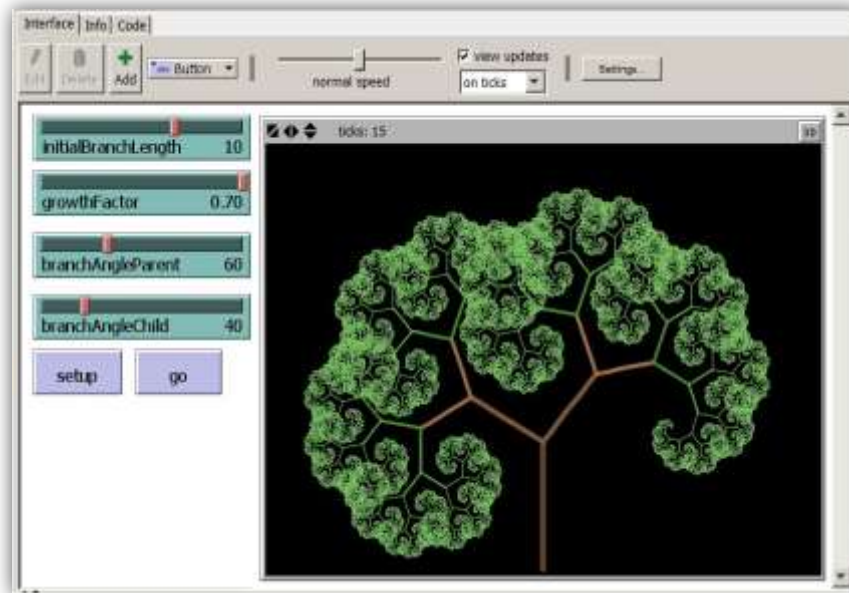


## CS108L Computer Science for All Module 8: Recursion and the Fractal Tree



### Model Overview:

The goal for this model is to create a **recursive program** that draws a tree- like **fractal pattern**. We define a recursive program as one that contains a procedure that calls itself! Recursion is a powerful concept that frequently stretches our brains! For more details on recursion, see this week's videos

### Setup:

- Create the following buttons: Setup and Go
- Create the following sliders:
  - initialBranchLength
  - growthFactor
  - branchAngleParent
  - branchAngleChild
  - branchThickness
- In Settings, set the location of origin to edge and bottom.
- Set the following coordinates:
  - min-pxcor = -23
  - max-pxcor = 23
  - max-pycor = 33



### The Basic Structure:

- For this module you will need a minimum of three procedures: Setup, Go, and Grow.
- Structure your Grow procedure in a recursive manner.
- Move your turtle a certain distance and “hatch” a new turtle with its heading set to branchAngleChild to grow your tree.
- Create a global variable that keeps track of the branch thickness of your fractal tree. This value should decrease with every call to the recursion.

### The overall approach to creating this model:

- 1) Build the basic model that creates a simple branching tree
- 2) Add changing the branch angle of the parent
- 3) Add in changing the branch thickness
- 4) Change the branch color
- 5) Change the branch thickness

Module 8: Recursion and the Fractal Tree Grading Rubric (20 Points Total)		
Done	Points	Task
	1	A: <ul style="list-style-type: none"> <li>• Submit a NetLogo source code with the file name: <i>M1.firstname.lastname.nlogo</i>.</li> <li>• The first few lines of your Code tab are comments including the following:               <pre>               ;Student's Name:               ;School:               ;Teacher's Name:               ;Date:             </pre> </li> </ul>
	2	B: <ul style="list-style-type: none"> <li>• The code in the Code tab of your program is appropriately documented with “in-line comments.”</li> </ul>
	2	C. <ul style="list-style-type: none"> <li>• You include a description of you program in the Info section. See Coding Standards Guidelines for more information.</li> </ul>



5	D: <ul style="list-style-type: none"><li>Clicking “Setup” and “Go” will run your program and create a fractal tree on the interface.</li></ul>
5	E: <ul style="list-style-type: none"><li>Clicking “Setup” and “Go” produces a treelike pattern with at least 3 different branch thicknesses for different generations – which may or may not match the choice of thicknesses shown above.</li></ul>
5	F: <ul style="list-style-type: none"><li>Clicking “Setup” and “Go” with the setting shown in Fig 1, produces a treelike pattern with at least 3 different branch colors for different generations – which may or may not match the choice of colors shown above.</li></ul>
2	G: <ul style="list-style-type: none"><li>(Extra Credit) Create a procedure that passes in two parameters <code>sz</code> and <code>colr</code>. The procedure should allow you to create a turtle of with a given size and color. You will call the procedure with code similar to this:  <code>create-my-turtle 3 red.</code>  Make a button on your interface to call this procedure!</li></ul>