# CS 211 Lab #10: Experimenting with HashTables

This lab is less like a typical computer science lab and more like a typical biology of chemistry lab in which you are reporting the results of experiments. In this lab, you must report on the following:

## HashTable Benchmarks

You begin by writing three benchmarks that will serve as the foundation of the following tasks. I suggest writing one benchmark that adds a bunch of random items to a hashtable, one that removes a bunch of random items from a hashtable, and one that attempts to find random items in a pre-filled hashtable.

## Part #1: Hashing Functions

Write at least three hashing functions (see SimpleStringHasher as a reference). Report the performance of each hashing function below:

|  |  |  |
| --- | --- | --- |
| Hashing Algorithm | Data Structure | Speed |
| SimpleStringHasher | BucketHashTable |  |
| SimpleStringHasher | LinearHashTable |  |
| SimpleStringHasher | QuadraticHashTable |  |
| SimpleStringHasher | DoubleHashTable |  |
| Your hashing attempt #1: | BucketHashTable |  |
| Your hashing attempt #1: | LinearHashTable |  |
| Your hashing attempt #1: | QuadraticHashTable |  |
| Your hashing attempt #1: | DoubleHashTable |  |
| Your hashing attempt #2: | BucketHashTable |  |
| Your hashing attempt #2: | LinearHashTable |  |
| Your hashing attempt #2: | QuadraticHashTable |  |
| Your hashing attempt #2: | DoubleHashTable |  |
| Your hashing attempt #3: | BucketHashTable |  |
| Your hashing attempt #3: | LinearHashTable |  |
| Your hashing attempt #3: | QuadraticHashTable |  |
| Your hashing attempt #3: | DoubleHashTable |  |

## Part #2: Load Factor

Using your fastest hashing algorithm, experiment using 3 different load factors per hash table. You can alter the load factor for each hashtable by altering the constant decimal in the equation found inside each needsResize function.

|  |  |  |
| --- | --- | --- |
| Data Structure | Load Factor | Speed |
| BucketHashTable |  |  |
| BucketHashTable |  |  |
| BucketHashTable |  |  |
| LinearHashTable |  |  |
| LinearHashTable |  |  |
| LinearHashTable |  |  |
| QuadraticHashTable |  |  |
| QuadraticHashTable |  |  |
| QuadraticHashTable |  |  |
| DoubleHashTable |  |  |
| DoubleHashTable |  |  |
| DoubleHashTable |  |  |

## Part #3: Optimal Hashtables

Report the optimal configuration for each hashtable:

|  |  |  |
| --- | --- | --- |
| Data Structure | Load Factor | Hashing Algorith, |
| BucketHashTable |  |  |
| LinearHashTable |  |  |
| QuadraticHashTable |  |  |
| DoubleHashTable |  |  |