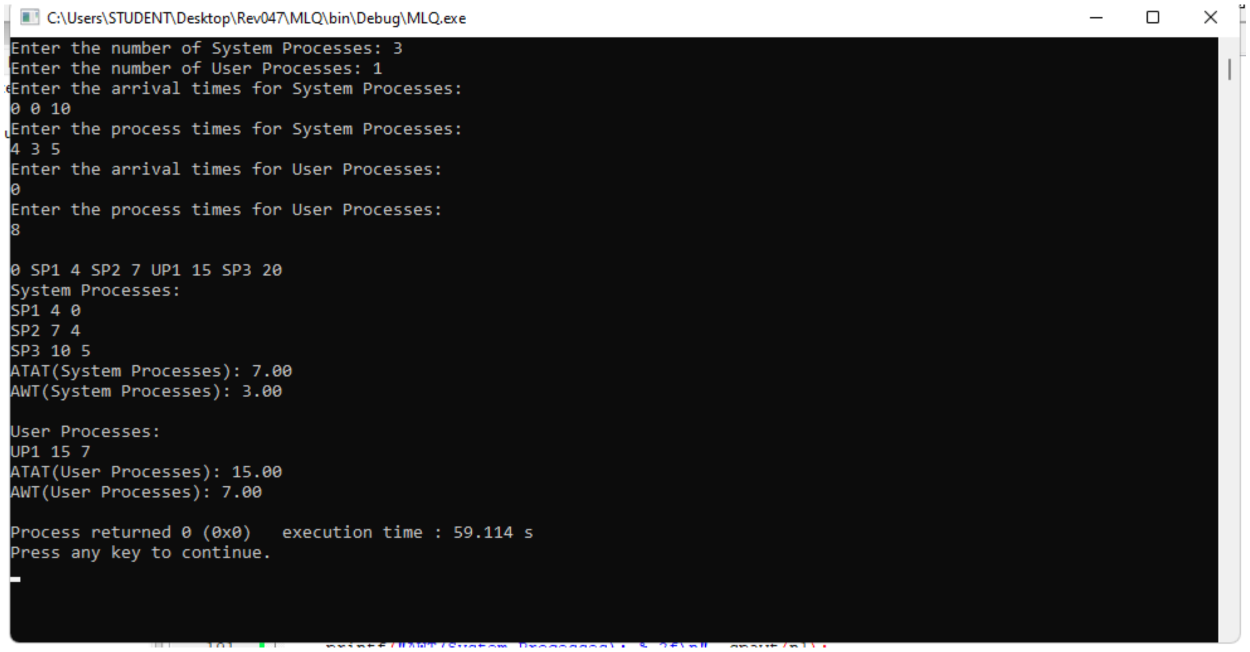
3.Write a C program to simulate multi-level queue scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories ± system processes and user processes. System processes are to be given higher priority than user processes. Use FCFS scheduling for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

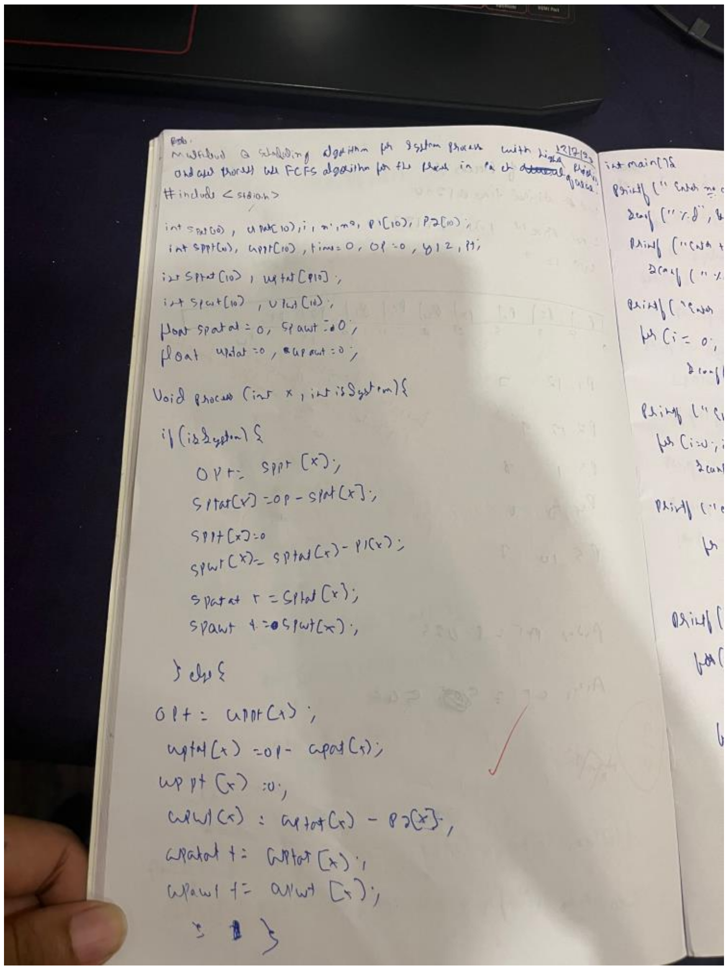
Output:



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.
```

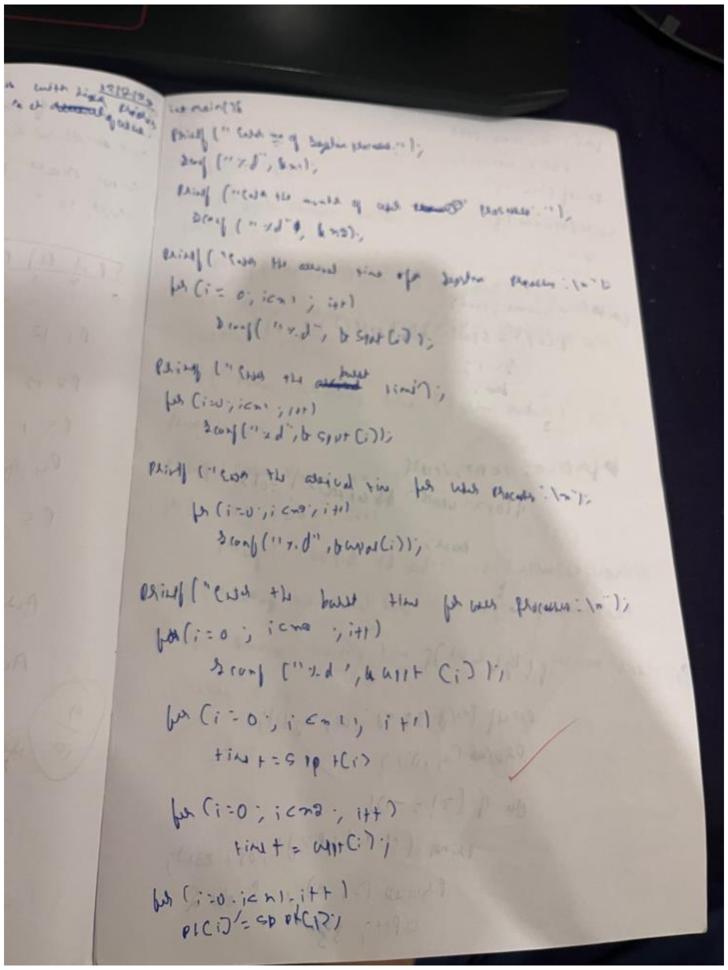
Observation:



Prob:
Multilevel Q scheduling algorithm for system process with higher priority and user process use FCFS algorithm for the process in each ~~[illegible]~~ queue. 13/7/23

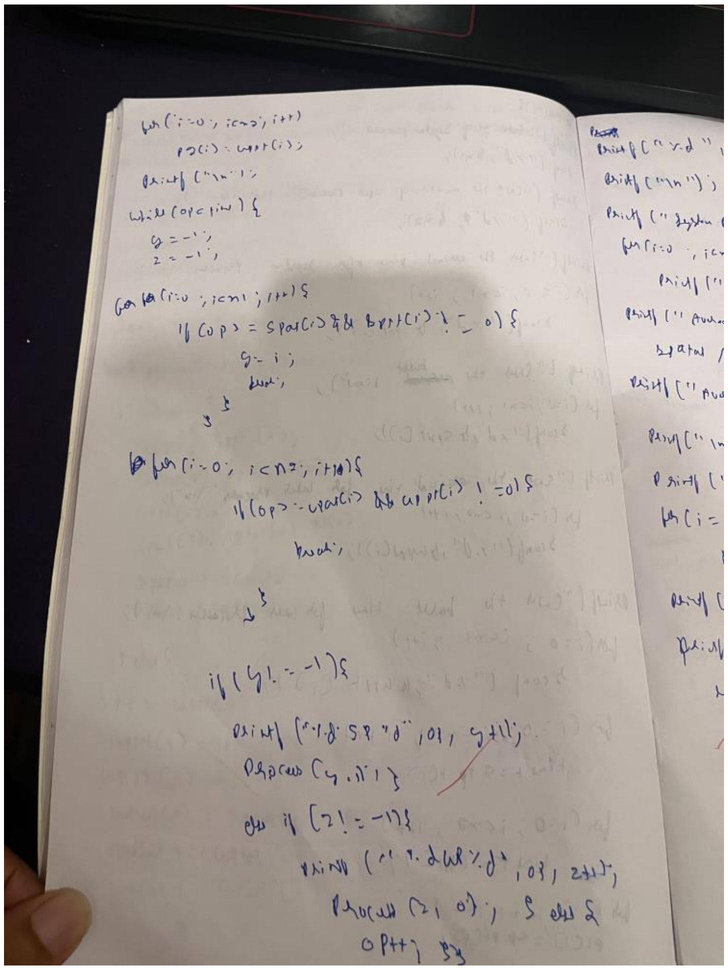
```
#include <stdio.h>

int spat[10], upat[10], i, n1, n2, p1[10], p2[10];
int sppt[10], uppt[10], time=0, op=0, y12, ty;

int sptat[10], uptat[p10];
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 no
  scanf("%d", &
 printf("Enter
   scanf("%
 printf("Enter
  for(i= 0;
      scanf(
 printf("E
  for(i=0;
     scanf
 printf("
   for

 printf(
  for(
```



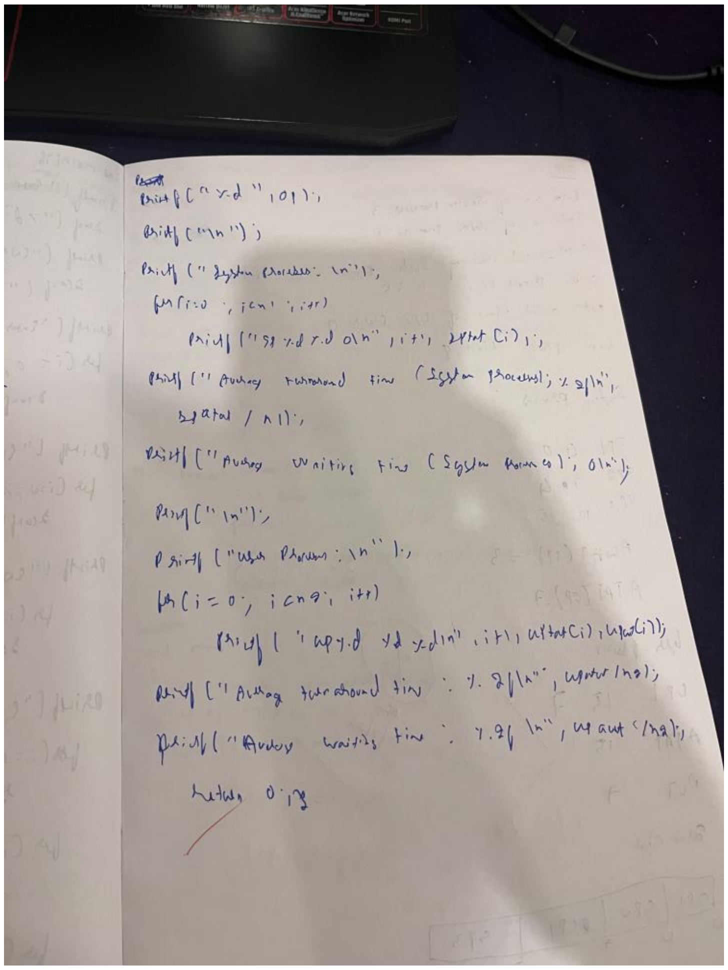
with high 17/12/23 [illegible] ~~[illegible]~~ priority queue.

```
int main(){
printf(" Enter no of System process: ");
scanf("%d", &n1);
printf("Enter the number of user ~~[illegible]~~ process: ");
 scanf("%d", &n2);
printf("Enter the arrival time of System process: \n");
for (i = 0; i<n1 ; i++)
     scanf( "%d", & Spat [i] );
printf ("Enter the ~~arrival~~ burst time");
for (i=0; i<n1 ; i++)
    scanf("%d", & spbt (i));
printf ("Enter the arrival time for user Process: \n");
  for (i=0; i<n2; i++)
     scanf("%d", &upat(i));
printf("Enter the burst time for user process: \n");
for(i=0 ; i<n2 ; i++)
     scanf ("%d", & upbt (i) );
 for (i=0; i<n1; i++)
     time += spbt(i)
 for (i=0; i<n2; i++)
       time += upbt(i);
for (i=0; i<n1; i++)
  pt[i] = spbt[i];
```

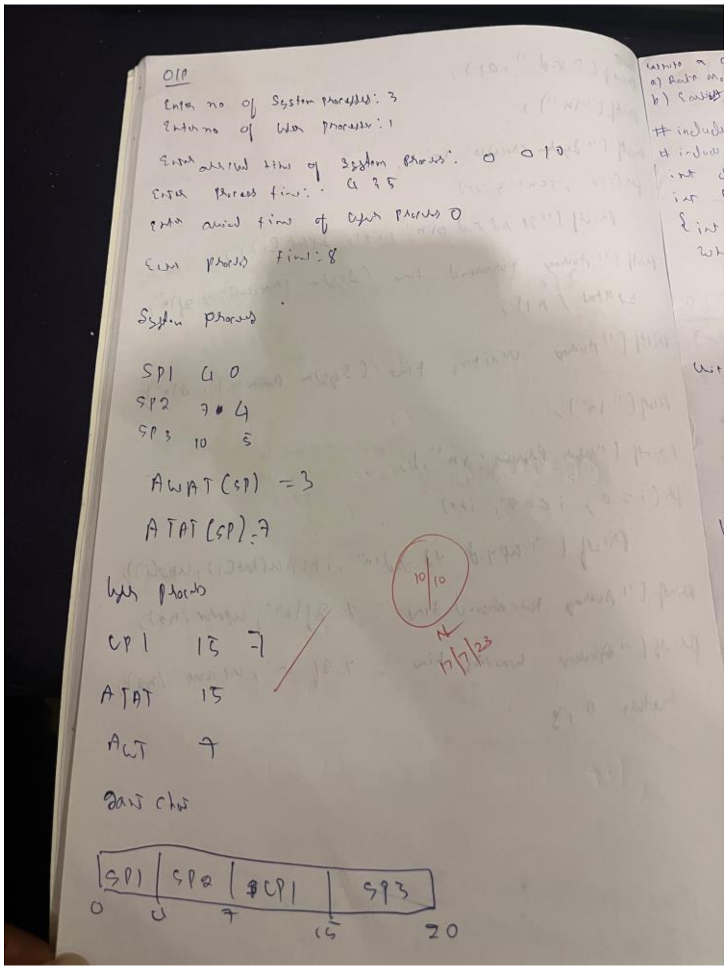


```
for(i=0; i<n2; i++)
    p2(i) = uppr(i);
printf("\n");
while(op<tim){
  y = -1;
  z = -1;

for(i=0 ;i<n1 ;i++){
    if(op>=spar(i) && bprt(i) != 0){
        y = i;
        break;
    }
  }

for(i=0; i<n2; i++){
    if(op>=upar(i) && uppr(i) != 0){
        break;

    }
  }

if(y!=-1){
  printf("%d SP %d", op, y+1);
  preproc(y, 1); }
  else if(z!=-1){
      printf("%dUP%d", op, z+1);
      preproc(z, 0); } else {
      op++; }}
```

```
printf("%d"
printf("\n");
printf("System
 for(i=0 ;i
   printf("
printf("Ava
 spatial
printf("Ava

printf("
printf("
for(i=
```



~~Print~~
```
printf("%d ",0);
printf("\n");
printf("System Processes:\n");
for(i=0 ; i<n1 ; i++)
     printf("SP%d %d 0\n",i+1, sptat[i]);
printf("Averag turnaround time (System processes): %.2f\n",
   sptatal / n1);
printf("Averag waiting time (System processes): 0\n");
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("Averag turnaround time : %.2f\n", uptotal/n2);
printf("Averag waiting time : %.2f \n", upwt/n2);
  return 0;}
```



O/P

```
Enter no of System processes: 3
Enter no of User processes: 1

Enter arrival time of System process: 0 0 10
Enter process time: 4 3 5
Enter arrival time of User process 0

Enter process time: 8

System process

SP1  4  0
SP2  7  4
SP3  10  5

AWAT(SP) = 3

ATAT(SP) = 7

User process

UP1  15  7

ATAT  15

AWT  7

Gantt chart

|SP1 | SP2 | UP1 | SP3 |
0    4     7     15    20
```

10/10
17/7/23