32 Monster Slayer
35 points

Introduction

There is a new video game called Monster Slayer, in which each player controls a group of heroes that go into dungeons and kill all the monsters there. The faster they clear the dungeons, the more points they gain.

In each dungeon there may be different classes of monsters: Trolls, Golems, Demons and Dragons. Each monster will have an associated elemental type: Fire, Ice, Earth. The heroes' equipment also has an elemental type, so that it is more effective depending on the elemental type of the monster. The effectiveness rules are as follows (effective equipment, ineffective equipment):

- Fire monsters: Earth, Ice

- Ice monsters: Fire, Earth

- Earth monsters: Ice, Fire

In Monster Slayer, the more monsters you kill in a dungeon and the less turns it takes you to do it, the more points you get. Noelia is a competitive player, and she wants to go up in the online rankings.

Noelia is confident that she can complete every dungeon with her heroes so she has elaborated a table with the number of turns it takes to kill a monster in the best case, depending on the effectiveness of the equipment:

Monster Class	Effective	Neutral	Ineffective
Dragon	7 turns	9 turns	12 turns
Demon	3 turns	7 turns	11 turns
Golem	2 turns	5 turns	7 turns
Troll	2 turns	3 turns	5 turns

Furthermore, the heroes can change the equipment type in the middle of a dungeon **only once**, *by using 2 turns*.

Noelia's favorite equipment is Fire, then Ice and lastly Earth. If she has multiple best options, she will always choose her heroes to stay for the longest time in the equipment she likes the most.

Taking all of this information into account, can you write a program to help Noelia decide which equipment type (with or without changes) allows her to clear the dungeon faster?

Input

The first line will be the number of monsters in a dungeon. The following lines will contain the order in which monsters appear, each monster class and its type.

Output

The output should be a line containing the initial equipment to use, the change of equipment to perform if it's the case followed by the lines containing the monsters to slay with that equipment.

Example 1

Input

```
5
Earth Golem
Ice Troll
Ice Dragon
Earth Demon
Ice Demon
```

Output

```
Initial equipment: Ice
Earth Golem
Ice Troll
Ice Dragon
Earth Demon
Changing to Fire equipment
Ice Demon
```

When she had to fight against the Ice Demon with an Ice equipment the effectiveness is neutral, but if she changes her equipment to the one that is effective, even if she waste 2 turns she will kill the monster faster.

Example 2

Input

```
5
Fire Dragon
Ice Dragon
Fire Dragon
Ice Dragon
Fire Dragon
```

Output

```
Initial equipment: Fire
Fire Dragon
Ice Dragon
Fire Dragon
Ice Dragon
Fire Dragon
```

Although having multiple options that result in the same number of turns spent (like swapping to Earth equipment before the last enemy), this is the only valid output because it is the one that spends more time in the Fire equipment (this being Noelia's favorite equipment)