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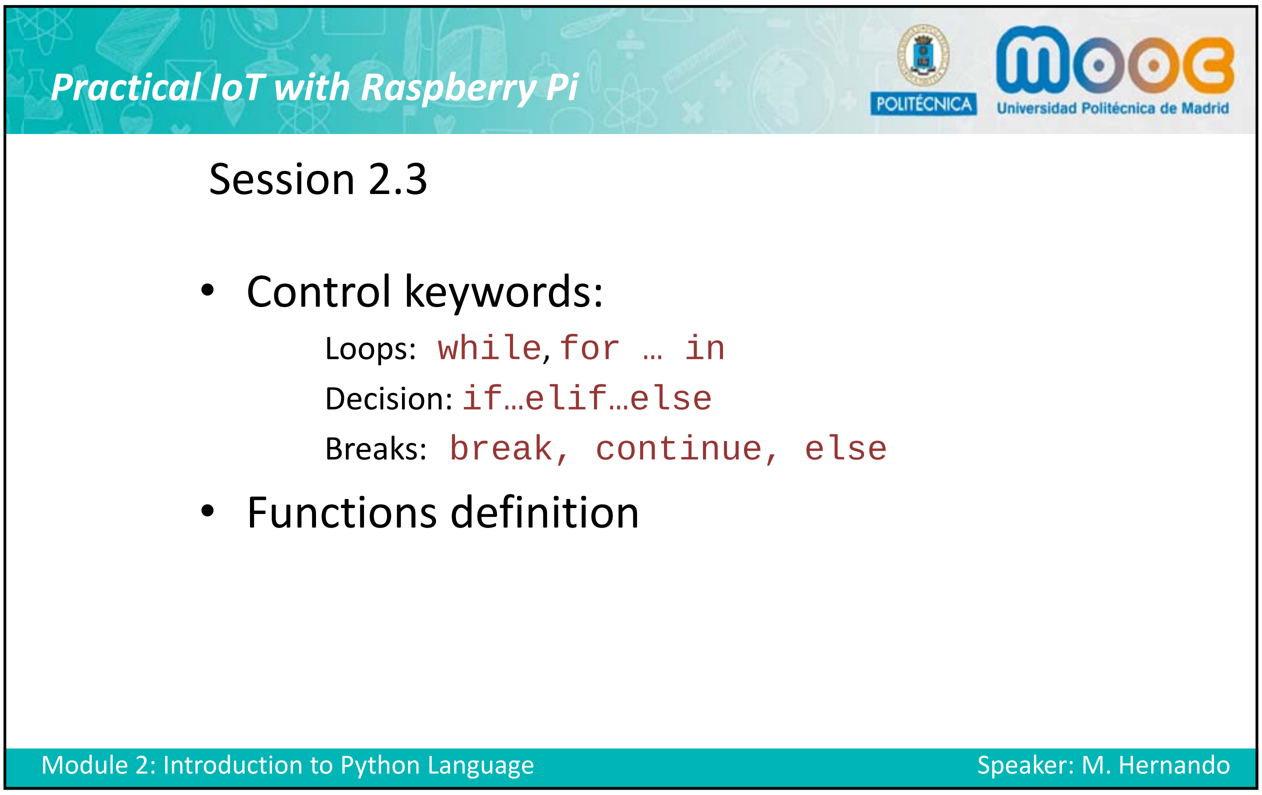
Practical IoT with Raspberry Pi

Module2. Introduction to Python Language



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Session 2.3

- Control keywords:
  - Loops: `while`, `for … in`
  - Decision: `if…elif…else`
  - Breaks: `break, continue, else`
- Functions definition

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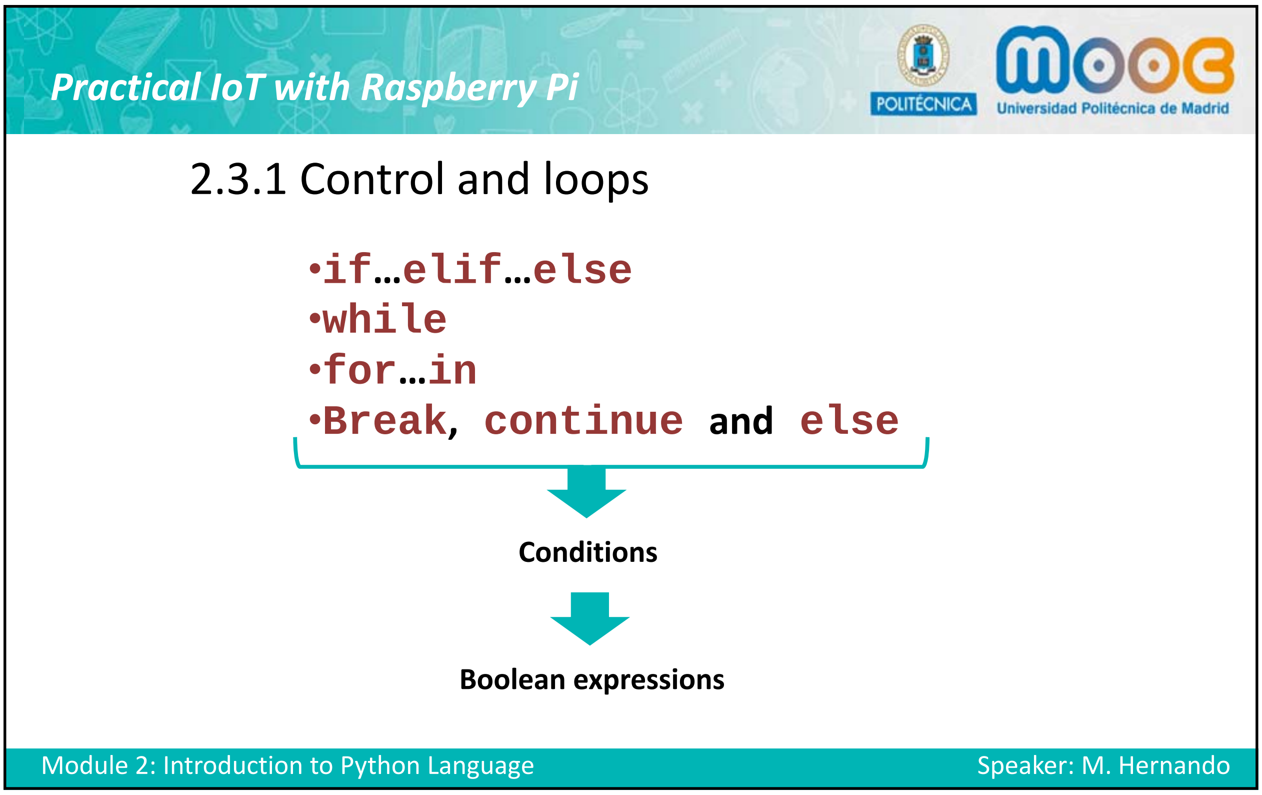

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2.3.1 Control and loops

- `if…elif…else`
- `while`
- `for…in`
- `Break`, `continue` and `else`

Conditions

Boolean expressions

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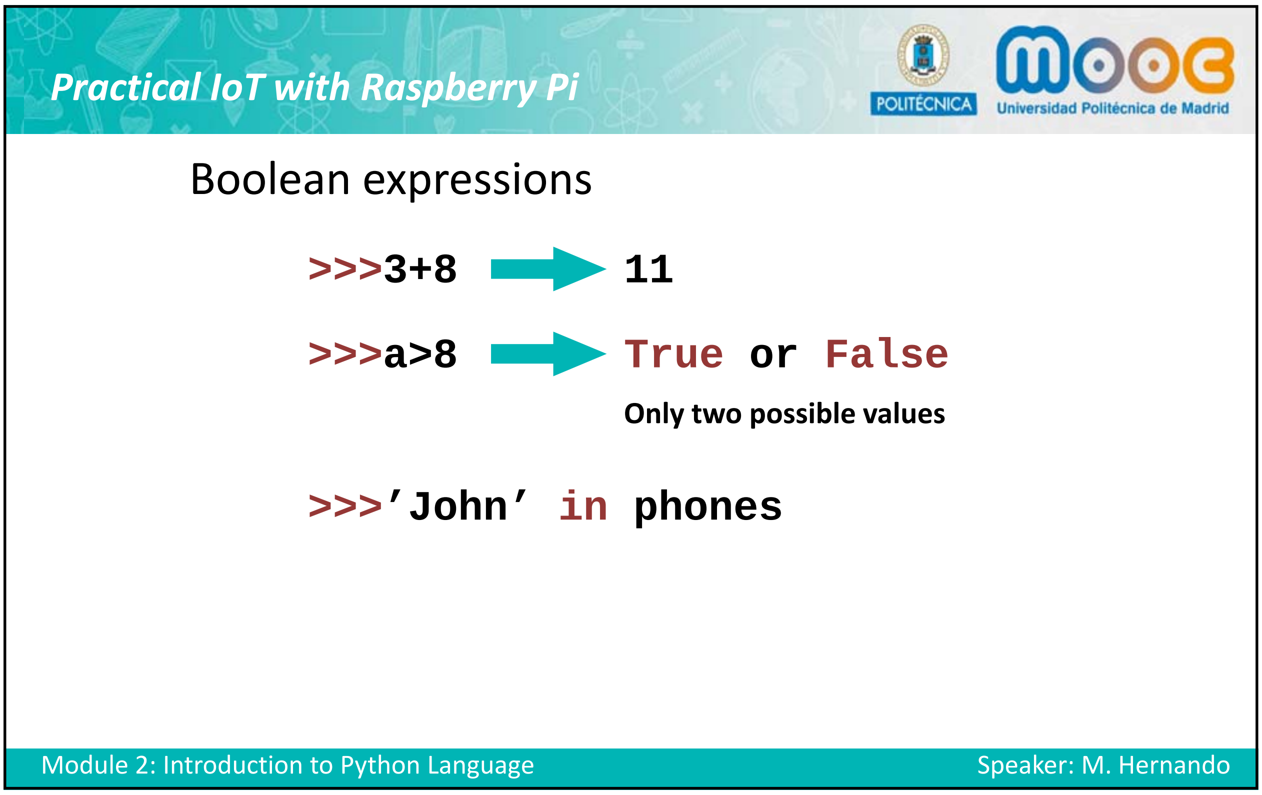

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Boolean expressions

```
>>>3+8     →  11

>>>a>8     →  True or False
```

Only two possible values

```
>>>'John' in phones
```

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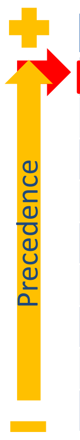
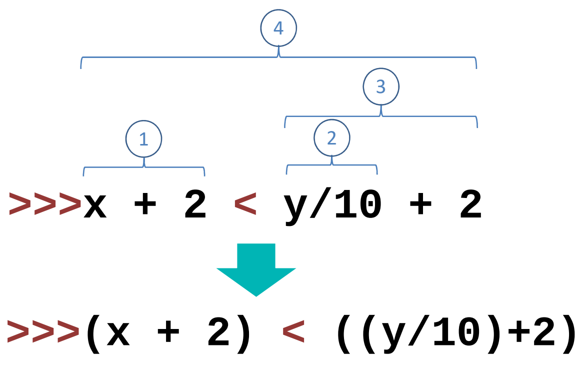
Boolean expressions



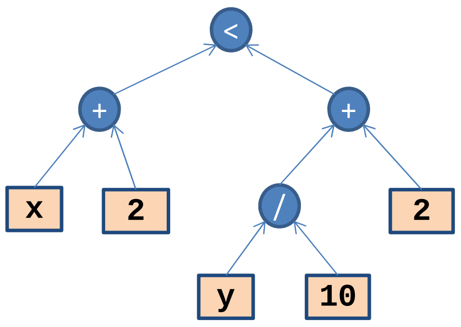
Operator	Meaning	example
x == y	True if x is **equal to** y; otherwise False	a == 'John'
x != y	True if x is **not equal to** y; otherwise False	a != 0
x < y	True if x is **less than** y; otherwise False	a < 10
x <= y	True if x is **less than or equal to** y; otherwise False	a <= 10
x > y	True if x is **greter than** y; otherwise False	a > 0
x >= y	True if x is **greater than or equal to** y; otherwise False	a >= b+5
not x	True if x is False; False if x is True	not 'John' in phones
x **and** y	True if x and y are True; False otherwise	a>3 and a<10
x **or** y	True if x or y are True; False otherwise	(a in b) or (a in c)

Boolean expressions



```
>>>x + 2 < y/10 + 2

>>>(x + 2) < ((y/10)+2)
```

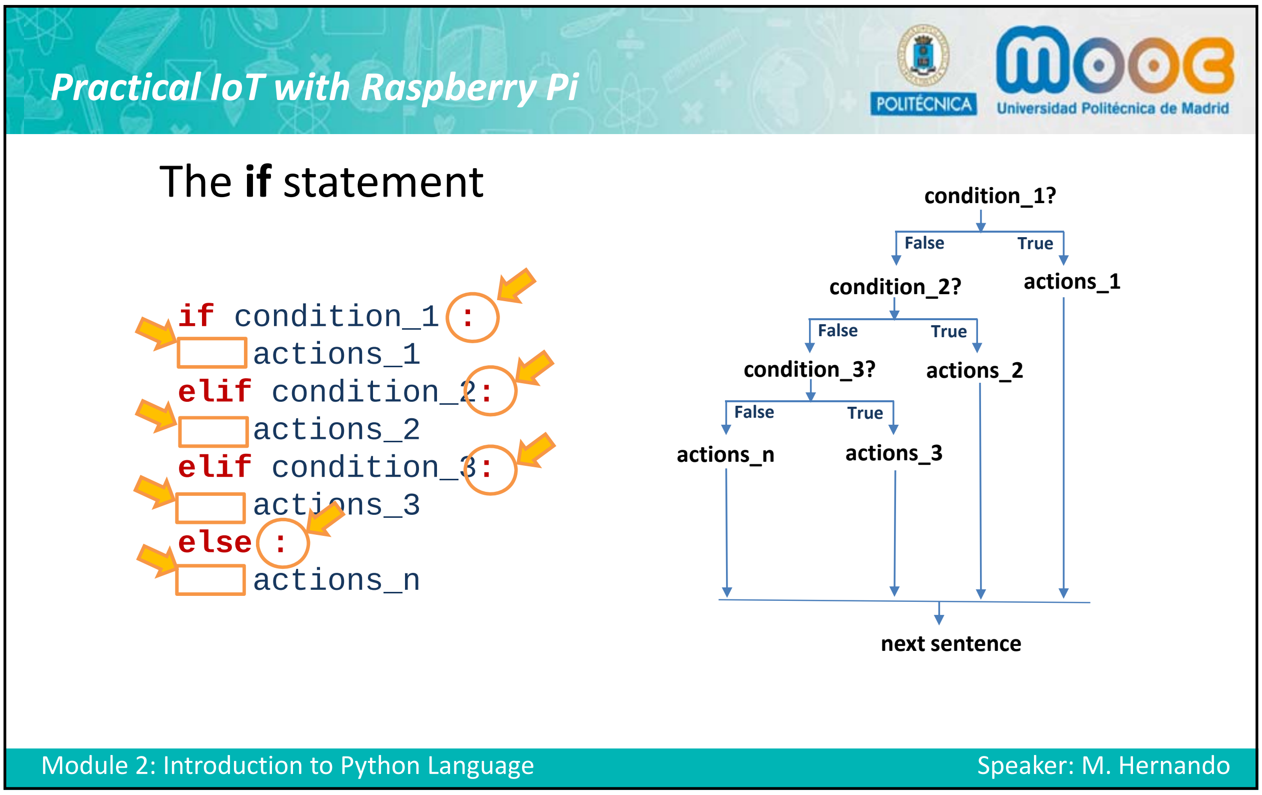


Boolean expressions

- **Integers:**
  - 0 is interpreted as False
  - <>0 is interpreted as True
- **floats:**
  - 0.0 is interpreted as False
  - <>0.0 is interpreted as True
- **strings:**
  - “” is interpreted as False
  - A non empty string is interpreted as True
- **Compound types:**
  - empty is interpreted as False
  - A non empty set or sequence is interpreted as True

2.3.1 Control and loops

- **`if…elif…else`**
- `while`
- `for…in`
- `Break, continue and else`



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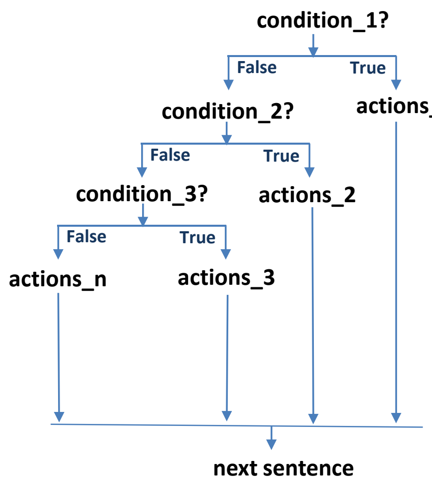
The **if** statement

```
if condition_1 :
    actions_1
elif condition_2:
    actions_2
elif condition_3:
    actions_3
else :
    actions_n
```



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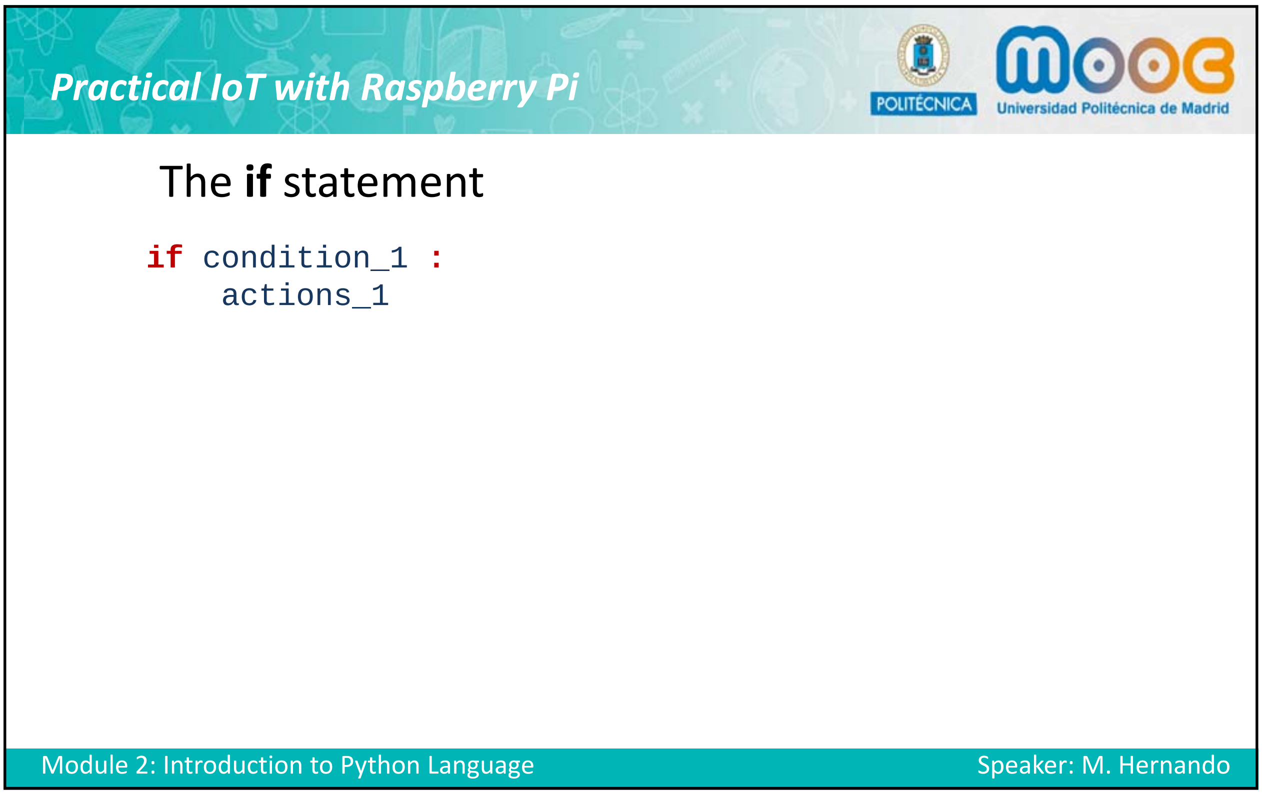

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The **if** statement

```
if condition_1 :
    actions_1
```

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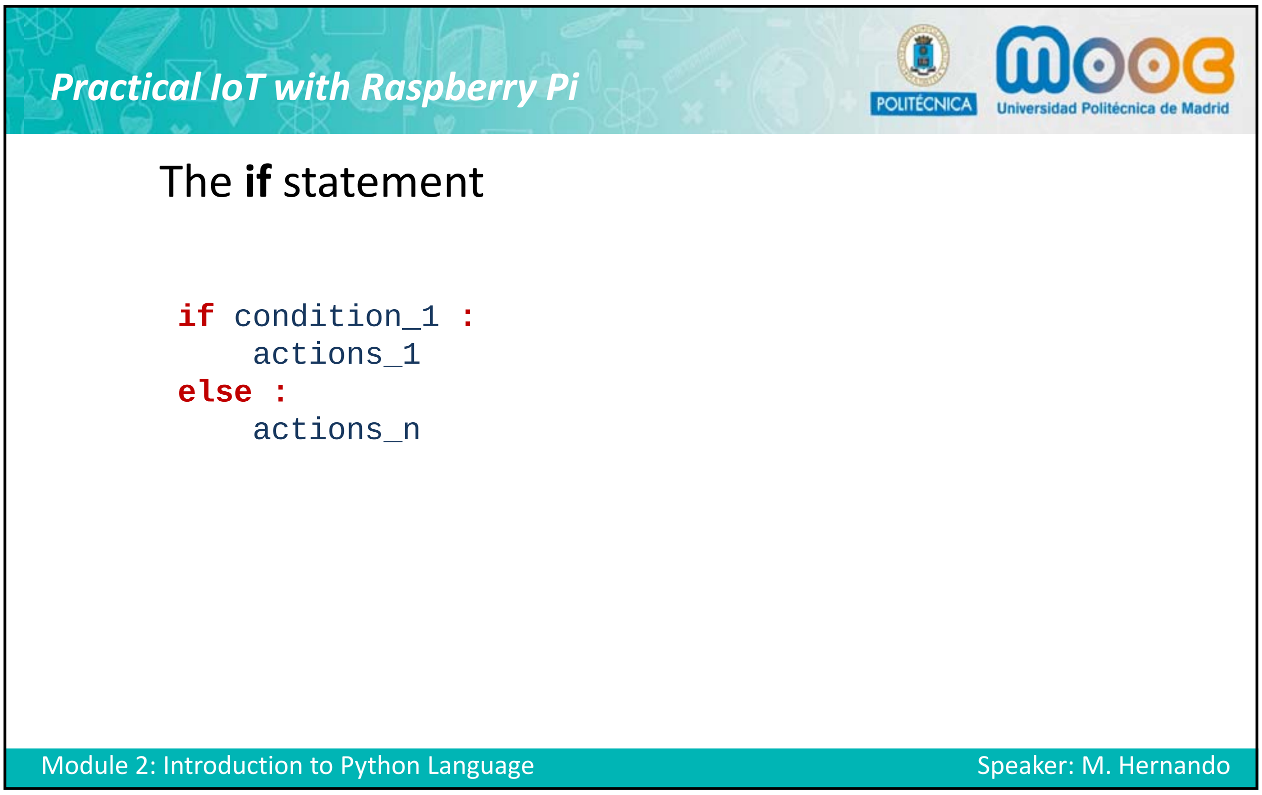

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The **if** statement

```
if condition_1 :
    actions_1
else :
    actions_n
```

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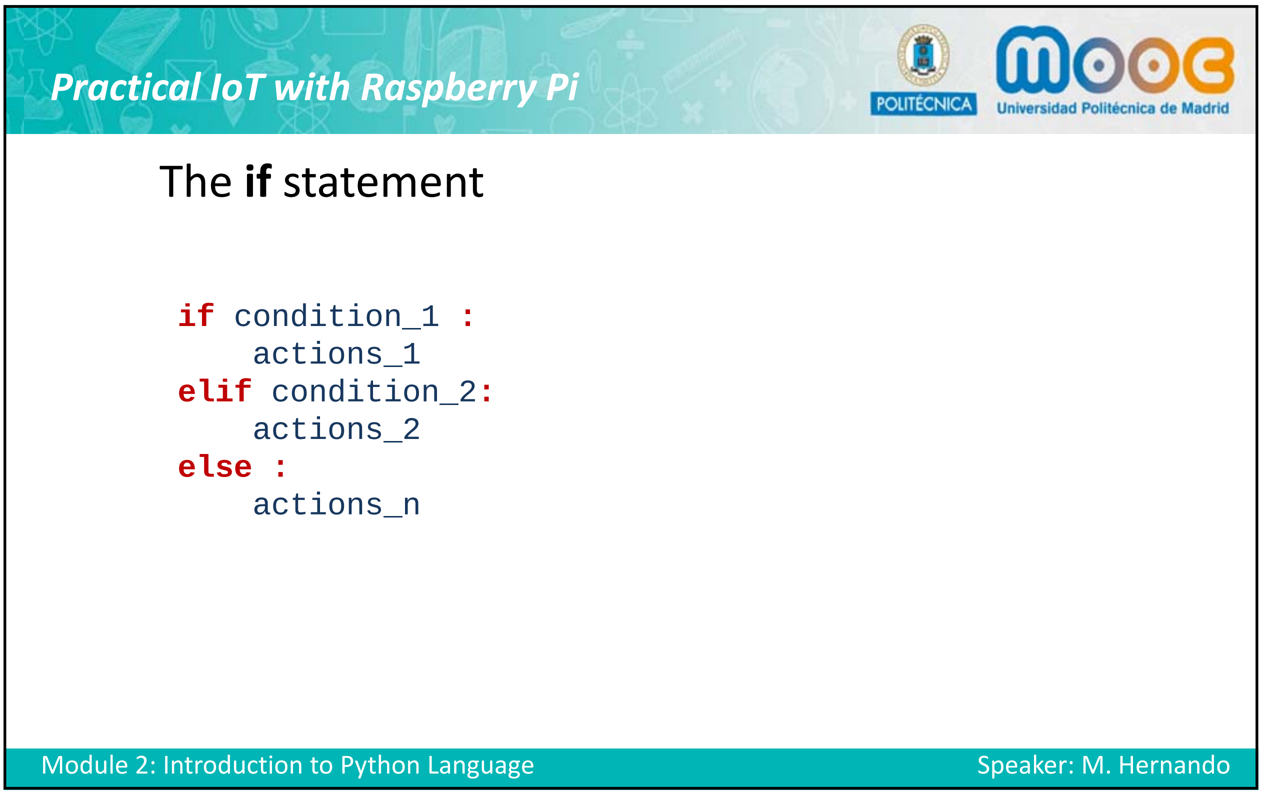

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The **if** statement

```
if condition_1 :
    actions_1
elif condition_2:
    actions_2
else :
    actions_n
```

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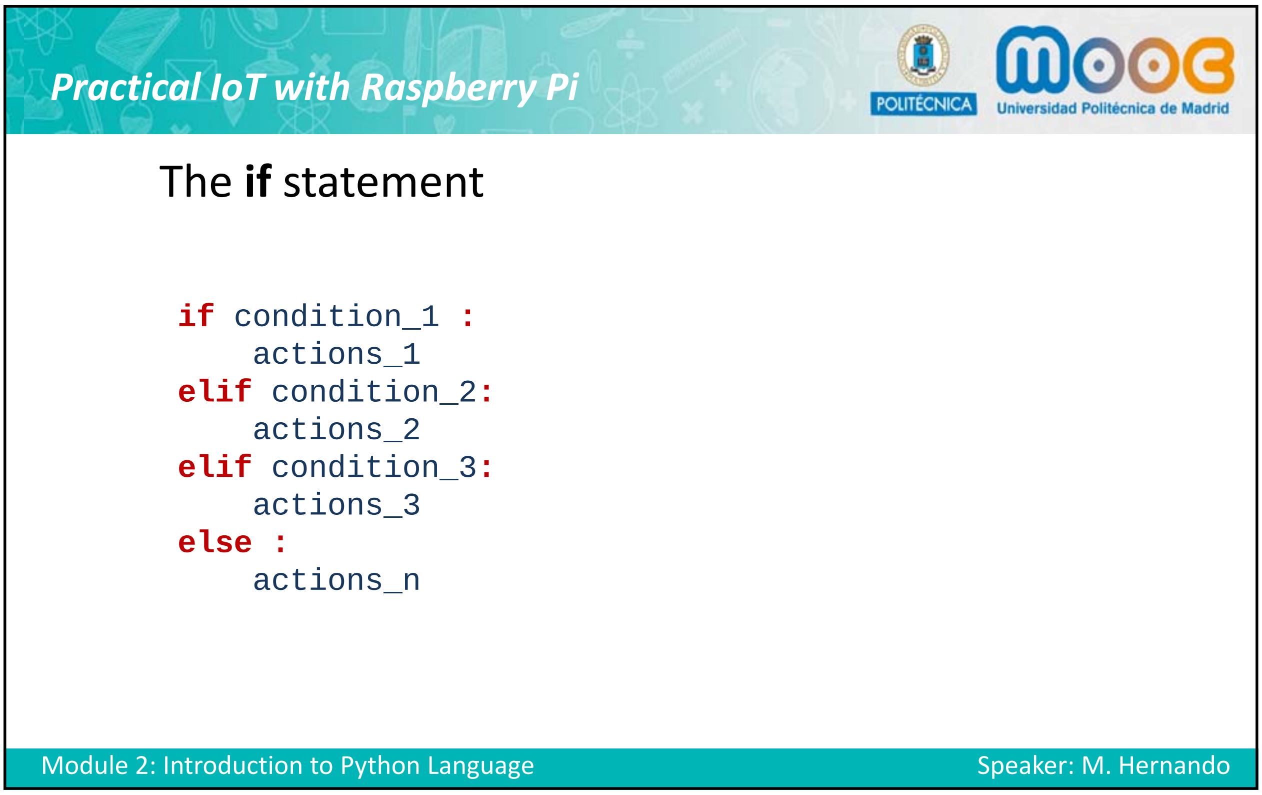
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The **if** statement

```
if condition_1 :
    actions_1
elif condition_2:
    actions_2
elif condition_3:
    actions_3
else :
    actions_n
```

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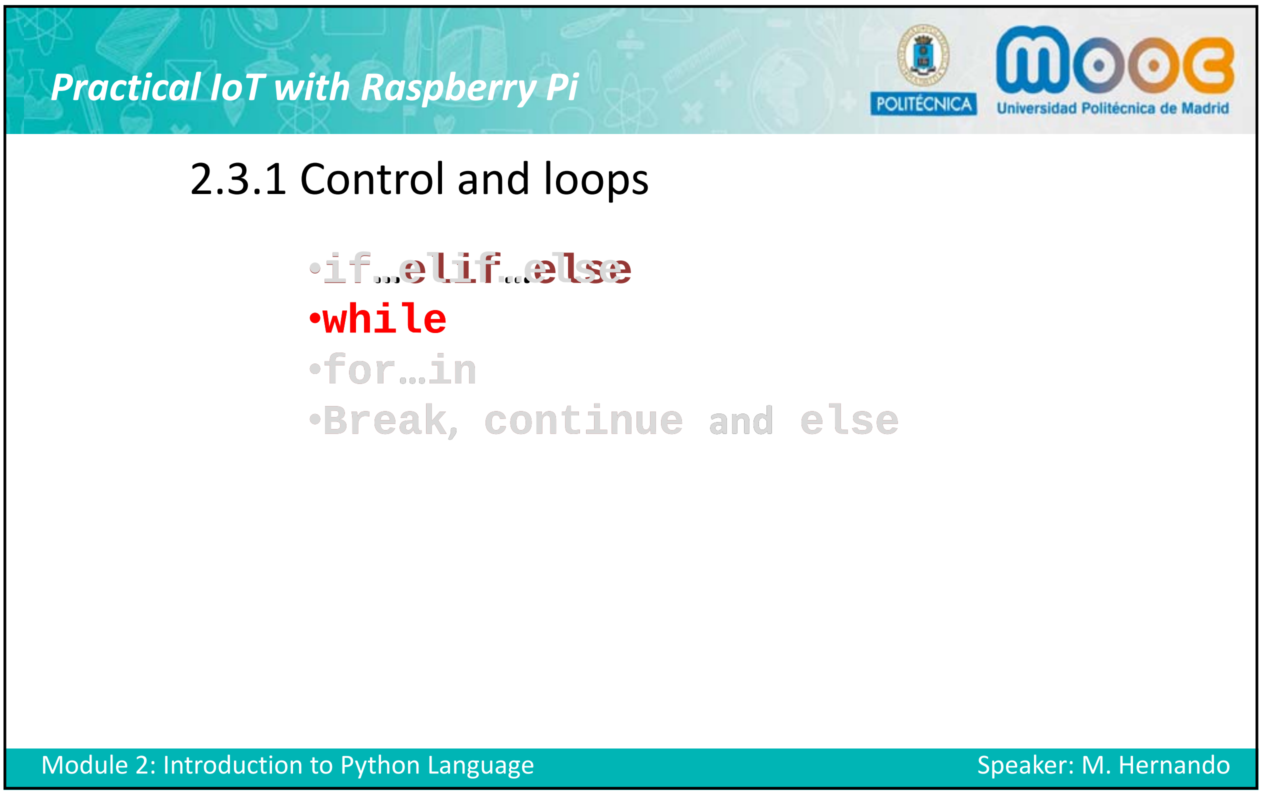
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2.3.1 Control and loops

- if…elif…else
- **while**
- for…in
- Break, continue and else

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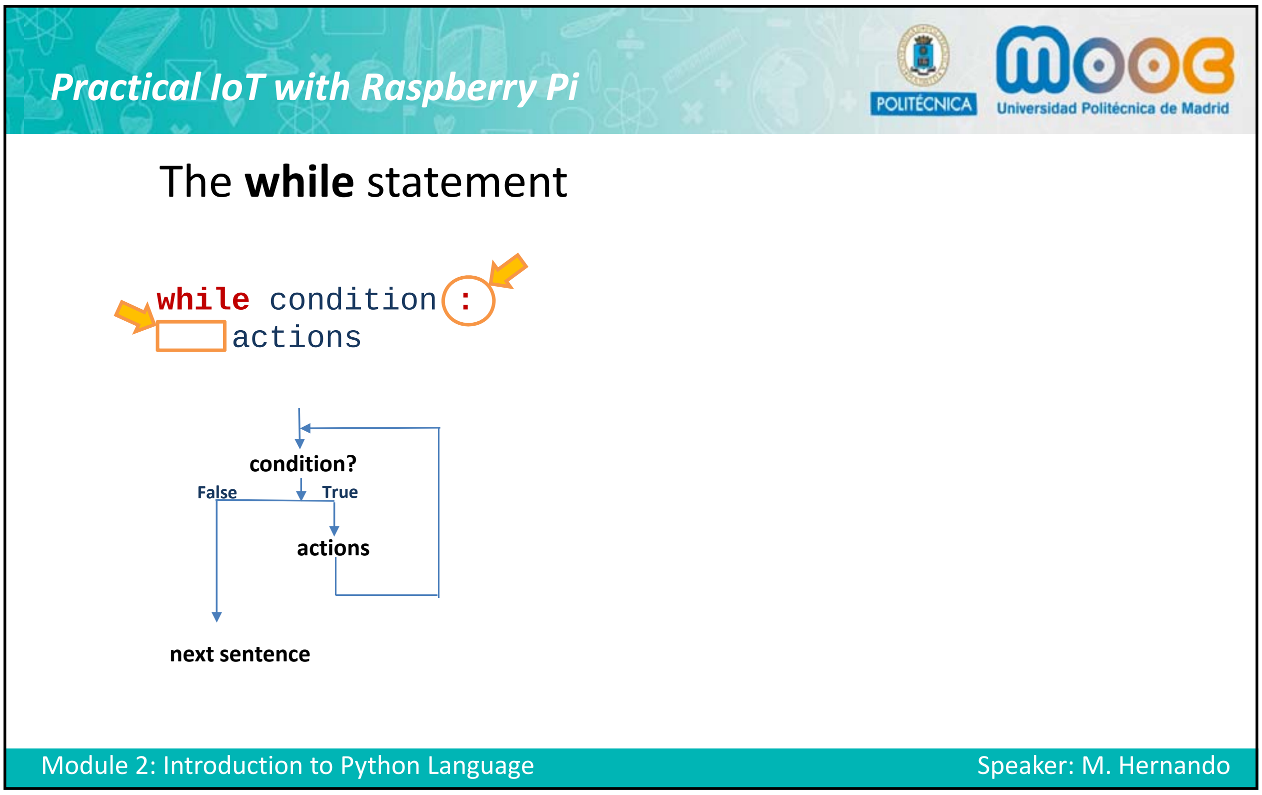

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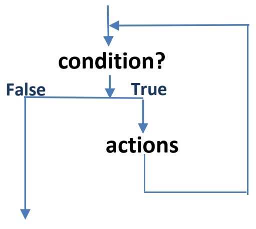
The **while** statement

```
while condition :
      actions
```



next sentence

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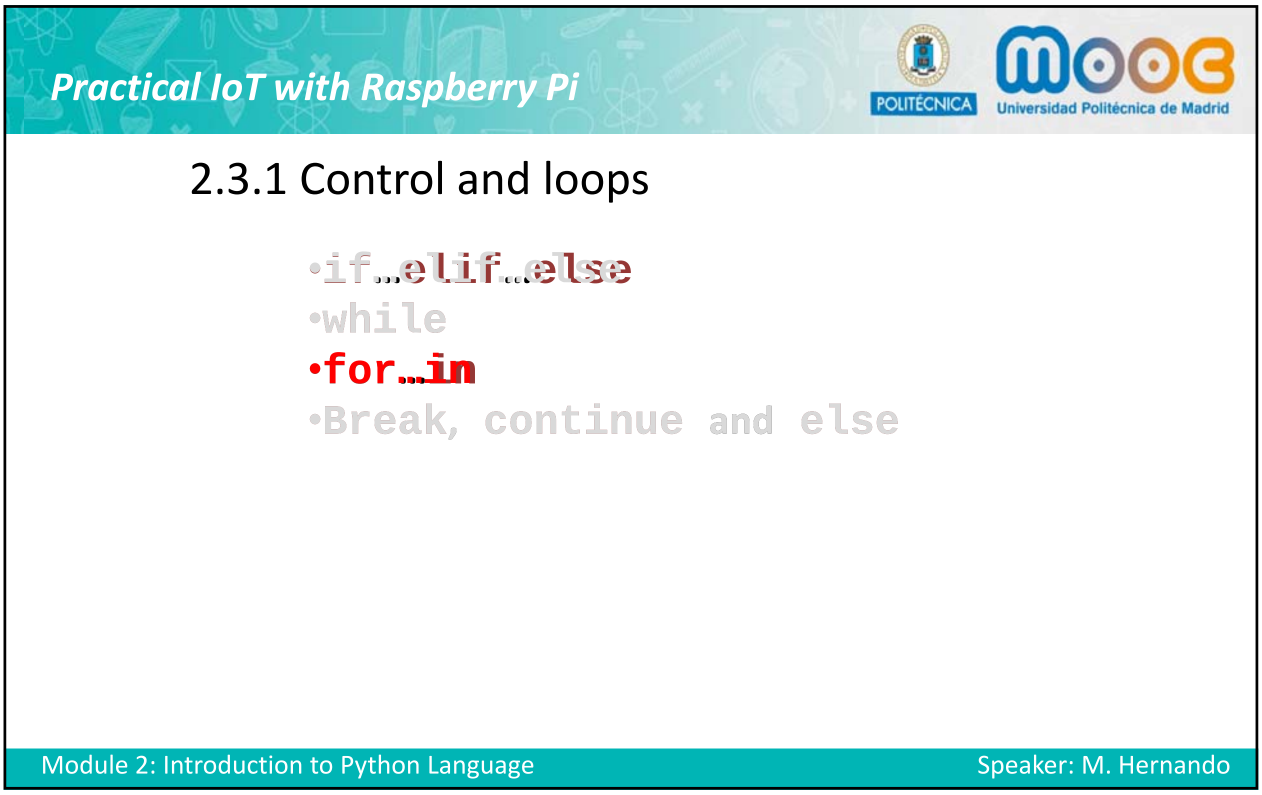

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2.3.1 Control and loops

- `if…elif…else`
- `while`
- `for…in`
- `Break, continue and else`

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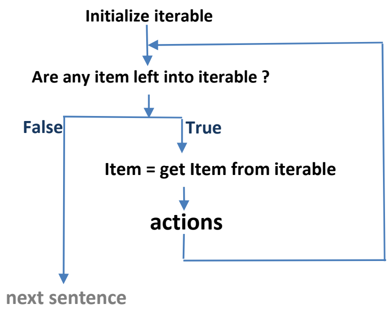
The **for** statement

```
for item in iterable:
    actions
```



Initialize iterable
Are any item left into iterable ?
False
True
Item = get Item from iterable
actions
next sentence

```
>>> n = 1
>>> while n <= 10:
        print(n)
        n = n+1 #equivalent to n += 1
```

```
>>> for n in range(1, 11):
        print(n)
```

The **for** statement

`range(begin, end, step)`

`range(begin, end)` *step=1*

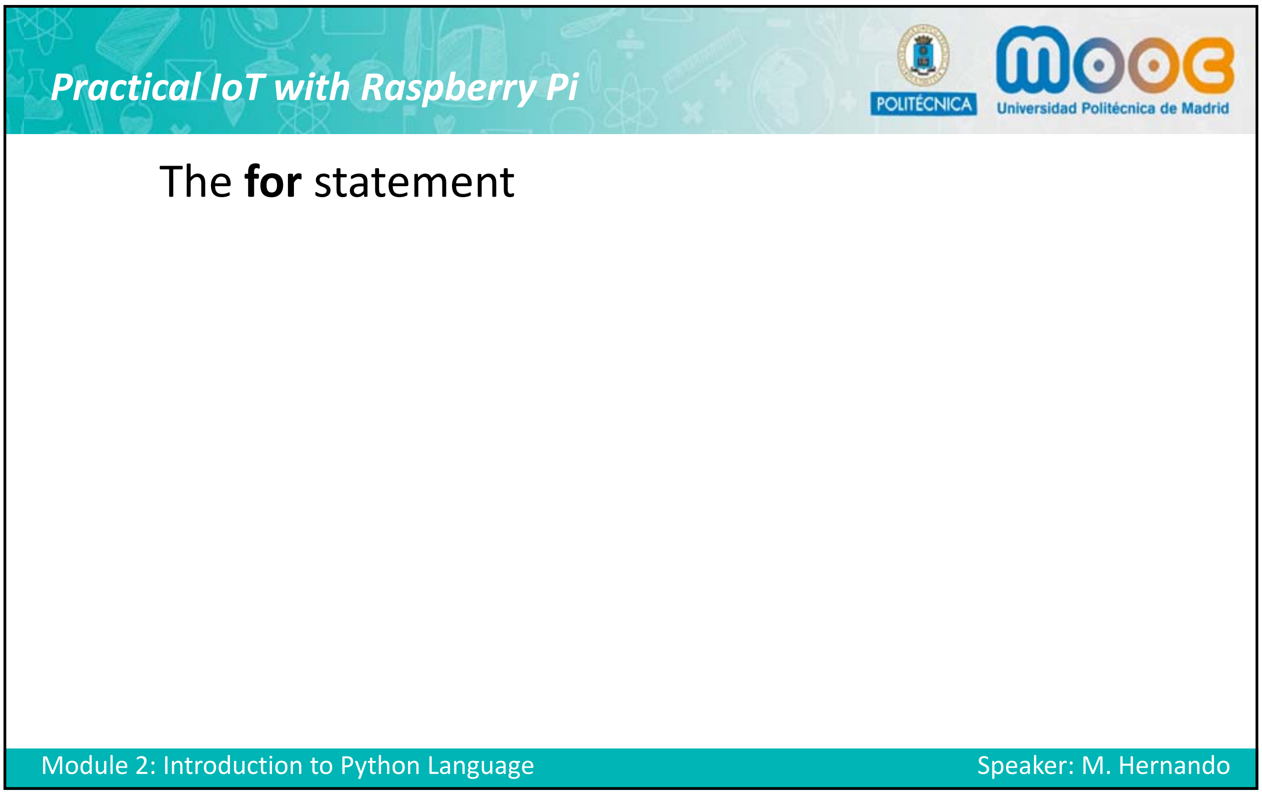
`range(end)` *begin=0; step=1*

- ✓begin: first value of the sequence
- ✓end: one past the last value of the sequence
- ✓step: the amount to increment

`range(5)` $\longrightarrow$ 0, 1, 2, 3, 4

`range(5, 2)` $\longrightarrow$ empty

`range(5, 2, -1)` $\longrightarrow$ 5, 4, 3



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The **for** statement

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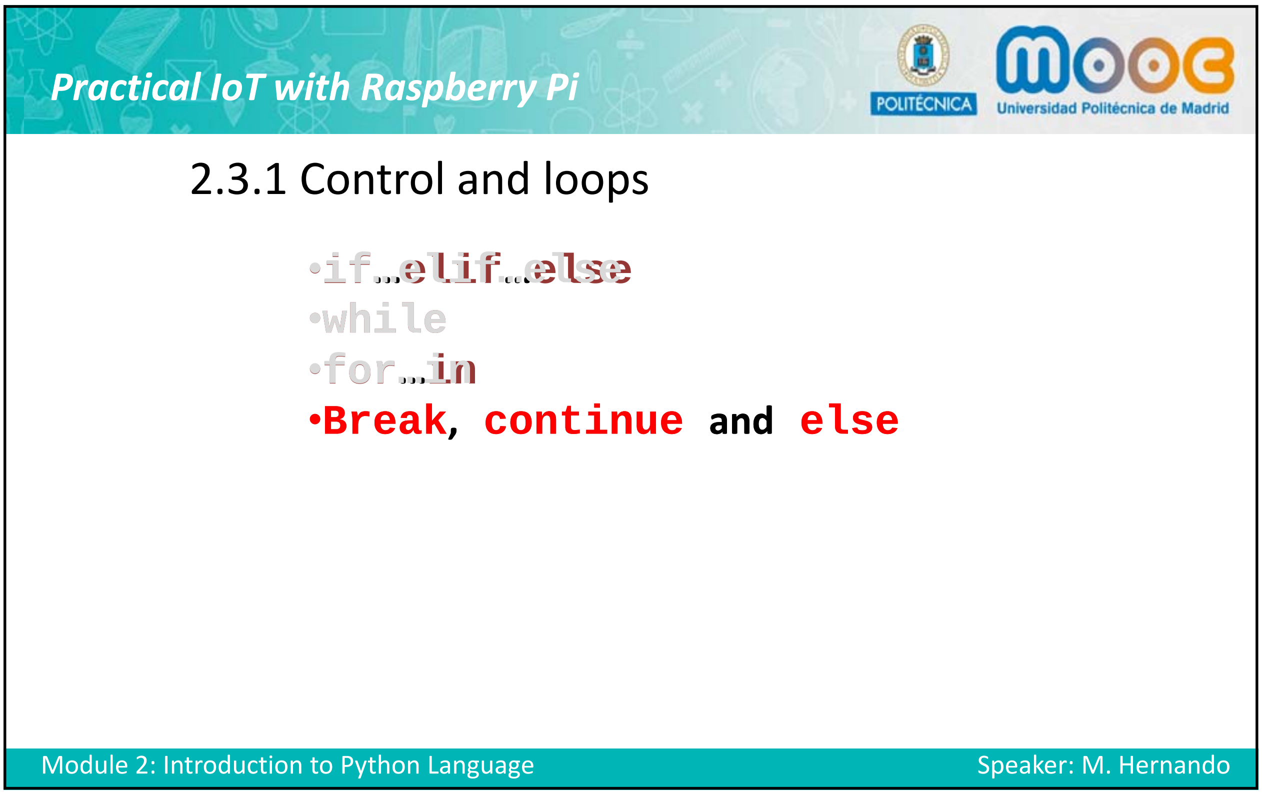

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2.3.1 Control and loops

- `if…elif…else`
- `while`
- `for…in`
- **`Break`, `continue` and `else`**

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break, **continue** and **else**

- **break:**
  Breaks out of the smallest enclosing loop

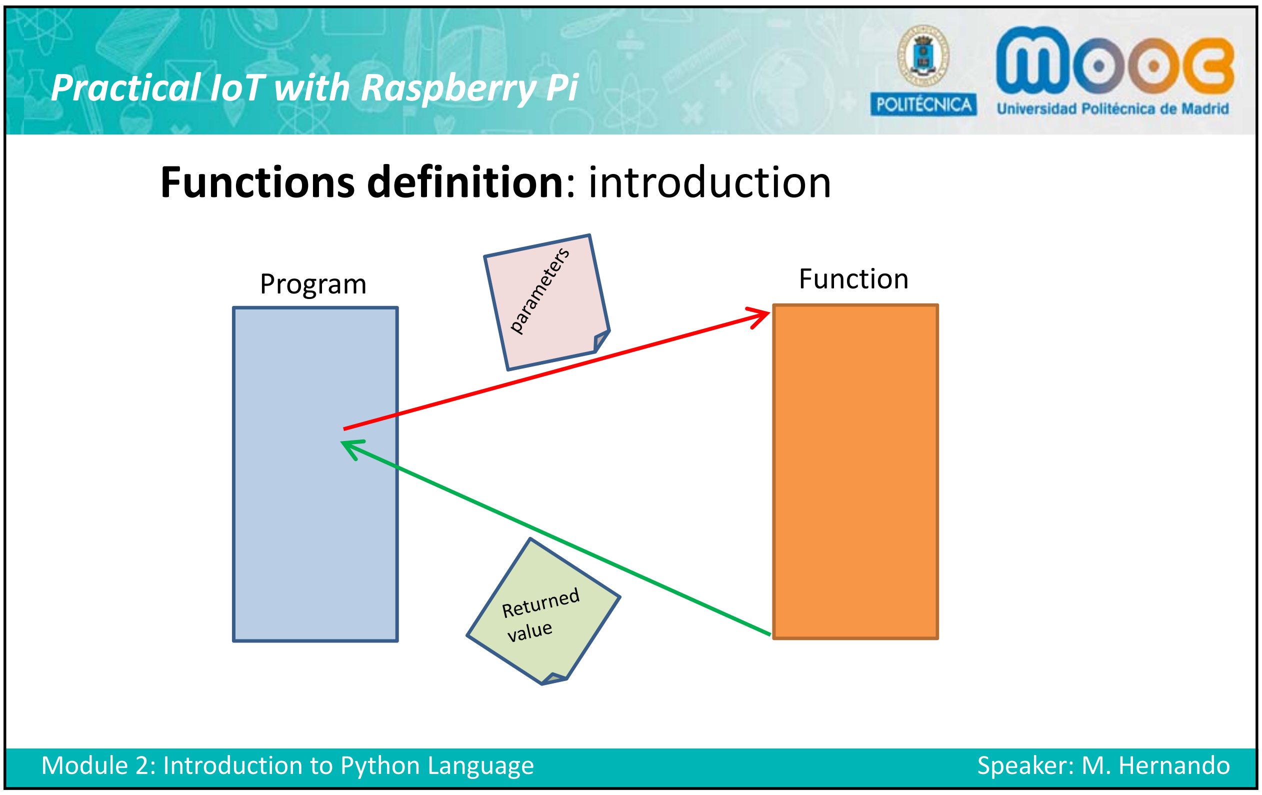
- **continue:**
  Continues with the next iteration

- **else:**
  For loops: executed when the sequence is finished
  While loops: executed when condition becomes false
  Always avoided by a break statement

break, **continue** and **else**

```
for n in range(2, 10):
    for x in range(2, n):
        if n % x == 0:
            print(n, 'equals', x, '*', n//x)
            break
    else:
        print(n, 'is a prime number')
    print("Checked: ", n)
```

```
2 is a prime number
Checked:  2
3 is a prime number
Checked:  3
4 equals 2 * 2
Checked:  4
5 is a prime number
Checked:  5
6 equals 2 * 3
Checked:  6
7 is a prime number
Checked:  7
8 equals 2 * 4
Checked:  8
9 equals 3 * 3
Checked:  9
```



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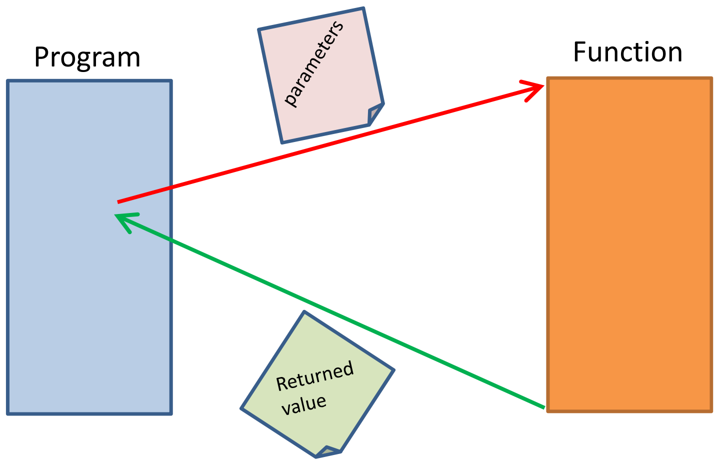
Functions definition: introduction



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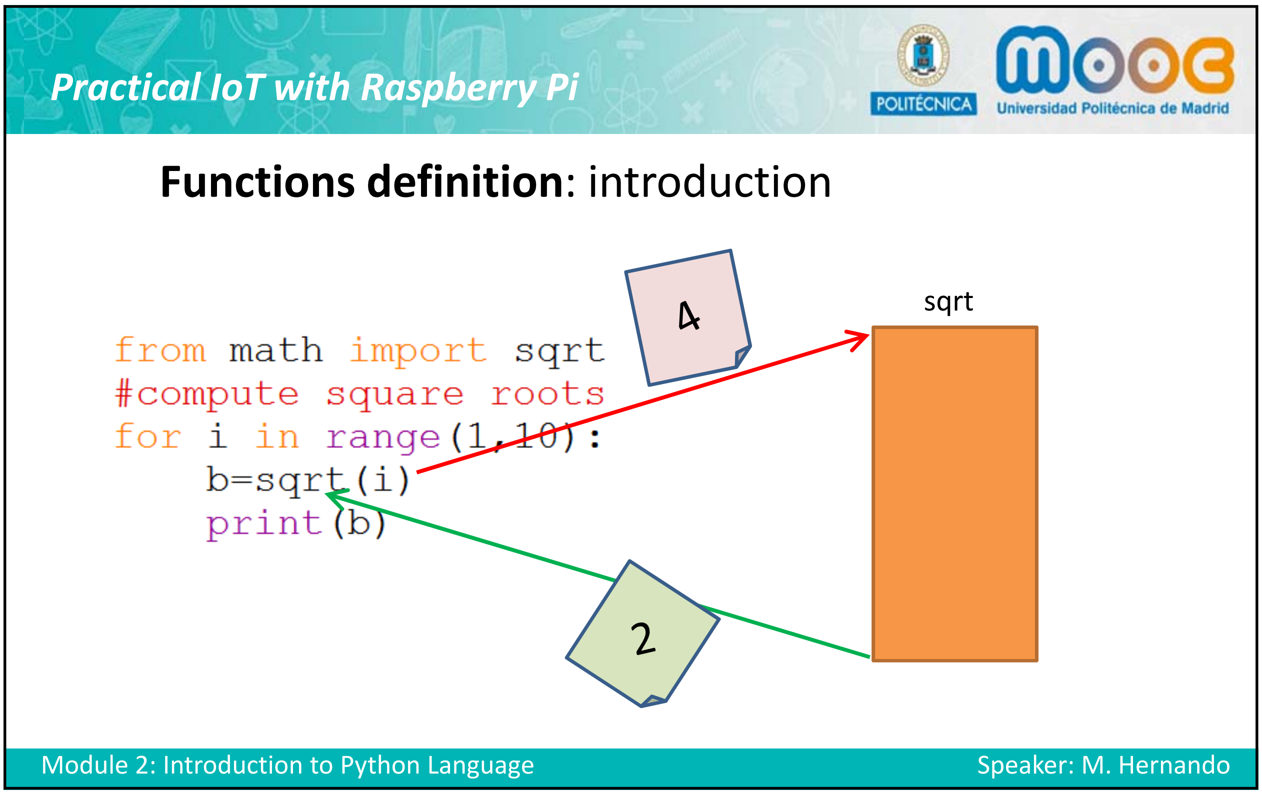

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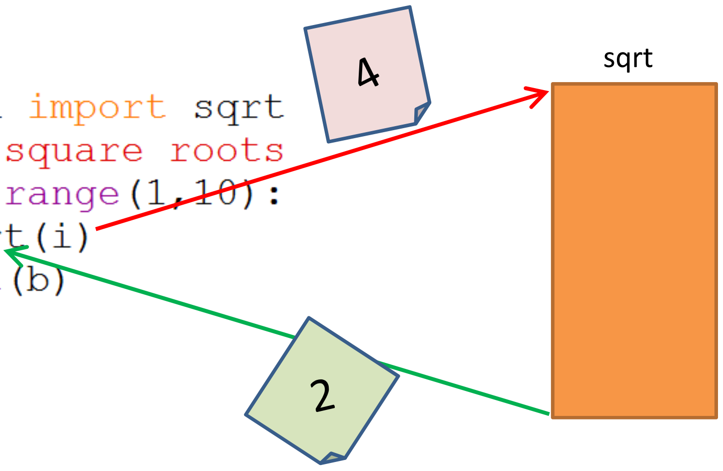
Functions definition: introduction

```
from math import sqrt
#compute square roots
for i in range(1,10):
    b=sqrt(i)
    print(b)
```



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Functions definition: introduction

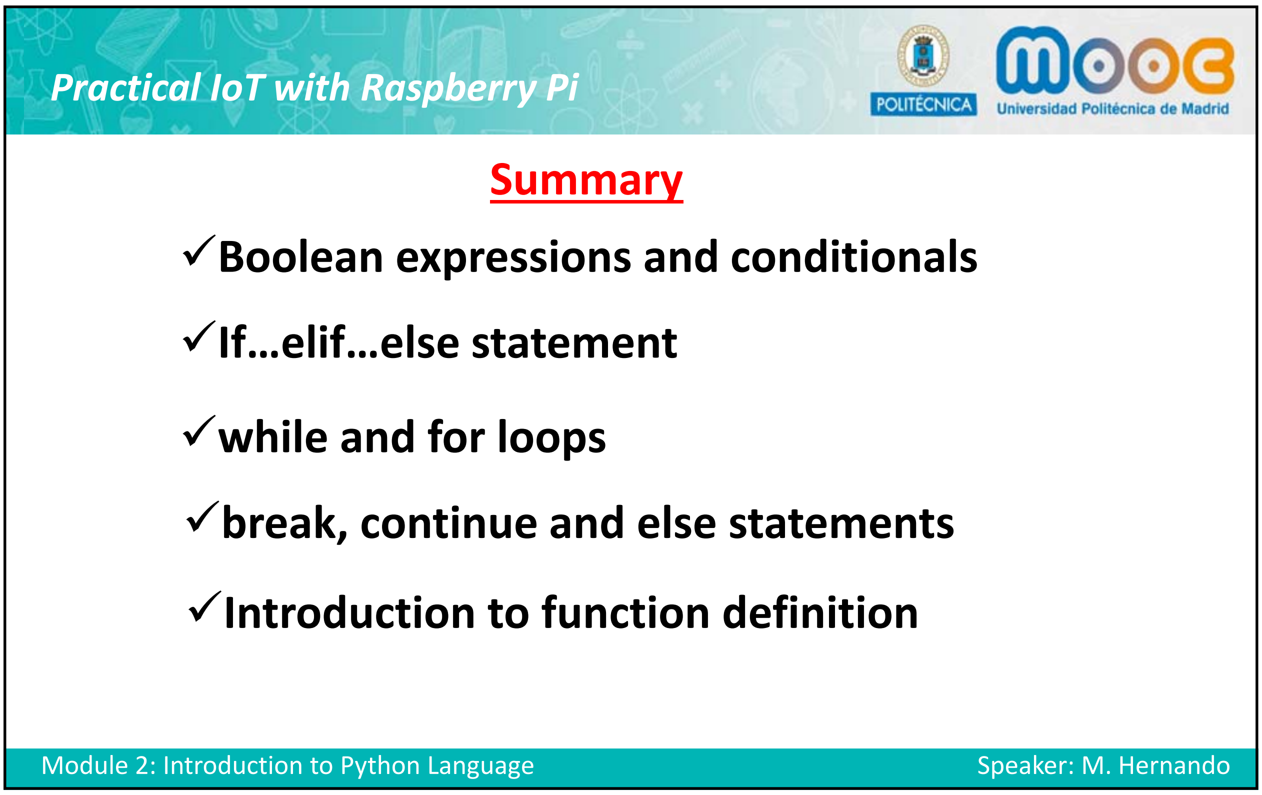
```
def functions_name (parameters):
    code of the function
    …
    …
    return value_returned
    …
```

```
>>> def check_parity(a):
    if(a%2):
        return False
    return True

>>> if(check_parity(4)):
        print("Even number")


Even number
```

Functions definition: introduction



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Summary

- ✓Boolean expressions and conditionals
- ✓If…elif…else statement
- ✓while and for loops
- ✓break, continue and else statements
- ✓Introduction to function definition

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