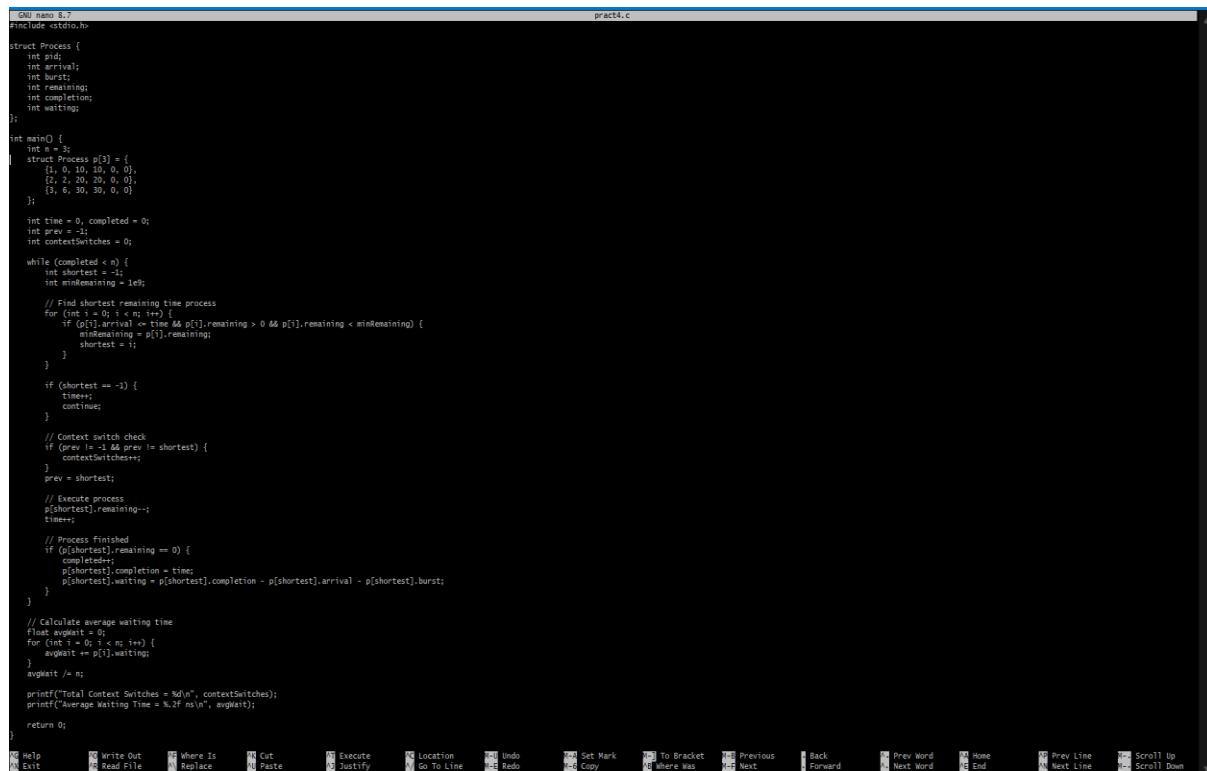# PRACTICAL: 04

Aim: Write a program to implement Shortest Job First (SJF) Preemptive Scheduling for three processes and calculate the total context switches and average waiting time. The processes have burst times 10ns, 20ns, and 30ns, arriving at 0ns, 2ns, and 6ns, respectively**.**

```c
#include <stdio.h>

struct Process {
    int pid;
    int arrival;
    int burst;
    int remaining;
    int completion;
    int waiting;
};

int main() {
    int n = 3;
    struct Process p[3] = {
        {1, 0, 10, 10, 0, 0},
        {2, 2, 20, 20, 0, 0},
        {3, 6, 30, 30, 0, 0}
    };

    int time = 0, completed = 0;
    int prev = -1;
    int contextSwitches = 0;

    while (completed < n) {
        int shortest = -1;
        int minRemaining = 1e9;

        // Find shortest remaining time process
        for (int i = 0; i < n; i++) {
            if (p[i].arrival <= time && p[i].remaining > 0 && p[i].remaining < minRemaining) {
                minRemaining = p[i].remaining;
                shortest = i;
            }
        }

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

        // Context switch check
        if (prev != -1 && prev != shortest) {
            contextSwitches++;
        }
        prev = shortest;

        // Execute process
        p[shortest].remaining--;
        time++;

        // Process finished
        if (p[shortest].remaining == 0) {
            completed++;
            p[shortest].completion = time;
            p[shortest].waiting = p[shortest].completion - p[shortest].arrival - p[shortest].burst;
        }
    }

    // Calculate average waiting time
    float avgWait = 0;
    for (int i = 0; i < n; i++) {
        avgWait += p[i].waiting;
    }
    avgWait /= n;

    printf("Total Context Switches = %d\n", contextSwitches);
    printf("Average Waiting Time = %.2f ns\n", avgWait);

    return 0;
}
```
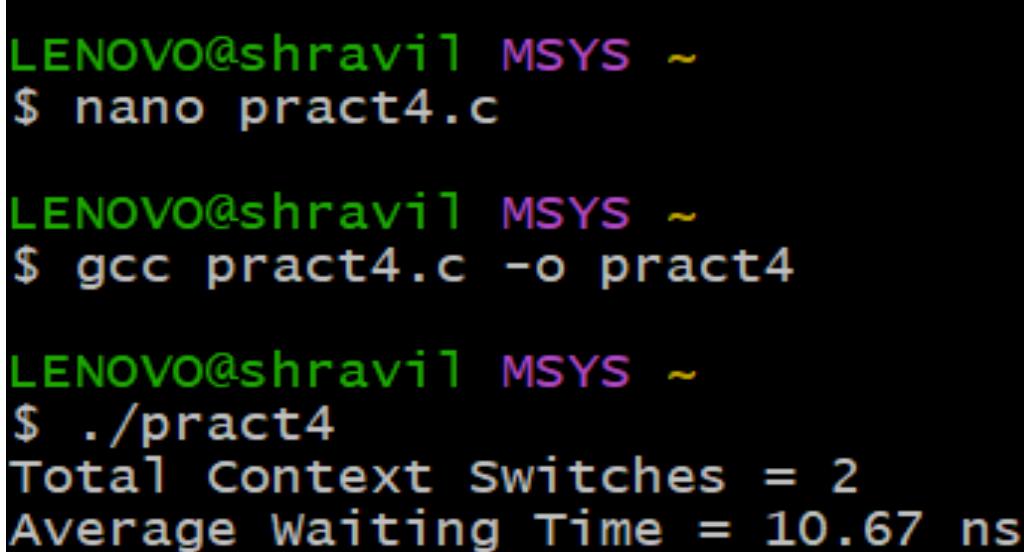
OUTPUT:


```
LENOVO@shravil MSYS ~
$ nano pract4.c

LENOVO@shravil MSYS ~
$ gcc pract4.c -o pract4

LENOVO@shravil MSYS ~
$ ./pract4
Total Context Switches = 2
Average Waiting Time = 10.67 ns
```