Python Tutorial 1

LING-381-Language Technology and LLMs

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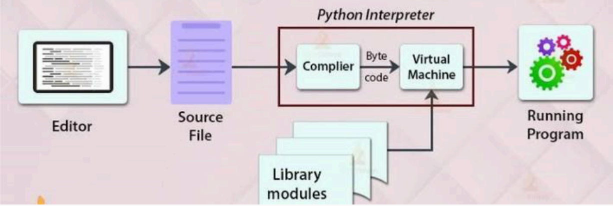
Introduction

Python Basics

- Python is a widely used, general-purpose programming language that is easy to learn, read, and write.
- Popular among researchers and developers for its simplicity and readability
- Supported by an active open-source community and a vast ecosystem of libraries

How Python Works

- Python is an **interpreted language** (cf. C, C++ which are compiled directly into machine code).
- Your code (.py) is first converted into bytecode (.pyc).
- The bytecode is executed by the Python Virtual Machine (VM).
- Most implementations (e.g., CPython) are written in C and translate into machine code.



Python is Strongly Typed

- Python keeps track of the type of each variable.
- It does not automatically convert between types unless explicitly told to.
- The interpreter respects types and raises errors for incompatible operations.

Tools to Run Python

IDEs and Notebooks

- IDE: Visual Studio Code (VSCode)
  - IDE = Integrated Development Environment
  - Lightweight, powerful editor
  - Integrated terminal, linting, debugging, version control
- Google Colab
  - Browser-based, no installation
  - Built on Jupyter notebooks
  - Pre-loaded libraries, GPU support, Google Drive integration
- For lab exercises, I'm planning to share Google Colab link.
  - You will need a Google account to copy the files.
  - Please submit your work as an `.ipynb` file so the grader can check both your code and its executed output.

Installation

Install Python 3

- Download installer: `https://www.python.org/downloads/`
- Windows: run `.exe`, check “Add Python to PATH”, click Install
- macOS: open `.pkg`, follow prompts
- Verify (shell command):
    - `python3 --version`
    - `python3 -v`, `python3 -vv`

Install Visual Studio Code

- Download: `https://code.visualstudio.com/`
- Windows: run `.exe`, follow defaults
- macOS: drag `VSCode.app` to /Applications
- Launch and install Python extension (Ctrl+Shift+X → Python)

Tutorials

Tutorials

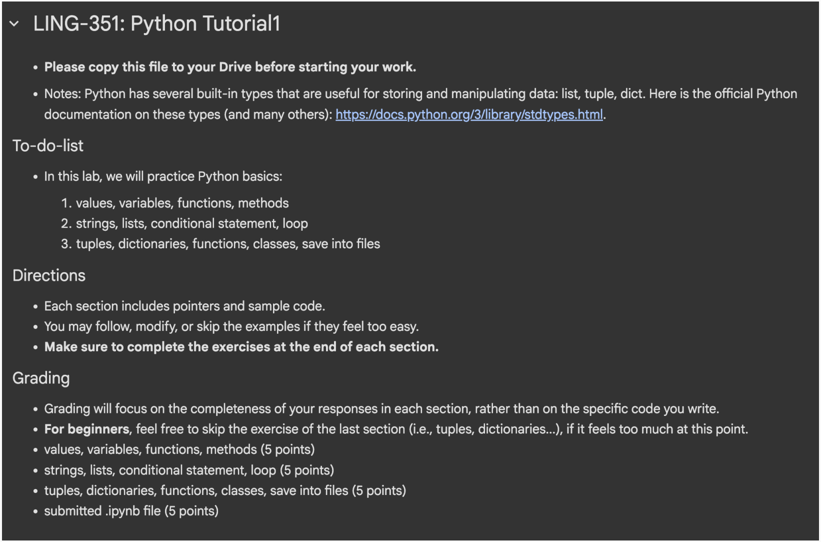
For the remainder of the class, students will work on the tutorials (either individually or with a peer next to you).

Please go through the three tutorials step-by-step using the provided Colab code (see course website).

- Values, variables, functions, methods
- Strings, lists, conditional statements, loops
- Tuples, dictionaries, functions, classes, files

All the necessary information is in the tutorials. At the end of class, please submit your `.ipynb` file with your name (e.g., *Lab1_HakyungSung.ipynb*).

Google colab



LING-351: Python Tutorial1

- **Please copy this file to your Drive before starting your work.**
- Notes: Python has several built-in types that are useful for storing and manipulating data: list, tuple, dict. Here is the official Python documentation on these types (and many others): https://docs.python.org/3/library/stdtypes.html.

To-do-list

- In this lab, we will practice Python basics:
  1. values, variables, functions, methods
  2. strings, lists, conditional statement, loop
  3. tuples, dictionaries, functions, classes, save into files

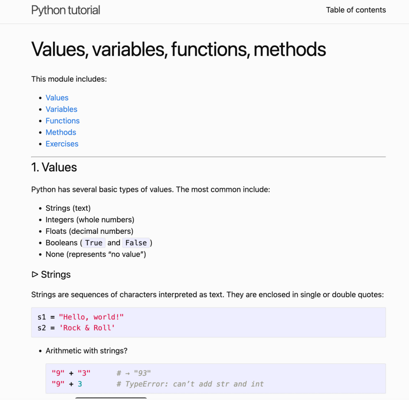
Directions

- Each section includes pointers and sample code.
- You may follow, modify, or skip the examples if they feel too easy.
- **Make sure to complete the exercises at the end of each section.**

Grading

- Grading will focus on the completeness of your responses in each section, rather than on the specific code you write.
- **For beginners**, feel free to skip the exercise of the last section (i.e., tuples, dictionaries...), if it feels too much at this point.
- values, variables, functions, methods (5 points)
- strings, lists, conditional statement, loop (5 points)
- tuples, dictionaries, functions, classes, save into files (5 points)
- submitted .ipynb file (5 points)

Tutorial + Colab



Python tutorial

Values, variables, functions, methods

This module includes:

- Values
- Variables
- Functions
- Methods
- Exercises

1. Values

Python has several basic types of values. The most common include:

- Strings (text)
- Integers (whole numbers)
- Floats (decimal numbers)
- Booleans (`True` and `False`)
- None (represents “no value”)

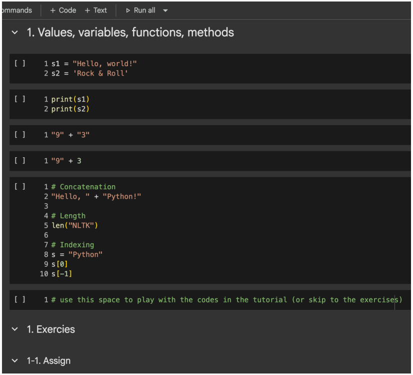
▷ Strings

Strings are sequences of characters interpreted as text. They are enclosed in single or double quotes:

```
s1 = "Hello, world!"
s2 = 'Rock & Roll'
```

- Arithmetic with strings?

```
"9" + "3"       # → "93"
"9" + 3         # TypeError: can’t add str and int
```



1. Values, variables, functions, methods

```
[ ]  s1 = "Hello, world!"
     s2 = 'Rock & Roll'
```

```
[ ]  print(s1)
     print(s2)
```

```
[ ]  "9" + "3"
```

```
[ ]  "9" + 3
```

```
[ ]  # Concatenation
     "Hello, " + "Python!"

     # Length
     len("NLTK")

     # Indexing
     s = "Python"
     s[0]
     s[-1]
```

```
[ ]  # use this space to play with the codes in the tutorial (or skip to the exercises)
```

1. Exercies

1-1. Assign