

CSCI 230 -- PA 1

Basic Hashing

Feel free to discuss and help each other out but does not imply that you can give away your code or your answers! Make sure to read all instructions before attempting this lab.

You can work with a lab partner and each one must submit the same PDF file (include both names in the submission file). Each person must include a brief statement about your contribution to this assignment.

You must use an appropriate provided template from Canvas and output "Author: Your Name(s)" for all your programs. If you are modifying an existing program, use "Modified by: Your Name(s)".

Exercise 1 – Use C++ STL **map** or Java **HashMap** to store the following integer keys: 13 21 5 37 15 (reverse the key and use it as a string for the value part so first entry would be <13, "31">). Perform the following operations to make sure it is working properly: search for 10 and 21, remove 20, 37, and then search for 37.

Input data file *small1k.txt*, containing a list of 1,000 integer values, to an array and then insert all the pairs <int, reverse key as string> to a new hash map. Collect the time it took to insert 1,000 pairs of values to the hash map and output the time to the screen.

Input data file *large100k.txt*, containing a list of 100,000 integer values, to an array and then insert all the pairs <int, reverse key as string> to another new hash map. Collect the time it took to insert 100,000 pairs of values to the hash map and output the time to the screen.

Exercise 2 – Put together the C++ **HashMap** in the book (Chain Hashing; may want to eliminate the third template parameter and add a hash function) or Java **ChainHashing** (Java book) with N = 11 and test it out with the same data and test cases from above. You might want to come up with all relevant test cases to confirm that C++ HashMap or Java ChainHashing is working correctly.

Question 1: Do collected times for exercise 1 make sense? Explain why or why not.

Question 2: Explain the differences between separate chaining and open addressing.

Extra Credit: Add code to the second exercise to process the two data files and collect the two times like exercise 1. Compare the two times with exercise 1.

Fill out and turn in the PA submission file for this assignment (save as PDF format).