

Relief-OpS Workshop: Introduction to Python



UNIVERSITY OF
Southampton



Objectives

At the end of this session participants should be able to:

- Know about Python Programming Language.
- Understand Python fundamentals.
- Able to run Python example code.

Agenda

- Introduction to Python Programming Language.
- Introduction to Jupyter Notebook.
- Hands-on Python Programming Language.

Introduction to Python

Programming Language

- Programming language is language with a purpose to give an instruction to a computer. In other words, it is a way of a programmers to communicate with a computer.
- There are dozens of programming language used in industry today. E.g (Java, Javascript, c++, etc).

What is Python?

- Python is an easy to learn, powerful programming language. It has efficient high-level data structures with a simple and easy to understand syntax, and also offers flexibility to built your code.



Introduction to Python

Why Python?

- Easy to learn and use yet powerful and versatile.
- Python strive to be as close as the human language as possible.
- Cross-platform.
- Rich ecosystem (library, tools, documentation).



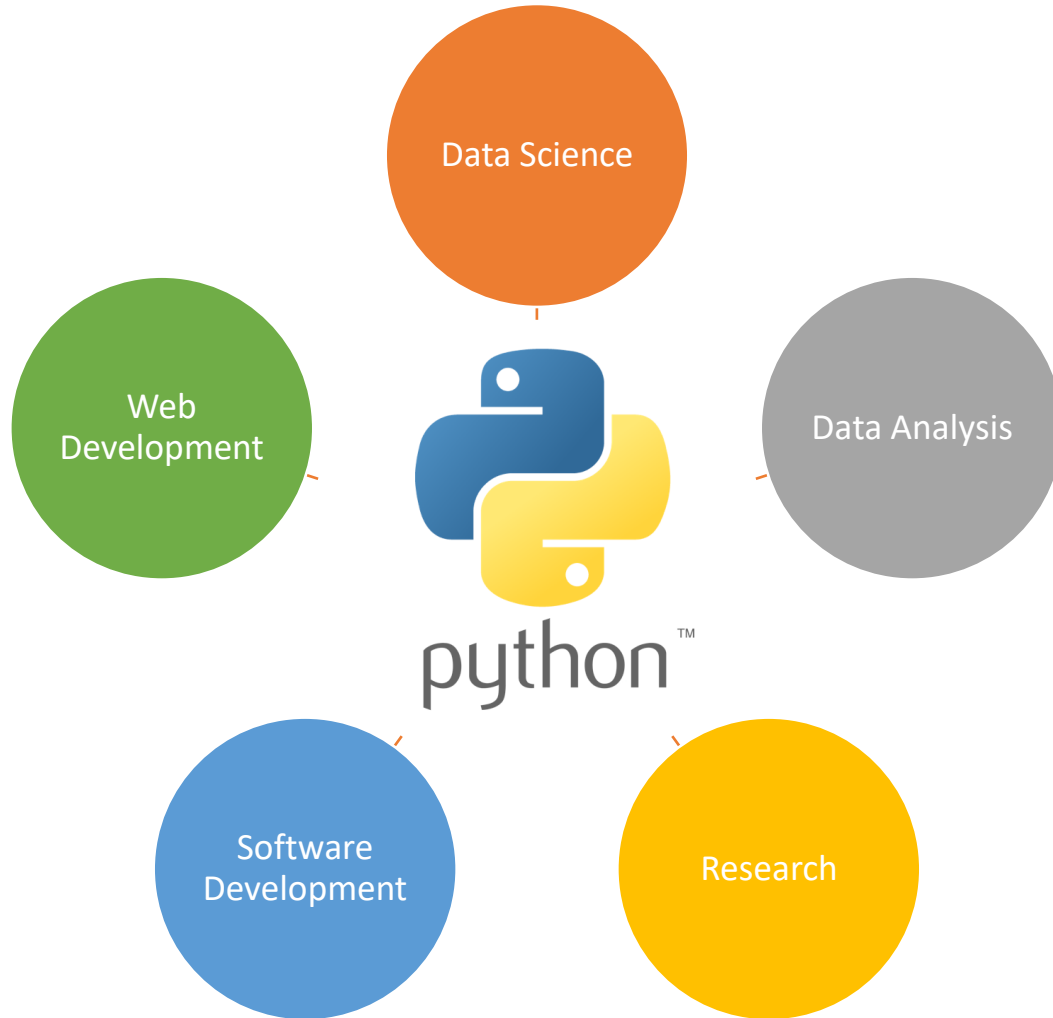
```
public class Example {  
    public static void main(String[] args) {  
  
        System.out.println("Text to be printed");  
  
    }  
}
```

```
#include <iostream>  
using namespace std;  
  
int main() {  
    cout << "Hello World!";  
    return 0;  
}
```

```
print("Hello, World!")
```

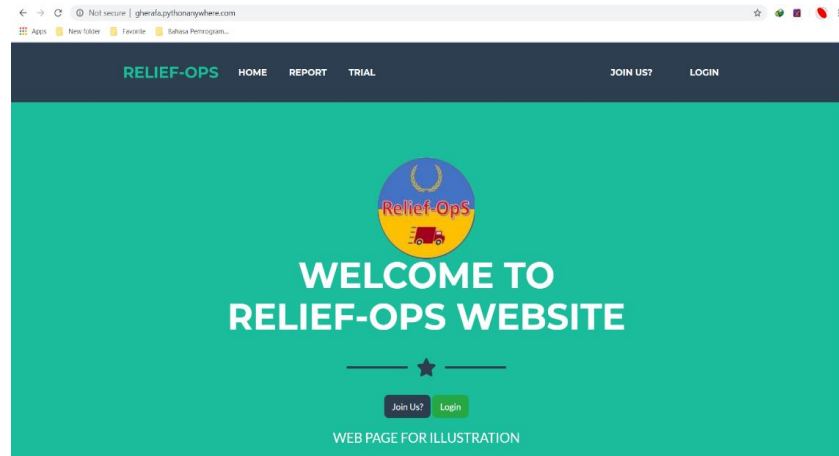
Introduction to Python

Where Python used?



Example of python usage

Web Developing

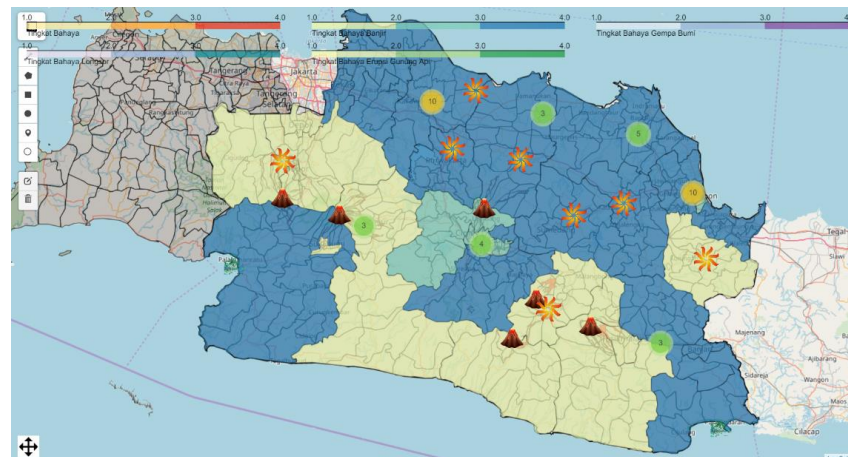


Web Page using Python



PETA RESIKO BENCANA DI PROVINSI JAWA BARAT

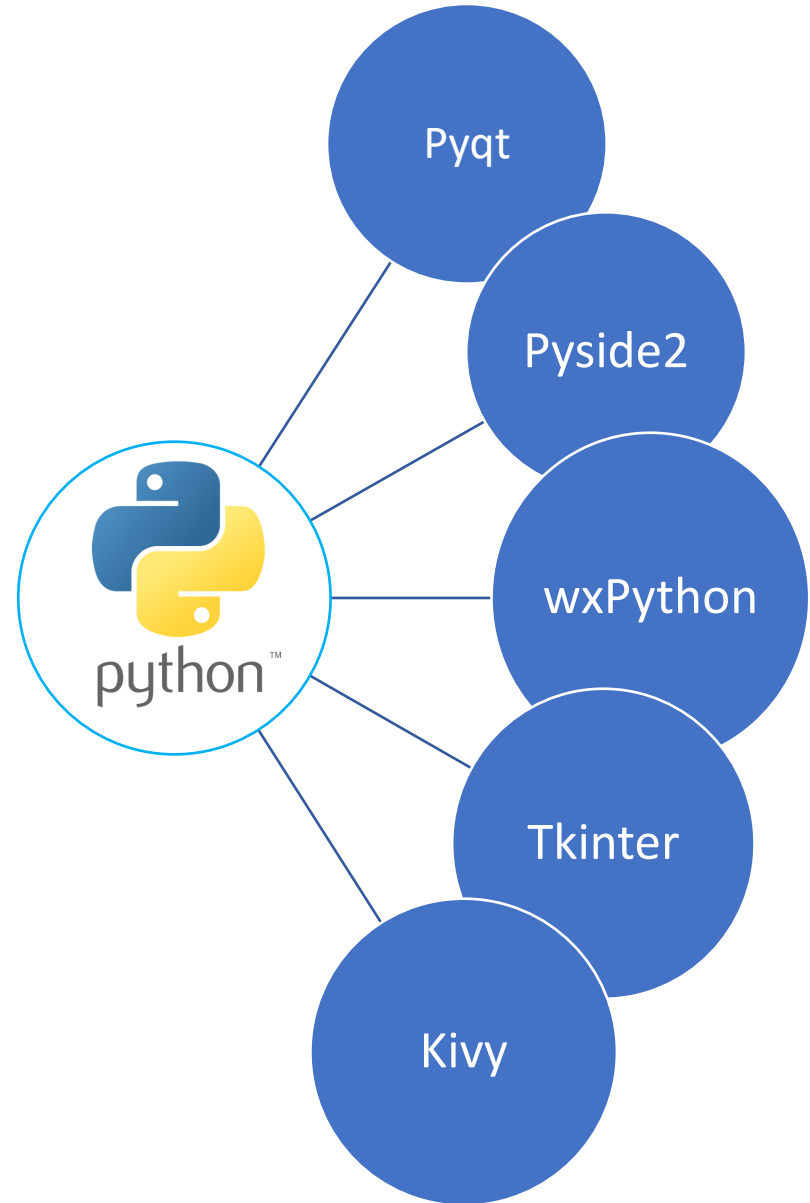
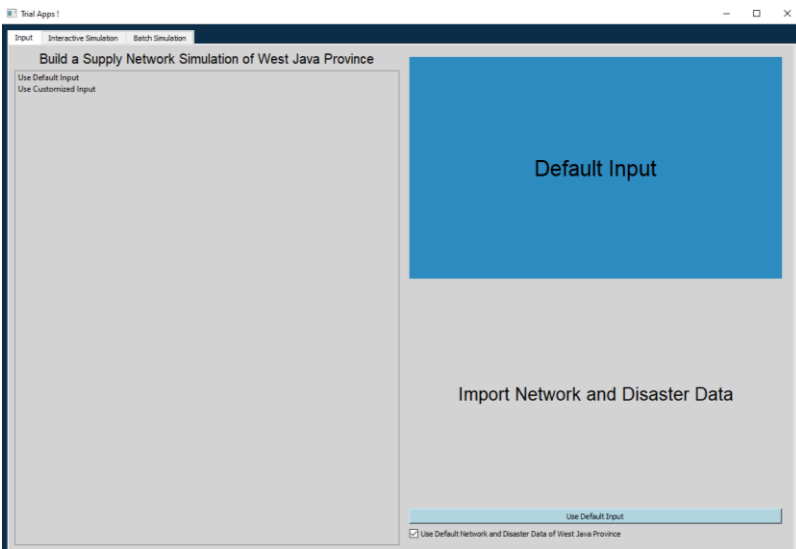
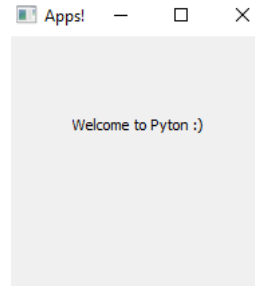
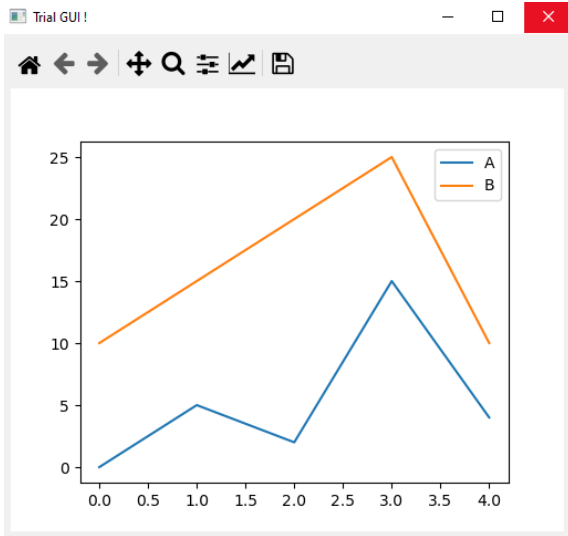
- Peta Resiko Semua Bencana
- Peta Resiko Bencana Gempa Bumi
- Peta Resiko Bencana Gunung Api
- Peta Resiko Bencana Banjir
- Peta Resiko Bencana Tanah Longsor
- Peta Lokasi Gudang Bulog



Visualization in the Web Page

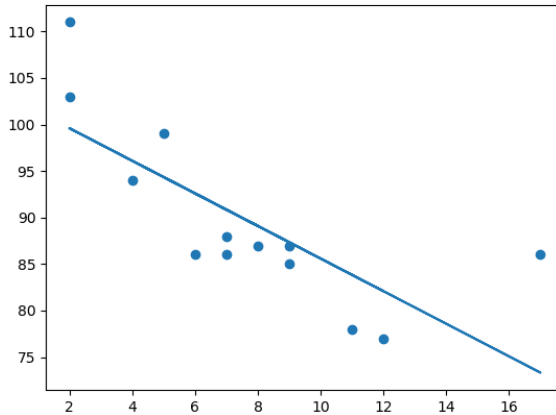
Example of python usage

Graphical User Interface



Example of python usage

Machine Learning



Linear regression in Python

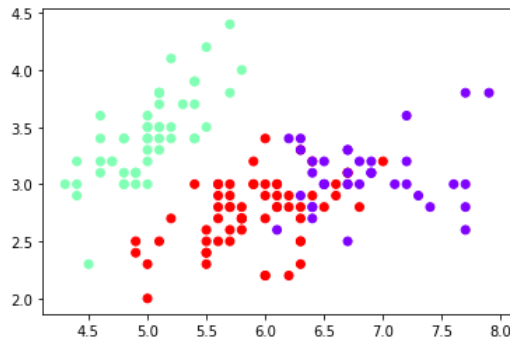
Deep Learning



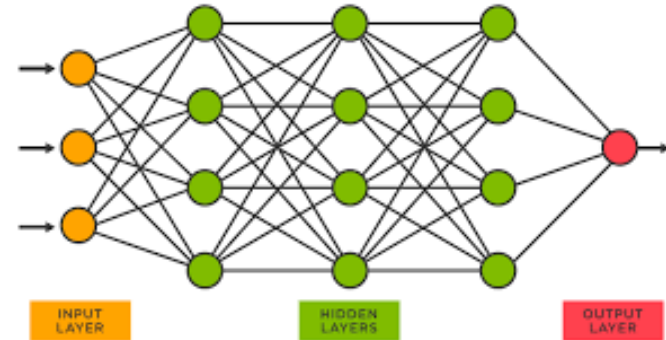
TensorFlow

Visualizing Clustering

```
plt.scatter(x[:, 0], x[:, 1], c=y_kmeans3, cmap='rainbow')  
<matplotlib.collections.PathCollection at 0x1eec1aa8d30>
```



Kmeans Clustering using Python



Neural Network Scheme

- Dhiraj, K.
- https://www.w3schools.com/python/python_ml_getting_started.asp

Example of python usage

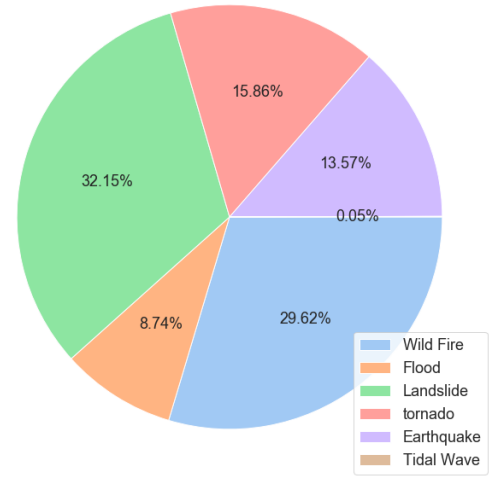
GIS

Data Cleansing

Data Visualization

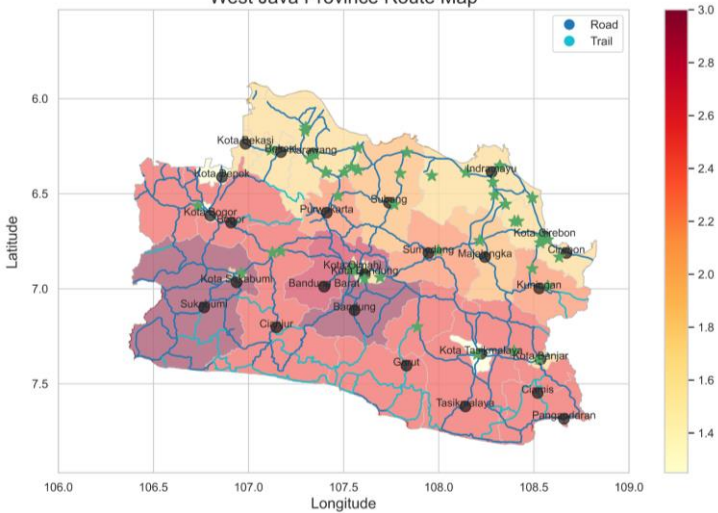
Index	Kabupaten	Banjir	GempaBumi	Longsor	ErupsiGuru
0	BANDUNG	3	3	3	3
1	BANDUNG BARAT	2	3	3	3
2	GARUT	3	3	3	3
3	GARUT SELATAN	3	3	3	3
4	KURANGAH	3	2	3	3
5	BEKASI	3	2	1	1
6	SUBANG	3	2	1	2
7	Kota BEKASI	3	2	1	1
8	Kota CIKARANG	3	2	1	1
9	Kota BANDUNG	2	3	1	1
10	SUREDANG	3	2	3	1
11	PALEANGKA	3	2	2	1
12	Kota Depok	3	2	1	1
13	Kota CIPUHI	2	3	1	1
14	Kota CIREBON	2	2	1	1
15	TASIKMALAYA	3	3	3	3
16	CIANGUR	3	3	3	3
17	CIREBON	3	2	1	1
18	Kota Banjar	3	2	1	1
19	BOGOR	3	3	3	3
20	Kota SUKABUMI	3	3	3	3
21	BOGOR BARAT	3	3	3	3
22	SUKABUMI	3	3	3	3
23	Kota BOGOR	3	2	1	1
24	INDRAHAYU	3	2	3	3
25	PURWAKARTA	3	2	2	2
26	CIAMIS	3	3	3	1
27	PANGANDARAN	3	3	3	1
28	Kota TASIKMAL	3	2	3	1

Dataframe in Python

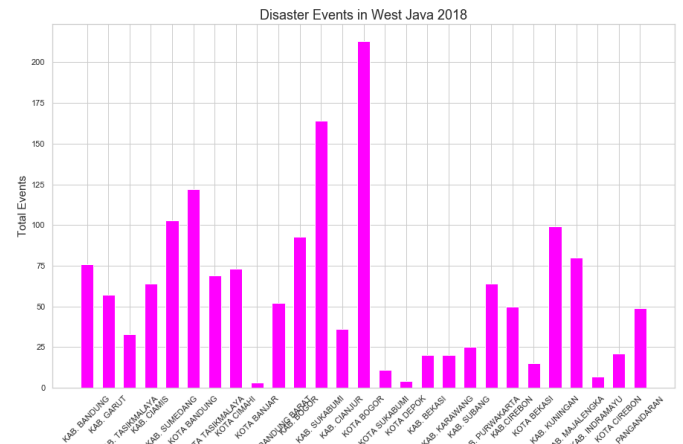


Pie Chart

West Java Province Route Map

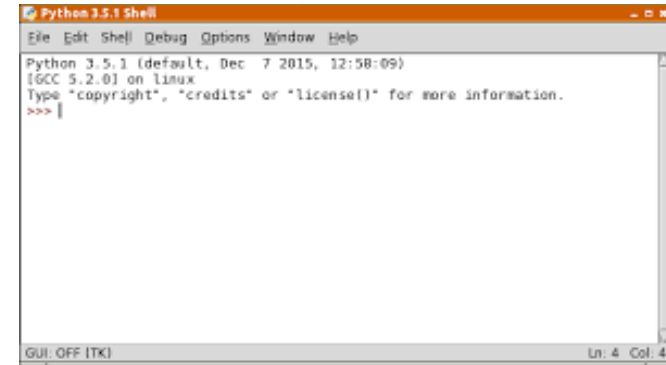
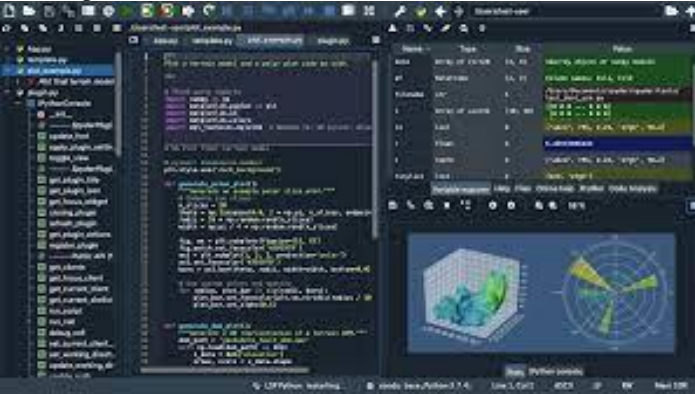


Map Visualization using Python

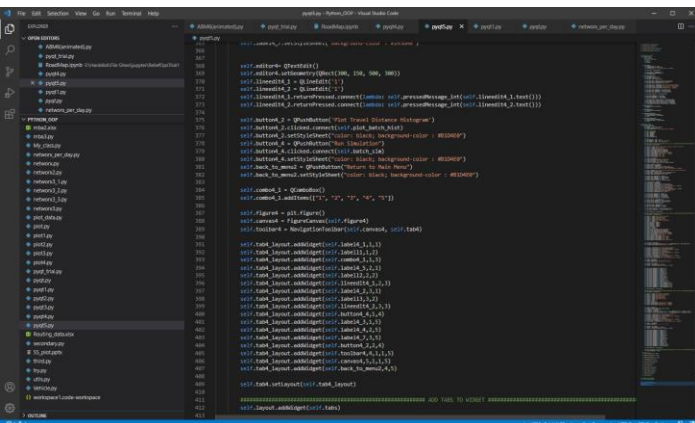


Bar Chart

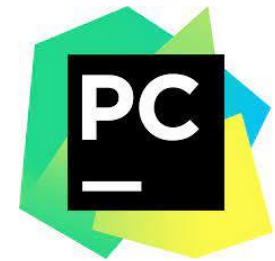
Run your Python file.



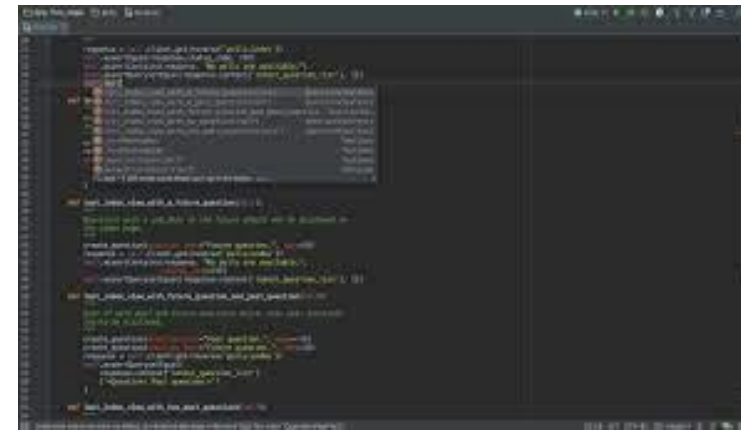
Visual Studio Code



Examples of IDE
(Integrated Development Environment)



PyCharm



Jupyter Notebook



- Easy to use.
- Interactive environment.
- Also can work as a presentation tool.

Start page

A screenshot of the Jupyter start page interface. At the top, there is a browser address bar showing "localhost:8888/tree". Below the address bar is the Jupyter logo and the word "jupyter". To the right of the logo are "Quit" and "Logout" buttons. Below this is a navigation bar with "Files", "Running", and "Clusters" tabs. Underneath, there is a prompt "Select items to perform actions on them." followed by "Upload", "New", and a refresh icon. A table lists the current directory structure:

<input type="checkbox"/>	0		/	Name ↓	Last Modified	File size
<input type="checkbox"/>		↳	3D Objects		2 months ago	
<input type="checkbox"/>		↳	anaconda3		2 months ago	
<input type="checkbox"/>		↳	ansel		13 days ago	

Header

jupyter Tutorial Last Checkpoint: 3 minutes ago (autosaved)

A screenshot of the Jupyter notebook header menu. It includes a menu bar with "File", "Edit", "View", "Insert", "Cell", "Kernel", "Widgets", and "Help". Below the menu bar is a toolbar with icons for "Run", "Stop", "Refresh", and "Code", along with a dropdown menu currently set to "Code".

Command Line

Run a simple program to print (Hello, welcome to Python tutorial !)

```
In [50]: 1 print("Hello, welcome to Python tutorial!")
```

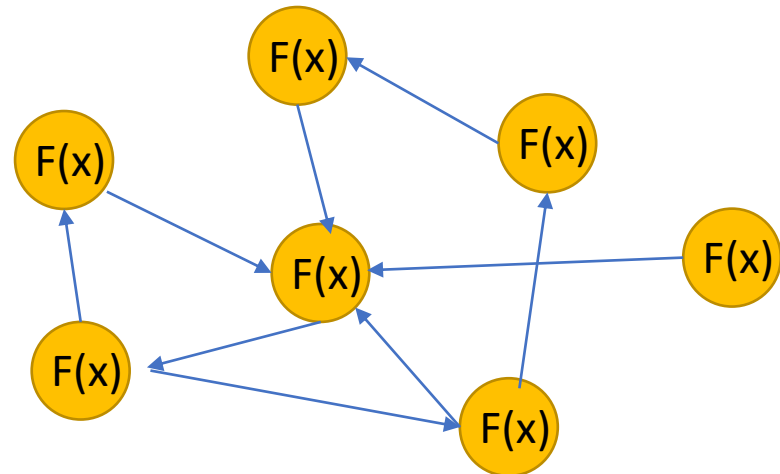
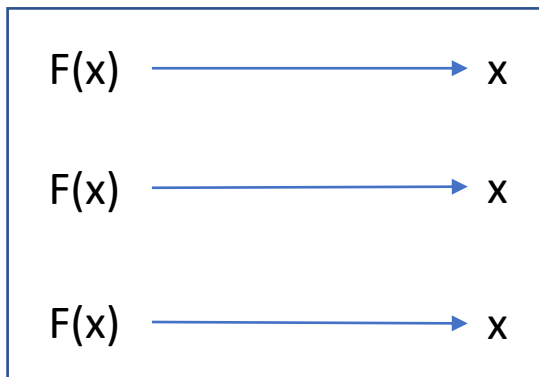
```
Hello, welcome to Python tutorial!
```

Programming Paradigm

Classification of programming languages based on its characteristics.

Procedural Programming

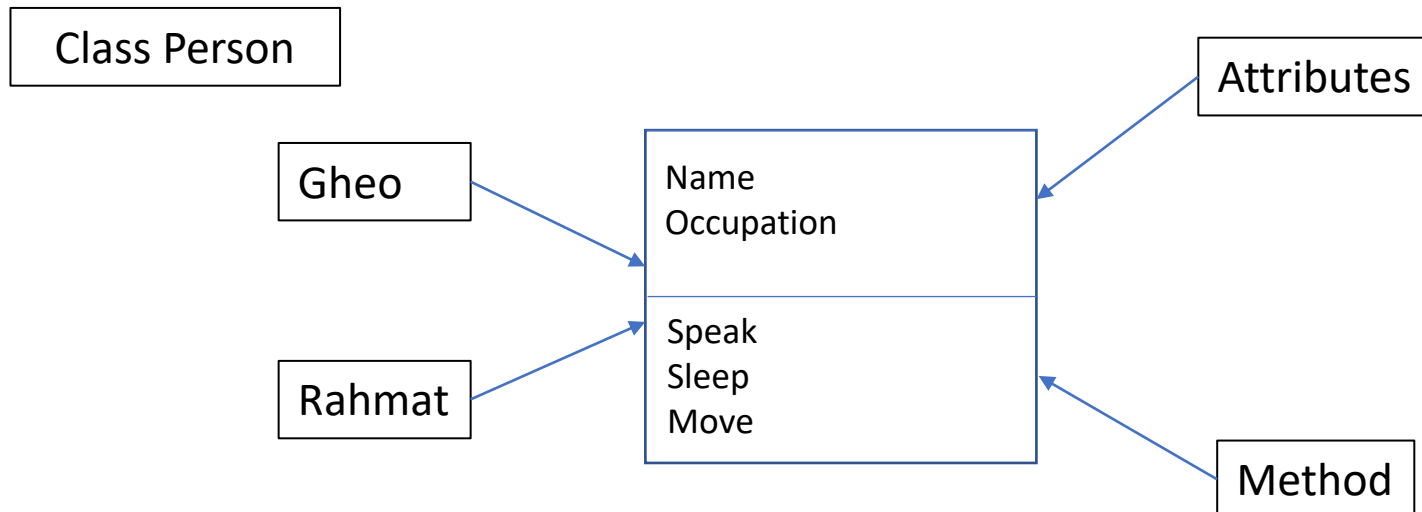
- Is a programming paradigm that based on subroutines procedure calls.
- Is formed by several functions and code blocks to perform some specified tasks
- Relies on procedure (functions) to operate on data structure.
- Whenever the program requires to perform that particular task, the functions will be called.



Programming Paradigm

Object Oriented Programming(OOP)

- Is a method of structuring program by bundling related attributes and behaviors into individual objects.
- Is an approach to models real-world related entities as a software object that have some data associated with it and allowing it to perform certain functions.
- Using object to operate on its own data structure.



Programming Paradigm

Class.

Is a user-defined blueprint of how something should be defined.

Object.

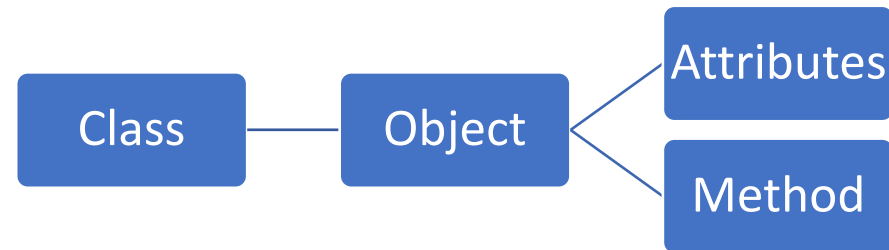
Is an instance of a class. Copy of the class with its actual values.

Attributes.

Represented by attributes of an object created by the class.

Method

Function which acts as a behavior and action of an object created by the class.



```
In [56]: 1 class cat:
         2     def __init__(self, name, breed):
         3         self.name = name
         4         self.breed = breed
```

```
In [57]: 1 billy = cat('billy', 'persian')
```

```
In [58]: 1 billy.name
```

```
Out[58]: 'billy'
```

```
In [59]: 1 billy.breed
```

```
Out[59]: 'persian'
```