

Introudction To Python

Module Code: ELEE1147

Module Name: Programming for Engineers

Credits: 15

Module Leader: Seb Blair BEng(H) PGCAP MIET MIHEEM FHEA

Overview

- **Python** is a high-level, interpreted programming language.
- Created by **Guido van Rossum** and first released in **1991**.
- Python's design philosophy emphasizes:
 - **Code readability**
 - Use of significant whitespace.



Why Python?

- **Simple and readable** syntax.
- Large **standard library**.
- **Cross-platform**: Works on Windows, Mac, Linux, and others.
- Popular in:
 - **Web development**
 - **Data science**
 - **Automation**
 - **Machine Learning**

Python Enhancement Proposals (PEP)

- **PEP 8** is the style guide for Python code.
- It emphasizes:
 - Code readability
 - Consistent indentation
 - Use of spaces around operators and after commas.

```
1 # PEP 8 Compliant Python Code Example
2
3 # Constants should be written in all uppercase letters
4 NOUN = "Name"
5
6 def print_full_name(name):
7     print(NOUN + ": " + name)
8
9 def main():
10     """Main function to demonstrate PEP 8 compliance."""
11     fullname = "Guido van Rossum"
12     print_full_name(fullname)
13
14 if __name__ == "__main__":
15     main()
~
~
NORMAL helloworld.py  unix | utf-8 | python  6%  1:1
```

Versions of Python

- **Python 2** (Released in 2000)
 - Legacy, not supported after 2020.
 - Incompatible with Python 3.
- **Python 3** (Released in 2008)
 - Current and actively supported.
 - Many improvements over Python 2.



Package Manager: `pip`

- `pip` stands for "Pip Installs Packages".
- Used to install, update, and remove Python packages.

Common `pip` commands:

- Install a package: `pip install package_name`
- Upgrade a package: `pip install --upgrade package_name`
- List installed packages: `pip list`

```
~/GitHub/Learning_Python via v3.12.3 took 13s
> pip --help

Usage:
  pip <command> [options]

Commands:
  install      Install packages.
  download    Download packages.
  uninstall   Uninstall packages.
  freeze      Output installed packages in requirements format.
  inspect     Inspect the python environment.
  list        List installed packages.
  show        Show information about installed packages.
  check       Verify installed packages have compatible dependencies.
  config      Manage local and global configuration.
  search      Search PyPI for packages.
  cache       Inspect and manage pip's wheel cache.
  index       Inspect information available from package indexes.
  wheel       Build wheels from your requirements.
  hash        Compute hashes of package archives.
  completion  A helper command used for command completion.
  debug       Show information useful for debugging.
  help        Show help for commands.
```

Variables and Data Types

- **Variables:** Store data values. No need to declare data types.

```
x = 5  
name = "Alice"
```

- **Basic Data Types** (implicit):
 - `int` : Integer numbers (e.g., 5)
 - `float` : Decimal numbers (e.g., 5.0)
 - `str` : String (e.g., "Hello")
 - `bool` : Boolean (True/False)

Indentation and Syntax

- **Python** uses **indentation** to define the structure of code (instead of brackets).
- Consistent indentation is crucial for Python programs.

```
if x > 0:  
    print("Positive")  
else:  
    print("Non-positive")
```

- **Syntax** in Python is designed to be clean and readable.
 - No need for semicolons to terminate statements.
 - Code blocks are identified by indentation levels, not braces.

Functions

- Functions are defined using the `def` keyword.

```
def greet(name):  
    return "Hello " + name  
  
def main():  
    greet("Guido van Rossum")
```

The `main()` Function

- In Python, scripts can have a `main()` function.
- You can use the following idiom to execute code only when the script is run directly (and not imported as a module):

```
import pandas as py # module installed via pip and ready to use here

def main():
    print("This is the main function.")

if __name__ == "__main__":
    main()
```

Conditionals and Loops

- **Conditionals:** `if`, `elif`, `else`

```
if x > 0:
    print("Positive")
elif x == 0:
    print("Zero")
else:
    print("Negative")
```

- **Loops:** `for` and `while`

```
for i in range(5):
    print(i)

x = 10

while x > 0:
    x -= 1
```

Conclusion

- Python is an accessible and versatile programming language.
- Its applications span from web development to data science.
- Python's package manager, `pip`, makes it easy to manage packages.
- Understanding basics like variables, data types, functions, conditionals, PEP standards, and indentation gives a strong foundation.

References

- Python Official Website: python.org
- Python Package Index: pypi.org
- PEP 8: pep8.org