

## 4542 Hard-working Student

Billy is a hard-working student. He is fond of computers and intends to learn as much as possible. Now he studies graph theory, and must write a program to build the graph which is shown on the Figure.

The vertices of the graph are labeled sequentially with integer keys starting from 0 to  $N - 1$  ( $N \leq 10000$ ). There are two types of edges: backward edges — labeled with **B** in the Figure (for example from node 4 to node 2, or from node 3 to node 1), and forward edges, labeled with **F** in the Figure (for example from node 1 to node 2 or from node 0 to node 3). Billy's program starts with an initial graph that contains the vertices 0, 1, 2, 3, and must continue to build the graph based on a sequence of commands written in a text file. A command has the following specification:

*index0 string\_of\_characters index1*

where *index0* and *index1* are the keys of vertices, and *string\_of\_characters* is a sequence of actions **executed from right to left**.

An action is represented by one of the following characters:

Character	Action
f	Follow the Forward edge if it does exist or creates it and the corresponding vertex from an argument node
b	Follow the backward edge if it does exist or creates it and corresponding vertex, starting from an argument node
k	Prints the key of the argument node
<	$v[index0] = \text{argument node}$
=	Prints '=' if $v[index0] == \text{node}$ or '#' otherwise

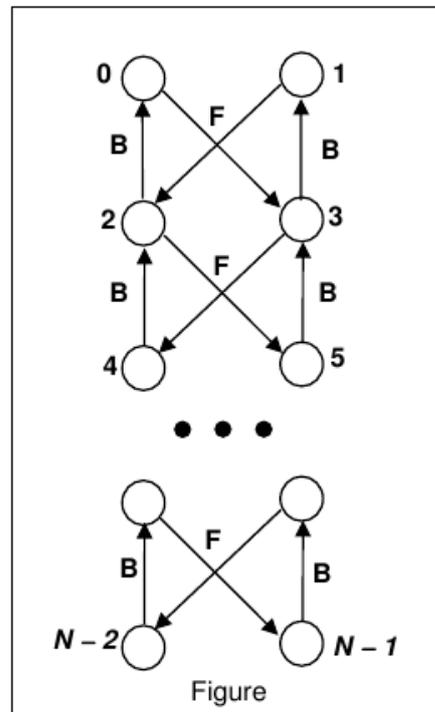
where  $v$  is the array of the nodes of the graph. The argument of the first operation is the node  $v[index1]$ . The result of the operations 'f' and 'b' is a node that represents the argument for all the other operations. The operations '<' and '=' are the leftmost specified.

For example, for the command "4 <kff 0" the actions are:

```

index0 = 4, index1 = 0
x = f(v[0])           // forward to node 3, x = 3
y = f(x)              // forward creates node (4), y = 4
k(y)                  // prints the key (4)
V[4] = y              // put node (4) in array v
  
```

A node is put in the array  $v$  only by the command '<'. Initially the array contains the nodes with keys 0, 1, 2, 3,  $v[0] = 0$ ,  $v[1] = 1$ ,  $v[2] = 2$  and  $v[3] = 3$ .



**Input**

The program input from the standard input, the sequence of commands. White spaces can occur freely in the input. The input data terminate with an end of file.

**Output**

Each print must be to the standard output from the beginning of a line. There are no empty lines in between.

**Sample Input**

```
4 <kf 3
0 =bb 4
7 <ff 3
```

**Sample Output**

```
4
=
```