I. Introduction & Background

(CS & IT)

- 1.1 What is Operating System ?
- 1.2 Function & Goals of Operating System
- 1.3 Types of Operating system
- 1.4 Multiprogrammed Operating System
- 1.5 Architectural requirements for multiprogrammed OS
- 1.6 Mode Shifting in Multiprogrammed OS
- 1.7 System Calls
- 1.8 Fork System Call
- 1.9 Problem Solving

II. Process Management

30%

- 2.Process Concepts
  - 2.1 program Vs Process
  - 2.2 Process as ADT
  - 2.3 Process State Transition Diagram
  - 2.4 Schedulers & Dispatchers
  - 2.5 Problem Solving

3.CPU Scheduling

- 3.1 Need For Scheduling & Scheduling Criteria
- 3.2 Process Times
- 3.3 Scheduling Algorithms
  - 3.3.1 FCFS
  - 3.3.2 SJF
  - 3.3.3 SRTF
  - 3.3.4 LRTF
  - 3.3.4 LRTF
  - 3.3.5 Priority
  - 3.3.6 Round Robin
  - 3.3.7 Multilevel Queue Scheduling
- 3.4 Problem Solving

4. Multithreading

- 4.1 Thread Concept & Benefits
- 4.2 Types of Threads
- 4.3 Thread Issues
- 4.4 Thread Libraries
- 4.5 Problem Solving

Theoretical

5.Process Synchronization/Coordination **

- 5.1 What is IPC & Synchronization
- 5.2 Types of Synchronization
- 5.3 Critical Section Problem
- 5.4 Requirements of CS Problem

(Analysis)

- **5.5 Synchronization Mechanism**
  - 5.5.1 Lock Variables
  - 5.5.2 Strict Alternation
  - 5.5.3 Peterson Solution
  - 5.5.4 Synchronization Hardware
  - 5.5.5 Semaphores Intro

- **5.6 Classical IPC Problems**
  - 5.6.1 Producer Consumer Problem
  - 5.6.2 Reader-Writer Problem
  - 5.6.3 Dining Philosopher Problem

5.7 Monitors

5.8 Concurrency Mechanisms

- 5.8.1 Parallel Construct
- 5.8.2 Fork & Join Statement

5.10 Problem Solving

6. Deadlocks

- 6.1 Concepts of Deadlock
- 6.2 System Model
- 6.3 Deadlock Characterizations
  - 6.3.1 Necessary conditions
  - 6.3.2 Resource Allocation Graph
- **6.4 Deadlock Handling Strategies** **
  - 6.4.1 Prevention
  - 6.4.2 Avoidance
    - 6.4.2.1 Bankers Algorithm
  - 6.4.3 Detection & Recovery
  - 6.4.4 Deadlock Ignorance
- 6.5 Problem Solving

III Memory Management

7. **Abstract View of Memory :**
8. **Loading vs Linking**
9. **Address Binding**
10. **Memory Management Techniques**

- 10.1 Swapping
- 10.2 Partitioning
  - 10.2.1 Fixed Partitions
  - 10.2.2 Variable partitions

- Non Contiguous Allocation
  - 11.3.1 Simple Paging
  - 11.3.2 Paging With TLB
  - 11.3.3 Hashed Paging
  - 11.3.4 Multilevel Paging
  - 11.3.5 Inverted Paging
  - 11.3.6 Shared Paging
  - 11.3.7 Segmentation
  - 11.3.8 Segmented-Paging Architecture

(*) (*)

Virtual Memory
→ Concept
→ Implementation
→ Performance Issues

13. Problem Solving

IV. File System & Device Management

14. Physical Structure of Disk

15. Logical Structure of Disk

16. File System Interface

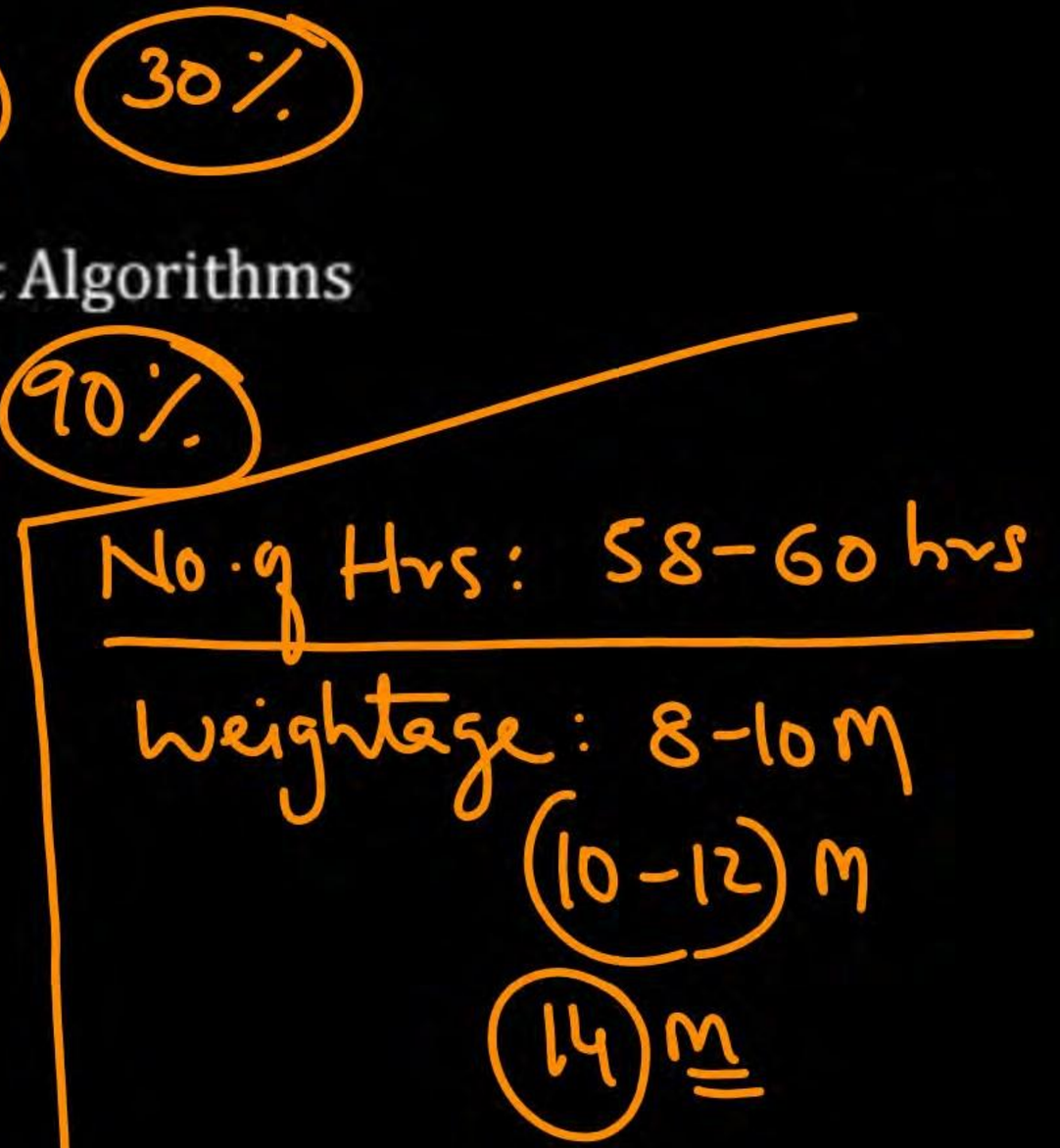
- 16.1 File & Directory Concept
- 16.2 File Attributes
- 16.3 File Operations
- 16.4 Types of Files
- 16.5 Directory Structure

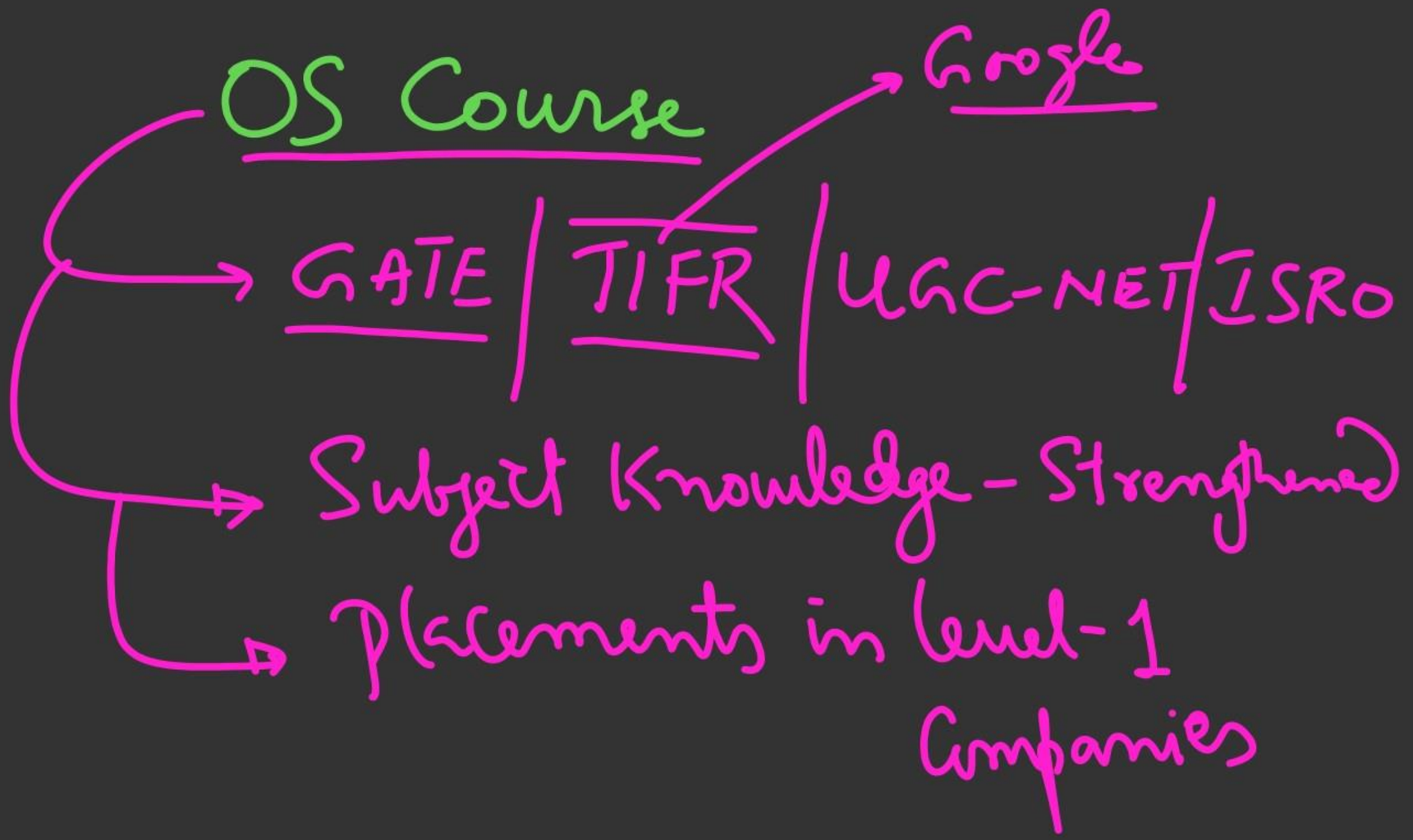
17. File System Implementation

- 17.1 Allocation Methods
- 17.2 Disk Free Space Management Algorithms

19. IO Scheduling(Disk Scheduling)

- 19.1 Need for Disk Scheduling
- 19.2 Disk Scheduling Techniques
  - 19.2.1 FCFS
  - 19.2.2 SSTF
  - 19.2.3 SCAN
  - 19.2.4 LOOK
  - 19.2.5 C-SCAN
  - 19.2.6 C-LOOK
- 20. Problem Solving



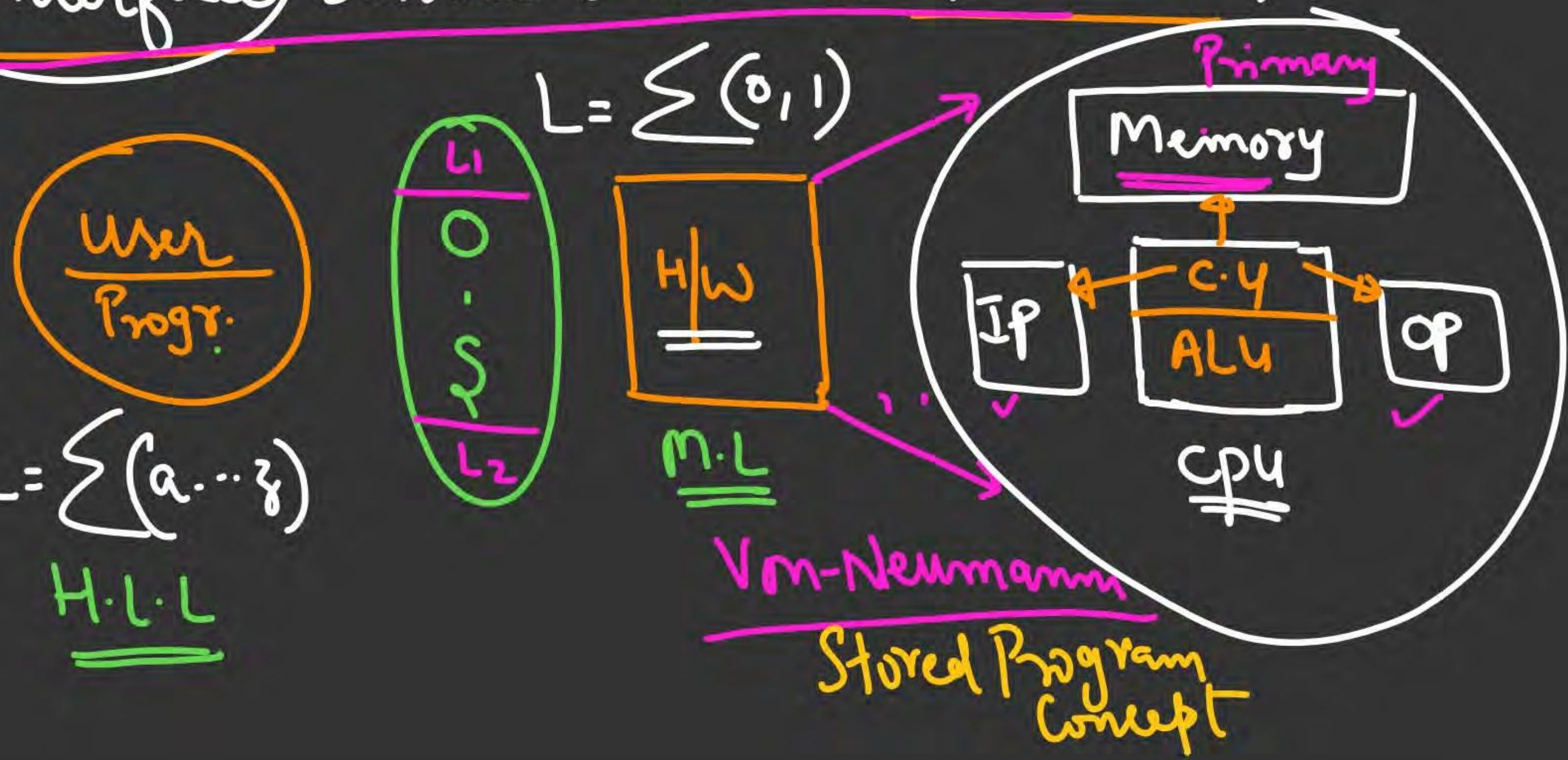

OS Course
Google
GATE | TIFR | UGC-NET | ISRO
Subject Knowledge - Strengthened
Placements in level-1
Companies

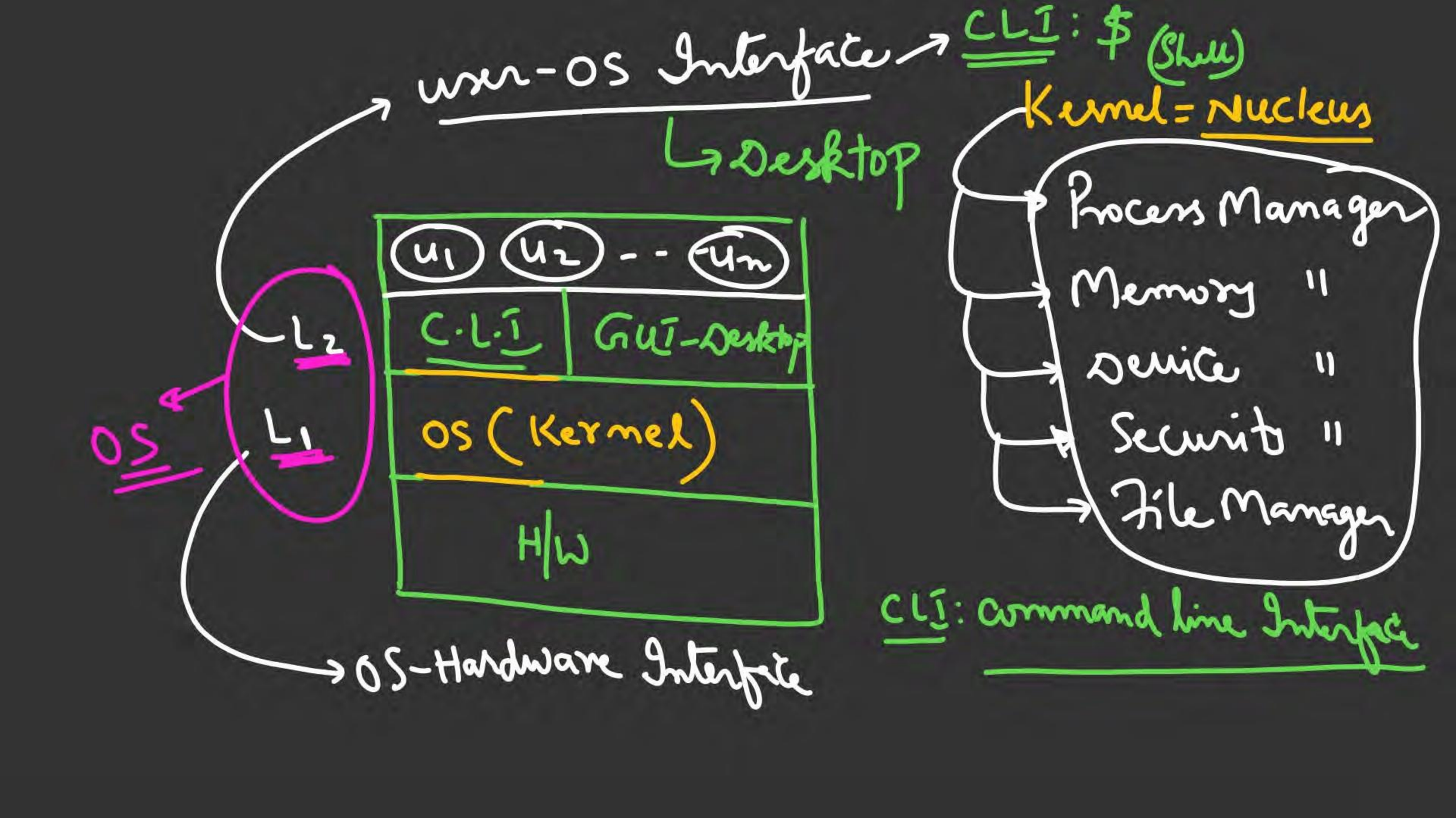
Types of Questions

- M.C.Q :
- M.S.Q :
- NAT :

What is O.S: (20 Min)

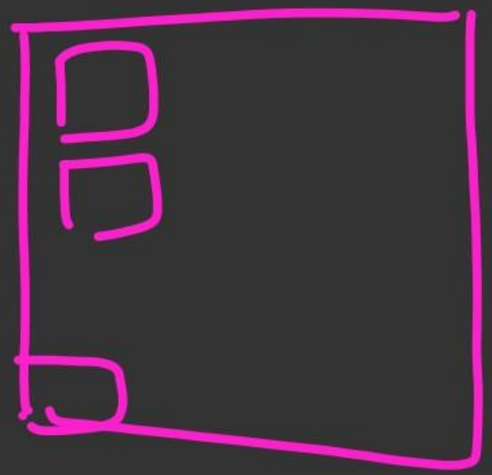
1) Interface between user & Hardware;




user-OS Interface
CLI : $ (Shell)
↳ Desktop
Kernel = Nucleus
U1 U2 - - Un
C.L.I
GUI-Desktop
OS (Kernel)
H/W
L2
L1
OS
OS-Hardware Interface
Process Manager
Memory "
Device "
Security "
File Manager
CLI: Command line Interface

WINDOWS :

L2 : Desktop



UNIX | DOS : Shell

L2 { $ ....

c:> ....

Other defns of OS

→ Resource Manager

- H/W
  - CPU
  - Mem
  - IO
  - :
- S/W
  - Files,
  - Device drivers,
  - Semaphores
  - Pipes

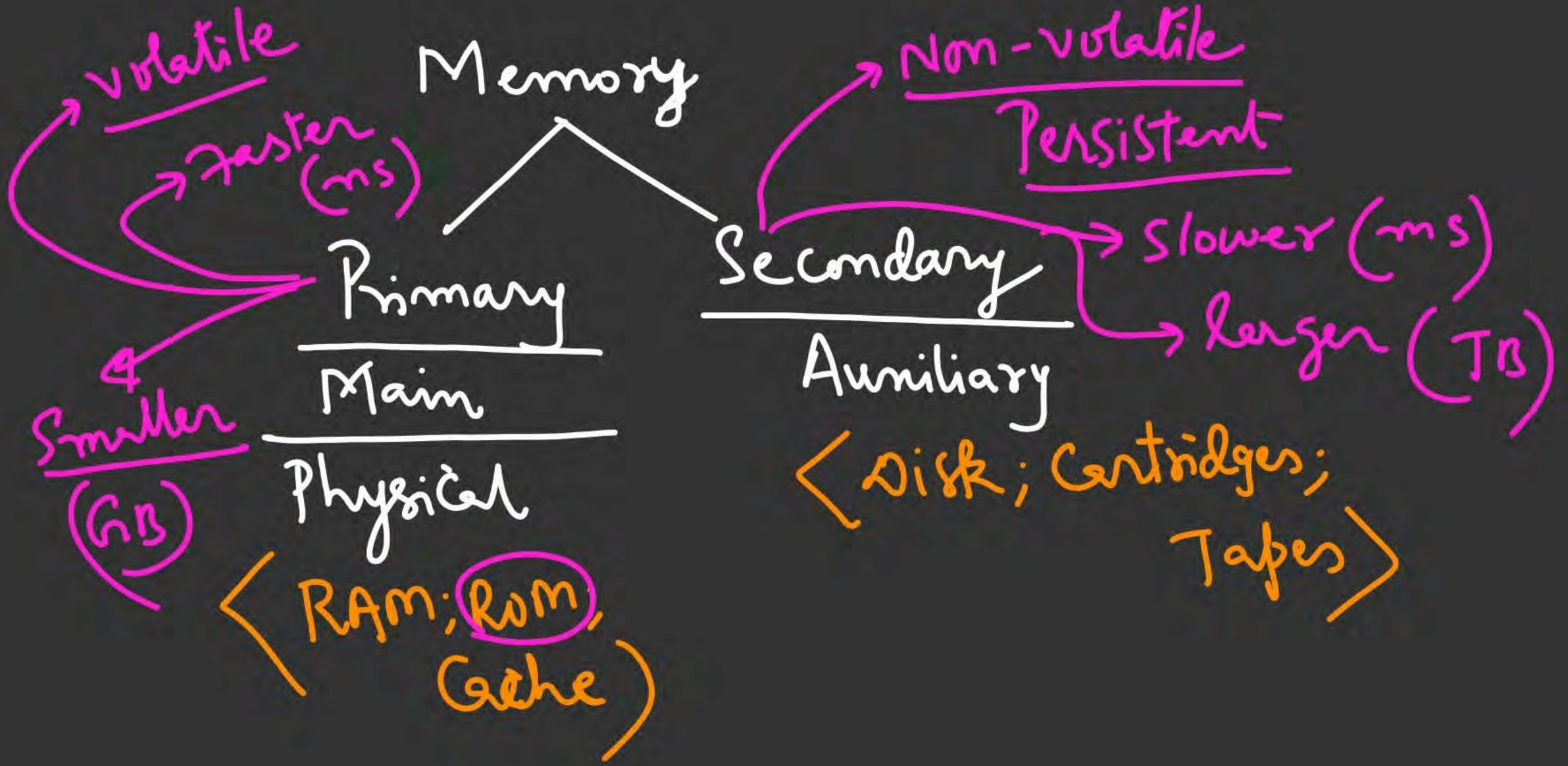
→ Control Program(s)

→ Set of utilities to simplify appl. development

(Platform/Environment)

→ Acts/Functions like a Govt

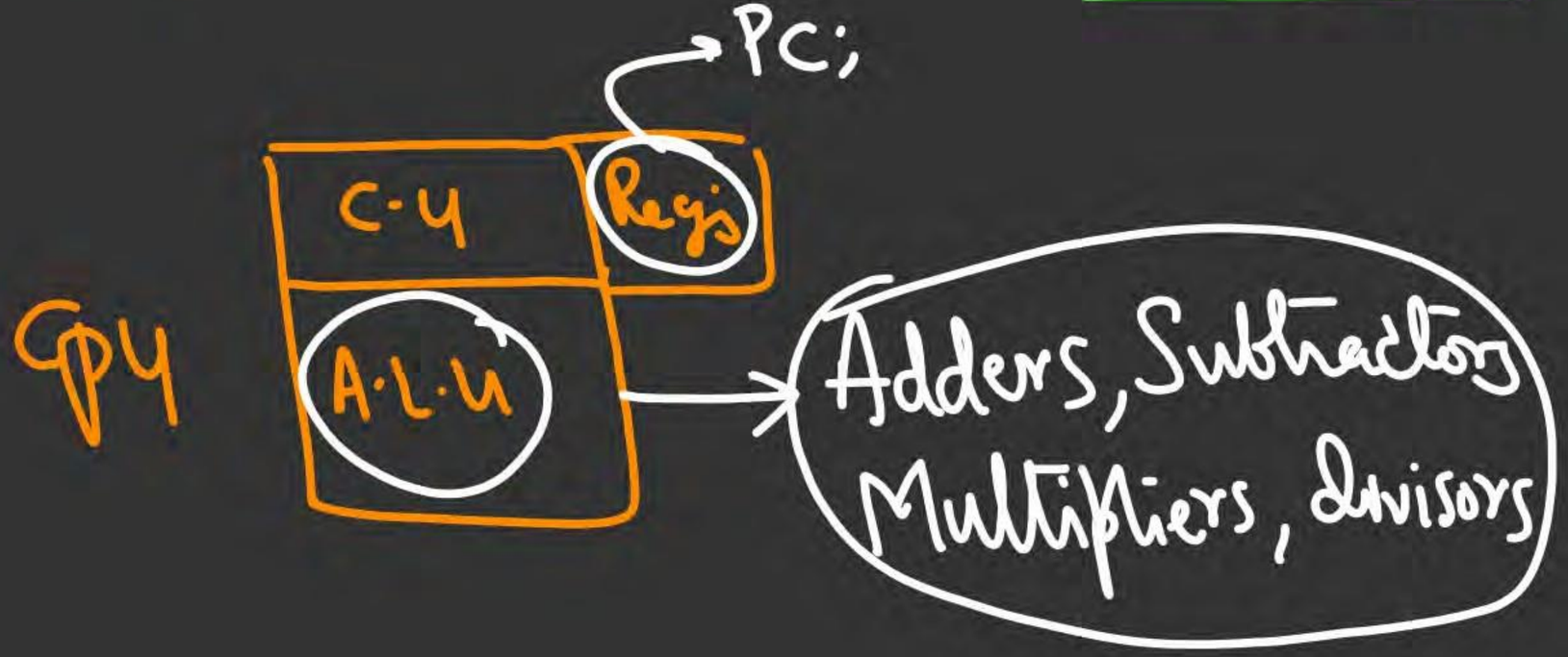
Functions & Goals


Memory
Primary
Main
Physical
RAM; ROM; Cache
Secondary
Auxiliary
Disk; Cartridges; Tapes
Volatile
Faster (ns)
Smaller (GB)
Non-volatile
Persistent
Slower (ms)
Larger (TB)

CPU (Central Processing Unit)

- Control unit (CU): Control Signals
- Arithmetic Logic Unit (ALU)
- Registers

Micro-opns



Micro-operations:

Primitive
Atomic
Fundamental

→ operations that are carried out on the Data Stored in registers during one/more Clock cycles;

$a = b + c;$

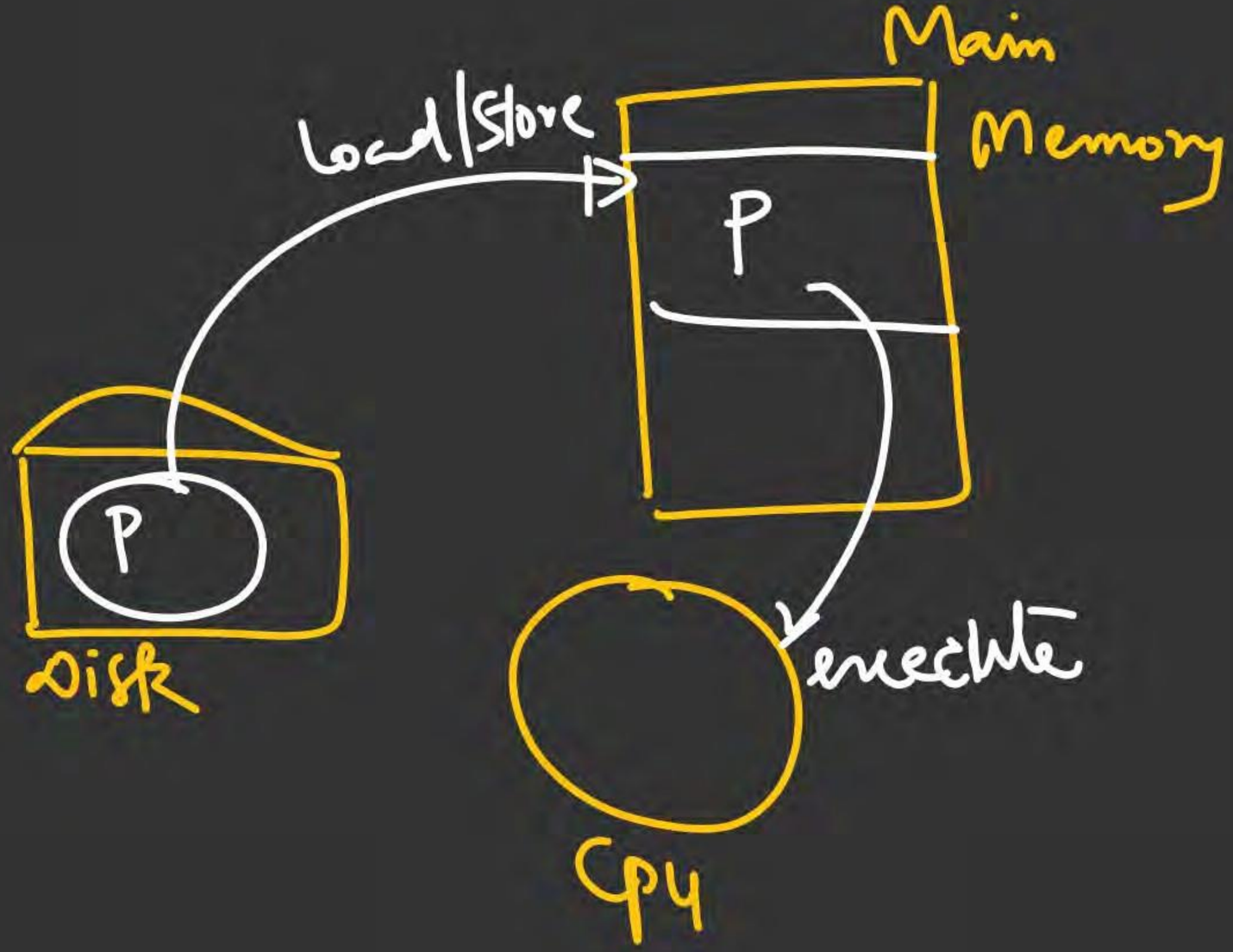
HLL

Load R1, b
Load R2, c
Add R1, R2
Store a, R1

Instructions

→ Fetch cycle
→ decode cycle
→ execute "

PC → MAR


Main
Memory
load/store
P
P
Disk
execute
CPU