Scopely Tree-Path Coding Problem

Instructions

Please use the language of your choice in solving these problems. Please submit a zip or tarball of your project. Provide a **simple** README to explain how to run your submission.

Two notes:

1. Don't use any code that anyone else has written, including external libraries (other than the built in, standard library of your chosen language).
2. If you choose to use Python, DO NOT use the following methods in the itertools module: combinations, permutations, and product.

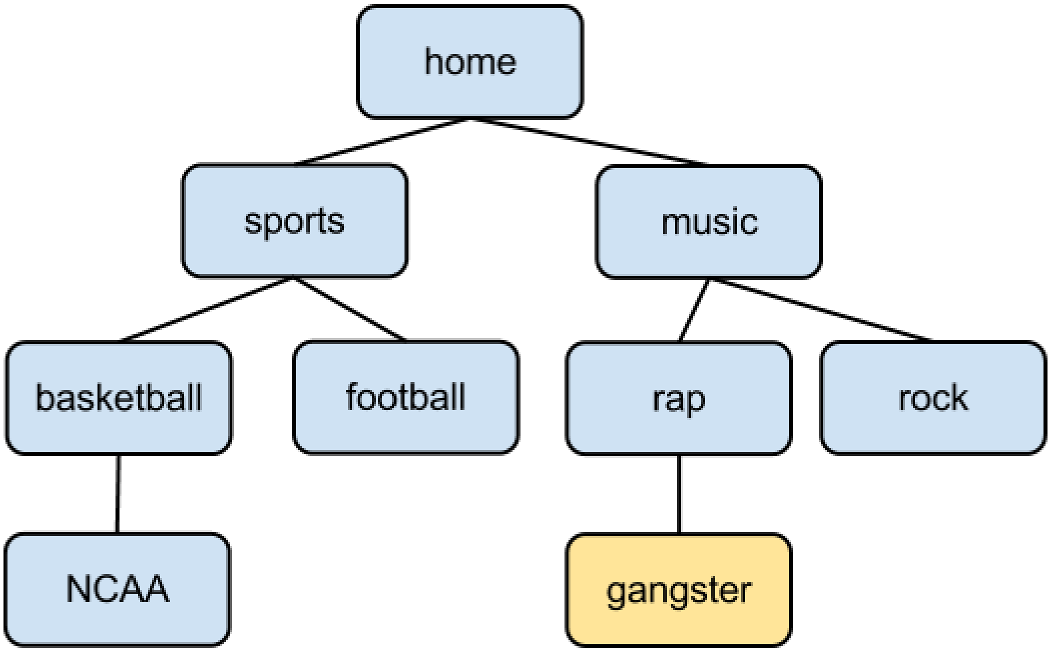
If there is any ambiguity in the questions, please use your best judgement in answering them. Requirements as in life are often messy!

This coding challenge should be completely solely by you. You cannot receive any assistance or submit any code authored by or with someone else. However, you may reference public open source libraries.

There are 6 parts. Complete as many as you can in 4 hours.

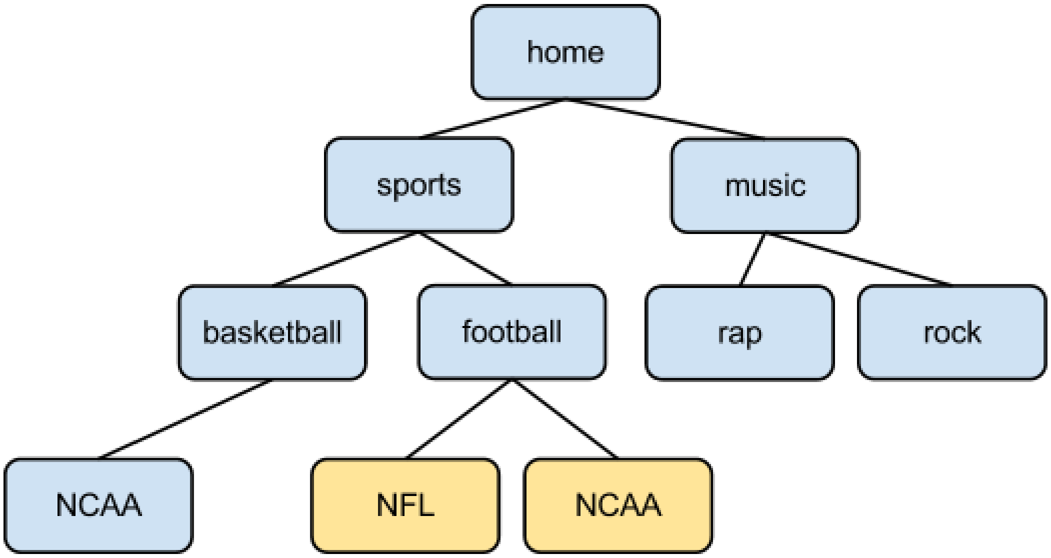
Part 1: Insert into Tree

Write a function to build a tree out of a path structure, such as /home/sports/basketball/ncaa/, and insert an new path into the tree. For example, if you inserted /home/music/rap/gangster into the tree, it would add a leaf node to rap.



Part 2: Support Dual Leaf-node inserts

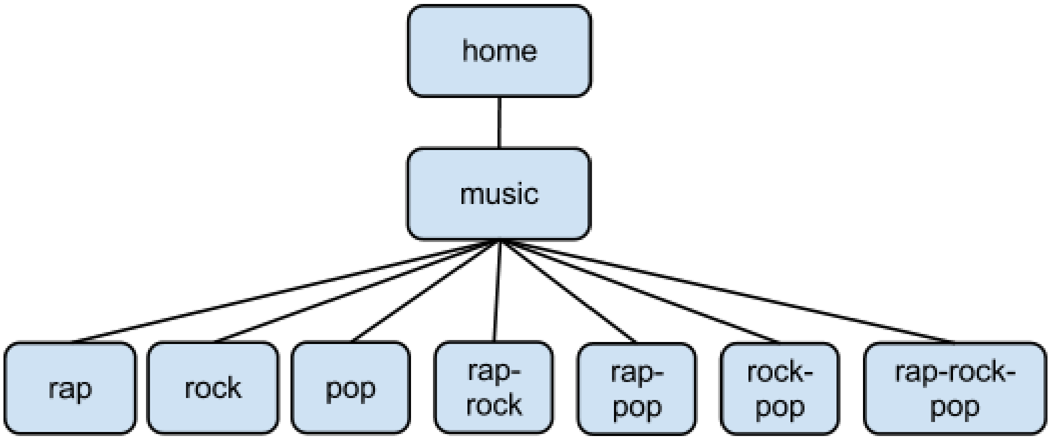
Write a function that allows you to insert two leaf-nodes at the same time. For example, given the path /home/sports/football/NFL|NCAA it would insert *two* leaf nodes: NFL, and NCAA. Note that the pipe character, “|”, marks the node boundaries.



Part 3: Support a combinatorial leaf-node insert

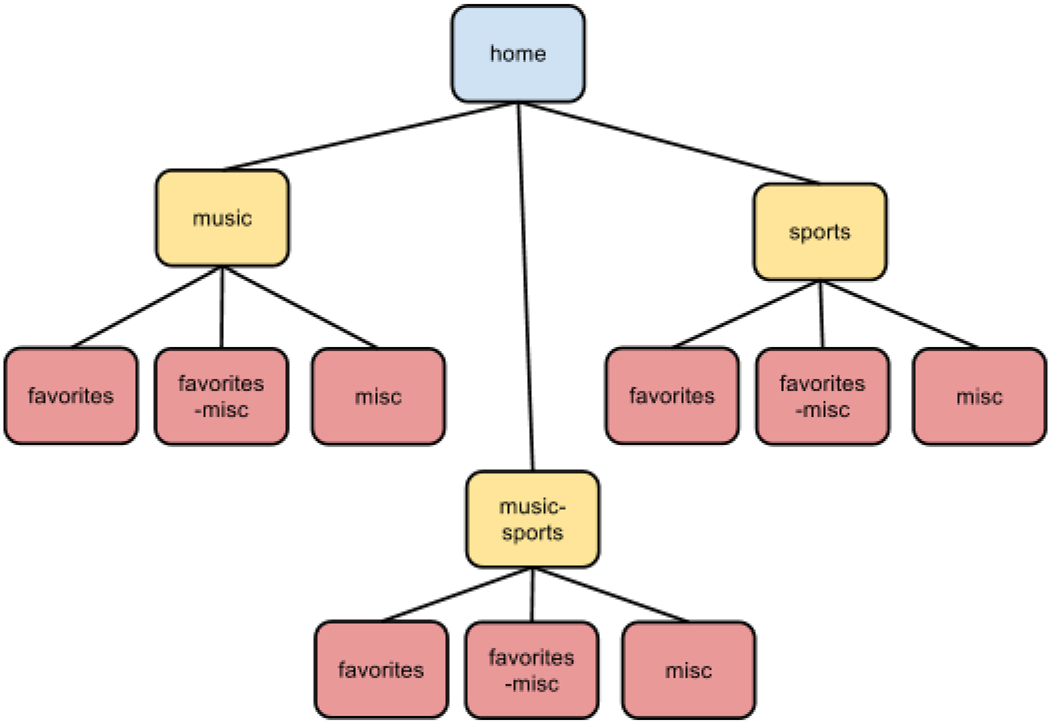
Write a function that allows you to insert a the combinatorial explosion of a path into a leaf-node. For example, given the path /home/music/rap|rock|pop, it would insert the following leaf nodes:

- rap
- rock
- pop
- rap-rock
- rap-pop
- rock-pop
- rap-rock-pop



Part 4: Support combinatorial nodes at any level

Write a function that allows you to insert a combinatorial explosion of a path at any level. For example, give the path **/home/sports|music/misc|favorites**, it would create the following tree:



Part 5: Collapse a combinatorial tree into a path

Write a function that takes as input a Tree and outputs a combinatorial tree. For example, in the Tree displayed in Part 4, the output of the function would be: /home/sports|music/misc|favorites.

Part 6: Subtree Similarity Detection

Write a function that returns a “synonym” for a given path. For example, in the Tree displayed in part 4, if the input was “/home/sports”, the output synonym would be “/home/music”. Let us define two nodes to be synonyms if all their child nodes are identical. Here we define two nodes to be identical if they have the same node name, even if they separate nodes. For example, “favorites” under sports and “favorites” under music are identical under this definition of name-equality.