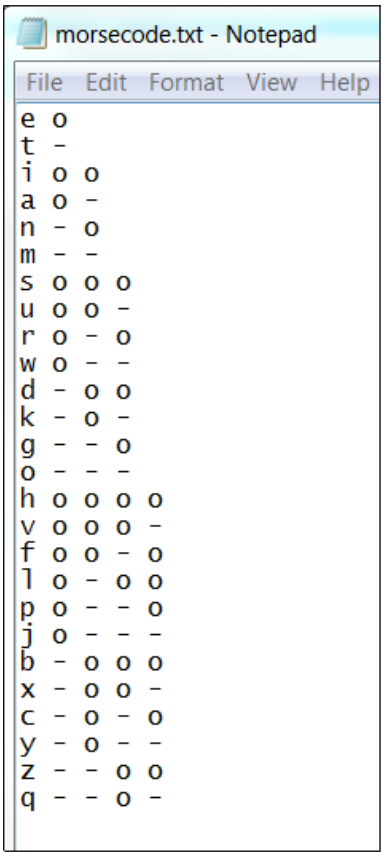
Homework #6

Assigned: 3/31/23
Due: 4/28/23 by 5 PM

This is the final assignment in the course. You should not underestimate it however, as there is quite a bit going on.

We will begin using a Tree to implement a solver for Morse Code. Morse Code is a simple encoding of the alphabet that uses dashes and dots to represent a single letter. The fact that more common letters use less symbols makes it an ideal candidate for a tree. You are heavily encouraged to use the Tree code presented in class.

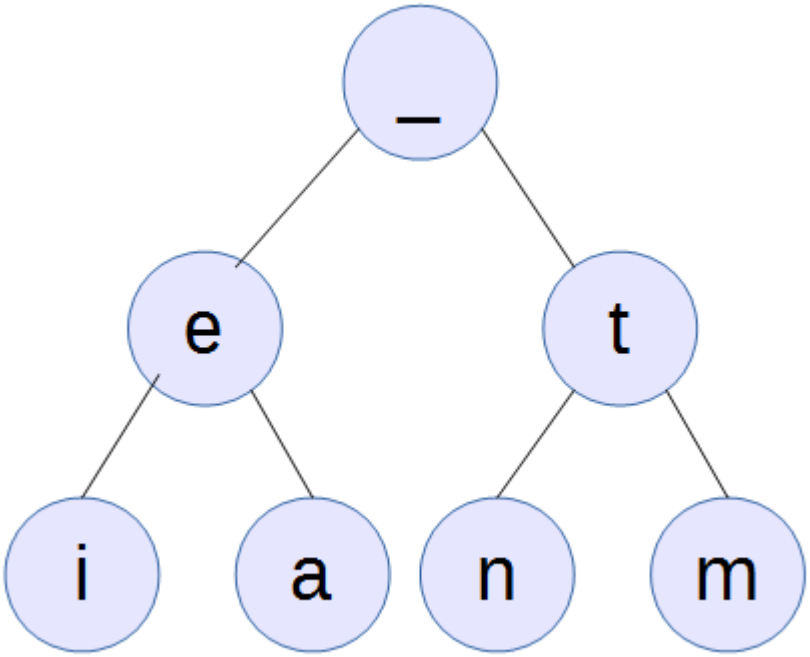
First, you must build up a Tree. A screenshot of a text file defining the structure of your Tree is below:



The primary way to populate the tree is to use File I/O to read the file line by line and add it to an empty Tree. The Scanner class is what you'll want to use here. The following is how you will insert the letters into the Tree:

- The root is no letter, it is merely a starting point
- If a character is represented by a dot (o), it will be a left descendant
- If a character is represented by a dash (-), it will be a right descendant
- If a character is represented by one symbol, it will be one level below the root
- If a character is represented by N symbols, it will be N levels below the root

If done correctly, your Tree will resemble this image:



Note: The lower levels of the tree are not pictured

Prepare the following Class's

- **MorseTree:**
  - Contains an TreeNode representing the root of the Tree containing letters
  - Contains a default constructor to make a **null** Tree
  - Implement a method that will return a String containing the Pre-order of the Tree
  - Implement a method that will return a String containing the Post-order of the Tree
  - Implement a method that will translate an English string into its Morse code equivalent (ignoring case)
  - Implement a method that will translate a Morse string into its English equivalent (ignoring spaces and case)

- **MorseTester:**
  - Contains a main function that will:
    - Instantiate a **MorseTree**
    - Fill the **MorseTree** in a manner of your choosing such that it contains the Morse Code (as defined above)
    - Produce the preorder of this Tree
    - Produce the postorder of this Tree
    - Define a string of English text, and translate it to Morse code using **MorseTree**
    - Using the same string as above, translate it back into English text

Example output: (note: you should not italicize your output, and ellipsis are used only to indicate that more is expected)

Your pre/post order functions should return a string with each letter separated by a space

Preorder tree contents: e i s h v …

When translating from English to Morse code, the pipe character (|) separates each character. Whitespace is totally ignored.

Input: The quick fox
Output: - | o o o o | o | - - o - | o o - | o o | - o – o | - o - | o o – o | - - - | - o o - |

Be careful, this assignment only has one Class, and a tester, you need to write, but it is a **deep** one. Much work will be required for each of its methods!

Submit .java files **in a .jar file** for each of the above to the Brightspace link for Homework #6