The Animal Guessing Game

This game is a version of "20 Questions" where the only category is animals. You think of an animal and your program will try to guess the animal by asking you a series of "yes or no" questions.

The program uses a tree to represent its knowledge about animals. Each leaf node contains the name of an animal and each interior node contains a question. For example, the tree,
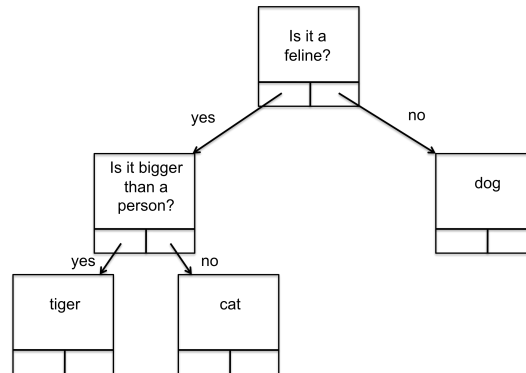
would cause the program to ask if the animal you are thinking of is a feline. If you respond "yes", it will ask you if it is bigger than a person. If you respond "no", it will guess that you are thinking of a cat.

If you had responded "no" when asked if it is a feline, it will guess dog. If that is not correct, the program will augment the tree with the animal you were thinking of by asking you what your animal was and asking for a question to distinguish your animal from a dog. Suppose you indicate that your animal was a bear and the question to distinguish a bear from a dog is "Is it canine?". The program will ask you what the answer for "bear" is and, when you say "no", it will add a "bear" node to the tree as follows:
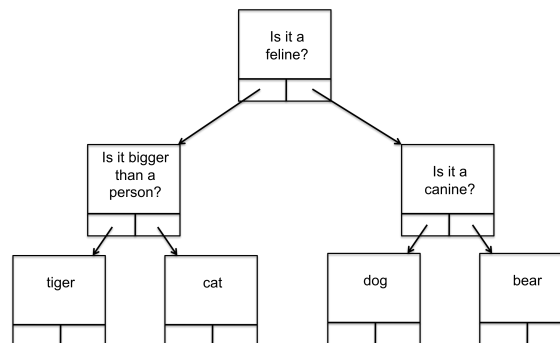
Note that two new nodes have been created, one for dog and one for bear. The old dog node has been overwritten with the question. Note that the tree is always a strictly binary tree, meaning that every node is either a leaf or has exactly two children.