Problem 35: Encryption

Difficulty: Medium

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Problem Background

Security has become one of the most important topics in the computing industry. There is no shortage of people trying to steal data or gain access to things they shouldn't. At the heart of protecting our systems is encryption. Encryption is the process of encoding data into a form that only the people who are allowed to view the data are able to decode and read it.

One method of encryption involves using a substitution cipher. A substitution cipher is where each letter in a message is substituted for another letter. For example, "hello" might be encrypted into "ifmmp" by substituting i=h, e=f, l=m, and o=p.

Problem Description

You have been hired to encrypt and decrypt messages according to the cipher key (the mapping for the alphabet into the new encoding). You must be able to both encrypt and decrypt messages, where encrypt means to map from the standard English alphabet to the cipher key and decrypt means to map from the cipher key to the standard English alphabet. You must also be adaptable to being given a different cipher key each time.

- Spaces should not be encrypted or decrypted, merely transferred to the encrypted or decrypted message directly.
- The letters map to the cipher regardless of capitalization (i.e. 'a' and 'A' will both map to the same letter, but the capitalization will be different). Capitalization should be preserved from input to output messages.

Sample Input

The first line of your program's input, received from the standard input channel, will contain a positive integer representing the number of test cases. Each test case will include:

- The first line of each test case will contain either "ENCRYPT" or "DECRYPT".
- The second line of each test case will contain the cipher key which will be 26 characters which map in order to the standard English alphabet.
- A positive integer **N** representing the number of messages to follow.
- **N** lines, each containing a message which need to either be encrypted or decrypted depending on the first line of the test case.

```
2
ENCRYPT
qwertyuiopasdfghjklzxcvbnm
2
Testing
it works
DECRYPT
poiuytrewqlkjhgfdsamnbvcxz
2
Vykigjy
xgn uwu wm
```

Sample Output

For each test case, print each encrypted or decrypted message on a separate line.

```
Ztlzofu
oz vgkal
Welcome
you did it
```