

CS 0445 Spring 2026 Recitation Exercise 7

Introduction:

In lecture we discussed iterative binary search and recursive binary search and said that generally speaking an algorithm implemented iteratively will be faster than the same algorithm implemented recursively, due to the overhead associated with the multiple recursive calls. In this exercise we will test that hypothesis by empirically comparing iterative and recursive binary search.

In order to minimize the impact of other factors on the run-time (ex: allocation of objects from the heap) we will use binary search on an array of int rather than a generic version. In order to lower the variance from random number generation, we will use a seed with the random number generator so that we can select the exact same numbers for the array contents and for the search values in any given run. Most of this test program is already written and provided for you in file Rec7.java. Read over this file carefully, including all of the comments to see what it does. The method to actually run and time the tests is left for you to complete:

```
public void runTest(int algo)
```

Complete this method to actually execute the runs and output the results, following the requirements stated in the comments and giving output in the same format as the sample output provided in file Rec7Out.txt.

Note: The empirical timing for this program is similar to that used in Recitation Exercise 5. If you are having difficulty figuring this out, see the posted solution for Recitation Exercise 5 on Canvas.

Once you have the program working, compare your search algorithms in the following way:

Test both algorithms using the same seed with the same array size for each and the same number of searches. To see how they increase try the following for both algorithms:

Array size: 1000000, 2000000, 4000000, 8000000

Searches: 1000000

As usual, if you are able, please volunteer to demonstrate and explain your solution to the rest of your class at the end of recitation. Also be ready to talk briefly about your results and whether or not the empirical tests support our hypothesis.