A Short and Incomplete Introduction to Python

Part 1: Basic Python syntax

Riccardo Murri <riccardo.murri@uzh.ch>,
Sergio Maffioletti <sergio.maffioletti@uzh.ch>
S3IT: Services and Support for Science IT,
University of Zurich

January 14, 2019

Python basics

Lines of Python code

Line of Python code are ended by the "new line" character. (I.e., when you press the *Enter* key.)

A line can be continued onto the next by ending it with the character '\'; for example:

```
In [1]: "hello" + \
   ...: " world!"
Out[1]: 'hello world!'
```

The prompt changes to '. . .' on continuation lines.

Reference:

http://docs.python.org/reference/lexical_analysis.html#line-structure

String literals, I

There are several ways to express string literals in Python.

Single and double quotes can be used interchangeably:

```
In [2]: "a string" == 'a string'
Out[2]: True
```

You can use the single quotes inside double-quoted strings, and viceversa:

```
In [3]: a = "Isn't it ok?"
In [4]: b = '"Yes", he said.'
```

String literals, II

Multi-line strings are delimited by three quote characters.

```
In [5]: a = """This is a string,
   ...: that extends over more
   ...: than one line.
   ...: """
```

In other words, you need not use the backslashes "\" at the end of the lines.

Operators

All the usual unary and binary arithmetic operators are defined in Python: `+`, `-`, `*`, `/`, `**` (exponentiation), `<<`, `>>`, etc.

Logical operators are expressed using plain English words: `and`, `or`, `not`.

Numerical and string comparison also follows the usual notation: `<`, `>`, `<=`, `==`, `!=`, ...

Reference:

- https://realpython.com/python-operators-expressions/
- http://docs.python.org/library/stdtypes.html

Your first exercise

How much is 2^{144} ?

(You have 1 minute time.)

Operators, II

Some operators are defined for non-numeric types:

```
>>> "Py" + 'thon'
'Python'
```

Some support operands of mixed type:

```
>>> "a" * 2
'aa'
>>> 2 * "a"
'aa'
```

Some do not:

```
>>> "aaa" / 3
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
TypeError: unsupported operand type(s) for /: 'str' and 'int'
```

Operators, III

The "%" operator computes the remainder of integer division.

```
In [6]: 9 % 2
Out[6]: 1
```

It also doubles up as *string interpolation operator*, but the '**format**()' method (see next slide) is more convenient.

String interpolation

The `.format()` method can be used to substitute values into placeholder strings.

Placeholders can indicate substitutions by ordinal number:

```
>>> "This is slide {0} of {1}".format(20, 1001)
'This is slide 20 of 1001.'
```

You can use names instead of numbers (then the order parameter occur in `format()` does not matter):

```
>>> "Today is {month} {day}".format(day=2, month='March')
'Today is March 2'
```

Reference: https://pyformat.info/

String interpolation

The `.format()` method can be used to substitute values into placeholder strings.

Placeholders can indicate substitutions by ordinal number:

```
>>> "This is slide {0} of {1}".format(20, 1001)
'This is slide 20 of 1001.'
```

You can use names instead of numbers (then the order parameter occur in `format()` does not matter):

```
>>> "Today is {month} {day}".format(day=2, month='March')
'Today is March 2'
```

Reference: https://pyformat.info/

String interpolation

The `.format()` method can be used to substitute values into placeholder strings.

Placeholders can indicate substitutions by ordinal number:

```
>>> "This is slide {0} of {1}".format(20, 1001)
'This is slide 20 of 1001.'
```

You can use names instead of numbers (then the order parameter occur in `format()` does not matter):

```
>>> "Today is {month} {day}".format(day=2, month='March')
'Today is March 2'
```

Reference: https://pyformat.info/

Assignment, I

Assignment is done via the '=' statement:

```
In [7]: a = 1
In [8]: print(a)
Out[8]: 1
```

There are a few shortcut notations:

- `a += b` is short for `a = a + b`,
- `a -= b` is short for `a = a - b`,
- `a *= b` is short for `a = a * b`,

etc. — one for every legal operator.

Basic types

Basic object types in Python 3:

bool	The class of the two boolean constants `True`, `False`.
int	Integer numbers: `1`, `-2`, ...
float	Double precision floating-point numbers, e.g.: `3.1415`, `-1e-3`.
bytes	String of byte-size characters.
str	Text (string of UNICODE characters).
list	Mutable list of Python objects
dict	Key/value mapping

The type of a Python object can be gotten via the `type()` function:

```
In [3]: type('hello')
Out[3]: str
```