

# FizzBuzz Rotate Matrix Problem

February 1, 2018

## Question

Given an image represented by an  $N \times N$  matrix, where each pixel in the image is 4 bytes, write a method to rotate the image by 90 degrees. Can you do this in place? (Question 1.7, Cracking the Coding Interview by Gayle McDowell)

## Explanation and Algorithm

Before you create the code, think about the problem in a series of logical steps. Draw out a  $4 \times 4$  matrix, and trace what happens to each box as it is moved ninety degrees. Notice that boxes in the top most row get moved to the right most column, the boxes in the right most column get moved to the bottom most row, and the boxes in the bottom most row get moved to the left most column. Also observe that it makes the process more efficient to work in layers. Work from the outermost layer into the inner most layer.

(Question 1.7, Cracking the Coding Interview by Gayle McDowell)

## Hints

1. What type of data structures will we need to rotate this  $4 \times 4$  matrix?
2. Think in terms of what kind of variables you will need. A temp variable will be helpful.
3. Think about how to write code to traverse the array.
4. Then swap items of the array out with one another.

## Code

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```
/* Code */
```

```

boolean rotate(int[] [] matrix){

    if (matrix.length == 0 || matrix.length !=matrix[0].length) return
        false;

    int n = matrix.length;

    for (int layer = 0; layer< n/2 ; layer++){

        int first = layer;
        int last = n - 1 - layer;
        for (int i = first; i<last; i++){
            int offset = i - first;

            int top = matrix[first][i]; //save top

            //left -> top
            matrix[first][i] = matrix[last-offset][first];

            //bottom -> left
            matrix[last-offset][first] = matrix[last][last-offset];

            //right -> bottom
            matrix[last][last-offset] = matrix[i][last];

            //top -> right
            matrix[i][last] = top; //right<- saved top
        }
    }

    return true;
}

// (Question 1.7, Cracking the Coding Interview by Gayle McDowell)

```

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## Run time analysis

This runs in  $O(N^2)$  time, because it must traverse every element of the matrix.