



Week 1

Basic Python programs,
defining functions

Python!

- Created in 1991 by Guido van Rossum (now at Google)
 - Named for Monty Python
- Useful as a **scripting language**
 - **script**: A small program meant for one-time use
 - Targeted towards small to medium sized projects
- Used by:
 - Google, Yahoo!, Youtube
 - Many Linux distributions
 - Games and apps (e.g. Eve Online)



Installing Python

Windows:

- **Miniconda** Python distribution
<https://docs.conda.io/en/latest/miniconda.html>
 - `conda create -n test-env`
 - `conda activate test-env`
- Anaconda comes with approximately 300 popular Python and data science packages for you, such as NumPy, Matplotlib, pandas, Regex, BeautifulSoup, requests, Bokeh, SciPy, SciKit-Learn, Seaborn, Spacy, sqlite, statsmodels and many more

Mac OS X:

- Python is already installed.
- Open a terminal and run `python` or run Idle from Finder.

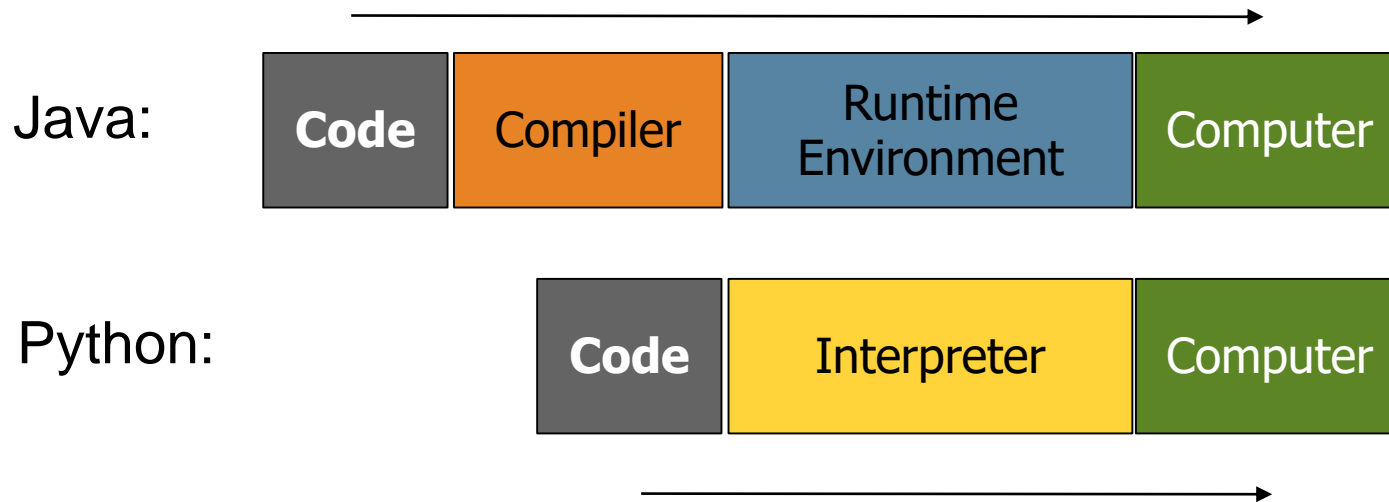
Linux:

- Chances are you already have Python installed. To check, run `python` from the terminal.
- If not, install from your distribution's package system.

Interpreted Languages

- **interpreted**

- Not compiled like Java
- Code is written and then directly executed by an **interpreter**
- Type commands into interpreter and see immediate results



The Python Interpreter

x = 2



Assignment statement

x = x + 2



Assignment with expression

print(x)



Print statement

Variable

Operator

Constant

Function

Sentences or Lines

- Allows you to type commands one-at-a-time and see results
- A great way to explore Python's syntax
 - Repeat previous command: Alt+P

Chapter 1 Review

- Console output: `System.out.println`
- Methods: `public static void name() { ...`

Hello2.java

```
1 public class Hello2 {  
2     public static void main(String[] args) {  
3         hello();  
4     }  
5  
6     public static void hello() {  
7         System.out.println("Hello, world!");  
8     }  
9 }
```

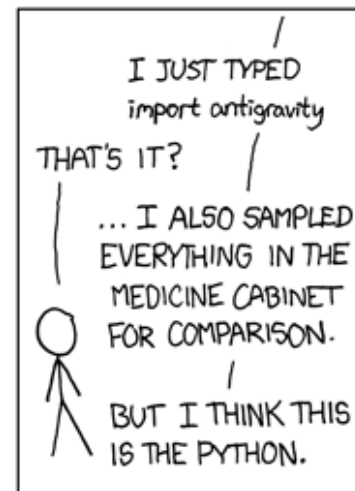
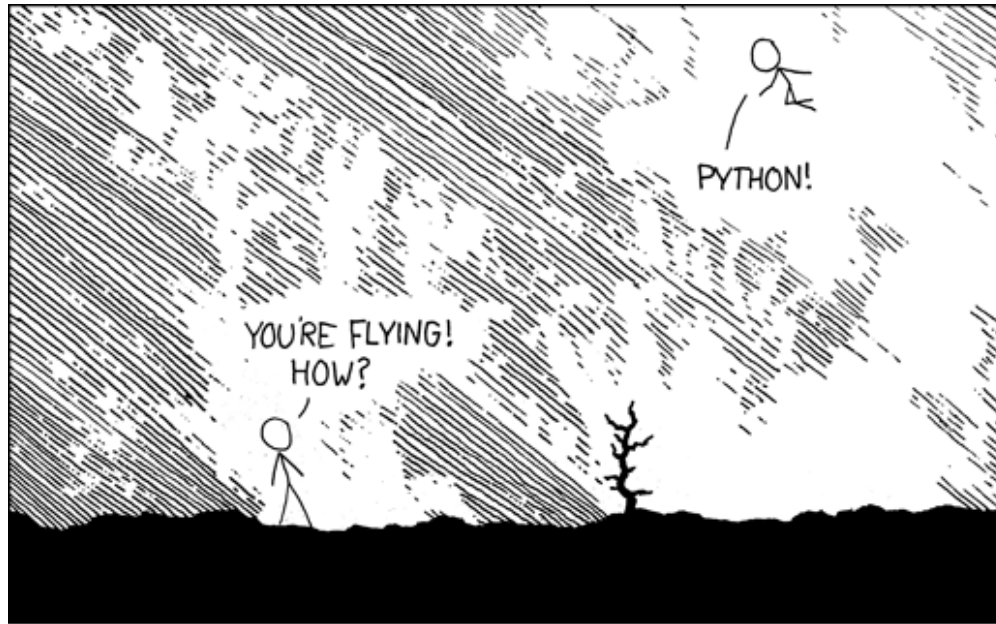
Our First Python Program

- Python does not have a `main` method like Java
 - The program's main code is just written directly in the file
- Python statements do not end with semicolons

hello.py

```
1 print("Hello, world!")
```


A Brief Review



The `print` Statement

```
print("text")
```

```
print()           (a blank line)
```

- Escape sequences such as `\` are the same as in Java
- Strings can also start/end with `'`

swallows.py

```
1 print("Hello, world!")
2 print()
3 print("Suppose two swallows \"carry\" it together.")
4 print('African or "European" swallows?')
```

The `print` Statement

- The `print` has some optional arguments to control where and how to print
- This includes `sep` the separator (default space) and `end` (end character) and `file` to write to a file

```
print("Hello", "World", sep='...', end='!!!')
```

Hello...World!!

The `print` Statement

- `{0:2}`: width space
- `{0:5d}` : width space, integer type

```
>>> print('{0} and {1}'.format('spam', 'eggs'))
spam and eggs
>>> print('{1} and {0}'.format('spam', 'eggs'))
eggs and spam
```

Comments

- Syntax:
 # comment text (one line)

swallows2.py

```
1  # Suzy Student, CSE 142, Fall 2097
2  # This program prints important messages.
3  print("Hello, world!")
4  print()                    # blank line
5  print("Suppose two swallows \"carry\" it together.")
6  print('African or "European" swallows?')
```

Functions

- **Function:** Equivalent to a static method in Java.
- **Syntax:**

```
def name () :  
    statement  
    statement  
    ...  
    statement
```

hello2.py

```
1  # Prints a helpful message.  
2  def hello():  
3      print("Hello, world!")  
4  
5  # main (calls hello twice)  
6  hello()  
7  hello()
```

- Must be declared above the 'main' code
- Statements inside the function must be indented

Whitespace Significance

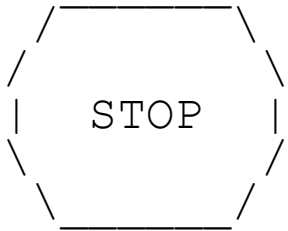
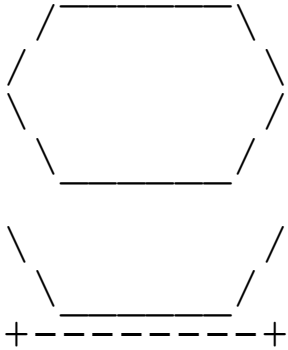
- Python uses indentation to indicate blocks, instead of { }
 - Makes the code simpler and more readable
 - In Java, indenting is optional. In Python, you **must** indent.

hello3.py

```
1  # Prints a helpful message.
2  def hello():
3      print("Hello, world!")
4      print("How are you?")
5
6  # main (calls hello twice)
7  hello()
8  hello()
```

Exercise

- Rewrite the Figures lecture program in Python. Its output:



Exercise Solution

```
def egg():
    top()
    bottom()
    print
```

```
def cup():
    bottom()
    line()
    print
```

```
def stop():
    top()
    print("|   STOP   |")
    bottom()
    print
```

```
def hat():
    top()
    line()
    print
```

```
def top():
    print("          ")
    print("/_____\\")
    print("/          \\")
```

```
def bottom():
    print("\\          /")
    print("\\_____/" )
```

```
def line():
    print("+-----+")
```

```
# main
egg()
cup()
stop()
hat()
```