CS 121 **Programming Assignment #1**
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August 27, 2012 **Due:** September 5, 2012

Objective: Refresh array manipulation skills and practice the basics of software design. Recall from CS 120 that top-down design is a problem-solving method in which the programmer breaks a problem up into its major subproblems and then solves the subproblems using techniques such as stepwise-refinement to derive the solution to the original problem. A structure chart is a documentation tool that shows the relationships among the subproblems of a problem. All subproblems should translate *directly* into functions used by the final program.

Program Description: The program will read in a file containing the number of rows and columns stored in the file (one line), followed by one row of data per line. After storing the image (data) in an array, the array will be rotated to both the left and right.

Requirements: Your program (modular) must perform the following operations:

- Read the image data file size (rows, columns).
- Allocate image array *dynamically*.
- Read (and store) the image data file.
- Rotate the array to the right and display it.
- Rotate the array to the left and display it.

NO global variables may be used in your program.

Sample:

Input:

```
 4  4
 1  2  3  4
 5  6  7  8
 9 10 11 12
13 14 15 16
```

Output (rotated to right):

```
13  9  5  1
14 10  6  2
15 11  7  3
16 12  8  4
```

Output (rotated to left):

```
 4  8 12 16
 3  7 11 15
 2  6 10 14
 1  5  9 13
```

Deliverables:

- Program—fully documented.
- A program design—A structure chart and a description of all functions needed to implement your program.
- Programming Log:
  - Record the time required to design and implement your program.
  - Record of things you encountered/learned while implementing your program.
- Output—proof that your program worked.
  Data files will be posted on the forum/class web page for your final program.