

Name: _____

Comp 15, Summer 2019

In-Class Activity 3

We will use the CS homework server for this activity. Let's move to the lab!

In this activity, you will perform an empirical analysis of three programs, **a**, **b**, and **c**. Each of the three programs performs the exact same operations, but they each use a different data structure to do so. First, 1,000,000 items (integers between 0 and 999,999, in ascending order) are put in a container; then, the user can retrieve the *i*-th item (0-based) from the container one at a time. The program prints out the value retrieved, which should be the same integer, *i*, that you typed in, and the elapsed time (time it took to access that integer from the data structure).

Your job is to figure out what data structure is used as the container in each program.

The files are under: **/comp/15/files/a3**

- First, take a look at the **test.cpp** file to see what the program does. "?????" at Line:4 and Line:8 hides the type of the data structure the program uses. The operation we care about is at Line:18 - namely, to retrieve the *i*-th item in the container.

- To run one of the programs, type one of the followings:

```
$ /comp/15/files/a3/a #to run Program a
$ /comp/15/files/a3/b #to run Program b
$ /comp/15/files/a3/c #to run Program c
```

- To end the program, type anything other than integer numbers between 0 and 999,999.
- Your job is to complete the following tasks:
 - 1) Plot the elapsed times you observed on the next page, in which the x-axis is *i*-th number and the y-axis is time.
 - 2) Find which data structure is used as the container in each of the three programs.
 - 3) Write how would you explain to a person over the phone about the decision-making process you took.

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