

Lecture 1.

Introduction to

Programming in



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Agenda

- Course introduction
- Setting up
- Python demonstrations
- Course overview

Course Introduction

- Programming
 - Computer language
 - Solving problems
- Style of programming
 - Interactive vs. batch
 - Crafting own solution vs. using existing solution

What is Python?

- name of programming language
 - high-level, clean syntax
 - dynamically typed, multi-paradigm (imperative and object-oriented)
- the run-time system for Python language
 - an interpreter to execute the program
 - interactively or in batch
 - cross-platform

What can Python do?

- From calculator and solving small daily problems to large servers
- WWW: CGI scripts
 - Many web based email systems
- User interface programming
 - TkInter, wxPython, ...
- Research tools for Scientific computing

Who invented Python?

- Guido van Rossum
 - Master's in mathematics and CS from University of Amsterdam
 - Open-sourced Python in 1991
 - NIST, CNRI, Google, Dropbox
 - "Benevolent Dictator for Life (BDFL) for Python user community until July 2018
 - 2006 ACM Distinguished Engineer



Guido's goals for Python

- It should be an easy and intuitive language, just as powerful as major competitors.
- It should be open source, so anyone can contribute to its development.
- Its code should be understandable as plain English.
- It should be suitable for everyday tasks, allowing for short development times.

Why learn Python?

- Good features
 - High level, powerful, clean syntax, easy to read, concise, expressive
- Productivity
 - say less, do more: no need to reinvent the wheel
 - extensible, structured => make fewer mistakes
 - get feedback immediately, encourage testing small pieces often
- Good community support
 - actively supported by community volunteers, up to date
- Get jobs in hot demand!
 - Deep learning, backend programming, ...

Who uses Python?

- Many mainstream companies
 - Google, Dropbox, Netflix, Facebook, Instagram, Spotify, Quora, Reddit, ...
- Many researchers
 - scientific computing,
- Deep learning
 - TensorFlow, Theanos, Keras, PyTorch ...



NETFLIX



Programming Environment assumed by this course: Unix-like

- Windows: several options
 - (Windows 10) bash on Ubuntu on Windows 10
 - Cygwin
- macOS:
 - already pre-installed; run 3.6.x; run Terminal
- Linux
 - most likely already pre-installed; run Terminal

Python Demo - say hello

- From a command-line interface (CLI)
- Example (macOS shown)
 - prompt is shown in **dark red** (\$, >>>)
 - type the text in **boldface blue color**

```
$ python3
Python 3.6.2 (default, Jul 17 2017, 16:44:45)
GCC 4.2.1 Compatible Apple LLVM 8.1.0 (clang-802.0.42) on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>> print('hello world')
hello world
>>>
```

the exact wording printed by the program may be different

Python Demo - save results in variables

```
>>> X = 1 + 2 * 3 - 4  
>>> X  
3
```

- Python evaluates $2*3$ before adding

```
>>> ABC = X + 5  
>>> ABC  
8
```

- a variable is a name (single or multiple letters) that is not a keyword

```
>>> (2 + 3) * 4  
20
```

- Python handles parentheses

Python demo: division and remainder

- Exact division (floating-point quotient)

```
>>> 9 / 4  
2.25
```

- To get integer quotient & remainder

```
>>> 9 // 4      # integer division of 9 / 4  
2  
>>> 9 % 4      # remainder of 9 / 4  
1
```

Plain text vs. Rich text

- Python program is plain text
 - just the characters, no font or typeface
 - stick to "ASCII" (characters for American keyboard) for now
 - Python can work with Unicode
- Syntax highlighting is for display only
 - Interactive: typed from keyboard
 - Batch: run from a plain-text file

Besides Python...

- Good to learn the "command line interface" (CLI)
 - shell: a program that interprets text commands
- A shell can let you access
 - files and directories (folders)
 - text editors
 - Python interpreter and other programming tools
 - many more... useful tools for programmers

Basic Unix shell commands

ls	list the files and directories
cd	change the working directory
pwd	print the working directory
cat	display file content to standard output (stdout)
more	display file content one screen at a time
man	manual page for a command
mv	move or rename files or directories
rm	remove files
rmdir	remove directory
mkdir	make a new directory

Useful to learn a text editor

- vi
 - a modal text editor, lightweight, fast, powerful, available for almost all CLI
- vim
 - improved version of vi, supports syntax highlighting
- emacs
 - a modeless text editor, programmable
- pico
 - simpler modeless text editor

Topics in this course

- Command-line environment
- language overview
- data objects and types
- sequences and dictionaries
- control flow constructs
- files and exceptions
- functions and recursion
- object oriented programming