Theory of Algorithms

ian.mcloughlin@gmit.ie

Topics

Python

About Python

January 1994 – Python 1.0.0 released.

Guido van Rossum – Designer/Author of Python.

Current versions – 3.5.1 and 2.7.11.

Interpreted – Python implementation must be present at runtime.

Off-side rule – Blocks identified by indentation, as opposed to curly braces.

Popularity – IEEE Spectrum ranks it as the fourth most popular language (July 2015).

Community – Python Enhancement Proposals, notably PEP 8: The Python Style Guide.

spectrum.ieee.org/computing/software/the-2015-top-ten-programming-languages

Guido van Rossum

- Started Python as a hobby.
- Worked for Google, half-time spent on Python.
- Now works at Dropbox.
- Benevolent dictator for life (BDFL).

Conditions

docs.python.org/2/tutorial

Loops

docs.python.org/3/tutorial

Functions

docs.python.org/3/tutorial

CPython

Reference implementation – Many different Python implementations exist.

Version 3 – Broke backwards compatibility (somewhat).

Unladen Swallow – Google attempt to fix some Python problems.

Modules – Lots of great Python modules available.

www.python.org

Lists

Lists in Python are usually written as comma-separated values between square brackets.

Types – elements of a list don't have to have the same types.

Slicing is possible, where we take a sublist of the list.

Assignment to slices is possible.

len() is a built-in function that returns the length of a list.

range() is a built-in function that returns a list of numbers. Note: it returns an *iterator*.

docs.python.org/3/tutorial

Strings

Strings are a lot like lists in Python.

Assignment to slices is not allowed, however.

docs.python.org/3/tutorial

Functions

def is the keyword for defining a function.

Parameters can be given defaults, so that they are optional.

docs.python.org/3/tutorial

List comprehensions

Comprehensions are quick ways of creating lists from other lists.

docs.python.org/3/tutorial

map()

map() takes a function and a list.

New list – it returns a new generator, which is the original list with the function applied to each element.

docs.python.org/3/tutorial

Lambda functions

lambda functions are short, inline functions.

Nameless – lambda functions need not have a name.

docs.python.org/3/tutorial

Timing Algorithms

Functional Programming

Turing Machines

Complexity Classes