به نام خدا

ازمایش 8

امیرحسین باریکلو9730003 ارمان حاتمی 9730008

قسمت اول)fcfs

در این الگوریتم هر فرایندی که زود تر امده باشد زود تر نیز نوبت اجرای ان میرسد در اینجا نیز شماره پردازه ها نشان از ترتیب ورود دارد

```
// main function
int main() {
   //process id's
   int pros_number;
   printf("please enter number of processes: ");
   scanf("%d",&pros_number);
   int proc[pros_number];
   for (int i = 0; i < pros_number; ++i)
   {
      proc[i] = i+1;
   }
   int n = sizeof proc / sizeof proc[0];
   //Burst time of all processes
   int burst_time[pros_number];
   for (int i = 0; i < pros_number; ++i)
   {
      int burst;
      printf("please enter burst time of process%d: ",i+1 );
      scanf("%d",&burst);
      burst_time[i] = burst;
   }
   avgtime(proc, n, burst_time);
   return 0;
                                                                                    }
```

ابتدا تعداد پروسس ها و burst_timeهر یک را میگیریم و سپس تابع avgtime()را صدا میکنیم

که در ادامه توضیح داده خواهد شد

```
// Function to find the waiting time for all processes
int waitingtime(int proc[], int n,
int burst_time[], int wait_time[]) {
   // waiting time for first process is 0
   wait_time[0] = 0;
   int i;
   // calculating waiting time
   for (i = 1; i < n ; i++ )
   wait_time[i] = burst_time[i-1] + wait_time[i-1] ;
   return 0;
```

```
}
```

در ادامه تابع waitingtime() را تعریف میکنیم که wait_time را برای پراسس اول 0 قرار میدهد و با توجه به اینکه زمان انتظار هر فرایند برابر است با زمان انتظار فرایند قبلی و burst_time آن به محاسبه زمان انتظار هر فرایند میپردازد

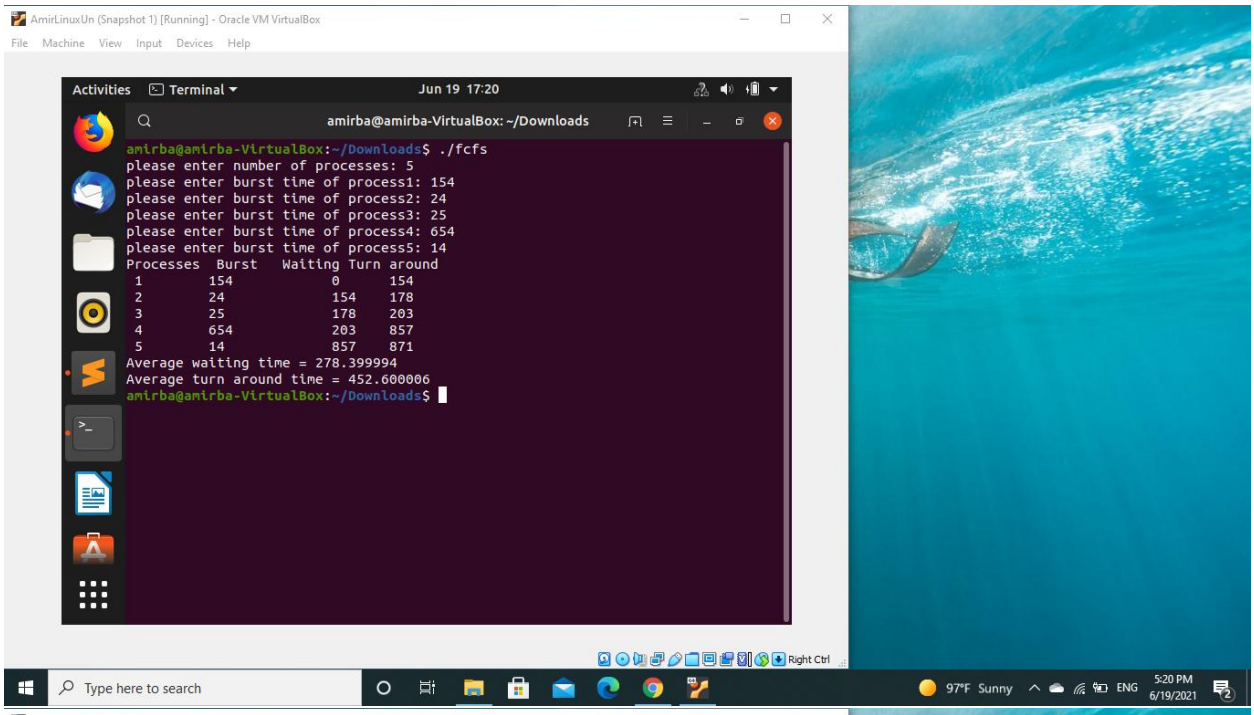
```
// Function to calculate turn around time
int turnaroundtime( int proc[], int n,
int burst_time[], int wait_time[], int tat[]) {
   // calculating turnaround time by adding
   // burst_time[i] + wait_time[i]
   int i;
   for ( i = 0; i < n ; i++)
   tat[i] = burst_time[i] + wait_time[i];
   return 0;
}
```

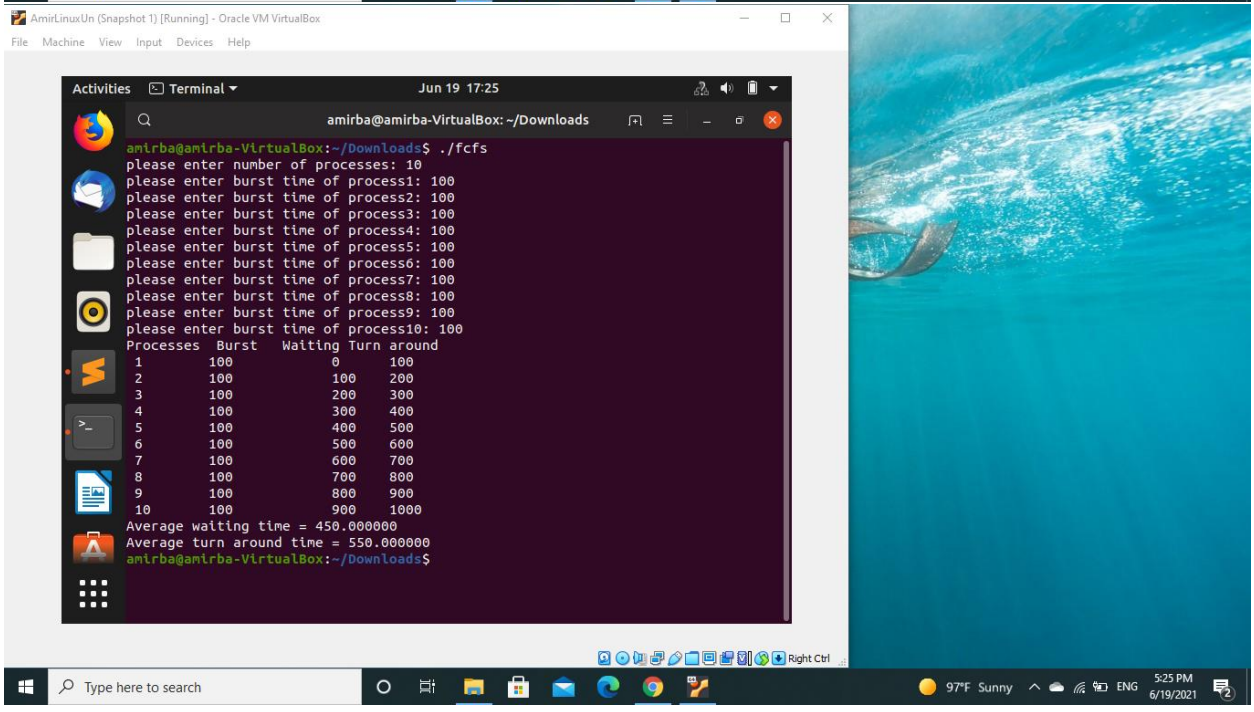
برای محاسبه زمان اجرا تابع turnaroundtime را تعریف میکنیم که در ان زمان اجرای هر فرایند برابر است با burst_time ان به علاوه زمان انتظار ان

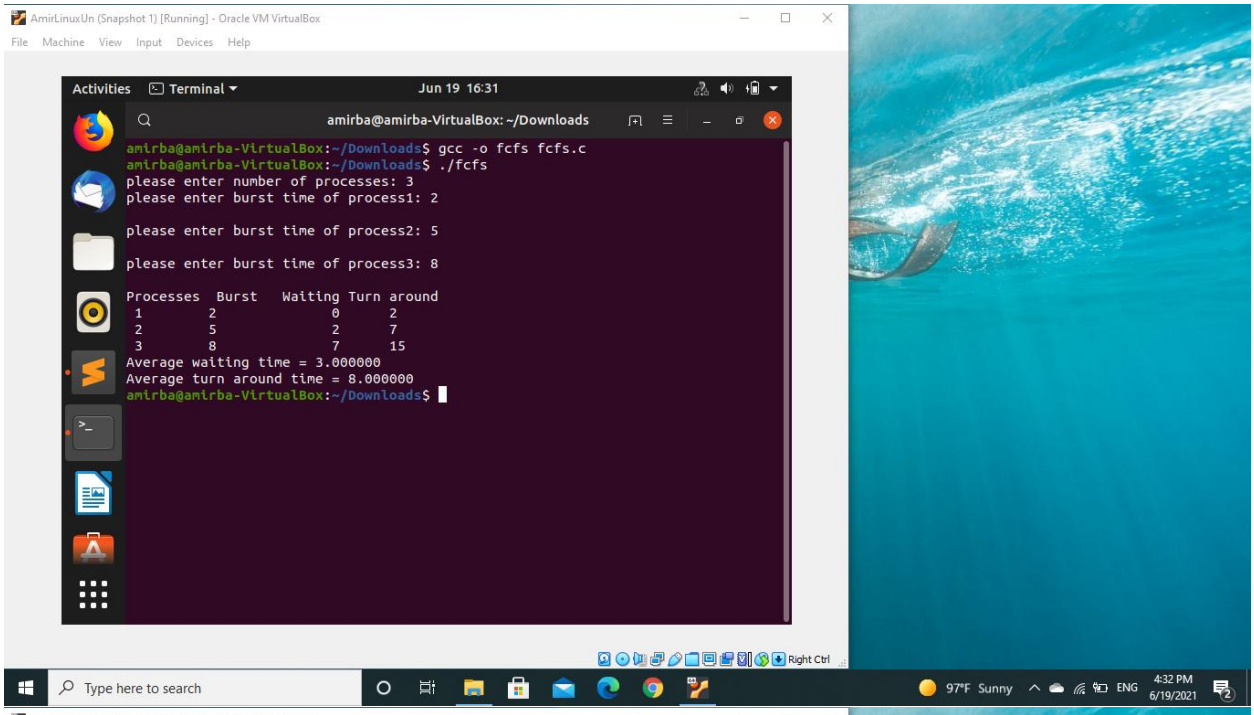
```
//Function to calculate average time
int avgtime( int proc[], int n, int burst_time[]) {
   int wait_time[n], tat[n], total_wt = 0, total_tat = 0;
   int i;
   //Function to find waiting time of all processes
   waitingtime(proc, n, burst_time, wait_time);
   //Function to find turn around time for all processes
   turnaroundtime(proc, n, burst_time, wait_time, tat);
   //Display processes along with all details
   printf("Processes  Burst   Waiting Turn around \n");
   // Calculate total waiting time and total turn
   // around time
   for ( i=0; i<n; i++) {
      total_wt = total_wt + wait_time[i];
      total_tat = total_tat + tat[i];
      printf(" %d\t  %d\t\t %d \t%d\n", i+1, burst_time[i], wait_time[i],
tat[i]);
   }
   printf("Average waiting time = %f\n", (float)total_wt / (float)n);
   printf("Average turn around time = %f\n", (float)total_tat / (float)n);
   return 0;
}
```

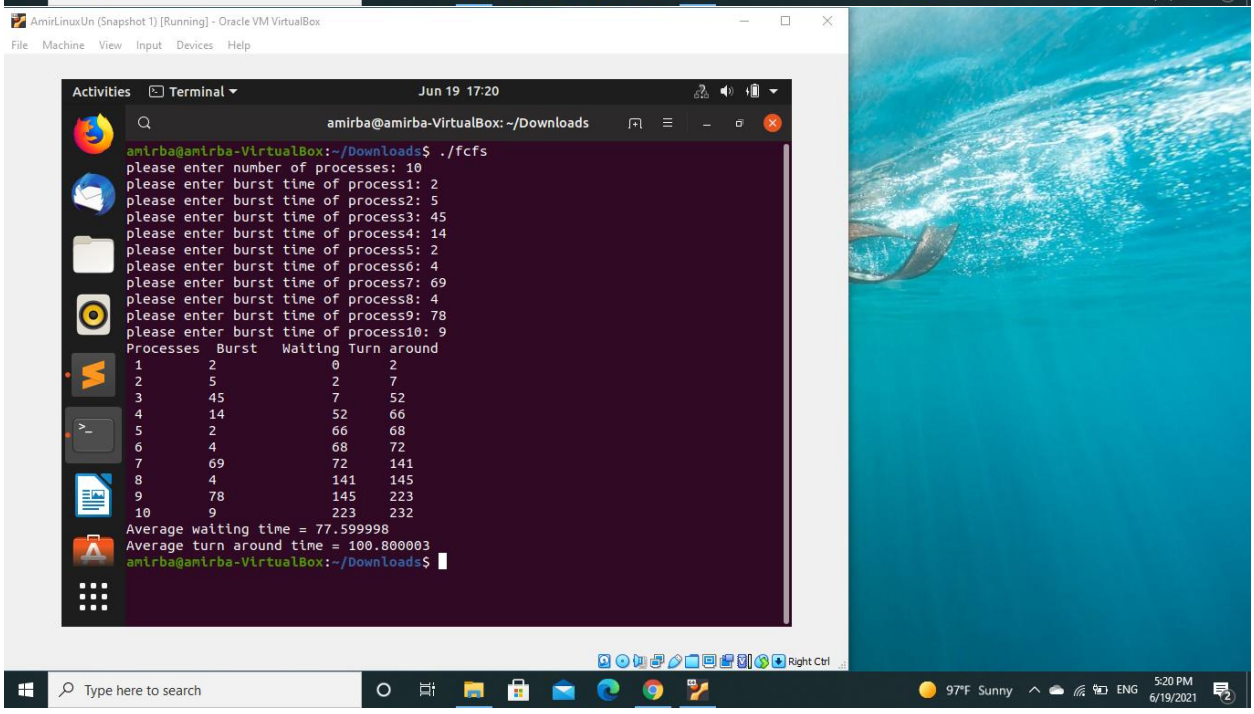
برای محاسبه میانگین زمان انتظار و میانگین زمان اجرای فرایند ها تابع avgtime() را تعریف میکنیم که در ان ابتدا تابع waitingtime که توضیح داده شد را فراخوانی میکند سپس turnaroundtime()

سپس در یک حلقه تمام این زمان هارا با یکدیگر جمع کرده و بر تعداد فرایند ها تقسیم کرده و میانگین زمانی هر یک را محاسبه میکند






AmirLinuxUn (Snapshot 1) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Jun 19 16:31
amirba@amirba-VirtualBox: ~/Downloads
amirba@amirba-VirtualBox:~/Downloads$ gcc -o fcfs fcfs.c
amirba@amirba-VirtualBox:~/Downloads$ ./fcfs
please enter number of processes: 3
please enter burst time of process1: 2
please enter burst time of process2: 5
please enter burst time of process3: 8
Processes Burst Waiting Turn around
1 2 0 2
2 5 2 7
3 8 7 15
Average waiting time = 3.000000
Average turn around time = 8.000000
amirba@amirba-VirtualBox:~/Downloads$
Right Ctrl
Type here to search
97°F Sunny
ENG
4:32 PM
6/19/2021


AmirLinuxUn (Snapshot 1) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Jun 19 17:20
amirba@amirba-VirtualBox: ~/Downloads
amirba@amirba-VirtualBox:~/Downloads$ ./fcfs
please enter number of processes: 10
please enter burst time of process1: 2
please enter burst time of process2: 5
please enter burst time of process3: 45
please enter burst time of process4: 14
please enter burst time of process5: 2
please enter burst time of process6: 4
please enter burst time of process7: 69
please enter burst time of process8: 4
please enter burst time of process9: 78
please enter burst time of process10: 9
Processes Burst Waiting Turn around
1 2 0 2
2 5 2 7
3 45 7 52
4 14 52 66
5 2 66 68
6 4 68 72
7 69 72 141
8 4 141 145
9 78 145 223
10 9 223 232
Average waiting time = 77.599998
Average turn around time = 100.800003
amirba@amirba-VirtualBox:~/Downloads$
Right Ctrl
Type here to search
97°F Sunny
ENG
5:20 PM
6/19/2021

قسمت دوم)

Sjf

```
int limit;
      printf("Enter the Total Number of Processes:");
      scanf("%d", &limit);
      int arrival_time[limit], burst_time[limit+1], temp[limit];
      int wait_time[limit],turnaround_time[limit];
      int i, smallest, count = 0, time;
      double total_wait_time = 0, total_turnaround_time = 0, end;
      float average_waiting_time, average_turnaround_time;

      printf("Enter Details of %d Processes\n", limit);
      for(i = 0; i < limit; i++)
      {     printf(".......prosess %d....... : \n",i);
            printf("Enter Arrival Time:");
            scanf("%d", &arrival_time[i]);
            printf("Enter Burst Time:");
            scanf("%d", &burst_time[i]);
            temp[i] = burst_time[i];

      }
```

ابتدا ورودی های لازم که burst time وarrival time است را برای هر پردازه میگیریم و متغیر های لازم را تعریف میکنیم

```
burst_time[limit] = 9999;
      for(time = 0; count != limit; time++)
      {
            smallest = limit;
            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[smallest] = end - arrival_time[smallest] -
temp[smallest];
                  turnaround_time[smallest] = end - arrival_time[smallest];
```

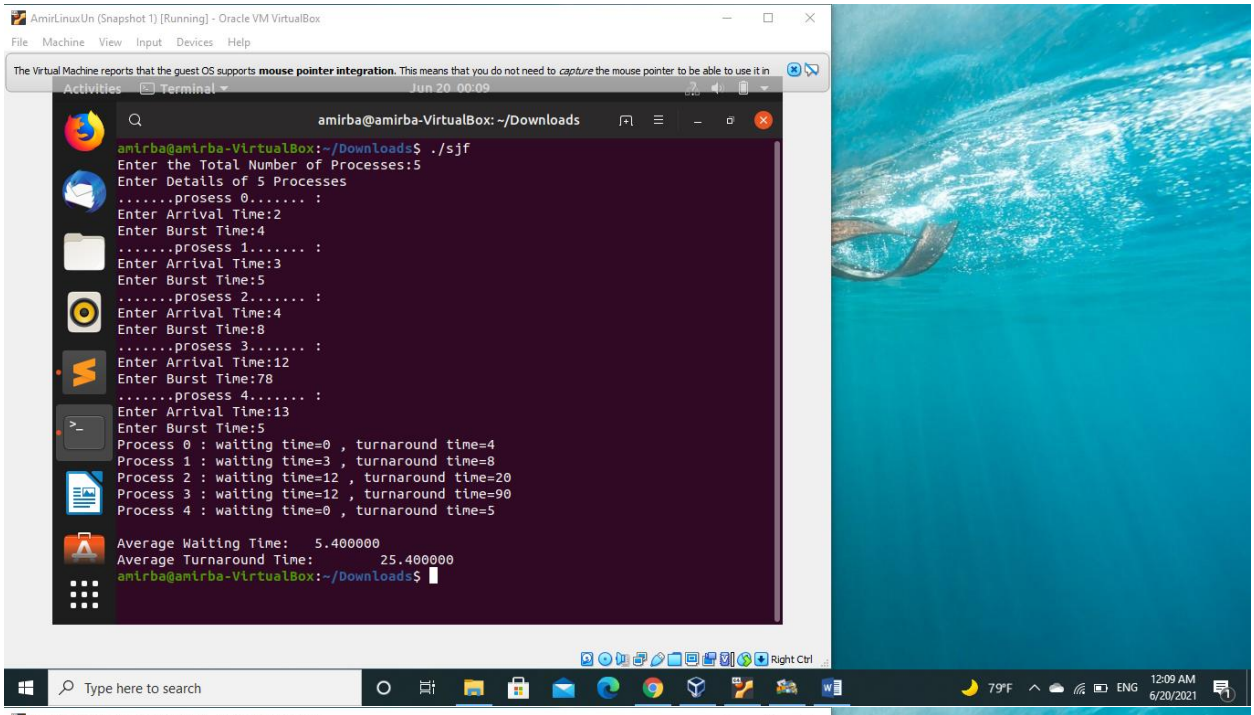
```
                total_wait_time += wait_time[smallest];
                total_turnaround_time += turnaround_time[smallest];
            }
        }
```

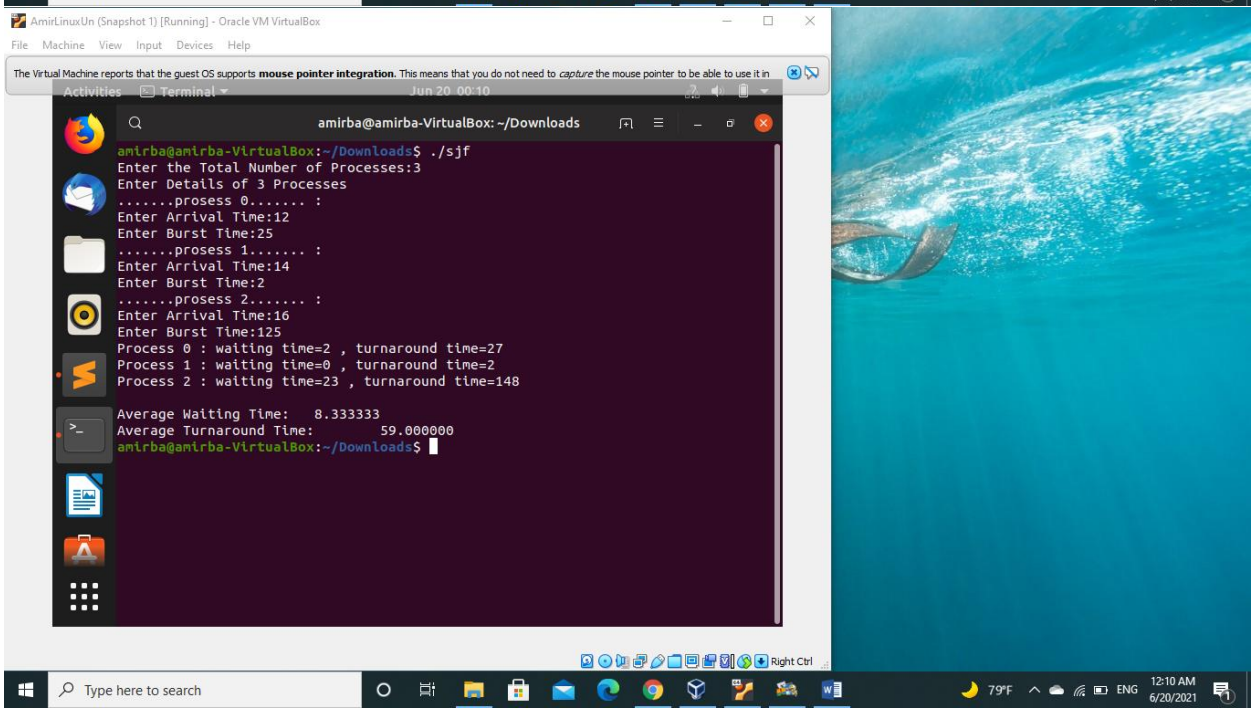
سپس در یک حلق که زمتن را یکی یکی اضافه میکند و زمانی تمام میشود که تمامی پروسس ها تمام شوند
در هر بار افزایش زمان پراسسی که arrival time ان کمتر از زمان فعلی و burst time ان از همه کمتر است انتخاب میشود و یکی hc burst time ان کم میشود و و اگر burst time ان 0 شود یعنی تمام شده است پس زمان انتظار ان و زمان اجرای ان حساب میشود و به جمع هریک اضافه میشود

```
for (int i = 0; i < limit; ++i)
        {
              printf("Process %d : waiting time=%d , turnaround time=%d\n",
                                  i, wait_time[i],turnaround_time[i] );
        }
        average_waiting_time = total_wait_time / limit;
        average_turnaround_time = total_turnaround_time / limit;
        printf("\nAverage Waiting Time:\t%lf\n", average_waiting_time);
        printf("Average Turnaround Time:\t%lf\n", average_turnaround_time);
        return 0;
}
```

د در اخر مقادیر لازم چاپ میشوند

عکس هایی از زمان اجرا:


AmirLinuxUn (Snapshot 1) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
The Virtual Machine reports that the guest OS supports mouse pointer integration. This means that you do not need to capture the mouse pointer to be able to use it in
Activities Terminal Jun 20 00:09
amirba@amirba-VirtualBox: ~/Downloads
amirba@amirba-VirtualBox:~/Downloads$ ./sjf
Enter the Total Number of Processes:5
Enter Details of 5 Processes
.......prosess 0....... :
Enter Arrival Time:2
Enter Burst Time:4
.......prosess 1....... :
Enter Arrival Time:3
Enter Burst Time:5
.......prosess 2....... :
Enter Arrival Time:4
Enter Burst Time:8
.......prosess 3....... :
Enter Arrival Time:12
Enter Burst Time:78
.......prosess 4....... :
Enter Arrival Time:13
Enter Burst Time:5
Process 0 : waiting time=0 , turnaround time=4
Process 1 : waiting time=3 , turnaround time=8
Process 2 : waiting time=12 , turnaround time=20
Process 3 : waiting time=12 , turnaround time=90
Process 4 : waiting time=0 , turnaround time=5
Average Waiting Time: 5.400000
Average Turnaround Time: 25.400000
amirba@amirba-VirtualBox:~/Downloads$
Right Ctrl
Type here to search
79°F ENG 12:09 AM 6/20/2021


AmirLinuxUn (Snapshot 1) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
The Virtual Machine reports that the guest OS supports mouse pointer integration. This means that you do not need to capture the mouse pointer to be able to use it in
Activities Terminal Jun 20 00:10
amirba@amirba-VirtualBox: ~/Downloads
amirba@amirba-VirtualBox:~/Downloads$ ./sjf
Enter the Total Number of Processes:3
Enter Details of 3 Processes
.......prosess 0....... :
Enter Arrival Time:12
Enter Burst Time:25
.......prosess 1....... :
Enter Arrival Time:14
Enter Burst Time:2
.......prosess 2....... :
Enter Arrival Time:16
Enter Burst Time:125
Process 0 : waiting time=2 , turnaround time=27
Process 1 : waiting time=0 , turnaround time=2
Process 2 : waiting time=23 , turnaround time=148
Average Waiting Time: 8.333333
Average Turnaround Time: 59.000000
amirba@amirba-VirtualBox:~/Downloads$
Right Ctrl
Type here to search
79°F ENG 12:10 AM 6/20/2021

قسمت سوم)

Priority

```
#include<stdio.h>
int main()
{
    int i,j,n,total=0,pos,temp,avg_wt,avg_tat;
    printf("Enter Total Number of Process:");
    scanf("%d",&n);
        int bt[n],p[n],wt[n],tat[n],pr[n];
    printf("\nEnter Burst Time and Priority\n");
    for(i=0;i<n;i++)
    {
        printf("\nP[%d]\n",i+1);
        printf("Burst Time:");
        scanf("%d",&bt[i]);
        printf("Priority:");
        scanf("%d",&pr[i]);
        p[i]=i+1;           //contains process number
    }
```

در ابتدا تعداد پراسس ها و burst time وpriorityهر یک را به عنوان ورودی میگیریم و کتغیر های لازم را تعریف میکنیم

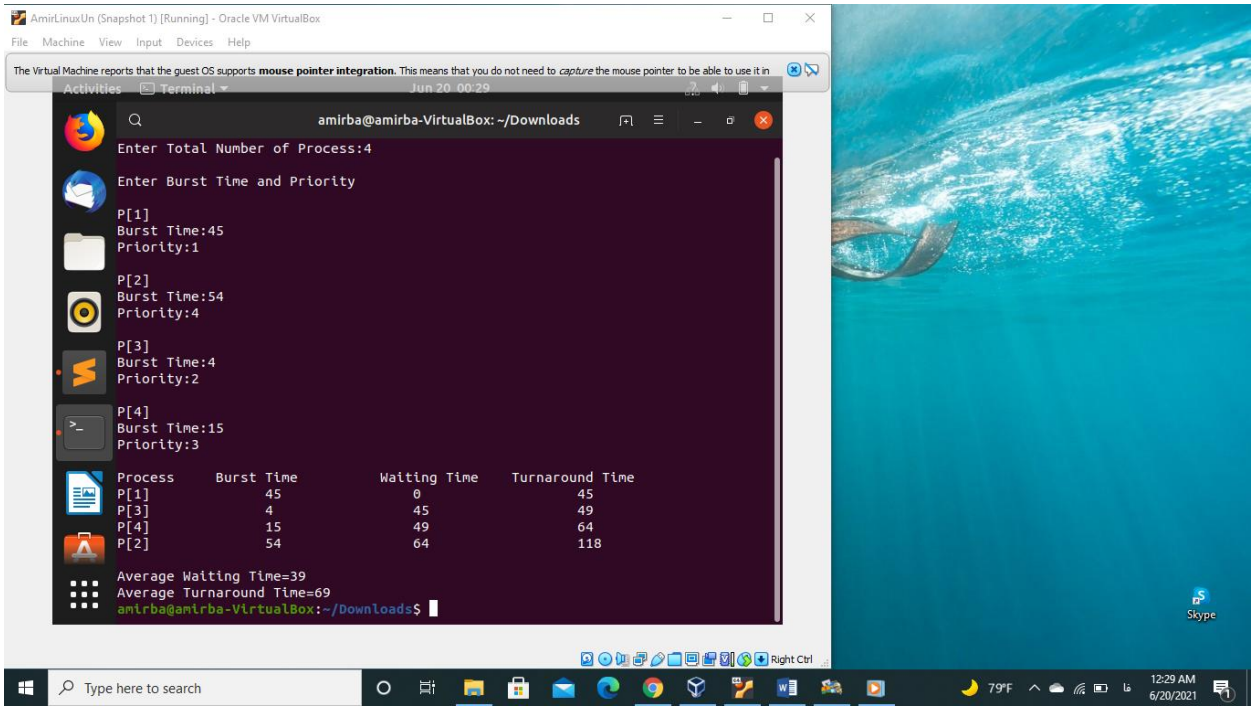
```
for(i=0;i<n;i++)
    {
        pos=i;
        for(j=i+1;j<n;j++)
        {
            if(pr[j]<pr[pos])
                pos=j;
        }

        temp=pr[i];
        pr[i]=pr[pos];
        pr[pos]=temp;

        temp=bt[i];
        bt[i]=bt[pos];
        bt[pos]=temp;

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

سپس پراسس ها را براسا الویت هایشان مرتیب میکنیم و این مرتب سازی بر اساس selection sort است

```
    //calculate waiting time
    for(i=1;i<n;i++)
    {
        wt[i]=0;
        for(j=0;j<i;j++)
            wt[i]+=bt[j];

        total+=wt[i];
    }

    avg_wt=total/n;      //average waiting time
    total=0;

    printf("\nProcess\t    Burst Time    \tWaiting Time\tTurnaround Time");
    for(i=0;i<n;i++)
    {
        tat[i]=bt[i]+wt[i];     //calculate turnaround time
        total+=tat[i];
        printf("\nP[%d]\t\t  %d\t\t    %d\t\t\t%d",p[i],bt[i],wt[i],tat[i]);
    }

    avg_tat=total/n;     //average turnaround time
    printf("\n\nAverage Waiting Time=%d",avg_wt);
    printf("\nAverage Turnaround Time=%d\n",avg_tat);

return 0;
}
```

سپس یا توجه به اینکه ارایه پراسس ها مرتب شده اند waiting time هر یک را حساب میکنیم (حلقه اول) و در حلقه دوم با توجه به اینکه زمان اجرا برابراست با saiting time + burst time زمان اجرا را محاسبه میکنیم و در اخر نیز چاپ میکنیم

عکس هایی از زمان اجرا :


AmirLinuxUn (Snapshot 1) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
The Virtual Machine reports that the guest OS supports mouse pointer integration. This means that you do not need to capture the mouse pointer to be able to use it in
Activities Terminal Jun 20 00:29
amirba@amirba-VirtualBox: ~/Downloads
Enter Total Number of Process:4
Enter Burst Time and Priority
P[1]
Burst Time:45
Priority:1
P[2]
Burst Time:54
Priority:4
P[3]
Burst Time:4
Priority:2
P[4]
Burst Time:15
Priority:3
Process Burst Time Waiting Time Turnaround Time
P[1] 45 0 45
P[3] 4 45 49
P[4] 15 49 64
P[2] 54 64 118
Average Waiting Time=39
Average Turnaround Time=69
amirba@amirba-VirtualBox:~/Downloads$
Right Ctrl
Skype
Type here to search
79°F
12:29 AM
6/20/2021