OS Practical No. 5

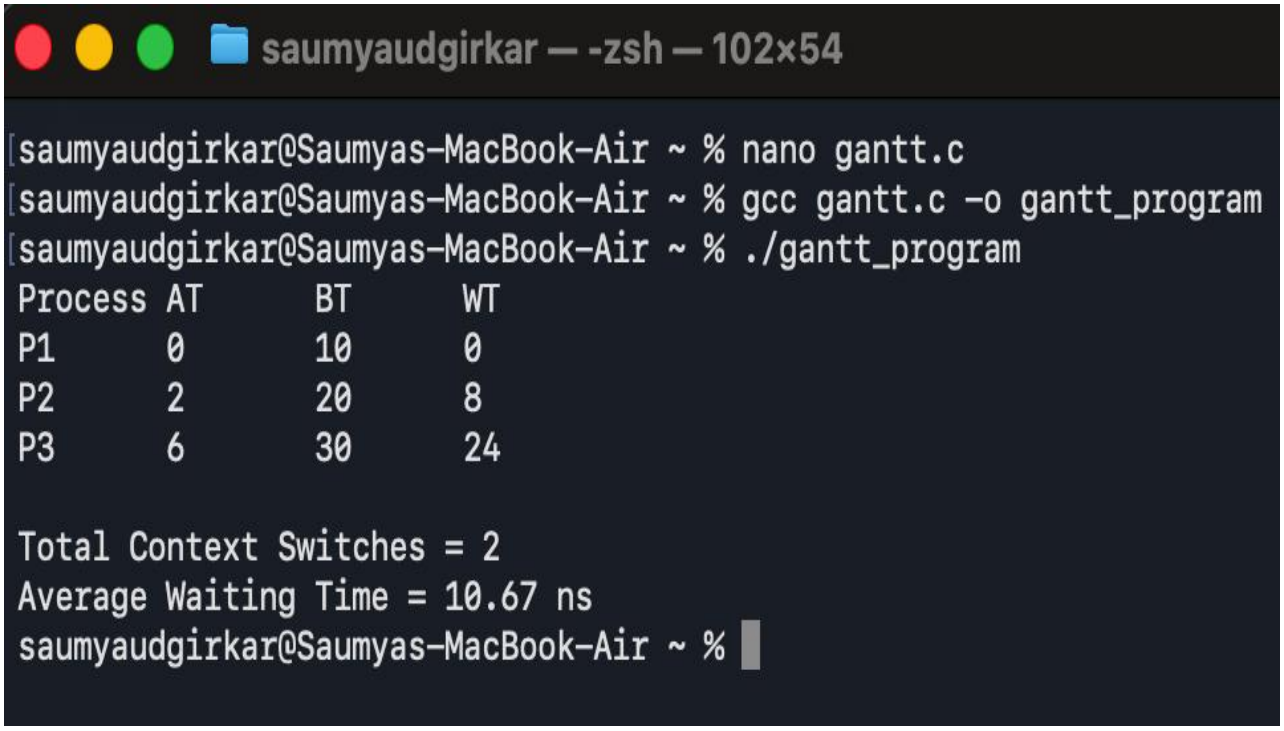
Aim :

In an operating system three CPU-intensive processes are ready for execution, which require 10ns, 20ns and 30ns and arrival at times 0ns,2ns and 6ns, respectively. Write a Program to calculate the total number of context switches needed if the operating system implements a shortest job first (preemptive) scheduling algorithm. Also calculate the average time for which the processes have to wait before getting the CPU.

Code :

```
#include <stdio.h>
int main() {
    int n = 3;
    int at[3] = {0, 2, 6};      // Arrival times
    int bt[3] = {10, 20, 30};  // Burst times
    int rt[3];                 // Remaining times
    int wt[3] = {0};
    int ct[3];
    int time = 0, completed = 0;
    int min, shortest;
    int prev = -1;
    int context_switch = 0;

// Copy burst time to remaining time
    for (int i = 0; i < n; i++)
        rt[i] = bt[i];
 while (completed != n) {
        min = 9999;
        shortest = -1;

        // Find process with shortest remaining time
        for (int i = 0; i < n; i++) {
            if (at[i] <= time && rt[i] > 0 && rt[i] < min) {
                min = rt[i];
                shortest = i;
            }
        }
```

```
        if (shortest == -1) {
            time++;
            continue;
        }

        // Count context switches
        if (prev != -1 && prev != shortest)
            context_switch++;
  prev = shortest;

        // Execute process for 1 unit time
        rt[shortest]--;
        time++;

        // If process completes
        if (rt[shortest] == 0) {
            completed++;
            ct[shortest] = time;
            wt[shortest] = ct[shortest] - at[shortest] - bt[shortest];
        }
    }

    // Display results
    float avg_wt = 0;
    printf("Process\tAT\tBT\tWT\n");
    for (int i = 0; i < n; i++) {
        printf("P%d\t%d\t%d\t%d\n", i+1, at[i], bt[i], wt[i]);
        avg_wt += wt[i];
    }
avg_wt /= n;
    printf("\nTotal Context Switches = %d", context_switch);
    printf("\nAverage Waiting Time = %.2f ns\n", avg_wt);

    return 0;
}
```


saumyaudgirkar — -zsh — 102×54
saumyaudgirkar@Saumyas-MacBook-Air ~ % nano gantt.c
saumyaudgirkar@Saumyas-MacBook-Air ~ % gcc gantt.c -o gantt_program
saumyaudgirkar@Saumyas-MacBook-Air ~ % ./gantt_program
Process AT BT WT
P1 0 10 0
P2 2 20 8
P3 6 30 24
Total Context Switches = 2
Average Waiting Time = 10.67 ns
saumyaudgirkar@Saumyas-MacBook-Air ~ %