

ALL-BST



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Come, my student. Sit by my side. It is time for us to have a serious conversation. You have been under my guidance for many weeks now, absorbing my teachings and philosophies. Today, I believe it is time for you to test that knowledge of yours. This final challenge is an easy one, you have to put all of your BST knowledge into one.

You will be making a program that takes some commands, and based on this command you will perform, insert, find, and many more on a BST. Here's the command list:

- IN {x}: insert a number x into BST, if x already exist, ignore
- FD {x}: print "on level {x's level}" if x exists, else print "no {x}". Level is counted from root = 1, ascending to leaf node/s.
- RK {x}: get the x-th number in an ascending sequence made from numbers in BST, if x doesn't exist, print "-1".
- PH {x}: print "{path to x}" if x exists, else print "no {x}". Path is the route that needs to be taken from root to the desired node. Constructed with a simple L, R, and S symbol. L means going to the left child of the current node, R to the right child, and S meaning we have arrived at our destination.
- STOP : stop the program, print "done".

Input format

every line is a command, keep scanning the input until "STOP".

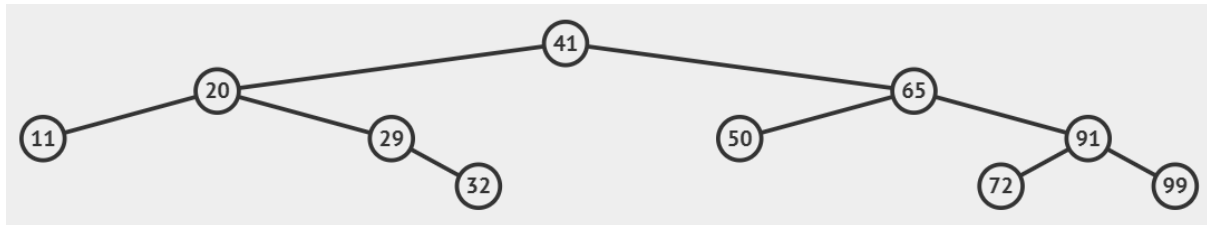
Output format

output something according to “FD”, “RK”, “PH”, and “STOP” commands.

Constraint

$1 \leq x \leq 100000$

Sample Input



IN 41

IN 20

IN 11

IN 29

IN 32

IN 65

IN 50

IN 91

IN 72

IN 99

RK 1

RK 2

RK 10

FD 20

FD 42

PH 20

PH 42

STOP

Sample Output

11

20

99

on level 2

no 42

LS

no 42

done