CSCI 2270 Data Structures and Algorithms
Summer 2014
Instructor: Hoenigman
Assignment 1
Due Sunday, July 13, by 5pm

# It's like Craigslist, only different

In this assignment, you're going to develop a simulated community message board that monitors items *wanted* and items *for sale* and looks for matches. When a match is found, e.g. there is a bike for sale for $50 and a bike wanted, where the buyer will pay up to $60, then the item is removed from the message board.

There is a file on Moodle called *messageBoard.txt* that includes 100 wanted or for sale items in five categories: bicycle, microwave, dresser, truck, or chicken. Your program needs to open the file and read each line. Each item should be stored in an array of struct objects, where each object has a type, such as bicycle, a price, and whether it is for sale or wanted. (You can treat for sale or wanted as an integer or Boolean, where 0 is for sale and 1 is wanted, for example.) The object array represents the message board.

As lines are read from the file, representing new items being posted to the message board, compare the item to existing items in the object array to search for a match. If a match is not found in the array, add the item to the array at the first unused position, e.g. if there are four items, add the item to position five. If a match is found, do not add the new item to the array and remove the matched item that is already in the array. Shift the array to fill the gap left by the removed item. Write the action performed to a file, such as *Bicycle, $50*. The formatting of the message is up to you, but needs to include the object and the price.

**Other things your program needs to do**
Include a function that will print out the state of the message board at any time. The function parameters and return values are at your discretion, but the function needs to be able to be called at any point in your program and correctly print the contents of the array.

Count operations, where an operation is defined as any step in the program that scales with the number of data points. For example, each read from the file is considered an operation because the file size can change. Searching the message board is also considered an operation because the size of the message board will change as items are added and removed. Processing each column that is read from the file is only one operation because the number of columns is constant for all lines in the file.

For example, after reading the first line in the file, your counter should be at the value 2: 1 for the read from the file, and 1 for adding the item to the struct array.

When the first sale occurs, all operations to complete the sale should be the sum of: 1 for the read from the file, *x* for the number of steps it takes to find the matching item, 1 for removing the item from the object array, and *y* for each shift in the contents of the array.

**Submitting Your Code:**
Submit your .cpp file through Moodle as Assignment 1. Make sure your code is commented enough to describe what it is doing. Include a comment block at the top of the .cpp file with your name, assignment number, and course instructor.