

Problem 3: Big Big Big Big Big Big Ben

5 Points

Problem ID: tournament

Rank: 1

Introduction

After a legendary battle between [Tung Tung Tung Tung Tung Tung Sahur](#) and Big Ben that rivals even the [Croco-Avian Wars](#), a stalemate has been reached. But from across the ocean, [Tralalero Tralala](#) appears from the sea to destroy the world. Without time to lose, [Tung Tung Tung Tung Tung Tung Sahur](#) and Big Ben perform a [fusion dance](#) to become Big Big Big Big Big Big Ben. With this newfound strength, can Big Big Big Big Big Big Ben defeat the evil [Tralalero Tralala](#)?



Problem Statement

You are witnessing a tournament with N competitors that eliminates competitors in a series of rounds until only a single champion is left. The competitors have names C_1, C_2, \dots, C_N and power levels P_1, P_2, \dots, P_N , where the i^{th} competitor has name C_i and power level P_i . In the tournament, the competitors are arranged in a line where the competitor with name C_1 comes first and the competitor with name C_N comes last.

Each round follows the following structure:

1. The competitors in line are paired up to fight each other such that the first two competitors in line fight each other, the next two competitors fight each other, etc. You can assume that there is always an even number of competitors in line for each round.
2. When two competitors fight:
 - The competitor i with the greater power level P_i eliminates the other competitor j from the line and increases their own power level by P_j .
 - If both competitors have the same power level, they are fused into one competitor with a name of C_iC_j (both competitors' names [concatenated](#)) and power level $P_i + P_j$.

Find the name of the tournament champion.

*Note: Templates are available for this problem—and **all other problems in this contest**—in Python, Java, and C++! Find them in the [contest.zip provided at the start of the contest](#). Templates handle input and output for you, so you can just fill out a single function!*

Input Format

The first line of the input contains a single integer T denoting the number of test cases that follow.
For each test case:

- The first line contains a single integer N denoting the number of competitors in the tournament.
- The second line contains N space-separated strings $C_1 C_2 \dots C_N$ denoting the name of each competitor.
- The third line contains N space-separated integers $P_1 P_2 \dots P_N$ denoting the power level of each competitor.

Output Format

For each test case, output a single line containing the name of the tournament champion.

Constraints

$$1 \leq T \leq 100$$

$$1 \leq N \leq 64$$

$$1 \leq P_i \leq 10^9 \text{ for all } i$$

$$N = 2^n \text{ for some } n$$

The sum of all P_i in a tournament does not exceed $2^{31} - 1$.

Every name C_i consists only of letters from the uppercase and lowercase alphabet

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

All names in C_1, C_2, \dots, C_N are unique.

Sample Test Cases

Sample Input

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```
5
4
TralaleroTralala BombardiroCrocodilo BrrBrrPatapim LiriliLarila
42750 31645 12455 12455
2
TungTungTungTungTungTungSahur BigBen
523530 999999999
2
TralaleroTralala TungTungTungTungTungTungSahur
100000 100000
16
A B C D E F G H I J K L M N O P
1 16 2 15 3 14 4 13 5 12 6 11 7 10 8 9
1
LaVaccaSaturnoSaturnita
12510
```

Sample Output

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```
TralaleroTralala
BigBen
TralaleroTralalaTungTungTungTungTungTungSahur
BDFHJLNP
LaVaccaSaturnoSaturnita
```

Main Sample Explanations

For test case #1, TralaleroTralala is the champion. The tournament has a total of 2 rounds:

Round 1:

1. TralaleroTralala with power level 42750 fights BombardiroCrocodilo with power level 31645. TralaleroTralala wins with a new power level of 74395.
2. BrrBrrPatapim with power level 12455 fights LiriliLarila with power level 12455. BrrBrrPatapim and LiriliLarila have an equal power level, so they fuse to become BrrBrrPatapimLiriliLarila and advance with a new power level of 24910.

Round 2:

1. TralaleroTralala with power level 74395 fights BrrBrrPatapimLiriliLarila with power level 24910. TralaleroTralala wins — as the last one standing, they are the champion!!!

For test case #2, BigBen is the champion as he has a higher power level (obviously).

For test case #3, TralaleroTralalaTungTungTungTungTungTungSahur is the champion as the two initial competitors have equal power levels and thus fuse, concatenating their names.

For test case #5, LaVaccaSaturnoSaturnita is the only competitor and is therefore champion.