Welcome!

Making Game with Python (1)

Zhihong (John) Zeng & Andrew Zeng

Zhihong (John) Zeng

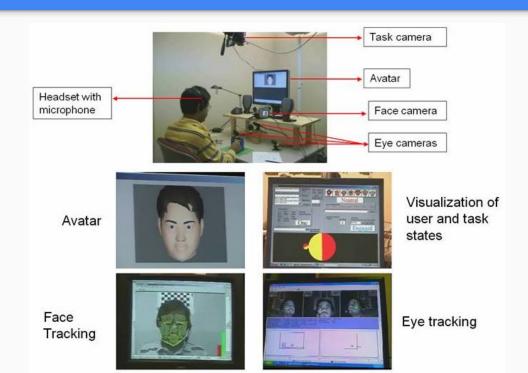






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Computer Game: Human-computer Interaction



Andrew Zeng



Today

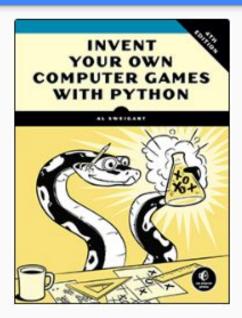
- School Rule
- Course info
- Computer fundamentals
- Python basics
- Mathematical operations
- Python variables and types
- Exercise

School Rule

- 1. Students must address teachers and parents respectfully at all times.
- 2. Students must attend the class(es) on time with all the needed and required supplies, materials, and instruments.
- 3. Students must wait at assigned area if coming in early.
- 4. Students must follow classroom rules for appropriate behavior.
- 5. No running, chasing, and/or yelling in corridors when class is in recess.
- 6. Students must respect and take good care of school property.
- 7. Students must help keep classroom clean and neat. No food or drinks are allowed in classroom.

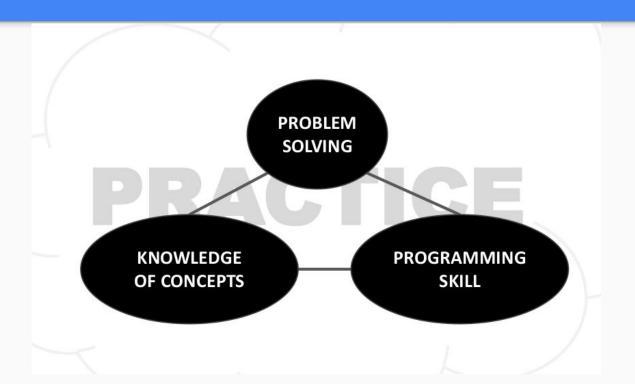
Safety: If you cannot find your parents after class, please notify your teacher or school staff at Room 409

Course Info



http://inventwithpython.com/invent4thed/

Course Info

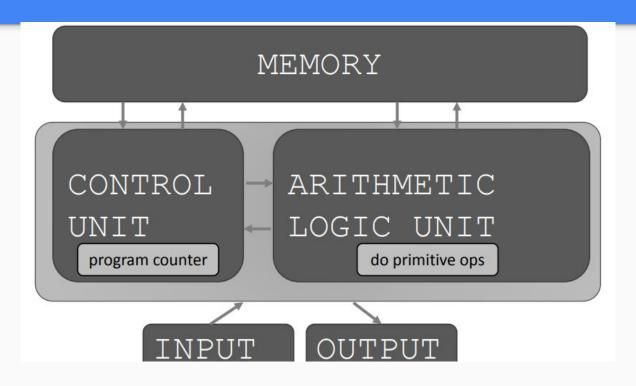


Computer Fundamentals

What does a Computer do?

- Fundamentally:
 - Performs calculations
 - Remembers results
- What kinds of calculations:
 - o Built-in to the language
 - Ones that you define as the programmer
- Computers only know what you tell them

Basic Computer Architecture



What is a programming recipe

- Sequence of simple steps
- Flow of control process that specifies when each step is executed
- A means of determining when to stop

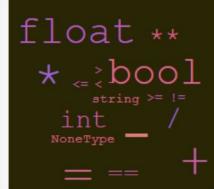
$$1+2+3 = an algorithm$$

Aspects of Languages

- Primitive constructs
 - English: words
 - Programming language: numbers, strings, simple operators



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Aspects of Languages

Syntax

- o English:
 - "Cat dog boy" -> not syntactically valid
 - "Cat hugs boy" -> syntactically valid but
- Programming language
 - "hi" 5 -> not syntactically valid
 - 3.2*5 -> syntactically valid

Aspects of Languages

- Language meaning
 - English: Can have many meaning
 - "Flying planes can be dangerous"
 - Programming language: can have only one meaning but may not be what a programmer intend

Python Basics

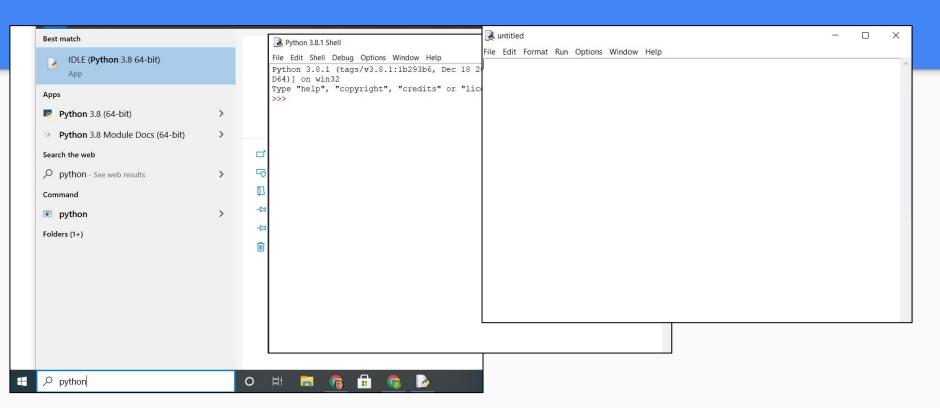
Python Programs

- A program is a sequence of definitions and commands
- A interpreter read the program to do something
- Can be typed directly in a shell or stored in a file that is read into the shell and evaluated intended

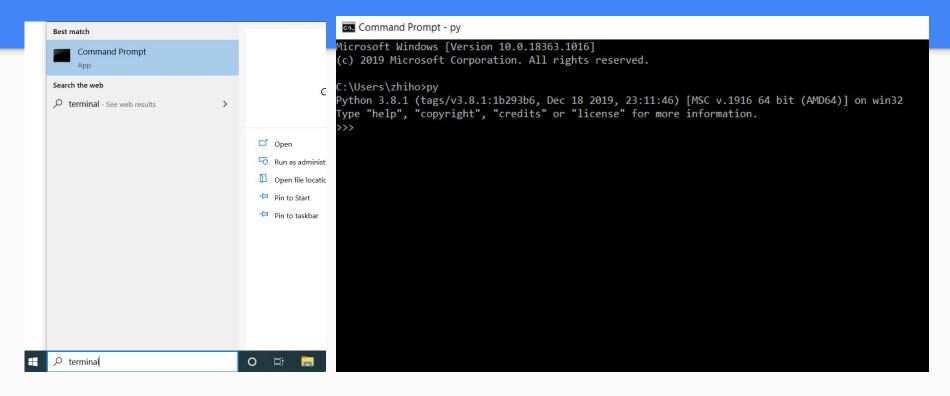
Open computer -> run python



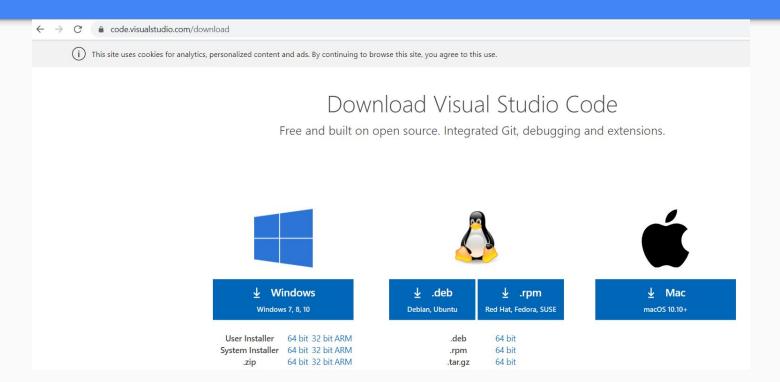
Windows



Terminal for windows (py) and mac (python3)



Visual studio code (https://code.visualstudio.com/download)



Scalar Objects

- int -- represent integers, ex. 5
- float -- represent real numbers, ex. 3.27
- bool -- represent Boolean values True and False
- NoneType -- special and has no value, None
- Can use type() to see the type of an object
 - >>>type(5) -->int
 - >>>type(3.0) -->float

Type Conversions (Cast)

- Can convert object of one type to another
 - float(3) converts integer 3 to float 3.0
 - int(3.9) truncates float 3.9 to integer 3
 - int('321') converts string '321' to integer 321
 - str(123) converts integer 123 to string '123'

Printing to Console

- To show output from code to a user, use print command
 - o print(3)
 - o print(3+2)
 - o print('ABC')

Expressions

- Combine objects and operators to form expressions
- Syntax for a simple expression
 - o <object> <operator> <object>

Operators on ints and floats

- $i + j \rightarrow addition (e.g., 1+2)$
- $i j \rightarrow subtraction (e.g., 2-1)$
- $i * j \rightarrow product (e.g., 2*4)$

Note: if both are ints, result is int. If either or both are floats, result is float

- $i/j \rightarrow division (e.g., 4/2)$.
- i % j \rightarrow remainder when i is divided by j (e.g., 5%2)
- $i ** j \rightarrow i$ to the power of j (e.g., 2**3)

Operation precedence (order)

- Parentheses used to tell Python to do these operations first
- Operator precedence without parentheses

```
0 **
```

- 0 *
- 0 /
- + and executed left to right, as appear in expression

Binding Variables and Values

- Equal sign is an assignment of a value to a variable name
 - \circ pi = 3.14
 - o text = 'abc' or "abc"
- Value stored in computer memory
- An assignment binds name to value
- Retrieve value associated with name or variable by invoking the name
 - o print(pi)
 - print(text)

Variables are very useful

- Why give names to values of expressions
 - To reuse names instead of values
 - Easier to change code later

```
pi = 3.14
radius = 2.2
area = pi * (radius ** 2)
```

Programming vs Math

- In programming, you do not "solve for x"
- Programming:
 - Expression on the right
 - Variable name on the left

Python:

```
pi = 3.14
radius = 2.2
area = pi * (radius ** 2)
```

Math:

```
pi = 3.14
radius = 2.2
pi * (radius ** 2) = area
```