Crossword

SEASON 9 – THIRD ROUND

Esi likes to solve interesting crosswords. An interesting crossword is a rectangular table of symbols. The words in the crossword start at a cell containing the first letter and each of the following letters is in a cell, adjacent to the previous one. It is possible for a letter from one cell to appear multiple times in the same word. Aside from lower case latin letters, the crossword can contain **up to one** symbol *, that stands for every letter. Unused cells are marked with #. We will call the *size* of a crossword the number of cells that are not #.

For example the crossword

#	#	#
b	a	n
#	*	k
#	d	#

has a size of 6 and contains the words `bar`, `bank`, `banana`, `asked` etc.

The columns of the crossword are numbered from left to right and the rows from top to bottom, starting from 0.

Because such interesting crosswords are hard to find, Esi asks you to generate one that contains every word from a given set and whose size is as small as possible.

Input

The first line of the file `crossword.in` contains one number T - the substask of that test.
The next line - one number N - the number of words.
Each of the next N lines each contain one word made of small latin letters.

Output

On the first line of the file `crossword.out` print W and H - the number of columns and the number of rows in the crossword.
On each of the next H lines print W symbols - the cells of the crossword.
On each of the next N lines print X_i и Y_i – the number of the column and row of the cell containing the first letter of the i-th word - followed by the directions in which the next letters are - "U" stands for up, "D" for down, "L" for left and "R" for right (without the quotation marks).

Crossword

Constraints

$1 \leq N$, the length of each word, the sum of the lengths of all words $\leq 10^4$

$1 \leq W$, H, $W * H \leq 10^6$

$0 \leq X_i < W \qquad 0 \leq Y_i < H$

Subtasks

T	% of all tests	Additional constraints
1	20	All of the words are collectively made of up to 6 different letters (a,b,c,d,e,f)
2	20	N=1
3	20	Each of the words is in english
4	20	Each of the words is a name of a chemical compound (in which the symbols that are not letters are removed)
5	20	No further constraints

Scoring

If the output file is invalid, you will get 0 points for the test.

Otherwise you will get $100 * \frac{yourScore + 1}{maxScore + 1}\%$ of the points for that test, where $yourScore = max(sumLengths - size, \, 0)$, *maxScore* is the maximal result amongst all participants, *sumLengths* is the sum of the lengths of all the words and *size* is the size of your crossword.

Time limit: 5 seconds
Memory limit: 256 MB

Example

Input (crossword.in)	Output (crossword.out)
3 4 bank banana asked knap	3 4 ### ban #*k #d# 0 1 RRD 0 1 RRLRL 1 1 DRLD 2 2 ULD

Crossword

The sum of the lengths of all the words is 19. The crossword has size 6. Thus, this test has a score of 13.