PYTHON CRASH COURSE: INTRODUCTION

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Contents

1 Something about programming language

2 What is Python?

Something about programming language

Questions

What is programming language?

Python sample code

```python
# Pre-provided codes
def foo(a, b):
    a = 0
    b = 2
    a = b + 1
    return 0
```

C++ sample code

```cpp
// Pre-provided codes
int main() {
    int a = 0;
    int b = 2;
    a = b + 1;
    return 0;
}
```

What is programming language

Programming languages are **notations** for **describing computations** to people and to machines.

Note: There are *high-level* and *low-level* languages. The lower it gets, the more comprehensible it is to the machine.

How it works?

How it works?

Vietnamese $\overset{speaks}{\longrightarrow}$ **"Xin chào"** $\overset{translated}{\longrightarrow}$ **"Hello"** $\overset{understood}{\longrightarrow}$ **American**

Just like

How it works?

Programmer $\overset{writes}{\longrightarrow}$ **"int a"** $\overset{translated}{\longrightarrow}$ **"01101..."** $\overset{executed}{\longrightarrow}$ **Computer**

$\Longrightarrow$ What is the important thing that we miss here?

Translator

Translator

Before a program can be run, it first must be **translated** into a form in which it can be **executed by a computer**. This software systems that do this translation are called **translators**.

Questions

- Name some common types of translator for programming language?
- What are the names of translators for C++, Java, Python, R and Matlab?

Environment

Environment

Environment is the **system** in which a **computer or computer program operates**. *(Cambridge dictionary definition)*

Environment variables

- They are **variables** storing **significant values** to **determine the environment** for a computer program to run.
- In programming language scope, it is often considered as the **location** of **corresponding translator, libraries and other materials** for code **translation task**.

Case-study

1. Go to Windows search using *Windows + S*.
2. Type *"environment variables"* and click on **Edit the system environment variables** function.
3. Click the **Environment Variables...** button.
4. Find environment variable named **Path** or **PATH** on both **User variables for Admin** and **System variables** boards, respectively click on it then click **Edit...** button.
5. See what is inside.

What is Python?

Python

What is Python?

- **Python** is a **high-level, multipurpose** and **popular** programming language today. Its **clear** and **easy-to-understand syntaxes** makes it **state-of-the-art**.
- Python is also an **interpreted**, **object-oriented** programming language with **dynamic semantics**.
- It supports **multi programming paradigms** such as **object-oriented, functional,...**.

Python structure

Python structure

A Python program is **constructed** as **blocks** and each **block** is **identified** by **indentation**. Note that **indentation** applied to discriminate each block must be the **same** throughout the program.

Sample code

```
# Note that when enter new block, indentations
# must be the same throughout the program
def main(): # Block 1
    a = 0 # Block 2
    if a % 2 == 0:
        if a == 0: # Block 3
            a = 1 # Block 4
    return a
```

Python name

Name in Python

Name is **identity** of one **entity** in Python program such as *function*, *variable*,... There are some rules for Python name:

- Name must **start** with a **letter** or the **underscore** character.
- Name **cannot start** with a **number**.
- Name can only **contain alpha-numeric** characters and **underscore**.
- Name is **case-sensitive**.
- Name **should not be** any of the **Python keywords**.

Ex: a123, *_ab5*, *_Ab5*, *_00* are valid names. *0bc*, *$ab* are not valid names.

What we need to start a Python program

What we need to start a Python program

1. *Something to write:* you can use any **text editor** including Microsoft Word (if it support file format).
2. *A translator:* In Python we call it **interpreter** (What is the difference between it and compiler?). You can download it at: *www.python.org*.
3. *A beautiful soul honey (maybe your brain) ...*

Write your first Python program

Create Python code file

1. Open your favorite text editor, create a file named *demo.py* (remember the format of the file is *.py*).
2. Type *"print("Hello world")"* into *demo.py*.
3. Save it.

Run created Python code file

1. Use *Windows + R*, then type *"cmd"* and hit *Enter*.
2. Go to the folder where *demo.py* file locates by typing *cd <dir>* to the terminal in which *<dir>* is the path to that folder.
3. Type "python demo.py" and hit *Enter*.
4. See the magic happens.

Note: In this example, we have *demo.py* file containing source code of our Python program. Now, we need to translate it into low-level language for computer to execute and the command *"python demo.py"* has done this job. Firstly, it call the translator *python* of Python to translate the source code, then execute it to print out string *"Hello world"* onto the screen.

Other tool to program Python

IPython

IPython is a **tool** for **programming Python** in **scripting style**, that means it will execute each line of Python program we type in. Here are steps to install IPython:

1. Open *Command Prompt* on Windows, type *"pip install ipython"* and hit *Enter*.
2. Wait until the installation finishes, type *"ipython"*, hit *Enter* and try the tool.

Note: pip is a package manager in Python, which is often used to install necessary packages, modules and libraries to support programming Python.