Section 1: Provided Test Cases Results

Sample1_input:

barbulescuv@AAD-PF4ECTGN:/mnt/c/Users/barbulescuv/CLion/Github/Operating Systems/Playground$ ./main.out sample1_input.txt

Simulation Starting. Preemption: false

2: Starting process with PID: 1 PRIORITY: 1

2: Process scheduled to run with PID: 1 PRIORITY: 1

3: Starting process with PID: 2 PRIORITY: 2

4: Process with PID: 1 waiting for I/O device 1

4: Process scheduled to run with PID: 2 PRIORITY: 2

6: Ending process with PID: 2

7: I/O completed for I/O device 1

7: Process scheduled to run with PID: 1 PRIORITY: 1

10: Ending process with PID: 1

Simulation ended at time 10

System idle time: 3

PID: 2, PRIORITY: 2, READY WAIT TIME: 1, I/O WAIT TIME: 0

PID: 1, PRIORITY: 1, READY WAIT TIME: 0, I/O WAIT TIME: 3

Sample2_input:

barbulescuv@AAD-PF4ECTGN:/mnt/c/Users/barbulescuv/CLion/Github/Operating Systems/Playground$ ./main.out sample2_input.txt

Simulation Starting. Preemption: true

2: Starting process with PID: 1 PRIORITY: 1

2: Process scheduled to run with PID: 1 PRIORITY: 1

3: Starting process with PID: 2 PRIORITY: 2

3: Process scheduled to run with PID: 2 PRIORITY: 2

4: Starting process with PID: 3 PRIORITY: 3

4: Process scheduled to run with PID: 3 PRIORITY: 3

5: Starting process with PID: 4 PRIORITY: 4

5: Process scheduled to run with PID: 4 PRIORITY: 4

6: Starting process with PID: 5 PRIORITY: 5

6: Process scheduled to run with PID: 5 PRIORITY: 5

7: Ending process with PID: 5

7: Process scheduled to run with PID: 4 PRIORITY: 4

8: Ending process with PID: 4

8: Process scheduled to run with PID: 3 PRIORITY: 3

9: Ending process with PID: 3

9: Process scheduled to run with PID: 2 PRIORITY: 2

10: Ending process with PID: 2

10: Process scheduled to run with PID: 1 PRIORITY: 1

11: Ending process with PID: 1

Simulation ended at time 11

System idle time: 2

PID: 5, PRIORITY: 5, READY WAIT TIME: 0, I/O WAIT TIME: 0

PID: 4, PRIORITY: 4, READY WAIT TIME: 1, I/O WAIT TIME: 0

PID: 3, PRIORITY: 3, READY WAIT TIME: 3, I/O WAIT TIME: 0

PID: 2, PRIORITY: 2, READY WAIT TIME: 5, I/O WAIT TIME: 0

PID: 1, PRIORITY: 1, READY WAIT TIME: 7, I/O WAIT TIME: 0

Sample3_input:

barbulescuv@AAD-PF4ECTGN:/mnt/c/Users/barbulescuv/CLion/Github/Operating Systems/Playground$ ./main.out sample3_input.txt

Simulation Starting. Preemption: true

2: Starting process with PID: 1 PRIORITY: 1

2: Process scheduled to run with PID: 1 PRIORITY: 1

3: Starting process with PID: 2 PRIORITY: 2

3: Process scheduled to run with PID: 2 PRIORITY: 2

4: Starting process with PID: 3 PRIORITY: 3

4: Process scheduled to run with PID: 3 PRIORITY: 3

5: Process with PID: 3 waiting for I/O device 3

5: Process scheduled to run with PID: 2 PRIORITY: 2

6: Process with PID: 2 waiting for I/O device 3

6: Process scheduled to run with PID: 1 PRIORITY: 1

7: Process with PID: 1 waiting for I/O device 4

10: I/O completed for I/O device 3

10: Process scheduled to run with PID: 3 PRIORITY: 3

11: I/O completed for I/O device 4

12: Ending process with PID: 3

12: Process scheduled to run with PID: 2 PRIORITY: 2

13: Ending process with PID: 2

13: Process scheduled to run with PID: 1 PRIORITY: 1

14: Ending process with PID: 1

Simulation ended at time 14

System idle time: 5

PID: 3, PRIORITY: 3, READY WAIT TIME: 0, I/O WAIT TIME: 5

PID: 2, PRIORITY: 2, READY WAIT TIME: 3, I/O WAIT TIME: 4

PID: 1, PRIORITY: 1, READY WAIT TIME: 5, I/O WAIT TIME: 4

PID: 1, PRIORITY: 1, READY WAIT TIME: 5, I/O WAIT TIME: 4

Section 2: Custom Test Case Results

Test 1: Simple Preemption: Preemptive scheduling with multiple processes, I/O, idle times, etc.

barbulescuv@AAD-PF4ECTGN:/mnt/c/Users/barbulescuv/CLion/Github/Operating Systems/Projects/process-simulator-Victor-Barbulescu/src$ ./main.out simple_preemptive.txt

Simulation Starting. Preemption: true

2: Starting process with PID: 1 PRIORITY: 3

2: Process scheduled to run with PID: 1 PRIORITY: 3

3: Starting process with PID: 2 PRIORITY: 2

4: Process with PID: 1 waiting for I/O device 1

4: Process scheduled to run with PID: 2 PRIORITY: 2

5: Process with PID: 2 waiting for I/O device 4

7: I/O completed for I/O device 1

7: Process scheduled to run with PID: 1 PRIORITY: 3

9: I/O completed for I/O device 4

11: Ending process with PID: 1

11: Process scheduled to run with PID: 2 PRIORITY: 2

11: Ending process with PID: 2

Simulation ended at time: 11

System idle time: 4

PID: 1, PRIORITY: 3, READY WAIT TIME: 0, I/O WAIT TIME: 3

PID: 2, PRIORITY: 2, READY WAIT TIME: 3, I/O WAIT TIME: 4

Test 2: Multiple processes in I/O queue: In this preemptive test, multiple elements of various priorities are sent to the same device queue. Then, an element with a much lower priority enters the system. When the I/O device finishes, the highest priority element is sent to the CPU and everything else is sent to the queue.

barbulescuv@AAD-PF4ECTGN:/mnt/c/Users/barbulescuv/CLion/Github/Operating Systems/Projects/process-simulator-Victor-Barbulescu/src$ ./main.out preemptive_queued_io.txt

Simulation Starting. Preemption: true

2: Starting process with PID: 1 PRIORITY: 7

2: Process scheduled to run with PID: 1 PRIORITY: 7

3: Starting process with PID: 2 PRIORITY: 5

4: Process with PID: 1 waiting for I/O device 1

4: Process scheduled to run with PID: 2 PRIORITY: 5

5: Process with PID: 2 waiting for I/O device 1

7: Starting process with PID: 3 PRIORITY: 3

7: Process scheduled to run with PID: 3 PRIORITY: 3

8: I/O completed for I/O device 1

8: Process scheduled to run with PID: 1 PRIORITY: 7

9: Ending process with PID: 1

9: Process scheduled to run with PID: 2 PRIORITY: 5

10: Ending process with PID: 2

10: Process scheduled to run with PID: 3 PRIORITY: 3

11: Ending process with PID: 3

Simulation ended at time: 11

System idle time: 4

PID: 1, PRIORITY: 7, READY WAIT TIME: 0, I/O WAIT TIME: 4

PID: 2, PRIORITY: 5, READY WAIT TIME: 2, I/O WAIT TIME: 3

PID: 3, PRIORITY: 3, READY WAIT TIME: 2, I/O WAIT TIME: 0

Test 3: Multiple I/O devices: This non-preemptive test places many processes in many different I/O devices. It demonstrates that the scheduler can handle the release of different processes from different I/O devices and schedule them all accordingly.

barbulescuv@AAD-PF4ECTGN:/mnt/c/Users/barbulescuv/CLion/Github/Operating Systems/Projects/process-simulator-Victor-Barbulescu/src$ ./main.out multiple_io.txt

Simulation Starting. Preemption: false

1: Starting process with PID: 1 PRIORITY: 1

1: Process scheduled to run with PID: 1 PRIORITY: 1

2: Starting process with PID: 2 PRIORITY: 2

3: Starting process with PID: 3 PRIORITY: 3

4: Starting process with PID: 4 PRIORITY: 4

5: Process with PID: 1 waiting for I/O device 1

5: Process scheduled to run with PID: 2 PRIORITY: 2

6: Process with PID: 2 waiting for I/O device 2

6: Process scheduled to run with PID: 3 PRIORITY: 3

7: Process with PID: 3 waiting for I/O device 3

7: Process scheduled to run with PID: 4 PRIORITY: 4

8: Process with PID: 4 waiting for I/O device 4

11: I/O completed for I/O device 4

11: Process scheduled to run with PID: 4 PRIORITY: 4

12: I/O completed for I/O device 3

13: I/O completed for I/O device 2

14: I/O completed for I/O device 1

15: Ending process with PID: 4

15: Process scheduled to run with PID: 3 PRIORITY: 3

16: Ending process with PID: 3

16: Process scheduled to run with PID: 2 PRIORITY: 2

17: Ending process with PID: 2

17: Process scheduled to run with PID: 1 PRIORITY: 1

18: Ending process with PID: 1

Simulation ended at time: 18

System idle time: 4

PID: 4, PRIORITY: 4, READY WAIT TIME: 3, I/O WAIT TIME: 3

PID: 3, PRIORITY: 3, READY WAIT TIME: 6, I/O WAIT TIME: 5

PID: 2, PRIORITY: 2, READY WAIT TIME: 6, I/O WAIT TIME: 7

PID: 1, PRIORITY: 1, READY WAIT TIME: 3, I/O WAIT TIME: 9

Test 4: Long idle time: This test shows that the scheduler can accurately track a longer idle time. The first process arrives at time 1, and there is a long idle time between times 4 and 10. This should lead to a total idle time of 7.

barbulescuv@AAD-PF4ECTGN:/mnt/c/Users/barbulescuv/CLion/Github/Operating Systems/Projects/process-simulator-Victor-Barbulescu/src$ ./main.out long_idle_time.txt

Simulation Starting. Preemption: false

1: Starting process with PID: 1 PRIORITY: 2

1: Process scheduled to run with PID: 1 PRIORITY: 2

2: Starting process with PID: 2 PRIORITY: 4

3: Process with PID: 1 waiting for I/O device 1

3: Process scheduled to run with PID: 2 PRIORITY: 4

4: Process with PID: 2 waiting for I/O device 1

10: I/O completed for I/O device 1

10: Process scheduled to run with PID: 1 PRIORITY: 2

11: Ending process with PID: 1

11: Process scheduled to run with PID: 2 PRIORITY: 4

12: Ending process with PID: 2

Simulation ended at time: 12

System idle time: 7

PID: 1, PRIORITY: 2, READY WAIT TIME: 0, I/O WAIT TIME: 7

PID: 2, PRIORITY: 4, READY WAIT TIME: 2, I/O WAIT TIME: 6