

You are now invited to build a simulator that determines not only how much time is needed for all water to end up in the last deposit, but also to explain how did that happen, much the same as shown immediately above.

Input

The input has exactly three lines:

- Line 1 contains the number of water deposits on the mountainside. For example, $N=3$ indicates the simulation will have 3 water deposits (and therefore two water pipes).
- Line 2 describes the initial contents of each water deposit, from the topmost to the lowest one. For example, `'A=11;B=0;C=0'` states that deposit 'A' (topmost) initially has 11 liters of water and that both remaining deposits ('B' and 'C') are empty at the beginning of the simulation.
- Line 3 indicates the maximum flow of water allowed inside the pipes that connect each pair of deposits, respecting the order imposed in the previous line. For example, `a=5;b=4` means the maximum flow between deposits 'A' and 'B' (pipe 'a') is 5 liters/second, and that between 'B' and 'C' (pipe 'b') it is 4 liters/second. Note, however, that the flow at an instant of time can be less than the maximum if the deposit contains insufficient water - a particular case is the empty deposit which disables the flow (see above examples).

Notes:

- All numbers (seconds, liters, and liters/second) are non-negative integers with a maximum value of 999.
- There must be at least two water deposits.
- The maximum flow of water inside pipes is always greater than zero (all pipes are unobstructed).
- Water deposits are represented by a single uppercase letter, starting with 'A' then 'B' and so on.
- Pipes are identified by a single lowercase letter, beginning with 'a' then 'b' and so on.

Output

The output is a table that displays the contents of all water deposits for each second that passes since the initial instant until all water is resting inside the last deposit (which is guaranteed to happen in no more than 999 seconds). The table has a line for the header, a separator line, and multiple lines of data - one line for each second of the simulation, including the initial instant (at zero seconds). The columns of the table vary with the number of water deposits, but the first one is always reserved for the elapsed time. See the sample output (below) for an example of a table built according to the simulation specified in the previous section.

Notes:

- All table columns have a width of three characters.
- Every pair of columns is separated by a single space character.
- All numbers are right justified (see sample output).
- Watch out for the lowercase 't' (elapsed time column).

Sample Input

N=3
A=11;B=0;C=0
a=5;b=4

Sample Output

t	A	B	C
0	11	0	0
1	6	5	0
2	1	6	4
3	0	3	8
4	0	0	11