Review

Dr Tran Duc Minh and Dr Tran Hung

Faculty of Data Science and Artificial Intelligence
College of Technology
National Economics University, Vietnam
Email: minhdt@neu.edu.vn, hung.tran@neu.edu.vn

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)?

3 HDD Scheduling

3.1 FCFS Scheduling

A disk queue with requests for I/O to blocks on cylinders:

- 45, 192, 17, 134, 88, 213, 63, 99, 8, 166
- Head starts at 75

Calculate the total head movement when using the FCFS algorithm.

3.2 SCAN Scheduling

A disk queue with requests for I/O to blocks on cylinders:

- 45, 192, 17, 134, 88, 213, 63, 99, 8, 166
- Head starts at 75 and moves toward higher cylinder numbers first

Calculate the total head movement when using the SCAN algorithm, assuming the head continues to the highest cylinder (213) before reversing direction.

3.3 C-SCAN Scheduling

A disk queue with requests for I/O to blocks on cylinders:

- 45, 192, 17, 134, 88, 213, 63, 99, 8, 166
- Head starts at 75
- Assume the cylinder range is from 0 to 250
- The head is moving in the increasing direction (from smaller to larger cylinders)

Calculate the total head movement when using the C-SCAN algorithm.

3.4 SSTF Scheduling

A disk queue with requests for I/O to blocks on cylinders:

- 45, 192, 17, 134, 88, 213, 63, 99, 8, 166
- Head starts at 75

Calculate the total head movement when using the SSTF algorithm.