CYPRUS INTERNATIONAL UNIVERSITY

Spring2024-2025
CMPE124/ISYE223
Algorithms and Programming
LAB WORK #5

Searching Methods on Arrays

Task 1:

Write a complete C program that searches an input key in an initialized array as **{3,6,23,35,42,88,155,434,570,678,732,755,812,834,900,945}.** The program should apply **linear search** and **binary search** algorithms one by one and then compare the performances of both algorithms for the input search key.

```
#include <iostream>
using namespace std;
int lin_search(int [],int,int);
int bin_search(int [], int, int);

int main(void)
{
	int a[16] = {3,6,23,35,42,88,155,434,570,678,732,755,812,834,900,945};
	int key,perflin,perfbin;
	cout<<"Please enter the search key:";
	cin>>key;
	perflin = lin_search(a,16,key);
	perfbin = bin_search(a,16,key);

	if(perflin==-1)
		cout<<"\nNot found...";
	else if (perflin<perfbin)
		cou<<"\nLinear search algorithm performed better with"<<perflin<<
"iteration(s).."<<endl;
	else if (perflin>perfbin)
		cout<<"\nBinary search algorithm perfromed better
with"<<perfbin<<"iteration(s).."<<endl;
	else
		cout<<"\nBoth algorithms performed well..");
	return 0;
}

int lin_search(int a[],int size,int key)
{
```

```
        int i;

        for(i=0;i<size;i++)
        {
                if (a[i]==key)
                        return i+1;
        }
        return -1;
}

int bin_search(int a[], int size, int key)
{
        int low,high,middle,cnt = 0;
        low = 0;
        high = size-1;
        while(low<=high)
        {
                middle = (low+high)/2;
                cnt++;
                if(a[middle]==key)
                        return cnt;
                else if (a[middle]<key)
                        low = middle+1;
                else
                        high = middle-1;
        }
        return -1;
}
```

Task 2: Write a complete program that gets 10 integers from the user and a search key, and applies binary search to find the search key. First, sort the given list in **descending (max. to min.) order by using bubble sort from the Labwork 4**. Then, modify binary search algorithm to **search in a sorted list in descender order**. Write a user defined function for your binary search.