



## Minimum Effort?

Thanks to the effort of those nameless heroes, students have successfully destroyed the network of Dr. K. just one day before the makeup exam. However, it is actually a trap!.. Oh~NO~!!! Actually Dr. K. never used any electronic material, the exam paper is actually exist only in hardcopy form. The network is just a dummy to waste students' time (for hacking).

While Dr. K. is celebrating his victory (?), he suddenly notice that it is almost time for the makeup exam and he need to take those exam papers with him now. As always, the paper is very thick!! (18 questions in 2 hrs, on average 6 minute 40 sec per question.) To minimize effort for carrying the papers (Dr. K. prefers escorting the papers himeself...), Dr. K. would like to find the best route between his office and the exam hall.



### Input

The input consists of several test cases. Each test case is formatted as follows:

- A line with a single integer  $N$  ( $2 \leq N < 200$ ), representing the number of places that Dr. K. *may* pass through.
- $N$  lines, consist of the names of places Dr. K. may pass though (each name could have a maximum of 16 characters, conststing of *any* character except colon ':') . You may assume there's no *leading* and *trailing* spaces on each line.
  - Among the  $N$  lines, you will observe at least: “**office**” and “**hall**”.
  - No name is the prefix of another name.
- A line with a single integer  $P$  ( $P \leq N * N$ ), representing the number of roads.

- $P$  lines in the format of either:

*<place1>:<place2><space><positive\_integer>*

or

*<place1>:<place2><space><positive\_integer><space><positive\_integer>*

where **<place1>** are **<place2>** unequal names in the list of  $N$  names.

- If the line has one integer, it means it is a *uni-directional* road from **<place1>** to **<place2>**; if the line has two integers, it is a *bi-rectional road*. The first number is the *cost* going from **<place1>** to **<place2>** while the second one is the *cost* going from opposite direction. (the two integers may, or may not be identical, consider the case of running up and down the stairs...)
- No new line between adjacent cases.

## Output

Your task in here is to find the best route for Dr. K with minimal overall cost. For each test case, print a line with the minimum cost for going from “**office**” to “**hall**” and back. Also print (on next line) the complete route Dr. K. have taken, using “->” to delimit adjacent names. Output a blank line after each test case. You may assume that the exam hall is always accessable from office and vice versa.

## Sample Input

```
2
office
hall
1
office:hall 1 1
3
hall
office
blue zone
3
office:blue zone 1 1
blue zone:hall 1
hall:blue zone 2
```

## Sample Output

```
2
office -> hall -> office

5
office -> blue zone -> hall -> blue zone -> office
```

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