Faculty of Engineering and Technology
Electrical and Computer Engineering Department

Computer Design Lab
ENCS4110

Project 2

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Section: **1**
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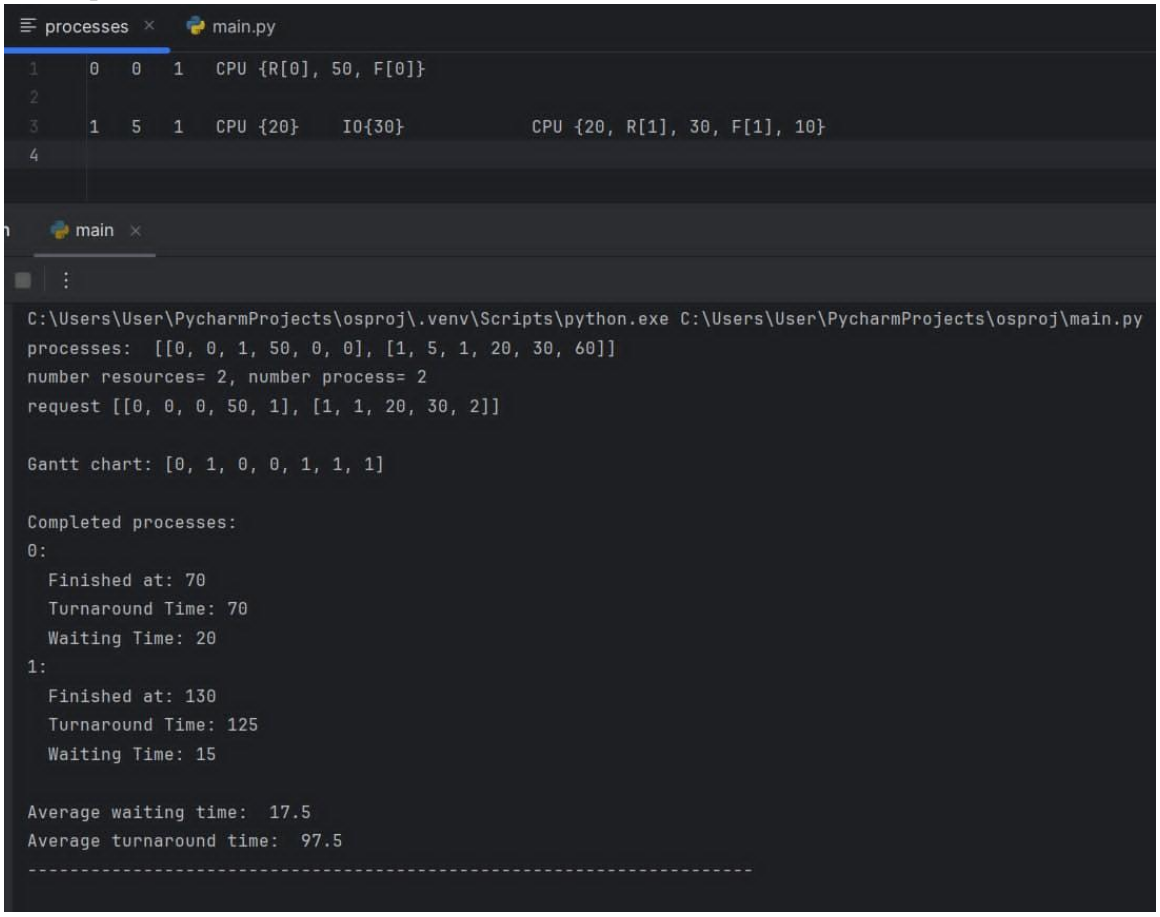
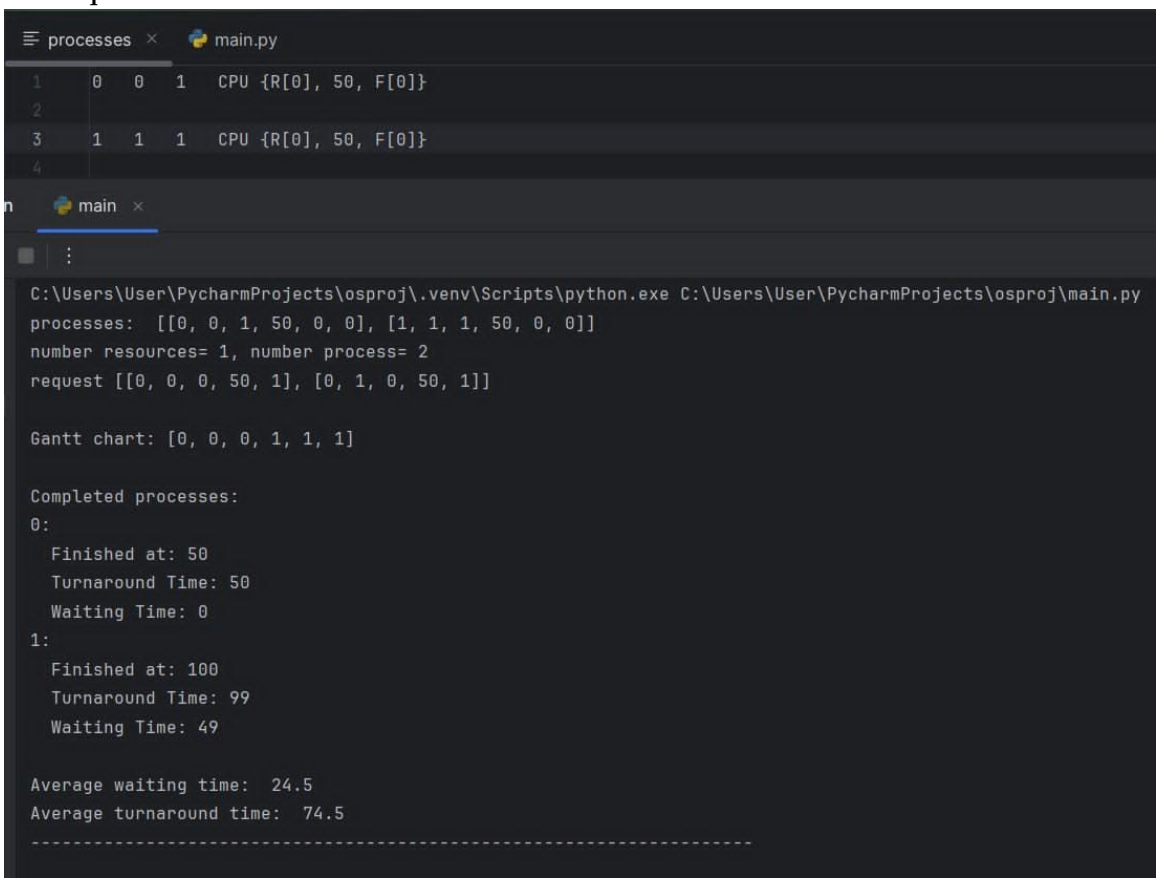
Test cases:

1) No deadlock:

First case: input file same as it was in the project
time quanta = 20



second case: two processes asking for the same recourse at the same time:
time quanta = 20

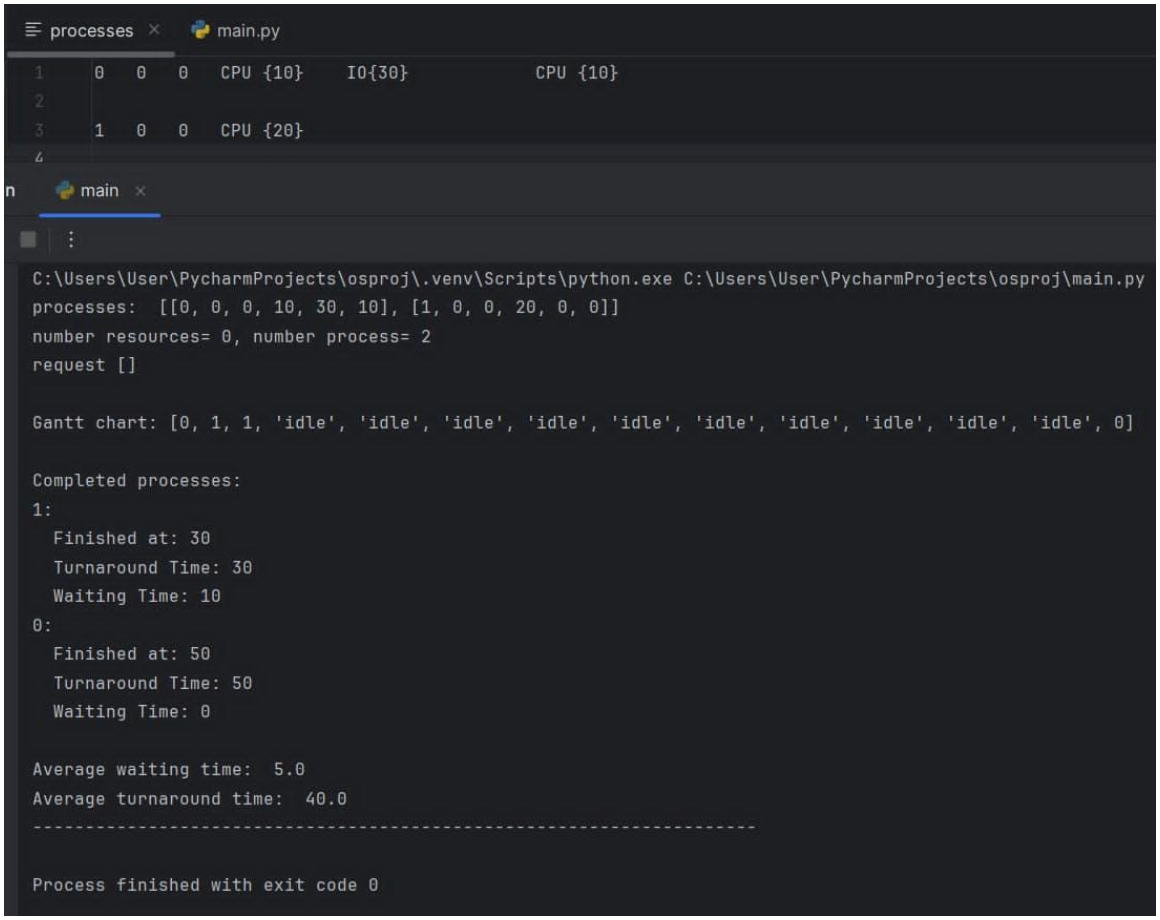


third case:
time quanta = 10

Test case 1 (without deadlock):

PID	Arrival Time	Priority	CPU / IO Bursts
0	0	0	CPU{10} IO{30} CPU{10}
1	0	0	CPU{20}

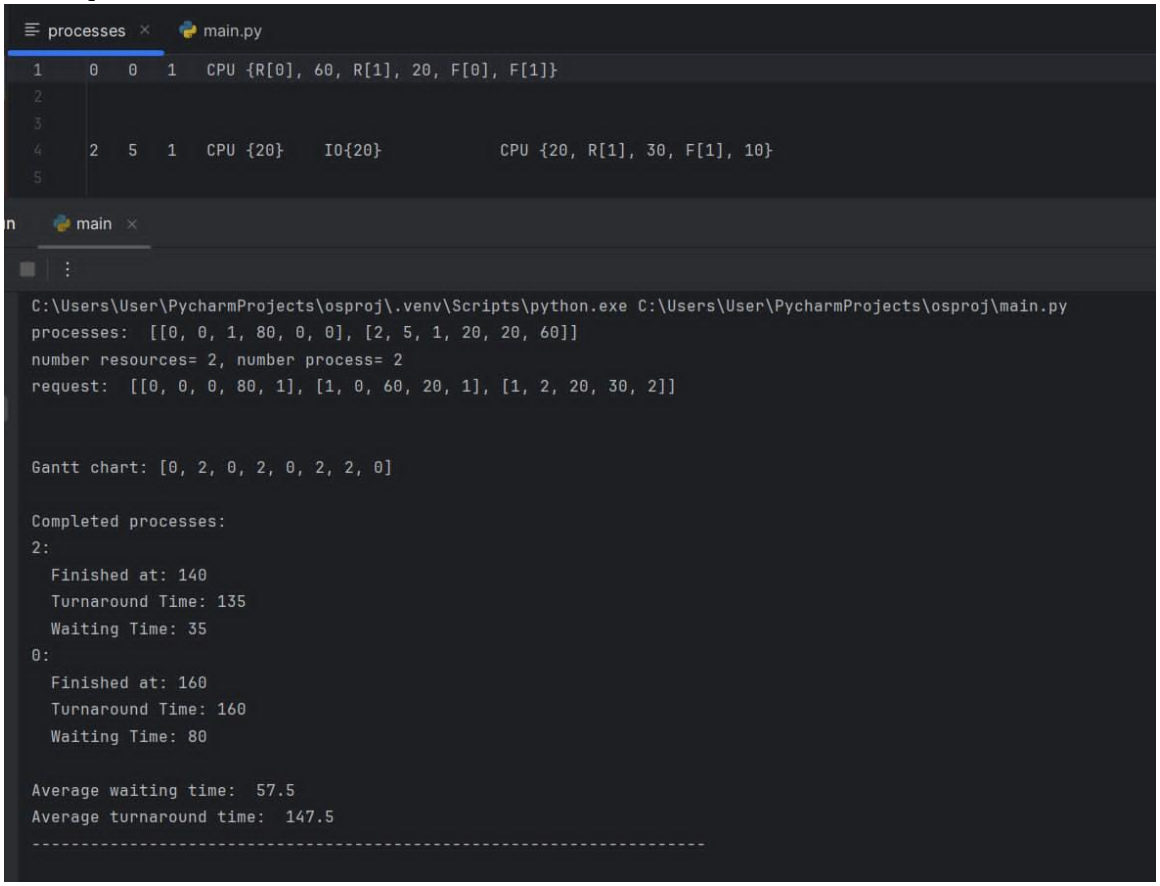
Gantt Chart



Here we have 10 idle each one unit time (idle is 1 sec)

Forth case:

Time quanta: 20



2) Deadlock and recovery:

First case:

Time quanta 10

```
0   0   1   CPU {R[0], 15, R[1], 10, F[0], F[1]}

1   0   1   CPU {R[1], 15, R[0], 10, F[1], F[0]}

2   0   0   CPU {50}

```

```
processes:  [[0, 0, 1, 25, 0, 0], [1, 0, 1, 25, 0, 0], [2, 0, 0, 50, 0, 0]]
number resources= 2, number process= 3
request:  [[0, 0, 0, 25, 1], [1, 0, 15, 10, 1], [1, 1, 0, 25, 1], [0, 1, 15, 10, 1]]

Deadlock detected! Process 1 is waiting for resource 0 held by blocked process 0
Deadlock detected! Process 0 is waiting for resource 1 held by blocked process 1
Deadlock processes [0, 1]
At time  80
Recovery:
Terminating process 0 to break the deadlock.

Gantt chart: [2, 2, 2, 2, 2, 0, 1, 0, 1, 1, 0, 0, 0]

Completed processes:
2:
  Finished at: 50
  Turnaround Time: 50
  Waiting Time: 0
1:
  Finished at: 90
  Turnaround Time: 90
  Waiting Time: 65
0:
  Finished at: 115
  Turnaround Time: 115
  Waiting Time: 90

Average waiting time:  51.666666666666664
Average turnaround time:  85.0
```

Second case:

Time quanta: 20

```
0   0   1   CPU {R[0], 20, R[1], 20, F[0], F[1]}

1   0   1   CPU {R[1], 20, R[0], 20, F[1], F[0]}

2   5   2   CPU {20}    IO{5}            CPU {20, R[1], 30, F[1], 10}
```

main

```
C:\Users\User\PycharmProjects\osproj\.venv\Scripts\python.exe C:\Users\User\PycharmProjects\osproj\main.py
processes:  [[0, 0, 1, 40, 0, 0], [1, 0, 1, 40, 0, 0], [2, 5, 2, 20, 5, 60]]
number resources= 2, number process= 3
request:  [[0, 0, 0, 40, 1], [1, 0, 20, 20, 1], [1, 1, 0, 40, 1], [0, 1, 20, 20, 1], [1, 2, 20, 30, 2]]

Deadlock detected! Process 1 is waiting for resource 0 held by blocked process 0
Deadlock detected! Process 0 is waiting for resource 1 held by blocked process 1
Deadlock processes [0, 1]
At time  40
Recovery:
Terminating process 0 to break the deadlock.

Gantt chart: [0, 1, 0, 1, 1, 0, 0, 2, 'idle', 'idle', 'idle', 'idle', 'idle', 2, 2, 2]

Completed processes:
1:
  Finished at: 60
  Turnaround Time: 60
  Waiting Time: 20
0:
  Finished at: 100
  Turnaround Time: 100
  Waiting Time: 60
```

```
Gantt chart: [0, 1, 0, 1, 1, 0, 0, 2, 'idle', 'idle', 'idle', 'idle', 'idle', 2, 2, 2]

Completed processes:
1:
  Finished at: 60
  Turnaround Time: 60
  Waiting Time: 20
0:
  Finished at: 100
  Turnaround Time: 100
  Waiting Time: 60
2:
  Finished at: 185
  Turnaround Time: 180
  Waiting Time: 95

Average waiting time:  58.333333333333336
Average turnaround time:  113.33333333333333
------------------------------------------------------------------------
```

For the discussion:

0	0	1	CPU {R[0], 50, F[0]}		
1	5	1	CPU {20}	IO{30}	CPU {34, R[1], 30, F[1], 10}
2	6	3	CPU {20, R[2], 30, F[2], 10}		
3	4	2	CPU {15}	IO{32}	CPU {25}
5	5	1	CPU {70}	IO{30}	CPU {R[3], 45, F[3]}
6	10	4	CPU {R[0], 20, R[1], 20, F[0], F[1]}		