

Homework 7

Data Structures II

Selection Problem

Due Monday 8th November, 5 pm on Sakai and Github

We discussed the Selection problem on Thursday. The selection problem asks to find the kth largest element in a collection. For instance, if the collection has {1,5,10,7,3,2,17,18} and k=4 then the 4th largest will be 7. You will implement three algorithms we discussed in class. You will also implement using the generic type E assuming it implements Comparable. You can use any of the code we developed in class (heap, list etc) or use standard java.util.* library. Either way is acceptable. The algorithms are described in Chapter 6 pages, 258 and 259 of the print edition of the book. In the pdf, they are on pages 238 and 239. The algorithms are named 1B, 6A and 6B and we discussed them in class.

Your Java class will be defined as below

```
public class Selection <E extends Comparable<E>> {  
  
    int k;  
  
    ArrayList<E> input ; // this holds the values of type E from which your code will find kth largest.  
  
    // constructors  
  
    // algorithm 1 methods -- implement 1B  
  
    // algorithm 2 methods -- 6A -- change the algorithm to do kth largest not kth smallest that is  
    described here  
  
    // algorithm 3 methods -- 6B  
  
}
```

Second part is to test your code with an integer collection containing 10 million random integers and set k= 1 million. Find the one that performs the fastest by timing the results, report out the results.

For submission purposes on Sakai and GitHub, submit Java class files, and performance results (in the form of Word /pdf doc).