Visualizing Computer Programs

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The goal of this project is to create a visualization tool for beginner programmers to understand how code is executed and to be able to see what the program sees. The end visual will be code on a panel that shows the current line that is being executed as well as showing the stack of execution as a series of stacked panels. This will both give insights to programs that are having problems as well as give insight to new programmers for the fundamentals of iteration versus recursion.

The first step in this process will be creating a versatile c# function that can work with an existing c# program to aid the visualization process. It will either work by taking in a string and compiling it as well as displaying the text, or work along side of the executing line of code in the main program.

After this I will create the visuals in unity to display the information that is held from the first step. The intention is to have the panels highlight the current line of code as well as the values for the local variables. The panels will be stacked in such a way that the current function is on top, but the previous code that called said function can be seen if desired. Another element that would be nice would be to have multiple stacks if the executing program is running with multiple threads.

After we can visualize the code, I want to create a simple interactive panel that sits in front of the user so they can speed up or slow down the execution of the code if they desire. This will probably include a lever or button to turn the code on and off as well as a knob that the user can grab and turn.

Finally, a reach goal is to make my program read in an existing program, do manipulations on it to insert the appropriate function calls, compile, and execute the new code to run the visualization. This would be significantly more powerful as you could watch any program without the need of marking it up yourself, though this will be difficult to achieve.

I am anticipating each step to take 1 to 2 weeks, but the last step may take longer or might not be possible in the timespan.