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TITLE:- ILLUSTRATE THE MS COMMAND.

OBJECTIVE:-

- To understand the basic concept of MS Command Prompt
- To learn and execute common command line instructions.
- To perform file and directory operations using commands.
- To explore system management through command-line interface.

THEORY:-

- MS Command prompt is a command-line interpreter available in Microsoft Windows Operating systems. It allows users to interact with the system by typing commands instead of using a graphical user interface (GUI). It is useful for performing advanced tasks quickly and efficiently.

COMMON COMMANDS:-

1) DIR

Description:- Displays the list of files and folders in the current directory.

Example:- DIR

2) CD (Change Directory)

Description: Changes from one directory to another.

Example: CD Documents

3) MD (Make Directory)

Description: Creates a new folder.

Example: MD Computer

4) RD (Remove Directory)

Description: Deletes a folder.

Example: RD Computer

5) COPY

Description: Copies files from one location to another.

Example: COPY file1.txt file2.txt

6) DEL

Description: Deletes a file.

Example: DEL file1.txt

7) REN (Rename)

Description: Renames a file.

Example: REN file1.txt file2.txt

8) TYPE

Description: Displays the content of a text file

Example: TYPE file1.txt

9) CLS

Description: Clears the command prompt screen.

Example: CLS

10) DATE

Description: Displays or changes the system date.

Example: DATE

11) TIME

Description: Displays or changes the system time.

Example: TIME

12) EXIT

Description: closes the command prompt window.

Example: EXIT

CONCLUSION:-

- The MS command prompt is a powerful tool for interacting with the Windows operating system. Through this lab, we learned essential commands for file management and system navigation. It enhances efficiency and provides deeper control over system operations compared to graphical interfaces.

Signature

TITLE:- CPU SCHEDULING ALGORITHM (First come first Serve) FCFS

OBJECTIVE:-

- To stimulate and compare CPU scheduling algorithms (FCFS)

TOOLS Needed:-

- Pen and Paper
- Spreadsheet (MS Excel / Google Sheets)

Scheduling Algorithms to Stimulate

- FCFS (First Come first Serve)
- Algorithm: Jobs are processed in the order they arrive.

Steps:

- 1) Sort the processes by arrival time.
- 2) Calculate Start Time, Completion Time, Turnaround Time, Waiting Time
- 3) Use Gantt chart to Visualize.

Sample Data Table:-

Process	Arrival Time	Burst Time	Completion Time	TAT (CT-AT) (Turn around Time)	WT (TAT - BT) (waiting Time)
P1	0	4	4	4	0
P2	1	2	6	5	3
P3	2	3	9	7	4
P4	3	5	14	11	6
P5	4	6	20	16	10
P6	5	1	21	16	15

Gantt Chart

P1	P2	P3	P4	P5	P6
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0 4 6 9 14 20 21

Ready queue

P2	P3	P4	P5	P6
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TITLE: CPU SCHEDULING ALGORITHM (Shortest Job first) SJF

OBJECTIVE:-

- To study and implement the shortest Job first (SJF) CPU scheduling algorithm and understand how it minimizes the average waiting time of processes.

THEORY:-

- Shortest Job first (SJF) is a CPU scheduling algorithm in which the process with the smallest CPU burst time is executed first. It can be either non-preemptive (once a process starts, it completes its execution) or preemptive (Shortest Remaining Time first).

The main idea of SJF is to reduce the average waiting time and improve system performance by selecting the shortest process from the ready queue. However, it requires prior knowledge of CPU burst time, which is not always possible in real systems. It may also cause starvation of longer processes.

ALGORITHM:-

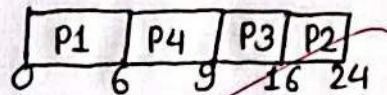
- 1) Start
- 2) Enter the number of processes.
- 3) Input burst time for each process.
- 4) Sort all processes in increasing order of burst time.
- 5) Assign CPU to the process with the shortest burst time first
- 6) Calculate waiting time for each process.
- 7) Calculate turnaround time for each process.
- 8) Compute average waiting time and average turnaround time.
- 9) Display results.
- 10) Stop

EXAMPLE TABLE

PID	AT	BT	CT	TAT	WT
P ₁	0	6	6	6	0
P ₂	2	8	24	22	14
P ₃	4	7	16	12	5
P ₄	5	3	9	4	1

$$\therefore TAT = CT - AT$$

$$\therefore WT = TAT - BT$$



CONCLUSION:-

- Shortest Job First (SJF) is an efficient CPU scheduling algorithm that executes the shortest process first to minimize waiting time and improve system performance.

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TITLE:- CPU SCHEDULING ALGORITHM (Shortest Remaining Time first) SRTF

OBJECTIVE:-

- To study the concept of the shortest Remaining Time first (SRTF) CPU scheduling algorithm.
- To understand how processes are scheduled based on the shortest remaining burst time.
- To calculate waiting time and turnaround time using SRTF scheduling.
- To analyze the performance of preemptive scheduling.

THEORY:-

- Shortest Remaining Time first (SRTF) is a preemptive CPU scheduling algorithm. It is the preemptive version of the shortest Job first (SJF) scheduling algorithm.

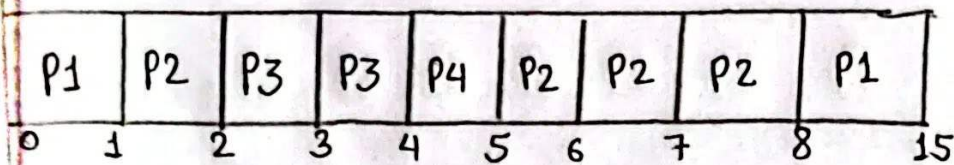
Working principle of SRTF

- 1) The CPU selects the process with the shortest remaining execution time.
- 2) If a new process arrives with a shorter burst time than the remaining time of the current process:
 - The current process is preempted.
 - The new process gets CPU allocation.
- 3) The process continues until all processes are completed.

EXAMPLE TABLE:

PID	AT	BT	CT	TAT	WT
P1	0	8 7	15	15	7
P2	1	4 3 2 1	8	7	3
P3	2	2 1 0	4	2	0
P4	3	1 0	5	2	1

Gantt chart



$$\text{Average waiting Time} = \frac{\text{Total waiting Time of all process}}{\text{No. of process}}$$

$$= \frac{7 + 3 + 0 + 1}{4}$$

$$= \frac{11}{4}$$

$$= 2.75$$

$$\text{Average Turn around Time} = \frac{CT - AT}{N}$$

$$= \frac{32 - 6}{4}$$

$$= \frac{26}{4}$$

$$= 6.5$$

CONCLUSION:-

- Shortest Remaining Time first (SRTF) is an efficient preemptive CPU scheduling algorithm that executes the process with the shortest remaining burst time first

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TITLE:- CPU SCHEDULING ALGORITHM (Round Robin) RR

OBJECTIVE :-

- To study the concept of the Round Robin CPU scheduling algorithm.
- To understand process scheduling using time quantum.
- To calculate waiting time and turn around time in Round Robin scheduling.
- To analyze the performance of time-sharing systems.

THEORY:-

- Round Robin (RR) is a ~~preemptive~~ CPU scheduling algorithm designed especially for time-sharing systems. In this algorithm, each process is assigned a fixed time interval called time quantum. The CPU executes a process for a maximum of one time quantum. If the process is not completed within that time, it is preempted and moved to the end of the ready queue. The CPU then allocates time to the next process in the queue.

WORKING PRINCIPLE OF ROUND ROBIN

- 1) Processes are placed in a ready queue.
- 2) The CPU allocates a fixed time quantum to each process.
- 3) If a process finishes before the ~~time quantum~~ expires, it leaves the system.
- 4) If the process is incomplete:
 - It is preempted.
 - Added to the end of the ready queue.
- 5) The cycle continues until all processes are completed.

EXAMPLE TABLE:-

If CPU scheduling policy is RR with time quantum = 2 unit, calculate the average WT and average TAT.

PID	AT	BT	CT	TAT	WT
P1	0	5 8	10	10	5
P2	1	4 2	12	11	7
P3	2	2 0	6	4	2
P4	4	1 0	9	5	4

Ready queue

P1 P2 P3 P1 P4 P1 P2

Running queue (Gantt chart)

P1	P2	P3	P1	P4	P1	P2	
0	2	4	6	8	9	10	12

Average WT = $\frac{\text{Total waiting Time of all process}}{\text{No. of process}}$

$$= \frac{5+7+2+4}{4}$$

$$= 4.5$$

Average Turn around time = $\frac{CT - AT}{N}$

$$= \frac{37-7}{4}$$

$$= \frac{30}{4}$$

$$= 7.5$$

CONCLUSION:-

- Round Robin is a widely used preemptive CPU scheduling algorithm suitable for time-sharing system. It allocates CPU time fairly among all processes using a fixed time quantum. The algorithm improves responsiveness and prevents starvation, but excessive context switching may reduce system efficiency if the time quantum is too small.

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TITLE:- DISK SCHEDULING ALGORITHM

FCFS (First Come First Serve)

OBJECTIVE:-

- To understand the concept of disk scheduling in an operating system.
- To study the working of the FCFS (First Come First Serve) disk scheduling algorithm.
- To calculate the total head movement and average seek time using FCFS.

THEORY:-

- Disk scheduling is a process used by the operating system to decide the order in which disk I/O requests are serviced. Efficient disk scheduling reduces seek time and improves system performance.

FCFS (First Come First Serve) Disk scheduling)

- FCFS is the simplest disk scheduling algorithm. Requests are processed in the order they arrive in the disk queue.

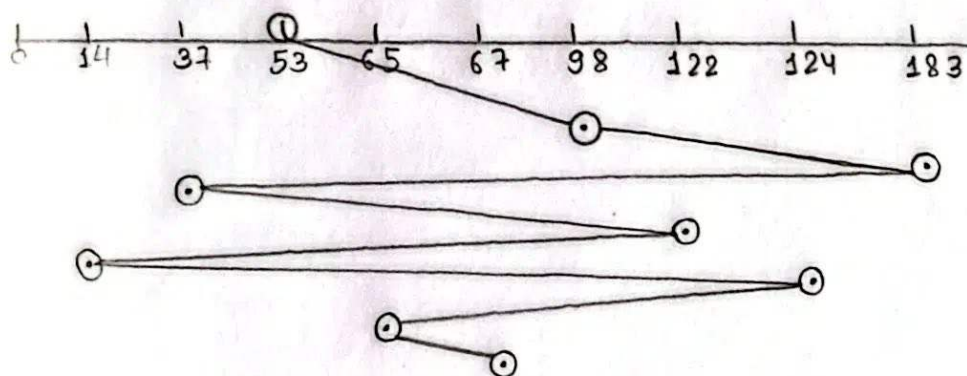
Working principle

- The disk head serves requests one by one in the sequence they are received.
- No request is given priority over another.
- It follows the FIFO (First In First Out) principle.

Example:-

Track request: 98, 183, 37, 122, 14, 124, 65, 67

Initial head position:- 53



CALCULATION:-

Movement	Distance
53-98	45
98-183	85
183-37	146
37-122	85
122-14	108
14-124	110
124-65	59
65-67	2

Total Head Movement

$$= (45 + 85 + 146 + 85 + 108 + 110 + 59 + 2)$$
$$= 640$$

$$\text{Average} = \frac{640}{8}$$
$$= 80$$

CONCLUSION:-

- The FCFS disk scheduling algorithm services disk requests in the order they arrive. It is simple, fair, and easy to implement. However, it may result in excessive head movement and higher seek time, making it less efficient than advanced algorithms such as SSTF, SCAN and C-SCAN.

Key

TITLE:- PAGE REPLACEMENT ALGORITHM (FIFO) First In First Out

OBJECTIVE:-

- To understand the concept of page replacement.
- To study the FIFO page replacement algorithm.
- To determine the number of page faults generated by FIFO.
- To analyze the performance of FIFO page replacement.

THEORY:-

- Page replacement is a memory management technique used by the operating system when the number of pages required by a process exceeds the available page frame in main memory.

FIFO (First-In first-Out) is the simplest page replacement algorithm. It replaces the page that has been in memory for the longest time (the oldest page) whenever a new page needs to be loaded and no empty frame is available.

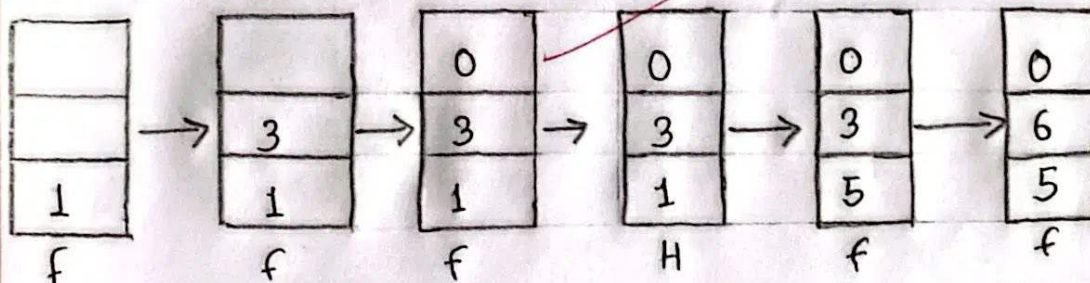
Working principle of FIFO:-

- 1) Pages are loaded into memory in the order they arrive.
- 2) The oldest page is removed first when a page fault occurs and all frames are occupied.
- 3) A queue structure is maintained to keep track of the order of the pages.

Example:-

Reference string:- 1, 3, 0, 3, 5, 6

Main memory has 3 slots



Total no of page fault = 5

Total no of page hit = 1

CONCLUSION:-

The FIFO page replacement algorithm replaces the page that entered memory first. It is simple to implement and requires minimal overhead. However, it does not consider page usage frequency and may lead to a large number of page faults compared to more efficient algorithms such as LRU and Optimal page Replacement.

Very easy