Introduction to Programming with Python

DUCSS - Dublin University Computer Science Society

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Volunteers are here to help

Ask Questions

Experiment with the Code

Plan for Today

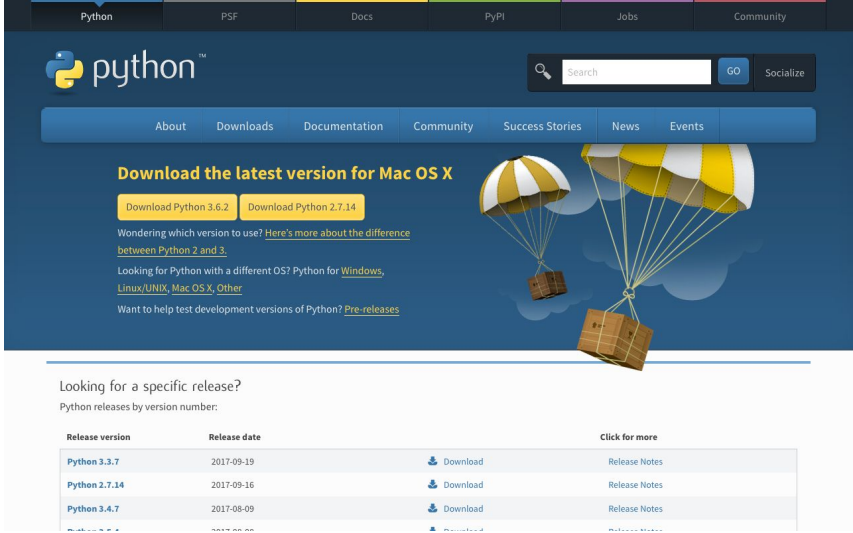
- Installing Python
- Python Tool

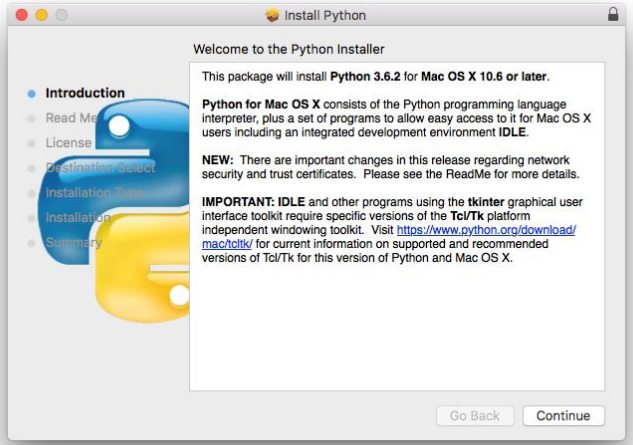
- “Hello World!”
- Variables
- Branching
- Loops
- Functions

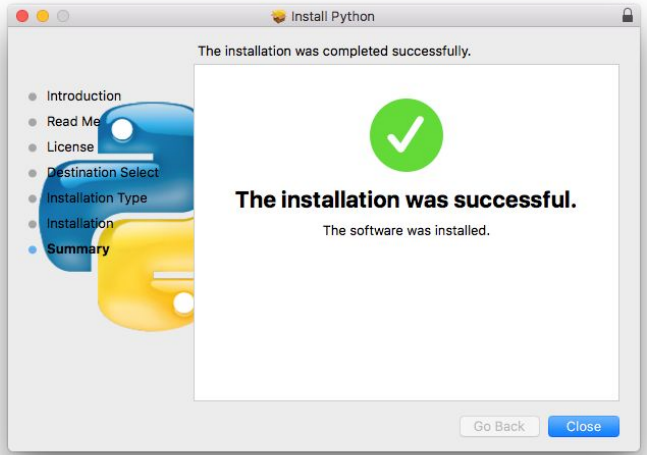
- Exercises

Installing Python

- Go to python.org/downloads
- Download Version 3.x.x
- Follow the Installation Instructions







Checking your Installation

- Open Terminal (Linux/macOS) or the Command Line (Windows)
- Run “python”

  Expected output:

```
Python 3.6.2 (v3.6.2:5fd33b5926, Jul 16 2017, 20:11:06)
[GCC 4.2.1 (Apple Inc. build 5666) (dot 3)] on darwin
Type "help", "copyright", "credits" or "license" for more
information.
>>>
```

- If version is not 3.x.x
  - Enter “exit()”
  - Run “python3”

Python Tool

- Entering manual commands:

```
python
>>> #your python commands here
>>> exit()
```

- Running Python scripts (.py files):

```
python path/to/your/python/script.py
```

Sample Code

github.com/arneph/python-workshops

“Hello World!”

```
python
>>> 'Hello World!'
'Hello World!'
```

“Hello World!”

```
>>> 'Hel' + 'lo!'
'Hello!'
```

“Hello World!”

```
>>> A = 'Hello'
>>> B = ' '
>>> C = 'World!'
>>> A + B + C
'Hello World!'
```

“Hello World!”

- Open Editor/Notepad/your favorite text editor
- Create a new file
- Enter the following:

```
X = 'Hello World!'

print(X)
```

- Save the file as “hello.py” on your desktop
- In Terminal/the Command Line:

```
python /Desktop/hello.py
Hello World!
```

hello_world.py

Variables

- Storing values:

```
firstName = 'Gina'
lastName = 'Hopper'
born = 1903
```

- Changing values:

```
firstName = 'Grace'
born = 1906
```

variables.py

Variables

- Values can be used in computation and for function calls

```
age = 2017 - born
name = firstName + ' ' + lastName
print(name + ' would now be')
print(age)
print('years old today')
```

variables.py

Variables

```
firstName = 'Gina'
lastName = 'Hopper'
born = 1903

firstName = 'Grace'
born = 1906

age = 2017 - born
name = firstName + ' ' + lastName
print(name + ' would now be')
print(age)
print('years old today')
```

variables.py

Variables

```
Grace Hopper would be
111
years old today
```

variables.py

Branching

- if-statements:

```
A = 9
B = 7
if A > B:
    print('A is larger')
    print('A wins!')

if B > A:
    print('B is larger')
    print('A loses! :-(')

print('Game over')
```

if_1.py

Branching

```
A is larger
A wins!
Game over
```

if_1.py

Branching

- if-statements (continued):

```
A = 42
B = 42
if A > B:
    print('A wins!')
elif A == B:
    print('Draw!')
else:
    print('B wins!')
```

if_2.py

Branching

```
Draw!
```

if_2.py

Branching

- Combining Conditions:

```
username = 'marc z'
password = 'dadada'
if username == 'marc z' and password == 'dadada':
    print('Hello Marc')
    print('Get a better password!')
else:
    print('You are not Marc!')
```

if_3.py

Branching

```
Hello Marc
Get a better password!
```

if_3.py

Branching

- Combining Conditions (continued):

```
age = 42
if age < 21 or age >= 30:
    print('Not a primary target')
    if age >= 18 and age < 21:
        print('Keep watching')
    else:
        print('Remove from watchlist')
```

if_4.py

Branching

```
Not a primary target
Remove from watchlist
```

Loops

- while-loops:

```
i = 1
while i <= 30:
    print(i ** 2)    #Print i^2
    i += 1           #Add 1 to i
```

loops_1.py

Loops

```
1
4
9
16
25
36
49
64
81
100
121
...
```

loops_1.py

Loops

- for-loops:

```
factorial = 1
for x in range(1, 12):
    factorial *= x
    print(factorial)
```

loops_2.py

Loops

```
1
2
6
24
120
720
5040
40320
362880
3628800
39916800
```

loops_2.py

Loops

- continue & break:

```
for x in range(2, 40):
    prime = True
    for y in range(2, x):
        if x % y == 0:
            prime = False
            break                   #Break out of inner for-loop
    if prime == False:
        continue                    #Continue with next item in
    print(x)                        #outer for-loop
```

loops_3.py

Loops

```
2
3
5
7
11
13
17
19
23
29
31
37
```

loops_3.py

Functions

- Using Functions:

```
print('Hello!')

A = pow(19, 2)
B = input()      #Get keyboard input from the user

for x in range(42, 888):
    #...
```

Functions

- Defining Functions:

```
def isOdd(x):
    return x % 2 == 1

print(isOdd(27))
print(isOdd(2048))
print(isOdd(22))
```

functions_1.py

Functions

```
True
False
False
```

functions_1.py

Functions

- Defining Functions (continued):

```
def fizzbuzz(x):
    a = (x % 3 == 0)
    b = (x % 5 == 0)
    if a and b:
        print('Fizz Buzz')
    elif a:
        print('Fizz')
    elif b:
        print('Buzz')
    else:
        print(x)
```

functions_2.py

Functions

- Defining Functions (continued):

```
#...

for x in range(1, 50):
    fizzbuzz(x)
```

functions_2.py

Functions

```
1
2
Fizz
4
Buzz
Fizz
7
8
Fizz
Buzz
11
...
```

functions_2.py

Exercises

- Prompt the user for a name and password and check if they are correct
  Hint: use the `input()` function

- Rewrite the prime numbers example with a function
  Hint: define a function `isPrime(x)`

- Print all Fibonacci numbers up to 10946