KESHAV SONI
2018UCP1438

OPERATING SYSTEM LAB ASSIGNMENT – 3

• FCFS

```
import sys
sys.stdout = open('output.txt', 'w')
sys.stdin = open('input.txt' , 'r')

processes = {}
n = int(input())
for _ in range(n):
    s = input().split()
    del s[-1]

    processes[s[0]] = s[1:]

process_info = {}
process_state = {}
input_seq = []
output_seq = []
cpu_seq = []

cpu_free = 100
ip_free = 100
op_free = 100
current_time = 0

cpu = []
inp = []
out = []

cpu_busy = False
ip_busy = False
op_busy = False

while True:
    for process in list(processes.items()):
        if int(process[1][0]) <= current_time:

            process_info[process[0]] = process[1]
            process_state[process[0]] = 2

            cpu.append( (process[0],int(list(process[1][1])[1])) )
            del processes[process[0]]
```

```python


    if cpu_free == current_time:
        cpu_busy = False

        temp = process_info[cpu_seq[-3]]
        state = process_state[cpu_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'I':
                inp.append((cpu_seq[-3],int(list(temp[state])[1])))
            else:
                out.append((cpu_seq[-3],int(list(temp[state])[1])))
            process_state[cpu_seq[-3]] += 1

    if not cpu_busy and len(cpu):
        cpu_busy = True
        cpu_seq += [cpu[0][0] , current_time , current_time + cpu[0][1]]
        cpu_free = current_time + cpu[0][1]
        del cpu[0]


    if ip_free == current_time:
        ip_busy = False

        temp = process_info[input_seq[-3]]
        state = process_state[input_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'C':
                cpu.append((input_seq[-3],int(list(temp[state])[1])))
            else:
                out.append((input_seq[-3],int(list(temp[state])[1])))
            process_state[input_seq[-3]] += 1

    if not ip_busy and len(inp):
        ip_busy = True
        input_seq += [inp[0][0] , current_time , current_time + inp[0][1]]
        ip_free = current_time + inp[0][1]
        del inp[0]

    if op_free == current_time:
        op_busy = False

        temp = process_info[output_seq[-3]]
        state = process_state[output_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'C':
                cpu.append((output_seq[-3],int(list(temp[state])[1])))
            else:
                inp.append((output_seq[-3],int(list(temp[state])[1])))
        process_state[output_seq[-3]] += 1

```

```python
    if not op_busy and len(out):
        op_busy = True
        output_seq += [out[0][0] , current_time , current_time + out[0][1]]
        op_free = current_time + out[0][1]
        del out[0]

    current_time += 1
    if current_time == 50:
        break

print("CPU Sequence is:")
for i in range(0,len(cpu_seq),3):
    print("{} - From {} to {}".format(cpu_seq[i],cpu_seq[i+1],cpu_seq[i+2]))
print("")

print("INPUT Sequence is:")
for i in range(0,len(input_seq),3):
    print("{} - From {} to {}".format(input_seq[i],input_seq[i+1],input_seq[i+2]))
print("")

print("OUTPUT Sequence is:")
for i in range(0,len(output_seq),3):
    print("{} - From {} to {}".format(output_seq[i],output_seq[i+1],output_seq[i+2]))
print("")
```

File Edit Selection View Go Run Terminal Help

input.txt

c: > Users > ksoni > Desktop > Python_codes > input.txt

```
4
100 0 C4 I3 C5 -1
101 2 C5 O4 C2 -1
102 3 C3 O2 C3 -1
103 5 C2 I1 C4 -1
```

output.txt

c: > Users > ksoni > Desktop > Python_codes > output.txt

```
CPU Sequence is:
100 - From 0 to 4
101 - From 4 to 9
102 - From 9 to 12
103 - From 12 to 14
100 - From 14 to 19
101 - From 19 to 21
103 - From 21 to 25
102 - From 25 to 28

INPUT Sequence is:
100 - From 4 to 7
103 - From 14 to 15

OUTPUT Sequence is:
101 - From 9 to 13
102 - From 13 to 15
```

- **SJF**

```
import sys
sys.stdout = open('output.txt', 'w')
sys.stdin = open('input.txt' , 'r')

processes = {}
n = int(input())
for _ in range(n):
    s = input().split()
    del s[-1]

    processes[s[0]] = s[1:]

process_info = {}
process_state = {}
input_seq = []
output_seq = []
cpu_seq = []

cpu_free = 100
ip_free = 100
op_free = 100
current_time = 0

cpu = []
inp = []
out = []

cpu_busy = False
ip_busy = False
op_busy = False

while True:
    for process in list(processes.items()):
        if int(process[1][0]) <= current_time:

            process_info[process[0]] = process[1]
            process_state[process[0]] = 2

            cpu.append( (process[0],int(list(process[1][1])[1])) )
            del processes[process[0]]


    if cpu_free == current_time:
        cpu_busy = False

        temp = process_info[cpu_seq[-3]]
        state = process_state[cpu_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'I':
```

```
                inp.append((cpu_seq[-3],int(list(temp[state])[1])))
            else:
                out.append((cpu_seq[-3],int(list(temp[state])[1])))
            process_state[cpu_seq[-3]] += 1

    if not cpu_busy and len(cpu):
        cpu_busy = True
        cpu = sorted(cpu , key = lambda cpu: cpu[1])
        cpu_seq += [cpu[0][0] , current_time , current_time + cpu[0][1]]
        cpu_free = current_time + cpu[0][1]
        del cpu[0]



    if ip_free == current_time:
        ip_busy = False

        temp = process_info[input_seq[-3]]
        state = process_state[input_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'C':
                cpu.append((input_seq[-3],int(list(temp[state])[1])))
            else:
                out.append((input_seq[-3],int(list(temp[state])[1])))
            process_state[input_seq[-3]] += 1

    if not ip_busy and len(inp):
        ip_busy = True
        input_seq += [inp[0][0] , current_time , current_time + inp[0][1]]
        ip_free = current_time + inp[0][1]
        del inp[0]



    if op_free == current_time:
        op_busy = False

        temp = process_info[output_seq[-3]]
        state = process_state[output_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'C':
                cpu.append((output_seq[-3],int(list(temp[state])[1])))
            else:
                inp.append((output_seq[-3],int(list(temp[state])[1])))
        process_state[output_seq[-3]] += 1

    if not op_busy and len(out):
        op_busy = True
        output_seq += [out[0][0] , current_time , current_time + out[0][1]]
        op_free = current_time + out[0][1]
        del out[0]
```

```python
    current_time += 1
    if current_time == 50:
        break

print("CPU Sequence is:")
for i in range(0,len(cpu_seq),3):
    print("{} - From {} to {}".format(cpu_seq[i],cpu_seq[i+1],cpu_seq[i+2]))
print("")

print("INPUT Sequence is:")
for i in range(0,len(input_seq),3):
    print("{} - From {} to {}".format(input_seq[i],input_seq[i+1],input_seq[i+2]))
print("")

print("OUTPUT Sequence is:")
for i in range(0,len(output_seq),3):
    print("{} - From {} to {}".format(output_seq[i],output_seq[i+1],output_seq[i+2]))
print("")

```

File Edit Selection View Go Run Terminal Help

input.txt

c: > Users > ksoni > Desktop > Python_codes > input.txt

```
4
100 0 C4 I3 C5 -1
101 2 C5 O4 C2 -1
102 3 C3 O2 C3 -1
103 5 C2 I1 C4 -1
```

output.txt

c: > Users > ksoni > Desktop > Python_codes > output.txt

```
CPU Sequence is:
100 - From 0 to 4
102 - From 4 to 7
103 - From 7 to 9
101 - From 9 to 14
102 - From 14 to 17
103 - From 17 to 21
101 - From 21 to 23
100 - From 23 to 28

INPUT Sequence is:
100 - From 4 to 7
103 - From 9 to 10

OUTPUT Sequence is:
102 - From 7 to 9
101 - From 14 to 18

```

- **Priority (non – preemtive)**

```
import sys
sys.stdout = open('output.txt', 'w')
sys.stdin = open('input.txt' , 'r')

processes = {}
n = int(input())
for _ in range(n):
    s = input().split()
    del s[-1]

    processes[s[0]] = s[1:]

process_info = {}
process_state = {}
priority = {}
input_seq = []
output_seq = []
cpu_seq = []

cpu_free = 100
ip_free = 100
op_free = 100
current_time = 0

cpu = []
inp = []
out = []

cpu_busy = False
ip_busy = False
op_busy = False

while True:
    for process in list(processes.items()):
        if int(process[1][0]) <= current_time:

            process_info[process[0]] = process[1]
            process_state[process[0]] = 3
            priority[process[0]] = process[1][1]

            cpu.append( (process[0],int(list(process[1][2])[1]) , prior-
ity[process[0]]) )
            del processes[process[0]]


    if cpu_free == current_time:
        cpu_busy = False

        temp = process_info[cpu_seq[-3]]
```

```
        state = process_state[cpu_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'I':
                inp.append((cpu_seq[-3],int(list(temp[state])[1])))
            else:
                out.append((cpu_seq[-3],int(list(temp[state])[1])))
            process_state[cpu_seq[-3]] += 1

    if not cpu_busy and len(cpu):
        cpu_busy = True
        cpu = sorted(cpu , key = lambda cpu: cpu[2])
        cpu_seq += [cpu[0][0] , current_time , current_time + cpu[0][1]]
        cpu_free = current_time + cpu[0][1]
        del cpu[0]



    if ip_free == current_time:
        ip_busy = False

        temp = process_info[input_seq[-3]]
        state = process_state[input_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'C':
                cpu.append((input_seq[-3],int(list(temp[state])[1]),prior-
ity[input_seq[-3]]))
            else:
                out.append((input_seq[-3],int(list(temp[state])[1])))
            process_state[input_seq[-3]] += 1

    if not ip_busy and len(inp):
        ip_busy = True
        input_seq += [inp[0][0] , current_time , current_time + inp[0][1]]
        ip_free = current_time + inp[0][1]
        del inp[0]



    if op_free == current_time:
        op_busy = False

        temp = process_info[output_seq[-3]]
        state = process_state[output_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'C':
                cpu.append((output_seq[-3],int(list(temp[state])[1]),prior-
ity[output_seq[-3]]))
            else:
                inp.append((output_seq[-3],int(list(temp[state])[1])))
        process_state[output_seq[-3]] += 1

```

```python
    if not op_busy and len(out):
        op_busy = True
        output_seq += [out[0][0] , current_time , current_time + out[0][1]]
        op_free = current_time + out[0][1]
        del out[0]

    current_time += 1
    if current_time == 50:
        break

print("CPU Sequence is:")
for i in range(0,len(cpu_seq),3):
    print("{} - From {} to {}".format(cpu_seq[i],cpu_seq[i+1],cpu_seq[i+2]))
print("")

print("INPUT Sequence is:")
for i in range(0,len(input_seq),3):
    print("{} - From {} to {}".format(input_seq[i],input_seq[i+1],input_seq[i+2]))
print("")

print("OUTPUT Sequence is:")
for i in range(0,len(output_seq),3):
    print("{} - From {} to {}".format(output_seq[i],output_seq[i+1],output_seq[i+2]))
print("")
```

File Edit Selection View Go Run Terminal Help

input.txt

c: > Users > ksoni > Desktop > Python_codes > input.txt

```
4
100 0 2 C4 I3 C5 -1
101 2 4 C5 O4 C2 -1
102 3 1 C3 O2 C3 -1
103 5 3 C2 I1 C4 -1
```

output.txt

c: > Users > ksoni > Desktop > Python_codes > output.txt

```
CPU Sequence is:
100 - From 0 to 4
102 - From 4 to 7
103 - From 7 to 9
100 - From 9 to 14
102 - From 14 to 17
103 - From 17 to 21
101 - From 21 to 26
101 - From 31 to 33

INPUT Sequence is:
100 - From 4 to 7
103 - From 9 to 10

OUTPUT Sequence is:
102 - From 7 to 9
101 - From 26 to 30
```

- **Preemtive Priority**

```
import sys
sys.stdout = open('output.txt', 'w')
sys.stdin = open('input.txt' , 'r')

processes = {}
n = int(input())
for _ in range(n):
    s = input().split()
    del s[-1]

    processes[s[0]] = s[1:]

process_info = {}
process_state = {}
priority = {}
input_seq = []
output_seq = []
cpu_seq = []

cpu_free = 100
ip_free = 100
op_free = 100
current_time = 0

cpu = []
inp = []
out = []

cpu_busy = False
ip_busy = False
op_busy = False

while len(processes) or len(cpu) or len(inp) or len(out) or True:
    flag = 0
    for process in list(processes.items()):
        if int(process[1][0]) <= current_time:

            process_info[process[0]] = process[1]
            process_state[process[0]] = 3
            priority[process[0]] = process[1][1]

            flag = 1
            cpu.append( (process[0],int(list(process[1][2])[1]) , prior-
ity[process[0]]) )
            del processes[process[0]]


    if cpu_free == current_time:
        cpu_busy = False
```

```
            cpu_seq.append(current_time)
            cpu = sorted(cpu , key = lambda cpu: cpu[2])
            del cpu[0]

            temp = process_info[cpu_seq[-3]]
            state = process_state[cpu_seq[-3]]
            if state < len(temp):
                if list(temp[state])[0] == 'I':
                    inp.append((cpu_seq[-3],int(list(temp[state])[1])))
                else:
                    out.append((cpu_seq[-3],int(list(temp[state])[1])))
                process_state[cpu_seq[-3]] += 1


        if ip_free == current_time:
            ip_busy = False

            temp = process_info[input_seq[-3]]
            state = process_state[input_seq[-3]]
            if state < len(temp):
                if list(temp[state])[0] == 'C':
                    flag = 1
                    cpu.append((input_seq[-3],int(list(temp[state])[1]),prior-
    ity[input_seq[-3]]))
                else:
                    out.append((input_seq[-3],int(list(temp[state])[1])))
                process_state[input_seq[-3]] += 1

        if not ip_busy and len(inp):
            ip_busy = True
            input_seq += [inp[0][0] , current_time , current_time + inp[0][1]]
            ip_free = current_time + inp[0][1]
            del inp[0]



        if op_free == current_time:
            op_busy = False

            temp = process_info[output_seq[-3]]
            state = process_state[output_seq[-3]]
            if state < len(temp):
                if list(temp[state])[0] == 'C':
                    flag = 1
                    cpu.append((output_seq[-3],int(list(temp[state])[1]),prior-
    ity[output_seq[-3]]))
                else:
                    inp.append((output_seq[-3],int(list(temp[state])[1])))
            process_state[output_seq[-3]] += 1

        if not op_busy and len(out):
```

```
            op_busy = True
            output_seq += [out[0][0] , current_time , current_time + out[0][1]]
            op_free = current_time + out[0][1]
            del out[0]


        if flag == 1 and cpu_busy:
            sth = sorted(cpu , key = lambda cpu: cpu[2])
            if cpu_seq[-2] != sth[0][2]:
                cpu_seq.append(current_time)
                del cpu[0]
                cpu.append((cpu_seq[-3] , cpu_free - current_time , prior-
ity[cpu_seq[-3]]))
                cpu_free = current_time + sth[0][1]
                cpu_seq += [sth[0][0] , current_time]

        elif not cpu_busy and len(cpu):
            cpu_busy = True
            cpu = sorted(cpu , key = lambda cpu: cpu[2])
            cpu_seq += [cpu[0][0] , current_time]
            cpu_free = current_time + cpu[0][1]

        current_time += 1
        if current_time == 50:
            break

    print("CPU Sequence is:")
    for i in range(0,len(cpu_seq),3):
        print("{} - From {} to {}".format(cpu_seq[i],cpu_seq[i+1],cpu_seq[i+2]))
    print("")

    print("INPUT Sequence is:")
    for i in range(0,len(input_seq),3):
        print("{} - From {} to {}".format(input_seq[i],input_seq[i+1],in-
put_seq[i+2]))
    print("")

    print("OUTPUT Sequence is:")
    for i in range(0,len(output_seq),3):
        print("{} - From {} to {}".format(output_seq[i],output_seq[i+1],out-
put_seq[i+2]))
    print("")

```

File Edit Selection View Go Run Terminal Help

input.txt

c: > Users > ksoni > Desktop > Python_codes > input.txt

```
4
100 0 2 C4 I3 C5 -1
101 2 4 C5 O4 C2 -1
102 3 1 C3 O2 C3 -1
103 5 3 C2 I1 C4 -1
```

output.txt

c: > Users > ksoni > Desktop > Python_codes > output.txt

```
CPU Sequence is:
100 - From 0 to 2
100 - From 2 to 3
102 - From 3 to 5
102 - From 5 to 8
102 - From 8 to 9
100 - From 9 to 12
103 - From 12 to 14
100 - From 15 to 16
100 - From 16 to 21
103 - From 21 to 25

INPUT Sequence is:
100 - From 12 to 15
103 - From 15 to 16

OUTPUT Sequence is:
102 - From 8 to 10
102 - From 10 to 13
```

- **MLFQ**

```
import sys
sys.stdout = open('output.txt', 'w')
sys.stdin = open('input.txt' , 'r')

processes = {}
n = int(input())
for _ in range(n):
    s = input().split()
    del s[-1]

    processes[s[0]] = s[1:]

process_info = {}
process_state = {}

input_seq = []
output_seq = []
cpu_seq = []

cpu_free = 100
ip_free = 100
op_free = 100
current_time = 0

work = 1000000
cpu1 = []
cpu2 = []
cpu3 = []
inp = []
out = []

cpu_busy = False
ip_busy = False
op_busy = False

while True:
    for process in list(processes.items()):
        if int(process[1][0]) <= current_time:

            process_info[process[0]] = process[1]
            process_state[process[0]] = 2

            cpu1.append( (process[0],int(list(process[1][1])[1]) ) )
            del processes[process[0]]


    if cpu_free == current_time:
        cpu_busy = False
        cpu_seq.append(current_time)
```

```
        temp = process_info[cpu_seq[-3]]
        state = process_state[cpu_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'I':
                inp.append((cpu_seq[-3],int(list(temp[state])[1])))
            else:
                out.append((cpu_seq[-3],int(list(temp[state])[1])))
            process_state[cpu_seq[-3]] += 1



    if ip_free == current_time:
        ip_busy = False

        temp = process_info[input_seq[-3]]
        state = process_state[input_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'C':
                cpu1.append((input_seq[-3],int(list(temp[state])[1])))
            else:
                out.append((input_seq[-3],int(list(temp[state])[1])))
            process_state[input_seq[-3]] += 1

    if not ip_busy and len(inp):
        ip_busy = True
        input_seq += [inp[0][0] , current_time , current_time + inp[0][1]]
        ip_free = current_time + inp[0][1]
        del inp[0]



    if op_free == current_time:
        op_busy = False

        temp = process_info[output_seq[-3]]
        state = process_state[output_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'C':
                cpu1.append((output_seq[-3],int(list(temp[state])[1])))
            else:
                inp.append((output_seq[-3],int(list(temp[state])[1])))
        process_state[output_seq[-3]] += 1

    if not op_busy and len(out):
        op_busy = True
        output_seq += [out[0][0] , current_time , current_time + out[0][1]]
        op_free = current_time + out[0][1]
        del out[0]

```

```
    if not cpu_busy and len(cpu1):
        cpu_busy = True
        cpu_seq += [cpu1[0][0] , current_time]
        cpu_free = current_time + cpu1[0][1]
        work = 1
        del cpu1[0]

    elif len(cpu1) and cpu_busy:
        cpu_seq.append(current_time)
        cpu2.append((cpu_seq[-3] , cpu_free - current_time ))

        cpu_seq += [cpu1[0][0] , current_time]
        cpu_free = current_time + cpu1[0][1]
        del cpu1[0]

    elif len(cpu2) and not cpu_busy:
        cpu_busy = True
        woek = 2
        cpu_seq += [cpu2[0][0] , current_time]
        cpu_free = current_time + cpu2[0][1]
        del cpu2[0]

    elif len(cpu2) and cpu_busy and work != 1:
        cpu_seq.append(current_time)
        cpu3.append((cpu_seq[-3] , cpu_free - current_time ))

        cpu_seq += [cpu2[0][0] , current_time]
        cpu_free = current_time + cpu2[0][1]
        del cpu2[0]

    elif len(cpu3) and not cpu_busy:
        cpu_busy = True
        work = 3
        cpu_seq += [cpu3[0][0] , current_time]
        cpu_free = current_time + cpu3[0][1]
        del cpu3[0]

    if current_time % 10 == 0:
        cpu1 += cpu2 + cpu3
        cpu2 = []
        cpu3 = []


    current_time += 1
    if current_time == 50:
        break

print("CPU Sequence is:")
```

```python
for i in range(0,len(cpu_seq),3):
    print("{} - From {} to {}".format(cpu_seq[i],cpu_seq[i+1],cpu_seq[i+2]))
print("")

print("INPUT Sequence is:")
for i in range(0,len(input_seq),3):
    print("{} - From {} to {}".format(input_seq[i],input_seq[i+1],input_seq[i+2]))
print("")

print("OUTPUT Sequence is:")
for i in range(0,len(output_seq),3):
    print("{} - From {} to {}".format(output_seq[i],output_seq[i+1],output_seq[i+2]))
print("")
```

File Edit Selection View Go Run Terminal Help

input.txt

c: > Users > ksoni > Desktop > Python_codes > input.txt

```
4
100 0 C4 I3 C5 -1
101 2 C5 O4 C2 -1
102 3 C3 O2 C3 -1
103 5 C2 I1 C4 -1
```

output.txt

c: > Users > ksoni > Desktop > Python_codes > output.txt

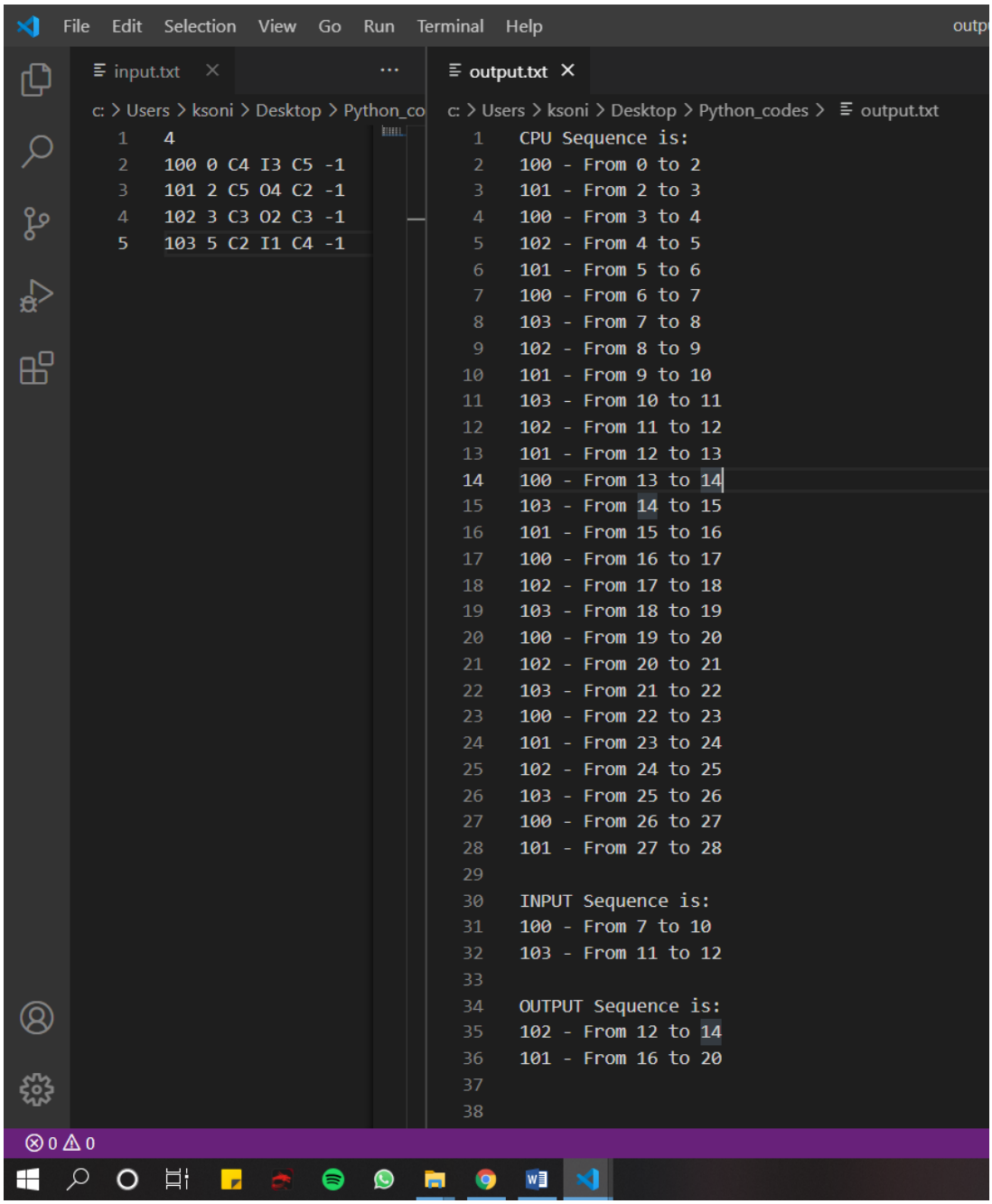
```
CPU Sequence is:
100 - From 0 to 2
101 - From 2 to 3
102 - From 3 to 5
103 - From 5 to 7
100 - From 7 to 8
103 - From 8 to 11
101 - From 11 to 12
102 - From 12 to 13
100 - From 13 to 14
103 - From 14 to 15
102 - From 15 to 17
100 - From 17 to 21
101 - From 21 to 22
102 - From 22 to 23
100 - From 23 to 24
101 - From 24 to 26
101 - From 30 to 32

INPUT Sequence is:
103 - From 7 to 8
100 - From 14 to 17

OUTPUT Sequence is:
102 - From 13 to 15
101 - From 26 to 30
```

- **Round Robin**

```
import sys
sys.stdout = open('output.txt', 'w')
sys.stdin = open('input.txt' , 'r')

processes = {}
n = int(input())
for _ in range(n):
    s = input().split()
    del s[-1]

    processes[s[0]] = s[1:]

process_info = {}
process_state = {}

input_seq = []
output_seq = []
cpu_seq = []

cpu_free = 100
ip_free = 100
op_free = 100
current_time = 0

cpu = []
inp = []
out = []

cpu_busy = False
ip_busy = False
op_busy = False

while True:
    for process in list(processes.items()):
        if int(process[1][0]) <= current_time:

            process_info[process[0]] = process[1]
            process_state[process[0]] = 2

            cpu.append( (process[0],int(list(process[1][1])[1]) ) )
            del processes[process[0]]


    if cpu_free == current_time:
        cpu_busy = False
        cpu_seq.append(current_time)

        temp = process_info[cpu_seq[-3]]
        state = process_state[cpu_seq[-3]]
```

```
        if state < len(temp):
            if list(temp[state])[0] == 'I':
                inp.append((cpu_seq[-3],int(list(temp[state])[1])))
            else:
                out.append((cpu_seq[-3],int(list(temp[state])[1])))
            process_state[cpu_seq[-3]] += 1

    if len(cpu) and cpu_busy:
        cpu_seq.append(current_time)
        cpu.append((cpu_seq[-3] , cpu_free - current_time ))

        cpu_seq += [cpu[0][0] , current_time]
        cpu_free = current_time + cpu[0][1]
        del cpu[0]

    if not cpu_busy and len(cpu):
        cpu_busy = True
        cpu_seq += [cpu[0][0] , current_time]
        cpu_free = current_time + cpu[0][1]
        del cpu[0]

    if ip_free == current_time:
        ip_busy = False

        temp = process_info[input_seq[-3]]
        state = process_state[input_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'C':
                cpu.append((input_seq[-3],int(list(temp[state])[1])))
            else:
                out.append((input_seq[-3],int(list(temp[state])[1])))
            process_state[input_seq[-3]] += 1

    if not ip_busy and len(inp):
        ip_busy = True
        input_seq += [inp[0][0] , current_time , current_time + inp[0][1]]
        ip_free = current_time + inp[0][1]
        del inp[0]



    if op_free == current_time:
        op_busy = False

        temp = process_info[output_seq[-3]]
        state = process_state[output_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'C':
                cpu.append((output_seq[-3],int(list(temp[state])[1])))
            else:
                inp.append((output_seq[-3],int(list(temp[state])[1])))
```

```
            process_state[output_seq[-3]] += 1

        if not op_busy and len(out):
            op_busy = True
            output_seq += [out[0][0] , current_time , current_time + out[0][1]]
            op_free = current_time + out[0][1]
            del out[0]

        current_time += 1
        if current_time == 50:
            break

    print("CPU Sequence is:")
    for i in range(0,len(cpu_seq),3):
        print("{} - From {} to {}".format(cpu_seq[i],cpu_seq[i+1],cpu_seq[i+2]))
    print("")

    print("INPUT Sequence is:")
    for i in range(0,len(input_seq),3):
        print("{} - From {} to {}".format(input_seq[i],input_seq[i+1],in-
    put_seq[i+2]))
    print("")

    print("OUTPUT Sequence is:")
    for i in range(0,len(output_seq),3):
        print("{} - From {} to {}".format(output_seq[i],output_seq[i+1],out-
    put_seq[i+2]))
    print("")

```



- **Lottery (proportional share)**

```
import sys
sys.stdout = open('output.txt', 'w')
sys.stdin = open('input.txt' , 'r')
import random

processes = {}
n = int(input())
for _ in range(n):
```

```
    s = input().split()
    del s[-1]

    processes[s[0]] = s[1:]

process_info = {}
process_state = {}

input_seq = []
output_seq = []
cpu_seq = []
rand = []

cpu_free = 100
ip_free = 100
op_free = 100
current_time = 0

cpu = {}
inp = []
out = []

cpu_busy = False
ip_busy = False
op_busy = False

while True:
    for process in list(processes.items()):
        if int(process[1][0]) <= current_time:
            rand += [process[0] for i in range(int(process[1][1]))]
            process_info[process[0]] = process[1]
            process_state[process[0]] = 3

            cpu[process[0]] = int(list(process[1][2])[1])
            del processes[process[0]]

    random.shuffle(rand)

    if cpu_free == current_time:
        cpu_busy = False
        cpu_seq.append(current_time)
        del cpu[cpu_seq[-3]]
        while cpu_seq[-3] in rand:
            rand.remove(cpu_seq[-3])

        temp = process_info[cpu_seq[-3]]
        state = process_state[cpu_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'I':
                inp.append((cpu_seq[-3],int(list(temp[state])[1])))
            else:
```

```
                out.append((cpu_seq[-3],int(list(temp[state])[1])))
            process_state[cpu_seq[-3]] += 1

    if cpu_busy:
        if cpu_seq[-2] != rand[0]:
            cpu_seq.append(current_time)
            cpu[cpu_seq[-3]] = cpu_free - current_time
            cpu_seq += [rand[0] , current_time]
            cpu_free = current_time + cpu[cpu_seq[-2]]

    elif not cpu_busy and len(cpu):
        cpu_busy = True
        cpu_seq += [rand[0] , current_time]
        cpu_free = current_time + cpu[rand[0]]



    if ip_free == current_time:
        ip_busy = False

        temp = process_info[input_seq[-3]]
        state = process_state[input_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'C':
                rand += [input_seq[-3] for i in range(int( process_info[input_seq[-3]][1]  ))]
                cpu[input_seq[-3]] = int(list(temp[state])[1])
            else:
                out.append((input_seq[-3],int(list(temp[state])[1])))
            process_state[input_seq[-3]] += 1

    if not ip_busy and len(inp):
        ip_busy = True
        input_seq += [inp[0][0] , current_time , current_time + inp[0][1]]
        ip_free = current_time + inp[0][1]
        del inp[0]


    if op_free == current_time:
        op_busy = False

        temp = process_info[output_seq[-3]]
        state = process_state[output_seq[-3]]
        if state < len(temp):
            if list(temp[state])[0] == 'C':
                rand += [output_seq[-3] for i in range(int( process_info[output_seq[-3]][1] ))]
                cpu[output_seq[-3]] = int(list(temp[state])[1])
            else:
                inp.append((output_seq[-3],int(list(temp[state])[1])))
        process_state[output_seq[-3]] += 1
```

```python
    if not op_busy and len(out):
        op_busy = True
        output_seq += [out[0][0] , current_time , current_time + out[0][1]]
        op_free = current_time + out[0][1]
        del out[0]

    current_time += 1
    if current_time == 50:
        break

print("CPU Sequence is:")
for i in range(0,len(cpu_seq),3):
    print("{} - From {} to {}".format(cpu_seq[i],cpu_seq[i+1],cpu_seq[i+2]))
print("")

print("INPUT Sequence is:")
for i in range(0,len(input_seq),3):
    print("{} - From {} to {}".format(input_seq[i],input_seq[i+1],input_seq[i+2]))
print("")

print("OUTPUT Sequence is:")
for i in range(0,len(output_seq),3):
    print("{} - From {} to {}".format(output_seq[i],output_seq[i+1],output_seq[i+2]))
print("")
```