

Mid-Sem Examination, September 2021

Name - Hari Kesh Rai

Year - 3rd

Stream - CSE

Section - 3 I

Class Roll Number - 23

Enrollment Number - 12019009001418

Paper Name - Operating Systems

Paper Code - PCCCS 501

Signature - Hari Kesh Rai

Date - 03/09/2021

1) i)

Hard Real Time	Soft Real Time
i) In hard real time system, the size of data file is small or medium.	ii) In soft real time systems, the size of data file is large.
ii) In this system response time is in millisecond.	ii) In this system response time are higher.
iii) Peak load performance should be predictable.	iii) In soft real time, peak load can be tolerated.
iv) Safety is critical.	iv) Safety is not critical.

ii) A monolithic kernel is an operating system software framework that holds all privileges to access input/output devices, memory, hardware interrupts and the CPU stack. Monolithic kernels tend to be larger than other kernels because they deal with so many aspects of computer processing at the lowest level, and therefore have to incorporate code that interfaces with many devices, I/O and interrupt channels, and other hardware operators. This form of kernel is the basis for Linux, Unix, MS-DOS and Mac OS. Newer operating systems typically use a hybrid kernel to allow for easier maintenance and operating system improvements.

iii)

In computer science, I/O bound refers to a condition in which the time it takes to complete a computation is determined principally by the period spent waiting for input/output operations to be completed. This is the opposite of a task being CPU bound.

iv)

Preemptive Priority is a special kind of FCFS Scheduling Algorithm: Preemptive Priority scheduling Algorithm acts like FCFS when there are equal priority processes. If two processes have the same priority, the process with the earlier arrival time will be executed first.

v)

Ageing is a scheduling technique used to avoid starvation. Aging is used to gradually increase the priority of a task, based on its waiting time in the ready queue.

vi)

Mounting is a process by which the operating system makes files and directories on a storage device (such as hard drive, CD-ROM, or network share) available for users to access via the computer's file system.

vii)

Sequential access is a term describing a group of elements (such as data in a memory array or a disk file or on magnetic tape data storage) being accessed in a predetermined, ordered sequence.

viii) The main disadvantage of contiguous memory allocation is memory wastage and inflexibility. As the memory is allocated to a file or a process keeping in mind that it will grow during the run. But until a process or a file grows many blocks allocated to it remains utilized.

ix) The Layered File System Applications Programs
High Level language interface to files:

Common access methods:
Sequential, Random and Indexed sequential
Logical File system (Directory level): Mapping from symbolic names to file locations

File Organisation Module: Allocation and management of file space

Basic or Fleet File System: Basic file access facilities.

Block address to disk address translation

I/O control: Device drivers and interrupt handlers.

Devices: Disks on which files are stored.

x) The MS-DOS File Allocation Table (FAT) is a collection of linked lists maintained separately from the files. One entry for each block on the disk. Each directory entry holds the block number of the file's first block. This number is also an index into the FAT.

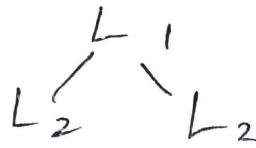
- 3) Events in real time system are the actions or the result of the actions that are generated by the system.
- a) On the basis of generation -
- Stimulus events - In real time systems stimulus events are generated by the environment. Stimulus events act on the computer system.
 - Response events - In real time systems, response events are generated by the computer systems. These events are generated in response of stimulus events.
- b) On the basis of duration -
- Instantaneous events - In real time system, this are the events having duration time zero.
 - Durational events - In real time system, duration events are the events having duration time greater than zero.
- 4) In UNIX, fork system creates the new process. The fork system creates an exact copy of original process. Here the forking process is called parent process and the new process is called child process. If any changes takes place in parent process, those change are not visible to the child & vice versa. Before a fork, if a file is open in the parent, then it will continue to be open in the parent and child afterwards.

2. The process control block (PCB) represents a process in the OS. It is also known as task control block. It's a repository of information associated with a specific process. It plays a crucial role in the context switch of a process. Sometimes several factors such as interrupt, signals or OS calls interrupt a running process and the process prompts its execution. When this happens, the OS saves the current execution statistics in PCB of the process. This ensures that the process execution resumes next time.

5) A) int main()
{ fork();
fork();
printf("hello\n");
return 0;
}

As no. of processes created = $2^n = 2^2 = 4$, where n is no. of fork system calls, so, here $n = 2$, $2^2 = 4$.

fork(); // L₁
fork(); // L₂



Output:

hello
hello
hello
hello

6.A) A Hardware abstraction are set of routines in software that provides programs with access to hardware resources through programming interfaces. The programming interface allows all devices in particular class C of hardware devices to be accessed through identical interfaces even though C may contain different sub-classes of devices that each provide a different hardware interface. The same type of abstraction.

8)

Long Term

Short Term

Medium Term

-) It is a job scheduler.
 -) Speed is less than short term scheduler.
 -) It controls the degree of multiprogramming.
 -) Absent or minimal in a time-sharing system.
 -) It selects processes from the pool and load them into memory for execution.
-) It is a CPU scheduler.
 -) Speed is very fast.
 -) Less control over the degree of multiprogramming.
 -) Minimal in a time-sharing system.
 -) It selects from among the processes that are ready to execute.
-) It is swapping scheduler.
 -) Speed is in b/w both.
 -) Reduce the degree of multiprogramming.
 -) Time-sharing system uses a medium-term scheduler.
 -) Process can be re-introduced into the meat and its execution can be continued.

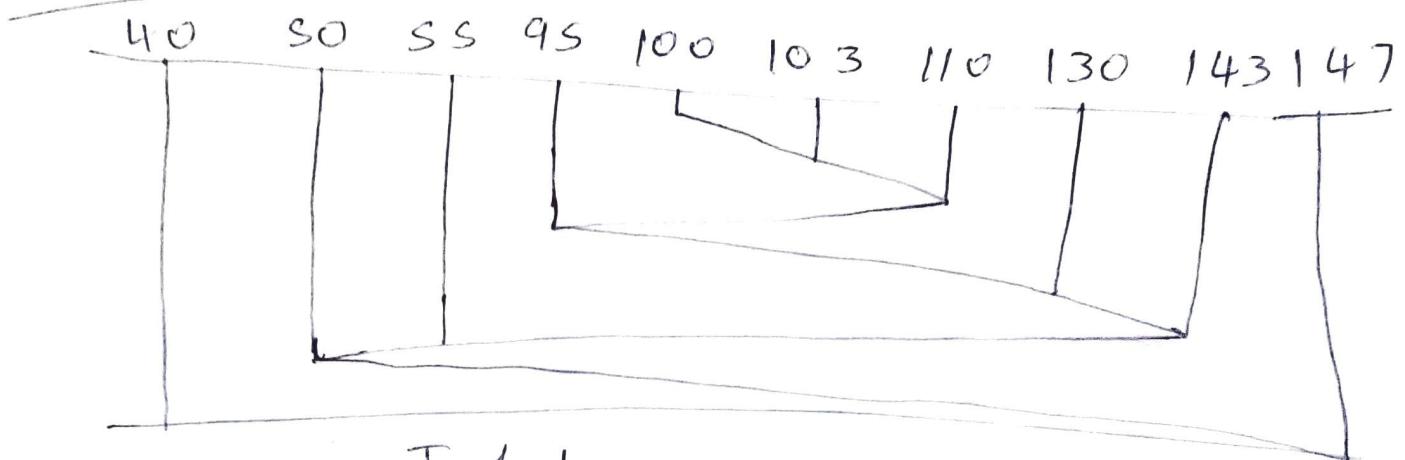
- 9) Context switching can happen due to :
-) When a process of high priority comes in the ready state. In this case, the execution of the running process should be stopped and the higher priority process should be given the CPU for execution.
 -) When an interruption occurs then the process in the running state should be stopped and the CPU should handle the interrupt before doing something else.
 -) When a transition b/w the user mode and kernel mode is required then you have to perform the context switching.
- Context switching is a process that involves switching of the CPU from one process or task to another.
- It is one of the essential features of the multitasking operating system.

11. B) Total tracks = 200 (0 - 199)

Rf: 103, 110, 95, 130, 143, 55, 50, 147, 40.

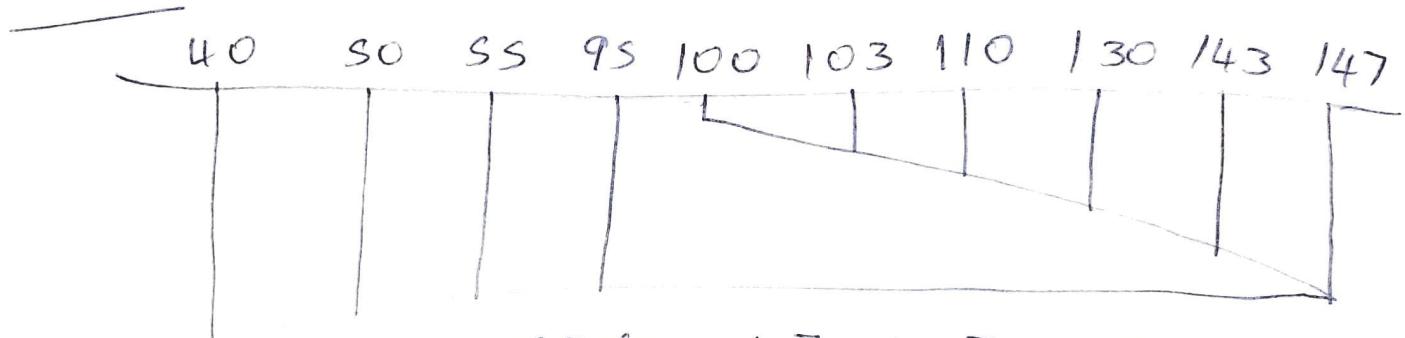
Current: 100

FIFO

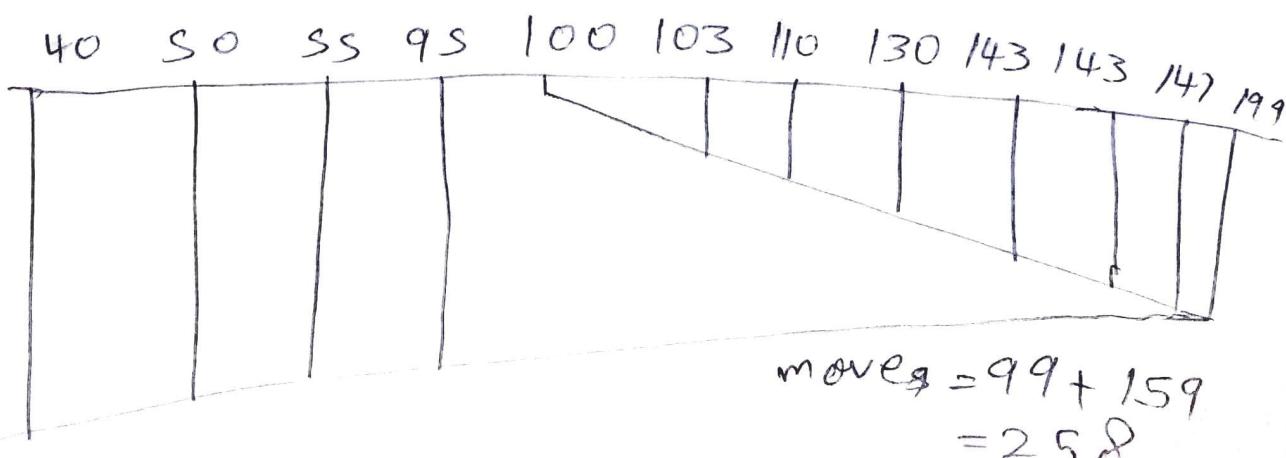


Total moves = 370

SSTF



SCAN



0 40 50 55 95 100 103 110 130 143 147 199



$$\begin{aligned} \text{moves} &= 99 + 199 + 95 \\ &= 393 \end{aligned}$$

Hence no. of moves less than algo is efficient
SSTF has min. no. of moves. It is most efficient.

7)

Image result for Discuss ~~the~~ attributes of a File. File attributes are pieces of information associated with every file and directory that includes additional data about the file itself or its contents. They can exist in only one of two states - Set or Cleared like an On or Off state. Attributes can be in files, directories, volumes and certain system objects.

12. B) Given 12 direct, 1 single direct, 1 double indirect pointers.

Size of disk block = 4 KB

Disk Block address = 32 bit = 4 B $\therefore \frac{32}{8 \text{ bits}} = 4 \text{ bytes}$

No. of addresses = Size of disk block/address size

$$= \frac{4 \text{ KB}}{4 \text{ KB}} = 2^{10}$$

Maximum possible file size = $12 \times 4 \text{ KB} + 2^{10} \times 4 \text{ KB}$
 $+ 2^{10} \times 2^{10} \times 4 \text{ KB}$

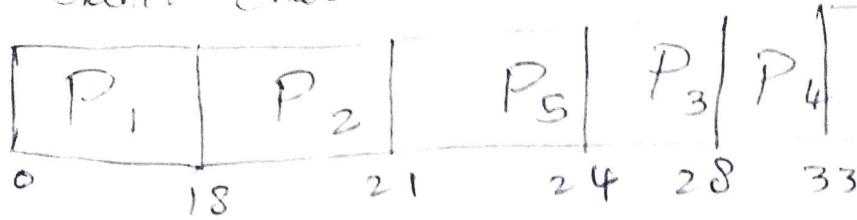
$$= 4,00395 \text{ GB} \approx 4 \text{ GB}$$

Hence, 4 GB is the correct answer

10) A) Using SJF (Non-Premptive)

Process	Arrival T	Execution T	CT	TAT Turn around Time	WT Waiting Time	RT Response Time
P ₁	0	18	18	18	0	0
P ₂	1	3	21	20	17	17
P ₃	2	4	28	26	22	22
P ₄	3	5	33	30	25	25
P ₅	4	3	24	20	17	17

Grattt Chart -



Avg of RT (Response Time) = $\frac{10+17+22+25+17}{5}$
 $= 16.2$

Avg of waiting Time = $\frac{(17+22+25+17+0)}{5}$

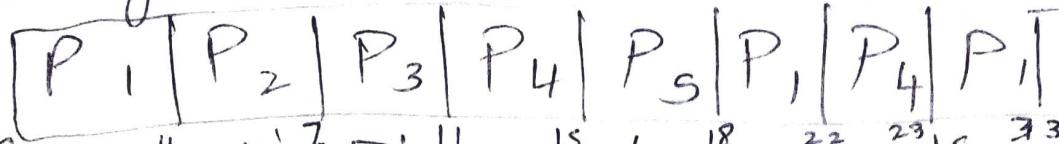
Using Round Robin = 16.2

Process	Arrival T	Execution T	Completion T	Preempt Time	
				WT	TAT
P ₁	0	18	33	15	33
P ₂	1	3	7	3	6
P ₃	2	4	11	5	9
P ₄	3	5	23	15	20
P ₅	4	3	18	11	14

Ready Queue -



Running Queue :-



Avg. of waiting Time = $\frac{(15+3+5+15+11)}{5} = 9.8$