Programming in Python[1]

Mattia Monga

Dip. di Informatica
Università degli Studi di Milano, Italia
mattia.monga@unimi.it

Academic year 2023/24, I semester

Lecture VIII: Other Composite Objects

Sets

A `set` is a composite object with no duplicate (non mutable) elements. Common set operations are possible.

- Set literals: `{1,2,3}` `set()`
- `{1,2,3}.union({3,5,6})`
  `{1,2,3}.intersection({3,5,6})`

Comprehensions

Comprehensions are a concise way to create lists, sets, maps... It resembles the mathematical notation used for sets $A = \{a^2 | a \in \mathbb{N}\}$.

```
squares = [x**2 for x in range(10)]

# equivalent to:
squares = []
for x in range(10):
  squares.append(x**2)

# filtering is possible
odds = [x for x in range(100) if x % 2 != 0]

# with a set
s = {x for x in range(50+1) if x % 5 == 0}

# with a dict
d = {x: x**2 for x in range(10)}
```

Make a program readable

You never write a program only for a machine! You, others, tools will *read* the program for different purposes. Every minute spent in making a program more understandable pays off hours saved later.

- Type hinting makes clear what a function needs to work properly, and what it produces
- Documentation helps understanding without the need to read implementation details
- Examples of use make easy to remember how to use a function and can be used for verification

Example

```
from typing import Union

Num = Union[int, float]

def cube(x: Num) -> Num:
    """Return the cube of x.

    >>> cube(-3)
    -27

    >>> abs(cube(0.2) - 0.008) < 10e-5
    True
    """
    return x * x * x
```

Examples can be tested by:
`python -m doctest filename.py`.