**Assignment Number: 11**

**Subject: Data Structure and Algorithms**

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**Division:B**

**Batch:B1**

**PROBLEM STATEMENT:**

* Write C++ program to store roll numbers of student in array who attended training program in random order. Write function for searching whether particular student attended training program or not using linear search and sentinel search.
* Write C++ program to store roll numbers of student array who attended training program in sorted order. Write function for searching whether particular student attended training program or not using binary search and Fibonacci search.

**CODE**

#include<iostream>

#include<limits>

using namespace std;

class searching

{

private:

unsigned int i;

public:

void senti();

void lin();

void bin();

int min(int ,int);

void fibb();

};

void searching::senti()

{

unsigned int Size;

int \*Arr,Search;

cout << "\n how many students attended ? : "<<endl;

cin >> Size;

Arr = new int[Size+1];

cout << "\n Enter roll no which attended : "<<endl;

for(i=0;i<Size;i++)

{

cin >> Arr[i];

}

cout << "\n Which roll no do you want to search? : "<<endl;

cin >> Search;

Arr[Size+1]=Search;

i=0;

while(Arr[i]!=Search)

{

i++;

}

if(i==Size+1)

{

cout << "\n Sentinel reached. roll no not found \n";

}

else

cout << "\n roll no found at " << i+1 << " position \n";

}

void searching::lin()

{

unsigned int size,search,flag;

int \*arr;

cout<<"how many students attended the programme?:"<<endl;

cin>>size;

arr=new int[size];

cout<<"enter the roll no which attended the programmes"<<endl;

for(i=0;i<size;i++)

{

cin>>arr[i];

}

cout<<"enter the roll no which you want to search";

cin>>search;

for(i=0;i<size;i++)

{

if(arr[i]==search)

{

flag=1;

break;

}

else

{

flag=0;

}

}

if(flag==1)

{

cout<<"roll no found at " <<i+1<< " position"<<endl;

}

else if(flag==0)

{

cout<<"roll no not found"<<endl;

}

}

void searching::bin()

{

unsigned int size,search,first,last,middle;

int \*arr;

cout<<"how many students attended the programme?:"<<endl;

cin>>size;

arr=new int[size];

cout<<"enter the roll no which attended the programmes"<<endl;

for(i=0;i<size;i++)

{

cin>>arr[i];

}

cout<<"enter the roll no which you want to search";

cin>>search;

first=0;

last=size-1;

middle=(first+last)/2;

while(first<=last)

{

if(arr[middle]<search)

{

first=middle+1;

}

else if(arr[middle]=search)

{

cout<<"roll no found at position no "<<middle+1<<endl;

break;

}

else

{

last=middle-1;

}

middle=(first+last)/2;

}

if(first>last)

{

cout<<"roll no not found"<<endl;

}

}

int searching::min(int x,int y)

{

return ((x<=y)?x:y);

}

void searching::fibb()

{

unsigned int size,search,flag=0;

int \*arr,j;

cout<<"how many students attended the programme?:"<<endl;

cin>>size;

arr=new int[size];

cout<<"enter the roll no which attended the programmes"<<endl;

for(i=0;i<size;i++)

{

cin>>arr[i];

}

cout<<"enetr the roll no which you want to search"<<endl;

cin>>search;

int fibm1=0;

int fibm2=1;

int fibm=fibm1+fibm2;

while(fibm<size)

{

fibm2=fibm1;

fibm1=fibm;

fibm=fibm2+fibm1;

}

int offset=-1;

while(fibm>1)

{

j=min(offset+fibm2,size-1);

if(arr[j]<search)

{

fibm=fibm1;

fibm1=fibm2;

fibm2=fibm-fibm1;

offset=j;

}

else if(arr[j]>search)

{

fibm=fibm2;

fibm1=fibm1-fibm2;

fibm2=fibm-fibm1;

}

else

flag=1;

break;

}

if(flag=1)

{

cout<<"roll no at"<<j<<endl;

}

else if(fibm1 && arr[offset+1]==search)

{

cout<<"roll no at "<<offset +1<<endl;

}

else

{

cout<<"roll no not found"<<endl;

}

}

int main()

{

searching o;

unsigned int ch;

int c;

do

{

cout<<"1.sentinental"<<endl<<"2.linear"<<endl<<"3.binary"<<endl<<"4.fibbo"<<endl<<"0.exit"<<endl;

cout<<"eneter your choice"<<endl;

cin>>ch;

switch(ch)

{

case 1:

o.senti();

break;

case 2:

o.lin();

break;

case 3:

o.bin();

break;

case 4:

o.fibb();

break;

case 0:

break;

default:

cout<<"Invalid choce"<<endl;

break;

}

cout<<endl;

}while(ch!=0);

return 0;

}

/\*

OUTPUT-:

1.sentinental

2.linear

3.binary

4.fibbo

0.exit

eneter your choice

1

how many students attended ? :

3

Enter roll no which attended :

2

1

4

Which roll no do you want to search? :

4

roll no found at 3 position

1.sentinental

2.linear

3.binary

4.fibbo

0.exit

eneter your choice

2

how many students attended the programme?:

3

enter the roll no which attended the programmes

2

5

3

enter the roll no which you want to search1

roll no not found

1.sentinental

2.linear

3.binary

4.fibbo

0.exit

eneter your choice

3

how many students attended the programme?:

2

enter the roll no which attended the programmes

1

2

enter the roll no which you want to search2

roll no found at position no 2

1.sentinental

2.linear

3.binary

4.fibbo

0.exit

eneter your choice

4

how many students attended the programme?:

4

enter the roll no which attended the programmes

1

2

3

4

enetr the roll no which you want to search

1

roll no at1

1.sentinental

2.linear

3.binary

4.fibbo

0.exit

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