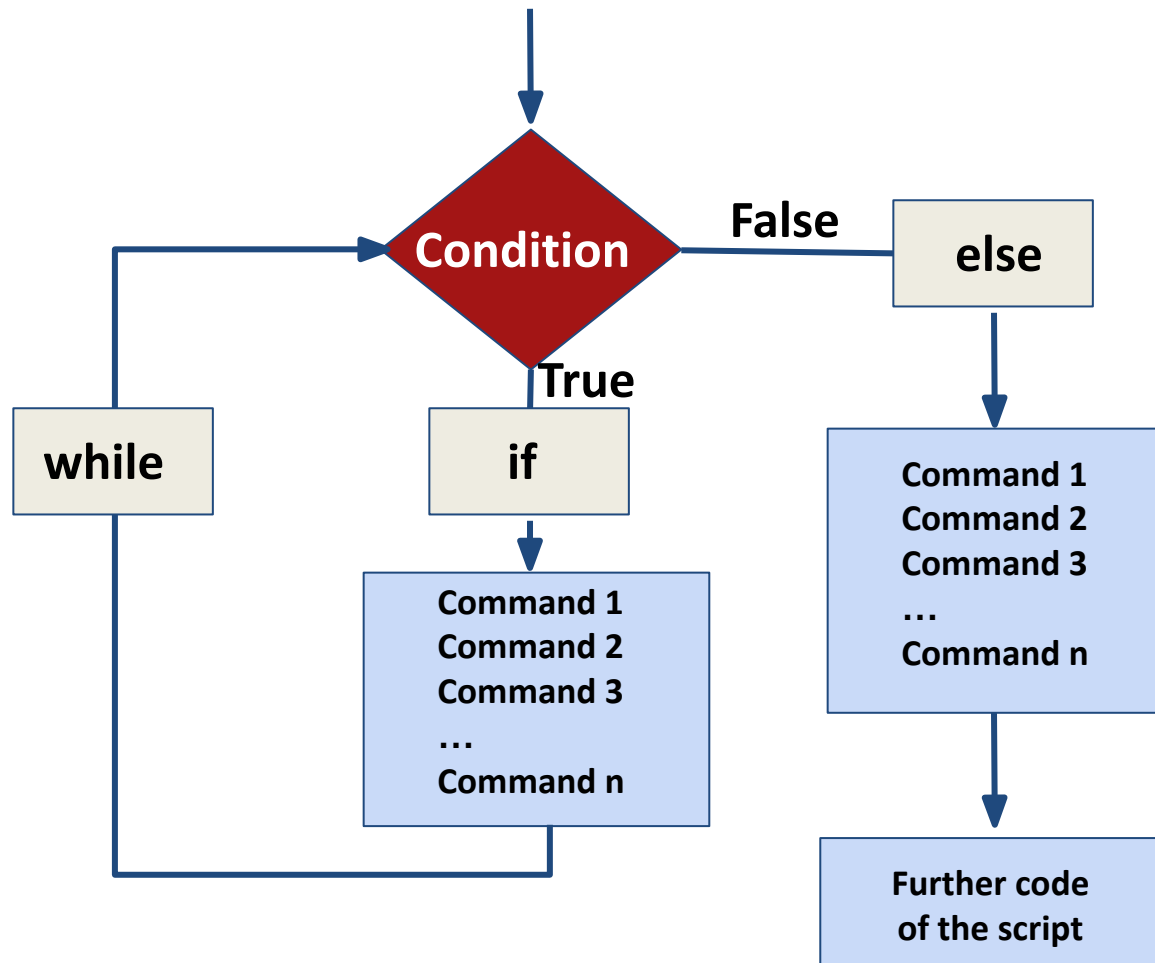
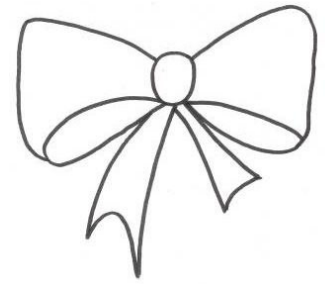


Concept of loops



Loops

- Python knows two kinds of loops:
 - while-loop
 - for-loop
- While-loop is re-run until the condition becomes False
- For-loop iterates over a sequence (e.g. list, tuple, dictionary, string)

While – loop (example)



Code is
re-run until
condition of
loop is false

```
1 a = 0
2 while a < 3:                                #iterate as long as expression is True
3     print(str(a) + ' smaller 3')
4     a += 1                                   #a = a+1
5
6 print('\n' + str(a) + ' equals 3')
7 print('loop ended, now other code')
```

```
0 smaller 3
1 smaller 3
2 smaller 3
```

```
3 equals 3
loop ended, now other code
```

While – loop and else

- While-loops can have else statements:

```
1 i = 0
2 while i < 3:
3     print(i, ' smaller 3')
4     i += 1
5 else:
6     # run this code for one time
7     print('\n' + str(i) + ' equals 3', '\n')
8
9 print('loop ended, now other code')
```

0 smaller 3

1 smaller 3

2 smaller 3

3 equals 3

loop ended, now other code

While – infinite loop



```
1 # infinite loop:
2 a = 0
3 while True:
4     a += 1
5     print(a)
6
7 print('loop never ends, code below will never run')
```

```
...
80494
80495
80496
80497
```

KeyboardInterrupt

Traceback (most recent call last)

[<ipython-input-34-b5acc72eb20b>](#) in <module>()

WARNING:

loop is infinite and must be stopped by the user

For loop

Executed until end of list

```
1 list_of_species = ['E. coli', 'H. sapiens', 'M. musculus', 'A. thaliana']
2 for species in list_of_species:
3     if len(species) > 10:           # Length of string is calculated and compared
4         print(species)             # print species name if >10
```

☞ M. musculus
A. thaliana

For loop

Control variable
(species)

List of data
(list_of_species)

```
▶ 1 list_of_species = ['E. coli', 'H. sapiens', 'M. musculus', 'A. thaliana']  
2 for species in list_of_species:  
3     if len(species) > 10:           # Length of string is calculated and compared  
4     | print(species)               # print species name if >10
```

```
☞ M. musculus  
   A. thaliana
```

Species name printed if
shorter than 10 characters

Loops - special statements

- behaviours of loops can be controlled with:
 - `break`
 - `continue`
 - `pass`
- **`break`** ends a loop:

```
1 i = 0
2 while i < 10:
3     print(i)
4     if i == 3:
5         print('Now stopping the loop\n')
6         break
7     i += 1
8
9 print('i is now', i)
```

```
0
1
2
3
Now stopping the loop
```

```
i is now 3
```


Loops - special statements

- **continue** skips the rest of the code and jumps to the next loop-iteration:



```
1 i = 0
2 while i < 5:
3     i += 1
4     if i == 3:
5         print('do not print i this time!\n')
6         continue
7     print(i)
8
9
10 print('i is now', i)
```

```
1
2
do not print i this time!

4
5
i is now 5
```

Loops - special statements

- **pass** is a placeholder:
 - mostly used in if-statements => if-bodies must never be empty

```
1 i = 0
2 while i < 5:
3     if i == 3:
4         print('Just do nothing\n')
5         pass
6     print(i)
7     i += 1
8
9 print('i is now', i)
```

```
0
1
2
Just do nothing

3
4
i is now 5
```

Exercises B – Part2

- 2.1) Write a function counting to 100 and printing all number which can be divided by 4 without any residue!
 - Info: `10 % 2` `#modulo division in Python`
- 2.2) Write a function counting down from 1000 to 0 and printing all numbers!
- 2.3) Generate a list of species names! Write a function printing all species names starting with “E”!
- 2.4) Expand this function to limit the printing to species names which are additionally shorter than 10 characters!
- 2.5) Expand this function to limit the printing to species names which are additionally ending with “a”.

range()

```
1 list_of_species = ["E.coli", "B.subtilis", "S.cerevisiae", "C.glutamicum", "A.tumefaciens"]
2 length = len( list_of_species ) #length = 5
3 for i in range( length ): #starts at 0 and runs to i=4 (five values)
4     if len( list_of_species[ i ] ) < 12: #length of name is calculated and compared
5         print(list_of_species[ i ]) #name is printed
6
7 #i is taking five different values:
8 #1: i=0
9 #2: i=1
10 #3: i=2
11 #4: i=3
12 #5: i=4
13 #i=5 is never reached by range()
```

enumerate()

```
1 list_of_species = ["E.coli", "B.subtilis", "S.cerevisiae", "C.glutamicum", "A.tumefaciens"]
2 for idx, species in enumerate( list_of_species ):
3     if len( species ) < 12: #length of names is calculated and compared
4         print("position of " + species + " is: " + str( idx ))
5
6 #i is taking five different values:
7 #1: i=0 and species="E.coli"
8 #2: i=1 and species="B.subtilis"
9 #3: i=2 and species="S.cerevisiae"
10 #4: i=3 and species="C.glutamicum"
11 #5: i=4 and species="A.tumefaciens"
12 #i=5 is never reached
```

Exercises B – Part3

- 3.1) Write a script to print 50x “here” and the current value of the control variable!
- 3.2) Write a script to walk through the species list and to print the character from the species where the index corresponds to the current control variable value!