



CS& IT ENGINEERING



Operating Systems

Introduction & Background

Lecture 01



By- Dr. Khaleel Khan sir



Topics to be covered

Operating Systems

Lecture schedule

① 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

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



Pre-Requisites

- essential {
1. Number System (Binary System + decimal + Hexadecimal)
 2. Fundamentals of Computer (Components)
 3. Programming exposure (Basic Constructs)

Desirable: → (Digital Logic + C.O.A)

(if-else; for; while)

3.CPU Scheduling (X) [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 ✓ (HRRN)
 - ❖ 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

90-95%

5. Process Synchronization/Coordination

**

Reasoning (Analytic)

- ❑ 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



Basic Analytical
Aptitude +
(Concept of Program
execution)

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

13. Problem Solving

Virtual Memory (Vm) **

1. Vm Concept
2. Vm Implementation
3. Performance Issues
 - Page Replacement
 - Thrashing
 - Working Set Model.

IV. File System & Device Management

14. Physical Structure of Disk

15. Logical Structure of Disk

(formatting) : Booting
↓

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% : 2m

- 17.1 Allocation Methods (I-node)
- 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

80%

Text - Books :

1) OS Concepts
⑧ — Galvin

2) Modern O.S.
— Tanenbaum

3) OS — Stallings

(Lecture)

+
(Reasoning Questions)

Weightage: (8-10) Marks (Avg)
(12-14): Marks (Max)
Integrated: (C.O + OS)

Material: Running Notes (PDF)
+ PYQ's
+ (Notes)

Hours: (70 Hrs)



(Concept Building
+ Nec. Problem Solving)

Test Series



Operating system



Windows 8



ANDROID

Linux



Mac OS



ubuntu



fedora

What is O.S:

- Is an Interface b/w user and H/W ✓ { Fund's } of
Computers
- Resource Manager
- Set of utilities to simplify application development
- Control Program(s) | Software
- Acts like a Govt;



**THANK
YOU!**

