Lesson 3.04: Debugging and Scope ## Learning Objectives Students will be able to... * Define and identify scope, aliasing, stack trace * Demonstrate changing a list in a function updates the list outside of the function * Demonstrate updating variables in a function does not affect the variable outside of the function * Demonstrate using global variables * Draw a simple stack trace ## Materials/Preparation * [Do Now] * [Lab - Aliasing & Scope] ([printable lab document]) ([editable lab document]) * Read through the do now, lesson, and lab so that you are familiar with the requirements and can assist students. * [Associated Readings 3.4] (https://tealsk12.gitbook.io/intro-cs-2/readings#3-4) ## Pacing Guide | **Duration** | **Description** | | ---------- | ---------- | | 5 Minutes | Do Now | | 10 Minutes | Lesson | | 30 Minutes | Lab/Review | | 10 Minutes | Debrief | ## Instructor's Notes ### 1. Do Now * Students have a chance to think about what & discuss what concepts they have been most challenged by. * Next, students practice passing a list as an argument and updating that list within the function. ### 2. Lesson * Discuss what students observed in the Do Now and take time, if needed, to go over questions about concepts that students find challenging. #### Aliasing * Explain the concept of **aliasing**. * You can draw on the board a diagram of the variable pointing to a list. * Note that when passing the location of a list you are not passing the actual value, so the list can be changed. * **Video Explanation of Aliasing** [![Python - aliasing](https://img.youtube.com/vi/7m_cw30tyr0/0.jpg)] (https://www.youtube.com/watch?v=7m_cw30tyr0) #### Scope of functions * Explain to students that variable scope is the part of a program where a variable is accessible * A variable which is defined in the main body of a file is called a global variable. * **Video explanation of Variable Scope** [![Python - Scope] (https://img.youtube.com/vi/A054Ged9suI/0.jpg)](https://youtu.be/A054Ged9suI) #### Global variables: variables defined outside of a function and used in many different functions * To modify global variables defined outside the function you must declare the variable with the statement `global name_of_variable`. * Any variable created inside of a function is a local variable. * Variables in functions include the function parameters, the variables defined in the function and variables declared as global. * Local variables of functions can't be accessed from outside when the function call has finished. * Explain global variables are often used for constants. * NOTE: We use the 'ALL CAPS' convention for global variables. #### Conventions * Discuss that programming languages frequently have **conventions**. It helps make code more readable, but isn't essential to functionality (in most cases). Here are some examples, * camelCase for function names * ALL_CAPS for global variables underscore_separated for variables #### Stick Diagrams * Demonstrate how to draw the Stack Diagrams shown in the course book ([found in section 3.4](https://tealsk12.gitbook.io/intro-cs-2/readings#stack-diagrams)) and explain how they show the scope of variables as they related to functions. * Point out the error messages that will occur if you use a variable out of its scope. #### Debugging * Help students follow their program to understand how the code is working * Explain how the use of print statements throughout your code can let you know where in the program things are not operating as expected. ### 3. Lab * This lab has students running code that gets them thinking about aliasing and scope. They must also create a stack trace for a program to show their understanding of scope. ### 4. Debrief * Take time to review the concepts covered today: **scope**, **aliasing**, and **stack traces**. * Call a few students to the board to draw their stack traces from the lab and talk through them. ## Accommodation/Differentiation If students are moving quickly, they can look ahead at the project spec or research the game Oregon Trail for context. ## Forum discussion [Lesson 3.04: Debugging and Scope (TEALS Discourse Account Required)](https://forums.tealsk12.org/c/2nd-semester-unit-3-functions/lesson-3-04-debugging-and-scope) [Do Now]:do_now.md.html [Lab - Aliasing & Scope]:lab.md.html [printable lab document]: https://github.com/TEALSK12/2nd-semester-introduction-to-computer-science/raw/master/units/3_unit/04_lesson/lab.pdf [editable lab document]: https://github.com/TEALSK12/2nd-semester-introduction-to-computer-science/raw/master/units/3_unit/04_lesson/lab.docx