P6. Polyomino Puzzle

[[홍원표 21701065]]

문제 분석

There is a shape (**not allowed to rotate**) which is a combination of one or more **1x1 square block**s. There are **at most 5** shapes. Each shape's height and weight, **h and w** respectively, are defined as 1 <= h <= 4, 1 <= w <= 4. The goal is to combine all shapes given to **build one square**. If the combination does not result a square, print 'No solution possible'.

문제 풀이

First of all, since the goal is to create a square, the length of **h and w must be square root of the number of total blocks used.** Second, since each shape **can't be rotated**, the **most top-left block of each shape does not change** no matter which position the shape is placed in the big square. Let us call the **big square S**, as a big array of h and w to be S[h][w]. Then, use **brute-force recursions** to try placing shapes to the big square, checking from left to right, from top to bottom of S. Place each shape, and find whether all block of the shape has fit inside of S. If successful, repeat the process with the next shape, until all shapes are used.

문제 풀이 분석

Let the height and weight of S be N. Note that the sum of all area of shapes will be N^2. Also, let the number of shapes be M. Considering the worst case for the process of 'fitting', (for example, the order of shapes to fit in was complete opposite..!) would be M!. The checking process will have to check for all blocks of the shapes which is N^2.

Time Complexity: O(M! * N^2)

Since the space for S is required as well as all shapes, Space Complexity: **O(N^2)**

Discussion

- If there was a problem with equal requirements of this Polyomino Puzzle, except if each shape can be rotated, how would we able to approach the problem?
- If there was a problem with equal requirements of this Polyomino Puzzle, except the goal is not to make a square but any kind of 'rectangle', how would we able to approach the problem?