

CSCI-1200 Data Structures — Fall 2025

Lab 9 — Maps

Checkpoint 1

estimate: 10-20 minutes

Download this provided code for Checkpoints 1 & 2:

http://www.cs.rpi.edu/academics/courses/fall25/csci1200/labs/09_maps/phonebook.cpp

This code implements a simple caller ID program. This program could be used by a university or company to perform a “reverse lookup” — given the 4 digit phone number extension, return the name of the caller. A vector of strings stores the complete database of names assigned to phone number extensions. Compile and run this program. Add your own test cases to the main function.

Analyze the computational cost of this program using the big O notation in terms of n the number of assigned phone numbers in the phonebook, and N the largest possible phone number (number of different possible phone numbers). What is the running time of constructing the phonebook and of the add and identify functions? How much memory is used by this program? Express this using big O notation. What would happen if you extended this to a 7- or a 10-digit number? Would it be functional and efficient on a phone with limited memory?

To complete this checkpoint: Present your analysis of the original program to a TA/mentor.

Checkpoint 2

estimate: 10-20 minutes

Rewrite this program to use maps, storing only the numbers that are assigned. Analyze the cost of creating the map, and of the add and the identify functions. Test it on 7 digit numbers. In what ways is the vector version better and in what ways is the map version better?

To complete this checkpoint: Demonstrate your revised & debugged program and be prepared to discuss the analysis of this version with a TA/mentor

Checkpoint 3

estimate: 60 minutes

Checkpoint 3 will be available for download from the Submittity
Course Materials page at the start of Wednesday’s lab:

https://submittity.cs.rpi.edu/courses/f25/csci1200/course_materials