

Assignment 9
CIS 2168 (Section 001)
Fall 2023
Instructor: Shuvra Chakraborty
Total points: 100

Objectives

In this assignment, you will work with

- HashMap
- HashSet
- TreeMap
- TreeSet
- Hashing with linear and quadratic probing
- Hashing with separate chaining

This assignment contains coding (problem 1) and report (problem 2 and 3) parts. You will submit both in a single zipped folder.

Problem description 1 (50 pts)

Consider the Set and Map class participation activity in course Canvas shell.

- 1) Solve the same problem using TreeMap and TreeSet.
- 2) Compare the following with respect to the given problem.
 - a) HashMap and TreeMap.
 - b) HashSet and TreeSet.

Submit the coding solutions. You should include the comparison in the report.

Problem description 2 (20 pts)

Suppose your hash table size is 7. Insert 76, 40, 48, 5, 55, 47 one by one sequentially in the hash table. Resolve the collisions using a) linear probing, b) separate chaining, and c) quadratic probing. Show the load factor of hash table for each step.

Summarize your findings for problem description 2.

Problem description 3 (20 pts)

Suppose your Hash table size is 13. The hash function is given as

$$h(k) = k \% 13$$

Insert 18, 41, 22, 44, 59, 32, 31, 73 one by one sequentially in the hash table. Resolve the collisions using a) linear probing, b) separate chaining, and c) quadratic probing. Show the load factor of hash table for each step.

Summarize your findings for problem description 3.

Submission Instruction

The assignment should be submitted through the available link on course Canvas shell. The assignment rubric is as follows:

1. Source code and demonstration [90 points]:

Provide the source code in zip file. Each file should have proper comments (e.g., explanations for methods, class and so on). It will be graded based on accuracy (e.g., program execution), clarity of the necessary comments, and short demonstration as instructed by TA or instructor. If the assignment contains report part, include that in the zipped file.

2. Status.txt [10 points]:

In this text file, you need to report:

- The status of your program (completed or not; partial credit will be given even if the program is not completed).
- The design of your program (what and how the objectives have been accomplished).
- Support and advice (if any) you get from TA and/or your classmates.
- Comments and suggestions to improve this assignment.

- If you have completed the extra credit part [if any], mention it explicitly.
- If you are doing late submission, you should mention the number of days you are late since the due date. According to our policy, for N days of late submission, you get a deduction of $N \times 3$ points per day even if your submission completes all the requirements. That said, if you are late for 5 days, your maximum point can be up to 85 out of 100.

Please have the source codes and status files zipped into a single file DSAssign9-
LastnameFirstname.zip and upload the file on Canvas.