KOLT Python
Functions

Ahmet Uysal

Monday 21st October, 2019

KOLT

Agenda

1. Recap

2. Functions

While Loops

Repeat some <expression>s as long as a <condition> is True.

```
while <condition>:
    <expression>
    <expression>
    ...
```

```
x = 15
while x > 10:
    print(x)
    x-=1
```

```
counter = 11
while counter > 6:
    counter -= 1
    print(2**counter)
    counter -= 1
```

<condition> is only checked **before** each execution.

List Slicing

Access collection of elements with **[start:stop:step]**
Gives a list, even when number of elements is not bigger than 1.

```
numbers[0::2]   # => [0, 2, 4]
numbers[:]      # => [0, 1, 2, 3, 4, 5]
numbers[1:]     # => [1, 2, 3, 4, 5]
numbers[-2:]    # => [4, 5]
numbers[1:4]    # => [1, 2, 3]
numbers[1:1]    # => []
numbers[-99:99] # => [0, 1, 2, 3, 4, 5]
numbers[::-1]   # => [5, 4, 3, 2, 1, 0]
numbers[::-2]   # => [5, 3, 1]
```

Slices with step = 1 are called **Basic Slice**.
Slices with step != 1 are called **Extended Slice**.

len() Function

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```
s = 'Python'
len(s) # => 6

my_list = [0, 1, 2, 3]
len(my_list) # => 4
```

range() Function

range() Function

range(**start, stop, step**) is a function to create ranges

```
a = range(3) # => generates 0, 1, 2
b = range(0,3) # => generates 0, 1, 2
c = range(2,4) # => generates 2, 3
d = range(0,6,2) # => generates 0, 2, 4
0 in a # => True
1 in b # => True
4 in c # => False
2 in d # => True
6 in d # => False
```

For Loops

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    print(num * 3,sep=".")
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for num in [4,23,12,0,50]:
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```

```
for i in range(0,8):
    print(i)
```

Break, Continue & Pass

break immidiately terminates the closest loop

```python
for i in range(0, 5):
    if i % 2 == 1:
        break
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while x < 100:
    x *= 2
    if (x+1) % 3 == 0:
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for letter in 'Python':
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- Loops, conditional statements, functions etc. cannot be empty

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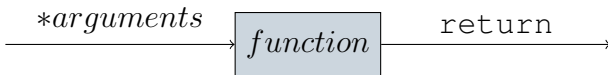Functions are blocks of **organized**, **reusable** code that carry some **specific** tasks.

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$$\xrightarrow{\quad *arguments \quad} \boxed{function} \xrightarrow{\quad \texttt{return} \quad}$$

Defining Functions

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    <expression>
    ...
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```python
def function_name(parameter1, parameter2, ...):
    <expression>
    ...
    return value
```

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```python
def fibonacci_series(limit):
    """Returns a list of the Fibonacci series up to limit."""
    fib_list = []
    first = 0
    second = 1
    while first < limit:
        fib_list.append(first)
        first, second = second, first + second
    return fib_list

print(fibonacci_series)
```

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```

Every function returns **one** value! Functions implicitly
return `None` if they complete without a return statement.

Return

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```python
def double(a):
    return a*2
    print("Doubled")

num = double(4)
print(num)
```

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Return **immediately** terminates the function. So, the output is 8.

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    print(num, name, surname, ID)
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```python
# 1 positional argument
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# 2 positional arguments
info(2, 'Jane')
# 3 positional arguments
info(2, 'Jane', 'Doe')
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info(2, 'Jane', 'Doe', 20)
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```

```python
# 1 keyword argument
info(num=1)
# 2 keyword arguments
info(name='Jane', num=9)
# 2 keyword arguments
info(num=9, name='Jane')
# 1 positional, 1 keyword
info(2, 'John', ID=13)
```

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def info(num, name='NoInfo', surname='NoInfo',
    print(num, name, surname, ID)
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Default Parameters

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```

Invalid Usages

```
# required argument missing
info()
# non-keyword argument after a keyword argumen
info(num=2, 'Jane')
# duplicate value for the same argument
info(2, num=3)
# unknown keyword argument
info(person='Jane')
```

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Suppose we want a `max` function that works as so:
max(3, 5) gives 5.
max(3, 4, 2) gives 4.
product(3, 5, -1, 2, 10, 20, 13, 34) gives 34.

Variadic Positional Arguments: my_max

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```python
def my_max(*nums):
    """Returns the maximum of the given arguments.
    Returns -infinity if no arguments are given."""
    max_num = -float('inf')
    for n in nums:
        if n > max_num:
            max_num = n
    return max_num
```

Local & Global Variables

- Local variables are created in functions.
- Global variables are created out of the functions.

```python
x = 10  # => global

def func():
    x = 5  # => local
    y = 7  # => local
    print(x, y)

func()
print(x)
```

```python
x = 10

def func():
    print(x)

func()  # => 10
```

```python
def func():
    a = 2
    print(a)

func()
print(a)  # => NameError
```