```
//20BCS042 Mohd Adil
//program 6: Non-premetive priority scheduling
#include<iostream>
#include<vector>
using namespace std;

struct Process{
    char Pname[3];
    int arvlTime;
    int brstTime;
    int priority;
    int cmplTime;
    int wtngTime;
    int tartTime;
    int respTime;
};

struct priorityQ{
    Process pr;
    priorityQ *next;
};

priorityQ *push(priorityQ *front, Process process, char c){
    priorityQ *node = new priorityQ;
    node->pr = process;
    node->next=NULL;

//push according to priority
    if(c=='p'){
        if(front==NULL){
            front=node;
        }
        else if(front->pr.priority > process.priority){
            node->next=front;
            front=node;
        }
        else{
            priorityQ *tmp=front;
            while (tmp->next!=NULL && tmp->next->pr.priority <
process.priority){
                tmp=tmp->next;
            }

            node->next=tmp->next;
            tmp->next=node;
        }
```

```
    }
//push according to arrival time
    else{
        if(front==NULL){
            front=node;
        }
        else if(front->pr.arvlTime > process.arvlTime){
            node->next=front;
            front=node;
        }
        else{
            priorityQ *tmp=front;
            while (tmp->next!=NULL && tmp->next->pr.arvlTime <
process.arvlTime){
                tmp=tmp->next;
            }

            node->next=tmp->next;
            tmp->next=node;
        }
    }

    return front;
}

priorityQ *pop(priorityQ *front){
    front=front->next;
    return front;
}

Process front(priorityQ *front){
    return front->pr;
}

bool empty(priorityQ *front){
    return (front==NULL);
}

//ans vector
vector<Process> v;
int n;
float avgc, avgw, avgt;

void PriorityScheduling(priorityQ *pq1){
    int cmpt = front(pq1).brstTime;
    v.push_back(front(pq1));
```

```
    pq1 = pop(pq1);

    priorityQ *pq2=NULL;

    while(!empty(pq1)){
        while(!empty(pq1) && front(pq1).arvlTime < cmpt){
            pq2 = push(pq2, front(pq1), 'p');
            pq1 = pop(pq1);
        }

        cmpt += front(pq2).brstTime;
        v.push_back(front(pq2));
        pq2 = pop(pq2);
    }

    while(!empty(pq2)){
        v.push_back(front(pq2));
        pq2 = pop(pq2);
    }
}

void calculateTimes(){
    v.front().wtngTime=0;
    v.front().cmplTime = v.front().brstTime;
    float sumc=0, sumw=0, sumt=0;

    //calculating completion time
    int prv = v.front().cmplTime;
    sumc += prv;
    for(int i=1; i<n; i++){
        v[i].cmplTime = prv + v[i].brstTime;
        prv = v[i].cmplTime;
        sumc += v[i].cmplTime;
    }

    //calculating waiting time
    prv = v.front().cmplTime;
    for(int i=1; i<n; i++){
        v[i].wtngTime = prv - v[i].arvlTime;
        prv = v[i].cmplTime;
        sumw += v[i].wtngTime;
    }

    //calculating turn around time
    for(int i=0; i<n; i++){
        v[i].tartTime = v[i].brstTime + v[i].wtngTime;
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        sumt += v[i].tartTime;
    }

    //calculating avg(s) time
    avgc = sumc/n;
    avgw = sumw/n;
    avgt = sumt/n;
}

void display(){
    cout<<"\n\nDisplaying the table :- ";

    cout<<"\n\n+--------------+------------+--------------+-----------------
+--------------+-----------------+---------------+";
    cout<<"\n| Process name | Burst Time | Arrival Time | Completion Time |
Waiting Time | TurnAround Time | Response Time |";
    cout<<"\n+--------------+------------+--------------+-----------------+-
-------------+-----------------+---------------+";

    for(auto i:v){
        printf("\n|      %s       |    %2d      |      %2d      |        %2d
      |      %2d      |      %2d          |      %2d       |"
               ,i.Pname, i.brstTime, i.arvlTime, i.cmplTime, i.wtngTime,
i.tartTime, i.wtngTime);
    cout<<"\n+--------------+------------+--------------+-----------------+-
-------------+-----------------+---------------+";
    }

    cout<<"\n\n";
    printf("\nAverage Completion time : %.2fns", avgc);
    printf("\nAverage Waiting time : %.2fns", avgw);
    printf("\nAverage TurnAround time : %.2fns", avgt);
    printf("\nAverage Response time : %.2fns", avgw);
}

void printGantt(){

    cout<<"\n\nGantt Chart : ";

    cout<<"\n\n+";
    for(auto p:v){
        for(int i=0; i<2*p.brstTime; i++){
            cout<<"-";
        }
        cout<<"+";
    }
```

```
    cout<<"\n|";
    for(auto p:v){
        for(int i=0; i<p.brstTime-1; i++){
            cout<<" ";
        }
        cout<<p.Pname;
        for(int i=0; i<p.brstTime-1; i++){
            cout<<" ";
        }
        cout<<"|";
    }

    cout<<"\n+";
    for(auto p:v){
        for(int i=0; i<2*p.brstTime; i++){
            cout<<"-";
        }
        cout<<"+";
    }

    cout<<"\n0";
    for(auto p:v){
        for(int i=0; i<2*p.brstTime-1; i++){
            cout<<" ";
        }
        printf("%2d", p.cmplTime);
    }
    cout<<"\n\n";
}

int main(){
    priorityQ *pq1=NULL;

    cout<<"Enter the no of the Processes : ";
    cin>>n;

    for(int i=0; i<n; i++){
        struct Process p;
        cout<<"Enter Process "<<i+1<<" name, its priority, burst Time and
Arrival Time : ";
        cin>>p.Pname>>p.priority>>p.brstTime>>p.arvlTime;
        pq1 = push(pq1, p, 'a');//initially pushed according to arrival time
    }
    PriorityScheduling(pq1);
    calculateTimes();
```

```
    display();
    printGantt();
    return 0;
}

//sample input:-
// 7 p1 2 3 0 p2 6 5 2 p3 3 4 1 p4 5 2 4 p5 7 9 6 p6 4 4 5 p7 10 10 7
```

OUTPUT

```
Enter the no of the Processes : 7
Enter Process 1 name, its priority, burst Time and Arrival Time : p1 2 3 0
Enter Process 2 name, its priority, burst Time and Arrival Time : p2 6 5 2
Enter Process 3 name, its priority, burst Time and Arrival Time : p3 3 4 1
Enter Process 4 name, its priority, burst Time and Arrival Time : p4 5 2 4
Enter Process 5 name, its priority, burst Time and Arrival Time : p5 7 9 6
Enter Process 6 name, its priority, burst Time and Arrival Time : p6 4 4 5
Enter Process 7 name, its priority, burst Time and Arrival Time : p7 10 10 7


Displaying the table :-

+--------------+------------+--------------+-----------------+--------------+-----------------+---------------+
| Process name | Burst Time | Arrival Time | Completion Time | Waiting Time | TurnAround Time | Response Time |
+--------------+------------+--------------+-----------------+--------------+-----------------+---------------+
|      p1      |     3      |       0      |        3        |       0      |        3        |       0       |
+--------------+------------+--------------+-----------------+--------------+-----------------+---------------+
|      p3      |     4      |       1      |        7        |       2      |        6        |       2       |
+--------------+------------+--------------+-----------------+--------------+-----------------+---------------+
|      p6      |     4      |       5      |       11        |       2      |        6        |       2       |
+--------------+------------+--------------+-----------------+--------------+-----------------+---------------+
|      p4      |     2      |       4      |       13        |       7      |        9        |       7       |
+--------------+------------+--------------+-----------------+--------------+-----------------+---------------+
|      p2      |     5      |       2      |       18        |      11      |       16        |      11       |
+--------------+------------+--------------+-----------------+--------------+-----------------+---------------+
|      p5      |     9      |       6      |       27        |      12      |       21        |      12       |
+--------------+------------+--------------+-----------------+--------------+-----------------+---------------+
|      p7      |    10      |       7      |       37        |      20      |       30        |      20       |
+--------------+------------+--------------+-----------------+--------------+-----------------+---------------+
```

```
Average Completion time : 16.57ns
Average Waiting time : 7.71ns
Average TurnAround time : 13.00ns
Average Response time : 7.71ns

Gantt Chart :

+------+--------+--------+----+----------+------------------+--------------------+
|  p1  |   p3   |   p6   | p4 |    p2    |        p5        |         p7         |
+------+--------+--------+----+----------+------------------+--------------------+
0      3        7        11   13         18                 27                   37

PS C:\Users\aadil\Desktop\CSE\OS Lab>
```