

**Lab Assignment 1**  
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**Date: 07-01-2022**

**Question:**  
**Scheduling**  
**Algorithm(RR,SJF(preemptive&nonpreemptive),FCFS)**

1. FCFS:

Code:

```
// Author: Chaudhary Hamdan, 1905387
```

```
#include<stdio.h>
```

```
void findWaitingTime(int processes[], int n, int bt[], int wt[])
{
    wt[0] = 0;

    for (int i = 1; i < n ; i++)
        wt[i] = bt[i - 1] + wt[i - 1] - processes[i];
}
```

```
void findTurnAroundTime( int processes[], int n, int bt[], int wt[], int tat[])
{
    for (int i = 0; i < n ; i++)
        tat[i] = bt[i] + wt[i];
}
```

```
void findavgTime( int processes[], int n, int bt[])
{
    int wt[n], tat[n], total_wt = 0, total_tat = 0;

    findWaitingTime(processes, n, bt, wt);
```

```

    findTurnAroundTime(processes, n, bt, wt, tat);

    for (int i = 0; i < n; i++)
    {
        total_wt = total_wt + wt[i];
        total_tat = total_tat + tat[i];
    }
    int s = total_wt * 1.0 / n;
    int t = total_tat * 1.0 / n;
    printf("Average waiting time: %d", s);
    printf("\nAverage turn around time: %d ", t);
}

int main()
{
#ifdef ONLINE_JUDGE
    freopen("C:\\Users\\KIIT\\input", "r", stdin);
    freopen("C:\\Users\\KIIT\\output", "w", stdout);
#endif

    int n;
    scanf("%d", &n);

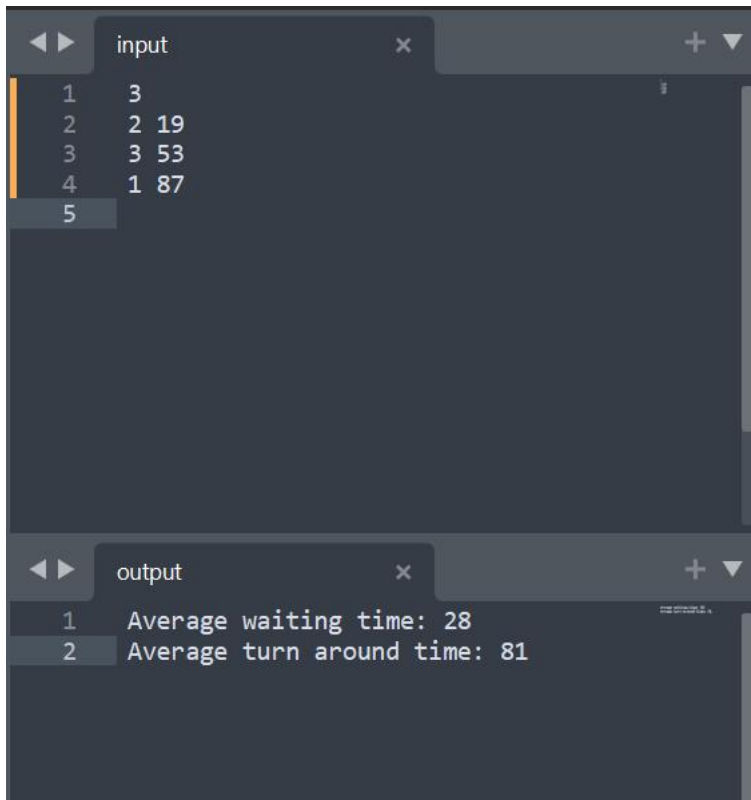
    int processes[n], burst_time[n];

    for (int i = 0; i < n ; i++) {
        scanf("%d", &processes[i]);
        scanf("%d", &burst_time[i]);
    }

    findavgTime(processes, n, burst_time);
    return 0;
}

```

Output:



The image shows a code editor with two tabs: 'input' and 'output'. The 'input' tab contains a list of five items, each with a number and a name: 1 3, 2 2 19, 3 3 53, 4 1 87, and 5. The 'output' tab contains two lines of text: '1 Average waiting time: 28' and '2 Average turn around time: 81'.

```
input
1 3
2 2 19
3 3 53
4 1 87
5

output
1 Average waiting time: 28
2 Average turn around time: 81
```

## 2. SJF (Preemptive)

Code:

```
// Author: Chaudhary Hamdan, 1905387
```

```
#include <stdio.h>
```

```
int main()
```

```
{
```

```
#ifndef ONLINE_JUDGE
```

```
    freopen("C:\\Users\\KIIT\\input", "r", stdin);
```

```
    freopen("C:\\Users\\KIIT\\output", "w", stdout);
```

```
#endif
```

```
    int arrival_time[10], burst_time[10], temp[10];
```

```
    int i, smallest, count = 0, time, limit;
```

```
    double wait_time = 0, turnaround_time = 0, end;
```

```
    float average_waiting_time, average_turnaround_time;
```

```
    scanf("%d", &limit);
```

```
    for (i = 0; i < limit; i++)
```

```
    {
```

```
        scanf("%d", &arrival_time[i]);
```

```
        scanf("%d", &burst_time[i]);
```

```
        temp[i] = burst_time[i];
```

```
    }
```

```
    burst_time[9] = 9999;
```

```
    for (time = 0; count < limit; time++)
```

```
    {
```

```
        smallest = 9;
```

```
        for (i = 0; i < limit; i++)
```

```
        {
```

```
            if (arrival_time[i] <= time && burst_time[i] < burst_time  
[smallest] && burst_time[i] > 0)
```

```
            {
```

```
                smallest = i;
```

```
            }
```

```
        }
```

```

        burst_time[smallest]--;
        if (burst_time[smallest] == 0)
        {
            count++;
            end = time + 1;
            wait_time = wait_time + end - arrival_time[smallest] -
temp[smallest];
            turnaround_time = turnaround_time + end -
arrival_time[smallest];
        }
    }
    average_waiting_time = wait_time / limit;
    average_turnaround_time = turnaround_time / limit;
    printf("Average Waiting Time:%lf\n", average_waiting_time);
    printf("Average Turnaround Time:%lf\n", average_turnaround_time);
    return 0;
}

```

Output:

The screenshot shows a code editor with two panels. The top panel, titled 'input', contains a list of five tasks with their IDs and burst times: 1 (3), 2 (19), 3 (53), 4 (1), and 5 (87). The bottom panel, titled 'output', shows the results of the algorithm: 'Average Waiting Time:30.000000' and 'Average Turnaround Time:83.000000'.

Task ID	Burst Time
1	3
2	19
3	53
4	1
5	87

Metric	Value
Average Waiting Time	30.000000
Average Turnaround Time	83.000000

### 3. Shortest Job First (Non Preemptive)

Code:

// Author: Chaudhary Hamdan, 1905387

```
#include<stdio.h>
```

```
int main()
```

```
{
```

```
#ifndef ONLINE_JUDGE
```

```
    freopen("C:\\Users\\KIIT\\input", "r", stdin);
```

```
    freopen("C:\\Users\\KIIT\\output", "w", stdout);
```

```
#endif
```

```
    int i, n, p[10] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, min, k = 1, btime = 0;
```

```
    int bt[10], temp, j, at[10], wt[10], tt[10], ta = 0, sum = 0;
```

```
    float wavg = 0, tavg = 0, tsum = 0, wsum = 0;
```

```
    scanf("%d", &n);
```

```
    for (i = 0; i < n; i++)
```

```
    {
```

```
        scanf(" %d", &at[i]);
```

```
        scanf(" %d", &bt[i]);
```

```
    }
```

```
    for (i = 0; i < n; i++)
```

```
    {
```

```
        for (j = 0; j < n; j++)
```

```
        {
```

```
            if (at[i] < at[j])
```

```
            {
```

```
                temp = p[j];
```

```
                p[j] = p[i];
```

```
                p[i] = temp;
```

```
                temp = at[j];
```

```
                at[j] = at[i];
```

```
                at[i] = temp;
```

```
                temp = bt[j];
```

```
                bt[j] = bt[i];
```

```
                bt[i] = temp;
```

```
            }
```

```
        }
```

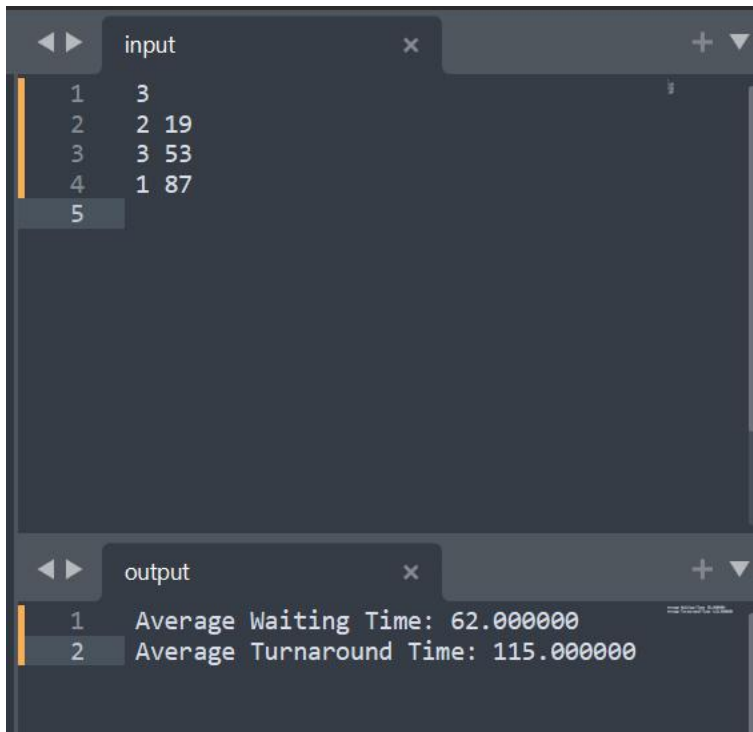
```

    }
    for (j = 0; j < n; j++)
    {
        btime = btime + bt[j];
        min = bt[k];
        for (i = k; i < n; i++)
        {
            if (btime >= at[i] && bt[i] < min) {
                temp = p[k];
                p[k] = p[i];
                p[i] = temp;
                temp = at[k];
                at[k] = at[i];
                at[i] = temp;
                temp = bt[k];
                bt[k] = bt[i];
                bt[i] = temp;
            }
        } k++;
    }
    wt[0] = 0;
    for (i = 1; i < n; i++)
    {
        sum = sum + bt[i - 1];
        wt[i] = sum - at[i];
        wsum = wsum + wt[i];
    }
    wavg = (wsum / n);
    for (i = 0; i < n; i++)
    {
        ta = ta + bt[i];
        tt[i] = ta - at[i];
        tsum = tsum + tt[i];
    }
    tavg = (tsum / n);

    printf("Average Waiting Time: %f", wavg);
    printf("\nAverage Turnaround Time: %f", tavg);
    return 0;
}

```

Output:



The image shows a code editor with two tabs: 'input' and 'output'. The 'input' tab contains a list of five items, each with an ID, a priority, and a time. The 'output' tab contains two lines of text showing calculated average waiting and turnaround times.

ID	Priority	Time
1	3	
2	2	19
3	3	53
4	1	87
5		

Metric	Value
Average Waiting Time	62.000000
Average Turnaround Time	115.000000



#### 4. Round Robin

Code:

```
// Author: Chaudhary Hamdan, 1905387
```

```
#include<stdio.h>
```

```
int main()
{
```

```
#ifndef ONLINE_JUDGE
```

```
    freopen("C:\\Users\\KIIT\\input", "r", stdin);
```

```
    freopen("C:\\Users\\KIIT\\output", "w", stdout);
```

```
#endif
```

```
    int i, limit, total = 0, x, counter = 0, time_quantum;
```

```
    int wait_time = 0, turnaround_time = 0, arrival_time[10], burst_time
        [10], temp[10];
```

```
    float average_wait_time, average_turnaround_time;
```

```
    scanf("%d", &limit);
```

```
    x = limit;
```

```
    for (i = 0; i < limit; i++)
```

```
    {
```

```
        scanf("%d", &arrival_time[i]);
```

```
        scanf("%d", &burst_time[i]);
```

```
        temp[i] = burst_time[i];
```

```
    }
```

```
    scanf("%d", &time_quantum);
```

```
    for (total = 0, i = 0; x != 0;)
```

```
    {
```

```
        if (temp[i] <= time_quantum && temp[i] > 0)
```

```
        {
```

```
            total = total + temp[i];
```

```
            temp[i] = 0;
```

```
            counter = 1;
```

```
        }
```

```
        else if (temp[i] > 0)
```

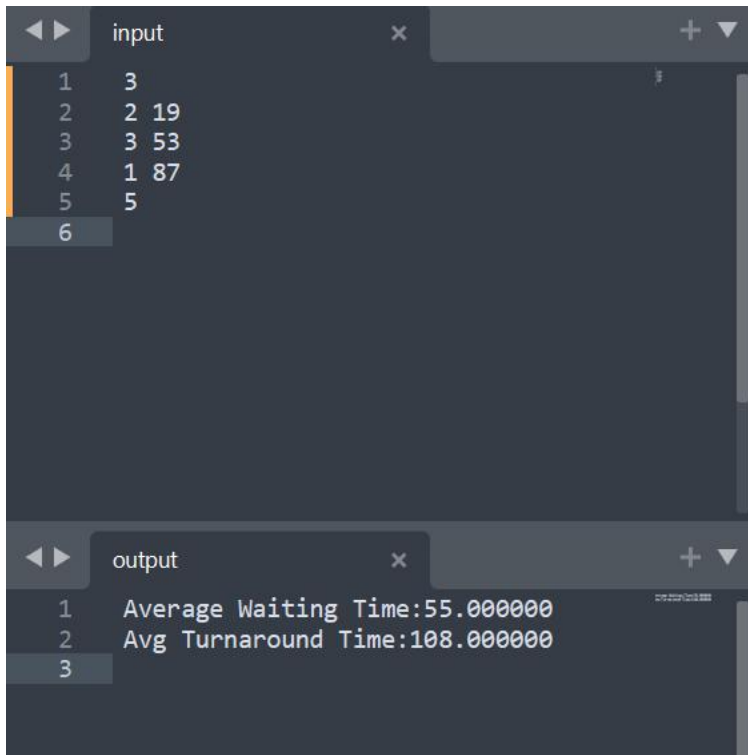
```
        {
```

```

        temp[i] = temp[i] - time_quantum;
        total = total + time_quantum;
    }
    if (temp[i] == 0 && counter == 1)
    {
        x--;
        wait_time = wait_time + total - arrival_time[i] -
            burst_time[i];
        turnaround_time = turnaround_time + total -
            arrival_time[i];
        counter = 0;
    }
    if (i == limit - 1)
    {
        i = 0;
    }
    else if (arrival_time[i + 1] <= total)
    {
        i++;
    }
    else
    {
        i = 0;
    }
}
average_wait_time = wait_time * 1.0 / limit;
average_turnaround_time = turnaround_time * 1.0 / limit;
printf("Average Waiting Time:%f", average_wait_time);
printf("\nAvg Turnaround Time:%f\n", average_turnaround_time);
return 0;
}

```

Output:



The image shows a code editor with two tabs: 'input' and 'output'. The 'input' tab is active and contains a list of numbers. The 'output' tab is also active and contains two lines of text representing calculated values.

Line	Input
1	3
2	2 19
3	3 53
4	1 87
5	5
6	

Line	Output
1	Average Waiting Time:55.000000
2	Avg Turnaround Time:108.000000
3	

## Average Waiting Time:

FCFS: 28

SJF Preemptive: 30

SJF Non Preemptive: 62

Round Robin: 55

## Graph:

