Introudction To Python

Module Code: ELEE1147

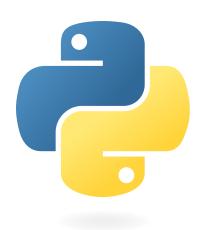
Module Name: Programming for Engineers

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

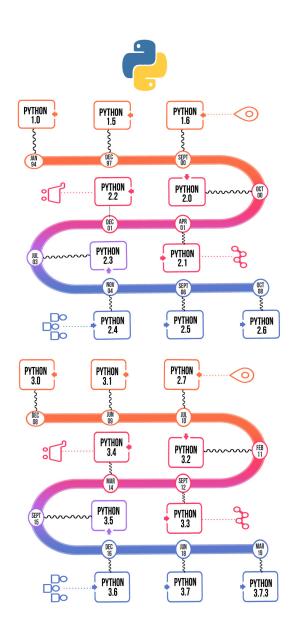
Python Enhancement Proposals (PEP)

- **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()
7
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.



5/13

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

lict

```
~/GitHub/Learning Python via 🤨 v3.12.3 took 13s
pip --help
 pip <command> [options]
Commands:
                             Install packages.
 install
 download
                              Download packages.
 uninstall
                              Uninstall packages.
                              Output installed packages in requirements format.
 freeze
                              Inspect the python environment.
 inspect
 list
                              List installed packages.
                              Show information about installed packages.
 show
                              Verify installed packages have compatible dependencies.
 check
                              Manage local and global configuration.
 config
                              Search PyPI for packages.
 search
                              Inspect and manage pip's wheel cache.
 cache
 index
                              Inspect information available from package indexes.
                              Build wheels from your requirements.
 wheel
 hash
                              Compute hashes of package archives.
                              A helper command used for command completion.
 completion
                              Show information useful for debugging.
 debug
 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):

```
o int: Integer numbers (e.g., 5)
```

- of loat: 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
```

11/13

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