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Q. Write the program to find the tower of Hanoi for given number of discs.

THEORY

Tower of Hanoi is a mathematical puzzle where we have three rods (A, B, and C) and N disks. Initially, all the disks are stacked in decreasing value of diameter i.e., the smallest disk is placed on the top and they are on rod A. The objective of the puzzle is to move the entire stack to another rod (here considered C), 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.

ALGORITHM

<u>concept</u>
Step 1: Move n-1 disks from from_rod to aux_rod.
Step 2: Move nth disk from from_rod to to_rod.
Step 3: Move n-1 disks from aux_rod to to_rod.

<u>Method</u>

Step1: Create a function towerOfHanoi where pass the N (current number of disk), from_rod, to_rod, aux_rod.

Step2: Make a function call for (N – 1) th disk.

Step3: Then print the current the disk along with from_rod and to_rod.

Step4: Again make a function call for (N – 1) th disk.

CODE

```
#include<stdio.h>        //library functions are included
#include<stdlib.h>

// we define our user defined function from here

void towhan(int n, char from_rod,char to_rod, char aux_rod)
{
 if(n==1)   //n value is 1 then print the below statement
 {
 printf("move disc 1 from rod %c to rod %c \n",from_rod,to_rod);   //here it is from rod A to C
 return;
```
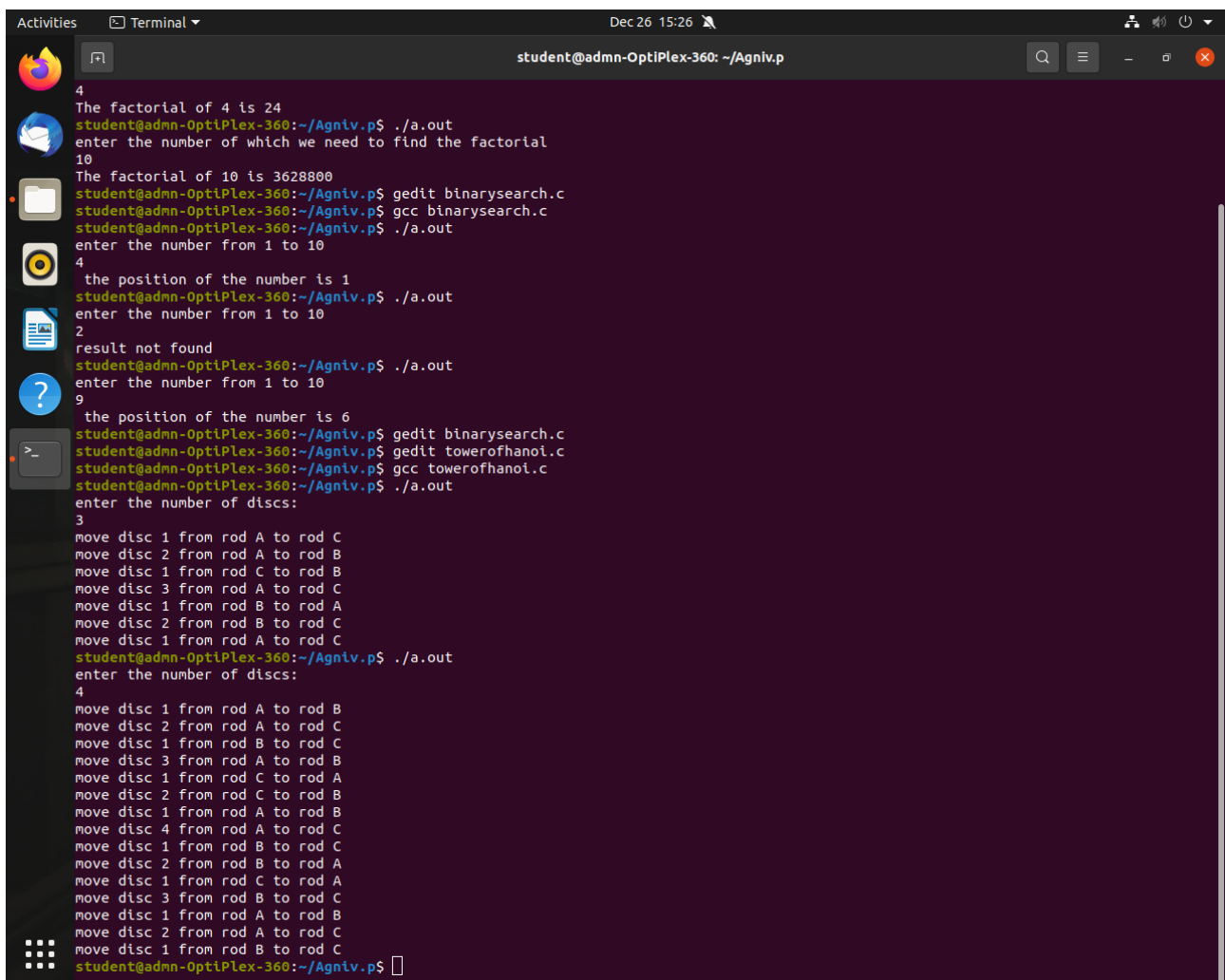
```c
}
towhan(n-1,from_rod,aux_rod,to_rod);   // n changed to n-1 and aux road and to rod is exchanged
printf("move disc %d from rod %c to rod %c \n",n,from_rod,to_rod); //print the statement
towhan(n-1,aux_rod,to_rod,from_rod);   // again we are calling the function
}

// main function starts from here
int main()
{
 int n;
 printf("enter the number of discs: \n");   // ask the user for number of disc
 scanf("%d",&n);
 towhan(n,'A','C','B');   // name the rods as A,B AND C
 return 0;
}
//END OF PROGRAM
```

OUTPUT