C2. Balanced Removals (Harder)

time limit per test: 1 second
memory limit per test: 512 megabytes
input: standard input
output: standard output

This is a harder version of the problem. In this version, $n \le 50\,000$.

There are n distinct points in three-dimensional space numbered from 1 to n. The i-th point has coordinates (x_i, y_i, z_i). The number of points n is even.

You'd like to remove all n points using a sequence of $\frac{n}{2}$ snaps. In one snap, you can remove any two points a and b that have not been removed yet and form a *perfectly balanced* pair. A pair of points a and b is perfectly balanced if no other point c (that has not been removed yet) lies within the axis-aligned minimum bounding box of points a and b.

Formally, point c lies within the axis-aligned minimum bounding box of points a and b if and only if $\min(x_a, x_b) \le x_c \le \max(x_a, x_b)$, $\min(y_a, y_b) \le y_c \le \max(y_a, y_b)$, and $\min(z_a, z_b) \le z_c \le \max(z_a, z_b)$. Note that the bounding box might be degenerate.

Find a way to remove all points in $\frac{n}{2}$ snaps.

Input

The first line contains a single integer n ($2 \le n \le 50\,000$; n is even), denoting the number of points.

Each of the next n lines contains three integers x_i, y_i, z_i ($-10^8 \le x_i, y_i, z_i \le 10^8$), denoting the coordinates of the i-th point.

No two points coincide.

Output

Output $\frac{n}{2}$ pairs of integers a_i, b_i ($1 \le a_i, b_i \le n$), denoting the indices of points removed on snap i. Every integer between 1 and n, inclusive, must appear in your output exactly once.

We can show that it is always possible to remove all points. If there are many solutions, output any of them.

Examples

input Copy

```
6
3 1 0
0 3 0
2 2 0
1 0 0
1 3 0
0 1 0
```

output Copy

```
3 6
5 1
2 4
```

input Copy

```
8
0 1 1
1 0 1
1 1 0
1 1 1
2 2 2
3 2 2
2 3 2
2 2 3
```

output Copy

```
4 5
1 6
2 7
3 8
```

Note

In the first example, here is what points and their corresponding bounding boxes look like (drawn in two dimensions for simplicity, as all points lie on $z = 0$ plane). Note that order of removing matters: for example, points 5 and 1 don't form a perfectly balanced pair initially, but they do after point 3 is removed.

Codeforces Global Round 5

Finished

Practice

☆

→ Virtual participation

Virtual contest is a way to take part in past contest, as close as possible to participation on time. It is supported only ICPC mode for virtual contests. If you've seen these problems, a virtual contest is not for you - solve these problems in the archive. If you just want to solve some problem from a contest, a virtual contest is not for you - solve this problem in the archive. Never use someone else's code, read the tutorials or communicate with other person during a virtual contest.

Start virtual contest

→ Practice

You are registered for practice. You can solve problems unofficially. Results can be found in the contest status and in the bottom of standings.

→ Clone Contest to Mashup

You can clone this contest to a mashup.

Clone Contest

→ Submit?

Language: GNU G++11 5.1.0 ▼

Choose file: 选择文件 未选择任何文件

Be careful: there is 50 points penalty for submission which fails the pretests or resubmission (except failure on the first test, denial of judgement or similar verdicts). "Passed pretests" submission verdict doesn't guarantee that the solution is absolutely correct and it will pass system tests.

Submit

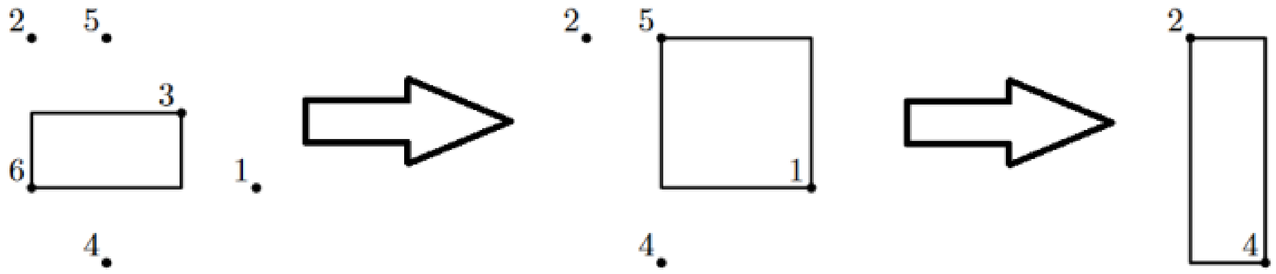
→ Problem tags

constructive algorithms
divide and conquer greedy
implementation sortings

No tag edit access

→ Contest materials

- Announcement #1 (en) ×
- Announcement #2 (ru) ×
- Tutorial (en) ×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