Institute of Computer Technology
B. Tech Computer Science and Engineering
Subject: DS (2CSE302)

PRACTICAL-24

AIM: - Implement searching methods on sorted elements.

1. Jigar is working in survey department of COVID-19. He has been received everyday number of cases from all the cities of Gujarat. Initially, He used to set data in ascending order, afterwards he wants to search number of cases from the data elements with relevant position. Kindly refer given scenario for searching and implement it in C:

```
Enter number of elements
8
Enter 8 elements:
34
22
56
13
89
5
67
45
List of searching methods:
1.Linear Search
2.Binary Search
3.Interpolation Search
4.Jump Search
5.Exit
Which searching method would you like to apply?
1
The elements of the array are - 5 13 22 34 45 56 67 89
Which value do you want search?
13
Element 13 found at position 2
List of searching methods:
1.Linear Search
2.Binary Search
3.Interpolation Search
4.Jump Search
```

```
5.Exit
Which searching method would you like to apply?
1
The elements of the array are - 5 13 22 34 45 56 67 89
Which value do you want search?
100
Element 100 not found
List of searching methods:
1.Linear Search
2.Binary Search
3.Interpolation Search
4.Jump Search
5.Exit
Which searching method would you like to apply?
2
The elements of the array are - 5 13 22 34 45 56 67 89
Which value do you want search?
34
Element 34 found at position 4
List of searching methods:
1.Linear Search
2.Binary Search
3.Interpolation Search
4.Jump Search
5.Exit
Which searching method would you like to apply?
2
The elements of the array are - 5 13 22 34 45 56 67 89
Which value do you want search?
35
Element 35 not found
List of searching methods:
1.Linear Search
2.Binary Search
3.Interpolation Search
4.Jump Search
5.Exit
Which searching method would you like to apply?
```

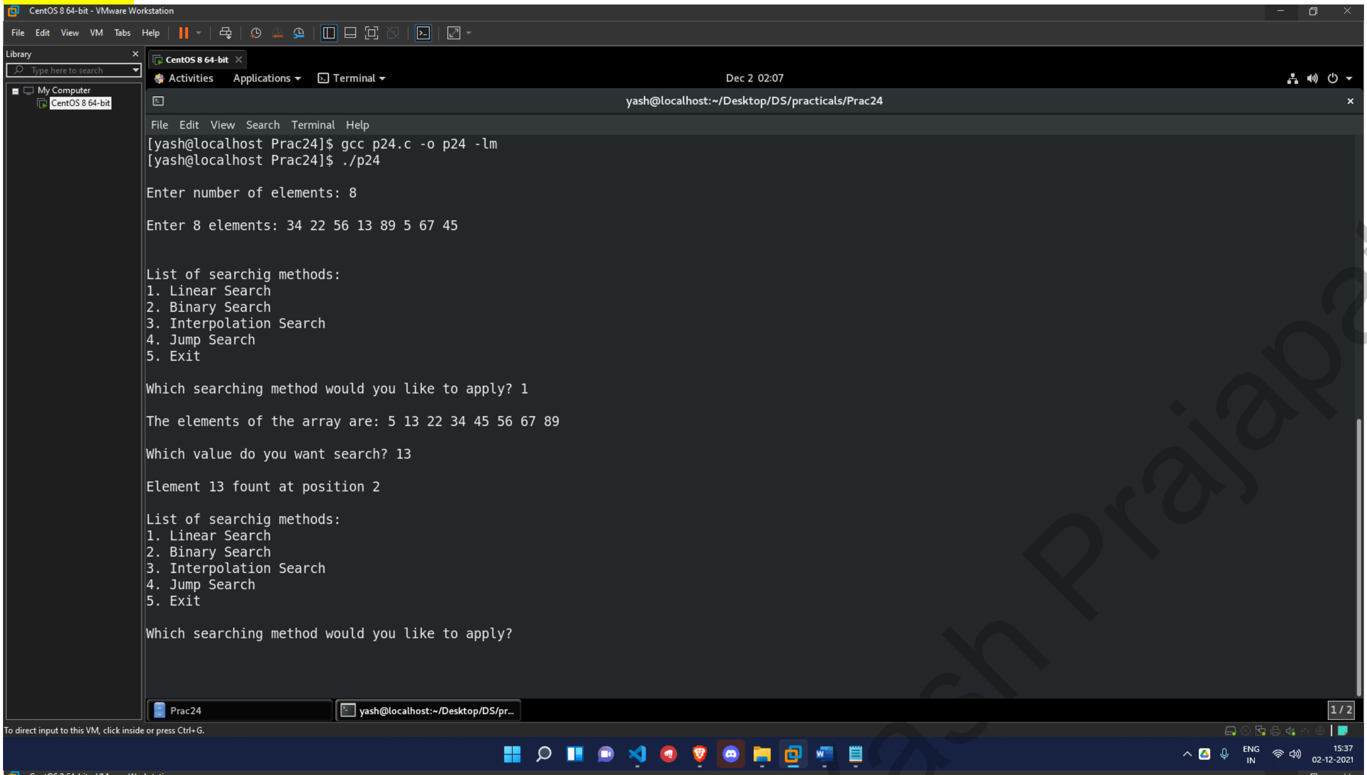
```
3
The elements of the array are - 5 13 22 34 45 56 67 89
Which value do you want search?
45
Element 45 found at position 5
List of searching methods:
1.Linear Search
2.Binary Search
3.Interpolation Search
4.Jump Search
5.Exit
Which searching method would you like to apply?
3
The elements of the array are - 5 13 22 34 45 56 67 89
Which value do you want search?
55
Element 55 not found
List of searching methods:
1.Linear Search
2.Binary Search
3.Interpolation Search
4.Jump Search
5.Exit
Which searching method would you like to apply?
4
The elements of the array are - 5 13 22 34 45 56 67 89
Which value do you want search?
67
Element 67 found at position 7
List of searching methods:
1.Linear Search
2.Binary Search
3.Interpolation Search
4.Jump Search
5.Exit
Which searching method would you like to apply?
4
The elements of the array are - 5 13 22 34 45 56 67 89
```

```
Which value do you want search?
88
Element 88 not found
List of searching methods:
1.Linear Search
2.Binary Search
3.Interpolation Search
4.Jump Search
5.Exit
Which searching method would you like to apply?
6
Enter valid choice!
```

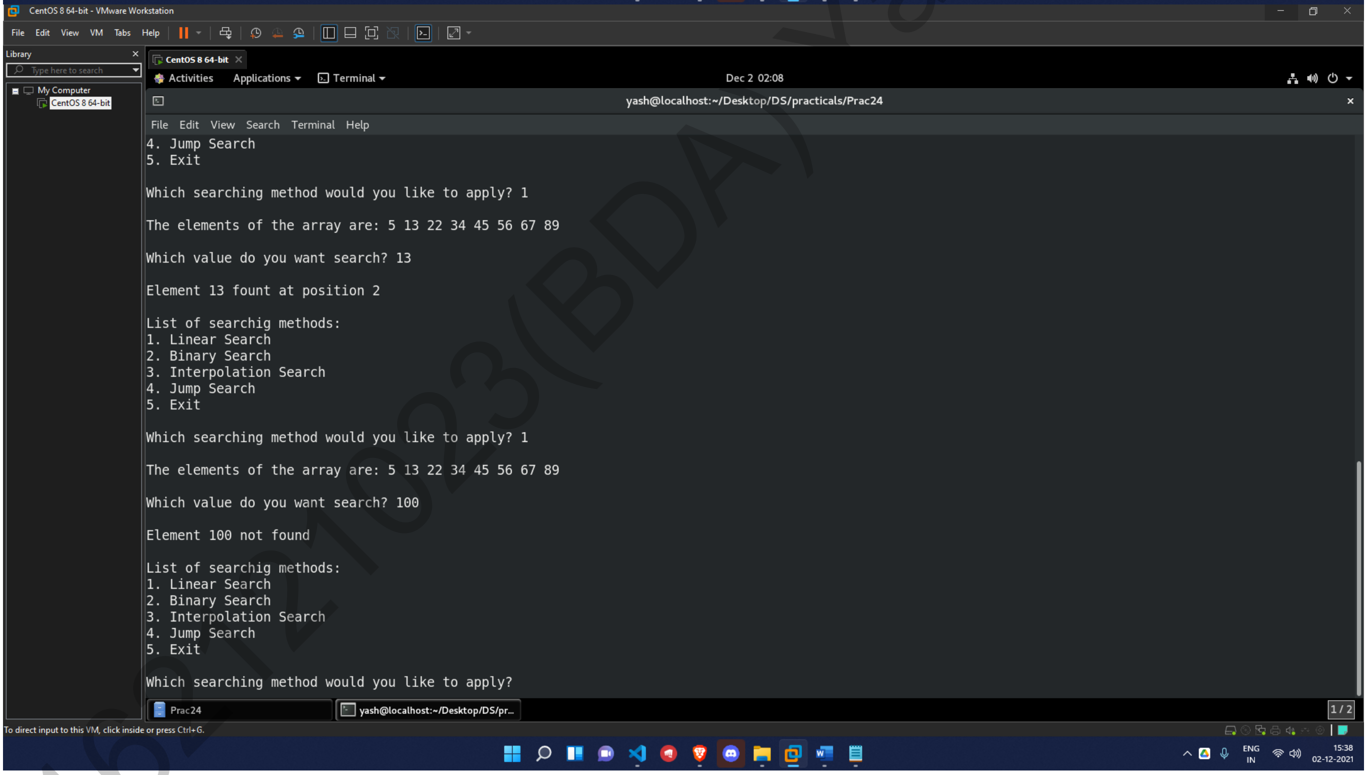
SOLUTION

```
#include <stdio.h>
#include <stdlib.h>
#include <math.h>

void Sort(int array[], int m)
{
    int i, j, k, temp;
    for (i = 0; i < m - 1; i++)
    {
        for (j = 0; j < m - i - 1; j++)
        {
            if (array[j] > array[j + 1])
            {
                temp = array[j];
                array[j] = array[j + 1];
                array[j + 1] = temp;
            }
        }
    }
}

void LinearSearch(int array[], int m, int v)
{
    int i, pos = -1;
    for (i = 0; i < m; i++)
    {
        if (array[i] == v)
        {
            pos = i;
            printf("\nElement %d fount at position %d", v, pos + 1);
            break;
        }
    }
    if (pos == -1)
    {
        printf("\nElement %d not found", v);
    }
}

void BinarySearch(int array[], int low, int high, int v)
{
    int beg = low, end = high, mid, pos = -1;
    while (beg <= end)
    {
        mid = (beg + end) / 2;
        if (array[mid] == v)
        {
            pos = mid;
            printf("\nElement %d fount at position %d", v, pos + 1);
            break;
        }
        else if (array[mid] > v)
        {
            end = mid - 1;
        }
        else
        {
            beg = mid + 1;
        }
    }
    if (pos == -1)
    {
        printf("\nElement %d not found", v);
    }
}

void InterpolationSearch(int array[], int low, int high, int v)
{
    int beg = low, end = high, mid, pos = -1;
    while (beg <= end)
    {
        mid = beg + (end - beg) * ((v - array[beg]) / (array[end] - array[beg]));
        if (array[mid] == v)
        {
            pos = mid;
            printf("\nElement %d fount at position %d", v, pos + 1);
            break;
        }
        else if (array[mid] > v)
        {
            end = mid - 1;
        }
        else
        {
            beg = mid + 1;
        }
    }
    if (pos == -1)
    {
        printf("\nElement %d not found", v);
    }
}
void JumpSearch(int array[], int low, int high, int v, int m)
{

    int step = sqrt(m), i = 0, beg = low, end = high, pos = -1;
    while (i < step)
    {
        if (v < array[step])
        {
            end = step - 1;
        }
        else
        {
            low = step + 1;
        }
        i = i + 1;
    }
    i = beg;
    while (i <= end)
    {
        if (array[i] == v)
        {
            pos = i;
            printf("\nElement %d fount at position %d", v, pos + 1);
            break;
        }
        i++;
    }
    if (pos == -1)
    {
        printf("\nElement %d not found", v);
    }
}
int main()
{
    int n, i;
    printf("\nEnter number of elements: ");
    scanf("%d", &n);
    printf("\nEnter %d elements: ", n);
    int yash[n];
    for (i = 0; i < n; i++)
    {
        scanf("%d", &yash[i]);
    }
    Sort(yash, n);
    int choice, value;
    do
    {
        printf("\n");
        printf("\nList of searchig methods:\n1. Linear Search \n2. Binary Search \n3.
Interpolation Search \n4. Jump Search \n5. Exit\n");
        printf("\nWhich searching method would you like to apply? ");
        scanf("%d", &choice);
        switch (choice)
        {
        case 1:
            printf("\nThe elements of the array are: ");
            for (i = 0; i < n; i++)
            {
                printf("%d ", yash[i]);
            }
            printf("\n");
            printf("\nWhich value do you want search? ");
            scanf("%d", &value);
            LinearSearch(yash, n, value);
            break;
        case 2:
            printf("\nThe elements of the array are: ");
            for (i = 0; i < n; i++)
            {
                printf("%d ", yash[i]);
            }
            printf("\n");
            printf("\nWhich value do you want search? ");
            scanf("%d", &value);
            BinarySearch(yash, 0, n - 1, value);
            break;
        case 3:
            printf("\nThe elements of the array are: ");
            for (i = 0; i < n; i++)
            {
                printf("%d ", yash[i]);
            }
            printf("\n");
            printf("\nWhich value do you want search? ");
            scanf("%d", &value);
            InterpolationSearch(yash, 0, n - 1, value);
            break;
        case 4:
            printf("\nThe elements of the array are: ");
            for (i = 0; i < n; i++)
            {
                printf("%d ", yash[i]);
            }
            printf("\n");
            printf("\nWhich value do you want search? ");
            scanf("%d", &value);
            JumpSearch(yash, 0, n - 1, value, n);
            break;
        case 5:
        there:
            printf("\nExiting system.....\n");
            exit(0);
            break;
        default:
        here:
            printf("Enter valid choice\n");
            break;
        }
    } while (choice != 5);

    printf("\n");
    return 0;
}
```

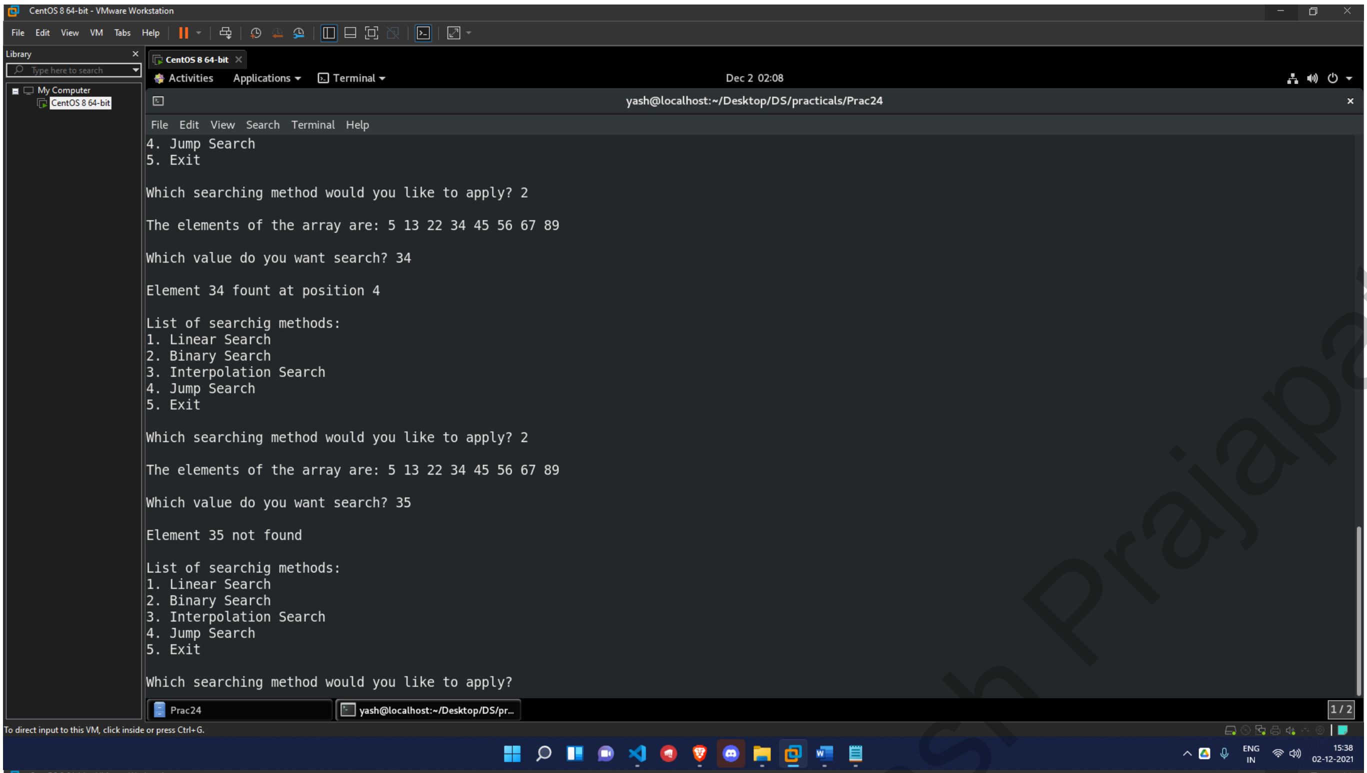
OUTPUT


CentOS 8 64-bit - VMware Workstation
Library
My Computer
CentOS 8 64-bit
Activities
Applications
Terminal
Dec 2 02:07
yash@localhost:~/Desktop/DS/practicals/Prac24
File Edit View Search Terminal Help
Prac24
1 / 2
To direct input to this VM, click inside or press Ctrl+G.
15:37
02-12-2021

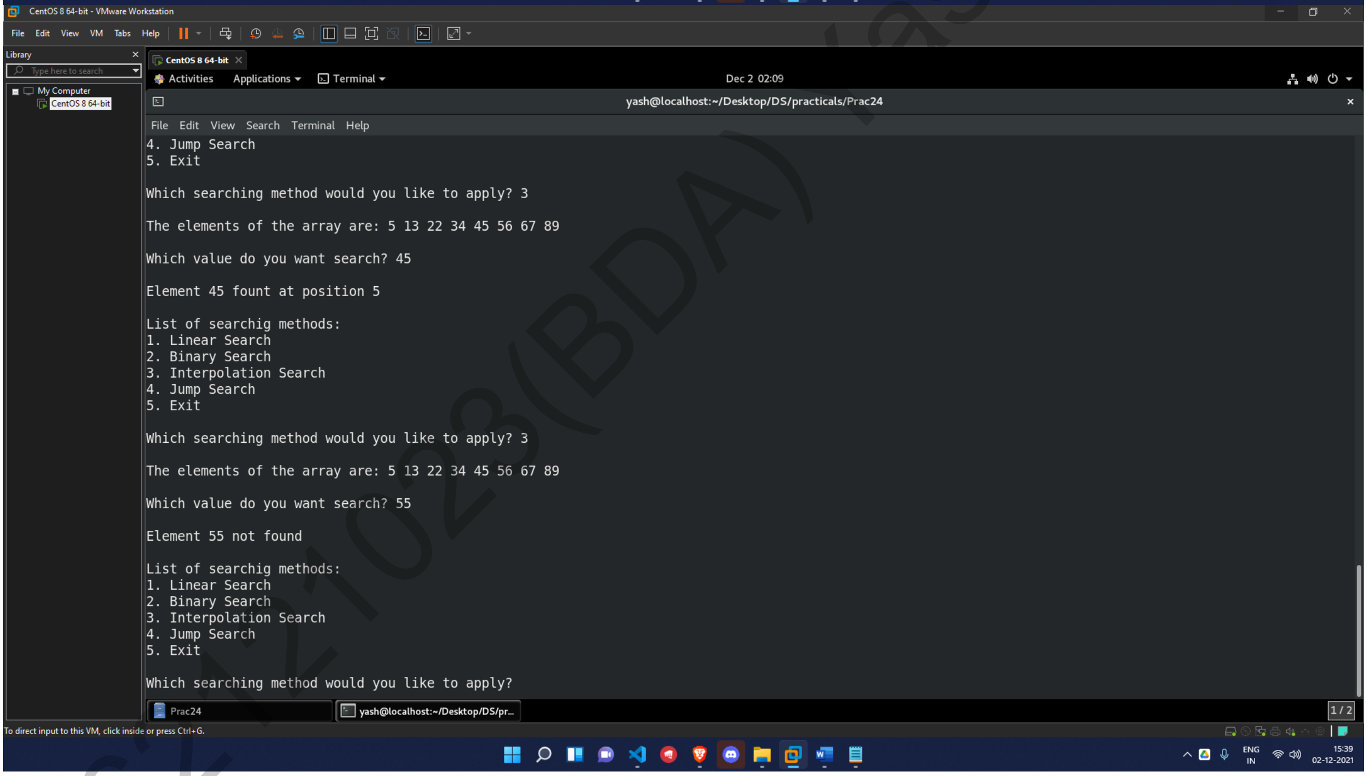
```
[yash@localhost Prac24]$ gcc p24.c -o p24 -lm
[yash@localhost Prac24]$ ./p24

Enter number of elements: 8

Enter 8 elements: 34 22 56 13 89 5 67 45


List of searchig methods:
1. Linear Search
2. Binary Search
3. Interpolation Search
4. Jump Search
5. Exit

Which searching method would you like to apply? 1

The elements of the array are: 5 13 22 34 45 56 67 89

Which value do you want search? 13

Element 13 fount at position 2

List of searchig methods:
1. Linear Search
2. Binary Search
3. Interpolation Search
4. Jump Search
5. Exit

Which searching method would you like to apply?
```


CentOS 8 64-bit - VMware Workstation
Library
My Computer
CentOS 8 64-bit
Activities
Applications
Terminal
Dec 2 02:08
yash@localhost:~/Desktop/DS/practicals/Prac24
File Edit View Search Terminal Help
Prac24
1 / 2
To direct input to this VM, click inside or press Ctrl+G.
15:38
02-12-2021

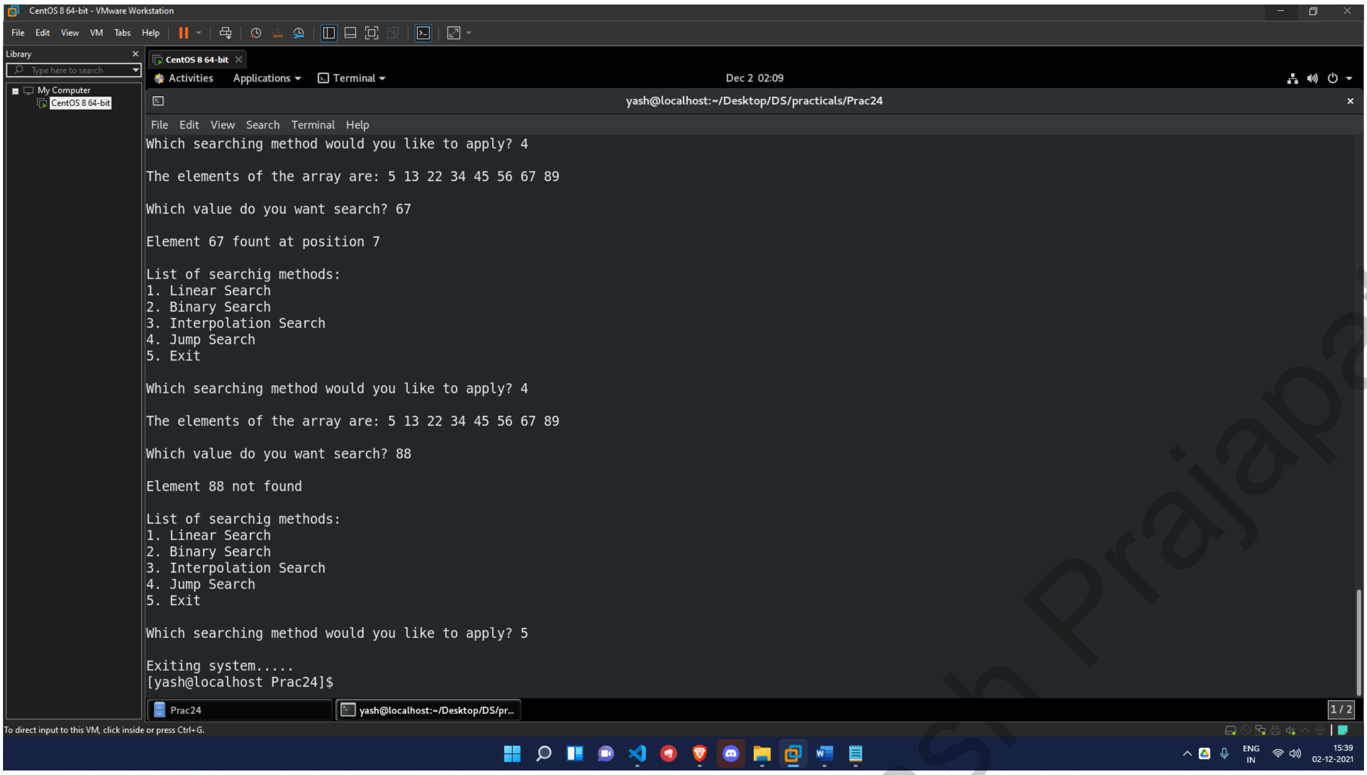
```
4. Jump Search
5. Exit

Which searching method would you like to apply? 1

The elements of the array are: 5 13 22 34 45 56 67 89

Which value do you want search? 13

Element 13 fount at position 2

List of searchig methods:
1. Linear Search
2. Binary Search
3. Interpolation Search
4. Jump Search
5. Exit

Which searching method would you like to apply? 1

The elements of the array are: 5 13 22 34 45 56 67 89

Which value do you want search? 100

Element 100 not found

List of searchig methods:
1. Linear Search
2. Binary Search
3. Interpolation Search
4. Jump Search
5. Exit

Which searching method would you like to apply?
```


CentOS 8 64-bit - VMware Workstation
File Edit View VM Tabs Help
Library
Type here to search
My Computer
CentOS 8 64-bit
Activities Applications Terminal
Dec 2 02:08
yash@localhost:~/Desktop/DS/practicals/Prac24
File Edit View Search Terminal Help
Prac24
yash@localhost:~/Desktop/DS/pr...
1 / 2
To direct input to this VM, click inside or press Ctrl+G.
ENG IN
15:38
02-12-2021

```
4. Jump Search
5. Exit

Which searching method would you like to apply? 2

The elements of the array are: 5 13 22 34 45 56 67 89

Which value do you want search? 34

Element 34 fount at position 4

List of searchig methods:
1. Linear Search
2. Binary Search
3. Interpolation Search
4. Jump Search
5. Exit

Which searching method would you like to apply? 2

The elements of the array are: 5 13 22 34 45 56 67 89

Which value do you want search? 35

Element 35 not found

List of searchig methods:
1. Linear Search
2. Binary Search
3. Interpolation Search
4. Jump Search
5. Exit

Which searching method would you like to apply?
```


CentOS 8 64-bit - VMware Workstation
File Edit View VM Tabs Help
Library
Type here to search
My Computer
CentOS 8 64-bit
Activities Applications Terminal
Dec 2 02:09
yash@localhost:~/Desktop/DS/practicals/Prac24
File Edit View Search Terminal Help
Prac24
yash@localhost:~/Desktop/DS/pr...
1 / 2
To direct input to this VM, click inside or press Ctrl+G.
ENG IN
15:39
02-12-2021

```
4. Jump Search
5. Exit

Which searching method would you like to apply? 3

The elements of the array are: 5 13 22 34 45 56 67 89

Which value do you want search? 45

Element 45 fount at position 5

List of searchig methods:
1. Linear Search
2. Binary Search
3. Interpolation Search
4. Jump Search
5. Exit

Which searching method would you like to apply? 3

The elements of the array are: 5 13 22 34 45 56 67 89

Which value do you want search? 55

Element 55 not found

List of searchig methods:
1. Linear Search
2. Binary Search
3. Interpolation Search
4. Jump Search
5. Exit

Which searching method would you like to apply?
```



CentOS 8 64-bit - VMware Workstation
File Edit View VM Tabs Help
Library
My Computer
CentOS 8 64-bit
Activities Applications Terminal
Dec 2 02:09
yash@localhost:~/Desktop/DS/practicals/Prac24
File Edit View Search Terminal Help
Prac24
yash@localhost:~/Desktop/DS/pr...
1 / 2
To direct input to this VM, click inside or press Ctrl+G.
ENG IN
15:39
02-12-2021

```
Which searching method would you like to apply? 4

The elements of the array are: 5 13 22 34 45 56 67 89

Which value do you want search? 67

Element 67 fount at position 7

List of searchig methods:
1. Linear Search
2. Binary Search
3. Interpolation Search
4. Jump Search
5. Exit

Which searching method would you like to apply? 4

The elements of the array are: 5 13 22 34 45 56 67 89

Which value do you want search? 88

Element 88 not found

List of searchig methods:
1. Linear Search
2. Binary Search
3. Interpolation Search
4. Jump Search
5. Exit

Which searching method would you like to apply? 5

Exiting system.....
[yash@localhost Prac24]$
```