# Learn To Program With Python 3

## Thinking About Programs

# What is Program?

- A collection of instructions that can be executed by a computer to perform a specific task.

- Written by a computer programmer in a programming language.

- Human readable programs are compiled (translated) into machine readable code (binary) and then executed by a computer

  - Think of the compiler as a "translator". It translates are source code written in English, to binary which the computer can understand.

# How do programs work?

- A program is a plain text document with a certain file extension:
  - program_one.py
  - program_two.java
  - program_three.php
  - program_four.c

- This file, also known as the source code, is converted from the plain text document to a computer readable file by the compiler.

- The compiler starts at the *TOP* of the file and reads *character by character*, line by line, until the bottom of the file

- The compiler only understands the programming languages rules: it's syntax

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## Example Programs

# "Hello World!" Program

- The image to the right is a valid python program.

- What do you think it does?

- Do you notice any patterns in the code?

```python
# filename: hello_world.py
print("Hello World!")
```

# Example Two

- The image to the right is a valid python program.

- What do you think it does?

- Do you notice any patterns in the code?

```python
# filename: example_one.py
print(2 + 4)
print(2 - 4)
print(2 / 4)
print(2 * 4)
print(2 + 4 * (4 - 2))
print(2 ** 4)
```

# Example Three

- The image to the right is a valid python program.

- What do you think it does?

- Do you notice any patterns in the code?

```python
# filename variables.py
myname = "Juan"
print(myname)


myage = 33
print(myage)


print("Hi my name is: " + myname)
print("I am " + myage + " years old!")
```

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# Example Four

- The image to the right is a valid python program.

- What do you think it does?

- Do you notice any patterns in the code?

```python
# filename conditionals.py
myage = 25
if myage > 18:
    print("You can vote")


if myage > 21:
    print("You can party!")


if myage > 35:
    print("You can run for president!")
```

# Example Five

- The image to the right is a valid python program.

- What do you think it does?

- Do you notice any patterns in the code?

```python
#filename loops.py
for number in range(0, 10):
    print(number)
```

# Example Six

- The image to the right is a valid python program.

- What do you think it does?

- Do you notice any patterns in the code?

```python
# filename functions.py

def say_hello(persons_name):
    print("Hello there " + persons_name + "!")


say_hello("Juan")
say_hello("Angela")
```

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# Syntax

- Syntax: the syntax of a computer language is the set of rules that defines the combinations of symbols that are considered to be a correctly structured document or fragment in that language.

- Different languages have different syntax.

- An error in the programming languages rules is called a syntax error.

- Compilers only understand STRICT syntax rules. They will not know "what you meant to type" when you make a syntax error.

# Syntax Error and Debugging

- You will make many mistakes while programming. **Embrace it.**

- Some errors are easy to solve, some are very hard.

- The process of finding and resolving errors in your program is called debugging.

- ALWAYS THINK LIKE A COMPILER (character by character, line by line)

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# Syntax Error and Debugging

- The program on the right has a syntax error.

- What do you think is?

- Pay close attention to the error statement below.

```
# filename syntax_example.py
print("Hello Juan")
print("Hello Angela')
```

```
PFS: ~/workspace/pfs/learn-python-3.8/1-first-program (master) $ python syntax_example.py
  File "syntax_example.py", line 3
    print("Hello Angela')
                        ^
SyntaxError: EOL while scanning string literal
```

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