DSA LAB

Week 2

Udeet Mittal
CSE C3
Roll Number 64

SOLVED EXERCISE:

1)Write a C program to implement binary search using recursion.

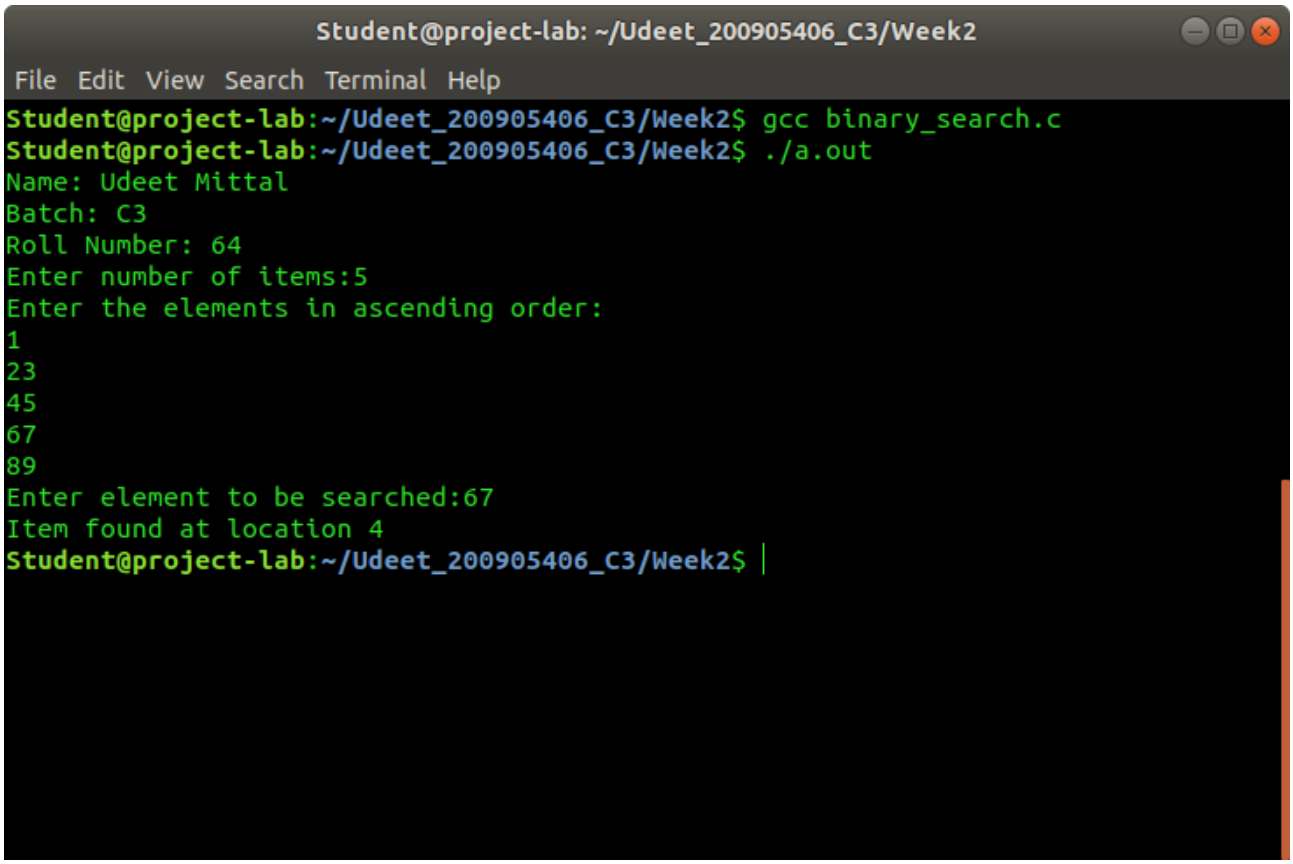
Filename: “binary_search_function.h”

```
int bin_search(int low,int high,int item,int a[])
{
	int mid;
	if(low>high)
		return(-1);
	else
		{
			mid=(low+high)/2;
			if(item==a[mid])
				return(mid);
			else if(item<a[mid])
				return(bin_search(low,mid-1,item,a));
			else
				return(bin_search(mid+1,high,item,a));
		}
}
```

Filename: “binary_search.c”

```
#include<stdio.h>
#include "binary_search_function.h"
void main()
{
	int i, pos,a[30],n,item;
	printf("Name: Udeet Mittal\nBatch: C3\nRoll Number: 64\n");
	printf("Enter number of items:");
	scanf("%d",&n);
	printf("Enter the elements in ascending order:\n");

	for(i=0;i<n;i++)
```

```
        scanf("%d",&a[i]);

        printf("Enter element to be searched:");
        scanf("%d",&item);
        pos=bin_search(0,n-1,item,a);
if(pos!=-1)
        printf("Item found at location %d\n",pos+1);
else
        printf("Item not found\n");

}
```



LAB2 Questions:

1. Create a structure STUDENT consisting of variables of structures:
i. DOB {day, month (use pointer), year},
ii. STU_INFO {reg_no, name(use pointer), address},
iii. COLLEGE {college_name (use pointer), university_name}

where structure types from i to iii are declared outside the STUDENT independently. Show how to read and display member variables of DOB type if pointer variable is created for DOB inside STUDENT and STUDENT variable is also a pointer variable. The programshould read and display the values of all members of STUDENT structure.

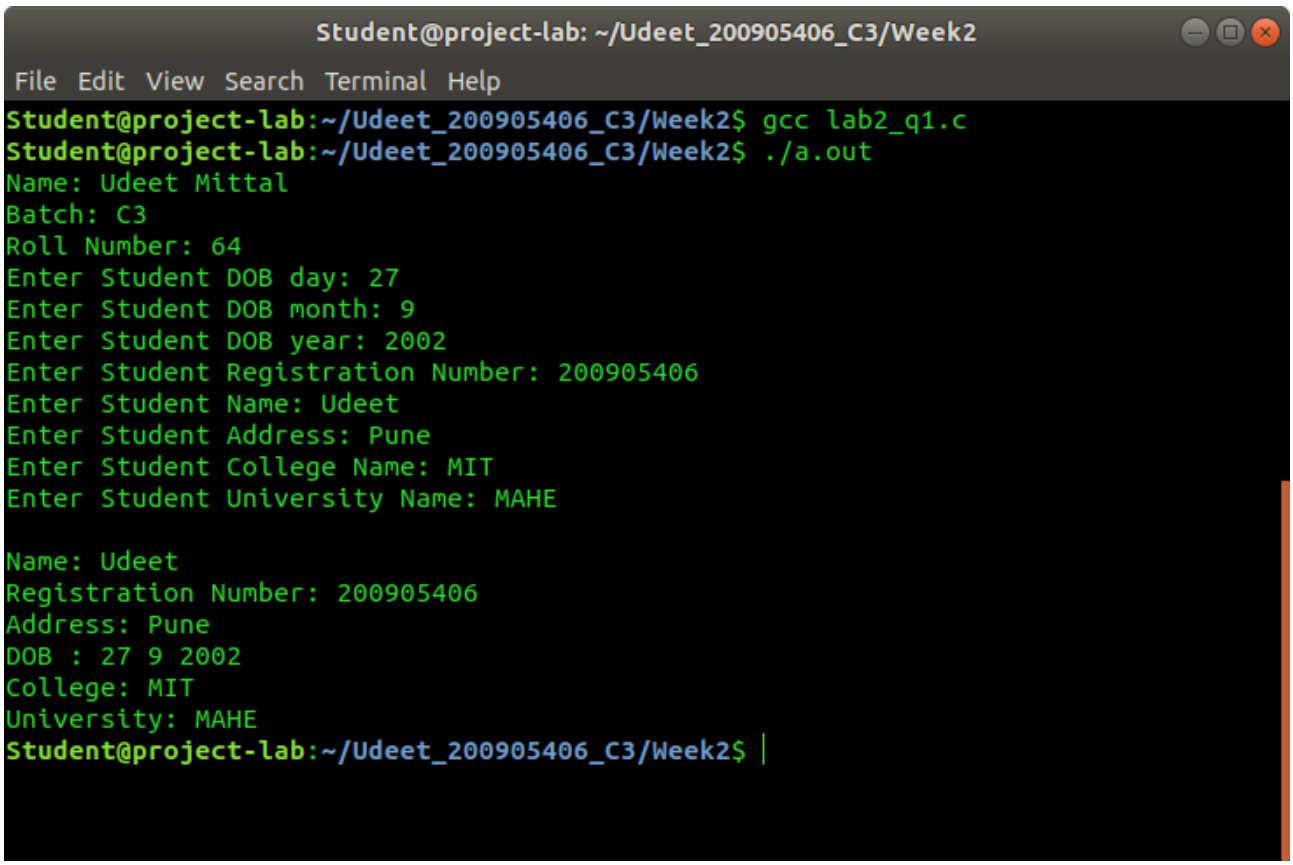
Filename: "student.h"

```
struct DOB
{
 int day;
 char* mth;
 int year;
};

struct STU_INFO
{
 int reg_no;
 char* name;
 char adrs[20];
};

struct COLLEGE
{
 char* clg_name;
 char univ_name[20] ;
};

struct STUDENT
{
 struct DOB *dob;
 struct STU_INFO stu_info;
 struct COLLEGE clg;
};
```

Filename: "lab2_q1.c"

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

```
#include "student.h"

int main()
{
 struct STUDENT *s1;
 s1=(struct STUDENT*)malloc(sizeof(struct STUDENT));
 s1->dob= (struct DOB*)malloc(sizeof(struct DOB));
 char month[10];
 printf("Name: Udeet Mittal\nBatch: C3\nRoll Number: 64\n");

 printf("Enter Student DOB day: ");
 scanf("%d", &s1->dob->day);
 printf("Enter Student DOB month: ");
 scanf("%s", month);
 printf("Enter Student DOB year: ");
 scanf("%d", &s1->dob->year);

 s1->dob->mth = (char*)calloc(strlen(month)+1,sizeof(char));
 strcpy(s1->dob->mth,month);

 char name[20];
 printf("Enter Student Registration Number: ");
 scanf("%d", &s1->stu_info.reg_no);
 printf("Enter Student Name: ");
 scanf("%s", name);
 printf("Enter Student Address: ");
 scanf("%s", s1->stu_info.adrs);
 s1->stu_info.name = (char*)calloc(strlen(name)+1,sizeof(char));
 strcpy(s1->stu_info.name,name);

 char college[30];
 printf("Enter Student College Name: ");
 scanf("%s", college);
 printf("Enter Student University Name: ");
 scanf("%s", s1->clg.univ_name);
 s1->clg.clg_name = (char*)calloc(strlen(college)+1,sizeof(char));
 strcpy(s1->clg.clg_name,college);

 printf("\nName: %s\n", s1->stu_info.name);
 printf("Registration Number: %d\n", s1->stu_info.reg_no);
 printf("Address: %s\n", s1->stu_info.adrs);
 printf("DOB : %d %s %d\n", s1->dob->day, s1->dob->mth, s1->dob->year);
 printf("College: %s\n", s1->clg.clg_name);
 printf("University: %s\n", s1->clg.univ_name);

 return 0;

}
```

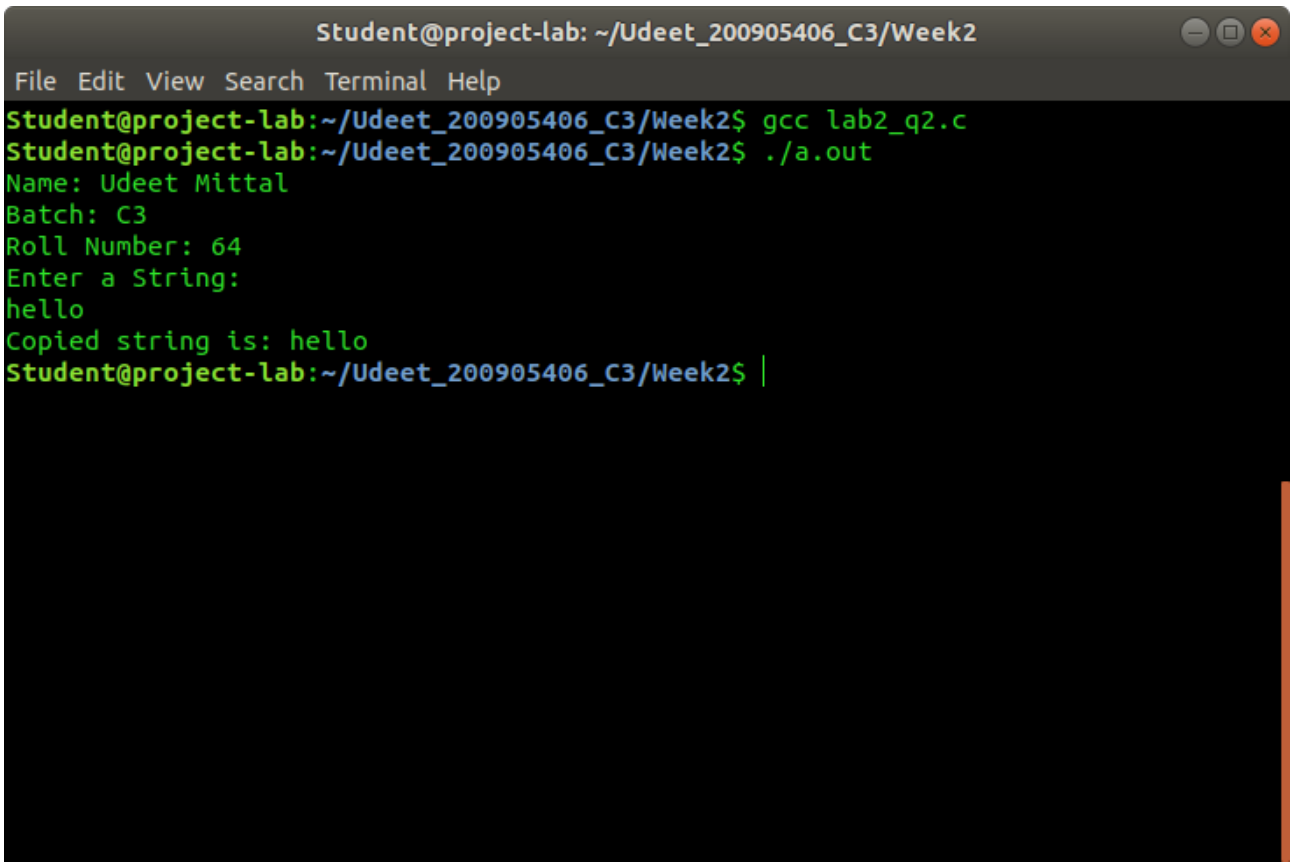


2. Write C program using recursion to copy one string to another using Recursion.

Filename: “lab2_q2.c”

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

void copy(char s1[], char s2[], int index)
{

s2[index] = s1[index];
if (s1[index] == '\0')
return;
copy(s1, s2, index + 1);

}

int main()
{

printf("Name: Udeet Mittal\nBatch: C3\nRoll Number: 64\n");
```

```
char str[100];
printf("Enter a String:\n");
scanf("%s", str);
char copystr[100];
copy(str, copystr, 0);
printf("Copied string is: %s\n", copystr);

}
```

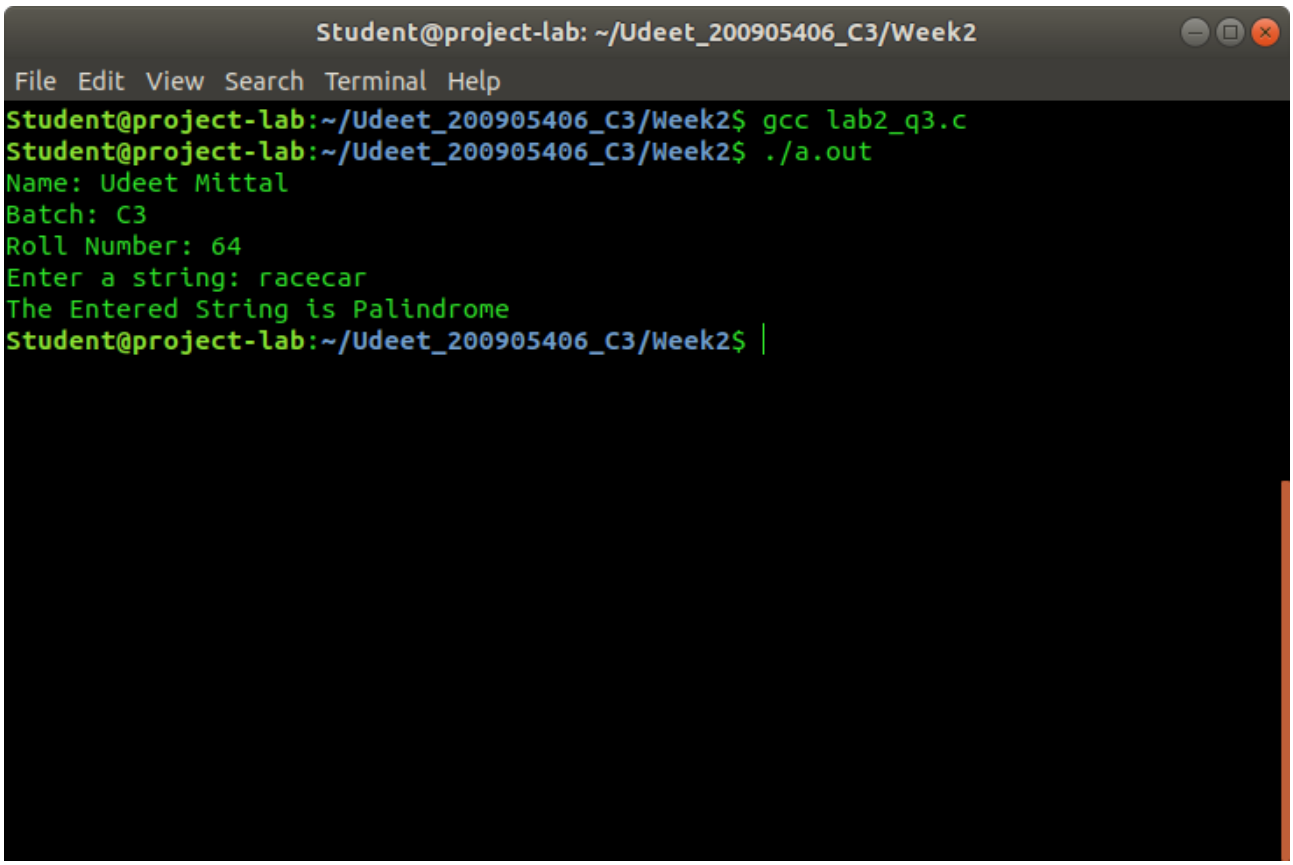


3. Write C programs using recursion to check whether a given String is Palindrome or not, using Recursion

Filename: “lab2_q3.c”

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

```
#include <stdlib.h>
#include <string.h>

int checkpal(char str[], int s, int e)
{

if (s >= e)
	return 1;

if (str[s] != str[e])
	return 0;

if (s < e + 1)
	return checkpal(str, s + 1, e - 1);

return 1;
}

int main()
{

printf("Name: Udeet Mittal\nBatch: C3\nRoll Number: 64\n");
char str[20];
printf("Enter a string: ");
scanf("%s", str);

if(checkpal(str, 0, strlen(str)-1) == 1)
{
	printf("The Entered String is Palindrome\n");
}

else
{
printf("The Entered String is not Palindrome\n");
}

}
```



4. Write C programs using recursion to simulate the working of Tower of Hanoi for n disks. Print the number of moves.

Filename: “lab2_q4.c”

```
#include <stdio.h>
#include <stdlib.h>
int TowerOfHanoi(int n, char from, char to, char inter)
{static int cnt=0;
if (n == 1)
{
printf("Move Disk 1 from rod %c to rod %c\n", from, to);
cnt++;
return cnt;
}

TowerOfHanoi(n - 1, from, inter, to);
printf("Move Disk %d from rod %c to rod %c\n", n, from, to);
cnt++;
TowerOfHanoi(n - 1, inter, to, from);
}
```

```
int main()
{
printf("Name: Udeet Mittal\nBatch: C3\nRoll Number: 64\n");
int n;
printf("Enter Number of Disks:\n");
scanf("%d", &n);
int cnt=TowerOfHanoi(n, 'A', 'C', 'B');
printf("Total Number of Moves=%d\n",cnt);
return 0;
}
```