# Case Study 4 Specification

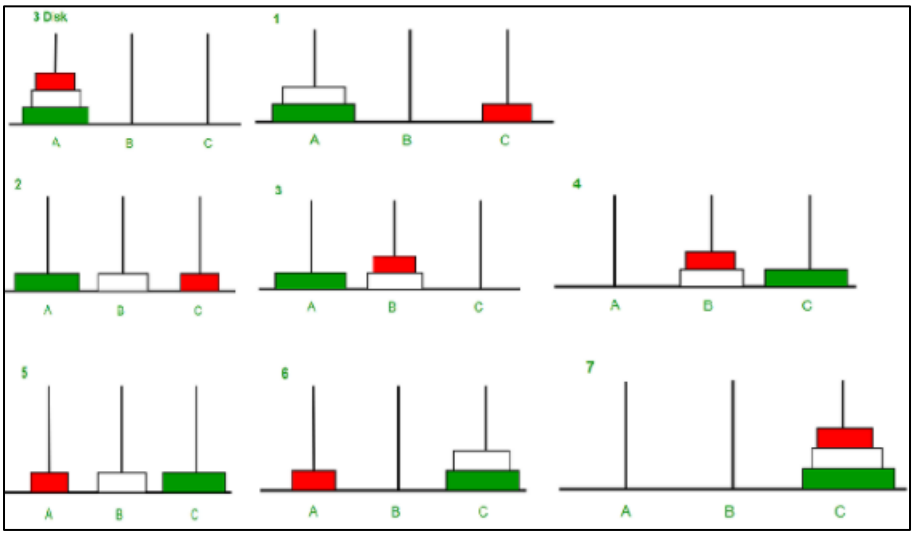
**Tower of Hanoi** is a mathematical puzzle where we have three rods and n disks. Three rods are named as source, auxiliary and the destination respectively. Rod which bears disks initially is called the source and the objective of the puzzle is to move the entire stack to the destination rod, obeying 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.

The rod in between source and the destination is called the auxiliary.

**Example**

If n=3, then the minimum number of attempts to move all 3 disks to the destination is 7. In the following example, the source, auxiliary and destinations are marks as A, B and C respectively.

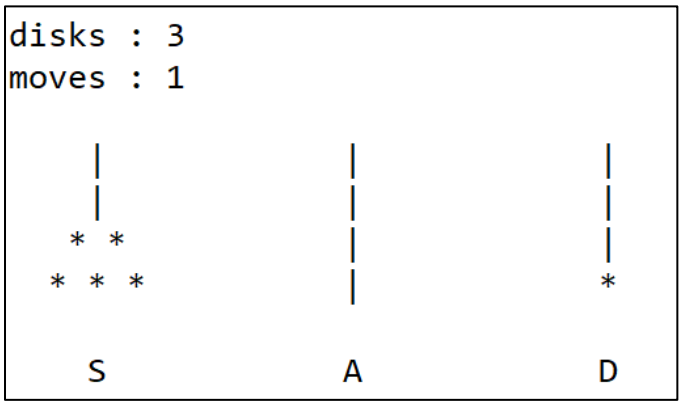



**Play**

Following features need to be designed and the player has the freedom to use.

1. First, the game needs to be introduced (mainly the rules). The player can start playing the game by entering the difficulty level.
   - *Expert: the player needs to be able to move all disks to the destination rod within minimum number of moves*
   - *Intermediate: the player can do the above movement within minimum number of movements + 3*
   - *Novice: the player has the freedom to move disks without any conditions (no limits for the moves)*
2. After the difficulty level selection, the game starts. Each time the player will be given a chance to enter the disk he/she wants to move along with the rod.

3. Each time the player executes a movement, output needs to be displayed. This needs to be continued until the player quit or the number of moves for the difficulty level exceeds. One sample output was given as follows.




4. At a given time stamp, the player should have the ability to go to the previous step or fast forward given number of steps. There after output needs to be displayed and the player will actively participate thereafter.
5. If the player is using the "expert" difficulty level, then for each move, the game needs to provide feedback which states the relevant move is right or wrong.
6. When the game ends, the player can complete the task before running out of moves. If the player uses "novice" difficulty level, disregard number of moves, the game ends when he/she completes the task. Of course, at any given time, the player can quit the game too.

**Tactics**

If you want to move all the disks to the destination rod in minimum number of moves, first you need to understand the pattern and then you need to follow the pattern. Otherwise, you will have to move the disks without a certain goal and end up with unplanned number of moves.

**Tasks**

1. Create a flow chart for the above scenario.
2. Create a pseudocode for the above scenario.