SNS COLLEGE OF ENGINEERING

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

# 19IT103 – COMPUTATIONAL THINKING AND PYTHON PROGRAMMING

❖ A readable, dynamic, pleasant, flexible, fast and powerful language

Recap:

1. Find a minimum in a list :
   - One way is to sort the list of elements in ascending order and get the first element as minimum.
   - Another method is to compare each element with other.
     - As an initial step, first element of the list is considered as minimum element.
     - And in each iteration, each element in the list is compared with the minimum.
     - If the element in the list is less than the minimum then swap both elements else compare with the next element in the list.
     - These steps are continued until the end of the list and finally print the minimum.

1.9.2 Tower of Hanoi :
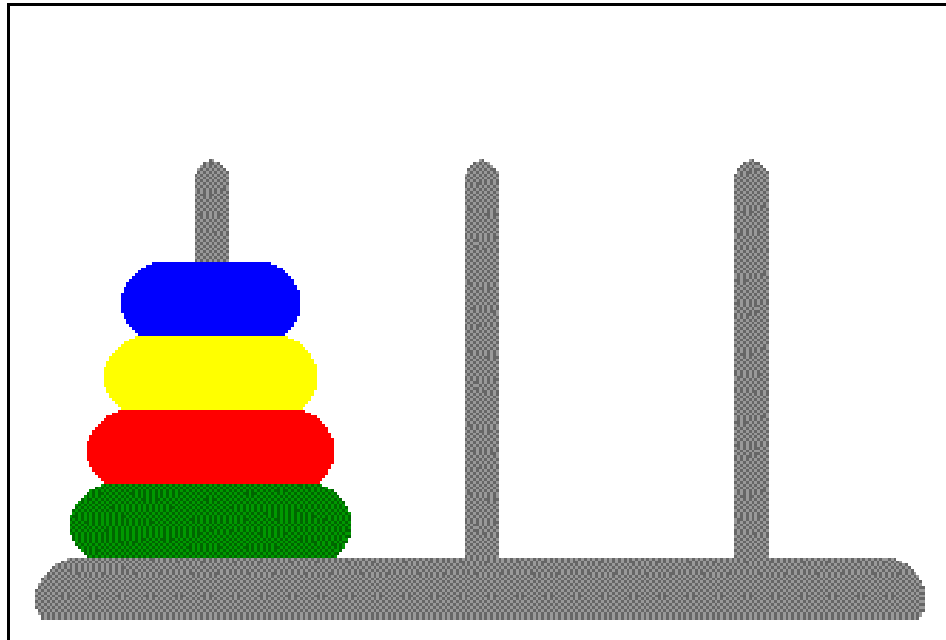
1.9.2 Tower of Hanoi :

- The mission is to move all the disks to some another tower without violating the sequence of arrangement.

- A few rules to be followed for Tower of Hanoi are :
  - Only one disk can be moved among the towers at any given time.
  - Only the "top" disk can be removed.
  - No large disk can sit over a small disk.

- Tower of Hanoi puzzle with n disks can be solved in minimum 2^n-1 steps.

1.9.2 Tower of Hanoi :

Python Code:

```python
# Tower of Hanoi

# one disk is tower A, destination is tower B, intermediate is tower C
print("Tower of Hanoi - with one disk")
source = 'A'
destination = 'B'
print("Move top disk from ", source, " to ", destination)
print()

# Two disk is at tower A, destination is tower B, intermediate in tower C
print("Tower of Hanoi - with 2 disk")
source = 'A'
destination = 'B'
temp = 'C'
print("Move top disk from ", source, " to ", temp)
print("Move top disk from ", source, " to ", destination)
print("Move top disk from ", temp, " to ", destination)
print()
```

1.9.2 Tower of Hanoi :

Output:

```
Tower of Hanoi - with one disk
Move top disk from  A   to   B

Tower of Hanoi - with 2 disk
Move top disk from  A   to   C
Move top disk from  A   to   B
Move top disk from  C   to   B
```

1.9.2 Tower of Hanoi :

Python Code:

```python
# In a recursive way

def tower_of_hanoi(n, fromTower, toTower, tempTower):
    if n == 1:
        print("Move top disc from ", fromTower, " to ", toTower)
    else:
        # Move n-1 disks from source to temp
        tower_of_hanoi(n - 1, fromTower, tempTower, toTower)
        # Move top disk from source to destination
        print("Move top disc from ", fromTower, " to ", toTower)
        # Move n-1 disks from temp to the destination
        tower_of_hanoi(n - 1, tempTower, toTower, fromTower)


n = int(input("Enter number of disks:"))
tower_of_hanoi(n, 'A', 'B', 'C')
```
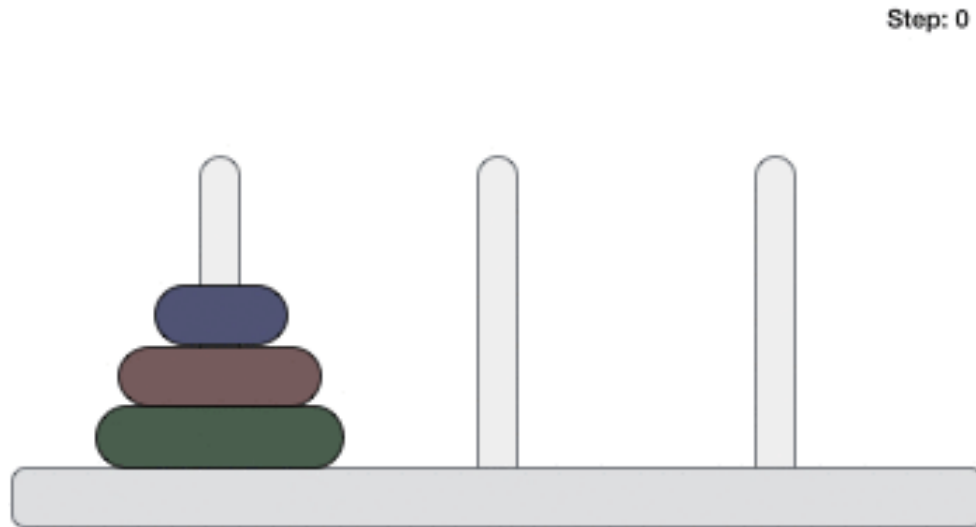
1.9.2 Tower of Hanoi :

Output:

Step: 0

1.9.2 Tower of Hanoi :

Output:

```
Enter number of disks:3
Move top disc from  A   to   B
Move top disc from  A   to   C
Move top disc from  B   to   C
Move top disc from  A   to   B
Move top disc from  C   to   A
Move top disc from  C   to   B
Move top disc from  A   to   B
```

Summary:

1. Guess an integer number in a range :

   - Shankar and Vijay are playing a game of integers.

   - Shankar chooses an integer of his choice in his mind. It can be any integer value within the range of 1 to 100.

   - Now, Vijay had to find that integer through some guesses.

   - Shankar can provides 3 hints to Vijay, each hint can be one of the below types:

     - Type 1 : Guess is Low

     - Type 2 : Guess is High

     - Type 3 : You guessed my number!

   - Now Vijay has to make some guesses in order to find Shankar's integer.

   - *Note*: Vijay is given only 10 chances to guess the number. If Vijay wins the game, then return **True** otherwise return **False**.

Summary:

2. Tower of Hanoi :

- Move all the disks to some another tower without violating the sequence of arrangement.

- Rules to be followed for Tower of Hanoi are :
  - Only one disk can be moved among the towers at any given time.
  - Only the "top" disk can be removed.
  - No large disk can sit over a small disk.

- Tower of Hanoi puzzle with n disks can be solved in **minimum 2^n-1 steps.**