



Problem D: Hanging Certificates of Merit

Time limit: 2s; Memory limit: 256 MB

The Informatics Olympiad Club of University of Science and Technology - University of Danang over the years participating in Vietnam The Informatics Olympiad and ICPC has received many certificates of merit. Captain Khai of the club came up with an idea to set up a display area for these certificates. Khai prepared n rectangular frames to hang them. The i^{th} frame of size (w_i, h_i) is hung on the wall using a nail nailed to the center of the frame at coordinates (x_i, y_i) on the wall. However, after doing this, Khai noticed that some frames were overlapping. Khai decided to adjust by selecting some frames and rotating them around these center 90 degrees so that the frames no longer overlap. Because the work is quite difficult, please help Khai.

Input

- The first line contains a positive integer n ($1 \leq n \leq 2500$).
- The next n lines, each line contains 4 interger x_i, y_i, w_i, h_i ($-10^9 \leq x_i, y_i \leq 10^9$, $1 \leq w_i, h_i \leq 10^9$).

Output

- If there is no way to rotate, print “No”.
- Otherwise: the first line prints “Yes”, the second line prints the rotation way by a string containing the characters “Q” or “K”. The i -th character represents whether the i^{th} frame rotates or not. “Q” represents **rotation** and “K” represents **no rotation**. If there are multiple ways, print the way with the smallest one in lexicographic order.

Sample

| Input | Output |
|---|-------------|
| 4 0 2 2 4 0 0 2 4 4 0 4 2 4 2 2 4 | Yes QQKQ |
| 2 0 0 2 2 1 1 2 2 | No |

Explanation Example 1:

