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DSA Lab 2

Q1)

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

struct DOB {
    int day;
    char *month;
    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;
};

int main()
{
    struct STUDENT *stu = (struct STUDENT*)malloc(sizeof(struct STUDENT));
    stu->dob = (struct DOB*)malloc(sizeof(struct DOB));
    stu->dob->month = (char*)malloc(sizeof(char) * 10);
    stu->stu_info.name = (char*)malloc(sizeof(char) * 20);
    stu->clg.clg_name = (char*)malloc(sizeof(char) * 50);
    printf("Enter Details of Student:\n");
    printf("Registration Number:\t");
    scanf("%d", &(stu->stu_info.reg_no));
    printf("Name:\t");
    scanf(" %s", stu->stu_info.name);
    printf("Address:\t");
    scanf(" %[^\\n]s", stu->stu_info.adrs);
    printf("Date of Birth (DD MONTH YYYY):\t");
    scanf("%d", &(stu->dob->day));
    scanf(" %s", stu->dob->month);
    scanf("%d", &(stu->dob->year));
    printf("College Name:\t");
```

```

        scanf(" %s", stu->clg.clg_name);
        printf("University Name:\t");
        scanf(" %s", stu->clg.univ_name);
        printf("\nStudent Details\n\n Registration Number:\t%d\nName:\t%s\nAddress:\t%s\nDate
of Birth:\t%d %s %d\nCollege Name:\t%s\nUniversity Name:\t%s\n\n", stu->stu_info.reg_no, stu-
>stu_info.name, stu->stu_info.adrs,stu->dob->day,stu->dob->month,stu->dob->year,stu-
>clg.clg_name,stu->clg.univ_name);
        return 0;
}

```

The screenshot shows a terminal window titled "student@dslab: ~/Desktop/AyushGoyalDSA". The terminal contains the following text:

```

student@dslab:~/Desktop/AyushGoyalDSA$ cc q1.c -o q1
student@dslab:~/Desktop/AyushGoyalDSA$ ./q1
Enter Details of Student:
Registration Number:    190905522
Name:    Ayush
Address:    MIT Hostel Block 14
Date of Birth (DD MONTH YYYY):  10 11 2001
College Name:    MIT
University Name:    MAHE

Student Details

Registration Number:    190905522
Name:    Ayush
Address:    MIT Hostel Block 14
Date of Birth:    10 11 2001
College Name:    MIT
University Name:    MAHE

student@dslab:~/Desktop/AyushGoyalDSA$ 

```

Q2)

```

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

void copy(char str1[], char str2[], int i)
{
    str2[i]=str1[i];
    if(str1[i] == '\0')
        return;
    copy(str1,str2,++i);
}

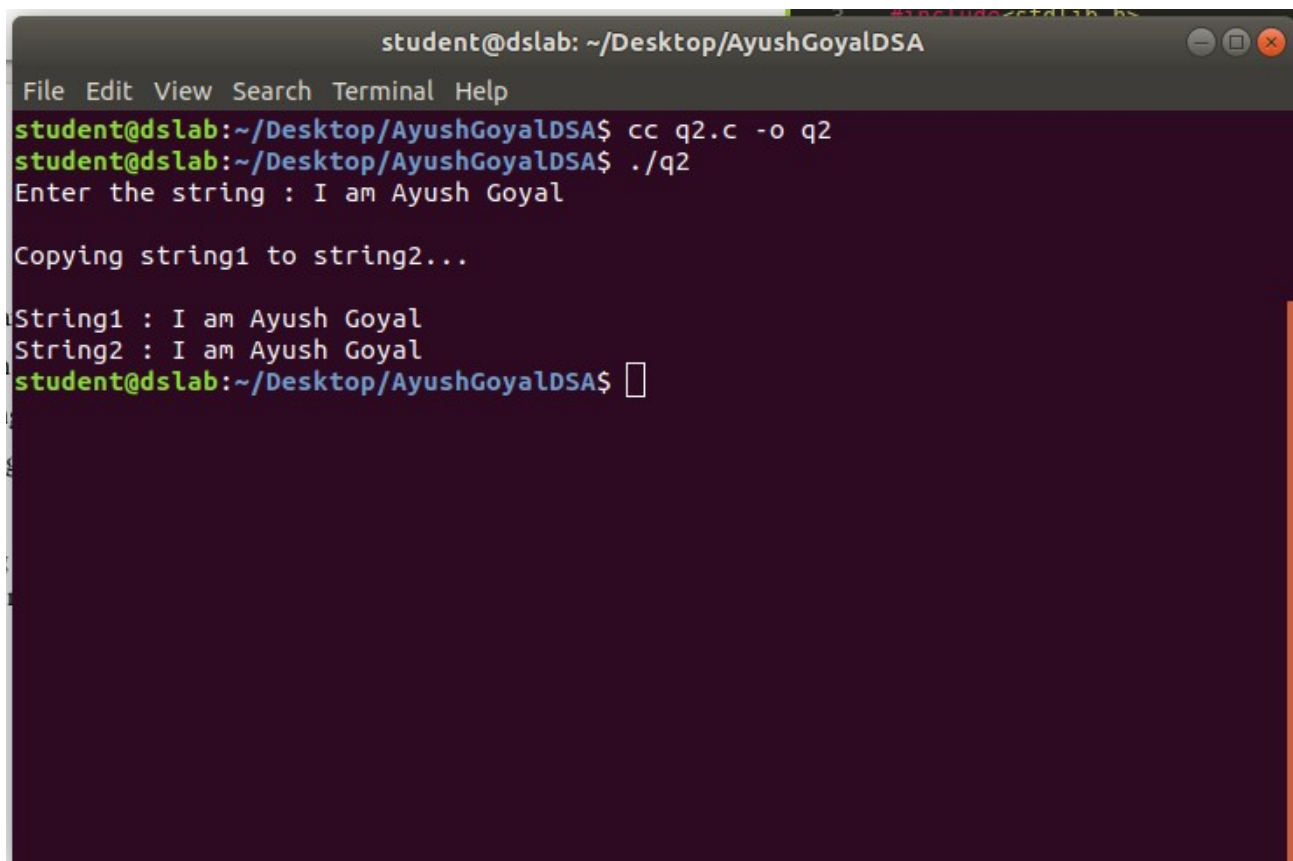
int main()
{
    char str1[100],str2[100];

```

```

printf("Enter the string : ");
scanf("%[^\n]s",str1);
printf("\nCopying string1 to string2...\n");
copy(str1,str2,0);
printf("\nString1 : %s\n",str1);
printf("String2 : %s\n",str2);
return 0;
}

```



```

student@dslab: ~/Desktop/AyushGoyalDSA
File Edit View Search Terminal Help
student@dslab:~/Desktop/AyushGoyalDSA$ cc q2.c -o q2
student@dslab:~/Desktop/AyushGoyalDSA$ ./q2
Enter the string : I am Ayush Goyal

Copying string1 to string2...

String1 : I am Ayush Goyal
String2 : I am Ayush Goyal
student@dslab:~/Desktop/AyushGoyalDSA$ 

```

Q3)

```

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

int palindromecheck(char str[], int i, int j)
{
    if(j>i){
        if(str[i] == str[j]){
            return palindromecheck(str,i+1,j-1);
        }
        else
            return 0;
    }
    return 1;
}

```

```

int main()
{
    char str[100];
    printf("Enter the string : ");
    scanf("%s",str);
    int l = strlen(str);
    int c = palindromecheck(str,0,l-1);
    if(c == 1)
        printf("\nString is palindrome.\n");
    else
        printf("\nString is not a palindrome.\n");
    return 0;
}

```

The screenshot shows a terminal window titled 'student@dslab: ~/Desktop/AyushGoyalDSA'. The user has compiled a program 'q3.c' into 'q3' and is running it. The program prompts for a string and checks if it is a palindrome. The following interactions are shown:

```

student@dslab:~/Desktop/AyushGoyalDSA$ cc q3.c -o q3
student@dslab:~/Desktop/AyushGoyalDSA$ ./q3
Enter the string : ayush

String is not a palindrome.
student@dslab:~/Desktop/AyushGoyalDSA$ ./q3
Enter the string : dad

String is palindrome.
student@dslab:~/Desktop/AyushGoyalDSA$ ./q3
Enter the string : wow

String is palindrome.
student@dslab:~/Desktop/AyushGoyalDSA$ ./q3
Enter the string : mother

String is not a palindrome.
student@dslab:~/Desktop/AyushGoyalDSA$ 

```

Q4)

```

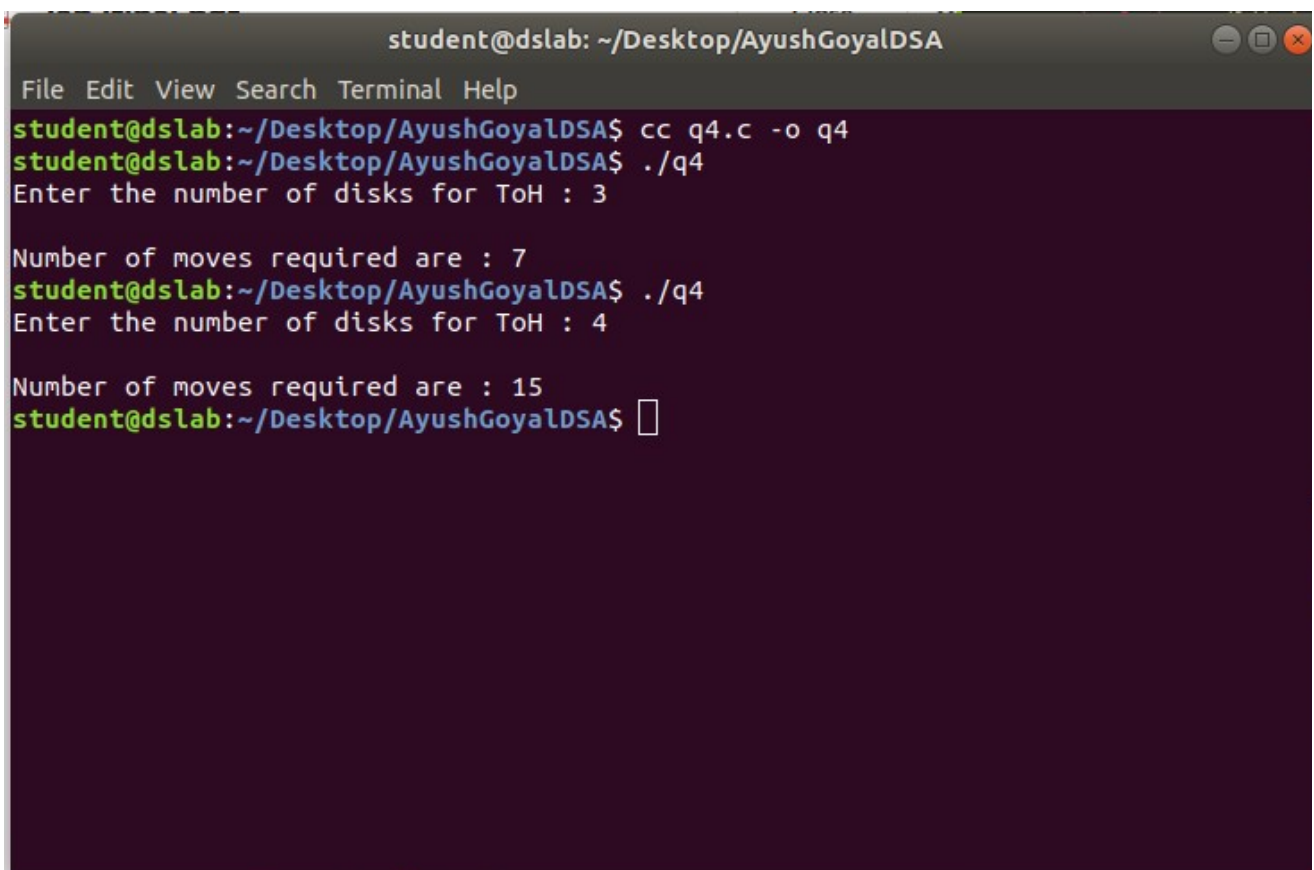
#include<stdio.h>
#include<stdlib.h>

int tower(int n, char s, char d, char t)
{
    static int count = 0;
    count++;
    if(n==1)
        return count;
    tower(n-1,s,d,t);
}

```

```
        tower(n-1,t,s,d);
    }

int main()
{
    int n,m;
    printf("Enter the number of disks for ToH : ");
    scanf("%d",&n);
    char s = 'a',d = 'b',t = 'c';
    m = tower(n,s,d,t);
    printf("\nNumber of moves required are : %d\n",m);
    return 0;
}
```



The screenshot shows a terminal window titled "student@dslab: ~/Desktop/AyushGoyalDSA". The terminal has a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The user enters the command `cc q4.c -o q4` to compile the program. Then, they run `./q4`. The program prompts "Enter the number of disks for ToH : 3". The user enters 3, and the program outputs "Number of moves required are : 7". The user runs `./q4` again. The program prompts "Enter the number of disks for ToH : 4". The user enters 4, and the program outputs "Number of moves required are : 15". The terminal ends with the prompt `student@dslab:~/Desktop/AyushGoyalDSA$` and a cursor.

```
student@dslab: ~/Desktop/AyushGoyalDSA
File Edit View Search Terminal Help
student@dslab:~/Desktop/AyushGoyalDSA$ cc q4.c -o q4
student@dslab:~/Desktop/AyushGoyalDSA$ ./q4
Enter the number of disks for ToH : 3

Number of moves required are : 7
student@dslab:~/Desktop/AyushGoyalDSA$ ./q4
Enter the number of disks for ToH : 4

Number of moves required are : 15
student@dslab:~/Desktop/AyushGoyalDSA$
```