IT300 Assignment 6

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TOPIC: GREEDY ALGORITHMS

Q1. Minimum Number of Platforms Required for a Railway/Bus Station.
SOLUTION:

Code:

```
/*
This program finds the number of platforms needed
given train schedules.
NOTE:
1) Arrival and departure times must be in 24 hour format
2) Please refrain from giving wrong inputs
*/
#include<bits/stdc++.h>
using namespace std;
typedef pair<int,char> pic;

int main()
{
	int n;
	cout<<"Enter the number of trains: ";
	cin>>n;

	//Stores arr and dept times in sorted format
	priority_queue<pic,vector<pic>,greater<pic>> pq;

	cout<<"Enter the arrival and dept of each train: ";
	cout<<"\nFormat: arr_hr arr_min dept_hr dept_min\n";
	for(int i=0;i<n;i++)
	{
		//Take input as hours and mins for arr and dept
		//Must be in 24 hr format
		int ah,am,dh,dm;
		cin>>ah>>am>>dh>>dm;

		//convert hrs to mins and push in queue
		pq.push({60*ah+am,'a'});
		pq.push({60*dh+dm,'d'});
```

```
    }

    //Calculate min no. of platforms
    int res = 0 , curr = 0;
    while(!pq.empty())
    {
        pic temp = pq.top();
        pq.pop();
        if(temp.second=='a') curr++;
        else curr--;
        res = max(res,curr);
    }

    cout<<"Minimum number of platforms: "<<res<<"\n";
}
```

Output:

```
ubuntu@suyash-18-04:~/Desktop/Sem 5/IT300/Assignment6$ g++ min_platforms.cpp
ubuntu@suyash-18-04:~/Desktop/Sem 5/IT300/Assignment6$ ./a.out
Enter the number of trains: 6
Enter the arrival and dept of each train:
Format: arr_hr arr_min dept_hr dept_min
9 0 9 10
9 40 12 0
9 50 11 20
11 0 11 30
15 0 19 0
18 0 20 0
Minimum number of platforms: 3
ubuntu@suyash-18-04:~/Desktop/Sem 5/IT300/Assignment6$
```

Q2. Interval Scheduling Problem.
SOLUTION:
Code:

```
#include<bits/stdc++.h>
using namespace std;
typedef pair<int,int> pii;

int main()
{
     int n;
     cout<<"Enter the no. of music festivals: ";
     cin>>n;
     priority_queue<pii,vector<pii>,greater<pii>> pq;
     cout<<"Enter the start and finish time of each
festival\n";
     cout<<"Format: start_time finish_time\n";
     for(int i=0;i<n;i++)
     {
          int si,fi;
          cin>>si>>fi;
          pq.push({fi,si});
     }
     vector<pii> res;
     int finish = 0;
     for(int i=0;i<n;i++)
     {
          pii temp = pq.top();
          pq.pop();
        if(finish < temp.second)
        {
            res.push_back(temp);
            finish = temp.second;
        }
    }
    cout<<"Max no. of events that can be attended:
"<<res.size()<<"\n";
```

```
    for(int i=0;i<res.size();i++)
    {
        cout<<res[i].second<<" to "<<res[i].first<<"\n";
    }
}
```

Output:

```
ubuntu@suyash-18-04:~/Desktop/Sem 5/IT300/Assignment6$ g++ eft.cpp
ubuntu@suyash-18-04:~/Desktop/Sem 5/IT300/Assignment6$ ./a.out
Enter the no. of music festivals: 6
Enter the start and finish time of each festival
Format: start_time finish_time
1 6
2 3
4 5
5 7
8 9
4 6
Max no. of events that can be attended: 4
2 to 3
4 to 5
5 to 7
8 to 9
ubuntu@suyash-18-04:~/Desktop/Sem 5/IT300/Assignment6$
```

THANK YOU