

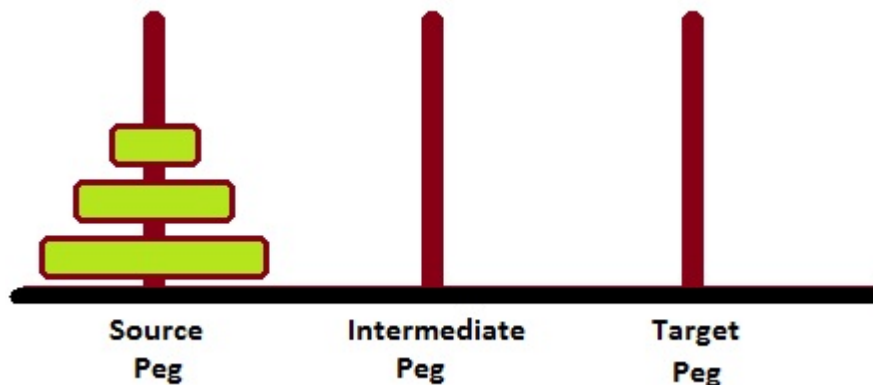
# Prolog - Towers of Hanoi Problem

AD

Towers of Hanoi Problem is a famous puzzle to move N disks from the source peg/tower to the target peg/tower using the intermediate peg as an auxiliary holding peg. There are two conditions that are to be followed while solving this problem –

- A larger disk cannot be placed on a smaller disk.
- Only one disk can be moved at a time.

The following diagram depicts the starting setup for N=3 disks.



To solve this, we have to write one procedure `move(N, Source, Target, auxiliary)`. Here N number of disks will have to be shifted from Source peg to Target peg keeping Auxiliary peg as intermediate.

For example – `move(3, source, target, auxiliary)`.

- Move top disk from source to target
- Move top disk from source to auxiliary
- Move top disk from target to auxiliary
- Move top disk from source to target
- Move top disk from auxiliary to source
- Move top disk from auxiliary to target
- Move top disk from source to target

## Program

```
move(1,X,Y,_) :-  
    write('Move top disk from '), write(X), write(' to '), write(Y), nl.  
move(N,X,Y,Z) :-  
    N>1,  
    M is N-1,  
    move(M,X,Z,Y),  
    move(1,X,Y,_),  
    move(M,Z,Y,X).
```

## Output

```
| ?- [towersofhanoi].  
compiling D:/TP Prolog/Sample_Codes/towersofhanoi.pl for byte code...  
D:/TP Prolog/Sample_Codes/towersofhanoi.pl compiled, 8 lines read - 1409 bytes written, 15  
yes  
| ?- move(4,source,target,auxiliary).  
Move top disk from source to auxiliary  
Move top disk from source to target  
Move top disk from auxiliary to target  
Move top disk from source to auxiliary  
Move top disk from target to source  
Move top disk from target to auxiliary  
Move top disk from source to auxiliary  
Move top disk from source to target  
Move top disk from auxiliary to target  
Move top disk from auxiliary to source  
Move top disk from target to source  
Move top disk from auxiliary to target  
Move top disk from source to auxiliary  
Move top disk from source to target  
Move top disk from auxiliary to target  
  
true ?  
  
(31 ms) yes
```

