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Test case 1 (without deadlock):

PID	Arrival Time	Priority	CPU / IO Bursts
0	0	1	CPU{15}
1	0	1	CPU{10} IO{15} CPU{5}

Gantt Chart

P0(0-10) P1(10-20) P0(20-25) (25-35)idle P1(35-40)

The output in consol :

```
Processing line: 0 0 1 CPU{15}
In the CPU block
Processing line: 1 0 1 CPU{10} IO{15} CPU{5}
In the CPU block
In the CPU block

Processes Information:
Process ID: 0
Arrival Time: 0
Priority: 1
CPU Bursts: 15
IO Bursts:

Process ID: 1
Arrival Time: 0
Priority: 1
CPU Bursts: 10 5
IO Bursts: 15

average waiting time=15.000000
gantt chart:
| P0 | | P1 | | P0 | | P1 |
| 0 | 10 | 10 | 20 | 20 | 25 | 35 | 40 |
40

PID: 0, Arrival: 0, Priority: 1, CPU Burst: 10,waiting time:0
PID: 1, Arrival: 10, Priority: 1, CPU Burst: 10,waiting time:10
PID: 0, Arrival: 20, Priority: 1, CPU Burst: 5,waiting time:20
PID: 1, Arrival: 35, Priority: 1, CPU Burst: 5,waiting time:0

=====
R[1] statues:0
R[1] pro:0
R[1] time:0
R[2] statues:0
R[2] pro:0
R[2] time:0
=====
=====

Process returned 0 (0x0) execution time : 0.036 s
Press any key to continue.
_
```

Test case 2 (with deadlock):

Assume the time quantum  $q = 10$ , and a lower priority number implies a higher priority

PID	Arrival Time	Priority	CPU / IO Bursts
0	0	1	CPU{R[1], 10, R[2], 5, F[1], F[2]}
1	0	1	CPU{R[2], 8, R[1], 7, F[2], F[1]}
2	0	0	CPU{10}

Deadlocked processes: P0 and P1

Gantt Chart

P2(0-10) P1(10-18) [Deadlock occurs]:

```
IO Bursts:

there is an dead lock
there is an dead lock
average time=9.333333
gantt chart:
|  | P2 |  |  | P1 |  |  | P0 |  |  | P1 |  |  | P0 |  |
|  | 10 | 10 | 18 | 18 | 28 | 28 | 35 | 35 | 40 |
40

PID: 2, Arrival: 0, Priority: 0, CPU Burst: 10,waiting time:0
PID: 1, Arrival: 10, Priority: 1, CPU Burst: 8,waiting time:10
PID: 0, Arrival: 18, Priority: 1, CPU Burst: 10,waiting time:18
PID: 1, Arrival: 28, Priority: 1, CPU Burst: 7,waiting time:0
PID: 0, Arrival: 35, Priority: 1, CPU Burst: 5,waiting time:0

=====
R[1] statues:1
R[1] pro:0
R[1] time:0
R[2] statues:0
R[2] pro:0
R[2] time:0
=====
=====

Process returned 0 (0x0)   execution time : 0.040 s
Press any key to continue.
|
```

### 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

P0	P1	idle	P0
0	10	30	40
50			

```
C:\Users\user\OneDrive\Desktop\OStask2\bin\Debug\OStask2.exe
Processing line: 0 0 1 CPU{10} IO{30} CPU{10}
In the CPU block
In the CPU block
Processing line: 1 0 1 CPU{20}In the CPU block

Processes Information:
Process ID: 0
Arrival Time: 0
Priority: 1
CPU Bursts: 10 10
IO Bursts: 30

Process ID: 1
Arrival Time: 0
Priority: 1
CPU Bursts: 20
IO Bursts:

average waiting time=15.000000
gantt chart:
| P0 | | P1 | | P1 | | P0 |
| 0 | 10 10 | 20 20 | 30 40 | 50 |
50

PID: 0, Arrival: 0, Priority: 1, CPU Burst: 10,waiting time:0
PID: 1, Arrival: 10, Priority: 1, CPU Burst: 10,waiting time:10
PID: 1, Arrival: 20, Priority: 1, CPU Burst: 10,waiting time:20
PID: 0, Arrival: 40, Priority: 1, CPU Burst: 10,waiting time:0

=====
R[1] statues:0
R[1] pro:0
R[1] time:0
R[2] statues:0
R[2] pro:0
R[2] time:0
=====
=====

Process returned 0 (0x0) execution time : 0.061 s
Press any key to continue.
```

### Test case 2 (with deadlock):

Assume the time quantum  $q = 10$ , and a lower priority number implies a higher priority

PID	Arrival Time	Priority	CPU / IO Bursts
0	0	1	CPU{R[1], 15, R[2], 10, F[1], F[2]}
1	0	1	CPU[5, R[2], R[1], 10, F[2], F[1]]
2	0	0	CPU{50}

Deadlocked processes: P0 and P1

Gantt Chart (assuming that deadlock detection is applied whenever a resource is requested and deadlock recovery is achieved by terminating P1, i.e., P1 should run again from the beginning)

	P2	P0	P1	P0	P0	P1
0	50	60	65	70	80	95



Deadlock is detected, P1 is terminated  
and resource 2 is preempted

```

there is an dead lock
there is an dead lock
average time=56.666667
gantt chart:
| P2 | P1 | P0 | P0 | P1 | P0 |
0 50 50 55 55 65 65 70 70 80 80 90
90

PID: 2, Arrival: 0, Priority: 0, CPU Burst: 50,waiting time:0
PID: 1, Arrival: 50, Priority: 1, CPU Burst: 5,waiting time:50
PID: 0, Arrival: 55, Priority: 1, CPU Burst: 10,waiting time:55
PID: 0, Arrival: 65, Priority: 1, CPU Burst: 5,waiting time:65
PID: 1, Arrival: 70, Priority: 1, CPU Burst: 10,waiting time:0
PID: 0, Arrival: 80, Priority: 1, CPU Burst: 10,waiting time:0

=====
R[1] statues:1
R[1] pro:0
R[1] time:0
R[2] statues:0
R[2] pro:0
R[2] time:0
=====
=====

Process returned 0 (0x0) execution time : 0.025 s
Press any key to continue.
|

```