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Ch 1 · Funda. of O.S.

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O.S → Acts as an interface b/w user & computer hardware.
→ manages resources & allocates them to pgms & users.

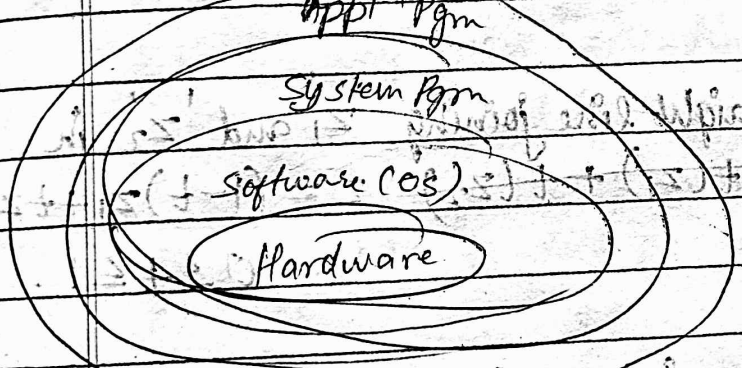
Goals of O.S

Obj. of O.S
→ Convenience
→ Efficiency
→ Ability to evolve

Services of O.S
→ Processor mgmt
→ File mgmt
→ Memory mgmt
→ Device mgmt
→ Concurrency Control

QB
1) Define O.S. functions/services/operation of OS. Goals of O.S. (Answer G.D 1.1)
what OS does.
2) Structure of O.S.
3) Evolution of O.S.
Seven phases of evolution of OS.
4) Types of O.S
1) Open Shop
2) Batch processing
3) Multiprogramming (single processor)
4) Time Sharing Systems (multiple processor)
5) Personal Computing
6) Distributed systems
7) Differences b/w

Structure of O.S



Types of OS.
→ Single user
→ Multi user

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★ Interfaces

- User OS Interface CLI (command line interface/interpreter)
- Shells - Interface b/w user & kernel, its a utility.
- User OS Interface GUI
- Touchscreen Interfaces -

QB ★ **System Programs** (2m Q) with eg.

- Provide a convenient environment for program dev. & execution.
  - ↳ File manipulation
  - ↳ Status info^n
  - ↳ pgm - language support
  - ↳ Comm^n.
  - ↳ Bckd services
  - ↳ Appl^n pgms
  - ↳ Pgm loading & execution.

QB ★ **System calls & its types**

- Programming interface to the services provided by OS.
- Typically written in high-level language.
- Mostly accessed by pgms via APIs rather than direct system call use.

Categories → Process Control
→ File mgmt
→ Device mgmt
→ Information maintainance
→ Communication.

OS System Architecture.

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OS

★ OS Architecture (Kernel Architecture)

- Provide services
- Support variety of hardware & software

QB ★ Kernel (also Nucleus)

- Portion of OS i.e is main memory.

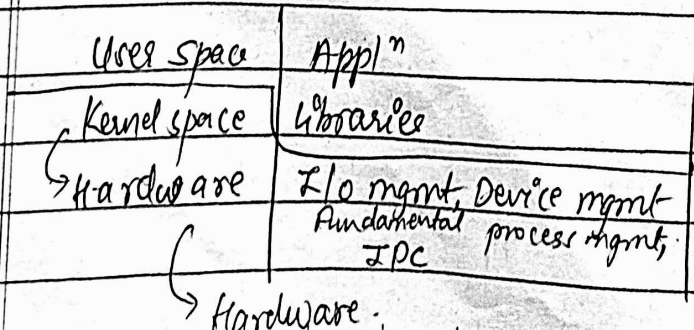
Functions

1) primary function is to mediate access to computer's resources including CPU/RAM, I/O devices.
2) Methods for synchronization & comm^n b/w processes called IPC.
3) Memory mgmt
- Core of OS
-

QB ★ Kernel Architectures

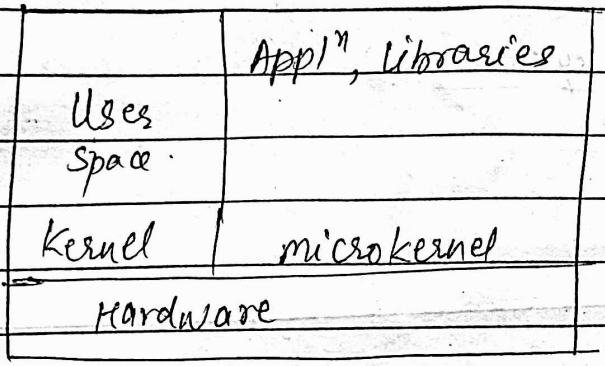
1) Monolithic
2) Layered
3) Micro-kernel
4) Distributed.

1) Monolithic



- Older approach.
- Runs basic system services.
- Inclusion of all basic services in Kernel space has 3 drawbacks
  → Kernel size increases
  → Lack of extensibility
  → Bad maintainability.

2.) Micro-Kernel



- Reduce the Kernel to basic process comm^n and I/O contrd.
- Other sys. services reside in user space in form of normal processes.

Q3/ Diff. b/w monolithic and micro kernel.

★ OS Structure
- Simple structure
- monolithic approach
- layered Approach.
- micro kernels

Q3/4/ dt

★ Distributed OS

pgm counter → contains address of next instruction to be fetched. 28/1

QB * Characteristics of modern OS.

1) micro-kernel architecture.
2) Multithreading
3) Symmetric multiprocessing
4) Distributed OS
5) Object-oriented design.

QB * Operation mode of a system
↳ kernel mode
↳ user mode

Mod2

QB) Define process. Distinguish b/w process & thread.

QB) Explain process state with diagram.

QB) Explain Process Control Block (PCB).

QB) Define Context Switching.

QB) Process Scheduling. what is job, ready, device queue.

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OS

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QB ☆ Process Scheduling.

- To max. CPU utilization follo. proc.-
- Job, Ready and Device queue.
  - Job → sets all processes in system.
  - Ready → set all processes in main memory ready and waiting to be executed
  - Device → SOP waiting for I/O devices.

QB) Types of CPU Schedulers.

Diff b/w
- long-term (job-scheduler) — sec storage → ready queue
- short-term (cpu scheduler) — ready queue → CPU.
- Medium term — removes process from memory and swaps to disk to reduce the degree of mp.

QB) Scheduling criteria.

Optimization criteria.

- CPU utiliz^n — max
- Throughput — max
- Turnaround time — min.
- Waiting time — min.
- Response time — min.

QB) Types of Scheduling & algorithms

- FCFS.
- SJF (3 cases) — non-preemptive / preemptive.
- Round Robin

☆ Priority Scheduling

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- Multi-level Queue Scheduling

- Multilevel feedback Queue Scheduling

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- Process & thread mgmt

Q3) Define multithreading? Benefits?

Diff. b/w process & thread

Types of threads

Diff. b/w user level & kernel level thread → Adv & Disadv.

Diff. Types of thread models.

↳ many-to-one (many user to 1 kernel thread)

↳ one-to-one (one " ")

↳ many-to-many

FIFO

TAtime = End - Arrival

Waiting = TA - Execution time

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(Q) Numerical FCFS, SJFS, Priority, Robin, etc. Quantum time = 4ms.

(Q3) 1. Throwput - Total time for compl^n of n proc. = X