Review

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1 CPU Scheduling

1.1 First-Come, First-Served Scheduling

Consider the following set of 6 processes that all arrive at time 0, with the length of the CPU burst given in milliseconds:

Process	Burst Time
P1	12
P2	6
P3	9
P4	4
P5	15
P6	7

Suppose the processes arrive in the order: **P1, P2, P3, P4, P5, P6**. Draw the **Gantt Chart** for the schedule and calculate the **average waiting time** and **average turnaround time** of the processes.

1.2 Shortest-Job-First Scheduling

Consider the following set of 5 processes, all arriving at time 0, with the length of the CPU burst given in milliseconds:

Process	Burst Time
P1	15
P2	7
P3	10
P4	20
P5	5
P6	12

Using **SJF scheduling** (non-preemptive), draw the **Gantt Chart** for the schedule and calculate the **average waiting time** and **average turnaround time** of the processes.

1.3 Shortest-Remaining-Time-First Scheduling

Consider the following set of 5 processes, with their arrival times and the length of the CPU burst given in milliseconds:

Process	Arrival Time	Burst Time
P1	0	12
P2	1	8
P3	2	5
P4	3	10
P5	4	3
P6	5	7

Using **SRTF scheduling** (preemptive SJF), draw the **Gantt Chart** for the schedule and calculate the **average waiting time** and **average turnaround time** for the processes.

1.4 Shortest-Remaining-Time-First Scheduling

Consider the following set of 8 processes, with their arrival times and the length of the CPU burst given in milliseconds:

Process	**Arrival Time**	**Burst Time**
P1	0	10
P2	0	5
P3	2	8
P4	2	3
P5	4	12
P6	5	6
P7	5	4
P8	7	9

Using **SRTF scheduling** (preemptive SJF), draw the **Gantt Chart** for the schedule and calculate the **average waiting time** and **average turnaround time** for the processes.

1.5 Round Robin Scheduling

Consider the following set of 6 processes that arrive at time 0, with the length of the CPU burst given in milliseconds. We use a time quantum of 5 milliseconds:

Process	**Burst Time**
P1	14
P2	8
P3	12
P4	20
P5	6
P6	9

Using **Round Robin (RR)** scheduling with a **time quantum of 5 milliseconds**, draw the **Gantt Chart** for the schedule and calculate the **average waiting time** and **average turnaround time** of the processes.

1.6 Priority Scheduling

Consider the following set of 6 processes, assumed to have arrived at time 0 in the order P1, P2, P3, P4, P5, P6 with the length of the CPU burst and priority given in milliseconds(lower priority number means higher priority):

Process	**Burst Time**	**Priority**
P1	12	3
P2	6	1
P3	9	4
P4	15	2
P5	4	5
P6	10	2

Using **preemptive Priority Scheduling** with a **time quantum of 3 milliseconds**, draw the **Gantt Chart** for the schedule and calculate the **average waiting time** and **average turnaround time** of the processes.

1.7 Priority Scheduling

Consider the following set of 6 processes, assumed to have arrived at time 0 in the order P1, P2, P3, P4, P5, P6, P7, P8 with the length of the CPU burst and priority given in milliseconds(lower priority number means higher priority):

Process	**Burst Time**	**Priority**
P1	12	3
P2	8	2
P3	15	4
P4	5	1
P5	10	3
P6	7	2
P7	14	5
P8	6	1

Using **preemptive Priority Scheduling** with a **time quantum of 2 milliseconds**, draw the **Gantt Chart** for the schedule and calculate the **average waiting time** and **average turnaround time** of the processes.

2 Memory Management

2.1 Exersice 1

Consider a logical address space of 256 pages with a 4-KB page size, mapped onto a physical memory of 64 frames.

- How many bits are required in the logical address?
- How many bits are required in the physical address?

2.2 Exersice 2

Given six memory partitions of 300 KB, 600 KB, 350 KB, 200 KB, 750 KB, and 125 KB (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of size 115 KB, 500 KB, 358 KB, 200 KB, and 375 KB (in order)?