

# OS

## (1) How can we recover a deadlock?

**Ans:** (a). Abort all the Deadlocked Processes: Aborting all the processes will certainly break the deadlock, but with a great expenses. (b). Abort one process at a time untill deadlock is eliminated: Abort one deadlocked process at a time, untill deadlock cycle is eliminated from the system.

## (2) Define a term High paging activity in memory.

**Ans: Memory paging** is a **memory** management technique for controlling how a computer or virtual machine's (VM's) **memory** resources are shared. ... When a computer runs out of **RAM**, the operating system (OS) will move pages of **memory** over to the computer's hard disk to free up **RAM** for other processes.

## (3) What is a meaning of context switch in process state?

**Ans:** In computing, a **context switch** is the **process** of storing the **state** of a **process** or **thread**, so that it can be restored and resume execution at a later point. This allows multiple **processes** to share a single central processing unit (CPU), and is an essential feature of a multitasking operating system.

## (4) What is a role of memory management unit?

**Ans:** A **memory management unit (MMU)**, sometimes called paged **memory management unit (PMMU)**, is a computer hardware **unit** having all **memory** references passed through itself, primarily performing the translation of virtual **memory** addresses to physical addresses.

## (5) Write about CPU scheduling criteria. OR List out CPU scheduling criteria. Explain any two criteria

**Ans:** Different **CPU scheduling algorithms** have different properties and the choice of a particular algorithm depends on the various factors. Many criteria have been suggested for comparing CPU scheduling algorithms.

The criteria include the following: **Turnaround time** –

For a particular process, an important criteria is how long it takes to execute that process. The time elapsed from the time of submission of a process to the time of completion is known as the turnaround time. Turn-around time is the sum of times spent waiting to get into memory, waiting in ready queue, executing in CPU, and waiting for I/O.

### 1. **CPU utilisation** –

The main objective of any CPU scheduling algorithm is to keep the CPU as busy as possible. Theoretically, CPU utilisation can range from 0 to 100 but in a real-time system, it varies from 40 to 90 percent depending on the load upon the system.

2. **Throughput –**

A measure of the work done by CPU is the number of processes being executed and completed per unit time. This is called throughput. The throughput may vary depending upon the length or duration of processes.

3. **Waiting time –**

A scheduling algorithm does not affect the time required to complete the process once it starts execution. It only affects the waiting time of a process i.e. time spent by a process waiting in the ready queue.

4. **Response time –**

In an interactive system, turn-around time is not the best criteria. A process may produce some output fairly early and continue computing new results while previous results are being output to the user. Thus another criteria is the time taken from submission of the process of request until the first response is produced. This measure is called response time.

(6) What is a belady's anomaly? OR Explain Belady's anomaly. (M.I.M.P)

Ans: Belady's anomalies means increasing the number of page frame results in increase in number of page faults.

OR

In computer storage, Bélády's **anomaly** is the phenomenon in which increasing the number of page frames results in an increase in the number of page faults for certain memory access patterns. This phenomenon is commonly experienced when using the first-in first-out (FIFO) page replacement algorithm.

(7) Describe characteristic deadlocks.

Ans: 1) *Mutual exclusion*: only one process at a time can use a sharable resource.(i.e.sharable resources must be used in mutually exclusive manner)

2) *Hold and wait*: a process holding at least one resource and is waiting to acquire additional resources held by other processes.

3) *No preemption*: a resource can be released only voluntarily by the process holding it, after that process has completed its task. The system cannot forcefully revoke them.

4) *Circular wait*: there exists a set  $\{P_0, P_1, \dots, P_n\}$  of waiting processes such that  $P_0$  is waiting for a resource that is held by  $P_1$ ,  $P_1$  is waiting for a resource that is held by  $P_2$ , ...,  $P_{n-1}$  is waiting for a resource that is held by  $P_n$ , and  $P_n$  is waiting for a resource that is held by  $P_0$ .

(8) Which partition allocation strategy is considered as best during memory allocation?

Ans: **Best Fit Allocate** the process to the **partition** which is the first smallest sufficient **partition** among the free available **partition**. It searches the entire list of holes to find the smallest hole whose size is greater than or equal to the size of the process.

(9)What is pure demand paging?

Ans: process faults for non-memory-resident page. After this page brought into memory, the process continues to execute, faulting as necessary until every page that it needs is available in memory. Then it can execute with no more faults. This scheme is **Pure Demand Paging**: never bring a page into memory until it is required.

(10)Differentiate co-operating process and independent process.

Ans: A **process** is **independent** if it cannot affect other other **process** or be affected by it. Any **process** that does not share data with others is **independent**. Otherwise the **process** is **cooperating**. Cooperation is done to provide information sharing, computational speedups, modularity and convenience.

(11)What is compaction? Why it is required? (M.I.M.P)

Ans: **Compaction** refers to combining all the empty spaces together and processes. - **Compaction** helps to solve the problem of fragmentation, but it requires too much of CPU time. - It moves all the occupied areas of store to one end and leaves one large free space for incoming jobs, instead of numerous small ones.

(12)What is critical section? How mutual exclusion can be achieved? (M.I.M.P)

Ans: The **mutual-exclusion** solution to this makes the shared resource available only while the process is in a specific code segment called the **critical section**. It controls access to the shared resource by controlling each **mutual** execution of that part of its program where the resource **would** be used.

(13)What is swapping? (M.I.M.P)

Ans: **Swapping** is a mechanism in which a process can be **swapped** temporarily out of main memory (or move) to secondary storage (disk) and make that memory available to other processes. At some later time, the system **swaps** back the process from the secondary storage to main memory.

(14)What is the difference between deadlock prevention and deadlock avoidance? (M.I.M.P)

Ans: The main **difference between deadlock prevention and deadlock avoidance** is that the **deadlock prevention** ensures that at least one of the necessary conditions to cause a **deadlock** will never occur, while **deadlock avoidance** ensures that the system will not enter an unsafe state.

(15)What is a shared page & shared segment?

Ans: shared page: An advantage of paging is the possibility of sharing common code. This consideration is particularly important in a time-sharing environment.

Shared segment: The “**shared segments**” are how many blocks that matching DNA is broken into

(16) Define the role and types of scheduler.

Ans: As a **scheduler**, your main **function** is to schedule appointments, project timelines, meetings or anything else required by the company or organization that employs you. **Schedulers** can work in a variety of settings including hospitals, trucking companies, manufacturing companies and retail settings.

There are three different scheduler namely: a long-term scheduler, a mid-term or medium-term scheduler and a short-term scheduler

(17) What is race condition? How to avoid race condition?

Ans: **Race conditions** can be avoided by proper thread synchronization in critical sections. Thread synchronization can be achieved using a synchronized block of Java code. Thread synchronization can also be achieved using other synchronization constructs like locks or atomic variables like java.

(18) Define preemptive scheduling and non-preemptive scheduling. (M.I.M.P)

Ans: **Preemptive Scheduling** is a CPU **scheduling** technique that works by dividing time slots of CPU to a given process. **Non-preemptive Scheduling** is a CPU **scheduling** technique the process takes the resource (CPU time) and holds it till the process gets terminated or is pushed to the waiting state.

(19) What is the difference between first-fit, worst-fit and best-fit? Which is better? Why? (M.I.M.P)

Ans: This algorithm **first** searches the entire list **of** free partitions and considers the smallest hole that is adequate. It then tries to find a hole which is close to actual process size needed. Memory utilization is much **better** than **first fit** as it searches the smallest free partition **first** available.

(20) What is internal fragmentation? How does it differ from external fragmentation?

Ans: **Internal Fragmentation** occurs when a process needs more space than the size of allotted memory block or use less space. **External Fragmentation** occurs when a process is removed from the main memory.

(21) Define turnaround time and throughput time. (M.I.M.P)

Ans: **Throughput – Throughput** is the amount of work completed in a unit of **time**. In other words **throughput** is the processes executed to number of jobs completed in a unit of **time**.

**Turnaround time** – **Turnaround time** refers to the **time** between the moment of submission of a job/ process and the **time** of its completion.

(22) What is a solution of dynamic storage allocation problem?

Ans: **Dynamic storage allocation problem** concerns how to satisfy a request of size  $n$  from a list of free holes. There are many **solutions** to this **problem**. The first-fit, best-fit, and worst fit strategies are the ones most commonly used to select a free hole from the set of available holes.

(23) What is the difference between page and segment?

Ans: In Paging, a process address space is broken into fixed sized blocks called **pages**. In **Segmentation**, a process address space is broken in varying sized blocks called sections. Operating System divides the memory into **pages**. Compiler is responsible to calculate the **segment** size, the virtual address and actual address.

(24) Define principle of Locality (M.I.M.P)

Ans: Strong tendency of program to demand subset of that address space during execution is known as Locality of Reference.

(25) What is a context switching?

Ans: Context switching is the procedure of storing the state of an active process for the CPU when it has to start executing a new one. Storing state will help CPU to resume that process execution from the same point at a later time.

(26) What is MMU?

Ans: The run time mapping from virtual to physical address is done by a hardware called Memory management Unit (MMU).

(27) What is page hit and page miss ratio?

Ans: When we want to load the **page** on the memory, and the **page** is already available on memory, then it is called **page hit**.

Page miss ratio:

(28) Define term: CPU utilization and response time.

Ans: **CPU utilization** is increased if the overheads associated with context switching is minimized. The context switching overheads could be lowered by performing context switches infrequently. This could however result in increasing the **response time** for processes.

(29) Give the difference between deadlock and starvation.

Ans:

Comparsion Deadlock		Starvation
• Definition	• Deadlock occurs when none of the processes in the set is able to move ahead due to occupancy of the required resources by some other process. Or Deadlock is where no process proceeds, and get blocked	• Starvation occurs when a process waits for an indefinite period of time to get the resource it requires. Or Starvation is where low priority processes get blocked, and high priority process proceeds.
• Other name	• Circular waiting	• Lived lock
• Arising conditions	• These four conditions arising simultaneously – mutual exclusion, hold and wait, no-preemption and circular wit	• Uncontrolled management of resources, Process priorities being strictly enforces Use of random selection, Scarcity of resources
• Avoidance/ prevention Techniques	• Infinite resources, Waiting is not allowed, Sharing is not allowed, Preempt the resources, All Requests made at the starting	

(30) What purpose dose the modified bit server in demand paging system?

Ans: If you require a page to be swapped out and must allow for the possibility of it being swapped back in, you need to make sure that the page has the latest changes when it is again swapped in.

(31) What is a role of dispatcher?

Ans: Receiving emergency and non-emergency calls and record significant information. Addressing problems and requests by transmitting information or providing solutions. Receiving and **dispatching** orders for products or deliveries.

(32) What is a solution of dynamic storage allocation problem?

Ans: **Dynamic storage allocation problem** concerns how to satisfy a request of size n from a list of free holes. There are many **solutions** to this **problem**. The first-fit, best-fit, and worst fit strategies are the ones most commonly used to select a free hole from the set of available holes.

(33) What is an overlays?

Ans: to lay or place (one thing) over or upon another. to cover, overspread, or surmount with something. to finish with a layer or applied decoration of something: wood richly overlaid with gold. Printing. to put an **overlay** upon.

(36) Differentiate between logical address space and physical address space.

Ans: **Logical Address Space** is set of all **logical addresses** generated by CPU in reference to a program. **Physical Address** is set of all **physical addresses** mapped to **the** corresponding **logical addresses**. User can view **the logical address** of a program. User can never view **physical address** of program



## LOGICAL ADDRESS VERSUS PHYSICAL ADDRESS

LOGICAL ADDRESS	PHYSICAL ADDRESS
An address at which an item such as memory cell, storage element appears to reside from the perspective of an executing program	A memory address that allows accessing a particular storage cell in the main memory
Logical address space is the set of all the logical addresses generated for a program	Physical address space is the set of all physical addresses of a program
Helps to obtain the physical address	Helps to identify a location in the main memory
Generates logical addresses	Produced by the combination of the relocation register and the logical address

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(37) What are independent processes?

Ans: Does not affect the execution of other processes. Does not affected by other processes. Does not share any data with other processes

(38) What is the difference between Preemptive and Non-preemptive scheduling?

DIFFERENCES BETWEEN PREEMPTIVE AND NON-PREEMPTIVE SCHEDULING:	
Preemptive	Non-preemptive
The resources are allocated to a process for a limited time.	The process holds resources till it completes its burst time or switches to waiting state.
Process can be interrupted in between.	Can't be interrupted till it completes its burst time.
If a high priority process frequently arrives in the ready queue, low priority process may starve.	If a process with long burst time is running CPU, then another process with less CPU burst time may starve.

Ans:

(39) What is Starvation? How starvation can be handling?

Ans: **Starvation** occurs if a process is indefinitely postponed. If a process is never provided the resources it requires for execution because of faulty resource allocation decisions, then **starvation can** occur. A lower priority process may wait forever if higher priority processes constantly monopolize the processor.

(40) Define fragmentation. What is the difference between internal and external fragmentation?

Ans: Fragmentation refers to the inability of the operating system to allocate portions of unused memory.

**Internal Fragmentation** occurs when a process needs more space than the size of allotted memory block or use less space. **External Fragmentation** occurs when a process is removed from the main memory

(41) What do you mean by co-operating process?

Ans: **Cooperating processes** are those that **can** affect or **are** affected by other **processes** running on the system. **Cooperating processes** may share data with each other.

(42) What is Thrashing?

Ans: The high paging activity is called thrashing. A process is thrashing if it is spending more time in paging than executing.

OR

**Thrashing** in computing is an issue caused when virtual memory is in use. It occurs when the virtual memory of a computer is rapidly exchanging data for data on hard disk, to the exclusion of most application-level processing. The swapping causes a very high rate of hard disk access.

(43) Explain starvation of process.

Ans: **Starvation** is the name given to the indefinite postponement of a **process** because it requires some resource before it can run, but the resource, though available for allocation, is never allocated to this **process**.