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6-2 Project 1

| **Action** | **List (Vector)** | **Quick Lookup (Hash Table)** | **Organized Tree (Binary Search Tree)** |
| --- | --- | --- | --- |
| Load Courses from File | Slow (O(n)) | Slow (O(n)) | Slow (O(n)) |
| Find a Course by Number | Very Slow (O(n)) | Super Fast (O(1)) | Fast (O(log n)) |
| Sort and Print Courses | Slow (O(n log n)) | Medium Speed (O(n)) | Fast (O(n)) |

**Speed Comparison**

From this speed test, I believe that the binary search tree is the best option for the program. It can organize the courses in a way to find them quickly. The Hash table is quick for searching, but unfortunately does not keep the courses all sorted. That would make it l ess productive, especially since it won't list them in order.

**File Handling:**

function loadFile(String filename)

open the file while the file is not fully read

read a line

break the line into courseNumber, courseTitle, and prerequisites

if the format is correct

create a Course object with courseNumber, courseTitle, and prerequisites

add the Course object to the data structure (e.g., list, hash table, tree)

else

print "Error: Invalid format in line"

close the file

**Creating a Course:**

function createCourse(String courseNumber, String courseTitle, List<String> prerequisites) create a new Course object

set newCourse's courseNumber to courseNumber

set newCourse's courseTitle to courseTitle

set newCourse's prerequisites to the given list of prerequisites

return newCourse

**Printing Course Info:**

function searchCourse(Tree<Course> courses, String courseNumber) {

if the tree is not empty

search for courseNumber in the tree

if the course is found

print the course title and course number

for each prerequisite in the course’s prerequisites {

print the prerequisite course details

else

print "Course not found"

**Menu Options:**

function displayMenu()

print "1: Load course data"

print "2: Show all courses"

print "3: Show course details and prerequisites"

print "9: Exit"

get user choice

if choice is 1

call loadFile function

else if choice is 2

call printAllCourses function

else if choice is 3

call searchCourse function

else if choice is 9

end program

**Sorting and printing the Courses:**

function printAllCourses(Vector<Course> courses)

sort the courses by course number

for each course in the list {

print the course number and title