Programming fundamentals with Python

Modules and packages

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Plan for today

- Learn what are modules and why they exist

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- Packages

Modules

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.

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Modules

To use modules, we need the import statement:

```
import module
```

Modules

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.

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Modules

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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Modules

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

sys

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
```

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Standard library

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

Standard library

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

time

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!")
```

math

```
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

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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
from module import * # importing everything from a module
import module as alias # It's possible to give alias to impor
```

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]'
```

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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.

import ... as ...

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"]}'
```

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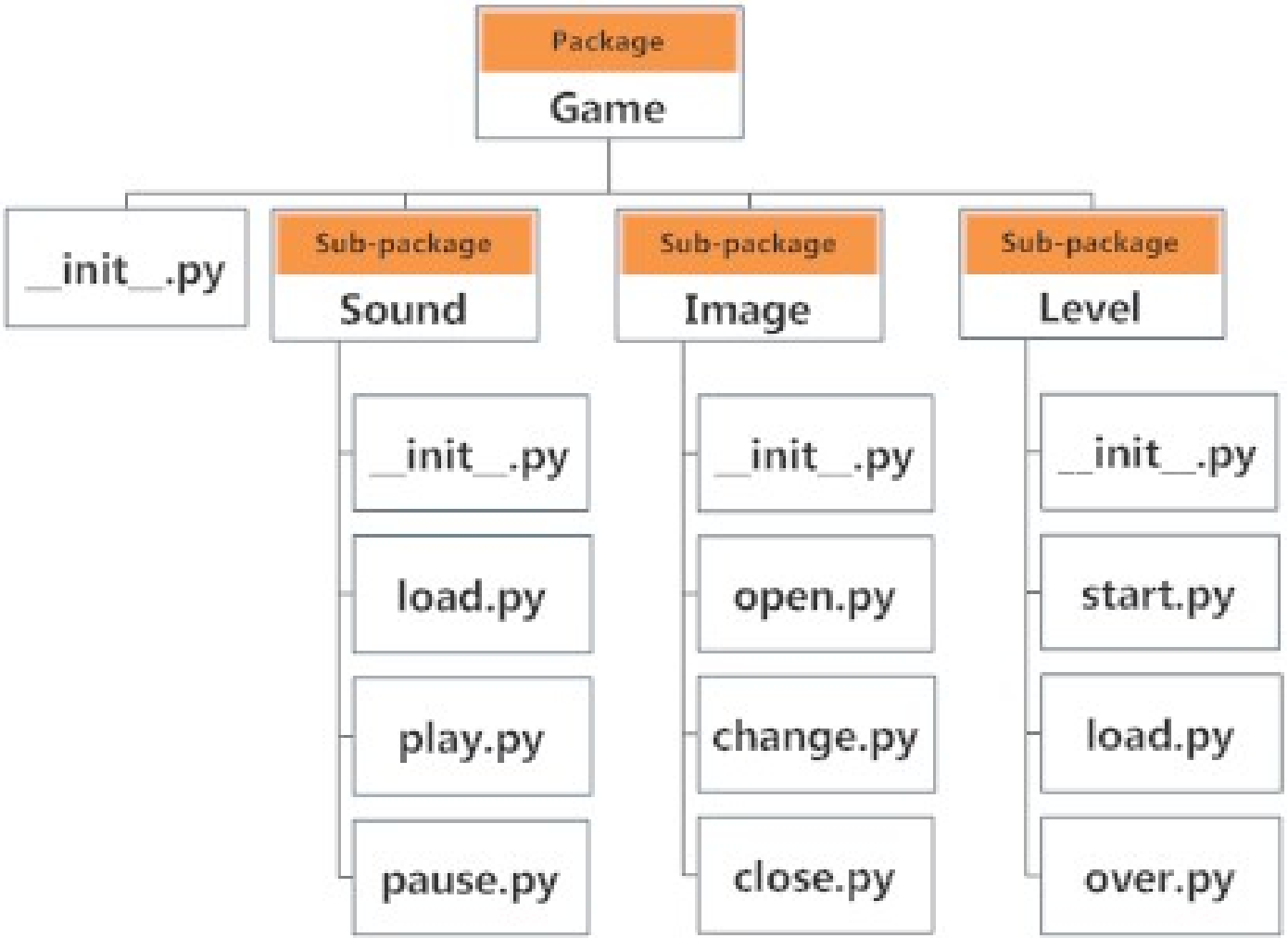
Packages

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



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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.

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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")
```

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Packages

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.

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Recap

- Import modules with import

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- Create our own modules as files

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Recap

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

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Recap

- 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