

This is the final lab for A290/A590 - C++. Its goal is to assess whether you have learned the important topics of the class. Basically, can you read a class description and define said class, and can you write a function given nothing but the description of its functionality.

Assigned: 12:00, 29 April 2009

Due: 12:00, 30 April 2009

NO EXTENSIONS

1. Define a class for floating point values. This class should be able to return both the integral portion and the decimal portion independently. Define the usual operators (+, -, *, /, %, =, +=, -=, *=, /=, %=, <, <=, >, >=, ==, >>, <<). Also, add a function floor which returns the floor of the value, ceiling which returns the ceiling.

This can be done quite easily by cleverly taking advantage of inheritance.

2. Define a class called metrics, which stores pairs of values. These values can be thought of as cartesian coordinates. Define the =, ==, <<, >> operators, as well as the following functions:
 - The standard Euclidean distance between two points (straight line).
 - Something called the taxicab metric. This measure of distance is defined as the distance along the Y axis plus the distance along the X axis. This can be thought of as the distance a taxi in Manhattan would traverse between two points.
 - The discrete metric, which is defined as 0 if the points are the same, 1 otherwise.

3. Using [names.txt](#), a 46K text file containing over five-thousand first names, begin by sorting it into alphabetical order. Then working out the alphabetical value for each name, multiply this value by its alphabetical position in the list to obtain a name score.

For example, when the list is sorted into alphabetical order, COLIN, which is worth $3 + 15 + 12 + 9 + 14 = 53$, is the 939th name in the list. So, COLIN would obtain a score of $938 \times 53 = 49714$.

What is the total of all the name scores in the file?

Hint: use a sorted STL container, or the STL sort algorithm, and remember that you can subtract char types.

To get the file on the burrow quickly and easily, use wget or curl (check the man pages for how to use these utilities).