



Strange Bank Problem

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EEE472/CSE422
Strange Bank Problem

Suppose, you are the owner of a bank that operates in a strange way. Customers can lend money from your bank (just like a normal bank) and they can also deposit money in your bank. A register is maintained to track the daily transactions. However, being the strange owner of a strange bank, you have a fascination with finding out whether a portion of your daily transactions (in/out) balance out to zero. For example, suppose your daily transaction register looks like this:

1	Lend	100
2	Deposit	150
3	Lend	400
4	Lend	500
5	Deposit	1000
6	Lend	460
7	Deposit	160



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portion of the transactions that would balance itself out. (6th, 7th, 8th, and 10th transactions would amount to 0).

Your task is to use a genetic algorithm to solve this strange bank problem.

Task Breakdown:

1. Model the transaction register in a way suitable for the problem.
2. Write a fitness function. Hint: It is the sum of the non-zero elements of a register.
3. Write the crossover function.
4. Write the mutation function.
5. Create a population of randomly generated registers.
6. Run genetic algorithms on the population until highest fitness has been reached and/or number of maximum iterations has been reached.

Input

The first line has a number N denoting the number of daily transactions followed by N lines each starting with either l or d and a number S denoting the amount of transaction. Here:

$$N (1 \leq N \leq 10^2)$$

$$S (1 \leq S \leq 10^5)$$



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or if in each string cannot be formed. String consisting of all zeros won't be accepted.

Example:**Sample Input 1**

7
I 120
I 289
d 475
I 195
d 6482
I 160
d 935

Sample Output 1

1011010

Sample Input 2

5
I 100
I 450
d 500
I 7923
d 9055

Sample Output 2

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