

# Intro to Python, Data Types, Sequences

Prof. Abby Stylianou

# Logistics

- Assignment 0 due before you walked in
- Next class: quiz/journal on →
- This week: learning python!

TECHNOLOGY

## How a Feel-Good AI Story Went Wrong in Flint

A machine-learning model showed promising results, but city officials and their engineering contractor abandoned it.

ALEXIS C. MADRIGAL JAN 3, 2019



Workers in Flint, Michigan, replace a lead water-service pipe. (BILL PUGLIANO / GETTY)

MORE IN THIS SERIES



Technology is transforming life for better and worse

Tech Is Killing Stuff  
CHRISTINE ROBERTSON

An Augmented Reality  
SARAH GAILEY

Meet the Safecracker  
GEOFF MANAUGH

**M**ORE THAN a thousand days after the water problems in Flint, Michigan, became national news, thousands of homes in the city still have lead pipes, from which the toxic metal can leach into the water supply. To remedy the problem, the lead pipes need to be replaced with safer, copper ones. That sounds straightforward, but it is a challenge to figure out which homes have lead pipes in the first place. The City's records are incomplete and inaccurate. And digging up all the pipes would be costly and time-consuming.



**Melissa Kline**  
@melissaekline



My strongest memory of learning to code is sitting thru my very first lecture silently panicking because while the FOR loop concept made perfect sense, I had no idea what I was supposed to do with it. I knew 'type it into Word' was wrong, but didn't know how to ask the Q...

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- Instruct a computer to carry out tasks
  - “Add 2 + 4”
  - “Round 3.14159265”

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  - “Read in a file with the stock prices for a stock over the last 5 years and compute the average return”

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  - “Read in a file with the stock prices for a stock over the last 5 years and compute the average return”
- Write these instructions in a language the computer can understand

# Parts of a Program

- Expressions

Expression Type	Operator	Example	Value
Addition	+	2 + 3	5
Subtraction	-	2 - 3	-1
Multiplication	*	2 * 3	6
Division	/	7 / 3	2.66667
Remainder	%	7 % 3	1
Exponentiation	**	2 ** 0.5	1.41421

# Parts of a Program

- Variables

NAME	VALUE	TYPE
number	123	int
sum	-456	int
pi	3.1416	double
average	-55.66	double

A variable has a name, stores a value of the declared type

# Parts of a Program

- Operations

a = 1

b = 2

c = a + b

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- Operations

```
a = 1  
b = 2  
c = a + b
```

- Functions (named operations)

```
max(2, 2 + 3, 4)
```

```
give_everyone_in_class_an_a(class_list)
```

# Python

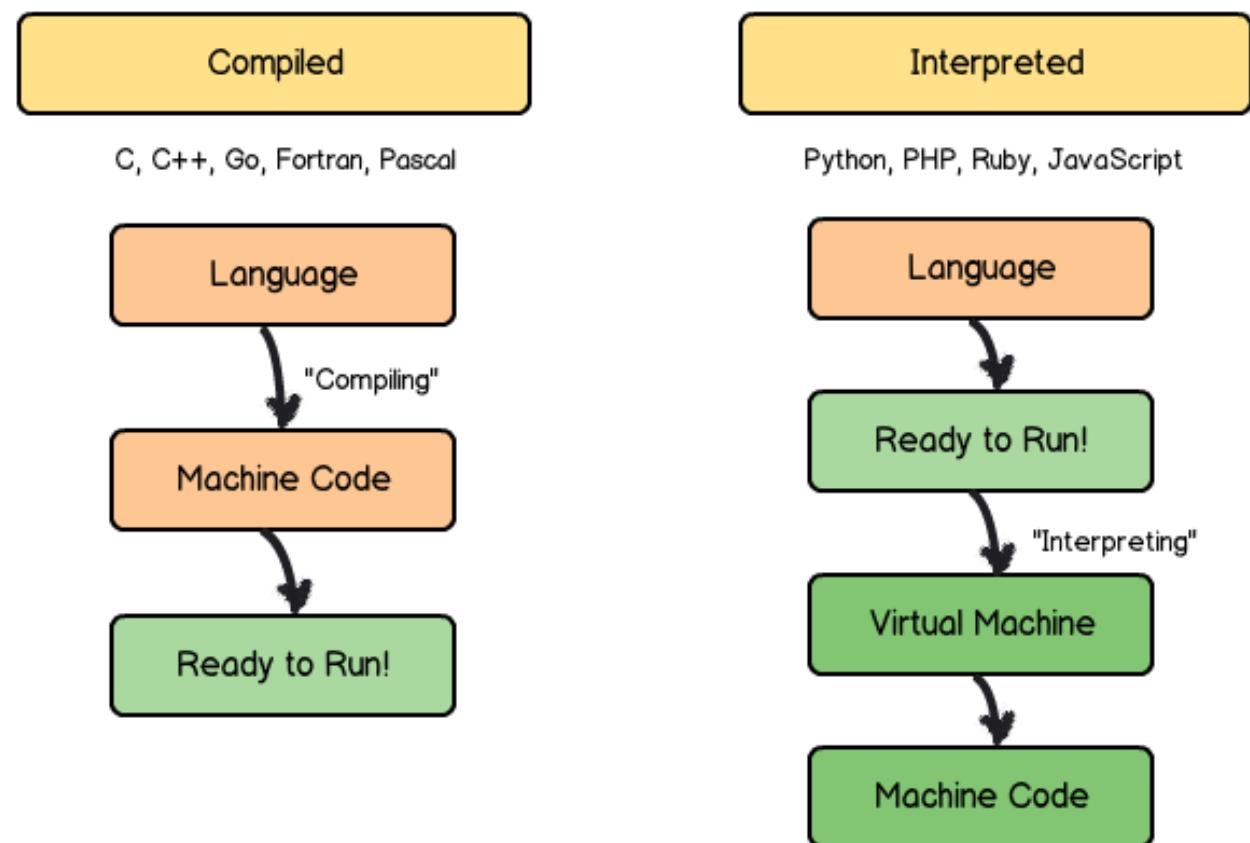
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- Dynamically typed

## Static typing:

String name;	Variables have types
name = "John";	Values have types
name = 34;	Variables cannot change type

## Dynamic typing:

var name;	Variables have no types
name = "John";	Values have types
name = 34;	Variables change type dynamically

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- Readable!

# Hello World: Python vs. Java

A "Hello, World!" program generally is a computer program that outputs or displays the message "Hello, World!". Such a program is very simple in most programming languages, and is often used to illustrate the basic syntax of a programming language. It is often the first program written by people learning to code.<sup>[1][2]</sup>

[https://en.wikipedia.org/wiki/%22Hello,\\_World!%22\\_program](https://en.wikipedia.org/wiki/%22Hello,_World!%22_program)

```
def hello_world():
    print("Hello, world!")

hello_world()
```

```
public class HelloWorld {
    public static void main (String[] args) {
        System.out.println("Hello, world!");
    }
}
```

# Whitespace in Python

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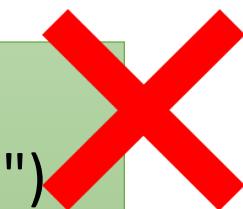
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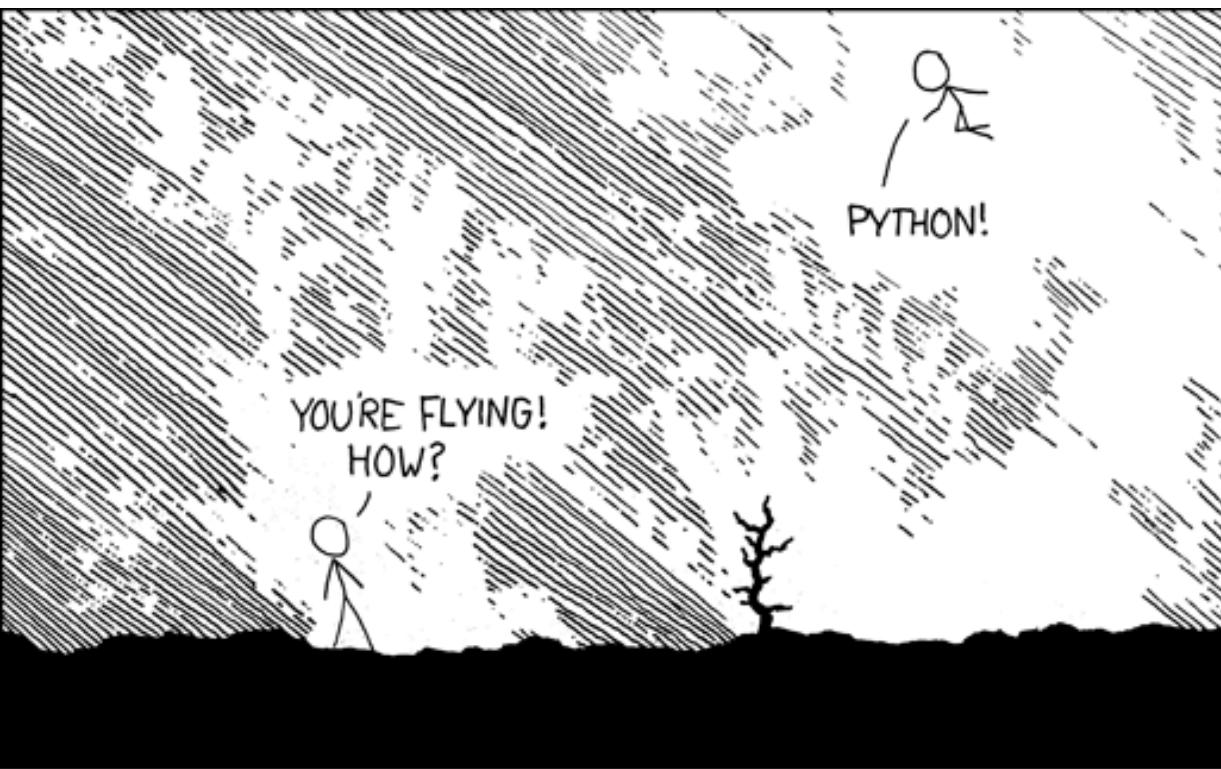
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hello_world()
```



```
>>> def hello_world():
...     print("Hello, world!")
...
>>> hello_world()
Hello, world!
[>>>
[>>>
>>> def hello_world():
...     print("Hello, world!")
File "<stdin>", line 2
    print("Hello, world!")
          ^
IndentationError: expected an indented block
>>>
```

# Python



I LEARNED IT LAST NIGHT! EVERYTHING IS SO SIMPLE!  
/ HELLO WORLD IS JUST  
print "Hello, world!"

I DUNNO...  
DYNAMIC TYPING?  
WHITESPACE?  
COME JOIN US!  
PROGRAMMING IS FUN AGAIN!  
IT'S A WHOLE NEW WORLD UP HERE!  
BUT HOW ARE YOU FLYING?

I JUST TYPED  
import antigravity  
THAT'S IT?  
/ ... I ALSO SAMPLED  
EVERYTHING IN THE  
MEDICINE CABINET  
FOR COMPARISON.  
/ BUT I THINK THIS  
IS THE PYTHON.

# Open your jupyter hub (cs1070.com)

Not Secure | cs1070.com/user/abby/tree

f t WACV2020 GitLab CSCI 1070: Tamin... CSCI 1070 1070 Readings 1070 Slide Refere...

jupyter Logout Control Panel

Files Running Clusters

Select items to perform actions on them.

0 /

cs1070\_materials

cs1070\_textbook

Name ↴

Upload New ↴

Notebook: Python 3

Other: Text File

Folder

Terminal

First start terminal....

# Open your jupyter hub (cs1070.com)

The screenshot shows a web browser window with the URL `Not Secure | cs1070.com/user/abby/tree`. The page title is "jupyter". The navigation bar includes links for Facebook, Twitter, AWS, AS, WACV2020, GitLab, CSCI 1070: Tamin..., CSCI 1070, 1070 Readings, 1070 Slide Refere..., Logout, and Control Panel. Below the navigation bar, there are tabs for "Files", "Running", and "Clusters", with "Files" selected. A message says "Select items to perform actions on them." followed by a list of items: "0" (checkbox), a folder icon, and two folder names: "cs1070\_materials" and "cs1070\_textbook". To the right, there is a "New" button with a dropdown menu. The "Notebook" option in the dropdown is highlighted with a red box and labeled "Python 3". Other options in the dropdown include "Text File", "Folder", and "Terminal".

## Start a new Python3 Notebook

# Next time...

- More on python...
- Quiz / journal on **How a Feel-Good AI Story Went Wrong in Flint**
- Background: <https://www.youtube.com/watch?v=Vwrv34lBgVo>