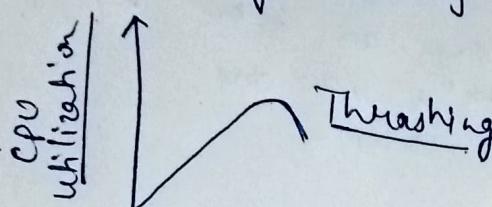


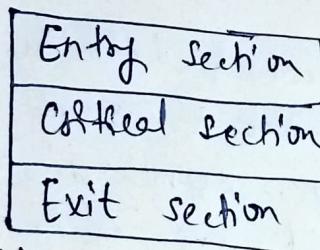
Q1 What is thrashing?

- Ans
- Thrashing is a condition in which excessive paging operation are taking place.
 - Thrashing occurs when a computer's virtual memory is overused.
 - Diagram of thrashing is:-



Q2 Explain multiprogramming

- Ans
- Critical section problem is never sure that only one process should be in a critical section problem.
 - When the process is in the critical section problem, no other processes are allowed to enter the critical section problem.



Q3 Explain starvation.

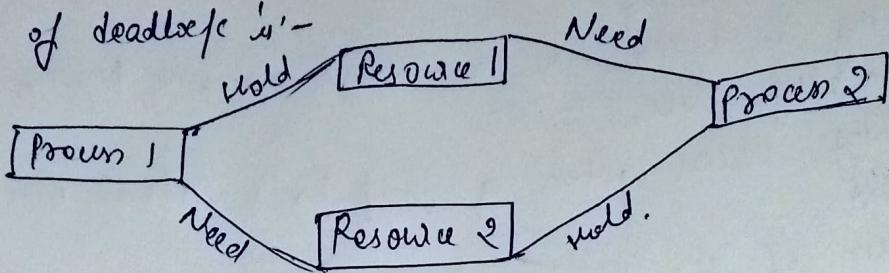
- Ans
- Starvation occurs if a process is indefinitely postponed.
 - Starvation is also called indefinite blocking.
 - Starvation caused due to poor scheduling algorithm.

Q4 Give short note on deadlock.

- Ans
- Deadlock is a situation in which more than one process is blocked.
 - There are four major conditions of deadlock:-
 - i) Mutual exclusion
 - ii) No preemption
 - iii) Hold & wait
 - iv) Circular wait

Operating System

- Diagram of deadlock is:-



(Q1) Explain basic concept of scheduling.

- Scheduling is the process of removing an active task from the processor & replacing it with a new one.

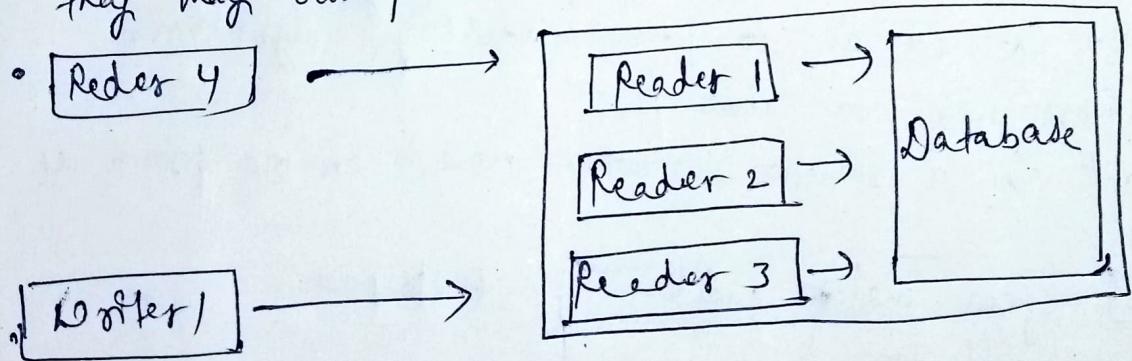
- Scheduling divides a procedure into states:-

- Ready
- Waiting
- Running

(Q2) Explain the reader writer problem & producer consumer problem.

READER WRITER PROBLEM

- The reader writer problem relates to an object such as a file that is shared b/w multiple process.
- Reader writer problem shares a buffer which hold one item.
- Reader writer problem shares a single writer & single reader.
- In reader writer there is single writer & single reader.
- Reader writer problem is used to manage synchronisation.
- Reader writer problem is used to manage synchronisation.
- If the two writer and one reader and one writer want to access the file at the same ~~time~~ point of time they may own problem.



Operating System (Important Ques)

PROCEDURE CONSUMER PROBLEM

producer consumer is a classical synchronization problem in the operating system.

- The problem describes two processes the producer and the consumer, who share a common fixed size buffer.
- Procedure consumer problem also known as bounded buffer.
- There are 3 imp. restriction here:-

i) Mutex

A mutual semaphore named mutex is used.

ii) Empty

The producer & consumer will use the empty semaphore for synchronisation.

iii) Full

The producer & consumer will be use the full semaphore for synchronisation.

(b)

Consider the set of 5 process whose arrival time & burst time are given below:-

Process Id	Arrival time	Burst time
P ₁	0	5
P ₂	1	3
P ₃	2	1
P ₄	3	2
P ₅	4	3

If the CPU scheduling is round robin with the quantum = 2 calculate the average waiting time & average turn around time.

① Explain PCB and its importance in Computer System

Ans

Ready queue = $\boxed{P_5 | P_1 | P_2 | P_5 | P_4 | P_1 | P_3 | P_2 | P_1}$

Running queue = $\boxed{P_1 | P_2 | P_3 | P_4 | P_5 | P_2 | P_1 | P_5}$

Turn around time = Completion time - Arrival time

Waiting time = Turn around time - Burst time

Process	Arrival time	Burst time	Completion time	Turn around time	Waiting time
P ₁	5	5	32	27	22
P ₂	4	6	27	23	17
P ₃	3	7	33	30	33
P ₄	1	9	30	29	20
P ₅	9	8	6	4	2
P ₆	6	3	21	15	12

$$\text{Average waiting time} = \frac{22 + 17 + 23 + 20 + 2 + 12}{6}$$

$$= \frac{96}{6} = 16$$

$$\text{Average turn around time} = \frac{27 + 23 + 30 + 29 + 4 + 15}{6}$$

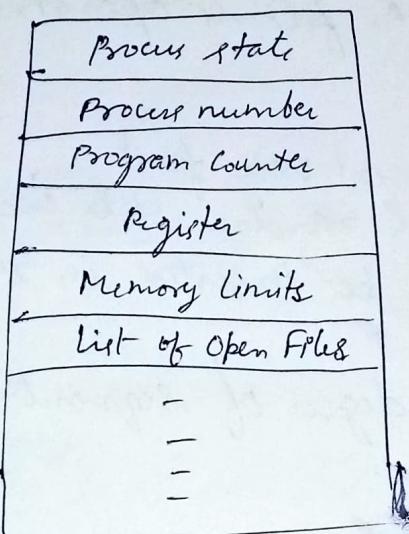
$$= \frac{128}{6} = 21.33$$

with a non memory with five page frames and the
following sequence of page reference: 3, 8, 2, 9, 7, 1, 6,
9, 5, 6, 2, 1, 3, which one of the following is true with
respect to page replacement first in first out (FIFO) at
least recently used (LRU)?

Operating System

(Important Ques)

- ① Explain PCB and its importance in Process execution.
- Process control Block is a data structure that contains information of the process related to it. The process control block is also known as a task control block, entry of the process table etc.
- It is very important for process management as the data structuring for processes is done in terms of PCB.
- It also defines the current state of the operating system.



- ② Process state and its uses.

— A process is a program in execution and it is more than a program code called as text section and this concept works under all the operating system because all the task perform by the operating system needs a process to perform a task.

Each process have following stat

- New - the process is being created
- Running - the instructions are being executed
- Waiting - waiting until an event like I/O operation.
- Ready - the process is assigned to a processor.
- Terminated - the process has finished execution.

It is important to know that one process can be running on any processor at any instant. Many processes may be ready and waiting.

Free space management

- The system maintains a free space list which keeps track of the disk blocks that are not allocated to some file or directory.

The free space list can be implemented mainly as:

① Bitmap or Bit vector

- A bitmap or bit vector is series or collection of bits where each bit corresponds to a disk block.

It takes two values 0 and 1.

② linked list

- the free disk blocks are linked together, free block contains a pointer to the next free block.

③ Grouping

- the first free block stores the address of some, say n free blocks, the first $n-1$ blocks are actually free and the last block contains the address of next n blocks.

④ Counting

- the address of the first free block and a number n of free contiguous disk blocks that follow the first block.

④ Paging and its uses

Paging is a memory management technique in which the memory is divided into fixed size pages.

Paging is used for faster access to data. When a program needs a page, it is available in the main memory as the OS copies a certain number of pages from your storage device to main memory. Paging allows the physical address space of a process to be noncontiguous.

Paging is to deal with external fragmentation problem.

This is to allow the logical address space of process to be noncontiguous, which makes the process to be allocated physical memory.

⑤ Need of file protection system (2 methods)

— when information is kept in a computer system, we want to keep it safe from physical damage and improper access (protection).

- File system can be damaged by hardware problems (such as errors in reading or writing), power surges or failures, dust, temperature etc.
- Files may be deleted accidentally.
- Bugs in the file-system software can also cause file contents to be lost.
- Protection can be provided in many ways. For a small single-user system, we might provide protection by physically removing the floppy disks and locking them in a desk drawer or file cabinet.

Methods

① Backups

- are a method of preventing data loss that can often occur either due to user error or technical malfunction.

Backups should be regularly made and updated. Such backups should be stored in a safe place.

② Access Controls

- the fewer people have access to the data, the lesser the risk of data breach or loss.

③ Virtual memory (method)

- A computer can address more memory than the amount physically installed on the system. This extra memory is actually called virtual memory and it is a section of a hard disk that's set up to emulate the computer's RAM.

Virtual memory serves two purpose

- (i) it allows us to extend the use of physical memory by using disk.
- (ii) it allows us to have memory protection, because each virtual address is translated to a physical address.

(7) Starvation and its uses
starvation occurs if a process is indefinitely postponed. This may happen if the process requires a resource for execution that it is never allotted or if the process is never provided the processor for some reason.

starvation may occur if there are not enough resources and if random selection of processes is used.

→ Solutions that can be implemented

- An independent manager can be used for allocation of resources.
- Random selection of process for resource allocation.
- The priority scheme of resource allocation should include concepts as aging, where priority of a process is increased.

(8) Multiprogramming / Multitasking

- In a multiprogramming system, one or more programs are loaded in the main memory which is ready to execute simultaneously.
- The objective is to improve the utilization of the CPU
- It takes more time to execute any program to process.

- Multitasking refers to execute multiple programs, tasks, threads running at the same time.
- the objective is to improve the timing of the response
- It takes less time to execute any ~~task~~ task or program process.

- ⑨ Memory management and types.
- It is the process of controlling and coordinating computer memory, assigning portions known as blocks to various running programs to optimize the overall performance of the system.
 - It is most important function of an operating system that manages primary memory. It helps processes to move back and forward b/w main memory and execution disk.

Uses

- It allocates the space to applications.
- Helps protect different processes from each other.
- It places the programs in memory so that memory is utilized to its full extent.

Types

- Paged memory management
 - this method divides the computer's main memory into fixed-size units known as page frame.
- Segmented memory management
 - It is the only memory management method that does not provide the user's program with a linear and contiguous address space.
Segments need hardware support in the form of a segment table.
- Single Contiguous Allocation
 - It is the easiest memory management technique. all types of computer's memory except a small portion which is reserved for the OS is available for one application.

⑩ Paging

- Paging is storage mechanism that allows OS to retrieve processes from the secondary storage into the main memory in the form of pages. The main memory is divided into small fixed-size blocks of physical memory, which is called frame. Paging is used for faster access to data, and it is a logical concept.

Segmentation

- Segmentation method works almost similarly to paging. The only difference between the two is that segments are of variable-length, whereas the paging method, pages are always of fixed size.

A program segment includes the program's main function, data structures, functions etc. The OS maintains a segment map table for all the processes.

⑪ Spooling, need, working.