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Basics of Programming through Python

Getting started with Python

Introduction to Programming COMP102

Term 3 2022-202

Getting started with Python

Learning outcomes

- Describe the features of Python programming language.
- List Python distributions, IDEs, and editors.
- Differentiate between Python script mode and interactive mode.
- Explain how to install Python and PyCharm.
- Use the programming environment PyCharm.
- Write a first Python program.

Features of Python (1)

- Python language is founded in the year 1991 by the developer Guido Van Rossum.
- Its most popular implementation is called CPython and is written in C programming language.
- Python is a high level language.
- It is a free and open source software that works on Linux, Mac, Windows, and various other platforms.

  ®Python is portable and platform independent, means it can run on various operating systems and hardware platforms.

Features of Python (2)

- It is an interpreted language, as Python programs are executed by an interpreter.
- Python programs are easy to understand as they have a clearly defined syntax and relatively simple structure.
- Python is case-sensitive.
    - For example, NUMBER and number are not same in Python.

Features of Python (3)

- Python has a rich library of predefined functions.
- Python is also helpful in Web development.
  - Many popular Web services and applications are built using Python.
- Python uses indentation for blocks and nested blocks.
- There are multiple python distributions

Python distributions

- A Python distribution is a software bundle, which contains:
  - A Python interpreter, and
  - The Python standard library.
- Installer programs for common operating systems.
- Aside from the official CPython distribution available from python.org, other distributions based on CPython include the followings:

Python IDE / IDLE

- What is an **IDE** (stands for Integrated Development Environment)?

  ®An IDE is a software application that provides comprehensive facilities to computer programmers for software development.

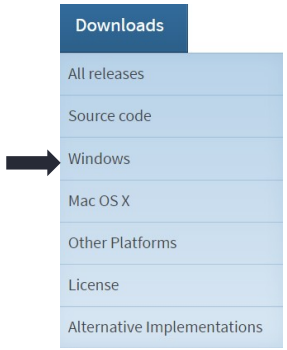
- **Python IDE / IDLE** (stands for Integrated Development and Learning Environment): an integrated development environment for Python, which has been bundled with the default implementation of the language.
- Most modern IDEs have intelligent code completion.

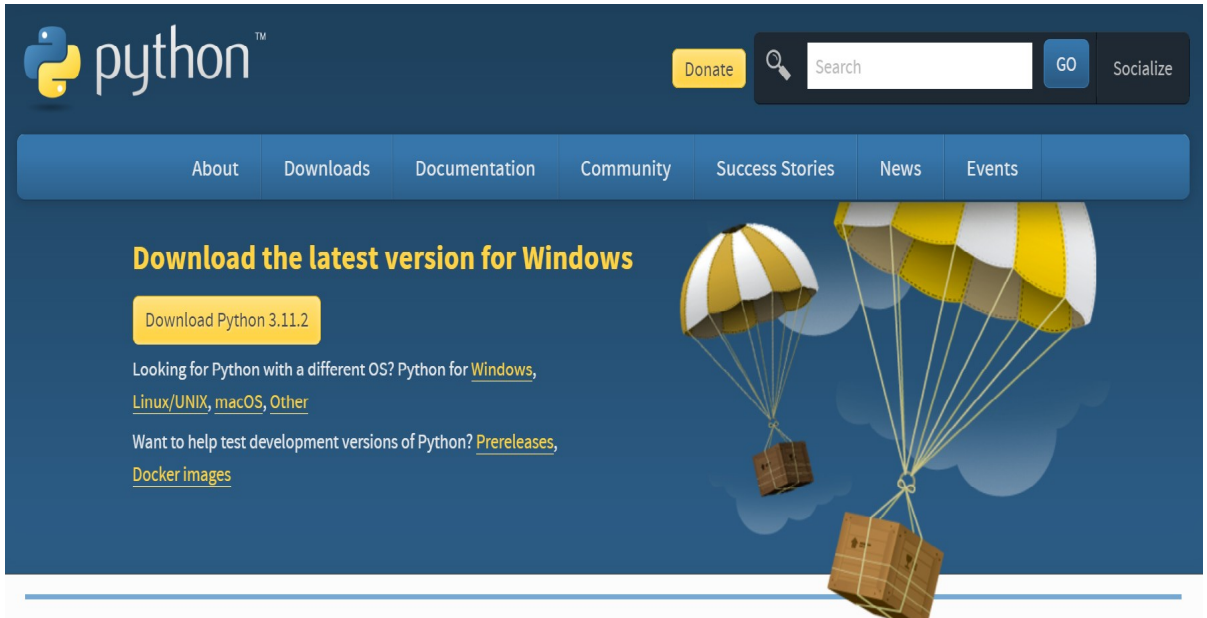
Popular Python IDEs

Popular Python editors (IDLE)

Installing Python and PyCharm IDE (1)
Installing Python on Windows

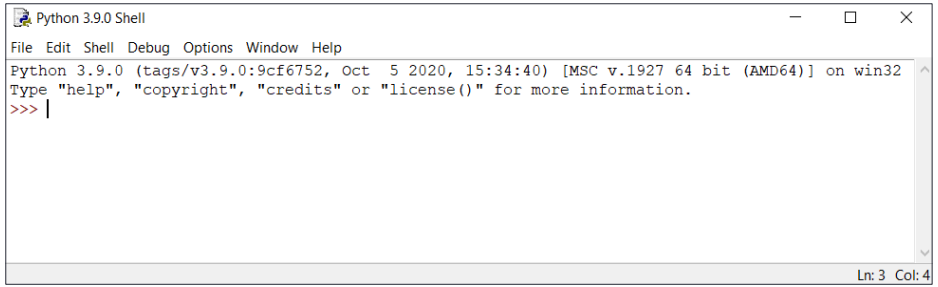
1) Go to www.python.org and click on "**Downloads**" link at the top of the page.
2) Click on "**Download Python 3.11.2**".





Running Python
Working with default Python distribution

- Now the Python interpreter is installed on your computer to run and execute python programs. You can use also any **online Python interpreter (i.e. https://www.online-python.com/)**.
- The interpreter is also called Python shell.
- A sample screen of Python interpreter (or shell) is shown in



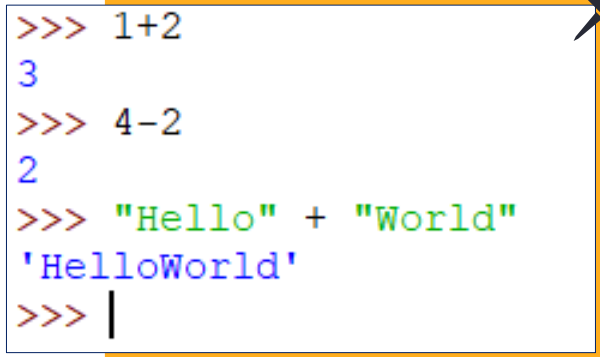
- The symbol >>> is the Python prompt, which indicates that the interpreter **is ready** to take instructions.
- We can type commands or statements on this prompt to execute them using a Python interpreter.

Execution modes

- There are **two ways** to use the Python interpreter:
  1) Interactive mode: allows execution of individual statement instantaneously
  2) Script mode: allows us to write more than one instruction in a file called Python source code file that can be executed.

Interactive mode (1)

- To work in the interactive mode, we can simply type a Python statement on the **>>> prompt directly**.
- As soon as we press enter, the interpreter executes the statement and displays the result(s), as shown in the figure.



Interactive mode (2)

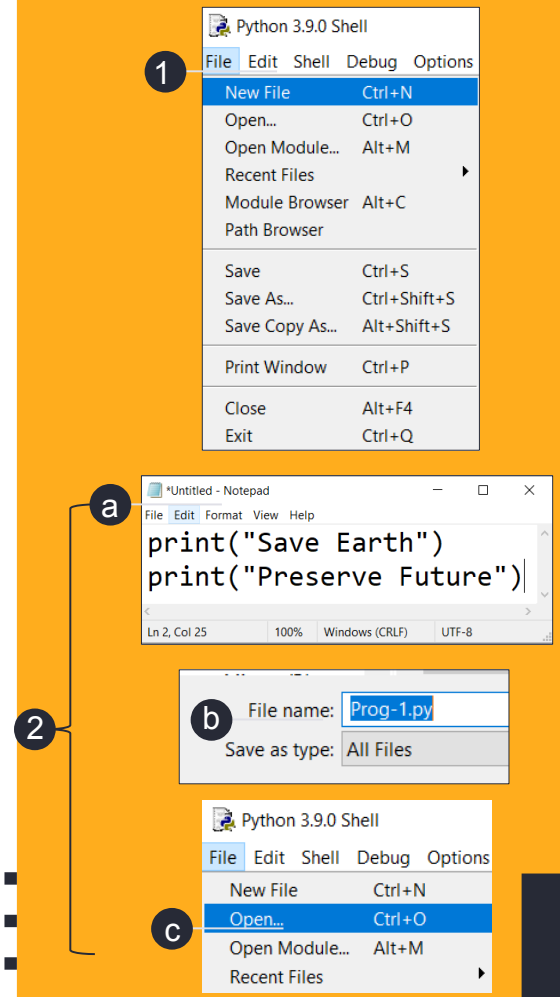
- Working in the interactive mode is convenient for testing a single line code for instant execution.
- **But** in the interactive mode, we cannot save the statements for future use and we have to retype the statements to run them again.

Script mode (1)

- In the script mode, we can write a Python program in a file, save it and then use the interpreter to execute it.
- Python scripts are saved as files where file name has extension **“.py”**.
- By default, the Python scripts are saved in the Python installation folder.

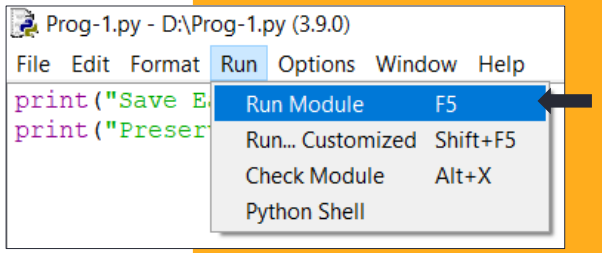
Script mode (2)

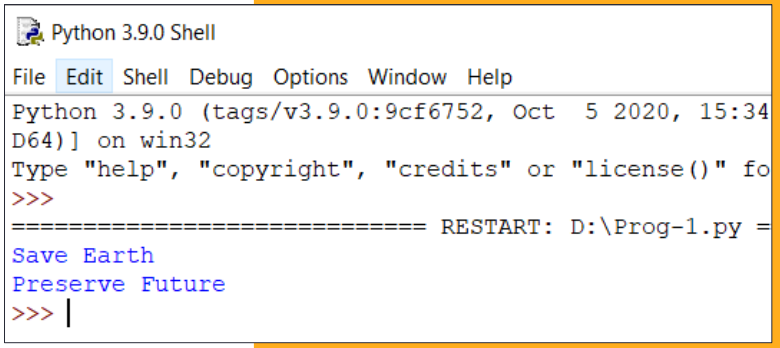
- To create a script file, we can either:
  1) Create a python file (.py) from IDLE (“**File**” Ⓟ”**New File**”), and save it.
  2) **a)** Create your Python file (.py) using editor like **Notepad++**, **b) save** it an **.py** file, then **c) open** it directly from IDLE (“**File**” Ⓟ”**Open**”) as shown in the figure



Script mode (3)

3) While working in the script mode, after opening the file, click on "**Run**"Ⓟ"**Run** *Module*" from the menu as shown in the figure.





Installing PyCharm (1)

- For Python programmers, PyCharm **is one of the best IDE for Python**. Also, it has a free version called "Community Edition".
- Now you are ready to install the PyCharm IDE.
    1) Go to www.jetbrains.com/pycharm.
    2) Click on the "**Download**" button at top left (you can also scroll down the page and click the download link for the

Python Keywords

- Keywords are **reserved words**.
- Each keyword has a specific meaning to the Python interpreter, and we can use a keyword in our program only for the purpose for which it has been defined.
- As Python is **case sensitive**, keywords must be written exactly as given in the table.

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

Identifiers (1)

- In programming languages, **identifiers** are names used to identify a variable, function, or other entities in a program.
- The **rules for naming an identifier in Python** are as follows:
    1) The name should begin with an uppercase or a lowercase alphabet or an underscore sign (_). This may be followed by any combination of characters **a–z**, **A–Z**, **0–9** or underscore (_).
        - An identifier **cannot** start with a digit.

Identifiers (2)

2) It can be of any length. (However, it is preferred to keep it short and meaningful).
3) It should not be a keyword or reserved word given in previous table.
4) We cannot use special symbols like **!**, **@**, **#**, **$**, **%**, etc., in identifiers.

Variables

- A variable in a program is uniquely identified by a name (identifier).
- Variable in Python refers to an object — an item or element that is stored in the memory.
- Value of a variable can be a string (e.g., ‘b’, ‘Global Citizen’), numeric (e.g., 345) or any combination of alphanumeric characters (CD67).
- In Python we can use an assignment statement to create new variables and assign specific values to them

Variables in Python

- Variable declaration is **implicit** in Python, means variables are automatically declared and defined when they are assigned a value the first time.
- Variables must **always be assigned values** before they are used in expressions as otherwise it will lead to an error in the program.
- Wherever a variable name occurs in an expression, the **interpreter** replaces it

Variables: Try out (1)

- Write a program to display “keep smiling” assigned to a variable in Python.
- Write a program to display “The user number is 101”, with **101** is assigned to a variable in Python.

```
>>> message="Keep Smiling"
>>> print(message)
Keep Smiling
>>>
```

```
>>> userNo=101
>>> print('The user number is',userNo)
The user number is 101
>>>
```

Variables: Try out (2)

- Write a Python program to find the area of a rectangle given that its length is 10 units and breadth is 20 units.

```
>>> length = 10
>>> breadth = 20
>>> area = length * breadth
>>> print(area)
200
>>> print('The area of the rectangle is',area)
The area of the rectangle is 200
>>>
```

Comments in Python

- Comments are used to add a remark or a note in the source code. Comments are not executed by interpreter.
- In Python, a comment starts with **#** (hash sign).
- Everything following the # till the end of that line is treated as a comment and the interpreter simply **ignores it** while executing the statement.

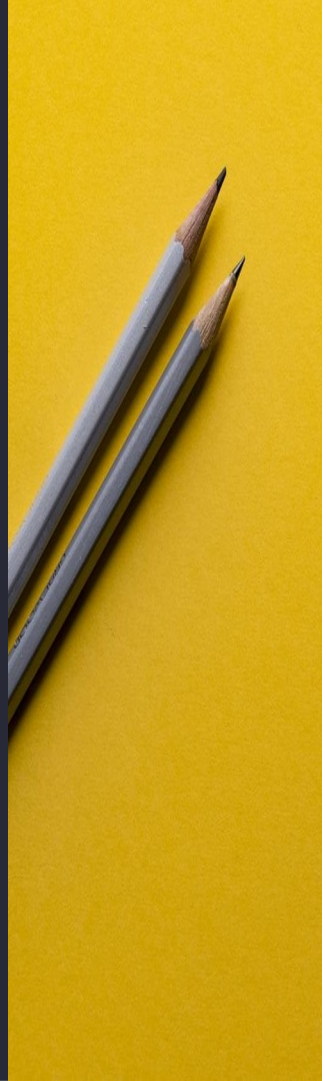
```
>>> #To find the sum of two numbers
>>> num1 = 10
>>> num2 = 20
>>> result = num1 + num2
>>> print(result)
30
>>>
```

Everything is an Object

- Python treats every value or data item whether numeric, string, or other type (discussed in the next topic) as an object in the sense that it can be assigned to some variable or can be passed to a function as an argument.
- Every object in Python is assigned a **unique identity (ID)** which remains the same for the lifetime of that object. This ID is akin to the **memory address of the object.**
  - Ⓟ**The function id()** returns the identity of an object.

```
>>> num1 = 20
>>> #Identity of num1
>>> id(num1)
1651325102992
>>> num2 = 30 - 10
>>> #Identity of num2 and num1
>>> #are same
>>> #as both refers to object 20
>>> id(num2)
1651325102992
>>>
```

1) What is Python distribution?
2) List any four Python IDEs.
3) What are the basic modes of python?
4) What is Python Shell or Python Interactive Shell?
5) What is script mode?
6) Differentiate between script mode and interactive mode.
7) What is PyCharm?
8) What is the extension of python program/script?



Thanks!