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Sec: F

Operating System

Implement the First Come First Serve (FCFS) non preemptive algorithm by taking user input of the arrival & burst time of different processes.

In [1]:

```
import numpy as np
```

Taking user input in this step. Users need to enter all the value for AT **and** BT **spear with spaces. Input must be a set of even numbers.**

In [2]:

```
print ("Enter All value with space")
inputs = np.array([int(x) for x in input().split()])
```

```
Enter All value with space
0 24 0 3 0 3
```

This step checking that user input even number **of values. And showing the inputs.**

In [3]:

```
if len(inputs)%2 == 1:
    print ("Please input correct value, May be you missed something (You ne
ed to input even number of values, two for each process)")
else:
    print("Successfully inserted all values")
inputs
```

```
Successfully inserted all values
```

Out[3]:

```
array([ 0, 24,  0,  3,  0,  3])
```

In this step whole user 1D input is converted into a 2D array, Also showing the 2D output where each column represents a process. Where first element is Arrival time **AT** and the Second element is Burst time **BT** **

In [4]:

```
process = inputs.reshape((int(len(inputs)/2), 2))
process
```

Out[4]:

```
array([[ 0, 24],
       [ 0,  3],
       [ 0,  3]])
```

This step is sorting the processes by their Arrival time AT

In [5]:

```
fcps = np.sort(process,axis=0)
fcps
```

Out[5]:

```
array([[ 0,  3],
       [ 0,  3],
       [ 0, 24]])
```

This step is calculating the completion time CT**, We know that *Completion Time is the Time at which process completes its execution*.** Also showning Completion Time for each process.

In [6]:

```
ct = []
for i in range(int(len(fcps))):
    if i == 0:
        ct.append(process[i][0] + process[i][1])
    else:
        ct.append(process[i][1] + ct[i-1])

# printing Compltion time
j=1
for i in ct:
    print ("Compltion time for P{} is: {}".format(j,i))
    j+=1
```

```
Compltion time for P1 is: 24
Compltion time for P2 is: 27
Compltion time for P3 is: 30
```

This step is calculating the Turn Around Time TAT**, We know that *Turn Around Time is the Time Difference between completion time and arrival time.*** Also showning Completion Time for each process.

```
Turn Around Time = Completion Time - Arrival Time
```

In [7]:

```
tat = []
for i in range(int(len(fcps))):
    tat.append(ct[i] - process[i][0])

# printing Turn Around Time
j=1
for i in tat:
    print ("Turn Around Time for P{} is: {}".format(j,i))
    j+=1
```

```
Turn Around Time for P1 is: 24
```

```
Turn Around Time for P2 is: 27
Turn Around Time for P3 is: 30
```

This step is calculating the average Turn Around Time for all the process and showing them. We know,

```
Average Turn Around Time = "sum of all Turn Around Time" DEVIDE by "Total number of process"
```

In [8]:

```
avarage_TAT = round(np.mean(tat),2)
print ("Average Turn Around Time for all process is: ",avarage_TAT)
```

```
Average Turn Around Time for all process is:  27.0
```

This stp is calculatin Waiting time for each process, Waiting Time(W.T) is the Time Difference between turn around time and burst time. We know,

```
Waiting Time = Turn Around Time - Burst Time
```

In [9]:

```
wt = []
for i in range(int(len(fcps))):
    wt.append(tat[i] - process[i][1])

# printing Waiting time
j=1
for i in wt:
    print ("Waiting time for P{} is: {}".format(j,i))
    j+=1
```

```
Waiting time for P1 is: 0
Waiting time for P2 is: 24
Waiting time for P3 is: 27
```

This step is calculatin average Waiting time for each process. We know,

```
Average Waiting Time = "sum of all Waiting Time" DEVIDE by "Total number of process"
```

In [10]:

```
avarage_WT = round(np.mean(wt),2)
print ("Average Waiting Time for all process is: ",avarage_WT)
```

```
Average Waiting Time for all process is:  17.0
```

Final Answar:

In [11]:

```
print ("Average Waiting Time for all process is: ",avarage_WT,"sec.")
print ("Average Turn Around Time for all process is: ",avarage_TAT,"sec.")
```

```
Average Waiting Time for all process is:  17.0 sec.
```

```
Average Turn Around Time for all process is:  27.0 sec.
```

Thank You

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