

Muffakham Jah College of Engineering and Technology
Information Technology Department
Operating Systems (Theory) Academic Year 2022-2023

QUESTION BANK (Important Questions)

Long Questions

Unit-1

1. Describe the function of Long-Term, Medium-Term and Short-Term schedulers and list their differences. **Or** List and compare the 3 types of schedulers
2. With the help of a transition diagram explain the different process states. **Or** Draw the process state diagram and explain the transitions among the various states
3. What is a system call. Explain any five process related system calls.
4. What are the advantages of Multithreading? Describe the different types of Multithreading Models. **Or** Explain the different Multithreading Models.
5. Define the contents of Process Control Block (PCB) and show the different states of a process.
6. Explain operating system structure.
7. What are the services provided by an operating system? Explain
8. What is the main purpose of system calls and system programs.
9. Explain two models of inter process communication.
10. What are the five major activities of an operating system in regard to file management?(Like this can be asked for any resource managed by the OS)

Unit-2

1. Define a Cooperative Process. What are the three criteria a critical section problem solution needs to satisfy?
2. Write and explain the Readers-Writers problem solution. **Or** Explain Reader-Writers Problem solution using Semaphores
3. Define a Safe state. Write and explain how Banker's Algorithm avoids deadlock in resource allocation to process requests. **Or** Write and explain the Banker's Algorithm used for Deadlock Avoidance
4. Write the Petersons solution for 2-process synchronization and explain how it satisfies CSP criteria.
5. Write about the following:
i. Deadlock Recovery. ii. Layered File System. iii. Atomic Transactions.
6. Explain Monitor solution for Dining Philosopher Problem.
7. Write and explain the Producer Consumer problem solution using semaphore.
8. Write about Deadlock Prevention.
9. What is Deadlock? Give the conditions for deadlocks?
10. Explain the scheduling algorithms with a suitable example.
11. Explain deadlock detection algorithm for single instance of each resource type.
12. What is a semaphore? Explain a binary semaphore with the help of an example?

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QUESTION BANK (Important Questions)

Unit-2 (Problems)

1. **Given below is a set of processes. Compute for each process Average Turnaround Time and Average Waiting Time** using the following techniques. Draw Gantt chart for each.

i. FCFS ii. SJF(Preemptive) iii. Priority(Non-Preemptive)
iv. Round Robin (Time Slice=2) process scheduling methods.

Process-id	CPU Burst Time	Arrival-Time	Priority Max Value =High Priority)
P1	3	1	1
P2	1	2	3
P3	1	3	4
P4	2	4	2

2. **For the given set of processes, Compute the Average Turnaround Time and Average Waiting Time** using the following techniques. Draw Gantt chart for each.

i. FCFS ii. SJF(Preemptive) iii. Round Robin (Time Slice=2) process scheduling methods.

Process-id	CPU Burst Time	Arrival-Time
P1	4	1
P2	2	2
P3	1	3
P4	3	3

3. **Consider the following snapshot of a system. Answer the following questions using the banker's algorithm.**

- What is the content of matrix need?
- Is the system in a safe state
- If a request from a process P1 arriver for (0, 4, 2, 0) can the request be granted immediately.

	Allocation	Max	Available
	A B C D	A B C D	A B C D
P0	0 0 1 2	0 0 1 2	1 5 2 0
P1	1 0 0 0	1 7 5 0	
P2	1 3 5 4	2 3 5 6	
P3	0 6 3 2	0 6 5 2	
P4	0 0 1 4	0 6 5 6	

4. **For the given set of processes compute each process' Turnaround Time, Waiting Time and Average Turnaround Time** using

FCFS, SJF, Priority, Round Robin (Time Slice/Quantum = 3) process scheduling methods. Depict using Gantt chart for each method.

Process-id	CPU Burst Time	Arrival-Time	Priority
P1	5	0	3
P2	3	1	1 (Max Priority)
P3	2	2	3
P4	4	2	2

5. Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:

Process Burst Time Priority

P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The process are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0. Draw four Gantt charts illustrating the execution of these processes using

FCFS, SJF, A non preemptive priority (a smaller priority number implies a higher priority), and **RR** (quantum = 1) scheduling.

6. Given the below set of processes, Calculate each process' Average Turnaround Time, and Average Waiting Time using **FCFS, SJF(Pre-emptive), Round Robin** (Time Slice/Quantum = 1) process scheduling methods. Depict using Gantt chart for each method.

Process-id	CPU Burst Time	Arrival-Time
P1	4	0
P2	3	1
P3	1	2

Unit-3

- Describe Paging technique and how it avoids external fragmentation.
- Discuss the different ways of storing the page table.
- What are the steps required service a Page Fault? Or List the steps involved to service a page fault.
- Define Fragmentation and write about the two types of fragmentation that exist.
- Explain the Paging technique with a suitable example.
- Differentiate between paging and segmentation.
- Explain the differences between :
 - Logical and physical address space.
 - Internal and external fragmentation.
- Why are Translation Look-aside Buffers (TLBs) important? In a simple paging system, what information is stored in a typical TLB table entry?
- Explain the concept of variable-partition contiguous storage allocation.
- Explain First-fit, Best-Fit, Worst-Fit memory allocation algorithms

QUESTION BANK (Important Questions)

Unit-3 (Problems)

1. For the given page reference string, calculate the total number of Page Faults caused by the following Page Replacement Algorithms for given frame size =3. Initially all frames are empty.

i) FIFO ii) LRU iii) Optimal Page Replacement

Page Reference String: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 5, 1, 3, 2.

2. Given memory partitions of 100k, 500k, 200k, 300k, and 600k (in order), apply first fit And best fit algorithms to place processes with the space requirement of

112k, 417k, 112k, and 426k (in order)? Which algorithm makes the most effective use of memory?

- a. What are implications of supporting UNIX consistency semantics for shared access for those files that are stored as remote files system?

3. Consider the following page reference and reference time strings for a program :

Page reference string : 5, 4, 3, 2, 1, 4, 3, 5, 4, 3, 2, 1, 5 Show how pages will be allocated using the FIFO page replacement policy. Also calculate the total number of page faults when allocated page blocks are 3 and 4 respectively.

4. For the given page reference string Compute the number of Page Faults using the following methods. Frame Size is 3. Initially all frames are empty.

i) FIFO ii) LRU iii) OptimalPage Replacement

Page Reference String: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2.

5. Consider the following page reference string 1,2,3,4,5,3,4,1,6,7,8,7,8,9,5,4,4,2. How Many page faults would occur for following page replacement algorithm assuming three and four frames? a. LRU b. FIFO c. optimal page replacement

6. Consider the following page reference string:

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6

How many page faults would occur for the following replacement algorithms?

- a. LRU replacement b. FIFO replacement c. Optimal replacement

22. Compute the number of Page Faults using the following methods for **Frame Size =**

3. Initially all frames are empty.

i) FIFO ii) LRU iii) Optimal Page Replacement

Page Reference String: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 7, 6, 3, 2, 1

7. Discuss the following page replacement algorithms i) FIFO ii) LRU iii) Optimal iv) LFU

No. of frames = 3, 4

Reference string = 7, 0, 2, 0, 1, 2, 3, 4, 2, 1, 0, 2, 4, 3, 1, 0, 0, 2, 1

8. Cosider the following page reference string: 1,2,3,4,5,3,4,1,6,7,8,7,8,9,7,8,9,5,4,5,4,2.

How many page fault would occur for the following page replacement algorithms, assuming three and four frames> Assuming frames are initially empty. i) LRU ii) FIFO iii) Optimal.

Unit-4

1. Explain the different space allocation methods for storing files on disks and the type of file access they support.
2. What is a bad block? Describe the techniques to manage disk bad blocks. **Or** Describe the methods to handle bad block?
3. Discuss about the following: i. DMA ii. File control Block
4. Explain the steps of transforming an I/O request to hardware operations. **Or** What are the steps involved in transforming an I/O request to hardware operations.
5. Explain the different space allocation methods for storing files on disks and the type of file access they support.
6. Explain the Layered File System
7. What is an I/O buffer? What is the advantage of buffering? Is buffering always effective? Justify your answer with help of an example.
8. Discuss the various disk scheduling strategies. **Or** Explain disk scheduling algorithms with examples in detail.
9. Explain various allocation methods.
10. Write short notes : a) File system b) RAID structure
11. How I/O operation can be performed using DMA?

Unit-4(Problems)

- 1. A disk drive has 1000 cylinders which are numbered from 0 to 999. Currently the drive is seeking request at 130. Previous request served was at cylinder 150.**

The pending requests in FIFO order in the queue are:

86, 470, 913, 774, 948, 509, 22, 750

Compute the total disk arm movement made to serve all the requests using the following methods and depict the arm movement under each method

i) FCFS ii) SSTF/Elevator iii) SCAN iv) C-SCAN v) LOOK

- 2.. Explain disk scheduling algorithm with an example given below:**

Initially read / write Head is at 125°. Total no. of cylinders are 5000. The I/O requests are: **86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130.**

- 3. Consider the situation in which the disk read/write head is currently located at track 45**

(of tracks 0-255) and moving in the positive direction. Assume that the following track requests have been made in this order: **40, 67, 11, 240, and 87.** What is the order in which optimized C-SCAN would service these requests and what is the total seek distance?

- 4. A disk drive has 2500 cylinders which are numbered from 0 to 2499. Currently the drive is seeking request at 100. Previous request served was at cylinder 80.**

The pending requests in FIFO order in the queue are:

86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130.

Starting from the current position, what is the total disk arm movement made to serve all the requests using the following methods. Depict the arm movement under each method.

i) FCFS ii) SSTF iii) SCAN iv) C-SCAN v) LOOK

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QUESTION BANK (Important Questions)

Unit-5

1. Explain the Access Matrix model used to define protection and the various operations.
2. Describe how firewall can be used to protect systems and networks.
3. Write the RSA public key cryptography algorithm. Explain it with a simple example.
4. Differentiate between symmetric key and asymmetric key encryption technique.
5. How is protection information implemented using Access Matrix model
6. Describe firewall mechanism used to protect systems and networks.
7. Write about Revocation of Access Rights.
8. Differentiate between protection and security. Explain the techniques used for protection of user files.
9. What do you mean by access rights in protection?
Explain.
10. Explain how cryptography is used as a security tool.
11. What are the goals and principles of protection?
12. List the different mechanisms used to implement protection.
13. Describe firewall mechanism used to protect systems and networks.
14. Explain the terms 'WORMS' and 'VIRUSES' with reference to system threats
15. Explain Denial of service attack.

*****BEST WISHES*****