```
/*****************************************************************************

                        Online C Compiler.
                Code, Compile, Run and Debug C program online.
Write your code in this editor and press "Run" button to compile and exec

*****************************************************************************/
#include <stdio.h>
#include <stdlib.h>
#include <time.h>

int linearsearch(int A[],int x,int index,int n)
{
    if(index >= n)
    {
        return -1;
    }
    else if(A[index] == x)
    {
        return index;
    }
    else
    {
        return linearsearch(A,x,index+1,n);
    }
    return index;
}

void bubblesort(int A[],int n)
{
    int i,j,temp;

    for (i = 0 ; i < n ; i++)
    {
        for (j = i+1 ; j < n ; j++)
        {
            if(A[i] > A[j])
            {
```

```
            {
                temp = A[i];
                A[i] = A[j];
                A[j] = temp;
            }
        }
    }
    //print sorted array
    printf("\n\nBubble Sorted Array:");
    for(i=0;i<n;i++)
    {
        printf("%d ",A[i]);
    }

}

int binarysearch(int A[], int lo, int hi, int x)
{
    int mid;

    if (lo > hi)
    {
        return -1;
    }
    mid = (lo + hi) / 2;
    if (A[mid] == x)
    {
        return mid;
    }
    else if (A[mid] > x)
    {
       return binarysearch(A, lo, mid - 1, x);
    }
    else if (A[mid] < x)
    {
       return binarysearch(A, mid + 1, hi, x);
    }
    return -1;
```

```
    }
    return -1;
}

void display(int y)
{
    if(y == -1)
    {
        printf("\nElement is not present in the given array");
    }
    printf("\n\nElement is present at index %d",y);
}

int main()
{
    int A[2000],x,y,n,i;
    clock_t start,end;
    double time_taken;

    printf("Enter the size of the array: ");
    scanf("%d",&n);

    for(i=0;i<n;i++)
    {
        A[i]=rand()%200;
    }

    for(i=0;i<n;i++)
    {
        printf("%d ",A[i]);
    }

    printf("\n\nEnter the element to be searched in the array: ");
    scanf("%d",&x);

    //Linear search
    start = clock();
    y = linearsearch(A,x,0,n);
```

```
90      clock_t start,end;
91      double time_taken;
92
93      printf("Enter the size of the array: ");
94      scanf("%d",&n);
95
96      for(i=0;i<n;i++)
97      {
98          A[i]=rand()%200;
99      }
100
101     for(i=0;i<n;i++)
102     {
103         printf("%d ",A[i]);
104     }
105
106     printf("\n\nEnter the element to be searched in the array: ");
107     scanf("%d",&x);
108
109     //linear search
110     start = clock();
111     y = linearsearch(A,x,0,n);
112     end = clock();
113     time_taken = ((double)(end-start))/CLOCKS_PER_SEC;
114     display(y);
115     printf("\nTime taken for linear search: %lf s",time_taken);
116
117     //binary search
118     start = clock();
119     bubblesort(A,n);
120     y = binarysearch(A,0,n,x);
121     end = clock();
122     time_taken = ((double)(end-start))/CLOCKS_PER_SEC;
123     display(y);
124     printf("\nTime taken for binary search: %lf s",time_taken);
125
126     return 0;
127 }
```

```
Enter the size of the array: 100
183 86 177 115 193 135 186 92 49 21 162 27 90 59 163 126 140 26 172 136 11 168 167 29 182 130 62 123 67 135 129 2 22 58 69 167 193 56 11
42 29 173 21 119 184 137 198 124 115 170 13 126 91 180 156 73 62 170 196 81 105 125 84 127 136 105 46 129 113 57 124 95 182 145 14 167 34
 164 43 150 87 8 76 178 188 184 3 51 154 199 132 60 76 168 139 12 26 186 94 139

Enter the element to be searched in the array: 94


Element is present at index 98
Time taken for linear search: 0.000014 s

Bubble Sorted Array:2 3 8 11 11 12 13 14 21 21 22 26 26 27 29 29 34 42 43 46 49 51 56 57 58 59 60 62 62 67 69 73 76 76 81 84 86 87 90 91
92 94 95 105 105 113 115 115 119 123 124 124 125 126 126 127 129 129 130 132 135 135 136 136 137 139 139 140 145 150 154 156 162 163 164
167 167 167 168 168 170 170 172 173 177 178 180 182 182 183 184 184 186 186 188 193 193 196 198 199

Element is present at index 41
Time taken for binary search: 0.000071 s

...Program finished with exit code 0
Press ENTER to exit console.
```