

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

PRACTICAL-6

AIM: - To learn applications of recursion in real-life scenario.

6. The Fibonacci appears in the smallest, to the largest objects in nature. It is a way for information to flow in a very efficient manner. The number of petals in a flower consistently follows the Fibonacci sequence. Famous examples include the lily, which has three petals, buttercups, which have five, the chicory's 21, the daisy's 34, and so on.



- a) Flowers of all kinds follow the pattern, but roses are most favourite kind to use as an example of the Fibonacci Sequence. The petals unfold more & more and the sequence increases for the best possible exposure to sunlight and other factors. There is a rose flower (as shown in Figure), which is having only 9 petals. So, Write the c program to print fibonacci series till Nth term (9th petal) using recursion.

Hint: N=9

- **Input:** Enter number of terms in Fibonacci series: 9
- **Output:** Fibonacci series till 9 terms

0 1 1 2 3 5 8 13 21

SOLUTION

```
#include<stdio.h>
void fibonacci(int num)
{
    static int n1=0,n2=1,n3;
    if(num>0)
    {
        n3 = n1 + n2;
        n1 = n2;
        n2 = n3;
        printf("%d ",n3);
        fibonacci(num-1);
    }
}
```

```

int main()
{
    int yash;
    printf("Enter the number of elements: ");
    scanf("%d",&yash);

    printf("Fibonacci Series: ");
    printf("%d %d ",0,1);

    fibonacci(yash-2);

    return 0;
}

```

OUTPUT

```

CentOS 8 64-bit - VMware Workstation
File Edit View VM Tabs Help
Library
My Computer
CentOS 8 64-bit
Shared VMs (Deprecated)
Activities Terminal
Sep 15 22:58
yash@localhost:~/Desktop/DS/Prac6
File Edit View Search Terminal Help
[yash@localhost Prac6]$ gedit p6A.c
[yash@localhost Prac6]$ gcc p6A.c
[yash@localhost Prac6]$ ./a.out
Enter the number of elements: 9
Fibonacci Series: 0 1 1 2 3 5 8 13 21 [yash@localhost Prac6]$

```

b) Tower of Hanoi is a mathematical puzzle where we have three rods and n disks. The objective of the puzzle is to move the entire stack to another rod, obeying the following simple rules:

- Only one disk can be moved at a time.
- Each move consists of taking the upper disk from one of the stacks and placing it on top of another stack i.e. a disk can only be moved if it is the uppermost disk on a stack.
- No disk may be placed on top of a smaller disk.

Write the c program for Tower of Hanoi using recursion.

Hint:

- No of Disk =3 and no. of rod = 3
- Take an example for 2 disks :

Let rod 1 = 'A', rod 2 = 'B', rod 3 = 'C'.

Step 1 : Shift first disk from 'A' to 'C'.

Step 2 : Shift second disk from 'A' to 'B'.

Step 3 : Shift first disk from 'C' to 'B'.

The pattern here is :

Top Disk moved from A to C

Top Disk moved from A to B

Top Disk moved from C to B

Input: Enter the Number of Disks: 3

Output :

Top Disk moved from A to B

Top Disk moved from A to C

Top Disk moved from B to C

Top Disk moved from A to B

Top Disk moved from C to A

Top Disk moved from C to B

Top Disk moved from A to B

SOLUTION

```
#include <stdio.h>
void TOH(int n, char a, char b, char c)
{
    if (n > 0)
    {
        TOH(n - 1, a, c, b);
        printf("\nTop Disk moved from %c to %c ", a, b);
        TOH(n - 1, c, b, a);
    }
}

int main()
{
    int yash;
    printf("\nEnter the Number of Disks: ");
    scanf("%d", &yash);
```

```
TOH(yash, 'A', 'B', 'C');
printf("\n\n");
}
```

OUTPUT

