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6. Construct a C program to implement preemptive priority scheduling algorithm

Aim:

To implement a preemptive priority scheduling algorithm in C to schedule processes based on their priority and calculate metrics like waiting time and turnaround time.

Algorithm:

1. Input the number of processes, their burst times, and priorities.
2. Initialize time to 0 and process data structures.
3. Continuously:
    - Select the highest-priority process that is ready to execute.
    - Execute it for one unit of time.
    - Update the remaining burst time for the process.
4. Stop when all processes are complete.
5. Calculate waiting time and turnaround time for each process.

Procedure:

1. Read input data for processes (arrival time, burst time, priority).
2. Use a loop to simulate the scheduling clock:
    - Find the process with the highest priority at the current time.
    - Update burst times and track completed processes.
3. Calculate the waiting time and turnaround time for each process.
4. Display the schedule and computed metrics.

Code:

```
#include <stdio.h>

#include <limits.h>



struct Process {

    int pid, at, bt, pri, rt, wt, tat, completed;

};



int main() {
```

```
int n, time = 0, completed = 0;
printf("Enter the number of processes: ");
scanf("%d", &n);
struct Process p[n];

for (int i = 0; i < n; i++) {
    printf("Enter arrival time, burst time, priority for process %d: ", i + 1);
    scanf("%d %d %d", &p[i].at, &p[i].bt, &p[i].pri);
    p[i].pid = i + 1;
    p[i].rt = p[i].bt;
    p[i].completed = 0;
}

while (completed < n) {
    int idx = -1, min_pri = INT_MAX;
    for (int i = 0; i < n; i++) {
        if (p[i].at <= time && p[i].completed == 0 && p[i].pri < min_pri) {
            min_pri = p[i].pri;
            idx = i;
        }
    }
    if (idx != -1) {
        p[idx].rt--;
```

```
            time++;
            if (p[idx].rt == 0) {
                p[idx].completed = 1;
                completed++;
                p[idx].tat = time - p[idx].at;
                p[idx].wt = p[idx].tat - p[idx].bt;
            }
        } else {
            time++;
        }
    }

    printf("\nPID\tAT\tBT\tPRI\tWT\tTAT\n");
    for (int i = 0; i < n; i++) {
        printf("%d\t%d\t%d\t%d\t%d\t%d\n", p[i].pid, p[i].at, p[i].bt, p[i].pri, p[i].wt, p[i].tat);
    }

    return 0;
}
```

Result:

Input: Number of processes, their arrival times, burst times, and priorities.

Output:

Run Debug Stop Share Save { } Beautify

main.c

```c
#include <stdio.h>
#include <limits.h>                    T. Nikhil
struct Process {
    int pid, at, bt, pri, rt, wt, tat, completed;
};
int main() {
    int n, time = 0, completed = 0;
    printf("Enter the number of processes: ");
    scanf("%d", &n);
    struct Process p[n];
    for (int i = 0; i < n; i++) {
        printf("Enter arrival time, burst time, priority for process %d: ", i + 1);
        scanf("%d %d %d", &p[i].at, &p[i].bt, &p[i].pri);
        p[i].pid = i + 1;
        p[i].rt = p[i].bt;
        p[i].completed = 0;
    }
    while (completed < n) {
        int idx = -1, min_pri = INT_MAX;
        for (int i = 0; i < n; i++) {
            if (p[i].at <= time && p[i].completed == 0 && p[i].pri < min_pri) {
                min_pri = p[i].pri;
                idx = i;
            }
        }
        if (idx != -1) {
            p[idx].rt--;
            time++;
            if (p[idx].rt == 0) {
                p[idx].completed = 1;
                completed++;
                p[idx].tat = time - p[idx].at;
                p[idx].wt = p[idx].tat - p[idx].bt;
            }
        } else {
            time++;
        }
    }
    printf("\nPID\tAT\tBT\tPRI\tWT\tTAT\n");
    for (int i = 0; i < n; i++) {
        printf("%d\t%d\t%d\t%d\t%d\t%d\n", p[i].pid, p[i].at, p[i].bt, p[i].pri, p[i].wt, p[i].tat);
    }
    return 0;
```

```
Enter the number of processes: 3
Enter arrival time, burst time, priority for process 1: 2 3 4
Enter arrival time, burst time, priority for process 2: 1 2 3
Enter arrival time, burst time, priority for process 3: 1 2 4

PID     AT      BT      PRI     WT      TAT
1       2       3       4       1       4
2       1       2       3       0       2
3       1       2       4       5       7
```