Basics of Python Programming

Session 01

Session Overview (1-2)

In this session, you will be able to:

- Describe the advantages of Python programming
- List the steps to install Python on Windows, Mac, and Linux
- Describe Integrated Development and Learning Environment (IDLE)

Session Overview (2-2)

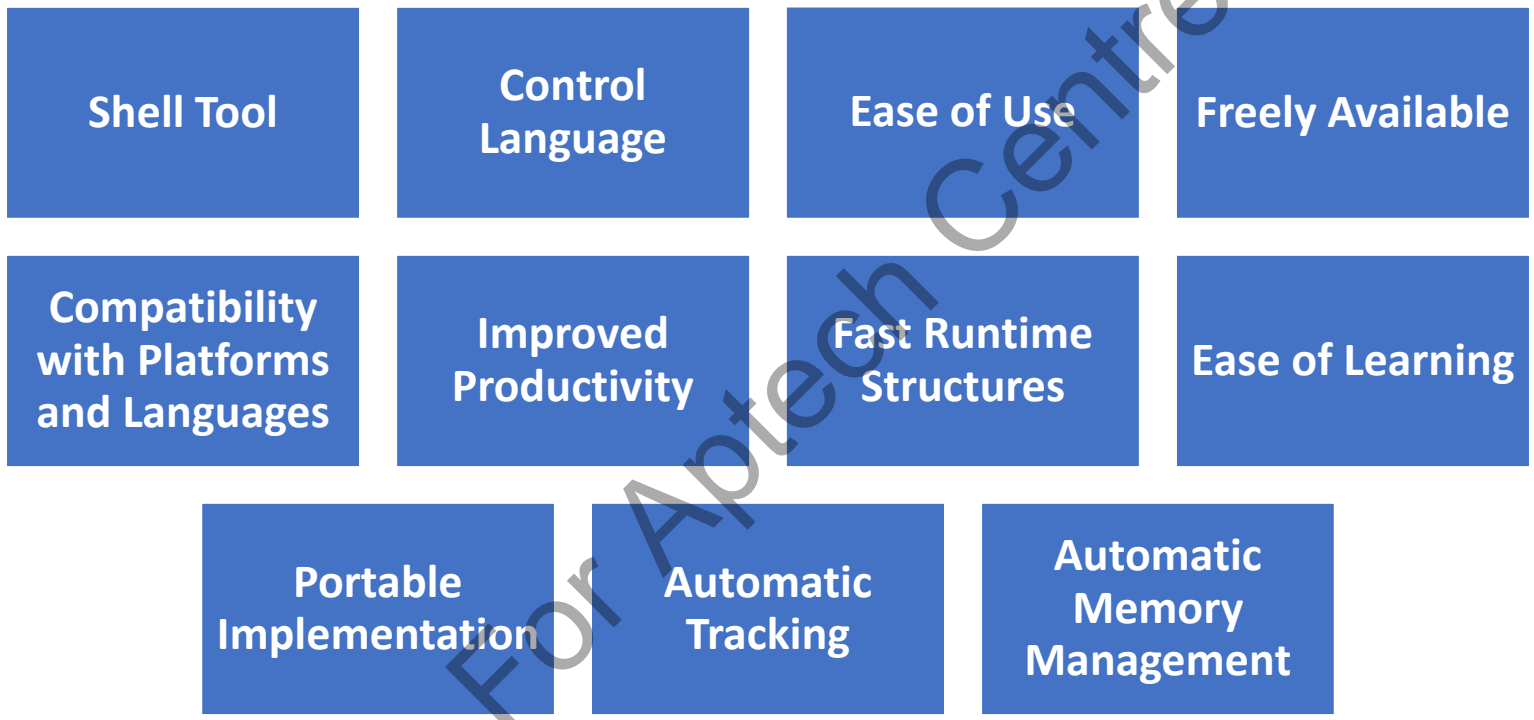
- List the steps to create and run Python code in PyCharm
- Identify the different Python vocabulary terms
- Explain the concept of dynamic typing in Python

Introduction to Python

- Python is a robust high level programming language, which is widely use in the world.
- Released in 1991, the language was developed by Guido Van Rossum.
- Python is similar to FORTRAN, which is one of the oldest programming languages.
- It is more powerful than FORTRAN.

Power and Benefits of Python

- Developers commonly use Python for scripting due to the following reasons:



Python 2 versus Python 3 (1-3)

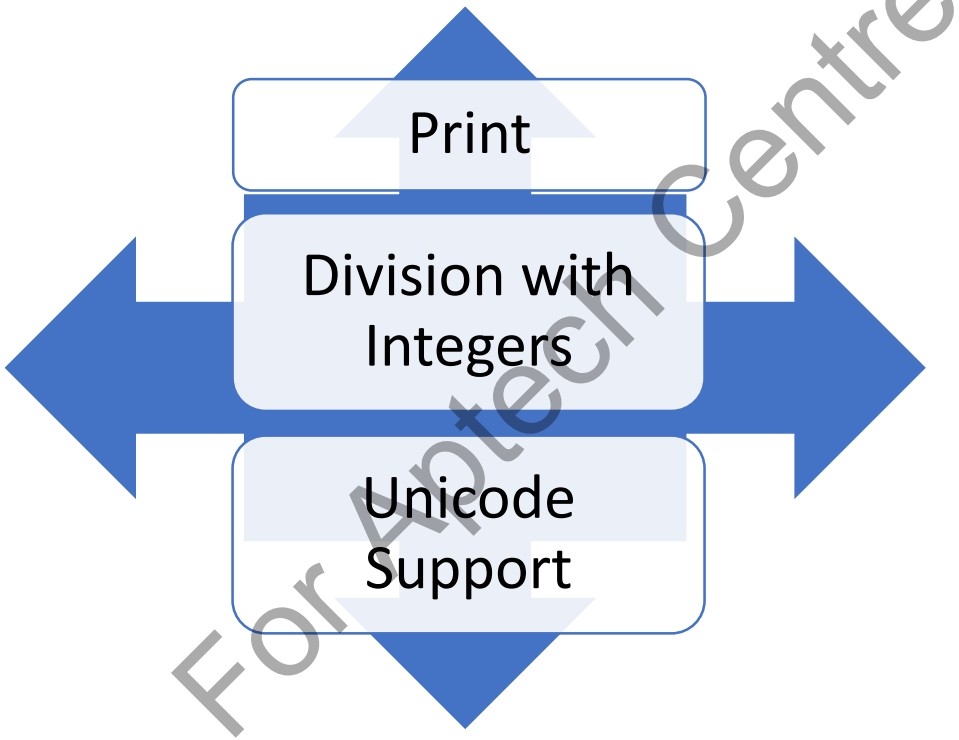
- Python 2.x is now a legacy due to the current version 3.x in use.
- With Python 3, the `print` statement is now a built-in function.
- Developers took time to adopt Python 3 as it was not compatible with version 2.

Python 2 versus Python 3 (2-3)

- To overcome the problem of backward compatibility, Python 2.7 was released in 2010.
- This compatibility support included improved modules for version 2.7 such as `Unittest` for test automation and `Argparse` for parsing command-line options.

Python 2 versus Python 3 (3-3)

- Differences between Python 2.0 and Python 3.0:



How Python Works? (1-2)

- Developer parses, analyzes, and feds Python code into an interpreter.
- Python first compiles the source code (the statements in the file) into a format termed as byte code.
- If Python has write access to a machine, it stores the byte code in a file that ends with a `.pyc` extension.

How Python Works? (2-2)

- In Python 3.2 and later, Python saves `.pyc` byte code files in a sub-directory termed as **__pycache__**, which is located in the directory where the source files reside.
- Once a program has been compiled into byte code, it is sent to a Python Virtual Machine (PVM) for execution.

Installing Python

Instructions:

Windows

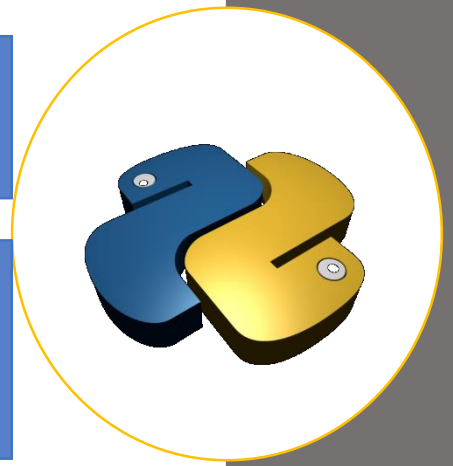
- In Windows systems, run the Python installation file after downloading. By default, Python is installed at **C:\Python36**.

Linux

- In Linux systems, run the following commands for installing Python 3:
  - `$ sudo apt-get update`
  - `$ sudo apt-get install python3.6`

Mac OS X

- In Mac OX systems, perform the following steps to install Python:
  - Download the Mac OS X 64-bit/32-bit installer from the Python Website.
  - Double-click the `python-2.7.11-macosx10.6.pkg` file from the **Downloads** folder.
  - Click **Continue**, **Agree,** and **Install** buttons in the **Install Python** wizard.



IDLE (1-3)

- Python IDLE is a powerful and useful tool for developing Python programs.
- Instructions to install IDLE on different platforms:

In Windows, the Python IDLE is installed along with Python.

In Linux, enter this command in the Terminal to install IDLE for Python 3:

```
$ sudo apt-get install idle3
```

In Mac OS X, Python IDLE is installed along with Python 3.

IDLE (2-3)

Steps to work with IDLE:

1. Perform one of the following steps:
    - On Windows, select **IDLE** from the list of Programs.
    - On Linux, select **IDLE** from the list of installed applications.

Python Program in IDLE Shell

IDLE (3-3)

2. Enter the code to view the sum of two numbers in Python (without >>> symbols).

PyCharm (1-5)

Steps to install the PyCharm community version on Windows:

1. Download the PyCharm Community version for Windows from the JetBrains Website.
2. Run the downloaded **.exe** file. The setup window is displayed.

PyCharm (2-5)

3. Click **Next**.
4. Click **Browse** to change the default location for installation.
5. Click **Next** to complete the installation process.

PyCharm (3-5)

Steps to install the community version on Mac OS:

1. Download the PyCharm Community version for Mac OS X from the JetBrains Website.
2. Double-click the downloaded **.dmg** file.
3. Drag the icon, **PyCharm**, to the **Applications** folder.

PyCharm (4-5)

Steps to install the community version of PyCharm on Linux:

1. Download the PyCharm Community version for Linux from the JetBrains Website.
2. Copy **PyCharm-2017.2.1.tar.gz** to the installation location.

PyCharm (5-5)

3. Unpack **PyCharm-2017.2.1.tar.gz** through the Terminal using following command: `$ tar -xzf pycharm-2017.2.1.tar.gz`
4. `Runpycharm.sh`from the **bin** sub-directory to start PyCharm.

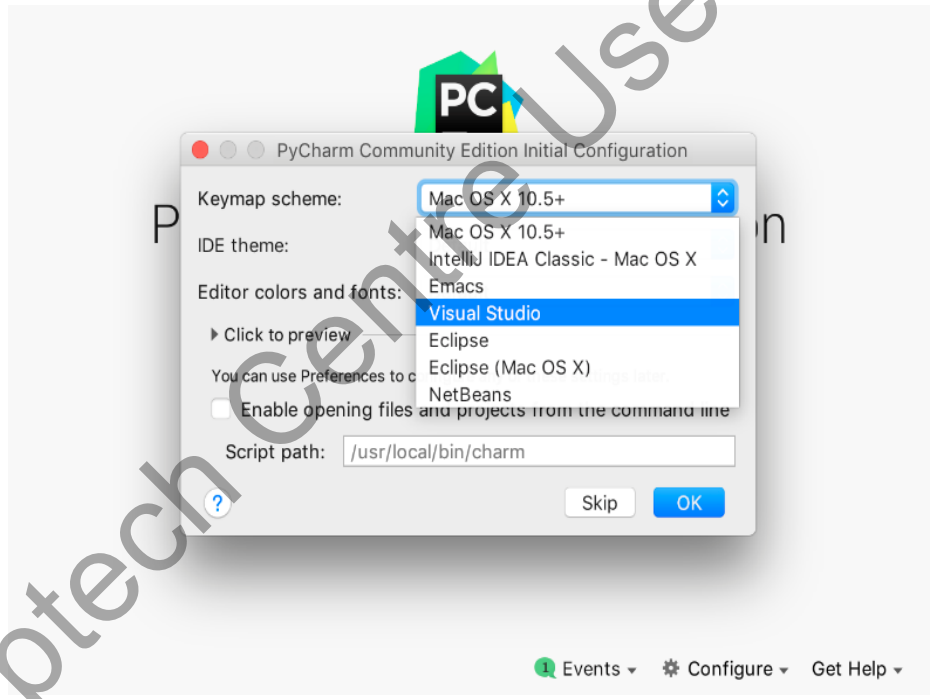
Running and Creating Sample Project in PyCharm IDE (1-3)

Steps to create a sample project in PyCharm IDE:

1. Start the PyCharm IDE.
2. Select an existing profile if any or select the default option.
3. Click **Continue**.
4. Agree the terms and conditions and continue.

Running and Creating Sample Project in PyCharm IDE (2-3)

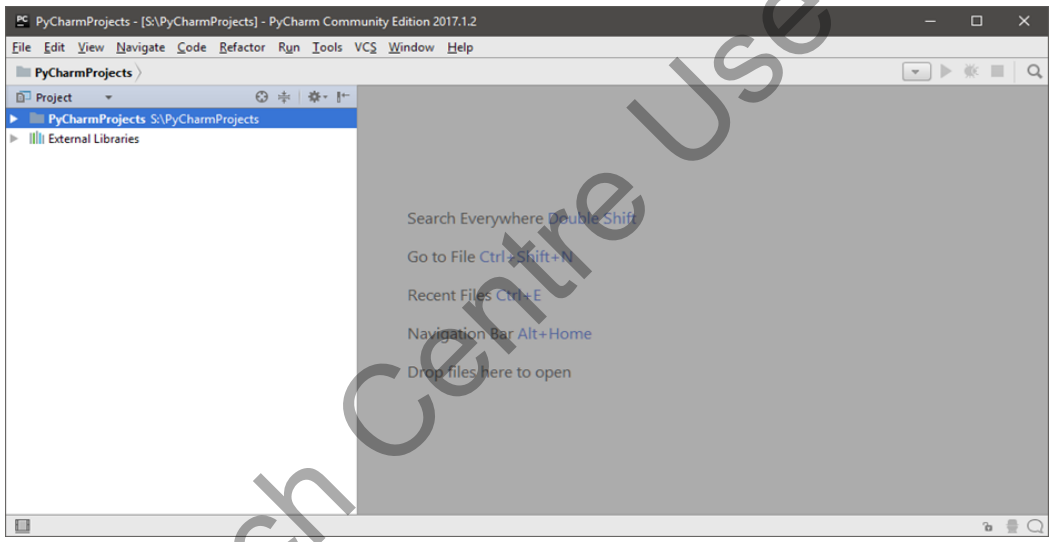
5. Select a suitable keymap scheme for accessing keyboard shortcuts.
6. Click **OK**.
7. Click **Create new project**.



Keymap Scheme Selection

Running and Creating Sample Project in PyCharm IDE (3-3)

8. Select a project location from the **Location** drop-down field.
9. Select a suitable interpreter from the **Interpreter** drop-down field in case of multiple Python versions.
10. Click **Create**.



PyCharm IDE

Creating and Running a Python Code in PyCharm (1-2)

Steps to create and run a Python code in PyCharm:

1. Right-click a suitable project in the **Project View**.
2. Select **New** → **Python File**. The New Python file dialog box is displayed.
3. Specify a suitable name for the Python program in the **Name** field.

Creating and Running a Python Code in PyCharm (2-2)

4. Click **OK**. The `.py file` is opened in the Editor area.
5. Enter the code to add two numbers.
6. On the menu bar, select **Run → Run.**

Running from Command Prompt (1-2)

Steps to run a Python code using the Command Prompt:

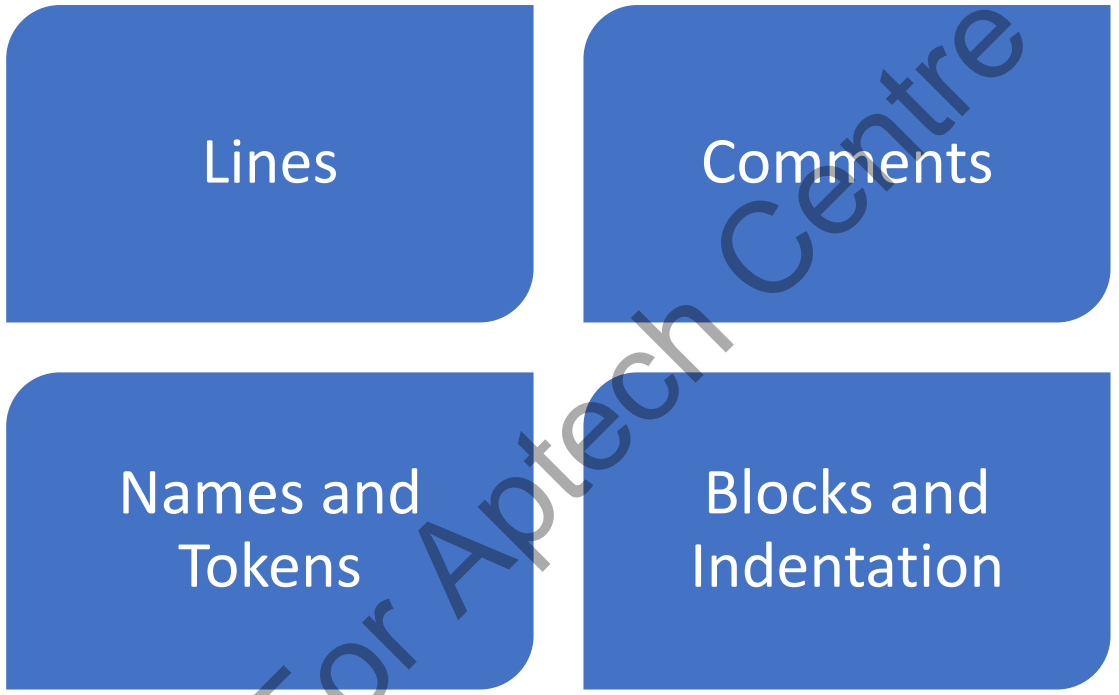
1. Open the Command Prompt.
2. Navigate to the location where the Python code file is present.
3. Prefix with `python` and specify the name of the Python file followed by `.py` extension.

Running from Command Prompt (2-2)

4. Press **Enter**. If both Python 2 and Python 3 are installed, prefixing `python` automatically selects Python 2.
5. To select Python 3 interpreter, use the Python3 prefix `orpy`.

Vocabulary of Python

- Terms of Python that a developer should know:



Dynamic Typing in Python

- A developer is not required to declare the specific types of objects in use, while writing a Python script.
- Types are determined automatically at runtime in Python.
- Following are a few points related to dynamic typing in Python:

Variable Creation

Variable Types

Variable Use

Summary (1-5)

- Python is a powerful object-oriented programming language that is frequently used for scripting.
- Some benefits of Python is ease of learning, open source license, compatibility with platforms, shell coding, and automatic memory management.

Summary (2-5)

- A developer is not required to declare the specific types of objects in use, while writing a Python script.
- Version 3 is considered the future of Python with support for Unicode characters, `print()` method and precise division.
- A Python file has an extension of `.py`.

Summary (3-5)

- In Python 3.2 and later, the compiler generates byte code as `.pyc` file and stores it in a sub-directory termed as **__pycache__**.
- Python's IDLE is a powerful tool that offers a shell window for running Python code in an interactive mode.
- PyCharm is an intelligent IDE for Mac, Linux, and Windows.

Summary (4-5)

- Python elucidates block structures and nested block structures with indentation instead of starting and ending brackets.
- A statement separator is a semicolon, which is required only when there are multiple statements in a line.
- Names are case-sensitive in Python.

Summary (5-5)

- A variable in Python is created when a value is assigned to it and points to an object. It does not contain any information regarding its type or constraints.
- A developer should clearly assign values to all variables before using them.
- The idea of 'type' is always associated with objects, not with names.