For Practice Assignment 05, the algorithm I chose to use is called Radix Sort. In Radix Sort, the algorithm finds the largest integer in the array in order to determine what the maximum amount of digits there are for each integer. For example, if the largest integer is 4328, then the maximum number of digits is 4.

After the maximum number of digits is found, the algorithm implements Count Sort. This is a sorting algorithm that counts how many of each digit (from 0-9) there is in the array and then sort the numbers in ascending order. For Radix Sort, Count Sort needs to be implemented multiple times: once for each digit in the integer. Count Sort starts with the ones digit in the integer and ends at the leftmost digit in the integer, which in this case is the thousands. Finally, Radix Sort does not happen in place, so the sorted array needs to be copied back into the original array.

I chose to use Radix Sort instead of Quick Sort after comparing the running times of each algorithm. Going into the assignment, I knew that the number of values I would be sorting is 1,000,000. The running time of Quick Sort is n*lg n, whereas the running time of Radix Sort is d*n, where d is the largest number of digits a value has in the array. So for Quick Sort, the running time would be 1000000 * lg(1000000) versus Radix Sort's running time of 4*1000000.