

## COSC-211 Midterm 2 Review

Imagine that you work for a library, and your job is to write a program, called `Library`, to keep track of the books. Specifically, your program should keep track of:

1. For all books that currently have at least one copy physically in the library, how many copies are physically in the library?
2. For all books that currently do not have any copies physically in the library, who has checked out each copy?

You decide to write this program by using a pair of dictionaries—one for books that are in the library, and one for books that aren't in the library. Your first design choice is to decide what the keys and values should be for each dictionary.

You want both dictionaries to support the usual `add`, `lookup`, and `remove` operations, but unlike the examples we discussed in class, now we need to manage not only the keys but also the associated values. Your job is to figure out how to do this.

**1. Implementing dictionaries.** Pick your favorite dictionary implementation: hash tables, (unbalanced) binary search trees, or a single linked list (we didn't actually talk about implementing a dictionary using a linked list: how would you do it?). (Note: "favorite" here probably should mean the data structure you feel least comfortable with and most want to review!) For the implementation that you chose, determine how you would modify the `add`, `lookup`, and `remove` methods to handle modifications to the values. Try to do this without looking at your notes: this will be the best way to determine the extent to which you remember what the original, unmodified data structures did!

**2. Using Dictionaries.** Write the following two methods to add to the `Library` class:

1. `checkout(String title, String name)`: This method runs when someone named `name` checks out the book with title `title`.
2. `return(String title, String name)`: This method runs when someone named `name` returns the book with title `title`.