PYTHON SEMINAR 2020

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THEORETICAL BIOPHYSICS

TODAY

I. Objects recap

II. Data structures

III. Flow control

I. ASSIGNMENT 1

Tasks

- *Fetch* from *upstream* and *merge* - get course material
- Replace *None* by *True/False* - work on assignment
- *Commit* file and *push* - save progress in repo

I. OBJECTS RECAP

- Duck typing - Python choses the *object type* automatically!
- Object - Every *object* has *attributes* and *methods* (functions)
- Attention!! - *objects* can be **mutable** or **immutable**

II. DATA STRUCTURES - LOGIC

Boolean (*bool*)

- ***`True`*/*`False`***

Answer of comparisons

`<` `>` `<=` `>=` `==` *`!=`* ***`is`*** ***`in`***

Logic operators: ***`not`*** ***`or`*** ***`and`***

None (*NoneType*)

- ***`None`***

II. DATA STRUCTURES - NUMBERS

Integer (*int*)	:	`1  2`
Real numbers (*float*)	:	`1.3  1e-6`
Complex (complex)	:	`4+j3`

Mathematical operators:

`+`	addition
`-`	subtraction
`*`	multiplication
`/`	division
`//`	floor division
`%`	modulo
`**`	exponent

II. DATA STRUCTURES

Strings (*str*)

```
'this is a string'

"this is also a string"

'''this is a string as well'''
```

Bytes (*bytes*)
Mutable bytes (*bytearray*)

Encodings:

`ASCII`	- 128 chars
`ISO8859`	- 256 chars
`utf-8`	- 2,164,864 chars

II. DATA STRUCTURES - CONTAINERS

Lists (*list*) : `[1, "hallo", 4+4j, True]`

Tuples (*tuple*) : `(1, "hallo", 4+4j, True)`

Sets (*set*) : `{1, "hallo", 4+4j, True}`

Immutable sets (*frozenset*)

II. DATA STRUCTURES - SLICES

```
my_list = [1,2,3,4,5,6,7,8,9,10]
```

`my_list[0]` - **first** element of list - `1`

`my_list[7:-1]` - from **8th** element to **last** - `[8,9]`

`my_list[0:10:2]` - **1st** to **11th** element, **2** steps - `[1,3,5,7,9]`

`[start:end:step]`

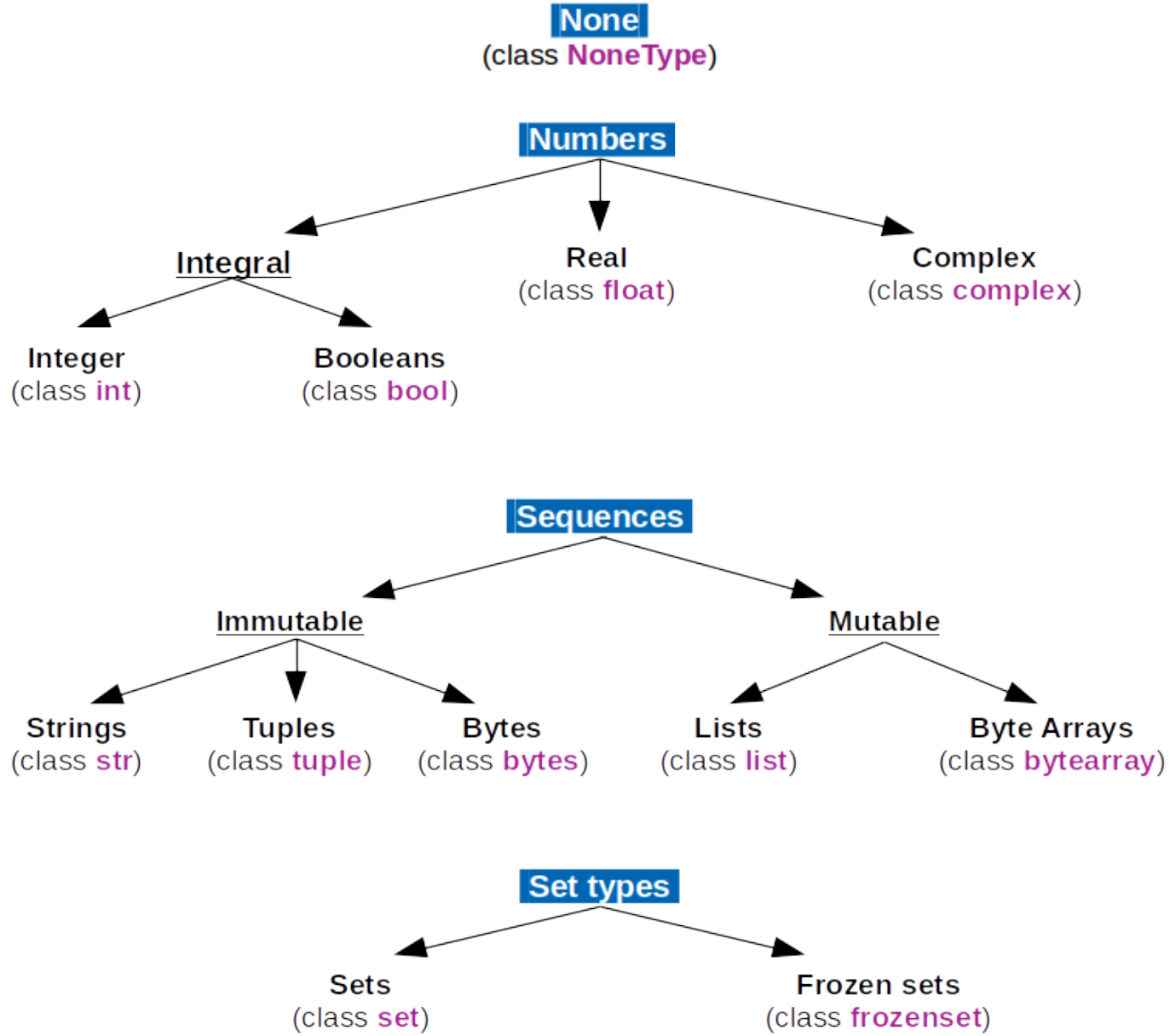
II. DATA STRUCTURES - DICTIONARIES

Dictionaries (*dict*)

```
room_numbers = {‘Jens’: 518, ‘Katja’: 518, ‘Edda’: 516}

room_numbers[‘Edda’]

     516
```



III. FLOW CONTROL - LOOPS

for loop

```
for list_element in my_list:
    print(list_element)
```

while loop

```
index = 0
while index <= 10:
    print(my_list[index])
    index += 1
```

III. FLOW CONTROL - CONDITIONAL

if / else / elif

```
if type(my_list) == list:
    print('this is a list')
elif type(my_list) == set:
    print('this is a set')
else:
    print('I don't even know what it is')
```

IV. ASSIGNMENT - ROMAN NUMERALS

Roman numerals

- I, II, III, IV, V, VI, VII, VIII, IX, X
- Addition if smaller numeral is right
- Subtraction if smaller numeral is left
- e.g. MCMXCV - 1995

Arabic numerals

- 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

I	–	1	V	–	5
X	–	10	L	–	50
C	–	100	D	–	500
M	–	1000			

III. FURTHER READING

Python data types

- Programiz – Python data types

  https://www.programiz.com/python-programming/variables-datatypes

- Unicode – character table

  https://unicode-table.com/en/#control-character

Python control flow

- Python documentation

  https://docs.python.org/3/tutorial/controlflow.html

- Roman and Arabic numerals converter Python

  https://stackoverflow.com/questions/28777219/basic-program-to-convert-integer-to-roman-numerals