

# Programming fundamentals with Python

## Modules and packages

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- Packages



With modules, Python provides functionality to package our functions, variables, and anything else into small packages ready to use anywhere else.

Every time we're creating a file in Python, we're creating a module. In order to import it we'll use its name without the `.py` extension.

To use modules, we need the import statement:

```
import module
```

When we import a module, all variables in the module are evaluated, all functions created, and top level statements executed.



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## Example

Let's see how importing a module will make Python evaluate everything in it. In the Python file at the root of the repo, import the utilities.py file, let's see what happens.

## Warning

As you've probably noticed, when we import a module, everything inside it gets evaluated.

This can be dangerous if the module has statements at the top level you're not expecting.

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- The directory containing the current module
- `sys.path`



sys contains functionality related with the current Python session

```
import sys
```

```
print(sys.path)
```

```
# ['',
```

```
#  '/Library/Developer/CommandLineTools/Library/Frameworks/Py
```

```
#  '/Library/Developer/CommandLineTools/Library/Frameworks/Py
```

```
#  '/Library/Developer/CommandLineTools/Library/Frameworks/Py
```

```
#  '/Users/pepe/Library/Python/3.7/lib/python/site-packages',
```

```
#  '/Library/Developer/CommandLineTools/Library/Frameworks/Py
```

The stdlib is a set of modules for a lot of different purposes

Python follows a batteries included approach, trying to give us as programmers everything we need



We have already used some modules from the standard library before:



The `time` module from the standard library contains utilities related for dealing with time. For example, we can use it for making our program stop for a certain amount of time.

```
import time

while True:
    time.sleep(1)
    print("hello!")
```

```
import math
```

```
math.ceil(3.4)
```

```
# 4
```

```
math.floor(3.4)
```

```
# 3
```

The `math` module contains useful functions and constants for doing numeric and mathematic operations



# Importing

We have already seen a way of importing modules, using the `import module` syntax, but there are more.

```
from module import variable # Cherry-picking what we want to import
from module import * # importing everything from a module
import module as alias # It's possible to give alias to imported module
```



# from ... import name

We can use this technique to import specific names from a module and use them directly.

```
from json import dumps
print(dumps([1,2,3]))
# '[1, 2, 3]'
```



# from ... import \*

```
from json import *  
print(dumps([1,2,3]))  
# '[1, 2, 3]'
```

This technique, also called wildcard import will import all names from a module.

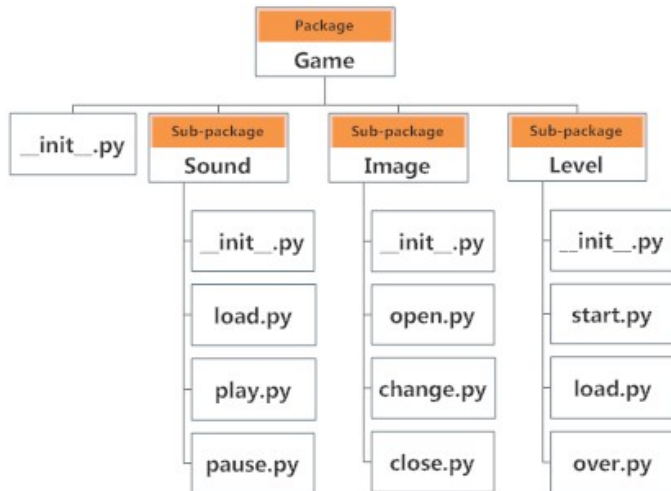
We can also rename modules when importing. This is specially useful whenever we will have a clash of names between imported stuff and our current module.

```
import json as momoa
momoa.dumps({"roles": ["Aquaman", "Khal  
{'roles': ["Aquaman", "Khal Drogo"]}]}
```

When Python projects get bigger it's common to start dividing them into files, and when there are too many into one single directory, into **packages**.

**Packages** are a way of organizing **modules** in Python projects.

# Packages





**Packages** are implemented using simple directories. These directories should contain a `__init__.py` (notice the two leading and trailing underscores) file in order for Python to find them.

# Packages

In order to import modules from packages we will use a dot (.) as a directory separator.

```
import pandas.io.pickle # we're importing the pickle *module*  
                        # from the pandas.io *package*
```

```
pickle("whatever")
```



## Importing packages

Let's do a quick exercise here in class. In the `python` file in the root of the repository, import the dictionary from `core/utils/data.py` and print the second element.

- Import modules with import

- Import modules with import
- Create our own modules as files



- Import modules with `import`
- Create our own modules as files
- `stdlib` contains a lot of useful stuff



- Import modules with `import`
- Create our own modules as files
- `stdlib` contains a lot of useful stuff
- third party libs can help when something is not on `stdlib`

