CSL 3030 - Operating System
Assignment 3
Scheduler

Task 1: Initialize Processes

Processes are created using the `fork()` system call, and their details such as PID, burst time and arrival time are stored in a `Process` structure.

```
Enter the number of processes: 3
Process 1 created: PID = 4920
Enter burst time for Process 1: 4
Enter arrival time for Process 1: 0
Process 2 created: PID = 4921
Enter burst time for Process 2: 2
Enter arrival time for Process 2: 2
Process 3 created: PID = 4922
Enter burst time for Process 3: 7
Enter arrival time for Process 3: 3
```

Task 2: User Interface for Scheduler Configuration

Provided an interface for users to select a scheduling algorithm.

```
Select Scheduling Algorithm:
1. Round-Robin
2. Priority-based Scheduling
```

Task 3: Round-Robin (RR) Scheduling

Implemented the Round-Robin scheduling algorithm. *The user will be required to select time quantum if they select Round Robin in the previous step.*

```
Select Scheduling Algorithm:
1. Round-Robin
2. Priority-based Scheduling
Enter your choice (1 or 2): 1
Round-Robin selected. Enter quantum time: 3
```

Task 4: Priority-Based Scheduling

Schedules processes based on priority values, executing higher-priority processes first without preemption. *The user will be required to enter priority for each process only if they select Priority Scheduling.*

```
Enter your choice (1 or 2): 2
Priority-based Scheduling selected.
Enter priority for Process 1 (lower number means higher priority): 2
Enter priority for Process 2 (lower number means higher priority): 1
Enter priority for Process 3 (lower number means higher priority): 3
```

Task 5: Calculate Average Waiting Time

Computed the average waiting time for both processes.

Round Robin:

```
Enter the number of processes: 3
Process 1 created: PID = 4946
Enter burst time for Process 1: 4
Enter arrival time for Process 1: 0
Process 2 created: PID = 4947
Enter burst time for Process 2: 2
Enter arrival time for Process 2: 2
Process 3 created: PID = 4948
Enter burst time for Process 3: 7
Enter arrival time for Process 3: 3

Select Scheduling Algorithm:
1. Round-Robin
2. Priority-based Scheduling
Enter your choice (1 or 2): 1
Round-Robin selected. Enter quantum time: 3
Time 0: Process with PID = 4946 executed for 3 units (Remaining Time = 1).
Time 3: Process with PID = 4947 executed for 2 units (Completed).
Time 5: Process with PID = 4948 executed for 3 units (Remaining Time = 4).
Time 8: Process with PID = 4946 executed for 1 units (Completed).
Time 9: Process with PID = 4948 executed for 3 units (Remaining Time = 1).
Time 12: Process with PID = 4948 executed for 1 units (Completed).
Average Waiting Time: 3.00
```

Priority Based Scheduling:

```
Enter the number of processes: 3
Process 1 created: PID = 4920
Enter burst time for Process 1: 4
Enter arrival time for Process 1: 0
Process 2 created: PID = 4921
Enter burst time for Process 2: 2
Enter arrival time for Process 2: 2
Process 3 created: PID = 4922
Enter burst time for Process 3: 7
Enter arrival time for Process 3: 3

Select Scheduling Algorithm:
1. Round-Robin
2. Priority-based Scheduling
Enter your choice (1 or 2): 2
Priority-based Scheduling selected.
Enter priority for Process 1 (lower number means higher priority): 2
Enter priority for Process 2 (lower number means higher priority): 1
Enter priority for Process 3 (lower number means higher priority): 3


Process_PID      Burst Time      Waiting Time    Turnaround Time
------------------------------------------------------------
         4921            2              0               2
------------------------------------------------------------
         4920            4              2               6
------------------------------------------------------------
         4922            7              6               13
------------------------------------------------------------


Average Waiting Time : 2.67
Average Turnaround Time: 7.00
```

Task 6: Compare Performance

1. **Average Waiting Times:**
    - **Round-Robin (RR):** Average Waiting Time = 3
    - **Priority Scheduling:** Average Waiting Time = 2.67
2. In this use case, The Priority Scheduling algorithm has a lower average waiting time compared to Round-Robin.
3. **Verdict:**
    - **Priority Scheduling** performed better in this instance, as it resulted in a lower average waiting time. This indicates that processes are generally completed more quickly with less waiting time when scheduled by priority compared to when scheduled in a Round-Robin manner.

***If minimizing waiting time is crucial**, such as in real-time systems or time-sensitive applications, **Priority Scheduling** might be preferred.*

***If ensuring fair CPU time for all processes is more important**, regardless of individual waiting times, **Round-Robin Scheduling** may be a better choice.*