CSI 32 LECTURE NOTES (Ojakian)

Topic 11: Structural Recursion

OUTLINE
(References: 11.1)

1. Structural Recursion
2. Examples: Bullseye and Binary Tree

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1. Basic Example

   PROBLEM 1. *Create a Tally class which somehow stores as internal data some number of "tally marks" (i.e. 1's). There should be a method to return the number of 1's. Create the class with structural recursion.*

2. Bullseye Example

   PROBLEM 2. *Write a program that takes a positive integer as input and then uses Tkinter to draw a picture of a bullseye with that many rings, alternating black and white. Do this using loops.*

   PROBLEM 3. *Do the last program again, but now using structural recursion. Then "unfold the recursion."*

3. Structural Recursion

   (a) Base Case. Do example with no base case to see problem ...

   (b) Unfolding Recursion.

   (c) Should make progress towards base case. Do example of not, to see problem ...

4. Improved Bullseye

   PROBLEM 4. *Add methods for getting number of bands, etc.*

5. Binary Tree

   PROBLEM 5. *Create a (cheap) Binary Tree class (though it need not be balanced). It should have an* `add` *method that takes one integer input and puts that integer in the right spot, where left is smaller and right is bigger. If the number is already in the tree, nothing is done. It should also have a* `member` *method which returns True or False, depending on whether or not the integer is in the tree.*