Memory Management -

Main memory is central to operation of Computer s/s.

It is large array of bytes ranging in size from hundreds of thousands of billions. Each byte has its own addrss.

It is responsible for accessing data shared by CPU & I/O devices.

CPU reads data from memory during Instruction Fetch cycle.

the Os is responsible for the following Activities in Memory mgmt -

* Keeping track of which parts of memory are currently being used & who is using them.
* Deciding which process & Data to move in & out of memory
* Allocating & Deallocating memory space as needed.

Storage Management -

1) File system Mgmt.
2) Mass storage Mgmt.
3) Cache Mgmt.
4) I/O Sub systems.

1) File System Management-

A File is a collection of related information defined by its creator. Files represent programs & data.

Logical storage unit for information storage is called a file.

Files are organized into directories for easy use.

Multiple User access a file → Read & write access will be appended.

Magnetic disk, Optical disk & Magnetic tape are most common, controlled by disk drive or tape drive.

Access speed, capacity, data transfer Rate & Access method vary for all.

The OS is responsible for the following Activities in file management.

* Creating & Deleting File.
* Creating & Deleting directories to Organize files.
* Supporting Primitives for manipulating files & directories.
* Mapping files onto secondary storage.
* Backing up files on stable (non volatile) storage media.

2) Mass - Storage management -

Secondary storage for back up main memory.

Os is resp for the foll in disk mgnt.

* Free space management
* Storage Allocation
* Disk Scheduling

Tertiary storage ⇒ Magnetic tape, CD, DVD, etc.,
May be WORM (Write once, Read many)
& RW (Read Write) format.

OS is responsible for mounting & unmounting media in devices, allocating & freeing the devices for procss & migrating data from secondary to teritary storage.

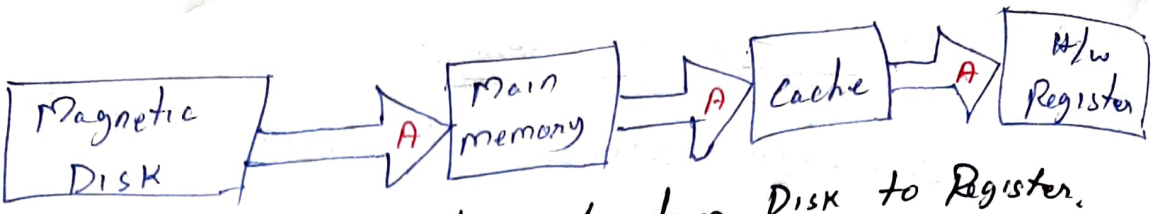
3) Caching / Cache Management

Information copied into faster storage system cache on temporary basis.

Register allocation & Register replacement algorithm is used to deside which info to keep in register and main memory.

Instruction Cache ⇒ hold instructions expected to be executed next.

Main memory is viewed as fast cache for secondary storage.



Migration of Integer A from Disk to Register.

eg If value of A is incremented. Its not problem. It access last updated value.

In multiprocessor environment, various CPU can execute in parallel, so if one processor update value of A, it must be immediately reflected to all other cache, where A resides, is called. **Cache Coherency**.

4) **I/O Systems** –

The I/O Sub S/y consist of several components.

A Memory Mgmt Component, that includes Buffering, Caching & Spooling

A General device driver Interface.

Drivers for Specific h/w devices.

Only device driver knows details of specific device to which it is assigned.

It is capable of manges devices, transfer data & detect I/O completion, Interrupt handler, etc...

Level	1	2	3	4	5
Name	registers	cache	main memory	solid state disk	magnetic disk
Typical size	< 1 KB	< 16MB	< 64GB	< 1 TB	< 10 TB
Implementation technology	custom memory with multiple ports CMOS	on-chip or off-chip CMOS SRAM	CMOS SRAM	flash memory	magnetic disk
Access time (ns)	0.25 - 0.5	0.5 - 25	80 - 250	25,000 - 50,000	5,000,000
Bandwidth (MB/sec)	20,000 - 100,000	5,000 - 10,000	1,000 - 5,000	500	20 - 150
Managed by	compiler	hardware	operating system	operating system	operating system
Backed by	cache	main memory	disk	disk	disk or tape

Figure 1.11 Performance of various levels of storage.