Instructions

Your friend wants a suitable data structure for the following task involving n distinct numbers.

Step 1: The n numbers will be provided (in some random order) and should be stored in the data structure.

Step 2: A series of m queries (m much larger than n) will be performed, where at least c.m of these queries will be for one of the numbers x provided in Step 1. (Here, $0 < c < 1$ is a constant, independent of n).

The required data structure must ensure that the amortized cost of each search for x is O(1), where the hidden constant can depend on c.

Your task is to experimentally convince your friend that splay trees can be an appropriate data structure. (Note: There is a theoretical justification, but your friend does not understand the maths involved!)

You can use this Java implementation of splay trees as a starting point.

Your whole assignment can be in Java, if you like.

Or, you can translate that implementation into another language (e.g., Python) -- if you do this, consider contributing it to the GitHub repo linked above.

For evaluation, our TAs will be "your friend" -- you will have to convince them on Fri Nov 8.

PROF