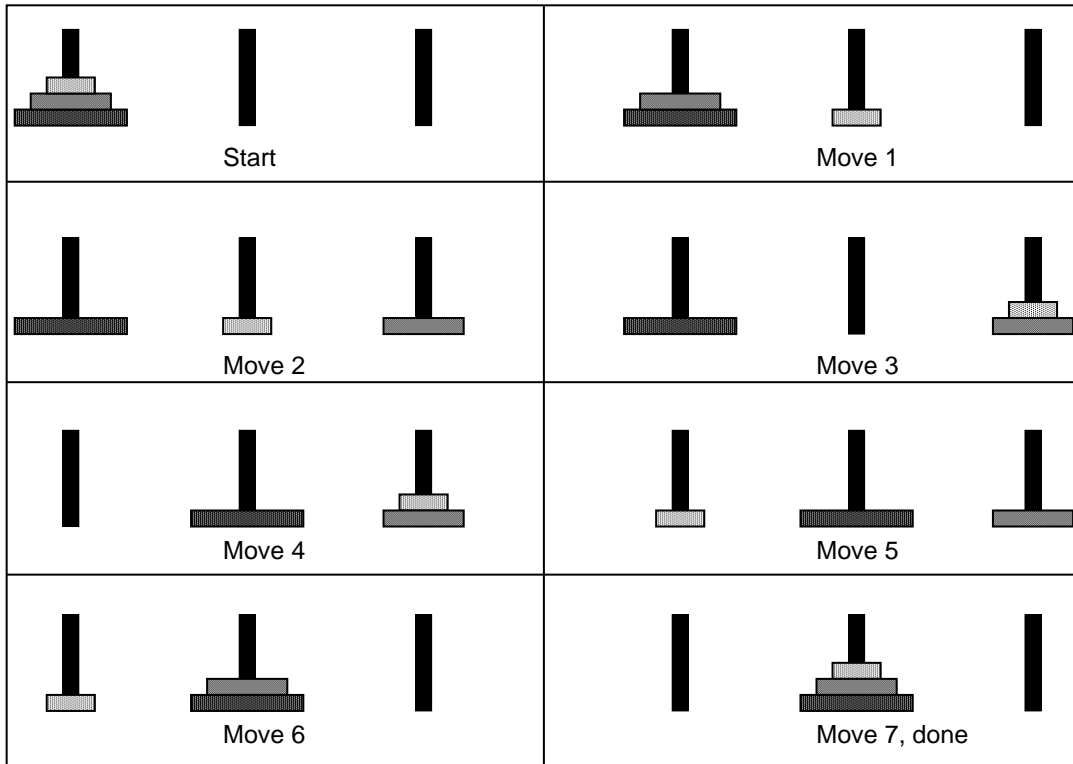


2003 Fall MSCS Exam – Algorithms

- The Towers of Hanoi is a simple game in which you have disks of different sizes, and three pegs on which you can place the disks. You cannot put a smaller disk onto a larger one, and you are allowed to move only one disk at a time. How many moves would it take to transfer 6 disks (stacked in order) from the first peg to the third peg? A figure for the movement of three disks is shown below.



- Suppose we implement quicksort, but instead of partitioning into two small groups, we partition into three. The Big-O complexity for merging three sorted lists is still $O(n)$. What is the (expected) Big-O complexity for this variation on quicksort?
- Give a short description of the complexity classes P and NP . What does it mean for a problem to be in each of these?
- Sketch pseudocode for Dijkstra's shortest path algorithm. What sort of data structure might be used to implement the priority queue?