**CSCE 2014 – Programming Project Report**

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**Academic Integrity Statement:** I pledge that I have neither given nor received unauthorized help on this programming assignment.

**Problem Statement:**

* The goal of this program is to test the efficiency of different search and insert methods between linked lists, vectors, and vectors using binary search.
* The inputs are different books from Project Gutenberg.
* The program outputs the time it requires to find every unique word in each of the books using all three methods.
* I included error checking to make sure the file that I am looking for exists.

**Design:**

* Describe the design decisions you made.
* I used the same linked list as project 3, and used a c++ Vector in order to compare efficiency.
* I used a linear search/insert, and a binary search/insert.
* The linear search and insert are much easier to implement, but the binary search and insert are much faster depending on CPU architecture. Using a vector vs. a linked list can much faster even using linear methods depending on CPU architecture.

**Implementation:**

* Describe your implementation process.
* I started with the code of Project 3, which implemented Dr. Gauch’s list 6.
* I extended this code by adding a separate class that used a Vector to also store all the words in the book.
* I started by implementing the linear search and the Vector class. After I tested that, I implemented the binary search and insert. After doing that, I did a lot of testing to make sure the times lined up with what should be happening.

**Testing:**

* I tested my program with many different books.
* The normal tests were books that existed.
* The specials cases prompted reading books that did not exist.
* Everything worked as expected except for the runtime benefits from the different methods. It seems like something about the Visual Studio(not VS code) C++ compiler made the binary method not increase performance as much as when compiling with G++. If I had to guess, it is most likely being compiled as Debug instead of Release.

**Conclusions:**

* This project was a success! It is very interesting to see the differences in speed between linked lists, vectors, and vectors using binary search/insert. I think that as long as the program is compiled with g++, it will show how big a difference in speed this can be.
* I think I would make sure I knew about the differences in compilers.
* The project took around 2 to 3 hours to complete, but I talked to Dr. Gauch extensively about the performance. This probably took up at least 30 minutes if not an hour over all the times we talked about it.
* This section should be 1 paragraph long.