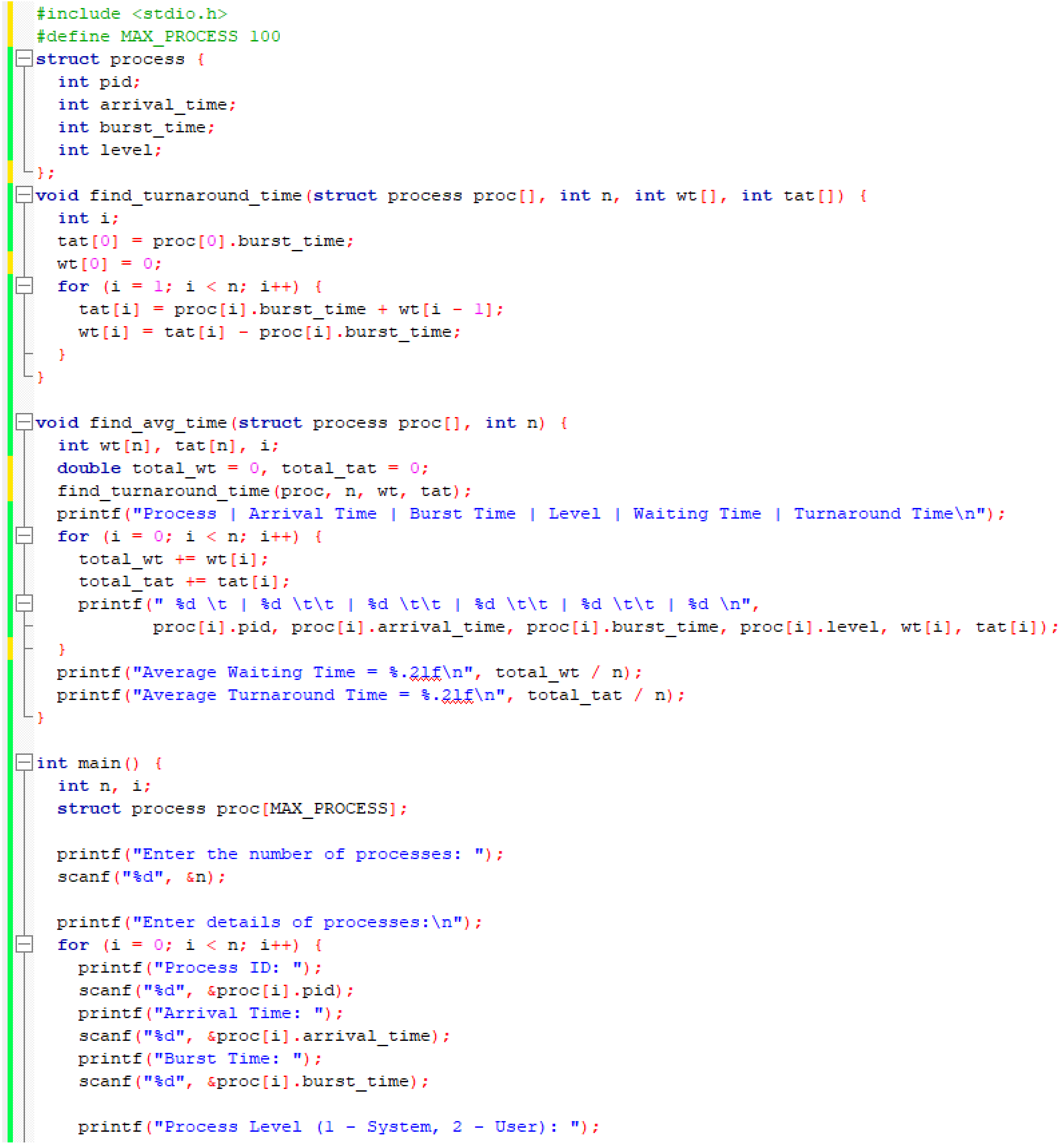
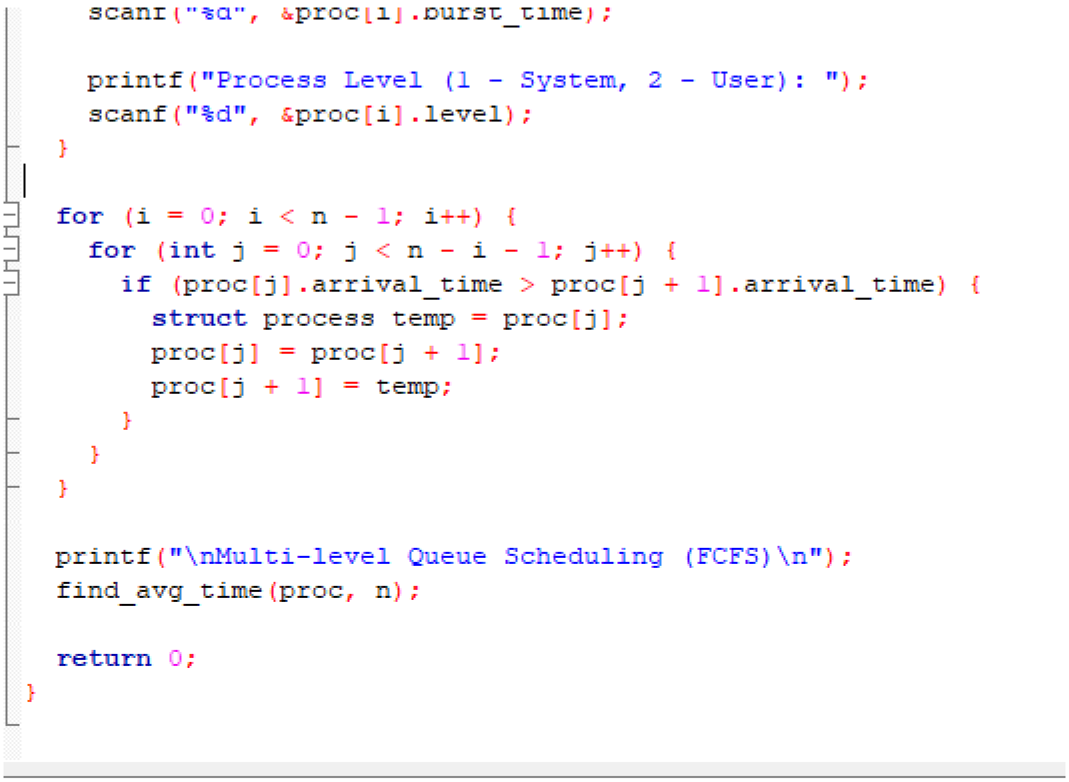
LAB PROGRAM 3

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.

INPUT

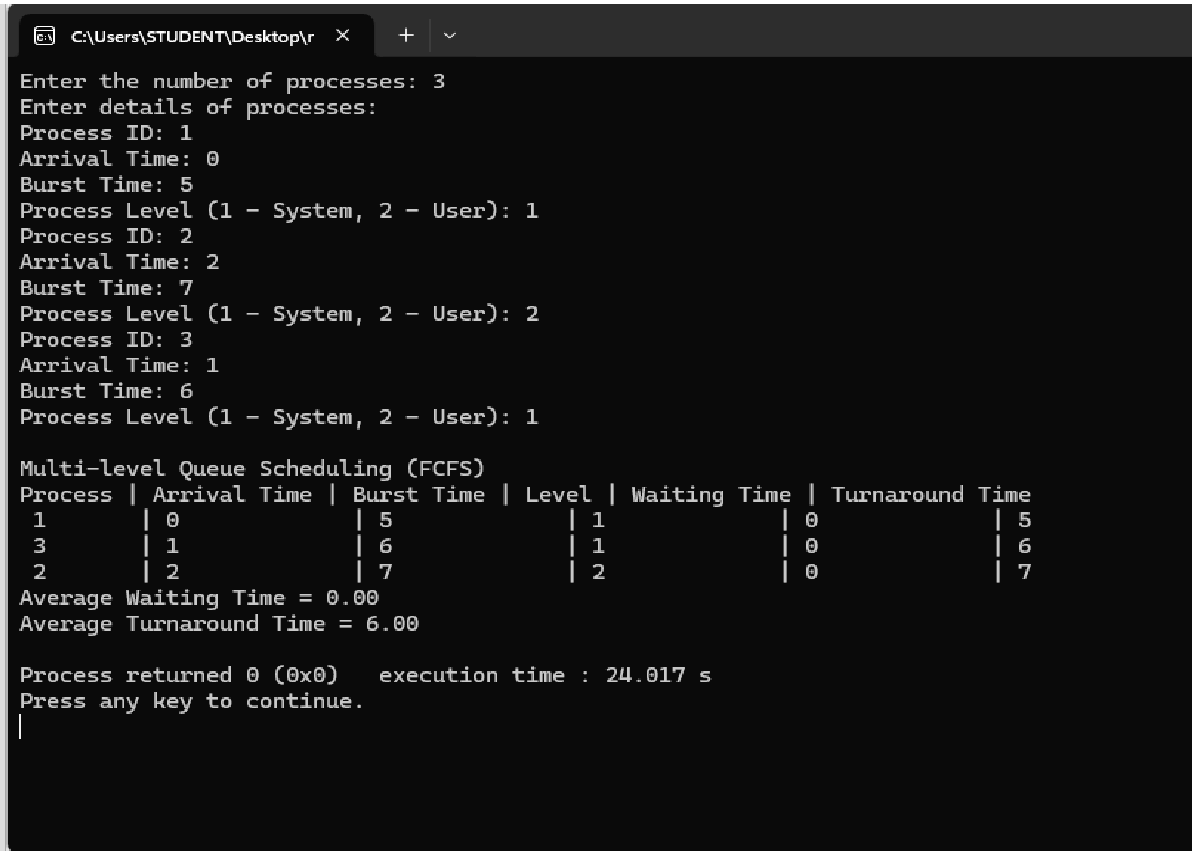


```c
#include <stdio.h>
#define MAX_PROCESS 100
struct process {
  int pid;
  int arrival_time;
  int burst_time;
  int level;
};
void find_turnaround_time(struct process proc[], int n, int wt[], int tat[]) {
  int i;
  tat[0] = proc[0].burst_time;
  wt[0] = 0;
  for (i = 1; i < n; i++) {
    tat[i] = proc[i].burst_time + wt[i - 1];
    wt[i] = tat[i] - proc[i].burst_time;
  }
}

void find_avg_time(struct process proc[], int n) {
  int wt[n], tat[n], i;
  double total_wt = 0, total_tat = 0;
  find_turnaround_time(proc, n, wt, tat);
  printf("Process | Arrival Time | Burst Time | Level | Waiting Time | Turnaround Time\n");
  for (i = 0; i < n; i++) {
    total_wt += wt[i];
    total_tat += tat[i];
    printf(" %d \t | %d \t\t | %d \t\t | %d \t\t | %d \t\t | %d \n",
           proc[i].pid, proc[i].arrival_time, proc[i].burst_time, proc[i].level, wt[i], tat[i]);
  }
  printf("Average Waiting Time = %.2lf\n", total_wt / n);
  printf("Average Turnaround Time = %.2lf\n", total_tat / n);
}

int main() {
  int n, i;
  struct process proc[MAX_PROCESS];

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

  printf("Enter details of processes:\n");
  for (i = 0; i < n; i++) {
    printf("Process ID: ");
    scanf("%d", &proc[i].pid);
    printf("Arrival Time: ");
    scanf("%d", &proc[i].arrival_time);
    printf("Burst Time: ");
    scanf("%d", &proc[i].burst_time);

    printf("Process Level (1 - System, 2 - User): ");
```



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

    printf("Process Level (1 - System, 2 - User): ");
    scanf("%d", &proc[i].level);
  }

  for (i = 0; i < n - 1; i++) {
    for (int j = 0; j < n - i - 1; j++) {
      if (proc[j].arrival_time > proc[j + 1].arrival_time) {
        struct process temp = proc[j];
        proc[j] = proc[j + 1];
        proc[j + 1] = temp;
      }
    }
  }

  printf("\nMulti-level Queue Scheduling (FCFS)\n");
  find_avg_time(proc, n);

  return 0;
}
```

OUTPUT



```
Enter the number of processes: 3
Enter details of processes:
Process ID: 1
Arrival Time: 0
Burst Time: 5
Process Level (1 - System, 2 - User): 1
Process ID: 2
Arrival Time: 2
Burst Time: 7
Process Level (1 - System, 2 - User): 2
Process ID: 3
Arrival Time: 1
Burst Time: 6
Process Level (1 - System, 2 - User): 1

Multi-level Queue Scheduling (FCFS)
Process | Arrival Time | Burst Time | Level | Waiting Time | Turnaround Time
 1       | 0             | 5             | 1             | 0             | 5
 3       | 1             | 6             | 1             | 0             | 6
 2       | 2             | 7             | 2             | 0             | 7
Average Waiting Time = 0.00
Average Turnaround Time = 6.00

Process returned 0 (0x0)   execution time : 24.017 s
Press any key to continue.
```