Conditionals in Python

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Interactive Programs

- we know how to output something on the screen:
  `print('Hello world.')`

- input:
  `input(<prompt>)`
  - returns the input from the keyboard

Example

```python
name = input('type your name: ')
```
Let’s assume you want to write a program that: 1) asks a user to type his/her name, 2) checks if it is a known user, and 3) prints a welcome statement.

▶ we know how to do the first part:

```python
known_users = ['Sandra', 'Markus']
name = input('type your name: ')
```

▶ We can check whether a person is in the list of known users:

```python
name in known_users
```

▶ But how do we tell python to print a welcome message if the name is known?
If Statement

- syntax:

  ```python
  if <test>:
      do this
  ```

- full program:

  ```python
  known_users = ['Sandra', 'Markus']
  name = input('type your name: ')

  if name in known_users:
      print("Hello " + name)
  ```

Blocks and Indenting

Definition

In Python, blocks are created by the use of a colon, followed by an indented section of text.

```python
if <test>:
    do something
    do another thing
    a final thing
do this regardless
```
Truth Values

- A test (in the if statement) corresponds to a yes/no question and can be either true or false.
- The following values count as false:
  - `False`
  - `None`
  - `0`
  - `[]` (empty list)
  - `{}` (empty dict)
  - `' '` (empty string)
  - `()` (empty tuple)
- Everything else counts as true!
Else Statements

- In case the program needs to do something when the test is false, use the `else:` statement
- E.g. if a user is not known, add him/her to the list

Example

```python
known_users = [ 'Sandra', 'Markus' ]
name = input( 'type your name: ' )

if name in known_users:
    print( 'Hello ' + name + ' . ' )
    print( 'It is nice to have you back. ' )
else:
    known_users.append(name)
    print( 'You have been added to the list. ' )
```
Elif

- if you want to check the next condition in the else case, there is a shortcut for `else if` called `elif`

Example

```python
known_users = ['Sandra', 'Markus']
name = input('type your name: ')

if name in known_users:
    print('Hello ' + name + ' .')
    print('It is nice to have you back .')
elif len(name) > 20:
    print('Your name is too long !')
else:
    known_users.append(name)
    print('You have been added to the list .')
```
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Nested Blocks

Example

known_users = [ 'Sandra', 'Markus']
name = input( 'type your name: ')

if name in known_users:
    print( 'Hello ' + name + ' . ')
    if name.startswith( 'Dr. '):
        print( 'Taking yourself seriously, huh? ')
    else:
        print( 'You re my buddy. ')
else:
    known_users.append( name)
    print( 'You have been added to the list. ')

print( 'You re my buddy. ')

print( 'You have been added to the list. ')

print( 'You re my buddy. ')
More Tests

x == y  x equals y
x < y   x is less than y
x > y   x is greater than y
x >= y  x is greater than or equal to y
x <= y  x is less than or equal to y
x != y  x is not equal to y
x is y  x is the same object as y
x is not y x is not the same object as y
x in y  x is a member of y
x not in y x is not a member of y

▶ Caution: = and == are different:
= assigns a value
== compares values
Equality vs. Identity

```python
>>> x = y = [1, 2, 3]
>>> z = [1, 2, 3]
>>> x == y
True
>>> x == z
True
>>> x is y
True
>>> x is z
False
```
Booleans

Definition

You can combine conditions with and and or, and negate with not

Example

```python
if 5 < x < 10 and x not in y:
    print('x is between 5 and 10 ')
    print('and is not in the list y ')
```
Short-circuit logic

Python evaluates the first part of an `and/or` condition and can short circuit

- If `x in x or y` is True, no need to evaluate both
- If `x in x and y` is False, no need to evaluate both

This means you can do things like:

```python
if line and line.startswith('%'):
```

You can also do things like:

```python
name = input('Please enter your name: ') or '<unknown>'
```