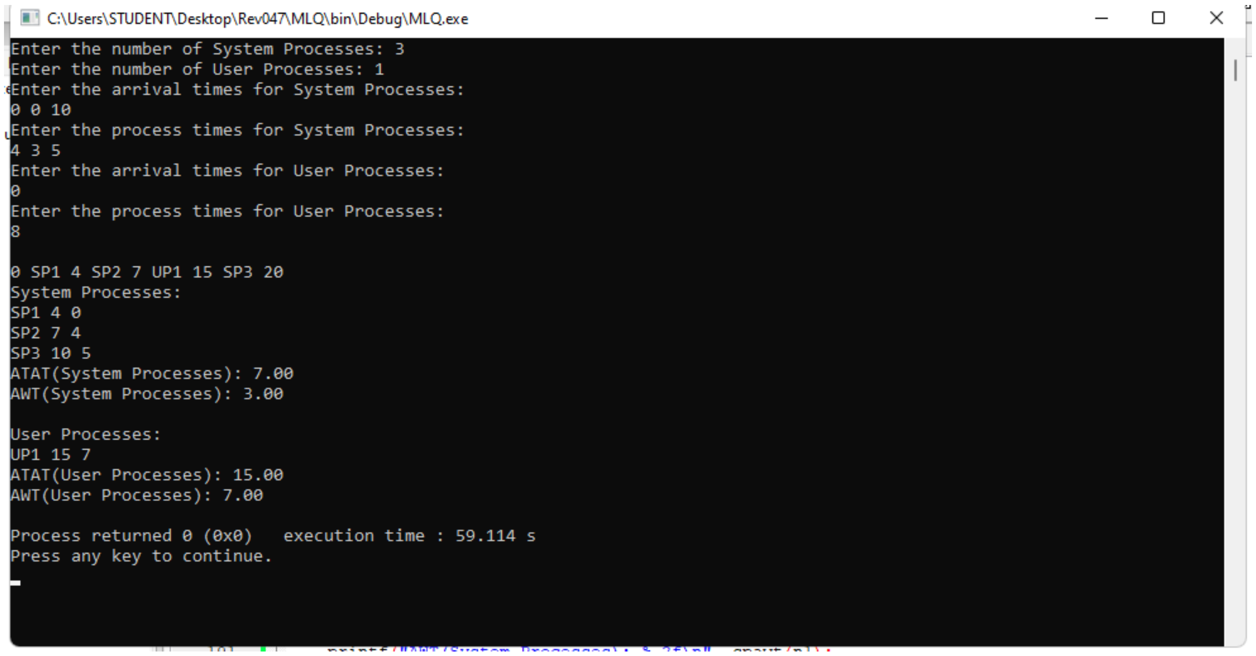
3.Write a C program to simulate multi-level queue scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories ± system processes and user processes. System processes are to be given higher priority than user processes. Use FCFS scheduling for the processes in each queue.

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

int spat[10], upat[10], i, n1, n2, p1[10], p2[10];
int sppt[10], uppt[10], time = 0, op = 0, y, z, pt;
int sptat[10], uptat[10];
int spwt[10], upwt[10];
float spatat = 0, spawt = 0;
float upatat = 0, upawt = 0;

void process(int x, int isSystem) {
    if (isSystem) {
        op += sppt[x];
        sptat[x] = op - spat[x];
        sppt[x] = 0;
        spwt[x] = sptat[x] - p1[x];
        spatat += sptat[x];
        spawt += spwt[x];
    } else {
        op += uppt[x];
        uptat[x] = op - upat[x];
        uppt[x] = 0;
        upwt[x] = uptat[x] - p2[x];
        upatat += uptat[x];
        upawt += upwt[x];
    }
}

int main() {
    printf("Enter the number of System Processes: ");
    scanf("%d", &n1);

    printf("Enter the number of User Processes: ");
    scanf("%d", &n2);

    printf("Enter the arrival times for System Processes:\n");
    for (i = 0; i < n1; i++)
    scanf("%d", &spat[i]);

printf("Enter the process times for System Processes:\n");
for (i = 0; i < n1; i++)
    scanf("%d", &sppt[i]);

printf("Enter the arrival times for User Processes:\n");
for (i = 0; i < n2; i++)
    scanf("%d", &upat[i]);

printf("Enter the process times for User Processes:\n");
for (i = 0; i < n2; i++)
    scanf("%d", &uppt[i]);

for (i = 0; i < n1; i++)
    time += sppt[i];

for (i = 0; i < n2; i++)
    time += uppt[i];

for (i = 0; i < n1; i++)
    p1[i] = sppt[i];

for (i = 0; i < n2; i++)
    p2[i] = uppt[i];

printf("\n");
while (op < time) {
    y = -1;
    z = -1;
    for (i = 0; i < n1; i++) {
        if (op >= spat[i] && sppt[i] != 0) {
            y = i;
            break;
        }
    }
    for (i = 0; i < n2; i++) {
        if (op >= upat[i] && uppt[i] != 0) {
            z = i;
            break;
        }
    }
    if (y != -1) {
        printf("%d SP%d ", op, y + 1);
```

```
            process(y, 1);
        } else if (z != -1) {
            printf("%d UP%d ", op, z + 1);
            process(z, 0);
        } else {
            op++;
        }
    }
    printf("%d ",op);
    printf("\n");
    printf("System Processes:\n");
    for (i = 0; i < n1; i++)
        printf("SP%d %d %d\n", i + 1, sptat[i],spwt[i]);
    printf("ATAT(System Processes): %.2f\n", spatat / n1);
    printf("AWT(System Processes): %.2f\n", spawt/n1);
    printf("\n");
    printf("User Processes:\n");
    for (i = 0; i < n2; i++)
        printf("UP%d %d %d\n", i + 1, uptat[i], upwt[i]);
    printf("ATAT(User Processes): %.2f\n", upatat / n2);
    printf("AWT(User Processes): %.2f\n", upawt / n2);
    return 0;
}
```

Output:



C:\Users\STUDENT\Desktop\Rev047\MLQ\bin\Debug\MLQ.exe

```
Enter the number of System Processes: 3
Enter the number of User Processes: 1
Enter the arrival times for System Processes:
0 0 10
Enter the process times for System Processes:
4 3 5
Enter the arrival times for User Processes:
0
Enter the process times for User Processes:
8

0 SP1 4 SP2 7 UP1 15 SP3 20
System Processes:
SP1 4 0
SP2 7 4
SP3 10 5
ATAT(System Processes): 7.00
AWT(System Processes): 3.00

User Processes:
UP1 15 7
ATAT(User Processes): 15.00
AWT(User Processes): 7.00

Process returned 0 (0x0)   execution time : 59.114 s
Press any key to continue.
```

Observation:

Q) Write a C program to simulate multi-level queue scheduling algorithm for system process with higher priority & user process. Use FCFS algorithm for the process in each queue.

```
#include <stdio.h>

int spat[10], upat[10], i, n1, n2, p1[10], p2[10];
int sppt[10], uppt[10], time=0, op=0, y, z, pt;
int sptat[10], uptat[10], spwt[10], upwt[10];
float spatat=0, spawt=0, upatat=0, upawt=0;

void process(int x, int issystem) {
    if(isSystem) {

        op+=sppt[x];
        sptat[x]=op-spat[x];
        sppt[x]=0;
        spwt[x]=sptat[x]-p1[x];
        spawt += spwt[x];
    }
    else {
        op+=uppt[x];
        uptat[x]=op -upat[x];
        uppt[x]=0;
        upwt[x]= uptat[x]-p2[x];
        upatat += uptat[x];
    }   upawt += upwt[x];
}.

int main() {
    printf("Enter the number of System processes: ");
    scanf("%d", &n1);

    printf("Enter the number of User processes: ");
    scanf("%d", &n2);

    printf("Enter arrival times for System Processes: \n");
    for(i=0; i<n1; i++)
        scanf("%d", &spat[i]);
    printf("Enter process times for System processes: \n");
    for(i=0; i<n1; i++)
        scanf("%d", &sppt[i]);

    printf("Enter arrival times for User process: \n");
    for(i=0; i<n2; i++)
        scanf("%d", &upat[i]);
    printf("Enter process times for user process: \n");
    for(i=0; i<n2; i++)
        scanf("%d", &uppt[i]);
```

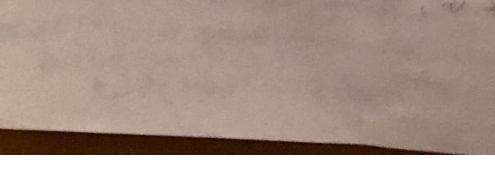
```
for(i=0;
{ time
    p1[
}
for(i=0,
{ time +
  p2[i]
}.

printf(

while(op
      y
      z
   for



      }
      f



      }

if(y



}
else


}
else{
}.
printf("%
  printf(
  for(i=
     pr
printf("ATA
printf("AW
  printf("
for(i=0; i<n1; i++ )
 { time += sppt[i];
   p1[i] = sppt[i];
 }
for (i=0; i<n2; i++ )
 { time += uppt[i];
   p2[i]= uppt[i];
 }.

 printf("\n");
while (op<time) {
      y=-1;
      z=-1;
   for(i=0; i<n1 ; i++) {
          if (op >= spat [i] && sppt[i] != 0 )
             { y=i;
                break;
      }
    }
    for (i=0; i<n2; i++) {
      if (op >= upat [i] && uppt [i] != 0 )
           { z= i;
               break; }.
    }

   if (y != -1) {
       printf(" %d SP %d ", op, y+1);
       process(y, 1);
   }
   else if (z != -1) {.
       printf("%d UP %d ", op, z+1);
       process (z, 0);
   }
   else { op++; }
 }.
printf("%d\n", op);

  printf( "System Processes:\n");
  for (i=0; i<n1; i++)
       printf(" SP %d   %d %d \n", (i+1), sptat[i], spwt[i]);
printf("ATAT(SP): %0.2f \n", spatat/n1);
printf("AWT(SP): %0.2f \n", spawt/n1);
  printf("\n");
printf(" User processes : \n");
for(i=0; i<n2; i++)
    printf(" UP%d %d %d \n", i+1, uptat[i], upwt[i]);
printf(" ATAT (UP) : %0.2f \n", upatat /n2);
printf(" AWT (UP): %0.2f \n", upawt /n2);

return 0;
}.
```

Output:

```
Enter number of System processes :3
Enter number Of User processes:1

Enter arrival times for System Processes:
0 0 10
Enter process times for System processes:
4 3 5
Enter arrival times for User processes.
0
Enter process times for user processes
8

0 SP1 4 SP2 7 UP1 15 SP3 20.
System processes:
SP1  4 0
SP2  7 4
SP3  10 5

ATAT (SP) : 7.00
AWT (SP) : 3.00

User processes:
UP1 15 7

ATAT (UP) : 15.00
AWT (UP) : 7.00
```

System pro
SP1	0	4
SP2	0	7
SP3	10	5

user pro
UP1	0	8



[illegible]
12/7/22