KOLT Python

Basic Operators, Intro to Branching & Simple Functions

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Agenda

1. Recap

2. Basic Operators

3. Branching

4. Objects

5. Basic Functions

Comments

```
# Single line comments start with a '#'

"""
Multiline comments can be written between
three "s and are often used as function
and module comments.
"""
print('Hello, stranger!')
```

Python will basically ignore comments, they are purely written **for humans**!

Variables

Type	Explanation	Examples
`int`	represent **integers**	3, 4, 17, -10
`float`	represent **real numbers**	3.0, 1.11, -109.123123
`bool`	represent **boolean** truth values	`True`, `False`
`str`	A sequence of characters.	'Hello', '', '3'
`NoneType`	special and has one value, None	`None`

- How to create a variable? `variable_name = value`
- How about types? use `type()`
- Can a variable change type? **Yes!** Just assing a new value with any type.
- What if we if want to convert a value between types, i.e, '2'→ 2?

Casting

- `int('2')` → 2
- Any possible reasons for casting?
  - Taking user input
  - Reading numbers from a file
- Can we cast every value to every type?
  NO!
  try `int('hello')`

Console I/O(Input/Output)

`print(*args, sep=' ', end='\n')`

- Can take arbitrary number of arguments
- Separates elements with space by default
- Adds newline character `'\n'` to end by default

`input([prompt])`

- Prints the prompt to Console
- Program is paused until user enters something
- **returns an `str` object!**

Arithmetic Operators

These operations are applicable on Numeric types: `int` and `float`

- `+`: Addition
- `-`: Subtraction
- `*`: Multiplication
- `/`: Division
- `//`: Floor (integer) Division
- `%`: Modulo
- `**`: Power

```
3.2 + 1.4  # => 4.6
3.2 - 1  # => 2.2
3.2 * 1.2  # => 3.84
3.5 / 1.5  # => 2.33333335
3.5 // 1.5 # => 2.0
3.5 % 1.5  # => 0.5
2 ** 10  # => 1024
```

Assignment Operators

We have already seen `'='`: `variable_name = value`

Frequently we will update variables' values based on their **old value**.
Ex: Increment a number: `num = num + 1`

Python has shorter representations for these updates with arithmetic operators.
`num += 1` is equivalent to `num = num + 1`
`result *= 2` is equivalent to `result = result * 2`

Assignment Operators

Operator	Usage	Equivalent
`+=`	`val += 3`	`val = val + 3`
`-=`	`val -= 3`	`val = val - 3`
`*=`	`val *= 3`	`val = val * 3`
`/=`	`val /= 3`	`val = val / 3`
`%=`	`val %= 3`	`val = val % 3`
`**=`	`val **= 3`	`val = val ** 3`
`//=`	`val //= 3`	`val = val // 3`

`bool` Operators

How to represent logical operations in Python?

A	B	A or B	A and B	not A
True	True	True	True	False
True	False	True	False	False
False	True	True	False	True
False	False	False	False	True

- **and**
- **or**
- **not**

`True or False and False` ⇒ **True**

WHY?

Operator Precedence

Logical operators are evaluated in this order:

1. `not`
2. `and`
3. `or`

You can override this order with parentheses

`(True or False) and False` ⇒ **`False`**

Short-Circuit Evaluation

`X`: Any boolean value

`True or X` ⇒ **`True`**

`False and X` ⇒ **`False`**

Python is smart enough to take advantage of this!

```
1/0   # => ZeroDivisionError
True or 1/0 # => True
False and 1/0 # => False
1/0 or True # => ZeroDivisionError
1/0 and False # => ZeroDivisionError
```

Truthy & Falsy Values

```
# 'Falsy' values
bool(None)  # => False
bool(False)  # => False
bool(0)  # => False
bool(0.0)  # => False
bool('')  # => False
# Empty data structures
bool([]) # => False
```

```
# Everything else is 'truthy'
bool(-100000)  # => True
bool('False')  # => True
bool(3.14)  # => True
bool(int)  # => True
# Nonempty data structures
bool([1, 'a', []])  # => True
bool([False])  # => True
```

Comparison Operators

- <: Strictly less than
- <=: Less than or equal
- >: Strictly greater than
- >=: Greater than or equal
- ==: Equal
- !=: Not equal

```
3.0 == 3   # => True
3.0 >= 3   # => True
# Small-case characters
# have bigger ASCII value
'Aa' > 'aa'   # => False
'hi' == 'hi'   # => True
'a' == None   # => False
3 > 'a'   # => TypeError
3 == 'a'   # => False
```

Chained Comparisons

`1 < 2 < 3` ⇒ **`True`**

You can chain arbitrarily many comparison operations together.

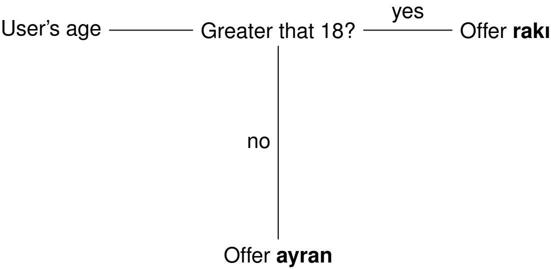
v_i: variables/values, op_i: comparison operators

$v_1 \quad op_1 \quad v_2 \quad op_2 \quad v_3 \quad \dots \quad op_{n-1} \quad v_n$ is equivalent to:

$v_1 \quad op_1 \quad v_2 \quad \textbf{and} \quad v_2 \quad op_2 \quad v_3 \quad \textbf{and} \quad ... v_{n-1} \quad op_{n-1} \quad v_n$

```
3 > 2 == 1 < 5 > 4   # => False
3 > (2 == 1) < 5 > 4   # => True
3 > True > False # => True
3 > 5 < 1/0   # => False
3 < 5 < 1/0   # => ZeroDivisionError
```

Branching



User's age

Greater that 18?

yes

Offer **rakı**

no

Offer **ayran**

Branching

```
if <condition>:
    <expression>
    <expression>
    ...
```

```
if <condition>:
    <expression>
    <expression>
    ...
else:
    <expression>
    <expression>
    ...
```

```
if <condition>:
    <expression>
    <expression>
    ...
elif <condition>:
    <expression>
    <expression>
    ...
...
else:
    <expression>
    <expression>
    ...
```

- `<condition>` has a **`bool`** value (`True` or `False`)
- Which expressions will be evaluated in which conditions?

Python Data Model

How did we represent data in Python?

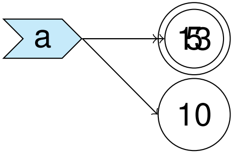
Variables!

How do they work?
Do they store the data themselves?

Objects

Everything is an object in Python.

```
a = 5
a = 10
a += 3
print(a)
```



↪ Values at the right side of our label analogy are objects! Even though variables **do not** have `types`, each object has a **fixed** `type`.

Objects - Identity

Each object has an `identity`, this value can be obtained by using **`id()`** function.

`==` operator compares values
`is` operator compares identities

Objects - Identity

Is this glass half full or half empty?

```
# What fraction of this glass is water?
pessimist = 0.5
optimist = 0.5
pessimist == optimist      # => True
pessimist is optimist      # => False
```

Functions

Functions are blocks of **organized**, **reusable** code that carry some **specific** tasks.

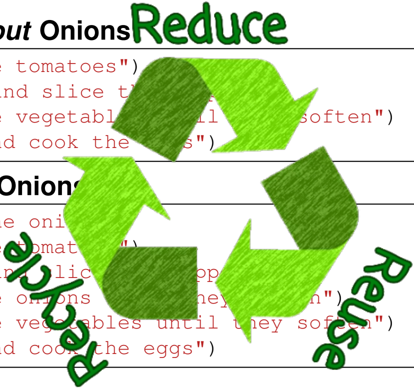
Functions

Menemen *without* Onions

```
print("Chop the tomatoes")
print("Deseed and slice the peppers")
print("Cook the vegetables until they soften")
print("Crack and cook the eggs")
```

Menemen *with* Onions

```
print("Slice the onions")
print("Chop the tomatoes")
print("Deseed and slice the peppers")
print("Cook the onions until they soften")
print("Cook the vegetables until they soften")
print("Crack and cook the eggs")
```



Defining Functions

`def` keyword introduces a function ***definition***.

```
def prepare_base_vegetables():
    print("Chop the tomatoes")
    print("Deseed and slice the peppers")
```

```
def cook():
    print("Cook the vegetables until they soften")
    print("Crack and cook the eggs")
```

Functions

Defining a `function` only makes it available.
You should *call* the `function` to execute it.

Menemen *without* Onions

```
prepare_base_vegetables()
cook()
```

Menemen *with* Onions

```
print("Slice the onions")
prepare_base_vegetables()
print("Cook the onions until they soften")
cook()
```

Defining a function = **writing down the recipe**
Calling a function = **executing the recipe**

Functions

You **can** call a function inside another function.

```
def menemen_without_onions():
    prepare_base_vegetables()
    cook()
```

```
def menemen_with_onions():
    print("Slice the onions")
    prepare_base_vegetables()
    print("Cook the onions until they soften")
    cook()
```