MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

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LESSON PLAN

Department of Information Technology

Name of the Subject	OPERATING SYSTEMS	Name of the handling Faculty	Mrs. Mandakini
Subject Code	CS8493	Year / Sem	II/IV
Acad Year	2021-2022	Batch	2020-2024

Course Objective

To understand the basic concepts and functions of operating systems.

To understand Processes and Threads

To analyze Scheduling algorithms.

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To understand the concept of Deadlocks.

To analyze various memory management schemes.

To understand I/O management and File systems.

To be familiar with the basics of Linux system and Mobile OS like iOS and Android

Course Outcome

Upon completion of the course, the students will be able to:

CO1: Describe the basic concepts of operating systems

CO2: Analyze various scheduling algorithms and Illustrate the deadlock, deadlock prevention and deadlock avoidance algorithms.

CO3:Compare and contrast various memory management schemes.

CO4: Perform administrative tasks on Linux Servers and functionality of file systems

CO5:Compare iOS and Android Operating Systems

Lesson Plan

Sl. No.	Topic(s)	T / R* Book	Periods Required	Mode of Teaching (BB / PPT / NPTEL / MOOC / etc)	Blooms Level (L1-L6)	CO	PO
	UNIT I INTRODUCTION						
1	Computer System Overview	T1	1	PPT	L1	CO1	PO1
2	Basic Elements, Instruction Execution, Interrupts	T1	1	PPT	L1	CO1	PO1
3	Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization	T1	1	PPT	L2	CO1	PO2
4	Operating system overview-objectives and functions	T1	1	PPT	L2	CO1	PO2
5	Evolution of Operating System	T2	1	PPT	L2	CO1	PO1
6	Computer System Organization	T2	1	PPT	L2	CO1	PO1
7	Operating System Structure and Operations	T1	1	PPT	L2	CO1	PO2
8	System Calls, System Programs,	T1	1	PPT	L2	CO1	PO3
9	OS Generation and System Boot	T2	1	PPT	L2	CO1	PO2

Suggested Activity: Assignment /~~ Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others~~ Planned if any

1.Explain system call, system program and os generation\

2.Describe evolution of operating System

3.Describe the Structure of an OS

4. Explain in detail about. Client-server and peer to peer models of distributed systems

Evaluation method

UNIT II PROCESS MANAGEMENT

10	Processes - Process Concept, Process Scheduling,	T1	1	PPT	L2	CO2	PO1
11	Operations on Processes, Inter-process Communication;	T1	1	PPT	L2	CO2	PO2
12	CPU Scheduling - Scheduling criteria, Scheduling algorithms, Multiple-processor	T1	1	PPT	L3	CO2	PO3
13	Threads- Overview, Multithreading models, Threading issues;	T1	1	PPT	L2	CO2	PO1
14	Process Synchronization - The critical-section problem, Synchronization hardware, Mutex locks,	T1	1	PPT	L3	CO2	PO2
15	Semaphores, Classic problems of synchronization, Critical regions, Monitors;	T1	1	PPT	L3	CO2	PO3
16	Deadlock - System model, Deadlock characterization, Methods for handling	T1	1	PPT	L3	CO2	PO2
17	Deadlock prevention, Deadlock avoidance,	T1	1	PPT	L3	CO2	PO3
18	Deadlock detection, Recovery from deadlock.	T1	1	PPT	L3	CO2	PO3

Suggested Activity: Assignment / ~~Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others~~ Planned if any

1.Can a multithreaded solution using multiple user-level threads achieve better performance on a multiprocessor system than on a singleprocessor system? 2.Suppose that the following processes arrive for execution at the times indicated. Each process will run the listed amount of time. In answering the questions, use non-preemptive scheduling and base all decisions on the information you have at the time the decision must be made. Process Arrival Time Burst Time

P1 0.0 8

P2 0.4 4

P3 1.0 1

a. Find the average turnaround time for these processes with the FCFS scheduling algorithm?

b. Find the average turnaround time for these processes with the SJF scheduling algorithm?

3. The SJF algorithm is supposed to improve performance, but notice that we chose to run process P1 at time 0 because we did not know that two shorter processes would arrive soon. Find what is the average turnaround time will be if the CPU is left idle for the first 1 unit and then SJF scheduling is used. Remembering that processes P1 and P2 are waiting during this idle time, so their waiting time may increase. This algorithm could be known as future-knowledge scheduling

4.Consider the following resource-allocation policy.Requests and releases for resources are allowed at any time. If a request for resources cannot be satisfied because the resources are not available,then we check any processes that are blocked,waiting for resources. If they have the desired resources, then these resources are taken away from them and are given to the requesting process.The vector of resources for which the waiting process is waiting is increased to include the resources that were taken away For example, consider a system with three resource types and the vector Available initialized to (4,2,2). If process P0 asks for (2,2,1), it gets them. If P1 asks for (1,0,1), it gets them. Then, if P0 asks for (0,0,1), it is blocked (resource not available). If P2 now asks for (2,0,0), it gets the available one (1,0,0) and one that was allocated to P0 (since P0 is blocked). P0‘s Allocation vector goes down to (1,2,1), and its Need vector goes up to (1,0,1).a. Predict whether deadlock occurs? If so, give an example. If not, which necessary condition cannot occur?b.Predict whether indefinite blocking occurs?

Evaluation method

UNIT III STORAGE MANAGEMENT

19	Main Memory – Background, Swapping, Contiguous Memory Allocation,	T1	1	PPT	L2	CO3	PO1
20	Paging,	T1	1	PPT	L2	CO3	PO2
21	Segmentation, Segmentation with paging,	T1	1	PPT	L3	CO3	PO2
22	32 and 64 bit architecture Examples;	T1	1	PPT	L4	CO3	PO3
23	Virtual Memory – Background, Demand Paging,	T1	1	PPT	L3	CO3	PO2
24	Page Replacement,	T1	1	PPT	L3	CO3	PO3
25	Allocation,	T1	1	PPT	L3	CO3	PO3
26	Thrashing;	T1	1	PPT	L3	CO3	PO2
27	Allocating Kernel Memory, OS Examples.	T1	1	PPT	L3	CO3	PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any

1.Consider the following page reference string 7, 0,1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 How many page faults would occur for the page replacement algorithms, assuming three frames that all frames are initially empty?

2.Define Belady's anomaly with an example?

3.List two differences between logical and physical addresses.

4.Formulate how long a paged memory reference takes if memory reference takes 200 nanoseconds .Assume a paging system with page table stored in memory.

5.Evaluating the maximum number of pages needed If a system supports 16 bit address line and 1K page size.

6.Consider a logical address space of 64 pages of 1024 words each, mapped onto a physical memory of 32 frames. a. How many bits are there in the logical address? b. How many bits are there in the physical address?

Evaluation method

UNIT IV FILE SYSTEMS AND I/O SYSTEMS

28	Mass Storage system – Overview of Mass Storage Structure,	T1	1	PPT	L2	CO4	PO1
29	Disk Structure, Disk Scheduling and Management,	T1	1	PPT	L2	CO4	PO3
30	swap space management; File-System Interface - File concept, Access methods,	T1	1	PPT	L2	CO4	PO2
31	Directory Structure, Directory organization,	T1	1	PPT	L2	CO4	PO2
32	File system mounting, File Sharing and Protection; File System Implementation	T1	1	PPT	L2	CO4	PO2
33	File System Structure, Directory implementation, Allocation Methods,	T1	1	PPT	L2	CO4	PO3
34	Free Space Management, Efficiency and Performance, Recovery;	T1	1	PPT	L3	CO4	PO3
35	I/O Systems – I/O Hardware, Application I/O interface,	T1	1	PPT	L4	CO4	PO3
36	Kernel I/O subsystem, Streams, Performance.	T1	1	PPT	L4	CO4	PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any

1.How does DMA increase system concurrency?

2.Why rotational latency is not considered in disk scheduling?

3.What is HSM? Where it is used?

4.Consider a file system where a file can be deleted and the disk space reclaimed while the links to that file still exist. What problems may occur if a new file is created in the same storage area or with the same absolute path name? How these problem be avoided?

Evaluation method

UNIT V CASE STUDY

37	Linux System - Design Principles,	T1	1	PPT	L3	CO5	PO2
38	Kernel Modules, Process Management,	T1	1	PPT	L3	CO5	PO2
39	Scheduling, Memory Management,	T1	1	PPT	L3	CO5	PO3
40	Input-Output Management	T1	1	PPT	L3	CO5	PO3
41	File System, Inter-process Communication;	T1	1	PPT	L3	CO5	PO3
42	Mobile OS - iOS and Android -	W1	1	PPT	L4	CO5	PO3
43	Architecture and SDK Framework,	W2	1	PPT	L3	CO5	PO3
44	Media Layer, Services Layer,Core OS Layer	W3	1	PPT	L3	CO5	PO3
45	File System.	W3	1	PPT	L3	CO5	PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any

1. Write about Linux architecture and Linux kernel with neat sketch

2. Explain in detail about LINUX multifunction server,DNS VMware on Linux host

3. Explain File system mounting, File Sharing and Protection

4.Explore any one open source operating system and submit a report on the same

Evaluation method

Content Beyond the Syllabus Planned

1	Linux Game design .
2	Real world applications of Linux OS
3	Mind mapping of Windows and Linux

Text Books

1	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 9 th Edition, John Wiley and Sons Inc., 2012

Reference Books

1	Ramaz Elmasri, A. Gil Carrick, David Levine, “Operating Systems – A Spiral Approach”, Tata McGraw Hill Edition, 2010.
2	Achyut S.Godbole, Atul Kahate, “Operating Systems”, McGraw Hill Education, 2016.
3	Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Pearson Education, 2004.
4	Gary Nutt, “Operating Systems”, Third Edition, Pearson Education, 2004.
5	Harvey M. Deitel, “Operating Systems”, Third Edition, Pearson Education, 2004.

6	Daniel P Bovet and Marco Cesati, “Understanding the Linux kernel”, 3rd edition, O’Reilly, 2005.
7	Neil Smyth, “iPhone iOS 4 Development Essentials – Xcode”, Fourth Edition, Payload media, 2011.

Website / URL References

1	W1: https://www.webopedia.com/DidYouKnow/Hardware_Software/mobile-operating-systems-mobile-osexplained.html (TOPIC NO: 42)
2	W2: https://www.techotopia.com/index.php/IOS_6_Architecture_and_SDK_Frameworks (TOPIC NO: 43)
3	W3: https://developer.apple.com/library/archive/documentation/MacOSX/Conceptual/OSX_Technology_Overview/CoreOSLayer/CoreOSLayer.html (TOPIC NO: 44 and 45)

Blooms Level

Level 1 (L1) : Remembering **Level 2 (L2) : Understanding** **Level 3 (L3) : Applying**	Lower Order Thinking	Fixed Hour Exams	**Level 4 (L4) : Analysing** **Level 5 (L5) : Evaluating** **Level 6 (L6) : Creating**	Higher Order Thinking	Projects / Mini Projects

Mapping syllabus with Bloom’s Taxonomy LOT and HOT

Unit No	Unit Name	L1	L2	L3	L4	L5	L6	LOT	HOT	Total
Unit 1	OPERATING SYSTEM OVERVIEW	2	7	0	0	0	0	9	0	9
Unit 2	PROCESS MANAGEMENT	0	3	6	0	0	0	9	0	9
Unit 3	STORAGE MANAGEMENT	0	2	**6**	**1**	**0**	**0**	8	1	9
Unit 4	FILE SYSTEMS AND I/O SYSTEMS	0	6	1	2	0	0	7	2	9
Unit 5	CASE STUDY	0	0	8	1	0	0	8	1	9
Total		2	18	21	4	0	0	41	4	45
Total Percentage		4.44444	40	46.6667	8.88889	0	0	91.11	8.888889	100

CO PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	0	0	0	0	0	0	0	0	0	3	2
CO2	3	2	1	0	0	0	0	0	0	0	0	0	3	2
CO3	3	2	1	0	0	0	0	0	0	0	0	0	3	2
CO4	3	2	1	1	0	0	0	0	0	0	0	0	3	2
CO5	3	2	1	0	0	0	0	0	0	0	0	0	3	2
Avg	3	2	1	0.2	0	0	0	0	0	0	0	0	3	2

Justification for CO-PO mapping

CO1	**Gain Knowledge about the overall view of the computer system and operating system**
CO2	**Identify and Analyze various scheduling algorithm and Understand the deadlock prevention and avoidance algorithm**
CO3	**Compare and contrast various memory management schemes and Discuss the performance of the various page replacement algorithms**
CO4	**Demonstrate administrative tasks on Linux servers and Identify file system functionalities and interpret the file system implementation, sharing and protection mechanisms.**
CO5	**Compare iOS and Android Operating Systems**

3	**High level**	**2**	**Moderate level**	**1**	Low level

Name & Sign of Faculty Incharge :Mrs Saranya.V

Name & Sign of Subject Expert	:
Head of the Department	:

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