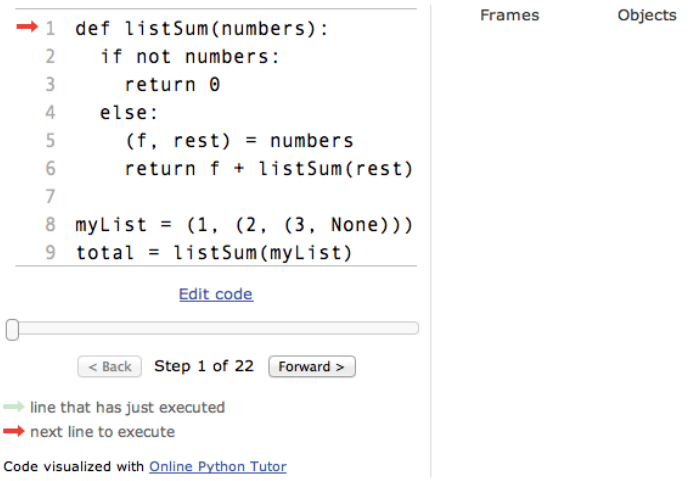
National University of Singapore
School of Computing
CS1010S: Programming Methodology
Semester I, 2018/2019

Debugging Exercises III

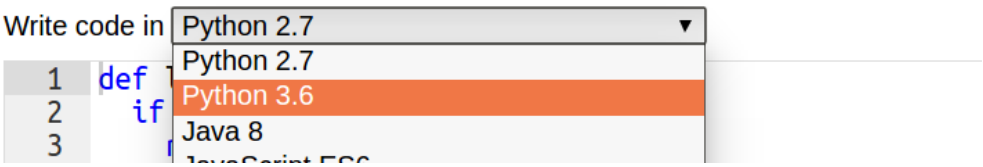
In the previous part, we have already walked through the basic debugging techniques in IDLE. In this session, we will introduce an online tool to help you debug and visualize the execution of your Python code.

Get started

Open the URL `http://pythontutor.com` in your browser and scroll down until you see the screen below.



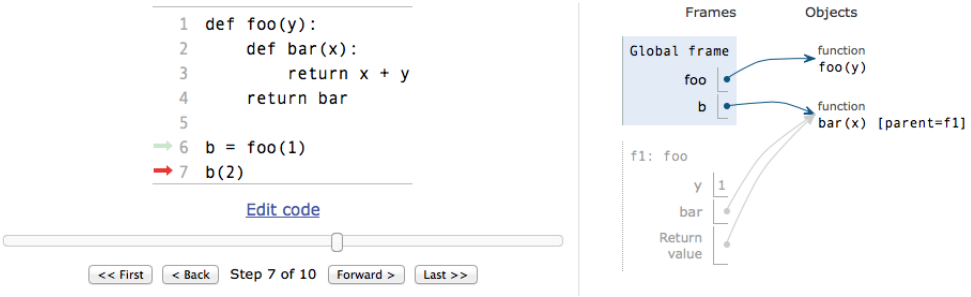
Click on Edit code. Change the Python version to 3.6 and leave other settings unchanged.



Scroll down and select closure 1. You should see code changed in the text editor above. We will use this simple program to illustrate. Click on Visualize Execution.

Similar to the Step button in IDLE debugger, the Forward button allows you to evaluate statements one step at a time. The Back button goes back the the previous statement executed. The First and Last button goes to the first and the last line of code respectively.

Click on forward and note the change on the right side. Stop at Step 7. You will see the following screen.



The green arrow indicates the line that has just been executed and the red arrow is the next line to execute. At step 7, we have just finished executing `b = foo(1)`. That means we have defined a function `foo` and a variable `b`.

The right hand side has two columns: Frames and Objects. The Frames column contains the variable names that appear in the program. Each variable name locates inside its own variable scope. In this program we have two variable scopes and you can see two colored blocks. The global frame contains global variables. The `f1: foo` frame contains all parameters of the function `foo` and the variables defined in it. Those variables are not accessible outside the scope of `foo`. The Objects column contains the actual values of those variable names.

Click on forward and explore the sequence of execution by yourself. In each step, pay attention to the variables, how they are stored in the memory and how their values change on the right side. More about memory allocation will be introduced in the next session.

Now you may proceed to training questions.