Python Quickstart - PyQuick

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What

Python is a programming language that lets you work quickly and integrate systems more effectively.*

*Source: https://www.python.org

Who and When?

- Guido van Rossum
- Feb, 1991
- Python Software Foundation
- https://www.python.org

Why

Python is powerful… and fast;
plays well with others;
runs everywhere;
is friendly & easy to learn;
is Open.*

These are some of the reasons people who use Python would rather not use anything else.*

*Source: https://www.python.org

Who use it.

Google
NASA
OpenAI
Dropbox
Quora
YouTube
mozilla
UBER

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Applications

- Web and Internet Development
- Scientific and Numeric Computing
- Education
- Desktop GUIs
- Software Development
- Business Applications
- Machine Learning Systems and Algorithms
- and many more…

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This Lecture

Exciting Parts of Programming with Python

Programming Intuitions with Python

Rapid Prototyping with Python

Building Practical Powerful Software with Python

Suggested Readings

Python Quick, Vamsi Kurama

Python Programming: A Modern Approach, Vamsi Kurama

Learn Python the Hard Way, Zed Shaw

A Byte of Python, Ch Swaroop

Think Python, Allen B. Downey

Dive into Python, Mark Pilgrim

Python Programming Language

Python is a **general purpose**, **dynamically typed** and **interpreted** programming language.

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Python Versions

- 2.x.y
- 3.x.y
- This Lecture is based on 3.6.y

Running Python Programs

Two ways of Running Python Programs

- Running Python Interpreter

```
python

>>>
```

- Running Python Scripts

```
python hello.py
```

Hello World!

```
print("Hello world!")

print("Hello Python!")
```

Primer

- Storing Information
- Making Decisions
- Repeating Techniques
- Making Lists / Organising Data
- Building Instructions
- Avoiding Pit holes

Working with Data

Numbers

Text (Characters and Symbols)

Logic

Working with Data

Numbers

- int
- float

Text

- str

Logic

- bool

Python as a Calculator

```
>>> 5 + 3

>>> 5 + 83 * 3

>>> 89 + (4 * 2)

>>> 6 + 7 //(8**7)

>>> (6 * 7) / (9+10)*(8**7)
```

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Variables and Assignment

```
>>> a = 24

>>> b = 19

>>> a + b

43

>>> b = a

>>> greet = "Hello"

>>> who = " World!"

>>> greet + who

Hello World!
```

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Interpreted Type?

Use `type(variable)` Function.

```
>>> a = 9.0

>>> type(a)

<class 'float'>

>>> b = 9

>>> type(b)

<class 'int'>
```

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Math

Operators

+, - ,*, **, /, %, << , >>, &, l, ^,
< >, <=, >=, ==, !=

** The Beautiful Math Library is also your Treasure

Boolean logic

```
>>> a = True
>>> b = False
>>> type(a)
<class 'bool'>
```

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Boolean logic Expressions

```
>>> print(24 > 17)
>>> print(19 < 2)
>>> print(24 > 17 and 19 < 2)
>>> print(24 > 17 or 19 < 2)
```

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Primitive Types

- `int`
- `float`
- `str`
- `bool`

Input

How do you deal with an input from the user?

```
>>> a = 17
>>> name = "Python"
>>> a = input()
2
>>> print(a)
2
```

Strings

```
>>> x = "hello"
>>> y = 'world'
>>> x = """This is a multi-line string
written in
three lines."""
>>> y = '''multi-line strings can be written
using three single quote characters as well.
The string can contain 'single quotes' or
"double quotes"
in side it.'''
```

String Interpolation

```
name = "Bond"
print(name)
print("Hello, I am {}".format(name))

num = "007"
print("Hello, I am {} {}".format(name, num))
```

Input with Prompt

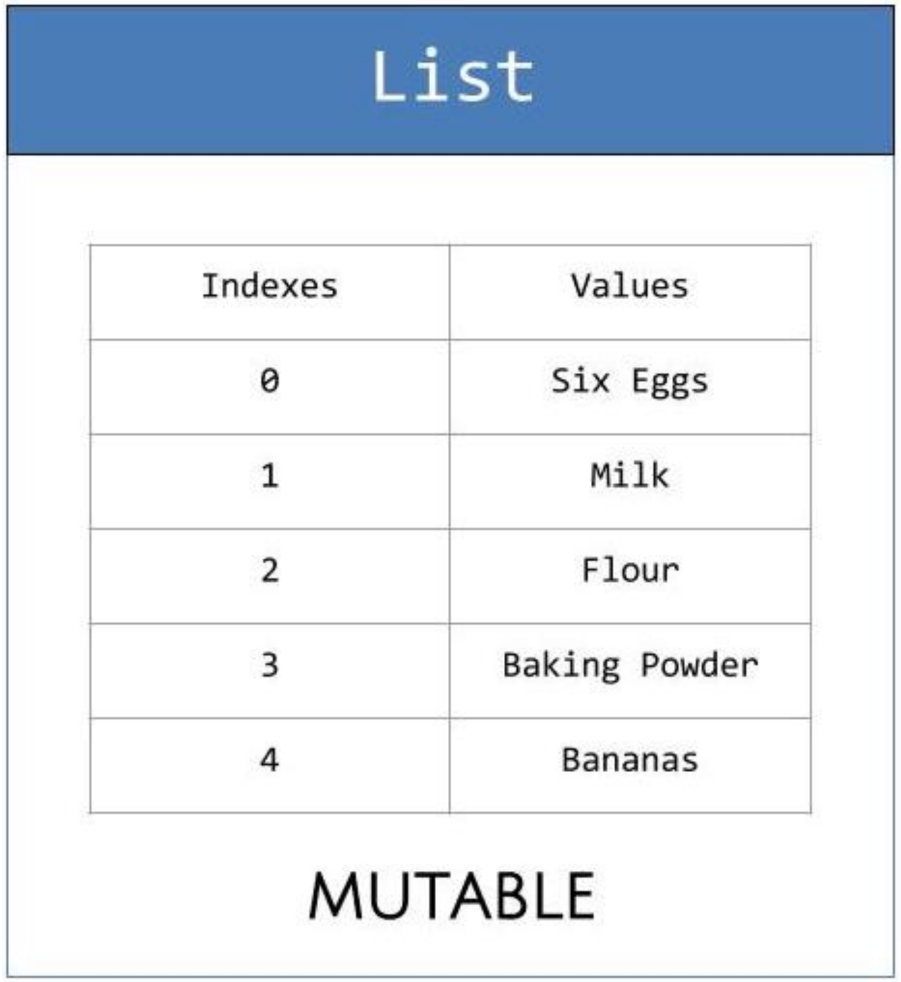
How do you deal with an input with a prompt?

```
>>> name = input("Enter your name: ")

Enter your name: Rossum

>>> print(name)

Rossum
```

String Methods

```
.strip
.spilt
.upper
.title
.capitalize
.startswith
.swapcase
.islower
```

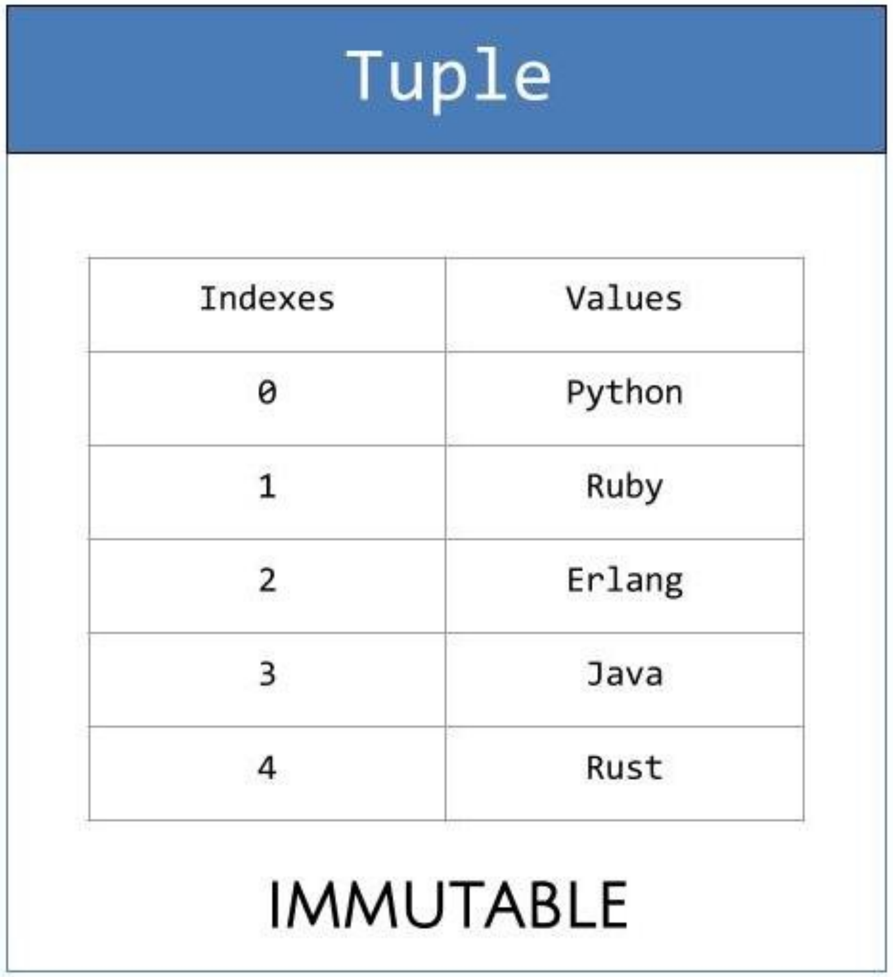
Compound Types



List

Indexes	Values
0	Six Eggs
1	Milk
2	Flour
3	Baking Powder
4	Bananas

MUTABLE



Tuple

Indexes	Values
0	Python
1	Ruby
2	Erlang
3	Java
4	Rust

IMMUTABLE

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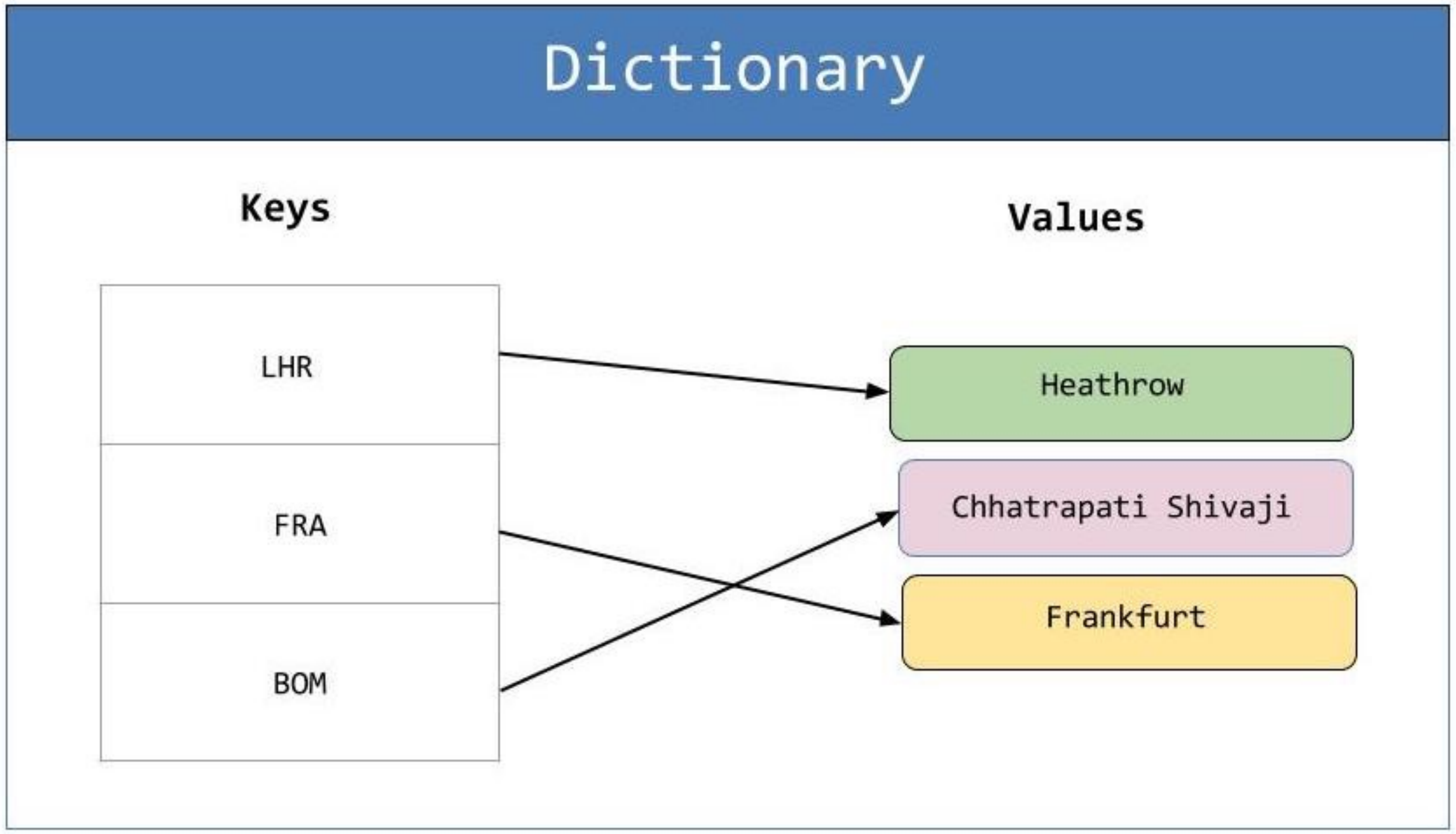
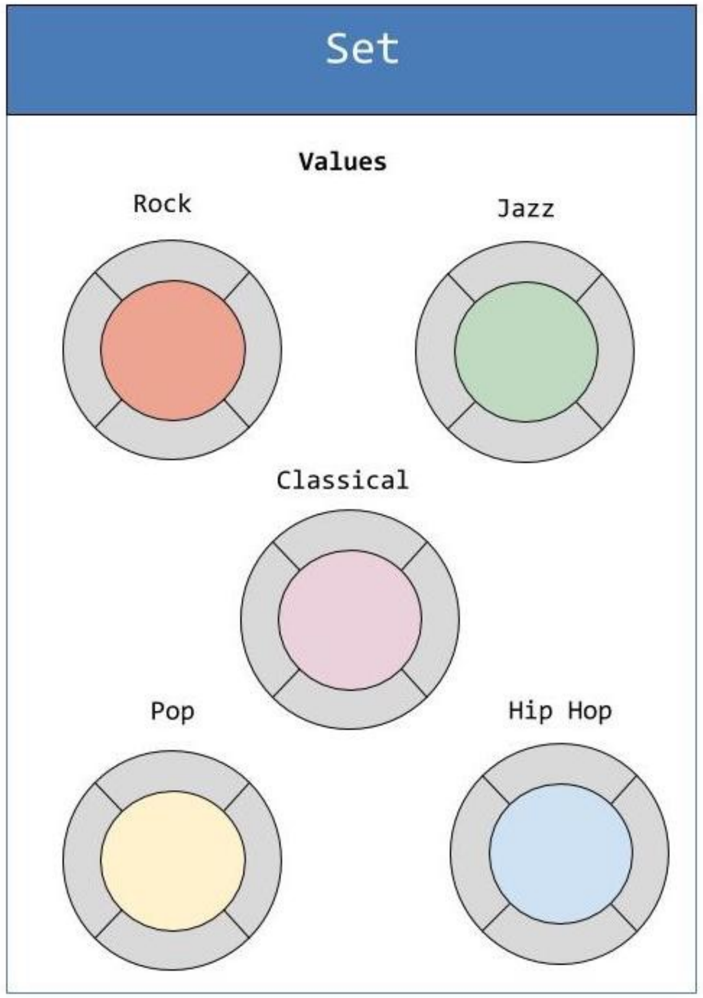
Compound Types





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Lists

- Enclosed with `[]`

- **Mutable**.

- **Heterogenous**.

```
>>> cart = ["eggs", True, 0, 24, [9]]

>>> type(cart)
<class 'list'>
```

List Methods

```
.sort

.append

.reverse

.insert

.index
```

Built-in Methods for Sequences

len(sequence)

min(sequence)

max(sequence)

sum(sequence)

Built-in Methods for Sequences

```
dir(variable)

help(variable)

type(variable)
```

Methods

- **Everything** in Python is a **object**.
- Methods are **special kind of functions** that work on an object.

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Methods

```
object.method(params)
```

Tuples

- Enclosed with `()`
- Immutable
- Heterogenous

```
>>> langs = ("py", "java", "cpp", "c")
>>> type(langs)
<class 'tuple'>
```

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Tuples Methods

```
>>> # Tuples have no methods.
```

Dictionaries

- Enclosed with **`{}`**
- Items exists as **Key-value** pairs.
- Access value by **key** of the item.

```
>>> airports = {"", True, 0, 24, [9]}

>>> type(airports)

<class 'list'>
```

Dictionaries Methods

```
.keys
.values
.items
```

Sets

- Enclosed with `{}`

- All items are unique.

- Use `set()` for typecasting.

```
>>> primes = {2, 3, 3 5, 7, 7, 11, 13, 17}

>>> type(primes)

<class 'set'>
```

Sets Methods

```
.union
.intersection
.difference
.symmetric_difference
```

White Space

- **White space is extremely important in Python.**
- **Even a single space matters to the Python Interpreter.**
- **Don't mix tabs and space.**

Indentation

```
x, y = 0, 2
if x==0:
....print("Say Hello")
....print("World")
if y == 2:
....print("Ok I Need to do something")
else:
....print("Say Bye")
```

Indentation

```
def hello(x, y):
....if x==0:
....print("Say Hello")
........print("World")
....if y == 2:
........print("Ok I Need to do something")
....else:
........print("Say Bye")

hello(0, 7)
```

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White Space

```
if (x==0)
{
printf("Hello");
printf("World");
}
else
{
printf("Say Bye")
}
```

```
if x==0:
....print("Say Hello")
....print("World")
else:
....print("Say Bye")
```

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Control flow

- Key words `if-elif-else`.
- Colon: after every condition.
- Indent statements by four(4) spaces.

Conditional Flow: Example

```
temperature = 43

if temperature <= 30:
    print("It's very cold. Consider wearing a scarf.")
```

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Conditional Flow: Example

```
temperature = 43

if temperature <= 30:
    print("It's very cold. Consider wearing a scarf.")
else:
    print("It's not that cold. Wear a t-shirt")
```

Conditional Flow: Example

```
temperature = 43

if temperature <= 30:
    print("It's very cold. Consider wearing a scarf.")
elif temperature >=40:
    print("It's really warm. Don't forget to wear a sunscreen")
else:
    print("It's not that cold. Wear a t-shirt")
```

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Repetitive Flow

Two kinds of Looping techniques

- `for`
- `while`

for: Example

```
for num in [2, 17, 19, 24]:
    print(num)


for con in ("ind", "aus", "eng", "srl"):
    print(con)


for key in {"python": "py", "ruby":"rb", "erlang": "erl"}:
    print(key)


for key, value in {"python": "py", "ruby":"rb", "erlang": "erl"}.items():
    print(key, value)


for element in {2,3,5,7,11, 13, 17}:
    print(element)
```

for range: Example

```
for i in range(0,100):
    print("Python!!")


for i in range(0, 24):
    print("ISB000{}".format(i))
```

while: Example

```
pool = 0
while pool < 100:
    pool += 10
    print("{} litres".format(pool))
```

Loop forever

```
while True:
    print("Hello!")
    print("IIDT")
```

```
while True:
    print("Receiving…")
```

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Making it clear!

for loop, iterates over sequences

while loop runs until the condition is False

Loop Jumps

`break`

The break statement exits a **for** or **while** loop completely.

`continue`

A continue statement is used to **end the current loop** iteration and **return control to the loop** statement.

break: Example

```
puzzle_input = "great minds think alike"
puzzle_output = ""
vowels = ['a', 'e', 'i', 'o', 'u']
for character in puzzle_input:
    if character in vowels:
        continue
    else:
        puzzle_output.append(character)
print(puzzle_output)
```

continue: Example

```
puzzle_input = "great minds think alike"
puzzle_output = ""
vowels = ['a', 'e', 'i', 'o', 'u']
for character in puzzle_input:
    if character in vowels:
        continue
    else:
        puzzle_output.append(character)
print(puzzle_output)
```

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Placeholder - Do nothing;

```
if condition:
    pass

while condition:
    pass


def create_alarm:
    pass

class Bank:
    pass
```

Looping: In Summary

Making it clear!

- **for** - iterates over sequence.
- **while** - until the condition is false.

List Comprehensions

```
c = [39.2, 36.5, 37.3, 37.8]

f = [((float(9)/5)*t + 32) for t in c]


# [102.56, 97.7, 99.14,100.03999999999999]
```

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List Comprehensions

```
colors = ["red", "green", "yellow","blue"]

things = [ "house", "car", "tree" ]

ct = [(x,y) for x in colors for y in things]

print(ct)
```

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Functions

Two things

1. Define a Function.

2. Call a Function.

Functions

```
def function_name(params):

    # statement_1

    # statement_2

    # statement_3


function_name(params)
```

Functions in Python

```python
# Defining Function greet.
def greet():
    print("Hello World!")


# Calling the Function greet.
greet()
```

Functions in Python

```
def greet(name):
    print("Hello {}!".format(name))


greet("stark")
```

Functions in Python

```python
def greet(name, gender=''):
    if gender == 'm':
        print("Hello Mr. {}".format(name))
    elif gender == 'f':
        print("Hello Ms. {}".format(name))
    else:
        print("Hello {}".format(name))

greet('stark', 'm')
greet('potts', 'f')
greet('parry')
```

Lambda

```
f1 = lambda x: x*x

f2 = lambda a, b: a**2 + b**2 + 2*a*b

f3 = lambda a, b: a if (a > b) else b
```

Primer

- Storing Information ✓
- Making Decisions ✓
- Repeating Techniques ✓
- Making Lists / Organising Data ✓
- Building Instructions ✓
- Avoiding Pit holes ✓

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Modules: num.py

```
def square(x):
    return x * x


def cube(x):
    return x * x * x
```

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Module

- `import num`
- `from num import square`
- `from num import *`
- `from num import cube as c`

Module

- `import module`
- `from module import something`
- `from module import *`
- `from module import something as name`

Object Oriented Programming

Object Orientation offers Abstraction.

Three Principles of Object Oriented Programming

- **Encapsulation**
- **Inheritance**
- **Polymorphism**

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OOP

- **Object**

A real world entity which has state and behaviour.

- **Class**

A blue print of an object.

OOP with Python

Everything is an object in Python.

```
class Person:
    pass

jack = Person()
```

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Classes

```
class Box:

    def method_1(param):

        pass



b1 = Box()

b1.method()
```

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Methods

```
class Box:
    def method_1(param):
        pass
    pass

b1 = Box()
b1.method()
```

__init__ Method

```
class Box():
    def __init__(a, b):
        pass
    pass



b1 = Box(a, b)
```

Modules continued.

```
from warehouse import Box

b1 = Box()

from warehouse import Box as B

b1 = B()

import warehouse

b1 = warehouse.Box()
```

Errors and Exceptions

```
try:
    # statements
except:
    # statements
finally:
    # statements
else:
    # statements
```

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exec and eval

```
>>> exec("a = 2")
>>> eval("a + 19")
21
>>> loop = """
d = [2, 17, 19, 24]
for nums in d:
    print(d)
"""
>>> exec(loop)
```

Standard Library

- `math, decimal, time, datetime, re`
- `glob, os, shutil, tempfile`
- `random`
- `sqlite, json, pickle`
- `urllib, wsgiref, logging`
- `itertools, functools`

Thanks!