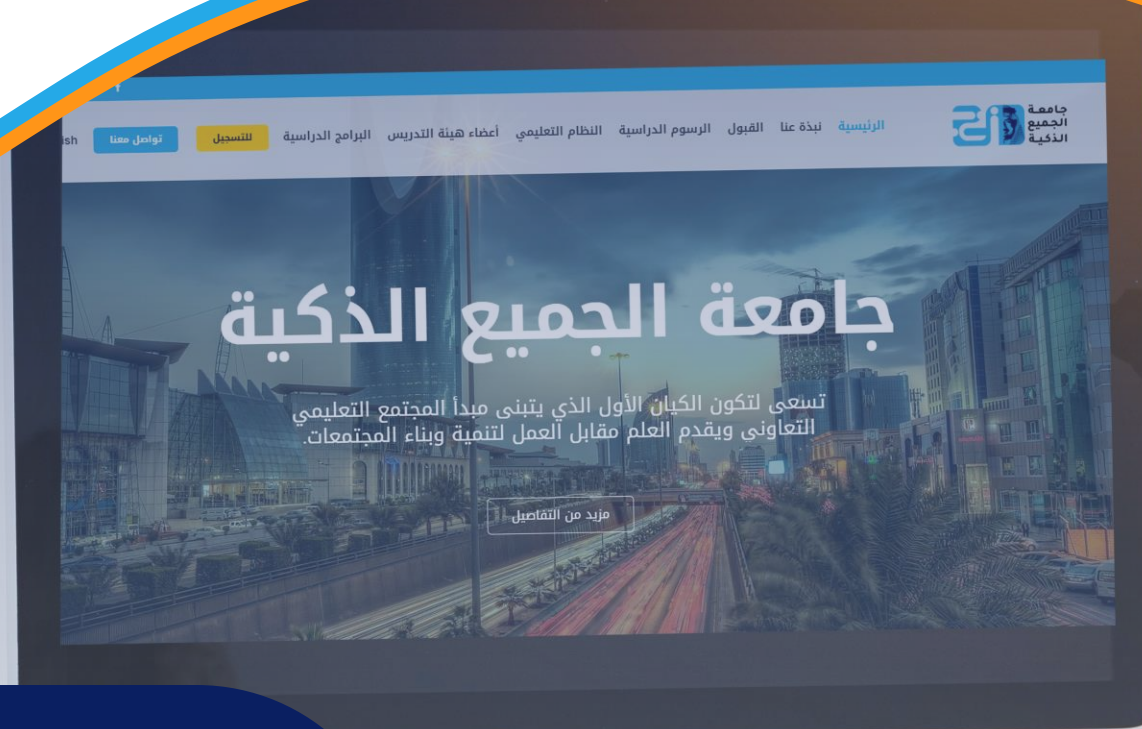




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Elective 1: Programming Foundations In Python

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Lecture 1

Lecture 1

LEARNING OBJECTIVES OF THIS COURSE

- Teach an example of scripting and interpretative language and compare it with classical compiled programming languages.
- Introduce the student to Python programming fundamentals.
- Learn to apply fundamental problem solving techniques.
- Expose students to application development and prototyping using Python.
- Gain best practice in software development.

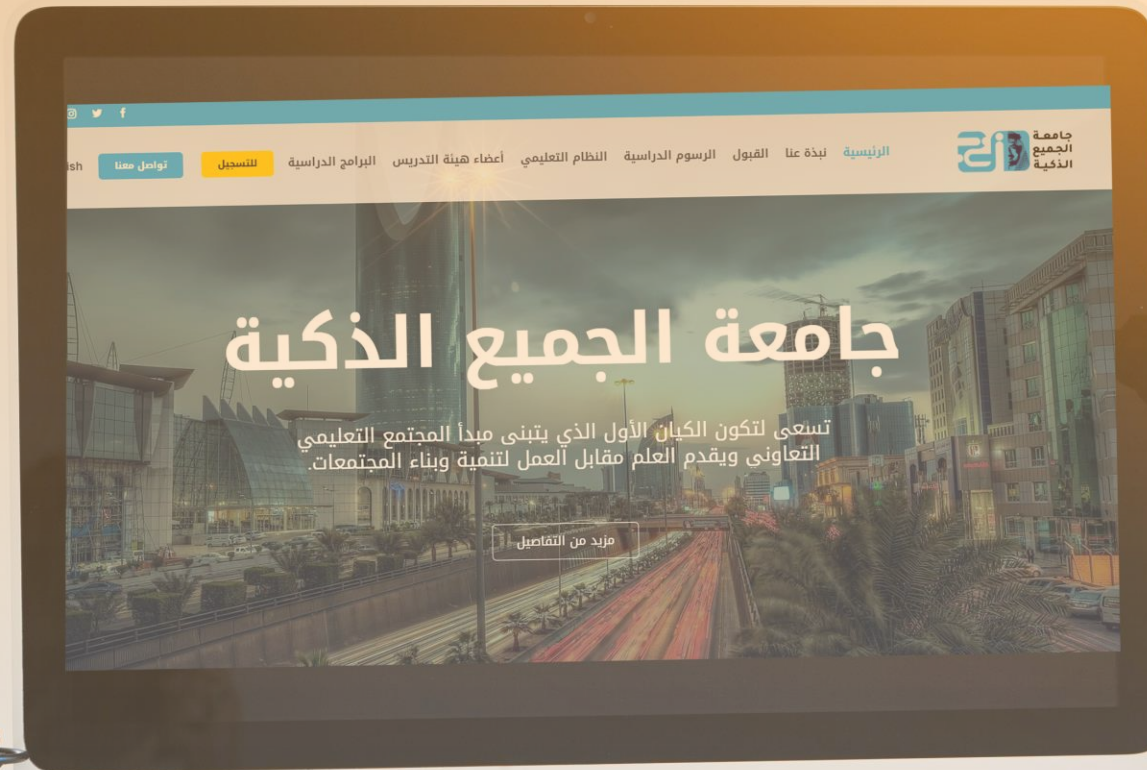
- The main content of the course are:
 - Introduction to Python and Computer Programming.
 - Data Types and Basic I/O Operations.
 - Conditional Execution, Loops and Lists.
 - Functions, Tuples, Dictionaries and Data Processing.

- The main content of the course are:
 - Modules, Packages, String and List Methods and Exceptions.
 - The Object-Oriented Programming, Exception Handling and Working with Files.
 - Writing GUIs in Python.

- All recorded lectures.
- Required resources:
 - The prescribed textbook for the course: "**Fundamentals of Python From First Programs Through Data Structures**", by Kenneth A. Lambert



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Module 1: Introduction to Python and Computer Programming

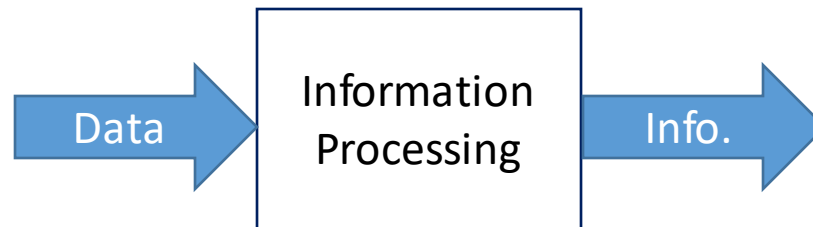
- Describe the basic features of an algorithm.
- Explain how hardware and software collaborate in a computer's architecture.
- Give a brief about Python programming.
- Compose and run a simple Python program.



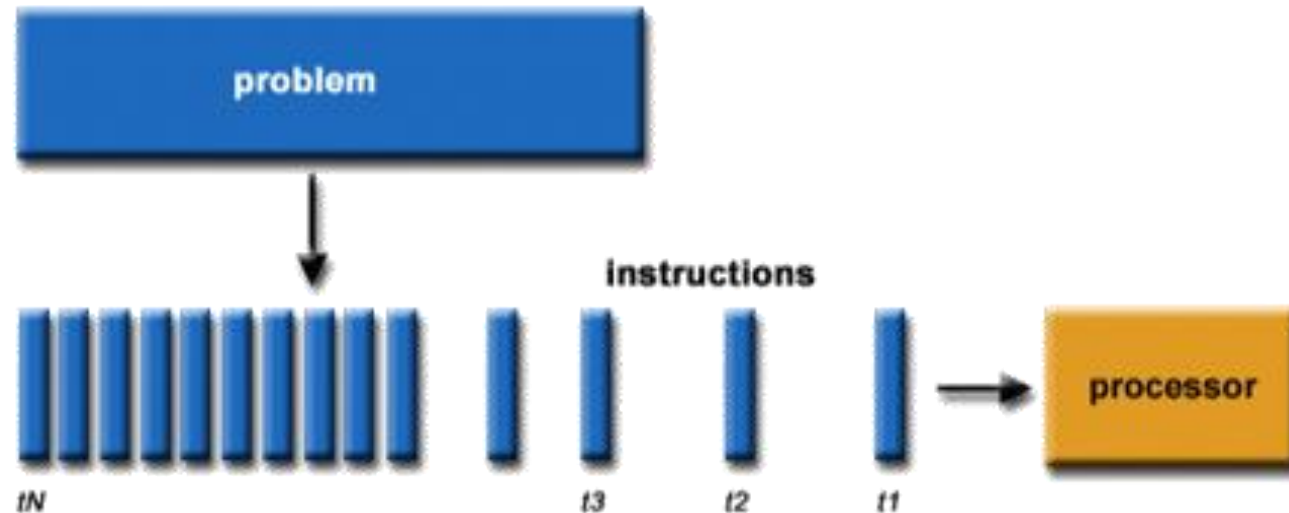
- Computer science is the study of **computation** and **information**.
- Computer science is fundamentally **problem-solving**.
- We can think of problem-solving as the process of taking some **input** (details about the problem) and generate some **output** (the solution to the problem). The "**black box**" in the middle is computer science.



- **Data**; Raw, unorganized facts (can be in the form of text, graphics, audio, or video).
- **Information**; Data that has been processed into a meaningful form.
- **Information Processing**; converting data into information.



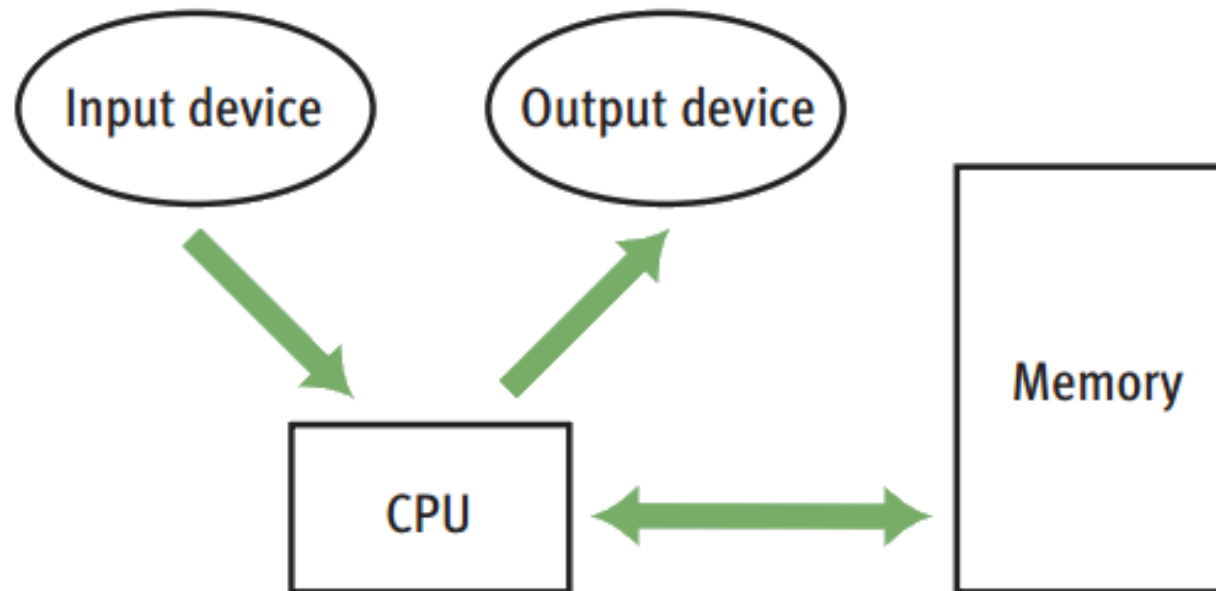
- Sequence of steps that describes each of these computational processes is called an **algorithm**.



- Features of an algorithm:
 - Consists of a finite number of instructions.
 - Each individual instruction is well defined.
 - Describes a process that eventually halts after arriving at a solution to a problem.

Lecture 1

HW & SW COLLABORATION



- A program (i.e., an algorithm) stored in computer memory must be represented in binary digits, or **machine code**.
- A **loader** takes a set of machine language instructions as input and loads them into the appropriate memory locations.

- Famous and fastest growing language.
- Open-source language.
- Scripting, Interpreted, and Expressive language.
- Simple and easy to learn language.

- Multipurpose language.
- High level language.
- Cross platform language.
- +20 years old language.

- Web Development (Django - Flask).
- Games (PyGame).
- Desktop Apps (PyGUI - Tkinter).
- Hacking.
- Machine Learning & Data Science.

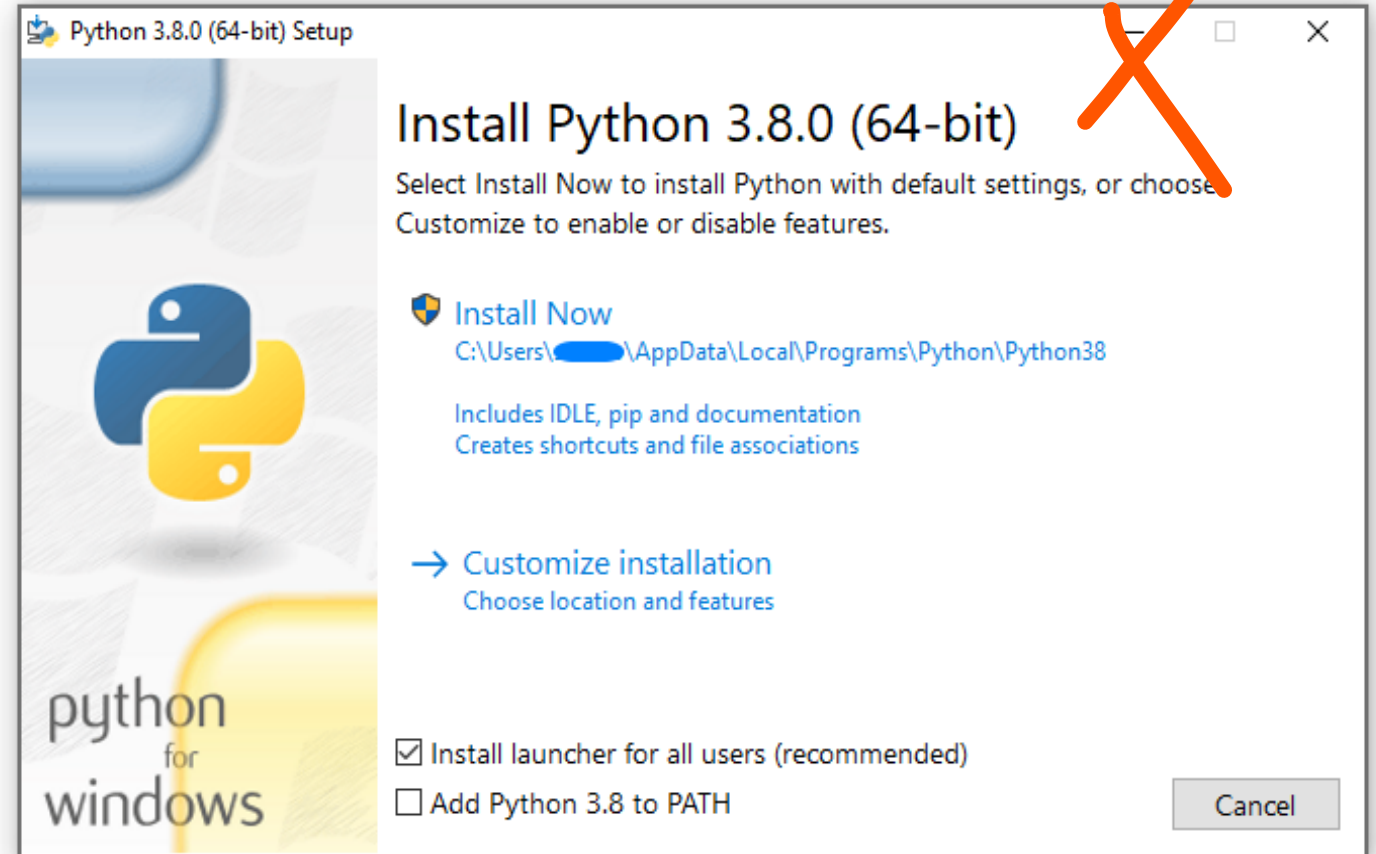


- AI & Robots in Mars.
- Automation.
- Web Scraping.
- Android Games.

Lecture 1

INSTALLING PYTHON LANGUAGE

- On Windows
 - Straightforward steps.





- On Linux
 - `sudo apt install python3 python3-pip build-essential python3-dev`

```
drhamada@dr-hamada: ~  
File Edit View Search Terminal Help  
drhamada@dr-hamada:~$ sudo apt install python3 python3-pip build-essential python3-dev
```

Lecture 1

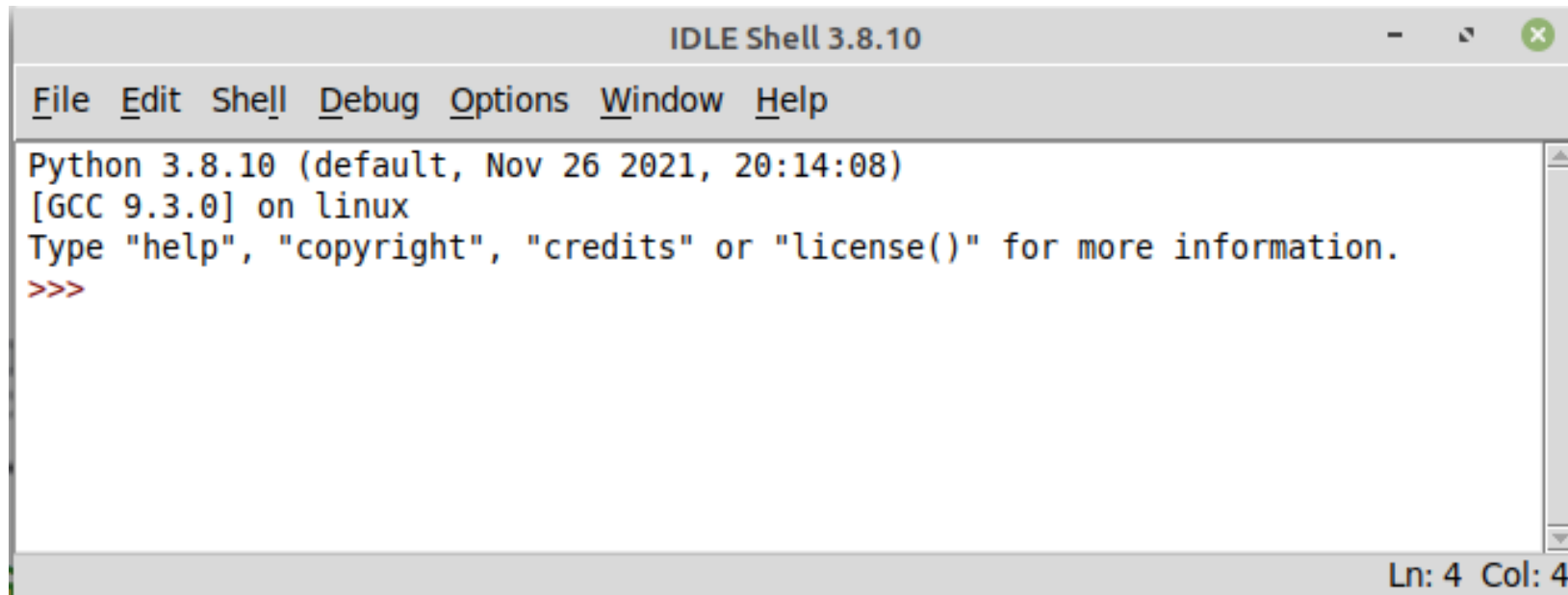
INSTALLING PYTHON LANGUAGE

Cont'd

- On Mac
 - Straightforward steps.



- Python IDLE.



```
IDLE Shell 3.8.10
File Edit Shell Debug Options Window Help
Python 3.8.10 (default, Nov 26 2021, 20:14:08)
[GCC 9.3.0] on linux
Type "help", "copyright", "credits" or "license()" for more information.
>>>
Ln: 4 Col: 4
```

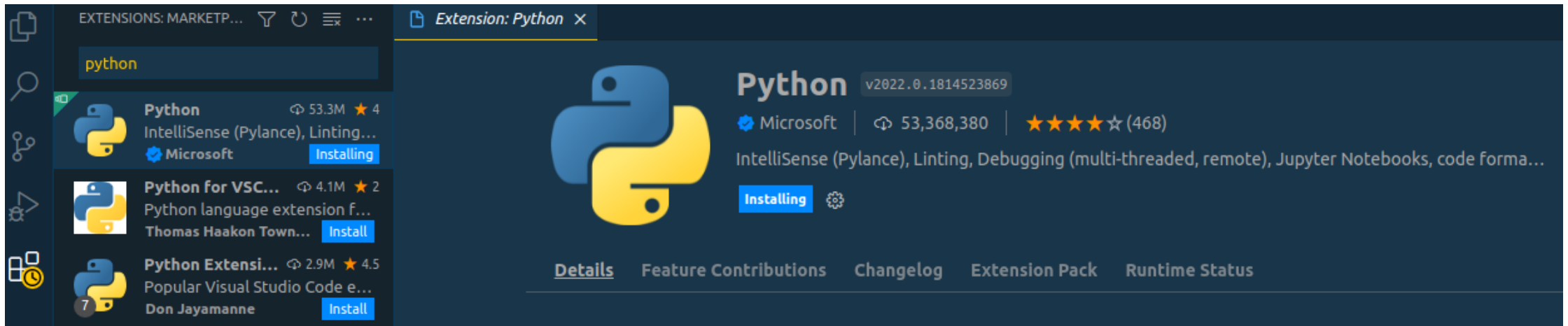
- Visual Studio Code (VScode)
 - [Download.](#)



Visual Studio Code



- Visual Studio Code (VScode)
 - Python extension.



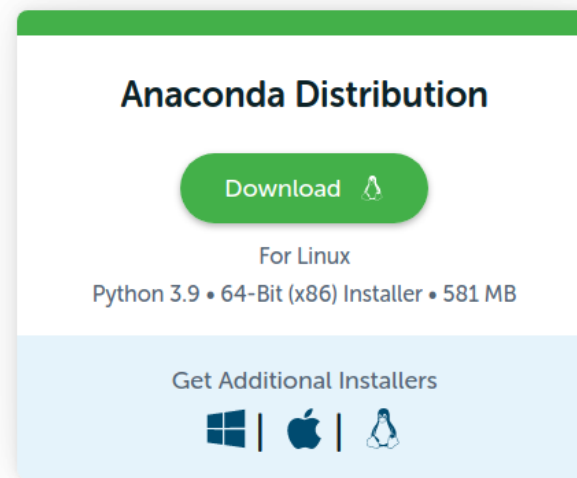


- Jupyter Notebook.
 - [Download](#).

Individual Edition is now

ANACONDA DISTRIBUTION

The world's most popular open-source Python distribution platform



- Online Editors:
 - [Online Python.](#)
 - [Pynative.](#)
 - [Programiz.](#)



- Using cmd (in Windows) or Terminal (in Linux) to do the following:
 - Create code folder.
 - Create code file.
 - Python program files use .py extension.
 - Open code file in the text editor (or IDE).
 - Write your code.

```
print("I Love Python")
```



- Using cmd (in Windows) or Terminal (in Linux) to do the following:
 - Run your code in cmd.

```
python3 first.py
```

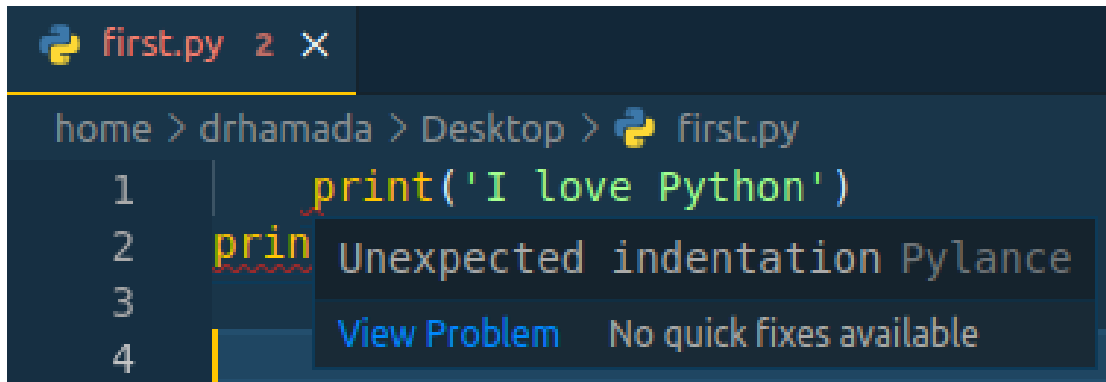
```
"/path/to/python3" "/path/to/code file/first.py"
```

In VScode IDE open new terminal to and press run button on top right.

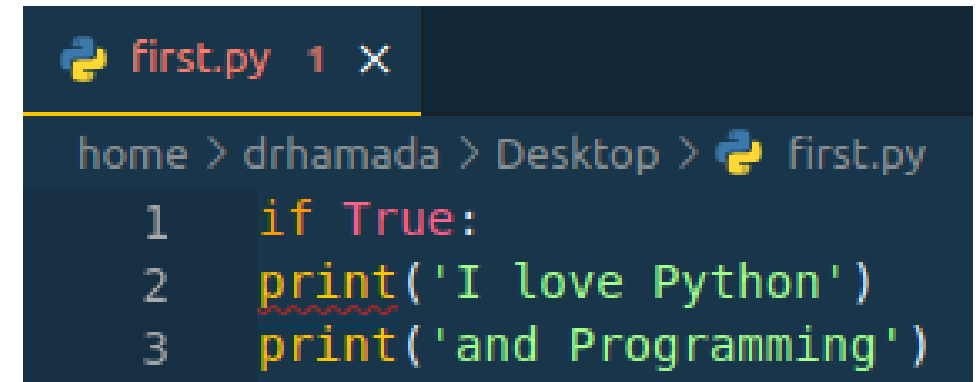
Lecture 1

SYNTAX IN PYTHON

- Based on **INDENTATION** even if one space!!!



```
first.py 2 X
home > drhamada > Desktop > first.py
1 print('I love Python')
2 prin Unexpected indentation Pylance
3
4 View Problem No quick fixes available
```



```
first.py 1 X
home > drhamada > Desktop > first.py
1 if True:
2     print('I love Python')
3     print('and Programming')
```



- Write a python code to sum two numbers num1 and num2.
 - Steps:
 - Ask the user to enter the first number.
 - Ask the user to enter the second number.
 - Compute the summation of the input numbers.
 - Display the result.

