JDIS Academy #1

Émile Fugulin
Émilio Gonzalez

Principe

- 1 rencontre par semaine
- Thèmes selon vos intérêts
- 1 workshop par mois
- Semaine prochaine: Sécurité
- https://www.strawpoll.me/17237601

Format

- Présentation d’un problème
- Tentatives petits groupes/individuelles
- Présentation de solutions & group thinking
- Résolution finale
- REPEAT!

Joignez notre discord! https://discord.gg/wtpmcHs

Problème #1

Pond Sizes: You have an integer matrix representing a plot of land, where the value at that location represents the height above sea level. A value of zero indicates water. A pond is a region of water connected vertically, horizontally, or diagonally. The size of the pond is the total number of connected water cells. Write a method to compute the sizes of all ponds in the matrix.

EXAMPLE

Input:

```
0 2 1 0
0 1 0 1
1 1 0 1
0 1 0 1
```

Output: 2, 4, 1 (in any order)

Hints: #674, #687, #706, #723

Source: Cracking the coding interview #16.19

Problème #2

T9: On old cell phones, users typed on a numeric keypad and the phone would provide a list of words that matched these numbers. Each digit mapped to a set of 0 - 4 letters. Implement an algorithm to return a list of matching words, given a sequence of digits. You are provided a list of valid words (provided in whatever data structure you'd like). The mapping is shown in the diagram below:

1	2 abc	3 def
4 ghi	5 jkl	6 mno
7 pqrs	8 tuv	9 wxyz
	0	

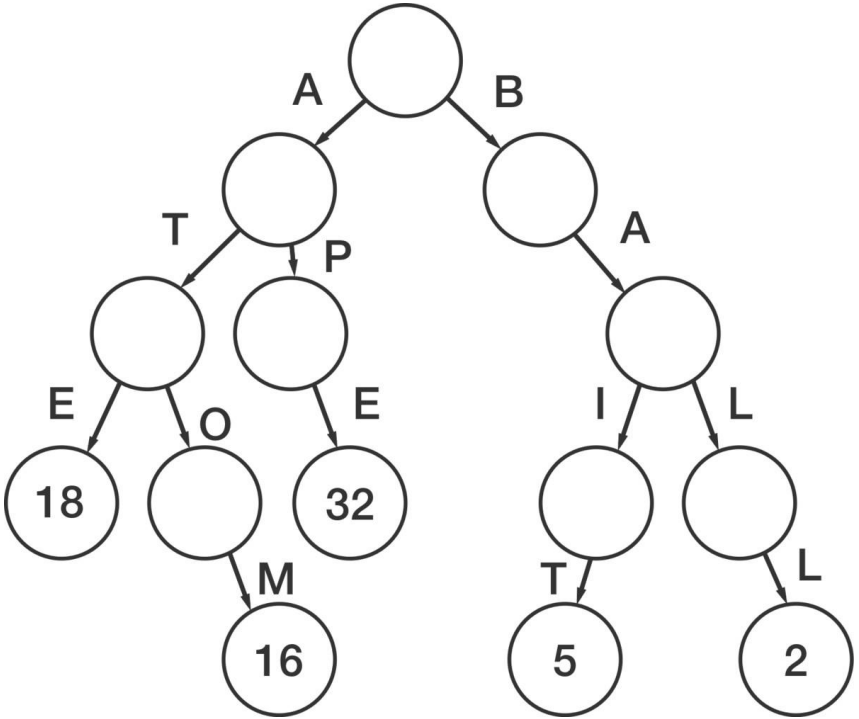
EXAMPLE

Input: 8733

Output: tree, used

Source: Cracking the coding interview #16.20

Tries



Problème #3

Baby Names: Each year, the government releases a list of the 10000 most common baby names and their frequencies (the number of babies with that name). The only problem with this is that some names have multiple spellings. For example, "John" and "Jon" are essentially the same name but would be listed separately in the list. Given two lists, one of names/frequencies and the other of pairs of equivalent names, write an algorithm to print a new list of the true frequency of each name. Note that if John and Jon are synonyms, and Jon and Johnny are synonyms, then John and Johnny are synonyms. (It is both transitive and symmetric.) In the final list, any name can be used as the "real" name.

EXAMPLE

Input:

Names: John (15), Jon (12), Chris (13), Kris (4), Christopher (19)

Synonyms: (Jon, John), (John, Johnny), (Chris, Kris), (Chris, Christopher)

Output: John (27), Kris (36)

Hints: #478, #493, #512, #537, #586, #605, #655, #675, #704

Source: Cracking the coding interview #17.7

DFS

```
1   void search(Node root) {
2      if (root == null) return;
3      visit(root);
4      root.visited = true;
5      for each (Node n in root.adjacent) {
6         if (n.visited == false) {
7            search(n);
8         }
9      }
10  }
```

BFS

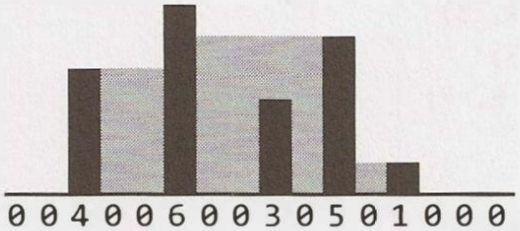
```
1   void search(Node root) {
2     Queue queue = new Queue();
3     root.marked = true;
4     queue.enqueue(root); // Add to the end of queue
5
6     while (!queue.isEmpty()) {
7       Node r = queue.dequeue(); // Remove from the front of the queue
8       visit(r);
9       foreach (Node n in r.adjacent) {
10        if (n.marked == false) {
11          n.marked = true;
12          queue.enqueue(n);
13        }
14      }
15    }
16  }
```

Problème #4

Volume of Histogram: Imagine a histogram (bar graph). Design an algorithm to compute the volume of water it could hold if someone poured water across the top. You can assume that each histogram bar has width 1.

EXAMPLE (Black bars are the histogram. Gray is water.)

Input: `{0, 0, 4, 0, 0, 6, 0, 0, 3, 0, 5, 0, 1, 0, 0, 0}`



Output: 26

Hints: #629, #640, #651, #658, #662, #676, #693, #734, #742

Source: Cracking the coding interview #17.21