Problem H
The Wedding of the Fox

A *sunshower* occurs when rain falls while the sun is still shining. Many cultures in Asia refer to sunshowers by the folkloric name “the wedding of the fox”.

A sunshower catches N foxes (numbered from 1 to N) at the top of a hill. They want to reach a shelter at the bottom, but they only have one old umbrella with them. At most two foxes can fit under it at a time. All foxes are capable of carrying the umbrella. No fox is willing to walk through the sunshower without the umbrella.

The trail is steep, so going downhill and uphill may take different amounts of time. Fox i needs A_i units of time to walk downhill from the hilltop to the shelter, and B_i units of time to walk uphill from the shelter back to the hilltop. Note that A_i may be greater than B_i.

During one trip, one or two foxes at the same end of the trail as the umbrella may walk to the other end. When two foxes walk together, they must stay together under the umbrella, so the duration of the trip is the time needed by the slower fox in that direction. Thus, a trip with foxes i and j takes $\max(A_i, A_j)$ units of time downhill and $\max(B_i, B_j)$ units of time uphill.

The trail is exhausting, so each fox may traverse the trail **at most three times** in total, counting trips in both directions.

Find the minimum total time needed for all foxes to reach the shelter, and output any sequence of trips achieving this minimum.

Input

The first line contains an integer N ($1 \le N \le 200\,000$), the number of foxes.

Each of the next N lines contains two space-separated integers A_i and B_i ($1 \le A_i, B_i \le 10^9$), describing fox i.

Output

In the first line, output a single integer T, the minimum possible total time.

In the second line, output a single integer M, the number of trips in your plan.

In the next M lines, output the trips in chronological order, where each line must be in one of the following formats:

- t `1` p: fox p takes the trip alone.
- t `2` p q: foxes p and q take the trip together.

Here, t must be the character `D` for a downhill trip or `U` for an uphill trip.

The sequence of trips must be valid according to the rules in the problem statement. After all M trips, every fox must be at the shelter, and the total duration must be exactly T.

If multiple sequences of trips achieve the minimum total time, output any one of them.

Sample 1

Sample Input	Sample Output
4 4 1 7 3 20 26 14 6	38 5 D 2 1 2 U 1 2 D 2 3 4 U 1 1 D 2 2 1

Explanation of Sample 1: The foxes can take five trips as follows.

1. Foxes 1 and 2 go downhill in 7 units of time.
2. Fox 2 goes uphill in 3 units of time.
3. Foxes 3 and 4 go downhill in 20 units of time.
4. Fox 1 goes uphill in 1 unit of time.
5. Foxes 2 and 1 go downhill in 7 units of time.

All foxes arrive at the shelter in 38 units of time. Foxes 1 and 2 each take three trips, while foxes 3 and 4 each take one, so the three-trip limit is satisfied.

It can be shown that no valid plan has a smaller total duration. Thus, the answer is 38.

Sample 2

Sample Input	Sample Output
1 23 67	23 1 D 1 1

Explanation of Sample 2: The only fox simply walks downhill with the umbrella, taking 23 units of time.