KOLT Python

Strings, Loops & Lists

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KOLT

Agenda

1. Recap

2. Strings

3. While Loops

4. Lists

5. For Loops

Branching

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

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

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

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

Branching Example

```
if have_ideas_for_exciting_examples():
    .
    .
    .
elif gul_sena_has_awesome_ideas():
    let_her_prepare_the_slides()
else:
    prepare_slides_about_your_misery()
    apologize_to_class()
```

Branching Example

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```

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   # => True
3 > 'a'   # => TypeError
3 == 'a'   # => False
```

`bool` Operators

How to represent logical operations in Python? (and, or, not)

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`

`True or False and False` ⇒ **`True`**

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

WHY?

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`

Strings

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my_string = 'abcde'
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```
            0 1 2 3 4
           'a b c d e'
```

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'a	b	c	d	e'
-5	-4	-3	-2	-1

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my_string = 'abcde'
```

```
            0 1 2 3 4
           'a b c d e'
           -5-4-3-2-1
```

```
print(my_string[2])
```

Strings

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Strings

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'a	b	c	d	e'	
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`print(my_string[2])` $\Rightarrow$ prints c

```
print(my_string[-2])
```

Strings

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my_string = 'abcde'
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	0	1	2	3	4
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`print(my_string[2])` ⇒ prints c
`print(my_string[-2])` ⇒ prints d

Indexing & Slicing

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```
s = 'Python'
s[1] # => 'y'
s[0:4] # => 'Pyth'
s[:3] # => 'Pyt'
s[3:] # => 'hon'
s[:] # => 'Python'
```

Indexing & Slicing

Access specific characters using **indexing**, i.e, **`[index]`**
Slice strings by using **`[start:stop:step]`**

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s[:3] # => 'Pyt'
s[3:] # => 'hon'
s[:] # => 'Python'
```

```
s = 'Python'
s[:5:2] # => 'Pto'
s[1:4:3] # => 'y'
s[::3] # => 'Ph'
s[::-1] # => 'nohtyP'
```

String Operations

String Operations

```
print('This a simple calculator program.')
number1 = input('Please enter the first number:')
number2 = input('Please enter the second number:')
print(f'{number1}+{number2} is {number1 + number2}')
```

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```

```
number1 = int(input('First number:'))
number2 = input('Please enter the second number:')
print(f'{number1}x{number2} is {number1 * number2}')
```

String Operations

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`str1 + str2` ⇒ **Concatenate** `str1` and `str2`

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```

`str1 + str2` $\Rightarrow$ **Concatenate** `str1` and `str2`

`str1 *` n $\Rightarrow$ Repeate `str1` n times.

Example: Evil Laughter

While Loops

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

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    <expression>
    <expression>
    ...
```

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

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

While Loops

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

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

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

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

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

Example: Evil Laughter (Cont.)

Lists

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Imagine variables, but with limitless capacity. . .

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```
sunnyside = ['Mr.  Potato Head', 'Hamm',
'Buzz Lightyear', 'Slinky Dog']
```

Lists

Lists

```
empty_list = []
letters = ['a', 'b', 'c', 'd']
numbers = [2, 3, 5]
```

Lists

```
empty_list = []
letters = ['a', 'b', 'c', 'd']
numbers = [2, 3, 5]
```

```
mixed_list = [4, 13, 'hello']
```

Accessing Elements

Accessing Elements

```
  0    1       2      3      4
[ 1, 'hello', None, [3], True ]
```

Accessing Elements

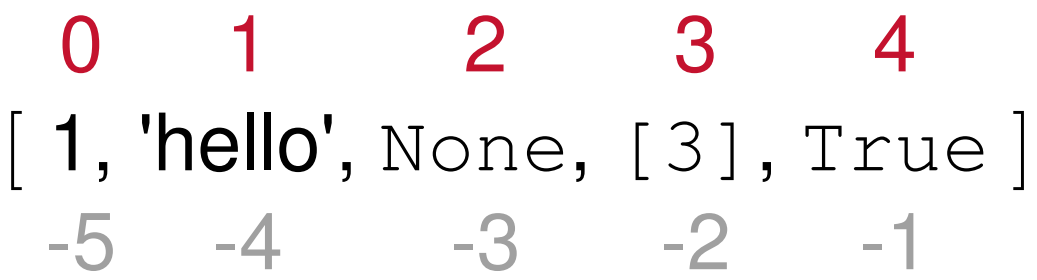
0	1	2	3	4
[1,	'hello',	None,	[3],	True]
-5	-4	-3	-2	-1

Accessing Elements

0	1	2	3	4
1	'hello'	None	[3]	True
-5	-4	-3	-2	-1

Use **indexing**, to access and **update** elements.

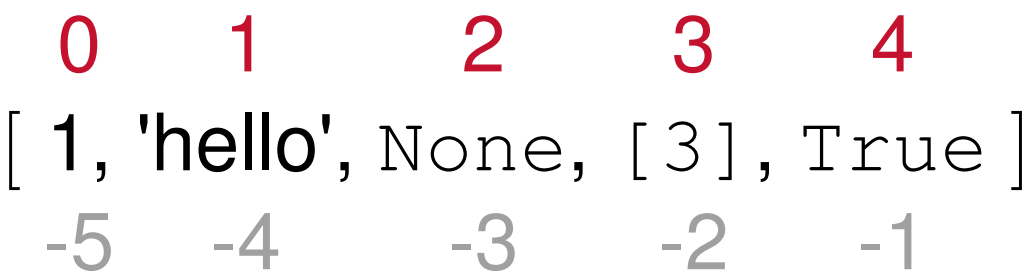
Accessing Elements



Use **indexing**, to access and **update** elements.

```
print(values[2])
```

Accessing Elements



Use **indexing**, to access and **update** elements.

```
print(values[2])
values[2] = 'new value'
```

Appending

Append elements at the end of a list by **append()**

```
numbers = [1, 2, 3]
numbers.append(7) # => numbers = [1, 2, 3, 7]
numbers.append(11) # => numbers = [1, 2, 3, 7, 11]

a_list = [1, 'a', 'python', 4.2]
a_list.append(3) # => a_list = [1, 'a', 'python', 4.2, 3]
a_list.append('hello') # => a_list = [1, 'a', 'python', 4.2, 3, 'hell
```

Appending

Append elements at the end of a list by **append()**

```
numbers = [1, 2, 3]
numbers.append(7) # => numbers = [1, 2, 3, 7]
numbers.append(11) # => numbers = [1, 2, 3, 7, 11]

a_list = [1, 'a', 'python', 4.2]
a_list.append(3) # => a_list = [1, 'a', 'python', 4.2, 3]
a_list.append('hello') # => a_list = [1, 'a', 'python', 4.2, 3, 'hell
```

```
x = [1, 2, 3]
y = [4, 5]
x.append(y) # => x = [1, 2, 3, [4, 5]]
```

Removing An Element

Remove elements in a list by **remove()**

```
x = [1, 2, 3, 4]

x.remove(2) # => x = [1, 3, 4]

y = ['a', 'b', 'c']

y.remove('b') # => y = ['a', 'c']
```

Removing An Element

Remove elements in a list by **remove()**

```
x = [1, 2, 3, 4]

x.remove(2) # => x = [1, 3, 4]

y = ['a', 'b', 'c']

y.remove('b') # => y = ['a', 'c']
```

```
x = [1, 2, 5, 4, 2, 6]

x.remove(2) # => x = [1, 5, 4, 2, 6]
```

Inspecting List Elements

Slice lists by using **`[start:stop:step]`**

```
x = [1, 2, 3, 4, 5]

x[2:4] # => [3,4]
x[3:4] # => [4]
x[1:-1] # => [2,3,4]
```

Inspecting List Elements

Slice lists by using **`[start:stop:step]`**

```
x = [1, 2, 3, 4, 5]

x[2:4] # => [3,4]
x[3:4] # => [4]
x[1:-1] # => [2,3,4]
```

```
y = ['a', 'b', 'c', 'd', 'e', 'f']

y[:3] # => ['a', 'b', 'c']
y[2:] # => ['c', 'd', 'e', 'f']
y[:-1] # => ['a', 'b', 'c', 'd', 'e
y[:] # => ['a', 'b', 'c', 'd', 'e',
```

Inspecting List Elements

```
y = ['a', 'b', 'c', 'd', 'e', 'f']

y[1:5:2] # => ['b', 'd']
y[::3] # => ['a', 'd']
```

Inspecting List Elements

```
y = ['a', 'b', 'c', 'd', 'e', 'f']

y[1:5:2] # => ['b', 'd']
y[::3] # => ['a', 'd']
```

```
y = ['a', 'b', 'c', 'd', 'e', 'f']

y[::-1] # => ['f', 'e', 'd', 'c', 'b', 'a']
```

Nested Lists

Lists can contain lists

```
x = [[15, 4, 20, 7], [3, 18, 9]]

x[1] # => [3, 18, 9]
x[1][2] # => 9
x[0][2:] # => [20, 7]
```

in Operator

Search an operand in the specified sequence by using **in**

```
0 in [] # => False
'y' in  'Python' # => True
23 in ['hello', 40, 'a', 5] # => False
23 in ['hello', 40, 'a', 23] # => True
23 in ['hello', 40, 'a', '23'] # => False
```

- Works with lists and strings
- Works with ranges

len() Function

`len()` is an operator to determine the size of lists, strings, etc.

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

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

List Slicing

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

```
numbers = [0, 1, 2, 3, 4, 5]
"""
ASCII art analogy :)
 +---+---+---+---+---+---+
 | 0 | 1 | 2 | 3 | 4 | 5 | => Indices
 +---+---+---+---+---+---+
 0   1   2   3   4   5   6 => Borders
-6  -5  -4  -3  -2  -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,
numbers[::-1]   # => [5, 4, 3, 2, 1,
numbers[::-2]   # => [5, 3, 1]
```

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

List Mutation

`list.append(x)`: Append x to end of the sequence
`list.insert(i, x)`: Insert x to index i
`list.pop(i=-1)`: Remove and return element at index i
`list.remove(x)`: Remove first occurrence of x
`list.extend(iterable)`: Add all elements in iterable to end of list
`list[i] = new_value`: Update value of index i with new value
`list[basic_slice] = iterable`: Change elements in basic slice with elements in iterable, sizes can be different:

```
numbers[:]  = []
```

`list[extended_slice] = iterable`: Change elements in extended slice with elements in iterable 1-1, sizes must be equal.

Some Other List Operations

`in` operator: Check whether an element is in list. `3 in numbers` ⇒ `True`

`len(list)`: Returns the length of list(and other collections).

`list.index(value, start=0, stop=len(list))`: Return first index of value.

`list.count(value)`: Count number of occurrences of value in list.

`list.reverse()`: Reverse the list (in-place)

`list.sort()`: Sort list elements (in-place)

For more, type `help(list)` in your interactive interpreter.

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

For Loops

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    <expression>
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    ...
```

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

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

Break, Continue & Pass

`break` immidiately terminates the closest loop

```
for i in range(0, 5):
    if i % 2 == 1:
        break
    print(i)
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```
x = 1
while x < 100:
    x *= 2
    if (x+1) % 3 == 0:
        break
    print(x)
```

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x = 1
while x < 100:
    x *= 2
    if (x+1) % 3 == 0:
        continue
    print(x)
```

Break, Continue & Pass

Pass does not have an effect

```
for letter in 'Python':
   if letter == 'y':
      pass
      print ('In pass case')
   print(letter)
```

- Loops, conditional statements, functions etc. cannot be empty
- Use when you have to create one