King Saud University

College of Computer and Information Sciences

CSC 227: OS

Project Report

Section #

Student ID	Student Name	task distribution
443200911	ARAM ALANTEET	ALL CODE

Fall 2024

Test Input 1: Basic Functionality

Purpose: Verify basic functionality and the ability to handle typical Round-Robin and Shortest-Job-First execution.

Processes:

Process 1: Priority 1, Arrival Time 0, CPU Burst 5

Process 2: Priority 2, Arrival Time 1, CPU Burst 3

Process 3: Priority 1, Arrival Time 2, CPU Burst 2

Process 4: Priority 2, Arrival Time 3, CPU Burst 1

```
Scheduling Order: [P1 | P3 | P1 | P4 | P2]
Process ID: P3, Priority: 1, Arrival Time: 2, CPU Burst: 0, Start Time: 3,
Process ID: P1, Priority: 1, Arrival Time: 0, CPU Burst: 0, Start Time: 5,
Process ID: P4, Priority: 2, Arrival Time: 3, CPU Burst: 1, Start Time: 7,
Process ID: P2, Priority: 2, Arrival Time: 1, CPU Burst: 3, Start Time: 8,
Average Turnaround Time: 6.25 ms
Average Waiting Time: 5.25 ms
Average Response Time: 4.25 ms
```

```
Termination Time: 5, Turnaround Time: 3, Waiting Time: 3, Response Time: 1
Termination Time: 7, Turnaround Time: 7, Waiting Time: 7, Response Time: 5
Termination Time: 8, Turnaround Time: 5, Waiting Time: 4, Response Time: 4
Termination Time: 11, Turnaround Time: 10, Waiting Time: 7, Response Time: 7
```

IN REPORT FILE:

```
Scheduling Order: [P1, P3, P1, P4, P2]
Process ID: P3, Priority: 1, Arrival Time: 2, CPU Burst: 0, Start Time: 3, Termination Time: 5, Turnaround Time: 3, Waiting Time: 3, Response Time: 1
Process ID: P1, Priority: 1, Arrival Time: 0, CPU Burst: 0, Start Time: 5, Termination Time: 7, Turnaround Time: 7, Waiting Time: 7, Response Time: 5
Process ID: P4, Priority: 2, Arrival Time: 3, CPU Burst: 1, Start Time: 7, Termination Time: 8, Turnaround Time: 5, Waiting Time: 4, Response Time: 4
Process ID: P2, Priority: 2, Arrival Time: 1, CPU Burst: 3, Start Time: 8, Termination Time: 11, Turnaround Time: 10, Waiting Time: 7, Response Time: 7
Average Turnaround Time: 6.25 ms
Average Waiting Time: 5.25 ms
Average Response Time: 4.25 ms
```

Test Input 2: Priority and Preemption

Purpose: Test the preemption of a lower priority process by a higher priority process.

Processes:

Process 1: Priority 2, Arrival Time 0, CPU Burst 6

Process 2: Priority 2, Arrival Time 1, CPU Burst 4

Process 3: Priority 1, Arrival Time 2, CPU Burst 5

Process 4: Priority 1, Arrival Time 3, CPU Burst 2

```
Scheduling Order: [P3 | P4 | P2 | P1]
Process ID: P3, Priority: 1, Arrival Time: 2, CPU Burst: 0, Start Time: 0,
Process ID: P4, Priority: 1, Arrival Time: 3, CPU Burst: 0, Start Time: 2,
Process ID: P2, Priority: 2, Arrival Time: 1, CPU Burst: 4, Start Time: 4,
Process ID: P1, Priority: 2, Arrival Time: 0, CPU Burst: 6, Start Time: 8,
Average Turnaround Time: 5.50 ms
Average Waiting Time: 3.00 ms
Average Response Time: 2.00 ms
```

```
Termination Time: 2, Turnaround Time: 0, Waiting Time: 0, Response Time: -2
Termination Time: 4, Turnaround Time: 1, Waiting Time: 1, Response Time: -1
Termination Time: 8, Turnaround Time: 7, Waiting Time: 3, Response Time: 3
Termination Time: 14, Turnaround Time: 14, Waiting Time: 8, Response Time: 8
```

Test Input 3: Round-Robin Quantum Effects

Purpose: Demonstrate the effects of the time quantum in Round-Robin scheduling.

Processes:

Process 1: Priority 1, Arrival Time 0, CPU Burst 5 (more than one quantum)

Process 2: Priority 1, Arrival Time 1, CPU Burst 8 (multiple quantums)

Process 3: Priority 1, Arrival Time 2, CPU Burst 4 (exactly multiple quantums)

Process 4: Priority 1, Arrival Time 3, CPU Burst 3 (less than one quantum)

```
Scheduling Order: [P1 | P2 | P3 | P4 | P1 | P2 | P3 | P2]
Process ID: P4, Priority: 1, Arrival Time: 3, CPU Burst: 0, Start Time: 9,
Process ID: P1, Priority: 1, Arrival Time: 0, CPU Burst: 0, Start Time: 12,
Process ID: P3, Priority: 1, Arrival Time: 2, CPU Burst: 0, Start Time: 17,
Process ID: P2, Priority: 1, Arrival Time: 1, CPU Burst: 0, Start Time: 18,
Average Turnaround Time: 14.50 ms
Average Waiting Time: 14.50 ms
Average Response Time: 12.50 ms
```

```
 Termination Time: 12, Turnaround Time: 9, Waiting Time: 9, Response Time: 6
, Termination Time: 14, Turnaround Time: 14, Waiting Time: 14, Response Time: 12
, Termination Time: 18, Turnaround Time: 16, Waiting Time: 16, Response Time: 15
, Termination Time: 20, Turnaround Time: 19, Waiting Time: 19, Response Time: 17
```

```
Scheduling Order: [P1, P2, P3, P4, P1, P2, P3, P2]
Process ID: P4, Priority: 1, Arrival Time: 3, CPU Burst: 0, Start Time: 9, Termination Time: 12, Turnaround Time: 9, Waiting Time: 9, Response Time: 6
Process ID: P1, Priority: 1, Arrival Time: 0, CPU Burst: 0, Start Time: 12, Termination Time: 14, Turnaround Time: 14, Waiting Time: 14, Response Time: 12
Process ID: P3, Priority: 1, Arrival Time: 2, CPU Burst: 0, Start Time: 17, Termination Time: 18, Turnaround Time: 16, Waiting Time: 16, Response Time: 15
Process ID: P2, Priority: 1, Arrival Time: 1, CPU Burst: 0, Start Time: 18, Termination Time: 20, Turnaround Time: 19, Waiting Time: 19, Response Time: 17
Average Turnaround Time: 14.50 ms
Average Waiting Time: 14.50 ms
Average Response Time: 12.50 ms
```

Test Input 4: Mixed Scenario

Purpose: Test a complex mix of arrivals, priorities, and burst lengths to validate the scheduler's robustness.

Processes:

Process 1: Priority 2, Arrival Time 0, CPU Burst 2

Process 2: Priority 1, Arrival Time 1, CPU Burst 1

Process 3: Priority 2, Arrival Time 2, CPU Burst 3

Process 4: Priority 1, Arrival Time 3, CPU Burst 5

```
Scheduling Order: [P2 | P4 | P4 | P1 | P3]
Process ID: P2, Priority: 1, Arrival Time: 1, CPU Burst: 0, Start Time: 0, Termination Time: 1,
Process ID: P4, Priority: 1, Arrival Time: 3, CPU Burst: 0, Start Time: 4, Termination Time: 6,
Process ID: P1, Priority: 2, Arrival Time: 0, CPU Burst: 2, Start Time: 6, Termination Time: 8,
Process ID: P3, Priority: 2, Arrival Time: 2, CPU Burst: 3, Start Time: 8, Termination Time: 11,
Average Turnaround Time: 5.00 ms
Average Waiting Time: 3.75 ms
Average Response Time: 3.00 ms
```

```
, Termination Time: 1, Turnaround Time: 0, Waiting Time: 0, Response Time: -1
, Termination Time: 6, Turnaround Time: 3, Waiting Time: 3, Response Time: 1
, Termination Time: 8, Turnaround Time: 8, Waiting Time: 6, Response Time: 6
, Termination Time: 11, Turnaround Time: 9, Waiting Time: 6, Response Time: 6
```

```
Scheduling Order: [P2, P4, P4, P1, P3]
Process ID: P2, Priority: 1, Arrival Time: 1, CPU Burst: 0, Start Time: 0, Termination Time: 1, Turnaround Time: 0, Waiting Time: 0, Response Time: -1
Process ID: P4, Priority: 1, Arrival Time: 3, CPU Burst: 0, Start Time: 4, Termination Time: 6, Turnaround Time: 3, Waiting Time: 3, Response Time: 1
Process ID: P1, Priority: 2, Arrival Time: 0, CPU Burst: 2, Start Time: 6, Termination Time: 8, Turnaround Time: 8, Waiting Time: 6, Response Time: 6
Process ID: P3, Priority: 2, Arrival Time: 2, CPU Burst: 3, Start Time: 8, Termination Time: 11, Turnaround Time: 9, Waiting Time: 6, Response Time: 6
Average Turnaround Time: 5.00 ms
Average Waiting Time: 3.75 ms
Average Response Time: 3.00 ms
```

Test Input 5: non-preemptive Shortest-Job-First (SJF)

Purpose: Test non-preemptive Shortest-Job-First (SJF).

Processes:

Process 1: Priority 1, Arrival Time 0, CPU Burst 5

Process 2: Priority 2, Arrival Time 1, CPU Burst 3

Process 3: Priority 1, Arrival Time 2, CPU Burst 2

Process 4: Priority 2, Arrival Time 3, CPU Burst 1

```
Scheduling Order: [P1 | P3 | P1 | P4 | P2]
Process ID: P3, Priority: 1, Arrival Time: 2, CPU Burst: 0, Start Time: 3, Termination Time: 5,
Process ID: P1, Priority: 1, Arrival Time: 0, CPU Burst: 0, Start Time: 5, Termination Time: 7,
Process ID: P4, Priority: 2, Arrival Time: 3, CPU Burst: 1, Start Time: 7, Termination Time: 8,
Process ID: P2, Priority: 2, Arrival Time: 1, CPU Burst: 3, Start Time: 8, Termination Time: 11,
Average Turnaround Time: 6.25 ms
Average Waiting Time: 5.25 ms
Average Response Time: 4.25 ms
```

```
 Turnaround Time: 3, Waiting Time: 3, Response Time: 1
 Turnaround Time: 7, Waiting Time: 7, Response Time: 5
 Turnaround Time: 5, Waiting Time: 4, Response Time: 4
, Turnaround Time: 10, Waiting Time: 7, Response Time: 7
```

```
Scheduling Order: [P1, P3, P1, P4, P2]
Process ID: P3, Priority: 1, Arrival Time: 2, CPU Burst: 0, Start Time: 3, Termination Time: 5, Turnaround Time: 3, Waiting Time: 3, Response Time: 1
Process ID: P1, Priority: 1, Arrival Time: 0, CPU Burst: 0, Start Time: 5, Termination Time: 7, Turnaround Time: 7, Waiting Time: 7, Response Time: 5
Process ID: P4, Priority: 2, Arrival Time: 3, CPU Burst: 1, Start Time: 7, Termination Time: 8, Turnaround Time: 5, Waiting Time: 4, Response Time: 4
Process ID: P2, Priority: 2, Arrival Time: 1, CPU Burst: 3, Start Time: 8, Termination Time: 11, Turnaround Time: 10, Waiting Time: 7, Response Time: 7
Average Turnaround Time: 6.25 ms
Average Waiting Time: 5.25 ms
Average Response Time: 4.25 ms
```

FULL REPORT FILE:

```
File   Edit   View

Scheduling Order: [P1, P3, P1, P4, P2]
Process ID: P3, Priority: 1, Arrival Time: 2, CPU Burst: 0, Start Time: 3, Termination Time: 5, Turnaround Time: 3, Waiting Time: 3, Response Time: 1
Process ID: P1, Priority: 1, Arrival Time: 0, CPU Burst: 0, Start Time: 5, Termination Time: 7, Turnaround Time: 7, Waiting Time: 7, Response Time: 5
Process ID: P4, Priority: 2, Arrival Time: 3, CPU Burst: 1, Start Time: 7, Termination Time: 8, Turnaround Time: 5, Waiting Time: 4, Response Time: 4
Process ID: P2, Priority: 2, Arrival Time: 1, CPU Burst: 3, Start Time: 8, Termination Time: 11, Turnaround Time: 10, Waiting Time: 7, Response Time: 7
Average Turnaround Time: 6.25 ms
Average Waiting Time: 5.25 ms
Average Response Time: 4.25 ms
Scheduling Order: [P3, P4, P2, P1]
Process ID: P3, Priority: 1, Arrival Time: 2, CPU Burst: 0, Start Time: 0, Termination Time: 2, Turnaround Time: 0, Waiting Time: 0, Response Time: -2
Process ID: P4, Priority: 1, Arrival Time: 3, CPU Burst: 0, Start Time: 2, Termination Time: 4, Turnaround Time: 1, Waiting Time: 1, Response Time: -1
Process ID: P2, Priority: 2, Arrival Time: 1, CPU Burst: 4, Start Time: 4, Termination Time: 8, Turnaround Time: 7, Waiting Time: 3, Response Time: 3
Process ID: P1, Priority: 2, Arrival Time: 0, CPU Burst: 6, Start Time: 8, Termination Time: 14, Turnaround Time: 14, Waiting Time: 8, Response Time: 8
Average Turnaround Time: 5.50 ms
Average Waiting Time: 3.00 ms
Average Response Time: 2.00 ms
Scheduling Order: [P1, P2, P3, P4, P1, P2, P3, P2]
Process ID: P4, Priority: 1, Arrival Time: 3, CPU Burst: 0, Start Time: 9, Termination Time: 12, Turnaround Time: 9, Waiting Time: 9, Response Time: 6
Process ID: P1, Priority: 1, Arrival Time: 0, CPU Burst: 0, Start Time: 12, Termination Time: 14, Turnaround Time: 14, Waiting Time: 14, Response Time: 12
Process ID: P3, Priority: 1, Arrival Time: 2, CPU Burst: 0, Start Time: 17, Termination Time: 18, Turnaround Time: 16, Waiting Time: 16, Response Time: 15
Process ID: P2, Priority: 1, Arrival Time: 1, CPU Burst: 0, Start Time: 18, Termination Time: 20, Turnaround Time: 19, Waiting Time: 19, Response Time: 17
Average Turnaround Time: 14.50 ms
Average Waiting Time: 14.50 ms
Average Response Time: 12.50 ms
Scheduling Order: [P2, P4, P4, P1, P3]
Process ID: P2, Priority: 1, Arrival Time: 1, CPU Burst: 0, Start Time: 0, Termination Time: 1, Turnaround Time: 0, Waiting Time: 0, Response Time: -1
Process ID: P4, Priority: 1, Arrival Time: 3, CPU Burst: 0, Start Time: 4, Termination Time: 6, Turnaround Time: 3, Waiting Time: 3, Response Time: 1
Process ID: P1, Priority: 2, Arrival Time: 0, CPU Burst: 2, Start Time: 6, Termination Time: 8, Turnaround Time: 8, Waiting Time: 6, Response Time: 6
Process ID: P3, Priority: 2, Arrival Time: 2, CPU Burst: 3, Start Time: 8, Termination Time: 11, Turnaround Time: 9, Waiting Time: 6, Response Time: 6
Average Turnaround Time: 5.00 ms
Average Waiting Time: 3.75 ms
Average Response Time: 3.00 ms
Scheduling Order: [P1, P3, P1, P4, P2]
Process ID: P3, Priority: 1, Arrival Time: 2, CPU Burst: 0, Start Time: 3, Termination Time: 5, Turnaround Time: 3, Waiting Time: 3, Response Time: 1
Process ID: P1, Priority: 1, Arrival Time: 0, CPU Burst: 0, Start Time: 5, Termination Time: 7, Turnaround Time: 7, Waiting Time: 7, Response Time: 5
Process ID: P4, Priority: 2, Arrival Time: 3, CPU Burst: 1, Start Time: 7, Termination Time: 8, Turnaround Time: 5, Waiting Time: 4, Response Time: 4
Process ID: P2, Priority: 2, Arrival Time: 1, CPU Burst: 3, Start Time: 8, Termination Time: 11, Turnaround Time: 10, Waiting Time: 7, Response Time: 7
Average Turnaround Time: 6.25 ms
Average Waiting Time: 5.25 ms
Average Response Time: 4.25 ms
```