures: Multiple processes can run concurrently w/o conflict.

c) Memory management: (handles virtual memory)
- → Manages: System memory, including allocation & deallocation of memory spaces for programs.

d) file system:
- → Manages: files on storage devices.
- → Services: file creation, deletion & access control.

e) User Interface:-
- → GUI (Graphical user interface)
- → CLI (command line interface)

Abstraction layer: User is interacting with appln on this layer.

4) Basic computer organization req for Os.

→ a) CPU (central processing unit):
→ Executes instructions from programs.
→ Manages the execution of processes.

b) Memory (RAM):
→ Temporarily stores data & instructions that the CPU needs while performing tasks.

c) Storage (HDD, SDD):
→ Permanent storages for
• Data • files • Os itself.

d) I/O devices:
→ peripherals (keyboards, mice, monitor, etc)

e) Bus:
→ A communication system that transfers data between diff components of computer

5) Example of well known Os:

→ a) Desktop Os: (Ex:- Windows, macOs, linux)
- (i) Designed for general purposes on P.C.
- (ii) Provides user friendly & rich interface,
- (iii) Supports wide range of applications.

→ b) Mobile Os: (Ex: Android, iOs)
- (i) optimized for mobile devices.
- (ii) Focuses: power efficiency, touch interface & mobile connectivity.

BIOS:- Basic/Binary I/O system

BIOS has address of bootloader

→ c) Embedded System OS:

- (i) Used in devices with specific, limited functio (ex:- microwaves, routers)
- (ii) Optimized for specific data.

→ d) RTOS (Real time OS): (Ex:- QNx, RTinux)

- (i) provides precise timing & high reliability for time sensitive applications. [Ex: Industrial Automation] (strict time)
- (ii) Guarantees response time within constraint
- Type:- HRT (Hard real time)
  SRT (Soft real time)

→ e) Server OS: (Ex: Windows Server, Ubuntu Server)

- (i) Optimized to manage server resources & serve multiple clients.
- (ii) Focuses: stability, scalability & network services

* BIOS (Basic/Binary I/O system)/Firmware

→ 1) has address of bootloader

2) Before BIOS was loaded on ROM. (Static)

3) Nowadays it is loaded on EPROM. (Dynamic)

Java Edition:-
SE,

6) Functions of OS:
→ a) Process Management
• (Creates, schedules & terminates processes)

b) Memory Management
• (Allocates & manages memory for processes)

c) Files management
• (Manages files on storage devices)

d) Device management
• (Manages I/O devices & drivers)

e) Security & Access control (Firewall)
• (Protects data & resources from unauthorized access)

f) Networking
• (Provides networking capabilities, allowing system to connect & communicate)

7) User & kernel space:
→ (i) User space: (PCB = Process control board)
• The memory area where user applications run. [Applications have limited access to system resources]

(ii) Kernel Space:
• The memory area where the OS kernel runs. [It access has full access to all hardware & system resources]

{ Whenever there is I/O call, shift is observed in User & kernel space }.

8) User Mode & Kernel Mode

→ (i) User Mode:
- A restricted mode where user application operate
- CPU restricts the operations that can be performed to prevent accidental system damage

(ii) Kernel Mode:
- A privileged mode where the OS operates with unrestricted access to all sys resources.

9) Interrupts:

→ (i) Signals to the CPU indicating that an event needs immediate attention.

(ii) They can be:-
- (a) Hardware based (like pressing a key)
- (b) Software based (like a sys call)

- Interrupt Handling:

→ When interrupt occurs, CPU switches to kernel mode,

~~→ CPU handles~~

→ kernel mode handles the interrupt & then returns to the previous task.

10) System Call:

→ (1) Controlled req are asked from the user appl^n to the kernel, which requests it to perform tasks that require higher priveleges
[reading a file / creating process]

Execution

(2) The appl^n makes a system call, the CPU switches to kernel mode, the kernel performs the task & then CPU switches back to user mode.

Register
Cache
RAM
HDD
Ext

Speed & cost (Bitwise).

High disk space

Cache
RAM

memory

* Memory Hierarchy

• Two types of main memory

A] Primary Memory

(i) ROM → PROM (Programmable ROM)
→ EPROM (Erasable Programmable ROM
→ EEPROM (Electrically —u—).

(ii) RAM → SRAM (Static RAM) used in CPU cache
→ DRAM (Dynamic RAM) stores data in ~~form of bit~~ in a capacitor

B] Secondary Memory

(i) SSD (Solide state drive)
(ii) HDD (
(iii) USB pendrive
(iv) Optical device