Lab 4

Due 11:59pm, 7 March

Handout 5
CSCI 136: Spring, 2005
28 February

Comparators Are My Favorite Sort of Vectors

1 Short Answers

Bring answers to the following questions to lab on Wednesday.

1. From the book:

   4.20
   4.23
   5.3
   5.4
   5.6

2. Write a recursive method `digitSum` that takes a nonnegative integer in return for some of its digits. For example, `digitSum(1234)` returns $1 + 2 + 3 + 4 = 10$. Your method should take advantage of the fact that it is easy to break a number into two smaller pieces by dividing by 10.

2 Lab

Do the laboratory at the end of Chapter 5. You should plan on using either MergeSort or QuickSort and think about how you will modify the algorithm to use `Comparators` instead of base types or `Comparables`. Chapter 5.7–5.9 discusses `Comparators` and how to use them. Come to lab with a sketch of what will be modified.

Be sure to test your Vector thoroughly before going on to the next part 3.

For part 3 of the lab, you are to write a program that reads Williams College phone book data into a Vector and then answers some questions by sorting it with `Comparators` applied to the student entries. To start, copy the file

`/Network/Servers/cortland.cs.williams.edu/Volumes/Courses/cs136/lab4/pbook`

to your lab4 directory. That file contains student entries, represented by three lines, and separated by a line of dashes:

```
Aamir U Wyne
Poker Flats B5
4135973427 3334 5406394821
-----------------
Stephen Freund
Southworth Apartments
4135974260  1234 4134581308
-----------------
...
```

The first line is the name of the student, the second is their campus address, and the third contains the campus phone, su box, and home phone. You should read in the phone numbers as `longs` rather than `ints`, because integer variables cannot store numbers greater than about 2 billion due to how they are represented inside the computer.

Your program should print out answers to at least four of the following questions:

1. Which student appears first in a printed phone book?
2. Which student has the smallest SU box? Largest?
3. Which student has the most vowels in his or her full name? (You may ignore "Y"s when counting vowels.)
4. Which students share the most-shared phone number?
5. What are the ten most common area codes for student home phone numbers, in decreasing order?

There are many ways to answer the last two questions- most will require using a secondary data structure, such as a Vector (with a new Comparator) to aid in the processing.

3 Deliverables

When you are finished, create and submit a tar file `lab4.tar` that includes the following:

- Your well-documented source code for all Java files used.
- A `README` file that includes 1) a description of what is in each Java file, 2) the answers to the questions about the data, and 3) answers to the two thought questions from the text.

To create a `tar` file, use the "`tar`" command to archive the full contents of a directory into a single file. For example, the command `tar -cf lab4.tar lab4dir` creates a file called `lab4.tar` containing the full contents of the directory `lab4dir`. You can then run `turnin -c 136 lab4.tar` to submit the tar file.