



CS & IT ENGINEERING

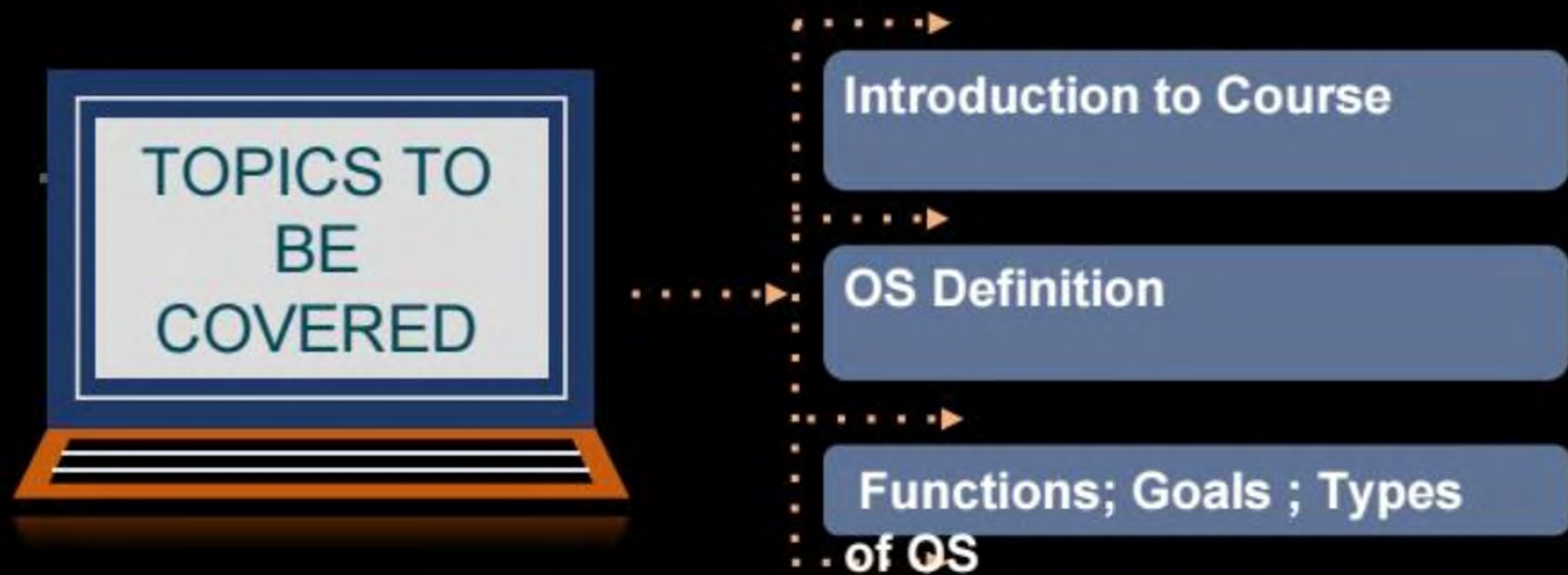
Operating Systems

Introduction & Background

Lecture No. 1



By- Dr. Khaleel Khan sir



ABOUT ME



Hello, I'm Dr. Khaleel Ur Rahman Khan.

1. Ph.D. in Computer Science.
2. Professor in Computer Science.
3. Has more than 28 Years of Experience in Teaching at Engineering Colleges.
4. Published more than 50 journal articles in the areas of Wireless Networks.
5. Seven candidates have been awarded PH.D. under his Supervision.
6. Has more than 22 years of Educating and Mentoring the GATE Aspirants.



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Operating Systems

Lecture schedule

I. Introduction & Background

- ❖ 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

□ 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 ☒ [85-90%]

- ☐ 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
 - ❖ 3.3.5 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

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

❑ 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 *
- ❖ 5.5.6 Monitors

❑ 5.6 Classical IPC Problems

- ❖ 5.6.1 Producer Consumer Problem
- ❖ 5.6.2 Reader-Writer Problem
- ❖ 5.6.3 Dining Philosopher Problem

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
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13. Virtual Memory (vm)

Concept + Implementation + Performance

IV. File System & Disk Management

→ service / IO

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

* *

[10-15%]

□ 17.1 Allocation Methods

□ 17.2 Disk Free Space Management Algorithms

Computer organization

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

Text-Books:

1) O.S Concepts — Galvin

2) Mod. O.S — Tanenbaum

3) O.S — Stallings

Pre-Requisite:

* 1) Basics of Progr. Knowledge (C)

* 2) Basics of D.S

* 3) Fund. of Computers

Avg Marks : 8-10 (Avg)
: 6 (Min)
: 14-16 (Max)

Exercises

of Test-Books

Academics { (i) Strengthen your Subject
(ii) GATE
(iii) TIFR | ISRO | BARC | NIC | DRDL | DRDO | State-level exams

Test Series

- (i) Time Mgmt.
- (ii) Preparation-level.

(iv)

Placements | Interviews

(Level-1 Prod. based Comparisons)

Operating system



Windows 8



ANDROID



Mac OS



What is O.S?

Defns:

→ Interface b/w user and Hardware

→ Resource Manager

→ Set of Modules to simplify application development.

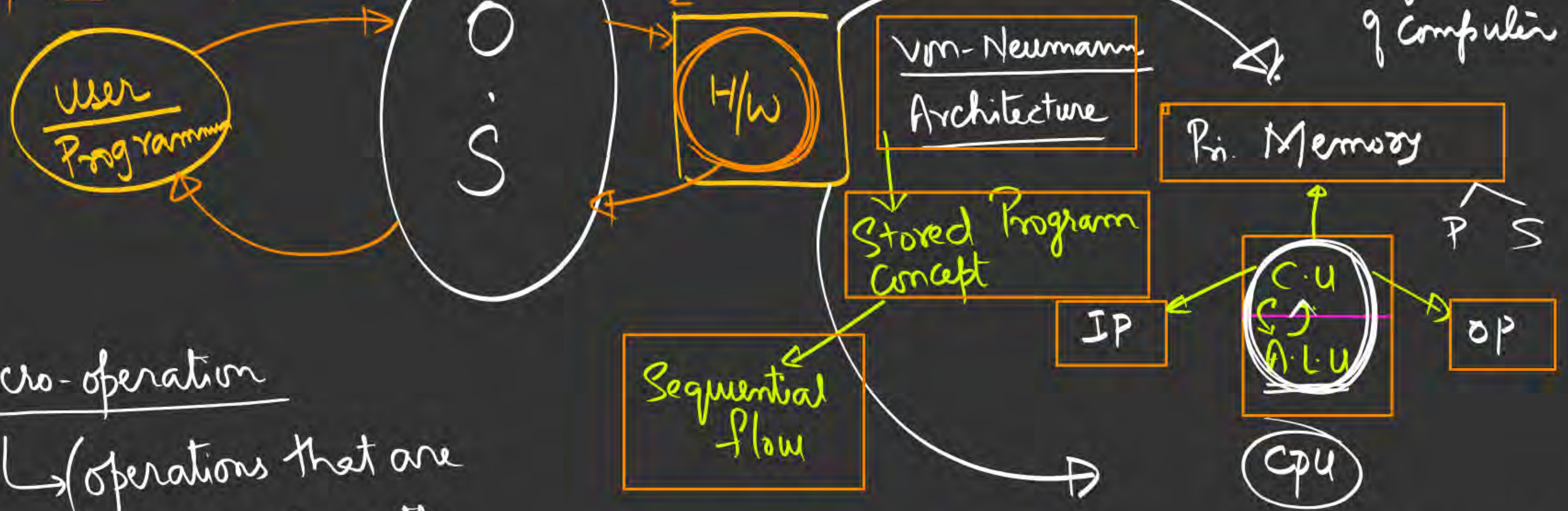
→ Control Program(s)

→ Acts like a government;

$$L_1 = \Sigma(a \dots z)$$

$$L_2 = \Sigma(0, 1)$$

Block diagram
of computer



Micro-operation

↳ (operations that are carried out on the data stored in registers during a single CPU cycle)

Control unit: Timing Signals (clock)
Micro-operations (execute)

Ex: $a = b + c;$ →

1. Load R_1, b
2. Load R_2, c
3. Add R_1, R_2
4. Store a, R_1

