

Introduction to Python

IT-Adventures: Smart IT

Textbook Overview

- **[How to Think Like a Computer Scientist: Interactive Edition](https://runestone.academy/runestone/books/published/thinkcspy/index.html)**
 - <https://runestone.academy/runestone/books/published/thinkcspy/index.html>
- Each Lesson will have a recommended reading section
 - Each reading will also have interactive questions incorporated into the readings.
- The readings are not required but will help immensely.
- First reading is chapter 2.1-2.8

What is Programming?

- Computers are super fast
 - 3 GHz processors do 3 billion instructions per second
- However the instructions they do are very simple, like basic addition or storing a number in a register
 - But because of how simple it is this means it's endlessly expandable
- Every program is nothing more than a list of simple instructions that the processor will break down into even more simple instructions
 - Everything you do on a computer is broken down eventually into 0s and 1s that flow through logic gates to perform tasks

Why Python?

- Python is the easiest programming language to learn and is written just about the same way you would say the instructions aloud
 - People often make jokes that python is the same as though you were programming in pseudocode, or an extremely simplified version of any other language
- Python has grown to be one of the most common programming languages used in the world today on par with programming giants like java
- Because it's so easy to program with it can be used to do just about anything
 - It's used for something as small as scripting, a small program designed to automate a task in order to save time, all the way to something as complex as machine learning and neural networks
- To make things even easier, developers have written a collection of modules that are collections of functions that can be called by others to save time writing them yourselves

Hello World

- Traditionally the first program written by students
- Each language has its own syntax that must be followed or error will occur and the program will not work
 - Do statements need to be inside classes/methods?
 - Not Python! Python does not require code to be in any class, method, or function to be run initially
- The syntax for the hello world statement is as simple as
 - `print("Hello World")`

Variables

- Variables are used to store information that will be needed later
 - This is often likened to a bucket
- Different types of variables play by different rules
 - Though something special about python is that variables are type agnostic, meaning that a variable could be assigned to an integer, and then reassigned to hold any other variable type without causing any problems
 - string, int, float, etc.
- Objects are variables that can hold multiple variables with themselves
 - Like a car, a variable made of variables, make, model, color, etc.

Input and Output

- Input is handled by the `input()` command
- When `input` is called the terminal will print out the arguments given to it, and then wait for the user's input
- Output can be handled by `print` statements for terminal output and by `return` statements for functions, but we'll be handling those at a later date same with writing to files

Statements vs. Expressions

- A statement is an action or command that does something
 - Assignments, print, etc.
- An expression is a mix of values, variables, and operations with an end goal of producing a value
 - Method calls, if statements, etc.

Writing Programs

- 3 parts
 - (optional) Function definition
 - Body
 - (optional) return statement

```
1 # add a '#' before your line
2 # to write a comment
3
4 #Function definition
5 def challenge_hint(a, b):
6
7     #body
8     c = a + b
9
10    #return statement
11    return c
12
```

Challenge 1

- Write a program that:
 - Takes in 2 numbers from input
 - Add, subtract, multiply, and divide the numbers and print the output
 - Convert the numbers into strings
 - Print both strings on the same line
- Watch the YouTube link to see a step-by-step solution
 - <https://youtu.be/qNZEwJU5YSI>