Program-3

Aim: Write a program to simulate multi-level queue scheduling algorithm.

Source code:

```
#include <stdio.h>

int main() {
    int p[20], bt[20], su[20], wt[20], tat[20], i, k, n, temp;
    float wtavg, tatavg;
    printf("Enter the number of processes: ");
    scanf("%d", &n);
    // Input burst times and process types
    for (i = 0; i < n; i++) {
        p[i] = i + 1;
        printf("Enter the burst time of process %d: ", i + 1);
        scanf("%d", &bt[i]);
        printf("System/User process (0/1): ");
        scanf("%d", &su[i]);
    }
    // Sorting processes by system/user type (0 < 1)
    for (i = 0; i < n - 1; i++) {
        for (k = i + 1; k < n; k++) {
            if (su[i] > su[k]) {
                // Swap processes
                temp = p[i];
                p[i] = p[k];
                p[k] = temp;
                // Swap burst times
                temp = bt[i];
                bt[i] = bt[k];
                bt[k] = temp;
                // Swap system/user types
                temp = su[i];
                su[i] = su[k];
```

```
            su[k] = temp;
        }
    }
}
// Initialize waiting time and turnaround time for the first process
wt[0] = 0;
tat[0] = bt[0];
wtavg = 0;
tatavg = bt[0];
// Calculate waiting times and turnaround times
for (i = 1; i < n; i++) {
    wt[i] = wt[i - 1] + bt[i - 1];
    tat[i] = wt[i] + bt[i];
    wtavg += wt[i];
    tatavg += tat[i];
}
// Display the results
printf("\nProcess\tSystem/User\tBurst Time\tWaiting Time\tTurnaround Time\n");
for (i = 0; i < n; i++) {
    printf("%d\t%d\t\t%d\t\t%d\t\t%d\n", p[i], su[i], bt[i], wt[i], tat[i]);
}
// Calculate and display average waiting time and turnaround time
printf("\nAverage Waiting Time: %.2f", wtavg / n);
printf("\nAverage Turnaround Time: %.2f\n", tatavg / n);
return 0;
}
```

Sample output:

Enter the number of processes: 3

Enter the burst time of process 1: 5

System/User process (0/1): 1

Enter the burst time of process 2: 2

System/User process (0/1): 0

Enter the burst time of process 3: 4

System/User process (0/1): 0

Process	System/User	Burst Time	Waiting Time	Turnaround Time
2	0	2	0	2
3	0	4	2	6
1	1	5	6	11

Average Waiting Time: 2.67

Average Turnaround Time: 6.33