Indian Institute of Technology (Indian School of Mines), Dhanbad

Algorithm Design & Analysis Lab-Report

Submitted by:

Shubham Maurya
16JE002437
4th Sem., CSE

INDEX

LAB-4

Date:06/02/2018

S. No.	Question	Page	Remarks
1			
2	Your task is to write a program, that will take an numbers and the final permutation of numbers as input and outputs if it is a stack permutation or not. Your program should also display the sequence of operations that formed the permutation		
3	You are provided A n*n matrix, where every row and column is sorted in increasing order. Given a key k , your task is to determine if this key is present in the matrix or not in minimum possible time.		

1.

2.

```
#include<bits/stdc++.h>
using namespace std;
typedef long long ll;

queue<int> p,q;
stack<int> s;

bool check_ans(ll n){
        while(!p.empty() || !s.empty())
        {
            ll e = p.front();
      if(e == q.front()){
                  q.pop();
                     p.pop();
          }
      else{
                     if(s.top() == q.front()){
                           s.pop();
                              q.pop();
                     }
                     else{
          s.push(e);
                        p.pop();
                    while(!s.empty() && s.top() != q.front())
                     {
                         s.push(p.front());
                               p.pop();
                     }
        }
      }
  }
```

```
    return s.empty() && p.empty();
}

int main(){
        ll n,a;
        cout<<"Ener the number of element ";
        cin>>n;
        cout<<"Ener the elements "<<endl;
        for(int i=0;i<n;i++){
          cin>>a;
          p.push(a);
        }

        cout<<"Ener the elements of permutated "<<endl;
        for(int i=0;i<n;i++){
          cin>>a;
          q.push(a);
        }

        bool ans = check_ans(n);
        if(ans)
          cout<<"stack permutation"<<endl;
    else
      cout<<"not a stack permutation"<<endl;
    return 0;
}
```

3.

```
#include <bits/stdc++.h>
using namespace std;
typedef long long ll;
vector <pair< ll, pair<ll ,ll>> > hashTables;

bool sortbysec(const pair<ll,pair<ll,ll>> &a,
        const pair<ll,pair<ll,ll>> &b){
        return (a.first < b.first);
}

pair <ll ,ll> search_ele(ll x,ll s, ll e){
```

```
        if(s>=e)
                return {-1,-1};
        if (e > s){
                ll mid = s+(e-s)/2;

                if (hashTables[mid].first == x)
                        return hashTables[mid].second;

                else if (hashTables[mid].first > x)
                        return search_ele(x , s, mid);
                else
                return search_ele(x , mid+1 , e);
        }
}

int main(){
        ll m,n,q,x,t;
        cin>>n>>m;
        for (ll i = 0; i < n; ++i){
                for (ll j = 0; j < m; ++j){
                        cin>>t;
                        hashTables.push_back({t,{i,j}});
                }
        }
        sort(hashTables.begin(),hashTables.end(),sortbysec);
        // for (ll i = 0; i < m*n; ++i){
        //                 cout<<hashTables[i].first<<" "<<hashTables[i].second.first<<"
"<<hashTables[i].second.second<<endl;
        // }

        cin>>q;
        for (ll i = 0; i < q; ++i){
                cin>>x;
                //code goes here binary search
                pair<ll ,ll > p = search_ele(x,0,m*n-1);
                if(p.first !=-1)
                  cout<<"Element Found"<<endl;
            else
             cout<<"Element not found"<<endl;
        }
        return 0;
}
```

```
/*

5 5
-10 -5 -3 4 9
-6 -2 0 5 10
-4 -1 1 6 12
2 3 7 8 13
100 120 130 140 150
3
0
-2
170



5 5
-993655555 -758584352 -725954642 -696391700 -649643547
-591473088 -568010221 -432112275 -421496588 -351507172
-323741602 -232192004 -30134637 -369573 100246476
156824549 174266331 392354039 601294716 763826005
768378344 802829330 818988557 992012759 999272829
10
156824549
-758584352
-993655555
601294716
-696391700
802829330
-993655555
-232192004
392354039
-568010221
*/
```