Intro to Python

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Overview

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What is a program?

What is a program?

A **program** consists of instructions that specify how to perform some task. There are many types of tasks a program can perform:

- Mathematical computation
  - Solving systems of equations
- Symbolic computation
  - Finding all instances of a word in a text document
- Graphical computation
  - Image recognition
  - Playing videos online

Input and Output

Many programs take **input** and/or yield some **output**.

- **Input:** Get data from the user, from a file, etc.
- **Output:** Print data, save data in a file, etc.

Program Flow

We utilize various code structures to control which lines of code execute.

- **Conditional execution:** Evaluate certain code blocks under certain conditions. For instance, `if` and `else` statements.
- **Repetition Structures:** Repeat some action.

Running Python

Running Python

- You can run Python from your browser
  - PythonAnywhere
- The Python interpreter
  - Accessed by typing `python` or `python3` from command line
- An IDE such as PyCharm

The Python Shell

The >>> prompt indicates that you may write a Python statement. When you press `Enter`, the statement is executed.

```
>>> son = "Luke"
>>> father = "Anakin"
>>> print(son + " is the son of " + father)
Luke is the son of Anakin
>>>
```

Two Modes of Python

Two Modes of Python

- **Interactive mode** is using python interactively, by typing directly into the python interpreter. Open up Python and type away!
- **Python Programming**, is programming in the python language, where .py scripts are run.

Expressions

Expressions: Values and Types

- **Value:** The basic building blocks of a program! For instance, a letter, or a number.
  - Examples: `42`, `3.14`, `'Diagon Alley'`
- **Type:** Every value belongs to a specific type. For instance,
  - `42` is an `int`, `3.14` is a `float`, and `'Diagon Alley'` is a `string`.

Data Types

A few data types available in Python are:

- **Booleans**, which take value `True` or `False`
- **Integers**, whole numbers
- **Floats**, numbers with decimals
- **Strings**, sequences of text characters

Debugging

Debugging

When you make a mistake in your code, you will receive an error. These errors are called **bug**. Getting rid of the bugs in your code is called **debugging**. Sometimes the mistake is as simple as a misspelled word, whereas other times the error is in the code structure itself. Tracking down bugs can be time-consuming and stressful, and it is important to learn various debugging skills. We will discuss various techniques throughout the course.

2.x VS 3.x

Python 2.x VS Python 3.x

- Python 3 is backwards incompatible with Python 2 and introduces new features.
- `print` is a function in Python 3 but a statement in python 2
- For more information on the differences across different versions see `https://docs.python.org/3/whatsnew/index.html`

References

References

- How to think like a computer scientist: Learning with Python `http://openbookproject.net/thinkcs/python/english3e/`
- Official Python 3 documentation `https://docs.python.org/3/`