Loops

Table of Contents

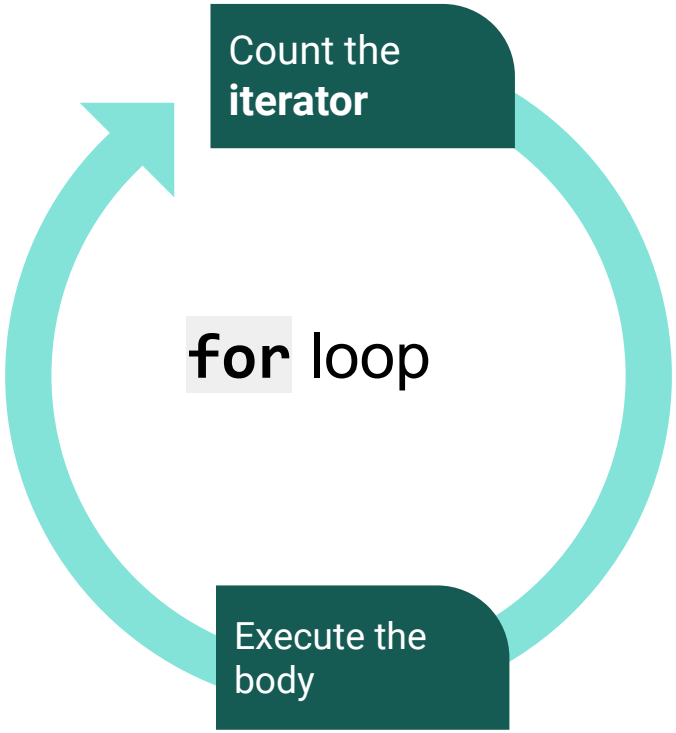
Definitions

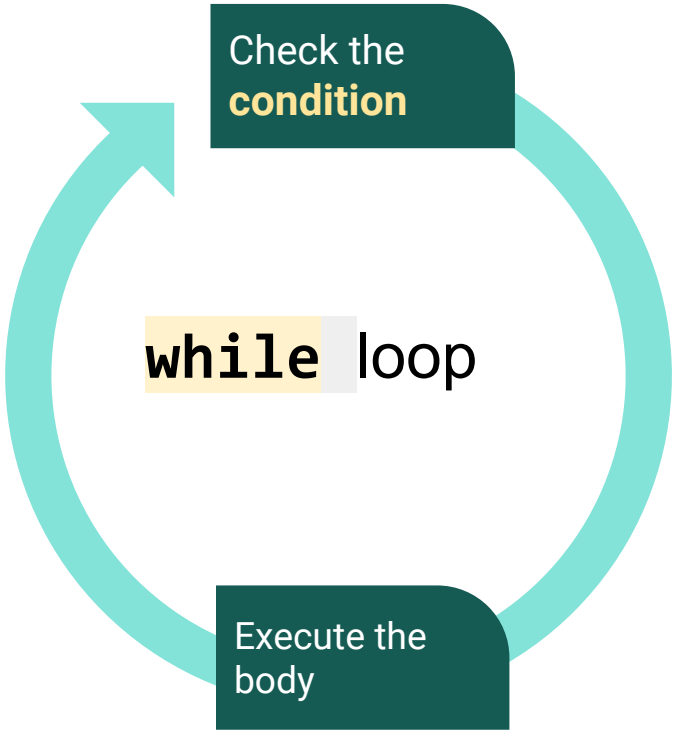
```
for i in iterator :
    print(i)
```

Can you explain the importance and logic of the loops?

Students, write your response!

Definitions - Loops

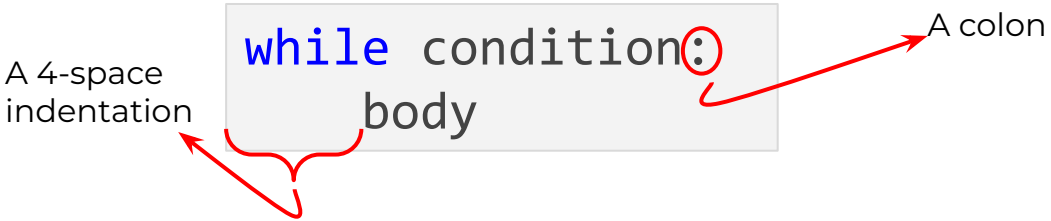




`while` Loop

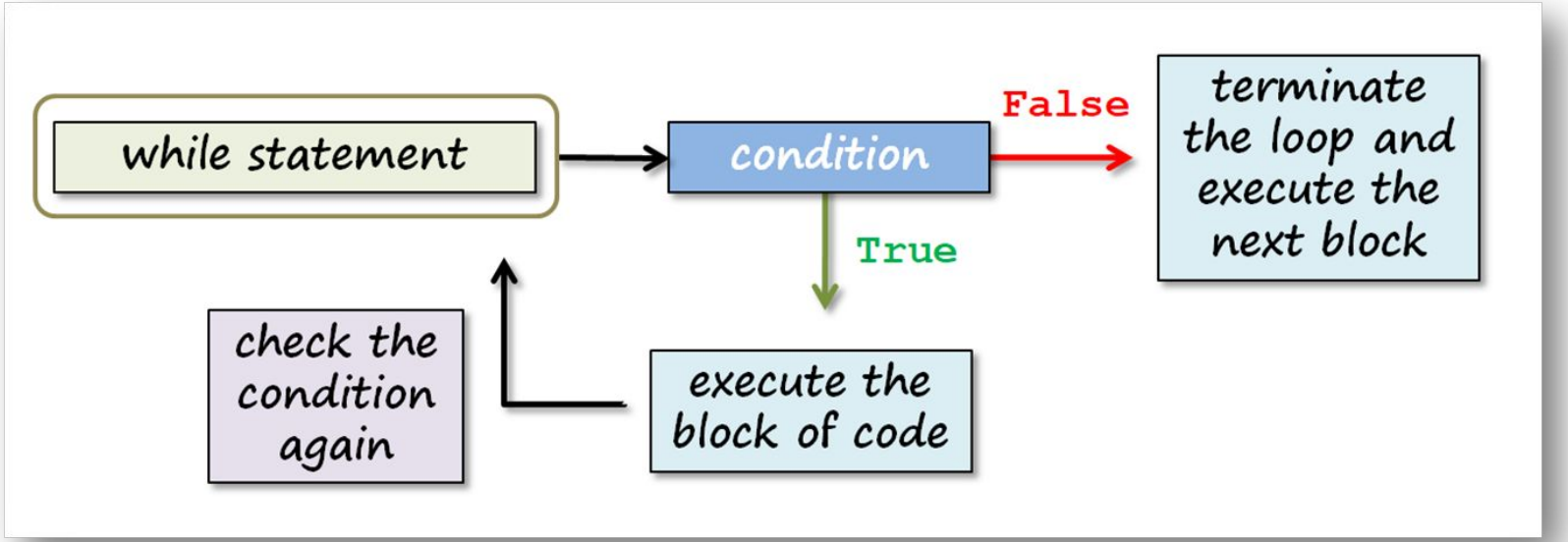
`while` Loop (review the pre-class)

- The simple syntax 👇 of a `while` loop is :



`while` Loop (review the pre-class)

- The basic diagram 👇 of a `while` loop works as follows :



`while` Loop (review the pre-class)

- Let's take a look at the first `while` loop in the pre-class content :

```
1  number = 0
2
3  while number < 6:
4      print(number)
5      number += 1
6  print('now, number is bigger or equal to 6')
7
```

`while` Loop (review the pre-class)

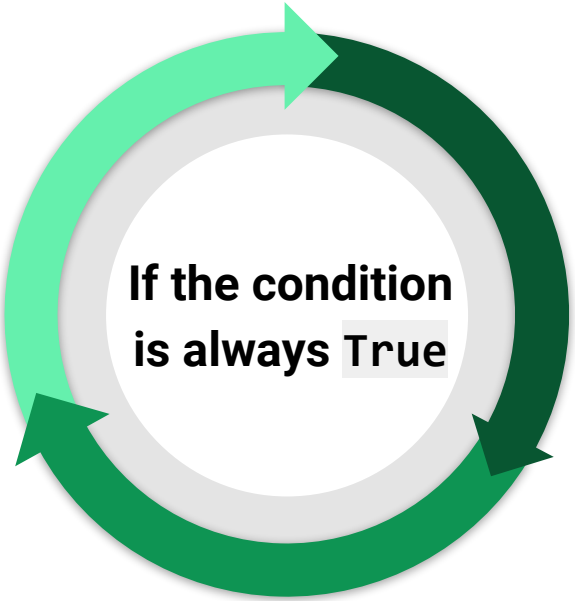
- The output :

```
number = 0

while number < 6:
    print(number)
    number += 1
print('now, number is bigger or equal to 6')

```

```
0
1
2
3
4
5
now, number is bigger or equal to 6

```

`while` Loop

- Pay attention not to start an **infinite** loop.



`while` Loop (review the pre-class)

- We can use an **iterator** object in a `while` loop. Let's call a `list` in this example :

```
1  my_list=["a", "b", "c", "d", "e"]
2
3  a = 0
4
5  while a < len(my_list):
6      print('square of {} is : {}'.format(a, a**2))
7      a+=1
8
```

`while` Loop (review the pre-class)

- The output :

```
1  my_list=["a", "b", "c", "d", "e"]
2
3  a = 0
4
5  while a < len(my_list):
6      print('square of {} is : {}'.format(a, a**2))
7      a+=1
8
```

```
1  square of 0 is : 0
2  square of 1 is : 1
3  square of 2 is : 4
4  square of 3 is : 9
5  square of 4 is : 16
6
```

`while` Loop (review the pre-class)

- **Task**: Take the age of the user using `input()` and `while` loop.
  - Write a program that ;
    - Takes the age from user,
    - Check the age if it is correct numeric format.

`while` Loop (review the pre-class)

- The code can be like :

```
1  age = input("Enter your age please : ")
2
3  while not age.isdigit():
4      print ("You entered incorrectly!")
5      age = input("Enter your age please : ")
6
7  print("Great! You enter valid input : ", age)
8
```

`while` Loop (review the pre-class)

- **Task**:
  Let's play famous '**guessing a number game**' using `while` loop.
  - Write a program that ;
    - Takes the numbers from user,
    - Compares the number the user entered with the number you assigned and then gives a message "**Little lower**" or "**Little higher**" till the user knows it.

`while` Loop (review the pre-class)

- The code can be like : In this case, we are trying to find number 28.

```
1  answer = 28
2
3  question = 'What a two-digit number am I thinking of?  '
4  print ("Let's play the guessing game!")
5
6  while True:
7      guess = int(input(question))
8
9      if guess < answer:
10         print('Little higher')
11     elif guess > answer:
12         print('Little lower')
13     else:  # guess == answer
14         print('Are you a MINDREADER!!!')
15         break
16
```

`while` Loop

- Lastly, let's play famou[illegible] game' using `while` loop.

We have written a program that does not exit the `while` loop until you find the correct number.

```
1  answer = 28
2
3  question = 'What a two-digit number am I thinking of?  '
4  print ("Let's play the guessing game!")
5
6  while True:
7      guess = int(input(question))
8
9      if guess < answer:
10         print('Little higher')
11     elif guess > answer:
12         print('Little lower')
13     else:  # guess == answer
14         print('Are you a MINDREADER!!!')
15         break
16
```

When the user knows the answer (28) and enters input, it takes the value of 28 and assigns to variable `guess`, in the end, `else` works and breaks the loop.

We used `break` keyword in order to quit and exit the `while` loop.

`while` Loop

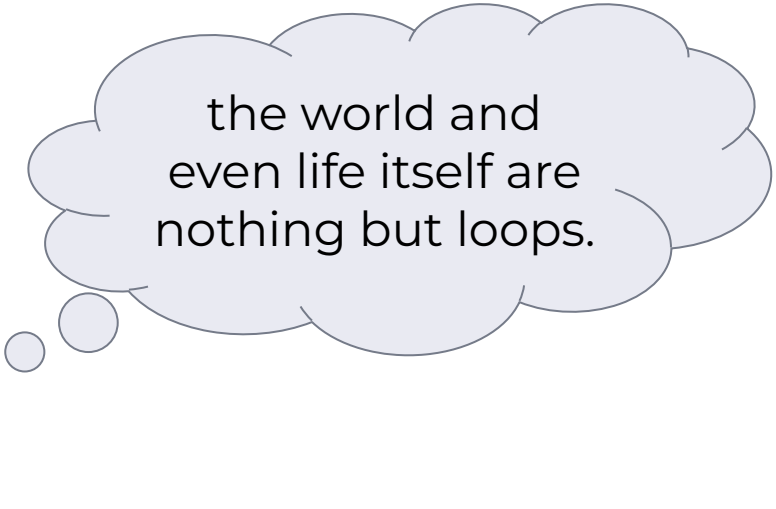
- **Task**:
  Find and print the length of the **longest word**.
  - Write a program that ;
    - Takes a **string sentence** consisting of a couple of words from the user,
    - Compares and find out the **longest** word and **prints** the whole sentence and the **length** of the longest word as `int` type.
    - Use `while` loop.

`while` Loop

- The code can be like :

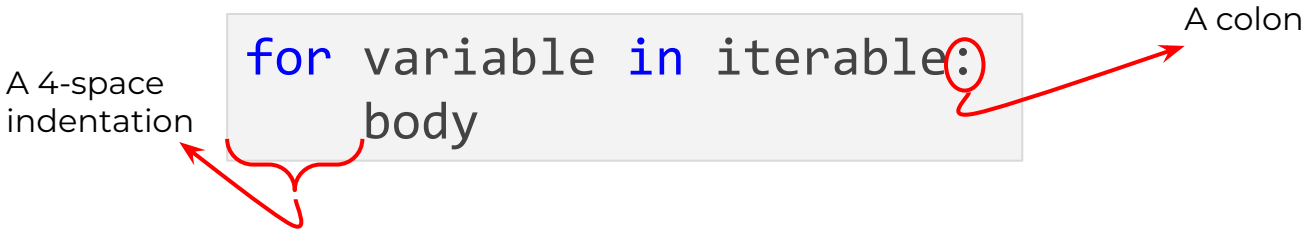
```
1  sentence = input("Give me a sentence :")
2  words = sentence.split()
3  i = 0
4  longest = 0
5  while i < len(words) :
6      if len(words[i]) > longest:
7          longest = len(words[i])
8      i += 1
9  print("the length of the longest word :", longest)
10
11
```

for Loop



`for` Loop (review the pre-class)

- The simple syntax 👇 of a `for` loop is :



`for` Loop (review the pre-class)

- To create a `for` loop, you need a **variable** and an **iterable** object.
- Let's examine the subject through an example :

```
1 for i in [1, 2, 3, 4, 5] :
2     print(i)
3
```

for Loop (review the pre-class)

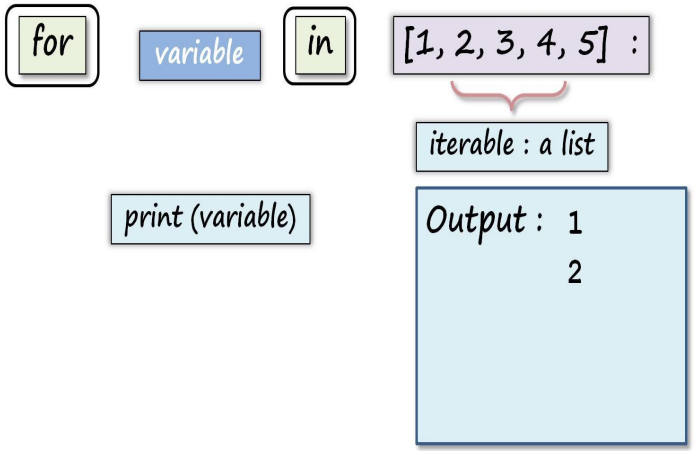
- To create a `for` loop, you need a **variable** and an **iterable** object.
- Let's examine the subject through an example :

```
1 for i in [1, 2, 3, 4, 5] :
2     print(i)
3
```

```
1 1
2 2
3 3
4 4
5 5
6
```

for Loop (review the pre-class)

- You can follow the animated diagram of this `for` loop for a better understanding.



for Loop (review the pre-class)

- Another example :

```
1  seasons = ['spring', 'summer', 'autumn', 'winter']
2
3  for season in seasons :
4      print(season)
5
```

for Loop (review the pre-class)

- In the structure of the `for` loop, you can use also a variable as an **iterable**.
- Let's see it in an example :

```
1  seasons = ['spring', 'summer', 'autumn', 'winter']
2
3  for season in seasons :
4      print(season)
5
```

```
1  spring
2  summer
3  autumn
4  winter
5
```

for Loop

- In the structure of the `for` loop, you can use also a variable as an **iterable**.
- Let's see it in an example :

```
1  seasons = ['spring', 'summer', 'autumn', 'winter']
2
3  for season in seasons :
4      print(season)
5
```

```
1  spring
2  summer
3  autumn
4  winter
5
```

for Loop

- In the structure of the `for` loop, you can use also a variable as an **iterable**.
- Let's see it in an example :

```
1  seasons = ['spring', 'summer', 'autumn', 'winter']
2
3  for season in seasons :
4      print(season)
5
```

```
1  spring
2  summer
3  autumn
4  winter
5
```

for Loop

- In the structure of the `for` loop, you can use also a variable as an **iterable**.
- Let's see it in an example :

```
1  seasons = ['spring', 'summer', 'autumn', 'winter']
2
3  for season in seasons :
4      print(season)
5
```

```
1  spring
2  summer
3  autumn
4  winter
5
```

for Loop

- In the structure of the `for` loop, you can use also a variable as an **iterable**.
- Let's see it in an example :

```
1  seasons = ['spring', 'summer', 'autumn', 'winter']
2
3  for season in seasons :
4      print(season)
5
```

```
1  spring
2  summer
3  autumn
4  winter
5
```

for Loop

- **Task** : **Python Program to say “hello `name`”**
  - Write a program to say “hello names” from the following list.
  - Print the result such as : “**hello Samuel**”

    “hello Victor”

```
names = ["Ahmed", "Aisha", "Adam", "Joseph", "Gabriel"]
```

for Loop

- **The code might be like** :

```
1  names = ["Ahmed", "Aisha", "Adam", "Joseph", "Gabriel"]
2
3  for i in names:
4      print("hello", i)
5
```

Output

```
hello Ahmed
hello Aisha
hello Adam
hello Joseph
hello Gabriel
```

for Loop

- **Task** : **Python Program to create numbers using** `range()`
  - Write a program to create a `list` consisting of numbers from **1** to **5**.
  - Print the result such as : `[1, 2, 3, 4, 5]`

for Loop

- **The code might be like** :

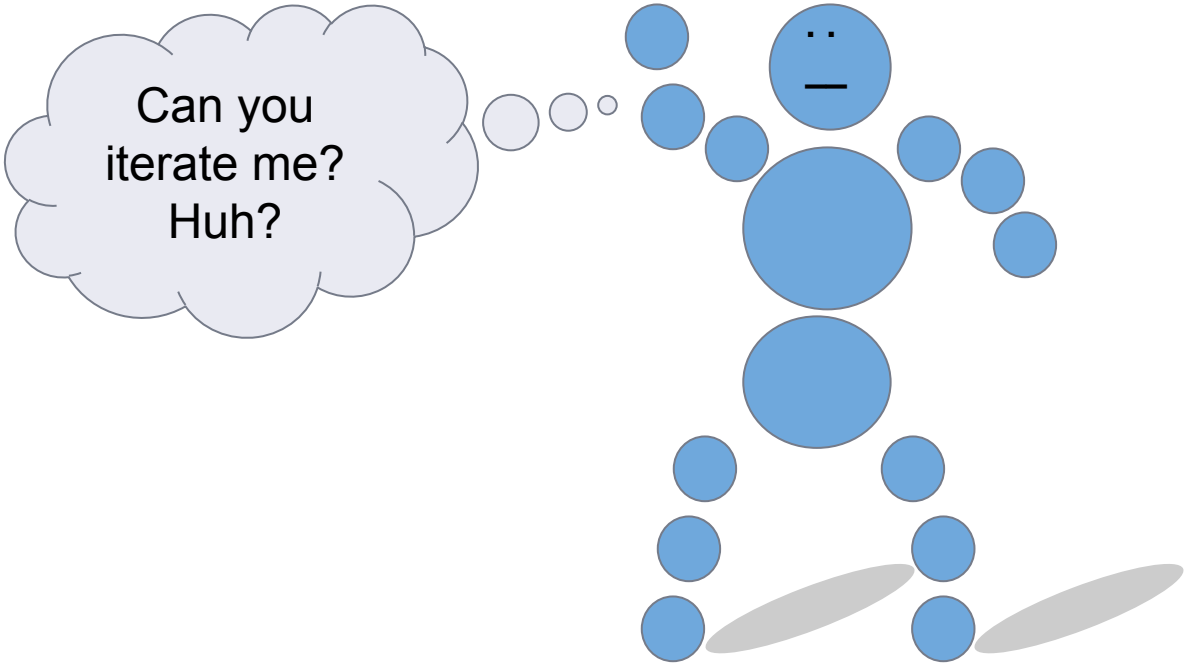
```
1  numbers = []
2
3  for i in range(1, 6):
4      numbers.append(i)
5  print(numbers)
6
```

Output

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

Working with the Iterators

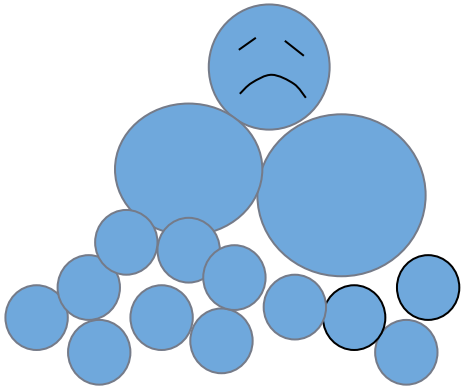
Working with the Iterators



Working with the Iterators (review)

- The most common iterable types :

- `str`
- `list`
- `tuple`
- `dict`
- `set`



Working with the Iterators (review)

- Consider this example of a `str` type.

```
1  course = 'clarusway'
2
3  for i in course :
4      print(i)
5
```

Working with the Iterators (review)

- Consider this example of a `str` type.

```
1  course = 'clarusway'
2
3  for i in course :
4      print(i)
5
```

```
1  c
2  l
3  a
4  r
5  u
6  s
7  w
8  a
9  y
10
```

Working with the Iterators

- **Task** : **Python Program to separate the string into its characters.**
  - Write a program to separate the string taken from the user into its characters using `for` loop.
  - Print the result such as :

```
input : "Clarusway"
desired output : c-l-a-r-u-s-w-a-y
```

Working with the Iterators

- **The code might be like** :

```
1  word = input("Give me a word :")
2  count = 0
3  for i in word:
4      count += 1
5      if count < len(word) :
6          i = i + "-"
7      print(i, end="")
8
9
```

input : "Clarusway"

Output

```
c-l-a-r-u-s-w-a-y
```

Working with the Iterators

- **Let's solve this without using a loop :**

input : "Clarusway"

```
string = "clarusway"
print("-".join(string))
```

Output

```
c-l-a-r-u-s-w-a-y
```

Working with the Iterators

- **Take a look at the other iterable type : `dict`.**

```
1  user = {
2      "name": "Daniel",
3      "surname": "Smith",
4      "age": 35
5  }
6
7  for attribute in user:
8      print(attribute)
9
```

What is the output? Try to figure out in your mind...

Students, write your response!

REINVENT YOURSELF

Working with the Iterators

- **The output :**

```
1  user = {
2      "name": "Daniel",
3      "surname": "Smith",
4      "age": 35
5  }
6
7  for attribute in user:
8      print(attribute)
9
```

Output

```
name
surname
age
```

Working with the Iterators

- **Take a look at the other iterable type : `dict`.**

```
1  user = {
2      "name": "Daniel",
3      "surname": "Smith",
4      "age": 35
5  }
6
7  for i in user.values():
8
9      print (i, end=" ")
10
```

What is the output? Try to figure out in your mind...

Students, write your response!

Working with the Iterators

- **The output :**

```
user = {
    "name": "Daniel",
    "surname": "Smith",
    "age": 35
}

for i in user.values():

    print (i, end=" ")
```

Output

```
Daniel Smith 35
```

Working with the Iterators

- **Take a look at the other iterable type : `dict`.**

```
1  user = {
2      "name": "Daniel",
3      "surname": "Smith",
4      "age": 35
5  }
6
7  for key, value in user.items():
8      print (key,":",value)
9
```

What is the output? Try to figure out in your mind...

Students, write your response!

Working with the Iterators (review)

- **The output :**

```
user = {
    "name": "Daniel",
    "surname": "Smith",
    "age": 35
}

for key, value in user.items():
    print (key,":",value)
```

Output

```
name : Daniel
surname : Smith
age : 35
```