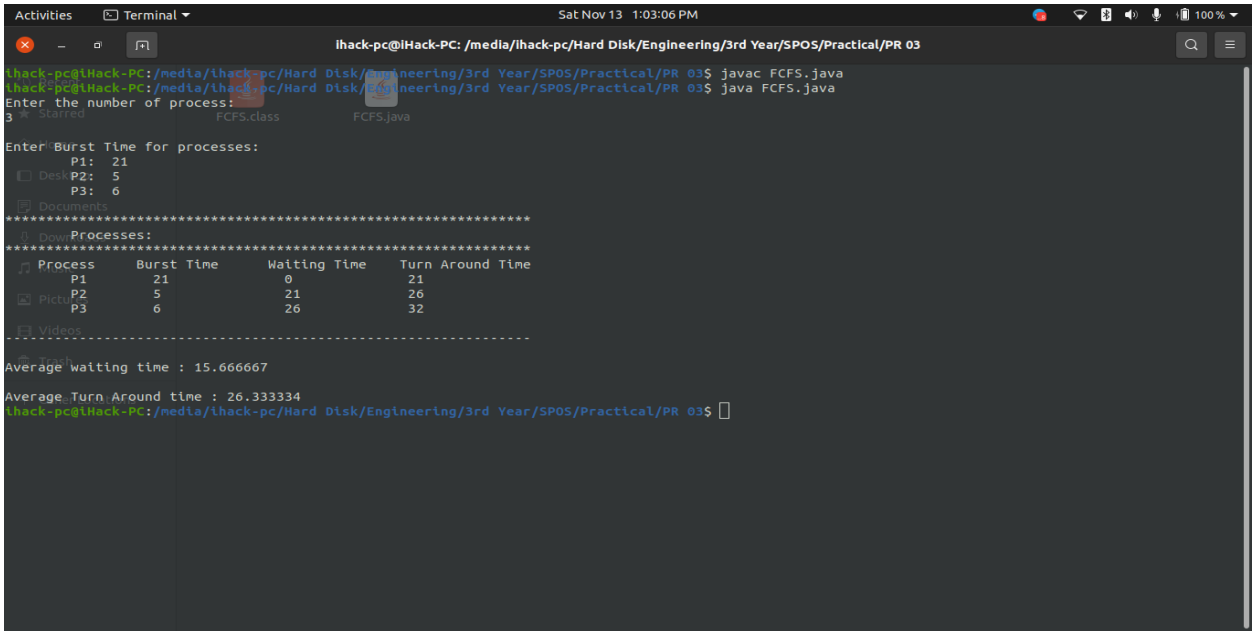
Practical No:- 03

Title :- Write a program to simulate CPU scheduling algorithms: FCFS , SJF (Preemptive), Priority (Non-Preemptive), and Round Robin (Preemptive).

1. **FCFS**

```
import java.io.*;
import java.util.Scanner;
public class FCFS
{
	public static void main(String args[])
	{
		int i,no_p,burst_time[],TT[],WT[];
		float avg_wait=0,avg_TT=0;
		burst_time=new int[50];
		TT=new int[50];
		WT=new int[50];
		WT[0]=0;
		Scanner s=new Scanner(System.in);
		System.out.println("Enter the number of process: ");
		no_p=s.nextInt();
		System.out.println("\nEnter Burst Time for processes:");
		for(i=0;i<no_p;i++)
		{
			System.out.print("\tP"+(i+1)+":  ");
			burst_time[i]=s.nextInt();
		}

		for(i=1;i<no_p;i++)
		{
			WT[i]=WT[i-1]+burst_time[i-1];
			avg_wait+=WT[i];
		}
		avg_wait/=no_p;

		for(i=0;i<no_p;i++)
		{
			TT[i]=WT[i]+burst_time[i];
```

```
                avg_TT+=TT[i];
            }
            avg_TT/=no_p;

System.out.println("\n*************************************************************
****");
            System.out.println("\tProcesses:");

System.out.println("*************************************************************
***");
            System.out.println("    Process\tBurst Time\tWaiting Time\tTurn Around Time");
            for(i=0;i<no_p;i++)
            {
                System.out.println("\tP"+(i+1)+"\t    "+burst_time[i]+"\t\t    "+WT[i]+"\t\t
"+TT[i]);

            }
            System.out.println("\n------------------------------------------------------------------");
            System.out.println("\nAverage waiting time : "+avg_wait);
            System.out.println("\nAverage Turn Around time : "+avg_TT+"\n");
        }
}
```

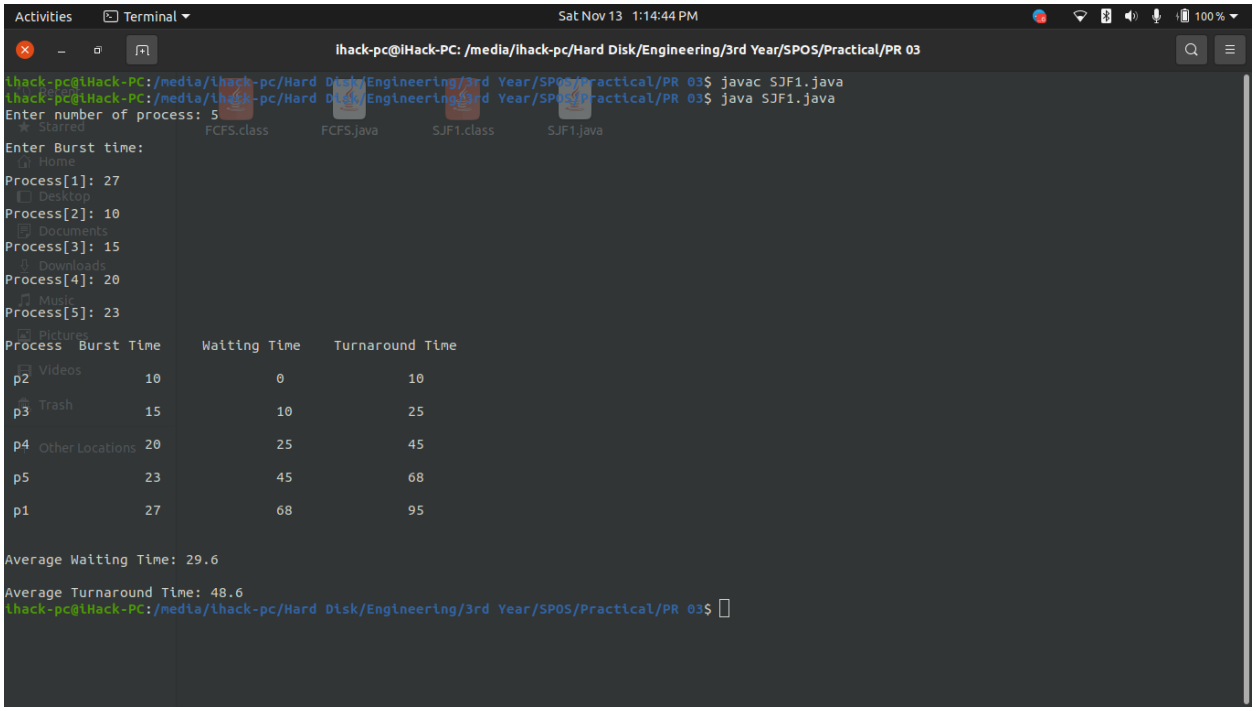


2. SJF(Non-Preemptive)

```
import java.util.Scanner;
class SJF1{
public static void main(String args[]){
int burst_time[],process[],waiting_time[],tat[],i,j,n,total=0,pos,temp;
float wait_avg,TAT_avg;
Scanner s = new Scanner(System.in);

System.out.print("Enter number of process: ");
n = s.nextInt();

process = new int[n];
burst_time = new int[n];
waiting_time = new int[n];
tat = new int[n];

System.out.println("\nEnter Burst time:");
for(i=0;i<n;i++)
{
System.out.print("\nProcess["+(i+1)+"]: ");
burst_time[i] = s.nextInt();;
process[i]=i+1; //Process Number
}

//Sorting
for(i=0;i<n;i++)
{
pos=i;
for(j=i+1;j<n;j++)
{
if(burst_time[j]<burst_time[pos])
pos=j;
}

temp=burst_time[i];
burst_time[i]=burst_time[pos];
burst_time[pos]=temp;

temp=process[i];
process[i]=process[pos];
process[pos]=temp;
```

```
}
//First process has 0 waiting time
waiting_time[0]=0;
//calculate waiting time
for(i=1;i<n;i++)
{
waiting_time[i]=0;
for(j=0;j<i;j++)
waiting_time[i]+=burst_time[j];
total+=waiting_time[i];
}

//Calculating Average waiting time
wait_avg=(float)total/n;
total=0;

System.out.println("\nProcess\t Burst Time \tWaiting Time\tTurnaround Time");
for(i=0;i<n;i++)
{
tat[i]=burst_time[i]+waiting_time[i]; //Calculating Turnaround Time
total+=tat[i];
System.out.println("\n p"+process[i]+"\t\t "+burst_time[i]+"\t\t "+waiting_time[i]+"\t\t "+tat[i]);
}

//Calculation of Average Turnaround Time
TAT_avg=(float)total/n;
System.out.println("\n\nAverage Waiting Time: "+wait_avg);
System.out.println("\nAverage Turnaround Time: "+TAT_avg);

}
}
```

Output:-


Activities
Terminal
Sat Nov 13 1:14:44 PM
100 %
ihack-pc@iHack-PC: /media/ihack-pc/Hard Disk/Engineering/3rd Year/SPOS/Practical/PR 03
ihack-pc@iHack-PC:/media/ihack-pc/Hard Disk/Engineering/3rd Year/SPOS/Practical/PR 03$ javac SJF1.java
ihack-pc@iHack-PC:/media/ihack-pc/Hard Disk/Engineering/3rd Year/SPOS/Practical/PR 03$ java SJF1.java
Enter number of process: 5
Enter Burst time:
Process[1]: 27
Process[2]: 10
Process[3]: 15
Process[4]: 20
Process[5]: 23
Process Burst Time Waiting Time Turnaround Time
p2 10 0 10
p3 15 10 25
p4 20 25 45
p5 23 45 68
p1 27 68 95
Average Waiting Time: 29.6
Average Turnaround Time: 48.6
ihack-pc@iHack-PC:/media/ihack-pc/Hard Disk/Engineering/3rd Year/SPOS/Practical/PR 03$

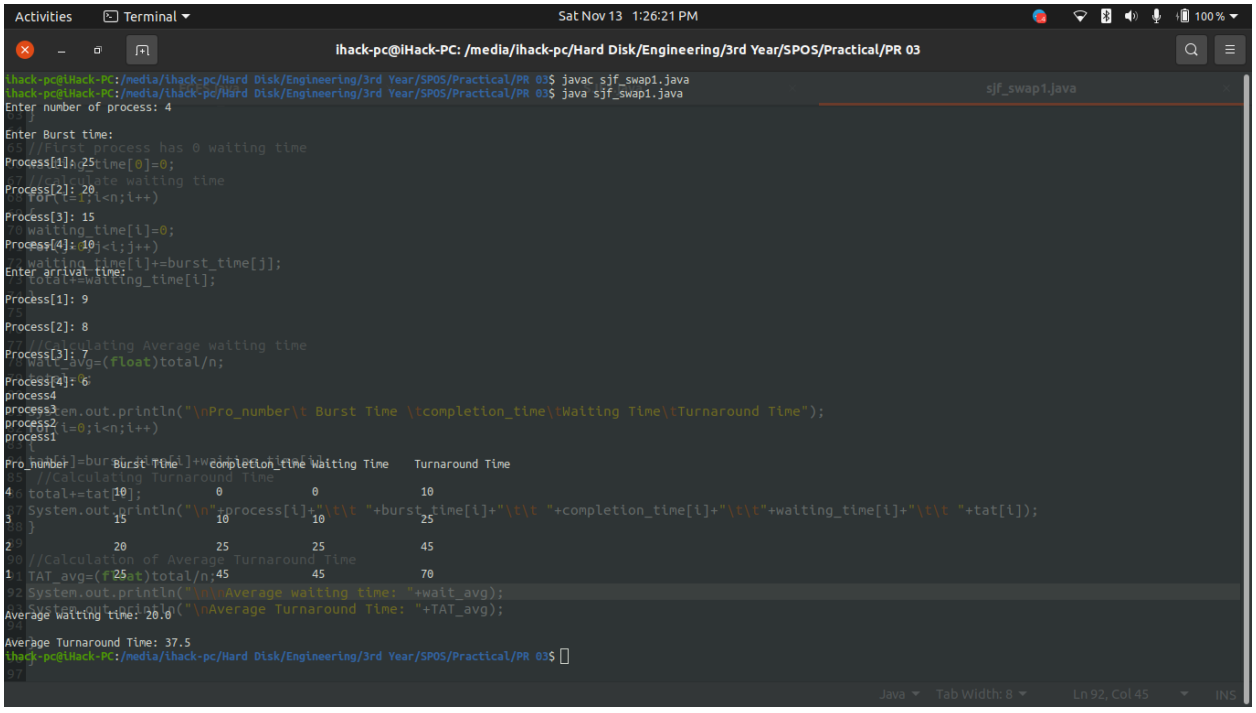
3. Priority (Non-Preemptive)

```
import java.util.Scanner;

class sjf_swap1{
public static void main(String args[])
{
int
burst_time[],process[],waiting_time[],tat[],arr_time[],completion_time[],i,j,n,total=0,total_comp=0,pos,t
emp;
float wait_avg,TAT_avg;
Scanner s = new Scanner(System.in);
 System.out.print("Enter number of process: ");
n = s.nextInt();
 process = new int[n];
burst_time = new int[n];
waiting_time = new int[n];
arr_time=new int[n];
tat = new int[n];
completion_time=new int[n];

//burst time
System.out.println("\nEnter Burst time:");
for(i=0;i<n;i++)
{
System.out.print("\nProcess["+(i+1)+"]: ");
burst_time[i] = s.nextInt();;
process[i]=i+1; //Process Number
}

//arrival time
System.out.println("\nEnter arrival time:");
for(i=0;i<n;i++)
{
System.out.print("\nProcess["+(i+1)+"]: ");
arr_time[i] = s.nextInt();;
process[i]=i+1; //Process Number
}

//Sorting
for(i=0;i<n;i++)
{
```

```
pos=i;
for(j=i+1;j<n;j++)
{
if(burst_time[j]<burst_time[pos])
pos=j;
}

temp=burst_time[i];
burst_time[i]=burst_time[pos];
burst_time[pos]=temp;

temp=process[i];
process[i]=process[pos];
process[pos]=temp;

System.out.println("process"+process[i]);
}
//completion time new
for(i=1;i<n;i++)
{
completion_time[i]=0;
for(j=0;j<i;j++)
completion_time[i]+=burst_time[j];
 total_comp+=completion_time[i];
}

//First process has 0 waiting time
waiting_time[0]=0;
//calculate waiting time
for(i=1;i<n;i++)
{
waiting_time[i]=0;
for(j=0;j<i;j++)
waiting_time[i]+=burst_time[j];
total+=waiting_time[i];
}


//Calculating Average waiting time
wait_avg=(float)total/n;
total=0;
```

```
System.out.println("\nPro_number\t Burst Time \tcompletion_time\tWaiting Time\tTurnaround Time");
for(i=0;i<n;i++)
{
tat[i]=burst_time[i]+waiting_time[i];
 //Calculating Turnaround Time
total+=tat[i];
System.out.println("\n"+process[i]+"\t\t "+burst_time[i]+"\t\t
"+completion_time[i]+"\t\t"+waiting_time[i]+"\t\t "+tat[i]);
}

//Calculation of Average Turnaround Time
TAT_avg=(float)total/n;
System.out.println("\n\nAverage waiting time: "+wait_avg);
System.out.println("\nAverage Turnaround Time: "+TAT_avg);

}
}
```

Output :-

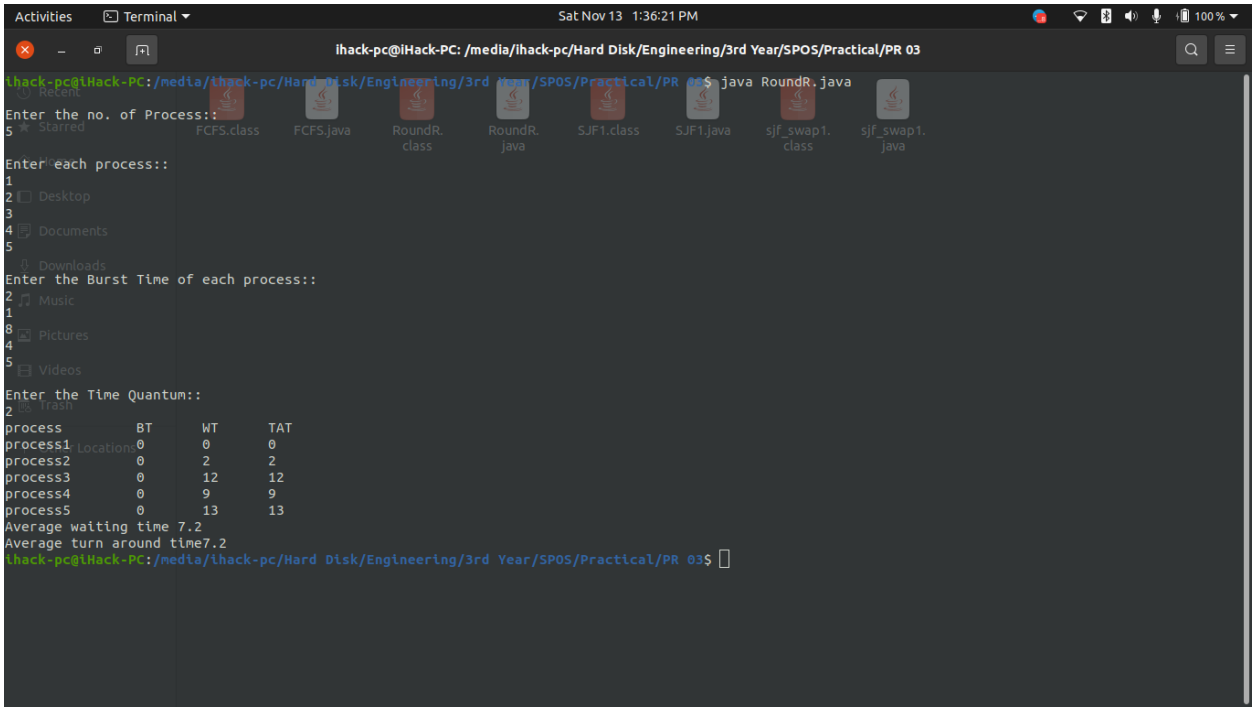


4. Round Robin (Preemptive)

```
import java.util.*;
import java.io.*;
class RoundR
{
	public static void main(String args[])
	{
		int Process[]=new int[10];
		int a[]=new int[10];
		int Arrival_time[]=new int[10];
		int Burst_time[]=new int[10];
		int WT[]=new int[10];
		int TAT[]=new int[10];
		int Pno,sum=0;;
		int TimeQuantum;

System.out.println("\nEnter the no. of Process::");
		Scanner sc=new Scanner(System.in);
		Pno=sc.nextInt();
		System.out.println("\nEnter each process::");
		for(int i=0;i<Pno;i++)
		{
			Process[i]=sc.nextInt();
		}

System.out.println("\nEnter the Burst Time of each process::");
		for(int i=0;i<Pno;i++)
		{
			Burst_time[i]=sc.nextInt();
		}
System.out.println("\nEnter the Time Quantum::");
TimeQuantum=sc.nextInt();
		do{
		for(int i=0;i<Pno;i++)
		{
			if(Burst_time[i]>TimeQuantum)
			{
				Burst_time[i]-=TimeQuantum;
				for(int j=0;j<Pno;j++)
				{
					if((j!=i)&&(Burst_time[j]!=0))
```

```
                                WT[j]+=TimeQuantum;
                        }
                }
                else
                {
                        for(int j=0;j<Pno;j++)
                        {
                                if((j!=i)&&(Burst_time[j]!=0))
                                WT[j]+=Burst_time[i];
                        }
                        Burst_time[i]=0;
                 }
          }
                sum=0;
                for(int k=0;k<Pno;k++)
                sum=sum+Burst_time[k];
        } while(sum!=0);

              for(int i=0;i<Pno;i++)
                        TAT[i]=WT[i]+a[i];
                System.out.println("process\t\tBT\tWT\tTAT");
                for(int i=0;i<Pno;i++)
                {
                   System.out.println("process"+(i+1)+"\t"+a[i]+"\t"+WT[i]+"\t"+TAT[i]);
                }
                    float avg_wt=0;
                float avg_tat=0;
                for(int j=0;j<Pno;j++)
                {
                      avg_wt+=WT[j];
                }
                for(int j=0;j<Pno;j++)
                {
                      avg_tat+=TAT[j];
                }
                 System.out.println("Average waiting time "+(avg_wt/Pno)+"\nAverage turn around
time" +(avg_tat/Pno));
          }
}
```

Output :-


Activities
Terminal
Sat Nov 13 1:36:21 PM
100 %
ihack-pc@iHack-PC: /media/ihack-pc/Hard Disk/Engineering/3rd Year/SPOS/Practical/PR 03
ihack-pc@iHack-PC:/media/ihack-pc/Hard Disk/Engineering/3rd Year/SPOS/Practical/PR 03$ java RoundR.java
Enter the no. of Process::
5
Enter each process::
1
2
3
4
5
Enter the Burst Time of each process::
2
1
8
4
5
Enter the Time Quantum::
2
process BT WT TAT
process1 0 0 0
process2 0 2 2
process3 0 12 12
process4 0 9 9
process5 0 13 13
Average waiting time 7.2
Average turn around time7.2
ihack-pc@iHack-PC:/media/ihack-pc/Hard Disk/Engineering/3rd Year/SPOS/Practical/PR 03$
FCFS.class
FCFS.java
RoundR. class
RoundR. java
SJF1.class
SJF1.java
sjf_swap1. class
sjf_swap1. java