

Language

Language is a system of words, sounds, or signs that people use to communicate ideas, feelings, information, and thoughts with one another.

For example: English, Urdu, Arabic, and Chinese are different languages.

Computer Language

A computer language is a language used to give instructions to a computer. Since computers do not naturally understand human languages like English or Urdu, programming languages provide a way for humans to tell computers what to do. The main purpose is to communicate instructions to a computer so it can perform specific tasks.

Examples

1. Python — used for AI, data science, and general programming.
2. Java — used for applications, websites, and Android development.
3. C — used for operating systems and embedded systems.
4. C++ — used for games, software, and high-performance applications.
5. JavaScript — mainly used to make websites interactive.
6. HTML/CSS — used to structure and style web pages.

Noted:

- Human language communicates between people
- Computer language communicates instructions to computers

Types of Computer Languages

Computer languages are generally divided into **three main types**:

1. **Machine Language**
 - The lowest-level language.
 - Written in **0s and 1s (binary)**.
 - Directly understood by the computer.
 - Example: 10110000 01100001
2. **Assembly Language**
 - Uses short codes or symbols instead of binary.
 - Easier for humans to understand than machine language.
 - Example: MOV A, B
 - Requires an **assembler** to convert it into machine language.
3. **High-Level Language**
 - Uses English-like words and is much easier to write and understand.
 - Examples: **Python, Java, C++, JavaScript, C#**.

Noted:

Every computer languages have translator it's could be compiler, **interpreter** or **Assembler** to translate it into machine instructions.

In short: Machine language is closest to the computer, while high-level languages are closest to human language.

Difference between Compiler, Interpreter, and Assembler

All three are **language translators**. They convert programming instructions into a form the computer can execute, but they work differently.

Translator	Converts	How it works	Example
Compiler	High-level language → machine code	Translates the whole program before execution	C, C++
Interpreter	High-level language → machine instructions	Translates and executes line by line	Python, JavaScript
Assembler	Assembly language → machine code	Converts assembly instructions into machine code	Assembly Language ,MOV, ADD commands

1. Compiler

A **compiler** translates the entire source program into machine code before the program runs.

Example:

```
printf("Hello");
```

The compiler converts the program into machine code, and then the computer executes it.

Advantage: Usually faster during execution.

Disadvantage: Errors are generally reported after compilation.

2. Interpreter

An **interpreter** translates and executes the program **one instruction at a time**.

For example, Python code can be interpreted as it runs:

```
print("Hello")
```

Advantage: Easy to test and debug.

Disadvantage: Traditionally slower because translation happens during execution.

3. Assembler

An **assembler** converts **assembly language** into machine language.

For example:

```
MOV AX, 5
```

The assembler converts this instruction into the corresponding machine-code representation.

Easy way to remember

Compiler: Whole program → then run

Interpreter: Line by line → while running

Assembler: Assembly language → machine language

Python Background:

Python is a high-level, general-purpose programming language known for its simple and readable syntax. It was designed to make programming easier to learn and to allow developers to write programs with fewer lines of code.

Python was created by **Guido van Rossum**, a Dutch programmer. He began developing Python in the late 1980s as a successor to the ABC programming language.

History of Python

- **1989:** Guido van Rossum began working on Python during the Christmas holidays.
- **1991:** The first public version, **Python 0.9.0**, was released. It already included important features such as classes, functions, exception handling, and modules.
- **1994:** **Python 1.0** was released, adding features such as functional programming tools.
- **2000:** **Python 2.0** was released with major improvements, including garbage collection and Unicode support.
- **2008:** **Python 3.0** was released. It introduced significant changes to improve the language and correct some older design limitations.
- **2020:** Official support for **Python 2** ended, and Python 3 became the standard version.

Today Python is widely used in web development, artificial intelligence, machine learning, data science, automation, scientific computing, cybersecurity, and education.

Why Python Became Popular

Python has now become a widely used professional language for various reasons

- Easy to learn, read and install setup/environment.
- Python has a simple syntax similar to the English language.
- Free and open source
- Python runs on an interpreter system, meaning that code can be executed as soon as it is written. This means that prototyping can be very quick.
- Cross-platform (Windows, Mac, Linux, Raspberry Pi, etc)
- Supported by a huge collection of libraries and frameworks
- Useful for both beginners and professional developers
- Widely used in modern fields such as **AI and data science**
- Python can be treated in a procedural way, an object-oriented way or a functional way.
- It produces Dynamic web Development With connected MYSQL and DBMONGO databases engine.

In short, **Python started as a relatively small programming-language project but developed into one of the world's most widely used programming languages.**

Downloading and Installing Python

Python can be downloaded and installed easily on Windows. Here is the step-by-step process.

1. Download Python

- Open a web browser.
- Go to the official Python website.
- Click **Downloads**.
- Select the latest **Python 3.xxxx** or **/latest** version for Windows.
- Download the installer.



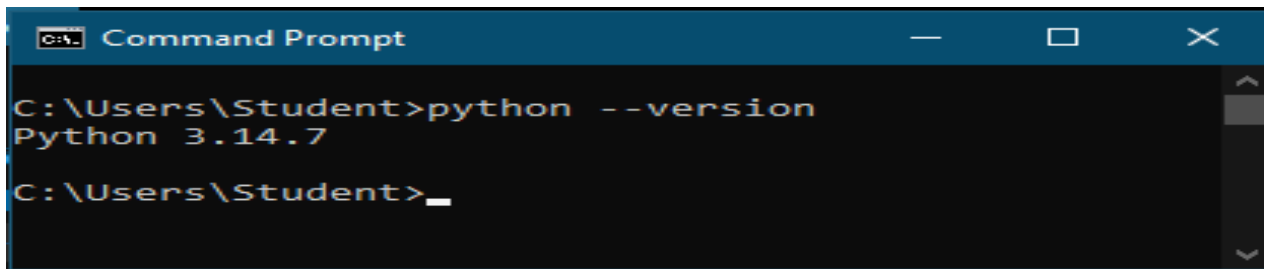
2. Install Python

- Open the downloaded Python installer.
- **Important:** At the bottom of the installer, check **"Add Python.exe to PATH."**
- Click **Install Now**.

- Wait for the installation to complete.
- Click **Close** when the installation is finished.

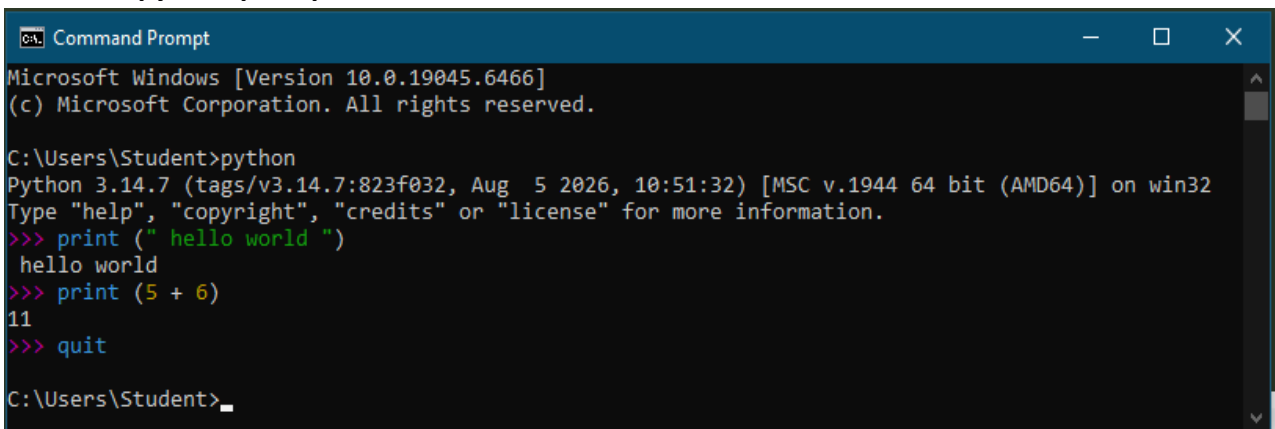
3. Check the Installation

Open **Command Prompt(CMD)** or Write **CMD** in search menu bar **ENTER** and type:



```
C:\Users\Student>python --version
Python 3.14.7
C:\Users\Student>_
```

4. Check the python prompt:



```
C:\Users\Student>python
Microsoft Windows [Version 10.0.19045.6466]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Student>python
Python 3.14.7 (tags/v3.14.7:823f032, Aug 5 2026, 10:51:32) [MSC v.1944 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> print (" hello world ")
hello world
>>> print (5 + 6)
11
>>> quit
C:\Users\Student>_
```

What is PyCharm

PyCharm is an **Integrated Development Environment (IDE)** developed by **JetBrains** for writing, running, testing, and debugging Python programs.

In simple words, **PyCharm is a software application that provides all the tools you need to develop Python programs in one place.**

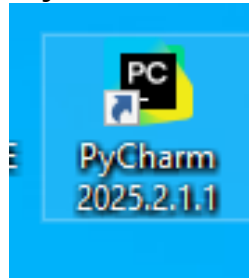
Uses of PyCharm

- **Writing Python code:** Provides a powerful code editor with syntax highlighting and code completion.
- **Running programs:** You can run Python programs directly inside PyCharm.
- **Debugging:** Helps find and fix errors in your program using breakpoints and a debugger.
- **Code completion:** Suggests functions, variables, and Python keywords while you type.
- **Project management:** Organizes Python files, folders, libraries, and other project resources.
- **Virtual environments:** Makes it easier to create and manage separate Python environments for projects.
- **Database development:** Provides tools for working with databases in supported PyCharm editions.

- **Web development:** Can be used for Python-based web frameworks such as Django and Flask.
- **Version control:** Integrates with systems such as Git to help manage changes to your code.

In PyCharm, you can **write the code** → **save the project** → **run it** → **see the output** → **debug any errors**, all within the same application.

In short: Python is the programming language, while **PyCharm is a tool/IDE used to develop Python programs efficiently.**



What is Visual Studio Code (VS CODE).

Visual Studio Code, commonly called **VS Code**, is a **free, lightweight source-code editor developed by Microsoft**. It can be used to write, edit, run, and debug programs in many programming languages, including **Python, C++, Java, JavaScript, and HTML**.

Uses of VS Code

- **Writing code:** Provides an editor for creating and modifying programs.
- **Running programs:** Allows you to run code using extensions and integrated terminals.
- **Debugging:** Helps find and fix errors in programs.
- **Extensions:** You can add features for different programming languages and tools.
- **Git integration:** Helps manage code versions using Git.
- **Terminal:** Includes a built-in terminal for running commands.
- **Web development:** Commonly used for HTML, CSS, JavaScript, and web frameworks.
- **Python development:** With the Python extension, VS Code can be used to write, run, and debug Python programs.

PyCharm vs Visual Studio (VS Code)

Mainly designed for Python development Supports many programming languages

PyCharm	VS Code
Full-featured Python IDE	Lightweight, extensible code editor
Many Python tools built in	Features can be added through extensions
Developed by JetBrains	Developed by Microsoft

In simple words: PyCharm is primarily a Python-focused IDE, while VS Code is a flexible code editor that can be customized for many languages.

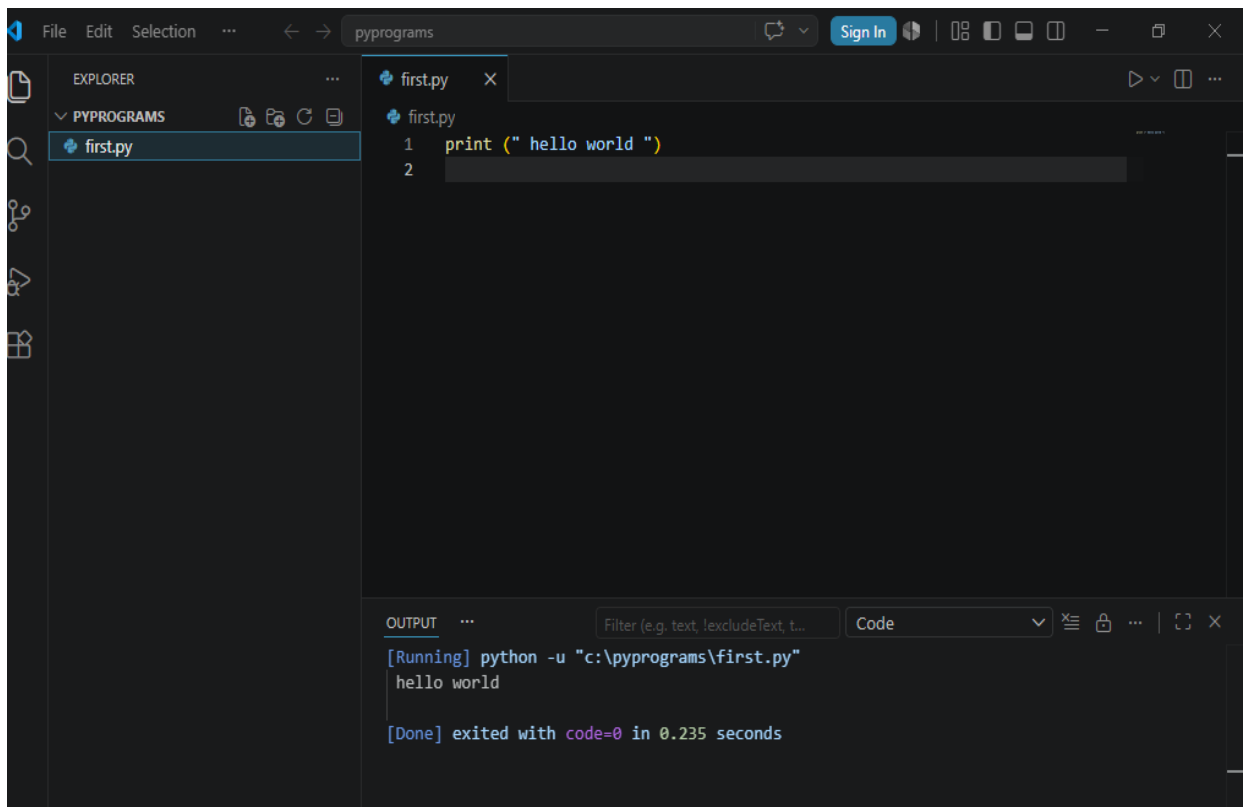
Configuration and Setting of Python in VS Code:

To configure Python in Visual Studio Code (VS Code), follow these steps:

1. Install Python
 - a Download and install Python from the official Python website.
 - b During installation on Windows, select "Add Python to PATH."
2. Install VS Code
 - a Download and install Visual Studio Code.
 - b Open VS Code after installation.
3. Install the Python Extension
 - a Open VS Code.
 - b Go to Extensions (Ctrl + Shift + X).
 - c Search for Python.
 - d Install the Python extension by Microsoft.
4. Select the Python Interpreter
 - a Press Ctrl + Shift + P.
 - b Search for Python: Select Interpreter.
5. Install Code Runner extension

Example

Write a first python program file, such as first.py and run the Python program (Hello World)



The screenshot displays the Visual Studio Code interface. The Explorer sidebar on the left shows a project named 'PYPROGRAMS' containing a file 'first.py'. The main editor window is open to 'first.py', showing the following code:

```
1 print (" hello world ")
2
```

Below the editor, the Output panel is visible, showing the execution results:

```
[Running] python -u "c:\pyprograms\first.py"
hello world
[Done] exited with code=0 in 0.235 seconds
```

Exercise

Theory Questions.

1. What is Python?
2. Write some features of Python Language.
3. Differences of PyCharm and VS Code.
4. Difference between the interpreter and Compiler.
5. What is a computer program.
6. What do you mean by types of Computer languages?

Practical Questions.

1. Write steps of python installation or setup process.
2. How to setting to python in VS Code.
3. Write Python program to display your Roll Number, Course Name and Technology Name on the output Screen

Objective and MCQs:

1. What is the default extension that most Web server uses to process Python file?
 - a) .html
 - b) .php
 - c) .py
 - d) .pyt
2. Who is invented of Python language?
 - a) Denis Retchie
 - b) Rasmus Lerdorf
 - c) John Baker
 - d) Guido van Rossum
3. Latest version of Python
 - a) 4.31
 - b) 3.14
 - c) 8.30
 - d) 7.13
4. Abbreviation of URL
 - a) Unified Resource location
 - b) Uni Resource locator
 - c) Uniform Resource Locator
 - d) United form locator

5. Which have translator name with Python language
 - a) assembler
 - b) compiler
 - c) Interpreter
 - d) Nothing all
6. Python 1.0 version was developed.
 - a) 1995
 - b) 1994
 - c) 2000
 - d) 2004
7. The first version released of Python.
 - a) 1990
 - b) 1992
 - c) 1995
 - d) 1989
8. PyCharm is an Integrated Development Environment (IDE) developed by
 - a) IBM
 - b) MACTOS.
 - c) JetBrains.
 - d) Microsoft.
9. VS Code (Visual Studio Code) developed by.
 - a) IBM
 - b) MACTOS.
 - c) JetBrains.
 - d) Microsoft.
10. Which command or instruction is use to display data on the screen in python language.
 - a) printf()
 - b) Print()
 - c) echo ()
 - d) write()