LAB ASSIGNMENT 1

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YEAR & BRANCH : SE (AIML)

ROLL NO : 23556

```
#include <iostream>
using namespace std;

struct Student
{
	int Roll_No;
	string Name;
	float SGPA;
};

void quicksort(Student students[], int low, int high);
int partition(Student students[], int low, int high);

int main()
{
	cout << "Enter number of students to accept: ";
	int n;
	cin >> n;
	Student students[n];

	// Input
	for (int i = 0; i < n; i++)
	{
		cout << "Enter Roll No of Student: ";
```

```
            cin >> students[i].Roll_No;
            cout << "Enter Name of Student: ";
            cin >> students[i].Name;
            cout << "Enter SGPA of Student: ";
            cin >> students[i].SGPA;
            cout << endl;
      }

      // Bubble sort by Roll_No
      for (int i = 0; i < n - 1; i++)
      {
            for (int j = 0; j < n - 1 - i; j++)
            {
                  if (students[j].Roll_No > students[j + 1].Roll_No)
                  {
                        Student temp = students[j];
                        students[j] = students[j + 1];
                        students[j + 1] = temp;
                  }
            }
      }

      // Output Roll Number-wise order
      cout << endl << "Roll Number-wise order" << endl;
      for (int i = 0; i < n; i++)
      {
            cout << "Student " << i + 1 << " details:" << endl;
            cout << "Roll No: " << students[i].Roll_No << ", Name: " <<
students[i].Name << ", SGPA: " << students[i].SGPA << endl;
      }
```

```
	// Insertion sort by Name
	for (int i = 1; i < n; i++)
	{
		Student tosort = students[i];
		int j = i - 1;
		while (j >= 0 && students[j].Name.compare(tosort.Name) > 0)
		{
			students[j + 1] = students[j];
			j = j - 1;
		}
		students[j + 1] = tosort;
	}

	// Output Alphabetical order
	cout << endl << "Alphabetical order" << endl;
	for (int i = 0; i < n; i++)
	{
		cout << "Student " << i + 1 << " details:" << endl;
		cout << "Roll No: " << students[i].Roll_No << ", Name: " <<
students[i].Name << ", SGPA: " << students[i].SGPA << endl;
	}

	// Quicksort by SGPA
	quicksort(students, 0, n - 1);

	// Output SGPA order
	cout << endl << "SGPA order" << endl;
	for (int i = n - 1; i >= 0; i--)
	{
```

```
            cout << "Student details:" << endl;
            cout << "Roll No: " << students[i].Roll_No << ", Name: " <<
students[i].Name << ", SGPA: " << students[i].SGPA << endl;
      }

      // Linear search
      cout << endl << "Enter SGPA to search (Linear): ";
      float searchl;
      cin >> searchl;
      int num = 0;
      for (int i = 0; i < n; i++)
      {
            if (students[i].SGPA == searchl)
            {
                  cout << "Roll No: " << students[i].Roll_No << ", Name: " <<
students[i].Name << ", SGPA: " << students[i].SGPA << endl;
                  num++;
            }
      }
      if (num == 0)
      {
            cout << "No Students with given SGPA found";
      }

      // Binary search
      cout << endl << "Enter SGPA to search (Binary): ";
      float searchb;
      cin >> searchb;
      int high = n - 1;
      int low = 0;
```

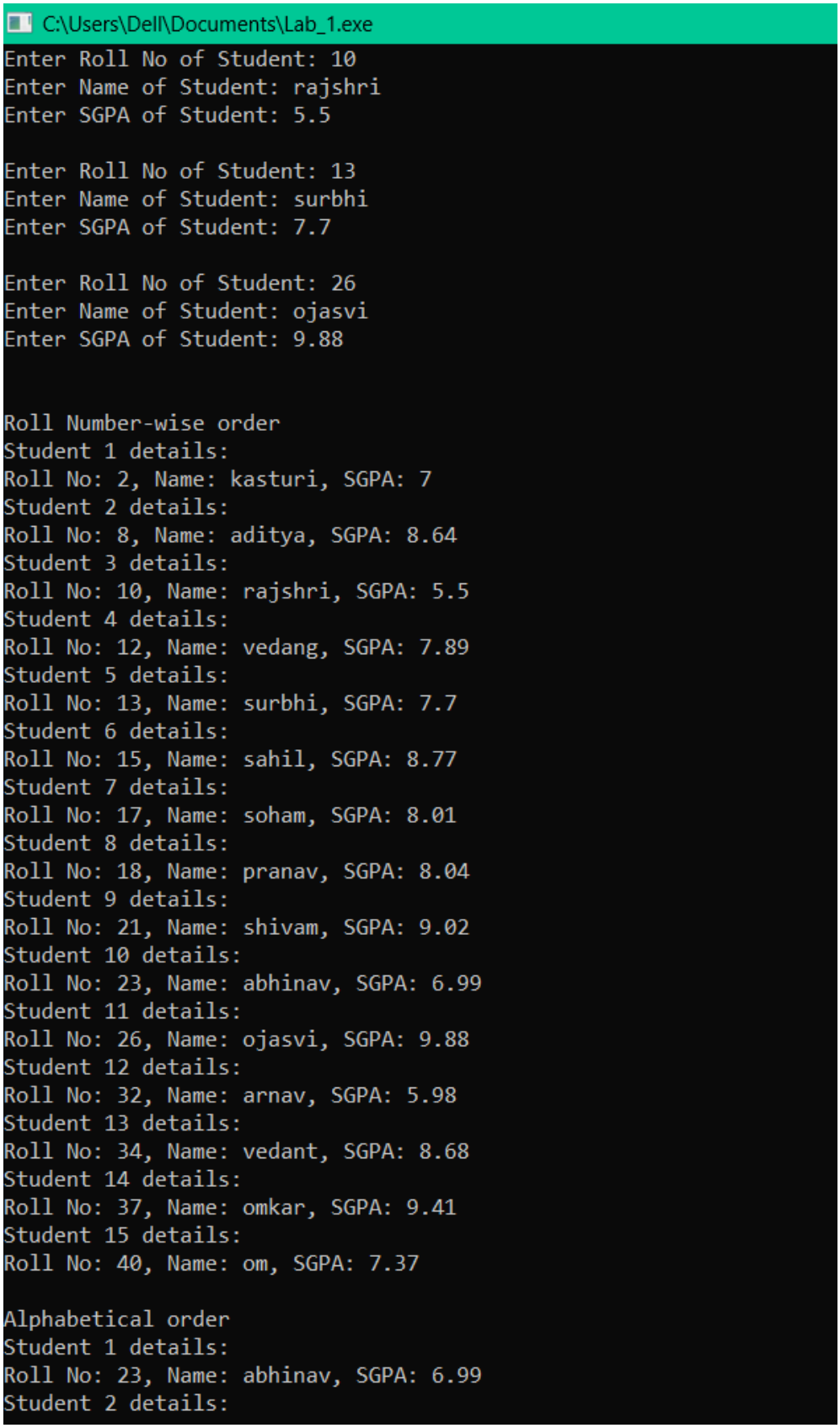
```
	int found = 0;
	while (low <= high)
	{
		int mid = (high + low) / 2;
		if (students[mid].SGPA == searchb)
		{
			cout << "Roll No: " << students[mid].Roll_No << ", Name: "
<< students[mid].Name << ", SGPA: " << students[mid].SGPA << endl;
			found++;
			break;
		}
		else if (students[mid].SGPA < searchb)
		{
			low = mid + 1;
		}
		else
		{
			high = mid - 1;
		}
	}
	if (found == 0)
	{
		cout << "No Students with given SGPA found" << endl;
	}
}

// Quicksort functions
int partition(Student students[], int low, int high)
{
	Student pivot = students[high];
```

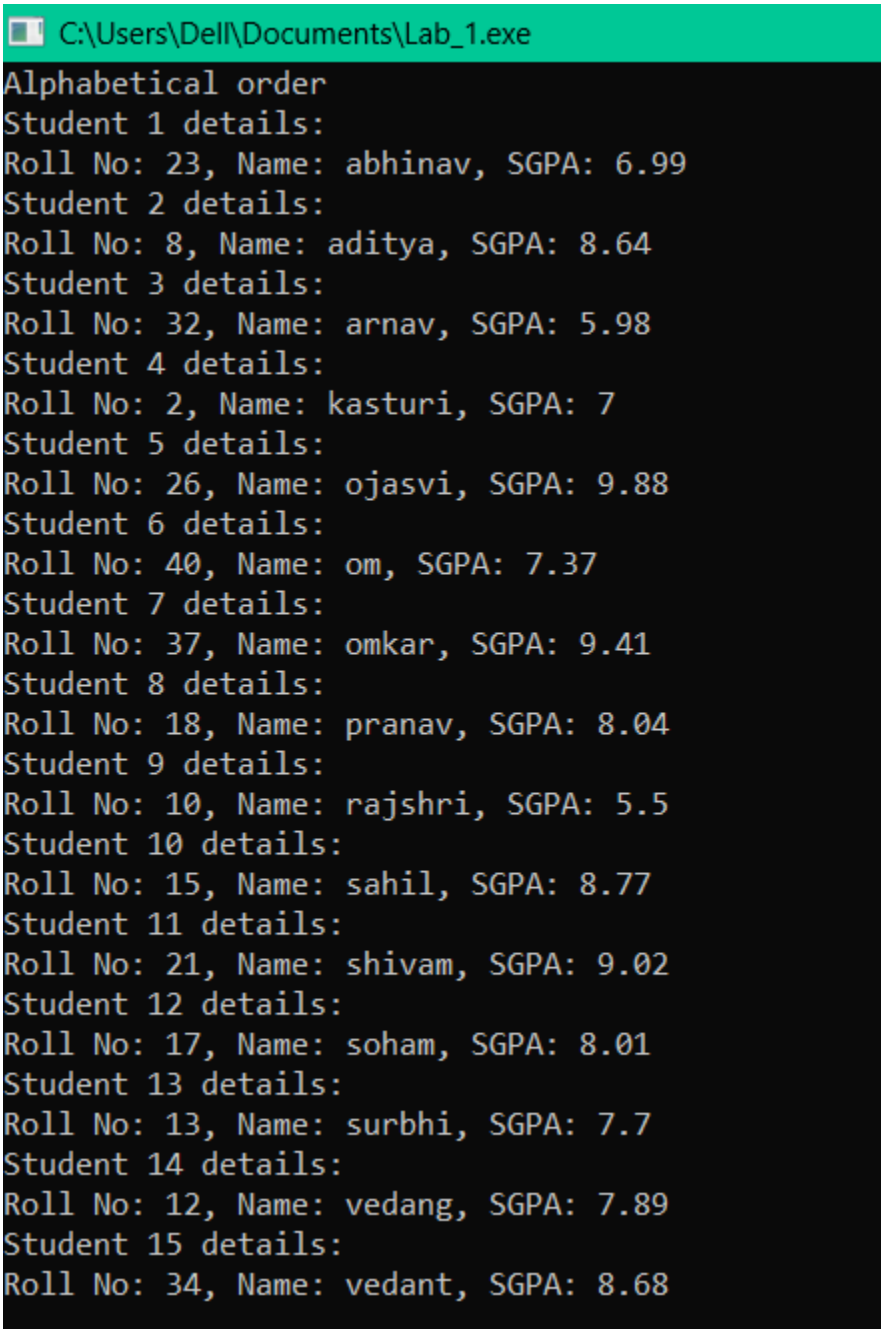
```
	int i = low - 1;
	for (int j = low; j < high; j++)
	{
		if (students[j].SGPA < pivot.SGPA)
		{
			i++;
			Student temp1 = students[i];
			students[i] = students[j];
			students[j] = temp1;
		}
	}
	Student temp2 = students[i + 1];
	students[i + 1] = students[high];
	students[high] = temp2;
	return i + 1;
}

void quicksort(Student students[], int low, int high)
{
	if (low < high)
	{
		int pivot_index = partition(students, low, high);
		quicksort(students, low, pivot_index - 1);
		quicksort(students, pivot_index + 1, high);
	}
}
```

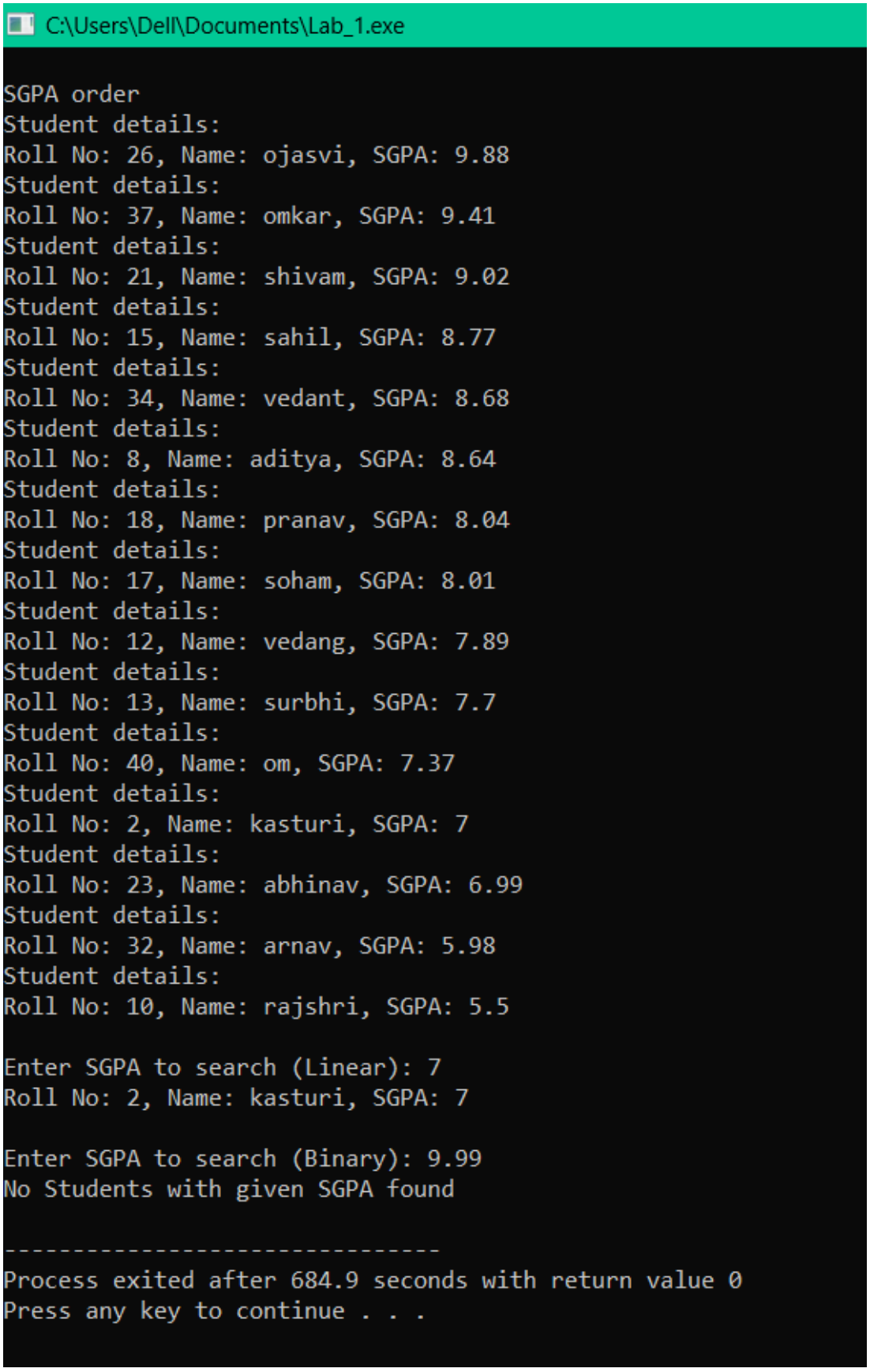
OUTPUT:

C:\Users\Dell\Documents\Lab_1.exe

```
Enter number of students to accept: 15
Enter Roll No of Student: 40
Enter Name of Student: om
Enter SGPA of Student: 7.37

Enter Roll No of Student: 32
Enter Name of Student: arnav
Enter SGPA of Student: 5.98

Enter Roll No of Student: 18
Enter Name of Student: pranav
Enter SGPA of Student: 8.04

Enter Roll No of Student: 8
Enter Name of Student: aditya
Enter SGPA of Student: 8.64

Enter Roll No of Student: 23
Enter Name of Student: abhinav
Enter SGPA of Student: 6.99

Enter Roll No of Student: 21
Enter Name of Student: shivam
Enter SGPA of Student: 9.02

Enter Roll No of Student: 2
Enter Name of Student: kasturi
Enter SGPA of Student: 7

Enter Roll No of Student: 15
Enter Name of Student: sahil
Enter SGPA of Student: 8.77

Enter Roll No of Student: 34
Enter Name of Student: vedant
Enter SGPA of Student: 8.68

Enter Roll No of Student: 37
Enter Name of Student: omkar
Enter SGPA of Student: 9.41

Enter Roll No of Student: 12
Enter Name of Student: vedang
Enter SGPA of Student: 7.89

Enter Roll No of Student: 17
Enter Name of Student: soham
Enter SGPA of Student: 8.01
```


C:\Users\Dell\Documents\Lab_1.exe
Enter Roll No of Student: 10
Enter Name of Student: rajshri
Enter SGPA of Student: 5.5
Enter Roll No of Student: 13
Enter Name of Student: surbhi
Enter SGPA of Student: 7.7
Enter Roll No of Student: 26
Enter Name of Student: ojasvi
Enter SGPA of Student: 9.88
Roll Number-wise order
Student 1 details:
Roll No: 2, Name: kasturi, SGPA: 7
Student 2 details:
Roll No: 8, Name: aditya, SGPA: 8.64
Student 3 details:
Roll No: 10, Name: rajshri, SGPA: 5.5
Student 4 details:
Roll No: 12, Name: vedang, SGPA: 7.89
Student 5 details:
Roll No: 13, Name: surbhi, SGPA: 7.7
Student 6 details:
Roll No: 15, Name: sahil, SGPA: 8.77
Student 7 details:
Roll No: 17, Name: soham, SGPA: 8.01
Student 8 details:
Roll No: 18, Name: pranav, SGPA: 8.04
Student 9 details:
Roll No: 21, Name: shivam, SGPA: 9.02
Student 10 details:
Roll No: 23, Name: abhinav, SGPA: 6.99
Student 11 details:
Roll No: 26, Name: ojasvi, SGPA: 9.88
Student 12 details:
Roll No: 32, Name: arnav, SGPA: 5.98
Student 13 details:
Roll No: 34, Name: vedant, SGPA: 8.68
Student 14 details:
Roll No: 37, Name: omkar, SGPA: 9.41
Student 15 details:
Roll No: 40, Name: om, SGPA: 7.37
Alphabetical order
Student 1 details:
Roll No: 23, Name: abhinav, SGPA: 6.99
Student 2 details:


C:\Users\Dell\Documents\Lab_1.exe
Alphabetical order
Student 1 details:
Roll No: 23, Name: abhinav, SGPA: 6.99
Student 2 details:
Roll No: 8, Name: aditya, SGPA: 8.64
Student 3 details:
Roll No: 32, Name: arnav, SGPA: 5.98
Student 4 details:
Roll No: 2, Name: kasturi, SGPA: 7
Student 5 details:
Roll No: 26, Name: ojasvi, SGPA: 9.88
Student 6 details:
Roll No: 40, Name: om, SGPA: 7.37
Student 7 details:
Roll No: 37, Name: omkar, SGPA: 9.41
Student 8 details:
Roll No: 18, Name: pranav, SGPA: 8.04
Student 9 details:
Roll No: 10, Name: rajshri, SGPA: 5.5
Student 10 details:
Roll No: 15, Name: sahil, SGPA: 8.77
Student 11 details:
Roll No: 21, Name: shivam, SGPA: 9.02
Student 12 details:
Roll No: 17, Name: soham, SGPA: 8.01
Student 13 details:
Roll No: 13, Name: surbhi, SGPA: 7.7
Student 14 details:
Roll No: 12, Name: vedang, SGPA: 7.89
Student 15 details:
Roll No: 34, Name: vedant, SGPA: 8.68


C:\Users\Dell\Documents\Lab_1.exe
SGPA order
Student details:
Roll No: 26, Name: ojasvi, SGPA: 9.88
Student details:
Roll No: 37, Name: omkar, SGPA: 9.41
Student details:
Roll No: 21, Name: shivam, SGPA: 9.02
Student details:
Roll No: 15, Name: sahil, SGPA: 8.77
Student details:
Roll No: 34, Name: vedant, SGPA: 8.68
Student details:
Roll No: 8, Name: aditya, SGPA: 8.64
Student details:
Roll No: 18, Name: pranav, SGPA: 8.04
Student details:
Roll No: 17, Name: soham, SGPA: 8.01
Student details:
Roll No: 12, Name: vedang, SGPA: 7.89
Student details:
Roll No: 13, Name: surbhi, SGPA: 7.7
Student details:
Roll No: 40, Name: om, SGPA: 7.37
Student details:
Roll No: 2, Name: kasturi, SGPA: 7
Student details:
Roll No: 23, Name: abhinav, SGPA: 6.99
Student details:
Roll No: 32, Name: arnav, SGPA: 5.98
Student details:
Roll No: 10, Name: rajshri, SGPA: 5.5
Enter SGPA to search (Linear): 7
Roll No: 2, Name: kasturi, SGPA: 7
Enter SGPA to search (Binary): 9.99
No Students with given SGPA found

Process exited after 684.9 seconds with return value 0
Press any key to continue . . .

GITHUB LINK : https://github.com/SangwaiAditya/DSA