Programming in Python[1]

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Academic year 2023/24, I semester

Lecture III: Control flow

Basic types

bool `False`, `True` Logical operations

int `1`, `-33`, `1_000_000_000` ... Arithmetic operations, no upper or lower limit

float `1.0`, `.1`, `1.2e34` ... Arithmetic operations, limited but you have `float('infinity')` (and `float('nan')`)

```
sys.float_info(max=1.7976931348623157e+308␣
↪   , max_exp=1024, max_10_exp=308,
↪   min=2.2250738585072014e-308,
↪   min_exp=-1021, min_10_exp=-307,
↪   dig=15, mant_dig=53,
↪   epsilon=2.220446049250313e-16,
↪   radix=2, rounds=1)
```

str `'aaaa\nthis is on a new line'`, `"bbb'b\"b"` ... Concatenation, alphabetical ordering, replication, ...

Sequence of operations

```
x = 1 + 2 * 3
x = x + 1
```

The 2 lines of code translate to at least 5 “logical” instructions (maybe more, for example adding two big numbers require multiple instructions):

1. `2 * 3`
2. `1 + 6`
3. `x = 7`
4. `7 + 1`
5. `x = 8`

Flow of control

It is normally not very useful to write programs that do just one single computation. You wouldn't teach a kid how to multiply 32 × 43, but the general algorithm of multiplication (the level of generality can vary).

To write programs that address a family of problems we need to be able to select instructions to execute according to conditions.

```
if x < 0:
  x = -x

y = 2 * x
```

```
if x == -1:
  x = x + 1
else:
  x = 3 * x

y = 2 * x
```

In Python the indentation is part of the syntax and it is mandatory.

Input (special command needed)

- A special command to ask to the operating system (same as `print`)
- `input()` or `input("Prompt the user:")`
- The operating system (or the operating environment as in cscircle) collect the input data (from keyboard/console or the network in cscircles) and returns them to Python as a `str`.
  - `s = input() ## read a string`
  - `i = int(input()) ## read a string, convert to int`
- Input on cscircles seems strange, but when one understands the need of the mediation, the machinery is rather straighforward