

COP 3503 Homework #1: SGA President

Filename: destroy.java

Time Limit: 2 seconds (per input case)

Standard Input, Standard Output

Liam and Sathwika are enjoying being TAs for COP3503, but they have decided to aim for higher goals, like running for SGA President and Vice President. Unfortunately, they have realized that with tickets from the previous election such as Josh/Jad and Brad/Breon, they have no hope of winning because all winning tickets must have two distinct names that start with the same first letter, so Liam and Sathwika just won't do.

Naturally, Liam was despondent about this revelation and to make himself feel better came up with a problem for all of the Computer Science 2 students. Given the names of each student at UCF, Liam wondered how many potential winning pairs for SGA President and Vice-President there might be. In order for a pair to have the potential to win, their names must be different but start with the same first letter. Since President and Vice President are different roles, we count the ticket of Josh and Jad differently than the ticket of Jad and Josh. (The first name listed is the candidate for President while the second name listed is the corresponding candidate for Vice President.) Note that UCF has many students that share a first name, so there might be several potential winning pairs of Josh and Jad. (For example, if there are 10 Joshes and 3 Jads on campus, there are 30 Josh/Jad pairs with a Josh running for President and a Jad running for Vice President.)

The Problem:

Given the names of each UCF student, calculate the number of possible President/Vice-President pairs who have a potential to win the SGA election.

The Input:

The first line of input contains a single positive integer, n ($n \leq 10^5$), representing the number of UCF students. The following n lines each contain a single first name of one UCF student. All names will consist of uppercase letters only and be between 1 and 20 letters long, inclusive. Each line represents a distinct student, but distinct students may have the same first name.

The Output:

On a line by itself, output the total number of President-Vice President pairs that have a chance to win the SGA election.

Sample Input**Sample Output**

10 JOSH JAD JENNIFER JENNIFER JALEN HASAAN ALI TAMARA LIAM SATHWIKA	18
5 ALEX BRANDY CELINE DWAYNE ELIZABETH	0

Implementation Requirements

This assignment is testing the use of Java's built in data structures. You must use at least one of the following in your code: HashSet, HashMap, TreeSet, TreeMap, PriorityQueue.

The desired run time is $O(n)$ expected run-time, where n is the number of input names. For full credit, a run-time of $O(n \lg n)$ must be achieved.

As always, your code should use good style, including but not limited to: a header comment, reasonable number of internal comments, good modular break down, good variable names, utilizing objects and the Java API as appropriate for solving the problem.

Note: If you do a careful analysis of the problem, you'll see that some of the output values can exceed the value that can be stored in an int variable. Thus, use the long type when necessary.

What To Submit

For this assignment, please submit a single Java program named **sga.java** which solves the posted problem.

In addition, for a tiny bit of extra credit, submit a file, **sga100.in** that is a valid input file to the problem and has a corresponding answer that overflows the int data type.