CS 152: Introduction, Types, and Variables

CS 152: Python for STEM

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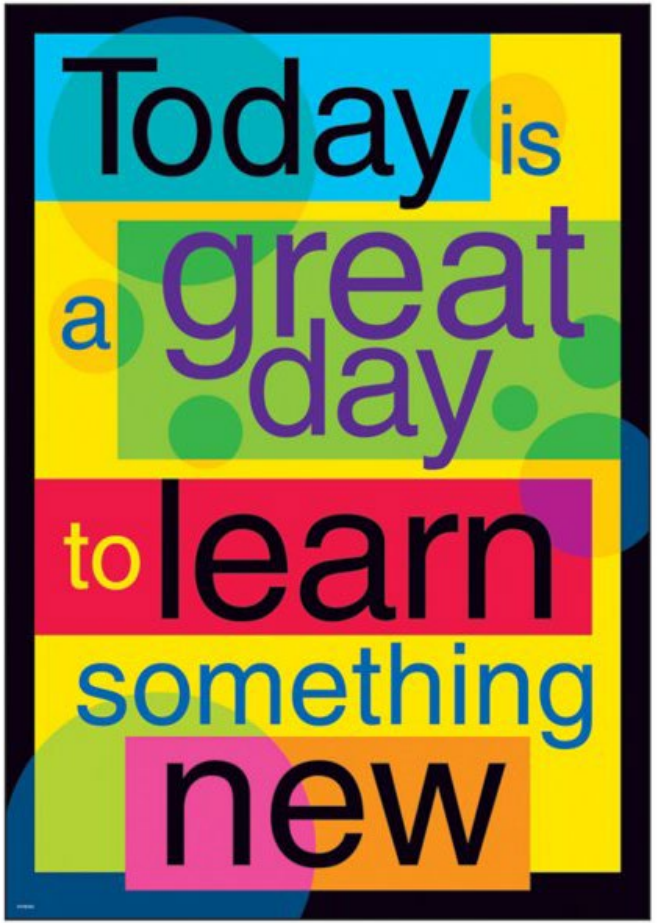
Weekly Announcements!

TODO Reminders:

- Setup MS Teams
- Reading 1 (zyBooks)
- Reading 2 (zyBooks)



Learning to program is…

Image available at: https://images.theconversation.com/files/222595/original/file-20180611-191978-7zidl7.jpg?ixlib=rb-1.1.0&q=45&auto=format&w=926&fit=clip

- to learn a new language! The computer language ☺!

Image available at: https://miro.medium.com/max/1400/1*8eT_CDXmoc2LLVHtu9Z5qw.png

Learning the Python Language

- Line by line
- Each line is an instruction
- Basic instructions
  - Store values
  - Perform arithmetic on values
  - Call other functions on and using values

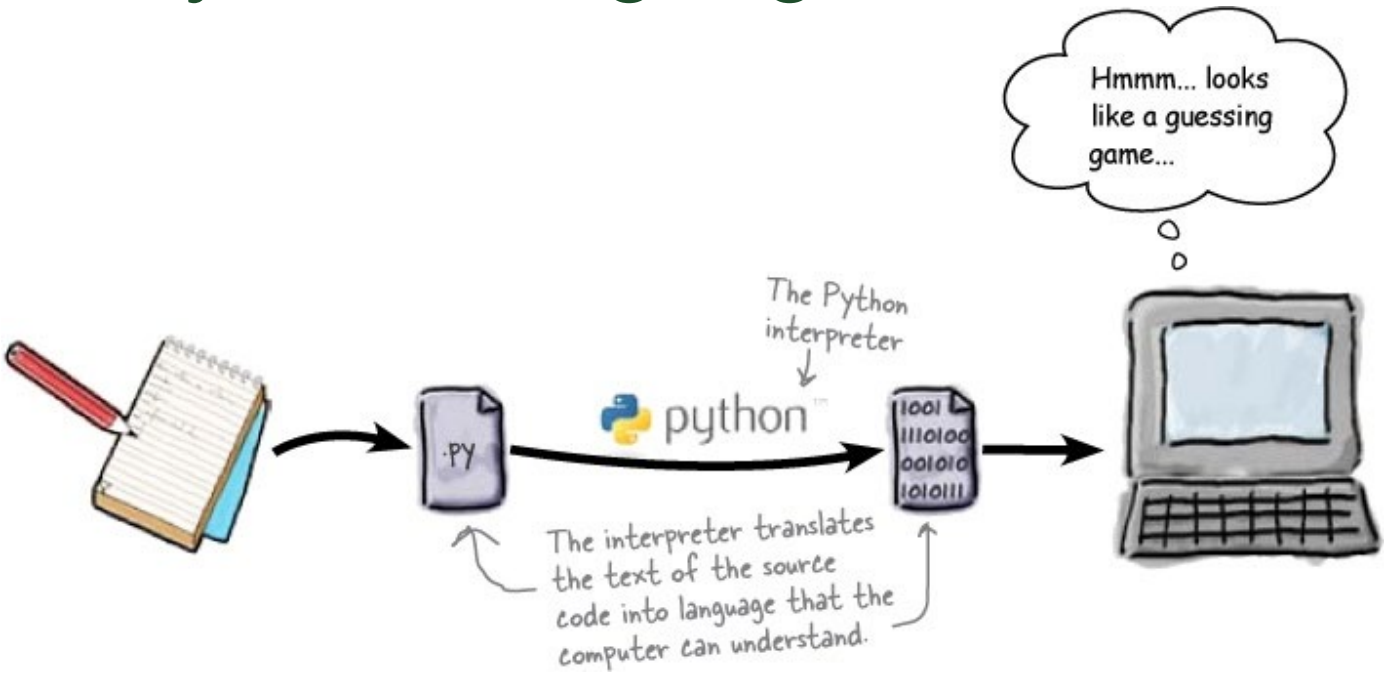


Image available at: https://www.oreilly.com/library/view/head-first-programming/9780596806682/httpatomoreillycomsourceoreillyimages1943857.png.jpg

Storing Values: Variables

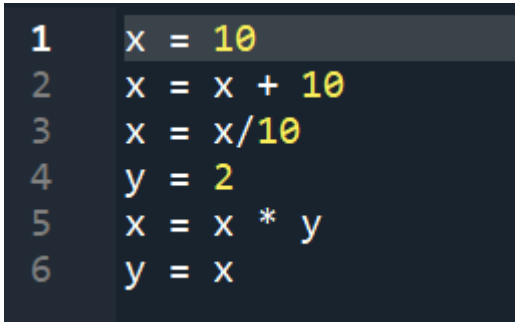
- Variable
  - is a place to hold a value
  - has an identifier/name (can not be any reserved keywords)
- Reserved keywords examples

```
False      await      else       import     pass
None       break      except     in         raise
True       class      finally    is         return
and        continue   for        lambda     try
as         def        from       nonlocal   while
assert     del        global     not        with
async      elif       if         or         yield
```

- Assignment statement
  - assigns the left-side variable with the right-side expression's value

Storing Values: Variables – Class Activity 1

- Consider the program below to answer the questions:



```
1  x = 10
2  x = x + 10
3  x = x/10
4  y = 2
5  x = x * y
6  y = x
```

1. How many variables do we have in this program?
2. What are their names/identifier?
3. What is the final value of each variable?
4. What happen if we run this program?

Output: Printing

- Function print()
  - Prints a message that could be:
    - A string literal - text enclosed in quotes
      - print(‘hello world!’) or print(“hello world!”)
    - A variable value
      - print(x)
    - A value resulting from an expression
      - print(x + 10)
    - A combination of all of the previous
      - print(‘value of x = ’, x, ‘ ’, ‘value of x + 10 = ’, x + 10)

Output: Printing – Class Activity 2

1. What does end=‘ ’ mean in the print on line 11?
2. Write down in a piece of paper the exact output for the program if we run it.

```
1   x = 10
2   print(x)
3   x = x + 10
4   print(x)
5   print(x + 10)
6   print('value of x = ', x, ' ', 'value of x + 10 = ', x + 10)
7   x = x/10
8   y = 2
9   x = x * y
10  y = x
11  print(x, end=' ')
12  print(y)
```

Output: Printing – Class Activity 3

1. How many variables do we have in this program?
2. What are their names/identifier?
3. What is the final value of each variable?
4. Write down in a piece of paper the exact output for the program if we run it.

```
1   computer = "Bombe Machine"  # assignment of string to variable
2   code = 10  # whole number - called int
3   formula = (code * 3/2) - 2.1  # now a floating point number
4   print("The code to the " + computer + " is ", end='')
5   print(formula)
```

Types in Python

- Python using ”implicit”/weak typing
  - figures out types for you!
  - Unlike Explicit/Strongly Typed Languages (Java)

```
1   computer = "Bombe Machine"  # assignment of string to variable
2   code = 10  # whole number - called int
3   formula = (code * 3/2) - 2.1  # now a floating point number
4   print("The code to the " + computer + " is ", end='')
5   print(formula)
```

Syntax Errors – Class Activity 4

- violate a programming language's rules
- Find and correct the error(s) in each statement below:

```
print("My name is)
```

```
    print("My name is)
                       ^
SyntaxError: EOL while scanning string literal
```

```
x + y = 10
```

```
    x + y = 10
            ^
SyntaxError: can't assign to operator
```

```
x = 10
y = 20
print('x = ' x, y= , y)
```

```
    print('x = ' x, y= , y)
                    ^
SyntaxError: invalid syntax
```

Logical Errors – Class Activity 5

- the program is logically flawed
- Find and correct the error(s) in each statement below:

```
x = 10
#10% increase on x
print('x = ', x * 10)
```

```
x = 10
y = 20
z = 30
#arithmetic average
average = x + y + z / 3
```

```
x = "abc"
y = "dc"
#concatenating x and y
z = x - y
print(z)
```

Peer Coding – Class Activity 6

- Write a Python program that swaps the value of two variables.
- For example, if variable a = 10 and variable b = 20 at the beginning of the program, after swapping their values “a” will have 20 and “b” will have 10
- Explain why do you think your program works.
- Explain what do you need to do in order to make your program “general”, meaning that it could work for any two values defined by a user.

Peer Coding – Class Activity 7

- Access Canvas and go to the “In Class Activity: ASCII Art”.