Vidyalankar Polytechnic	DEPARTMENT OF COMPUTER ENGINEERING

Subject: - DSU	**Subject Code:** 313301
Semester: - III	**Course:** COMPUTER ENGINEERING
Laboratory No: L003	**Name of Subject Teacher:** Prof. Imraan S.
Name of Student: Saad Sharif Kazi	**Roll Id: -** 24203A0013
Experiment No:	4
Title of Experiment	Write a 'C' program to Search a particular data from the given Array of numbers using Binary Search Method.

Aim: Write a 'C' program to Search a particular data from the given Array of numbers using Binary Search Method.

Algorithm:

- **Step 1**: Start
- **Step 2**: Declare variables: a[100], i, j, key, n, low, high, mid
- **Step 3**: Clear screen using clrscr()
- **Step 4**: Print "Enter the size of the Array"
- **Step 5**: Scan value of n from keyboard
- **Step 6**: Print "Enter the Elements in the Array"
- **Step 7**: Run a loop such that i = 0 to i < n
    - Scan each element and store it in a[i]
- **Step 8**: Print "Enter the element to be searched"
- **Step 9**: Scan the value of key from keyboard
- **Step 10**: Initialize low = 0, high = n - 1
- **Step 11**: Run a loop from i = 0 to i < n
    - Calculate mid = (low + high) / 2
    - If a[mid] == key, then
        - Print "key found at index mid"
        - Break the loop
    - Else if key > a[mid], then
        - Set low = mid + 1
    - Else
        - Set high = mid - 1
- **Step 12**: After the loop, if a[mid] != key, then
    - Print "Element not found :("
- **Step 13**: Stop

Code:

```
≡ File Edit Search Run Compile Debug Project Options Window Help
[■]═══ SAAD4.C ═══1=[↕]
#include<stdio.h>
#include<conio.h>
void main()
{
int a[100],i,j,key,n,low,high,mid=0;
clrscr();
printf("Enter the size of array:\n");
scanf("%i",&n);
printf("Enter the elements in the array:\n");
for(i=0;i<n;i++)
{
scanf("%i",&a[i]);
}
printf("\nEnter the elements to be searched:\n");
scanf("%i",&key);
low=0;
high=n-1;
for(i=0;i<n;i++)
{
mid=(low+high)/2;
if(a[mid]==key)
1:1
F1 Help F2 Save F3 Open Alt-F9 Compile F9 Make F10 Menu
```

```
≡ File Edit Search Run Compile Debug Project Options Window Help
[■]═══ SAAD4.C ═══1=[↕]
if(a[mid]==key)
{
printf("%i found at index %i",key,mid);
break;
}
else if(key>a[mid])
{
low=mid+1;
}
else
{
high=mid-1;
}
}
if(a[mid]!=key)
{
printf("Element not found:");
}
getch();
}
41:8
F1 Help F2 Save F3 Open Alt-F9 Compile F9 Make F10 Menu
```

OUTPUT: -

```
{Enter the size of array:
5
Enter the elements in the array:
1
2
3
4
5

Enter the elements to be searched:
4
4 found at index 3_
```

Practical Related Questions:

1. **Write a program to find the first and last occurrence of the element 3 in an array of 20 integers using binary search.**

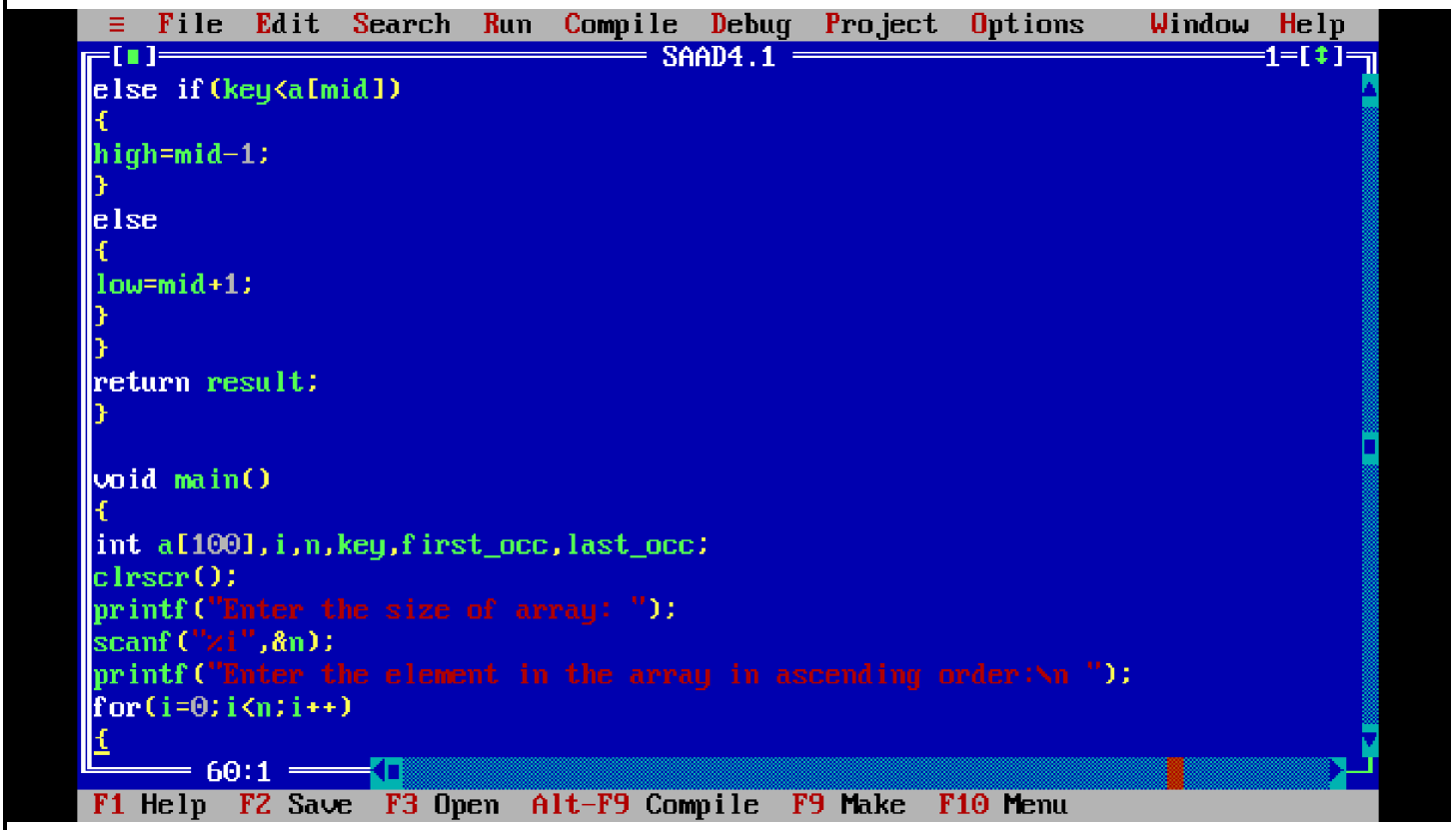
CODE:

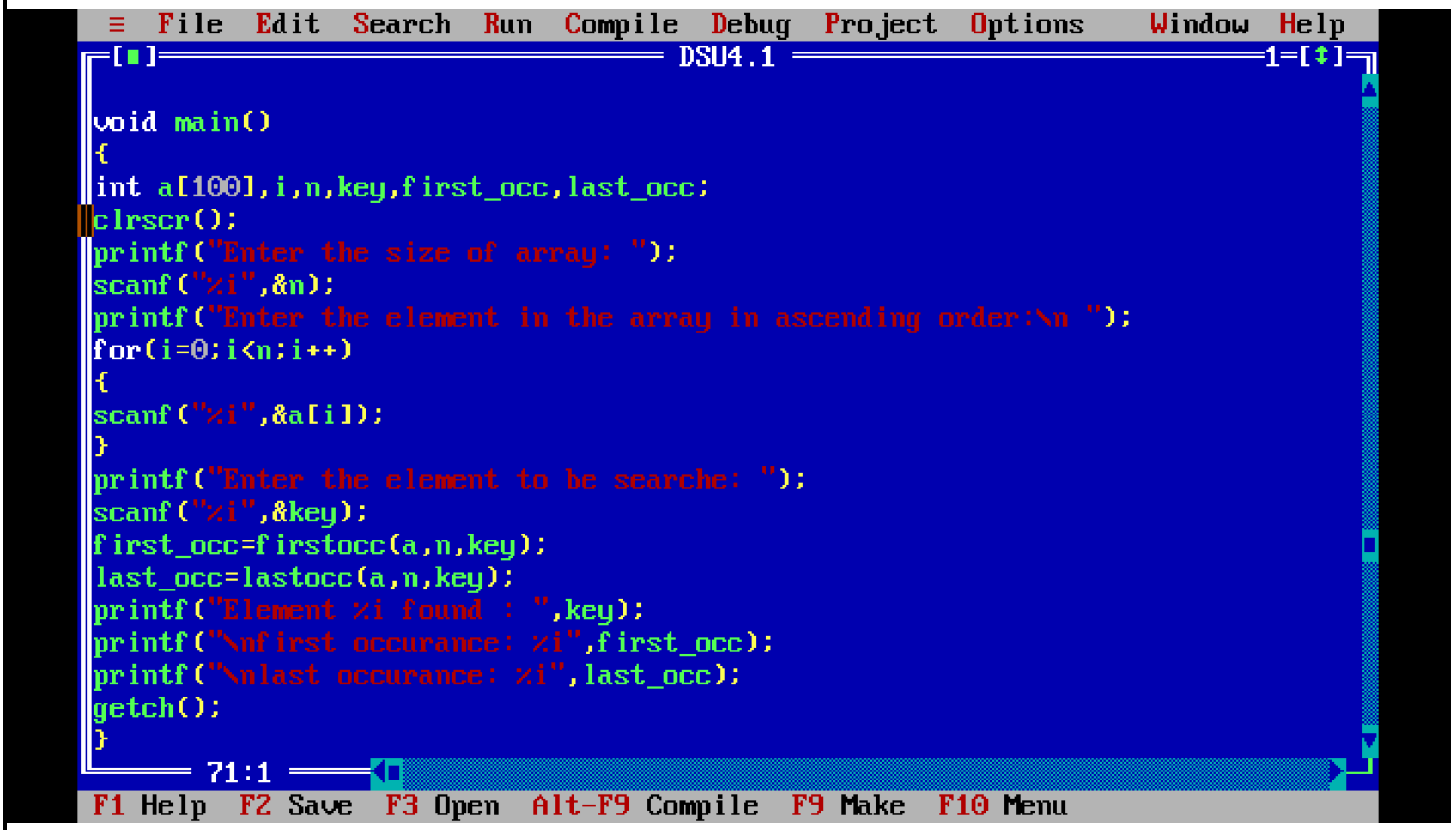
```
#include<stdio.h>
#include<conio.h>
int firstocc(int [],int,int);
int lastocc(int [],int,int);

int firstocc(int a[],int n,int key)
{
int low=0,high=n-1,mid=0,result=-1;
while(low<=high)
{
mid=(low+high)/2;
if(a[mid]==key)
{
result=mid;
high=mid-1;
}
else if(key<a[mid])
{
high=mid-1;
}
else
```

```
else
{
low=mid+1;
}
}
return result;
}

int lastocc(int a[],int n,int key)
{
int low=0,high=n-1,mid=0,result=-1;
while(low<=high)
{
mid=(low+high)/2;
if(a[mid]==key)
{
result=mid;
low=mid+1;
}
else if(key<a[mid])
{
```


File Edit Search Run Compile Debug Project Options Window Help
SAAD4.1
1
else if(key<a[mid])
{
high=mid-1;
}
else
{
low=mid+1;
}
}
return result;
}
void main()
{
int a[100],i,n,key,first_occ,last_occ;
clrscr();
printf("Enter the size of array: ");
scanf("%i",&n);
printf("Enter the element in the array in ascending order:\n ");
for(i=0;i<n;i++)
{
60:1
F1 Help F2 Save F3 Open Alt-F9 Compile F9 Make F10 Menu


File Edit Search Run Compile Debug Project Options Window Help
DSU4.1
1
void main()
{
int a[100],i,n,key,first_occ,last_occ;
clrscr();
printf("Enter the size of array: ");
scanf("%i",&n);
printf("Enter the element in the array in ascending order:\n ");
for(i=0;i<n;i++)
{
scanf("%i",&a[i]);
}
printf("Enter the element to be searche: ");
scanf("%i",&key);
first_occ=firstocc(a,n,key);
last_occ=lastocc(a,n,key);
printf("Element %i found : ",key);
printf("\nfirst occurance: %i",first_occ);
printf("\nlast occurance: %i",last_occ);
getch();
}
71:1
F1 Help F2 Save F3 Open Alt-F9 Compile F9 Make F10 Menu

```
≡ File  Edit  Search  Run  Compile  Debug  Project  Options    Window  Help
[■]═══════════ SAAD4.1 ═══════════1=[↕]
```

```
void main()
{
int a[100],i,n,key,first_occ,last_occ;
clrscr();
printf("Enter the size of array: ");
scanf("%i",&n);
printf("Enter the element in the array in ascending order:\n ");
for(i=0;i<n;i++)
{
scanf("%i",&a[i]);
}
printf("Enter the element to be searche: ");
scanf("%i",&key);
first_occ=firstocc(a,n,key);
last_occ=lastocc(a,n,key);
printf("Element %i found : ",key);
printf("\nfirst occurance: %i",first_occ);
printf("\nlast occurance: %i",last_occ);
getch();
}
```

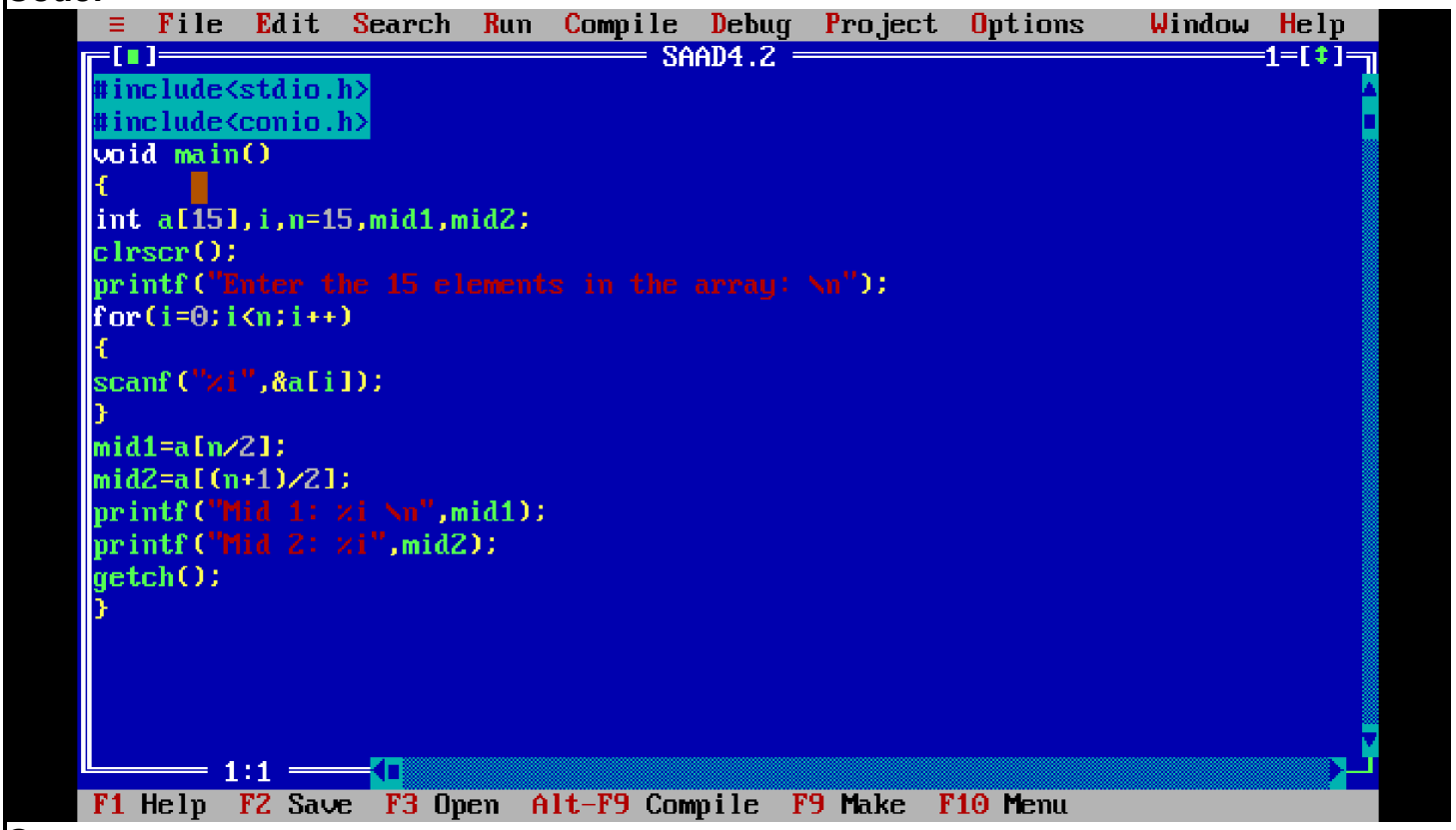
```
═══ 71:1 ═══
F1 Help  F2 Save  F3 Open  Alt-F9 Compile  F9 Make  F10 Menu
```

OUTPUT:

```
Enter the size of array: 10
Enter the element in the array in ascending order:
 1
2
3
4
5
7
8
7
9
12
Enter the element to be searche: 7
Element 7 found :
first occurance: 5
last occurance: 7_
```

1. **Given an array of 15 integers, write a program to find the two middle elements using binary search.**

Code:



Output:

Marks Obtained			Dated signature of Teacher
Process Related (35)	**Product Related(15)**	**Total (50)**	