

Introduction to Python programming

Introduction to Python Programming

- Python is a high-level, interpreted programming language that is easy to learn and use.
- Python was created by Guido van Rossum and was first released in 1991.
- Python uses simple and readable syntax, which makes programming easier for beginners.
- Python is an open-source language, which means anyone can download, use, and modify it without paying a license fee.
- Python is widely used in many fields because of its simplicity and powerful features.

Features of Python

- Python has simple and easy-to-read syntax.
- Python is an interpreted language, so programs are executed line by line without compilation.
- Python supports object-oriented, procedural, and functional programming.
- Python has a large collection of built-in libraries and third-party libraries.
- Python works on different operating systems such as Windows, Linux, and macOS.

Applications of Python

1. Web Development

- Python is used to build websites and web applications.
- Popular frameworks include Django and Flask.

2. Data Science

- Python is used for data analysis, visualization, and statistical computing.
- Libraries such as NumPy, Pandas, and Matplotlib are commonly used.

3. Artificial Intelligence and Machine Learning

- Python is widely used to develop intelligent systems.
- Libraries such as TensorFlow and Scikit-learn support machine learning.

4. Automation

- Python can automate repetitive tasks such as file management and report generation.

5. Game Development

- Python can be used to create simple games using libraries such as Pygame.

Advantages of Python

- Python is easy to learn for beginners.

- Python programs are shorter and easier to understand.
- Python has a large community that provides support and learning resources.
- Python can be used for many different types of applications.

Installing Python and an Integrated Development Environment (IDE)

Installing Python

1. Download Python

- Visit the official Python website at <https://www.python.org>.
- Download the latest stable version for your operating system.

2. Install Python

- Run the downloaded installer.
- Select the option **"Add Python to PATH"** before starting the installation.
- Complete the installation by following the setup instructions.

3. Verify the Installation

- Open the Command Prompt or Terminal.
- Type `python --version` or `python3 --version`.
- If Python is installed correctly, the installed version number will be displayed.

Installing an Integrated Development Environment (IDE)

1. Jupyter Notebook

- Jupyter Notebook is a browser-based environment used for writing and running Python code.
- It is especially useful for data science, machine learning, and education.

Installation

- Install Python first.
- Open the Command Prompt or Terminal.
- Install Jupyter Notebook using the command:

```
pip install notebook
```
- Start Jupyter Notebook using the command:

```
jupyter notebook
```

2. PyCharm

- PyCharm is a professional IDE developed by JetBrains.
- It provides tools for coding, debugging, testing, and project management.

Installation

- Download PyCharm from the official JetBrains website.
- Install the software by following the setup instructions.
- Open PyCharm and configure the Python interpreter.

3. Visual Studio Code (VS Code)

- VS Code is a lightweight and popular code editor developed by Microsoft.
- It supports Python programming through extensions.

Installation

- Download VS Code from the official website.
- Install the software.
- Install the **Python Extension** from the Extensions Marketplace.
- Select the installed Python interpreter before running programs.

Advantages of IDEs Over Text Editors

1. Syntax Highlighting

- Keywords, variables, strings, and comments are displayed in different colors.
- This makes code easier to read.

2. Code Auto-Completion

- The IDE suggests keywords, functions, and variable names while typing.
- This saves time and reduces typing mistakes.

3. Error Detection

- The IDE highlights syntax errors before the program is executed.
- This helps programmers correct mistakes quickly.

4. Debugging Tools

- IDEs allow programmers to execute code step by step.
- Variables and program flow can be examined during execution.

5. Project Management

- IDEs organize files and folders in large projects.
- Multiple files can be managed easily.

6. Integrated Terminal

- Many IDEs include a built-in terminal.
- Python commands can be executed without leaving the IDE.

7. Version Control Support

- IDEs often provide built-in support for Git.
- This makes project collaboration easier.

Comparison Between IDEs and Text Editors

Feature	IDE	Text Editor
Syntax highlighting	Available	Limited or optional
Auto-completion	Available	Usually limited
Debugging	Built-in	Usually not available
Project management	Available	Limited
Code execution	Built-in	Usually requires external tools
Suitable for	Large and complex projects	Small programs and simple editing

Python Variables and Data Types

Variables

- A variable is a named location in memory that stores data.
- Variables allow programs to store, retrieve, and modify information.
- In Python, variables are created automatically when a value is assigned.

Variable Naming Rules

- Variable names can contain letters, numbers, and underscores.
- A variable name cannot begin with a number.
- Spaces are not allowed in variable names.
- Python keywords cannot be used as variable names.
- Variable names are case-sensitive.

Creating Variables

```
name = "John"
```

```
age = 20
```

```
height = 5.8
```

```
is_student = True
```

Data Types

1. Integer (int)

- An integer is a whole number without a decimal point.
- **Examples**

age = 21

marks = 95

2. Float (float)

- A float is a number that contains a decimal point.
- **Examples**

price = 49.99

temperature = 36.5

3. String (str)

- A string is a sequence of characters enclosed in single or double quotation marks.
- **Examples**

name = "Alice"

city = 'London'

4. Boolean (bool)

- A Boolean value represents either **True** or **False**.
- **Examples**

is_logged_in = True

is_admin = False

Checking the Data Type

- The type () function is used to determine the data type of a variable.
- **Example**

age = 20

print(type(age))

Multiple Variable Assignment

x = y = z = 100

a, b, c = 10, 20, 30

Type Casting



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