



Problem D Database

Time limit: 1 second

Memory limit: 2048 megabytes

Problem Description

A certain insurance company utilizes a database to maintain information about each user. However, due to insufficient functionality of the existing database, the company has hired you to assist in optimizing this database.

Each user has two pieces of information: name and age. There are k records of user data in the database. Each record is in the form of (a, b) where a is a string representing the user's name, and b is a number representing the user's age.

Assume there are n records in the database. The “age distance” is defined as the difference between the ages of the $\lfloor \frac{1}{3}n \rfloor$ -th youngest person and the $\lfloor \frac{2}{3}n \rfloor$ -th youngest person. However, the current database does not support queries for “age distance.” Hence, one of your task you is enabling the database to support the functionality of querying “age distance”.

Because users will continue to increase, the “age distance” may be altered over time. The database must support the addition of users and update the “age distance” dynamically.

It is known that there will be q operations to add new users. Each addition operation consists of data in the form (a, b) . a is a string representing the user's name, and b is a number representing the user's age. For each operation of adding a new user, please output three pieces of data x, y, z . x, y, z represent the name of the $\lfloor \frac{1}{3}n \rfloor$ -th youngest person, the name of the $\lfloor \frac{2}{3}n \rfloor$ -th youngest person, and the “age distance” after the addition, respectively.

Input Format

The first line contains two integers, k and q , representing the initial number of records in the database and the number of users to be added, respectively. Following that, there will be k lines. Each contains a string a and an integer b indicating that at the beginning, there is a user whose name and age are a and b , respectively. Then, q lines follow. The i -th contains a string a_i and an integer b_i indicating the i -th user addition is to add a user whose name and age are a_i and b_i , respectively.

Output Format

For each user addition, please output the name of the $\lfloor \frac{1}{3}n \rfloor$ -th youngest person, the name of the $\lfloor \frac{2}{3}n \rfloor$ -th youngest person, and the “age distance” after the user addition. Note that n is the number of users in the database.

Technical Specification

- $3 \leq k \leq 10^5$

- ### Sample Input 1

Sample Output 1

Sample Input 2

Sample Output 2

Note

10