**Assignment 3: Morse Code using Binary Trees (Last Programming Assignment)**

This assignment is based on programming exercise 7 of chapter 8, pp 509. It is helpful if you read the problem in the textbook and get familiar with “morse code” (e.g., via google search, Wikepedia).

Unlike the previous labs and assignments, you will design and code your own solutions from scratch. Also, this is an individual assignment and cannot be done as a team of two.

**Requirement/Data Structures**: You need to use a binary tree to keep a morse-code table, and implement encode and decode functions.

**Hint**: your data may be more complicated; you need the letter and a boolean, indicating that the node is empty, since not all nodes encode data. Here . and - are used instead of left/right. Use spaces to separate morse 'letters'. You need to use a binary tree, built by reading from the file. You need to encode and decode by searching on that tree.

You need to create a morse\_tree.h file, which defines one class, morse\_tree. This class

contains the following methods:

* **string encode(string),** that takes a string of characters and encodes it as morse-

code. Letters in either upper or lowercase get translated to morse, . and - pass

through unchanged, any other character is not passed to the output string. Use

space to separate the individual morse code letters. Notice you may want to do

one that encodes one character. You need to search the tree.

* **string decode(string)**, that takes a string of space-separated morse-code letters and produces a string with the corresponding letters. The produced string has all

lowercase letters and no spaces. You can safely assume the input string contains

only .- and spaces. If the combinations of .- for a given character is not valid, no

corresponding character should be put on the output string. Again, you need to

search the tree.

You need to read the morse-code data from a file called morse-code.txt . This file

contains the letter (lowercase), a space, and the morse code.

Your program should allow the user to choose either encode or decode. Then, the

program will ask for the string and print the corresponding result. (Then go back to the

selection, either encode or decode.)

If encoding is chosen, you can enter a string and the system will print the corresponding result (i.e., morse-code). If decoding is chosen, the system will print the letters for the corresponding to a string of morse-code.

**Turn In:**

* Submit source code (morse\_tree.h, morse\_tree.cpp) and text file (morse\_tree.txt)
* Include an info comment block at the top of your files as described in syllabus.
* Comment your code within your methods explaining your logic.
* NOTE: Unlike the previous assignments and labs, you need to provide your own testing cases. Your submission (above) should help TA (Tim S.) test your programs without confusion.