

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.

```

M ~
GNU nano 8.7
#include <stdio.h>
sjf.c
Modified

int main() {
    int n = 3;
    int bt[3] = {10, 20, 30};
    int at[3] = {0, 2, 6};
    int rt[3] = {0, 0, 0};
    int completed = 0, time = 0;
    int shortest = -1, min;
    int done[3] = {0};
    int context_switch = 0;
    int prev = -1;

    for (int i = 0; i < n; i++)
        rt[i] = bt[i];

    while (completed < n) {
        min = 9999;
        shortest = -1;

        for (int i = 0; i < n; i++) {
            if (at[i] <= time && !done[i] && rt[i] < min && rt[i] > 0) {
                min = rt[i];
                shortest = i;
            }
        }

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

        if (prev != shortest) {
            context_switch++;
            prev = shortest;
        }

        rt[shortest]--;
        time++;

        if (rt[shortest] == 0) {
            completed++;
            done[shortest] = 1;
            wt[shortest] = time - bt[shortest] - at[shortest];
        }
    }

    float avg_wt = 0;
    for (int i = 0; i < n; i++)
        avg_wt += wt[i];

    printf("Total Context Switches: %d\n", context_switch - 1);
    printf("Average Waiting Time: %.2f ns\n", avg_wt / n);
}

Air: Moderate
Tomorrow
Help   Write Out   Where Is   Cut   Execute   Location   Undo   Set Mark   To Bracket   Previous   Back Forward   Prev Word   Next Word
Exit   Read File   Replace   Paste   Justify   Go To Line   Redo   where Was   Next   ENG IN   01-02-2026

```

```
F0IN@LAPTOP-MC73RDEH MSYS ~
$ nano sjf.c

F0IN@LAPTOP-MC73RDEH MSYS ~
$ gcc sjf.c -o sjf

F0IN@LAPTOP-MC73RDEH MSYS ~
$ ./sjf
Total Context Switches: 2
Average Waiting Time: 10.67 ns

F0IN@LAPTOP-MC73RDEH MSYS ~
$
```



A screenshot of a Windows desktop environment. At the top is a black taskbar with several pinned icons: File Explorer, Search, Task View, Edge browser, File Manager, Spotify, Camera, and Microsoft Store. To the right of the taskbar are system status icons for battery level, signal strength, and connectivity, along with the date and time (01-02-2026) and a volume icon.