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Advanced Python

Class 6

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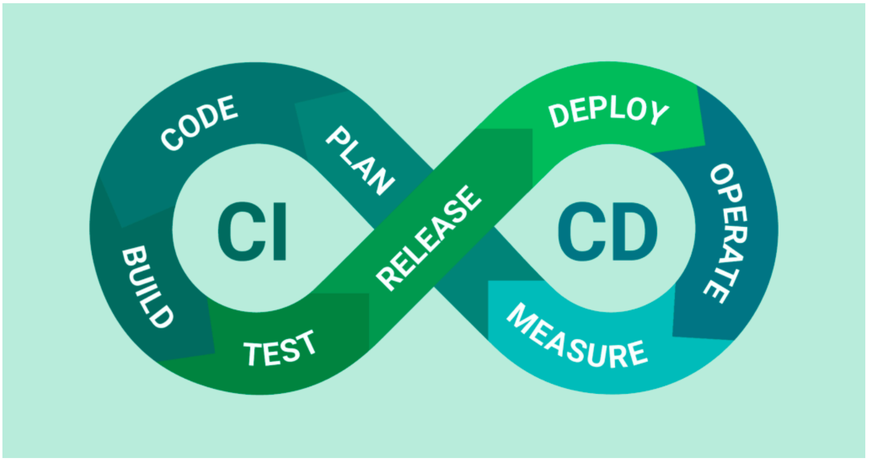
Topic 1: Recap Class 5

What is CI / CD ?

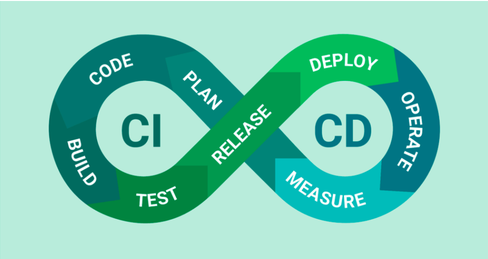
- **Continuous Improvement (CI)** refers to the practice of regularly integrating code changes from multiple developers into a shared repository.
    - The goal is to detect issues and conflicts early in the development cycle and ensure that the codebase remains stable.
- **Continuous Deployment (CD)** focuses on automating the deployment of applications to various environments (e.g., staging, production) after passing the CI stage.
    - It involves automating the steps required to build, test, and deploy software, reducing manual effort and ensuring consistent and reliable deployments.

GitHub

GitHub Actions



What are the benefits?



GitHub Actions

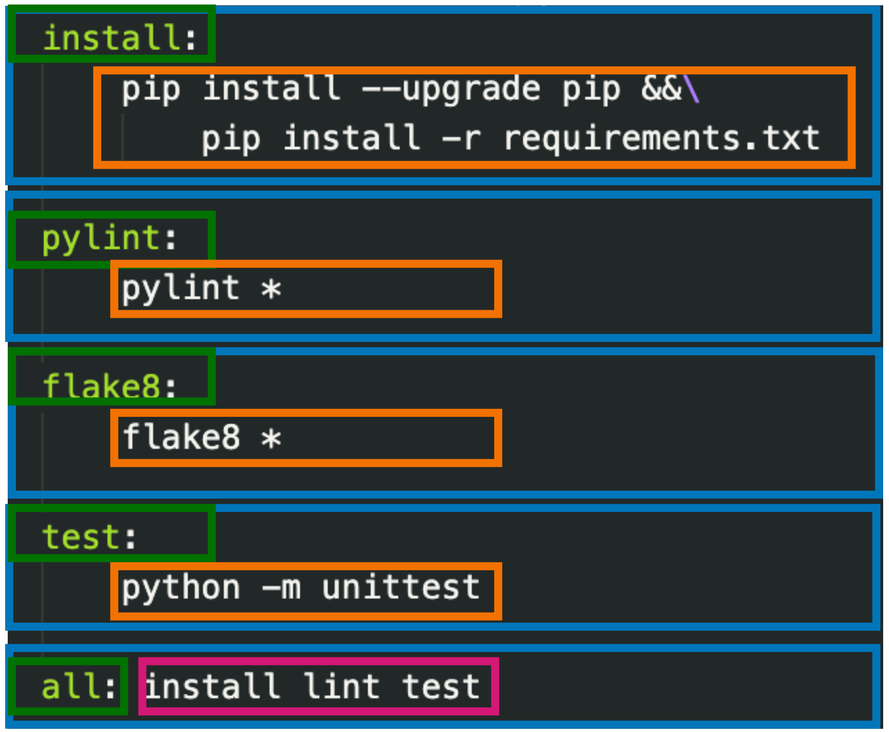
GitHub

- **Faster Time to Market**: Automating processes reduces manual effort and speeds up the delivery of software updates.
- **Improved Code Quality:** Continuous integration and automated testing catch errors early, ensuring code quality and reducing the risk of introducing bugs.
- **Collaboration and Feedback:** Code reviews and feedback from peers help improve code quality and foster collaboration among team members.
- **Reliable Deployments (Less human mistakes):** Automating the deployment process minimizes the risk of configuration errors and ensures consistent deployments across environments.

Makefile

- Makefile is a special file used to automate the process of compiling and building software by using “**make**”

- Every blue box is a rule
- Every rule has a target (a name) (Green box)
- Every name can have dependencies (pink)
- Every rule and name has a command to be run (orange boxes)



What is Multiprocessing in Python

Essentially is a tool to parallelize tasks to take advantage of multiple CPUs to reduce computation time

```
@click.option(
    '-cpu', '--cpus', default=1, help='number of processes to be used, default 1'
)
@click.option(
    '-o', '--output', default='', help='Output file'
)
def preprocess(**kwargs):
    """Preprocess data for training"""

    args = Namespace(**kwargs)

    if args.split_features:
        split_preprocess(
            args.features, args.output, args.save_tsv, args.cpus,
            args.split_type, args.positions, args.feature_type
        )
    else:
        no_split_preprocess(
            args.features, args.output, args.cpus, args.feature_type
        )
```

```
print('Splitting original file...')
os.mkdir(tmp_folder);
os.mkdir(tmp_train); os.mkdir(tmp_test); os.mkdir(tmp_val)
cmd = 'split -l {} {} {}'.format(20000, features, tmp_folder)
subprocess.call(cmd, shell=True)

if positions:
    print('Getting position file...')
    positions = pd.read_csv(positions, sep='\t')

print('Extracting features to h5 and tsv files...')
counter = 0

f = functools.partial(split_sets_files, tmp_folder=tmp_folder, \
        counter=counter, tsv_flag=tsv_flag, output=output, \
            tmps=os.path.dirname(features), split_type=split_type, \
                positions=positions, feature_type=feature_type)
with Pool(cpus) as p:
    for i, rval in enumerate(p.imap_unordered(f, os.listdir(tmp_folder))):
        counter += 1
```

Something I saw in an assignment

```
def setUp(self):
    """
    Create a sample DataFrame for testing
    """

    data = {
        "x_data": [1, 2, 3],
        "y_data": [4, 5, 6],
    }
    self.sample_df = pd.DataFrame(data)

@patch('builtins.print')
@patch('matplotlib.pyplot.show')
@patch('matplotlib.pyplot.plot')
def test_plotting_successful(self, mock_plot, mock_show, mock_print):
    """
    Test successful plotting
    """
    with patch('matplotlib.pyplot.xlabel'), patch('matplotlib.pyplot.ylabel'), patch('matplotlib
        plot_data(self.sample_df, "x_data", "y_data")

    mock_plot.assert_called_once_with(self.sample_df["x_data"], self.sample_df["y_data"])
    mock_show.assert_called_once()

    mock_print.assert_not_called()
```

Decorators

- They modify or enhance functions without changing their actual code.

- You place a decorator (@decorator) above a function, and it adds some new capabilities to it

```python
def my_decorator(func):
    def wrapper():
        print("Something is happening before the function is called.")
        func()
        print("Something is happening after the function is called.")
    return wrapper

@my_decorator
def say_hello():
    print("Hello!")

say_hello()
```

Mocking

- When testing, you often need to test parts of your code without dealing with external factors like databases, web servers, or external APIs.

- Mocks act as placeholders for these parts, mimicking their behavior.

- Imagine your code needs to send emails, you don't want to send real emails every time you run a test. So, you use a mock that pretends to send an email.

```python
import unittest
from unittest.mock import patch
from your_module import fetch_data_from_api  # Replace 'your_module' wi

class TestApiCall(unittest.TestCase):
    @patch('your_module.fetch_data_from_api')  # Replace 'your_module'
    def test_fetch_data_from_api(self, mock_fetch):
        # Set up the mock to return a specific value
        mock_fetch.return_value = "Mocked Data"

        # Call the function - it will use the mock instead of the real
        result = fetch_data_from_api("http://fakeurl.com")

        # Assert that the mock was called with the correct URL
        mock_fetch.assert_called_with("http://fakeurl.com")

        # Assert that the result is what we expect from the mock
        self.assertEqual(result, "Mocked Data")

if __name__ == '__main__':
    unittest.main()
```

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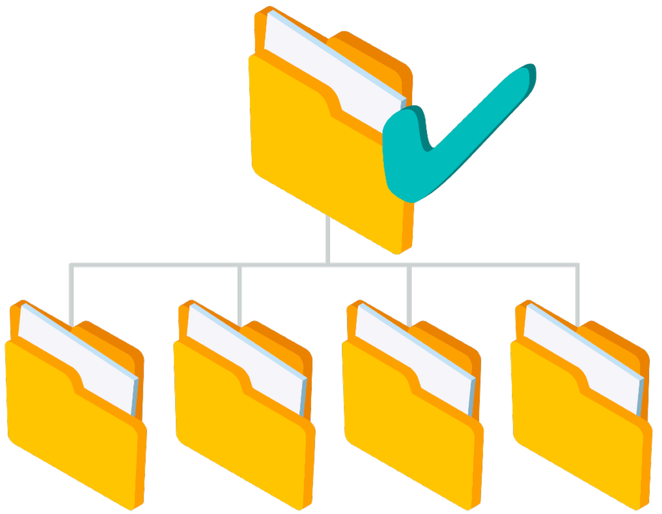
Topic 2: Repository Structure

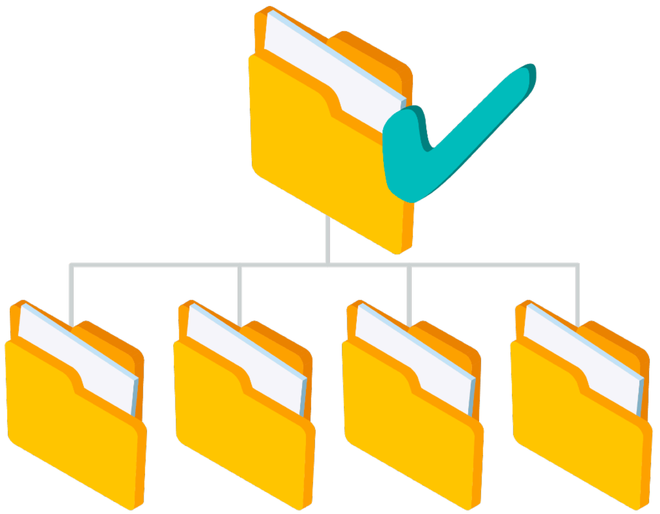
What do we need in our repository? (File-wise)



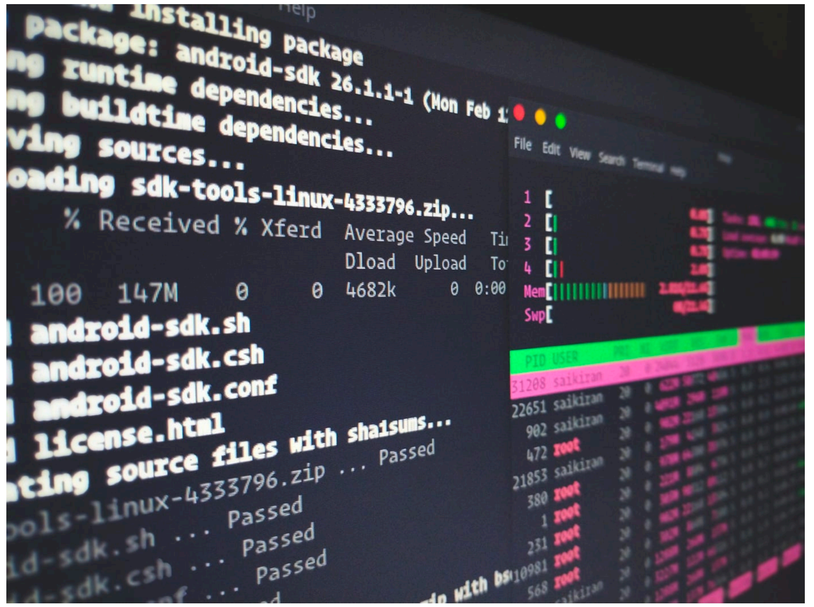
What do we need in our repository? (File-wise)

- requirements.txt
- Scripts folder
- Datasets folder
- Tests folder
- .gitignore

- .github/workflows/checks.yml
- Makefile
- .flake8
- .pylintrc

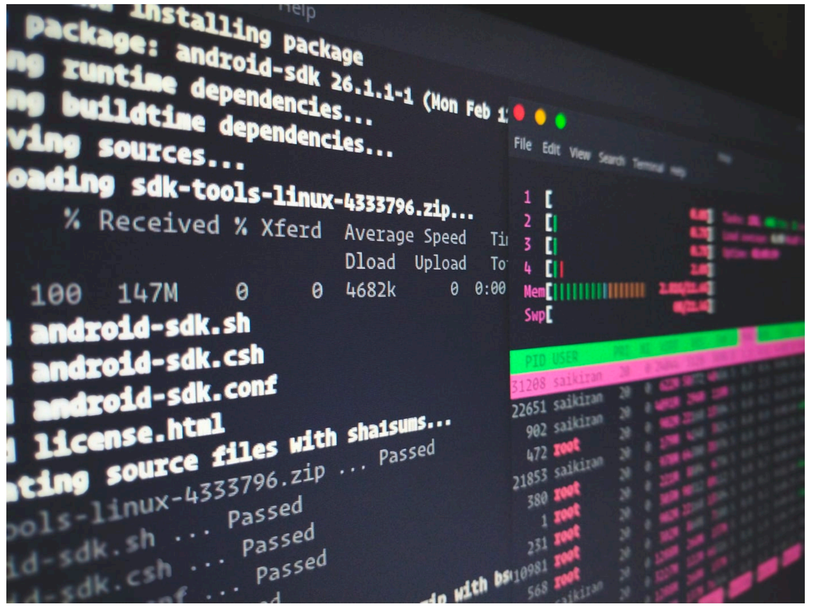


What commands we will need for sure?



What commands we will need for sure?

- Command for installing the dependencies in the environment
- Command for testing code
- Command for linting code
- Commands for running the code

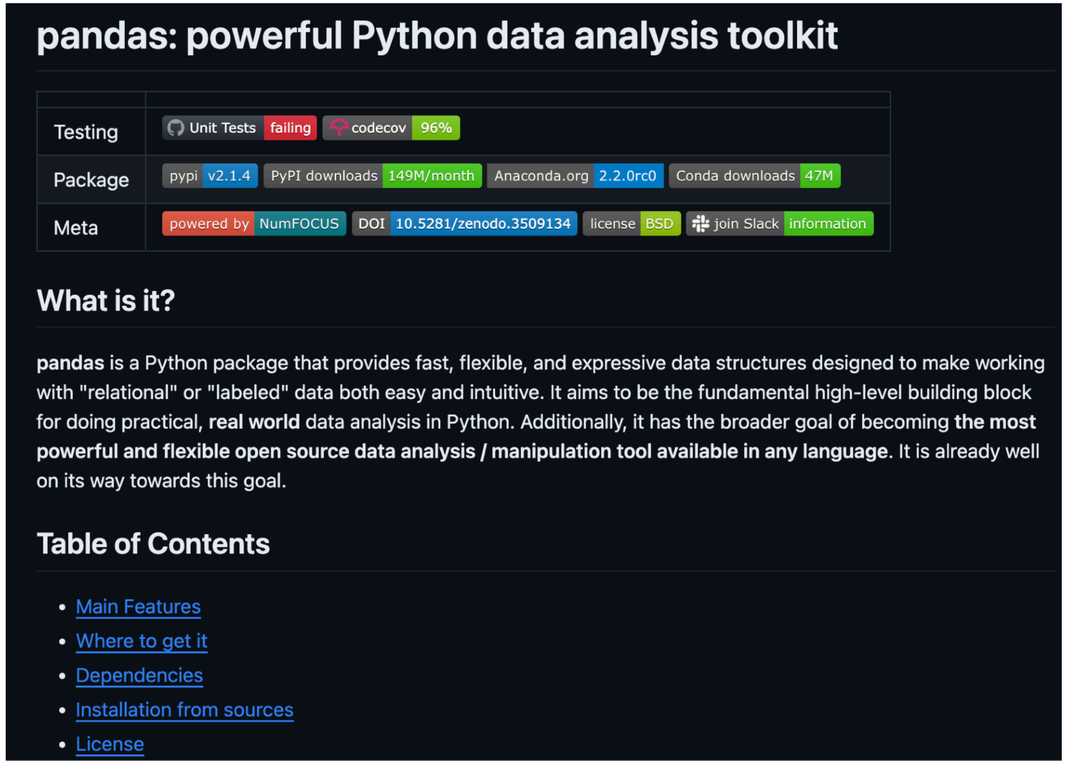


We are missing something. Any ideas?

We are missing something. Document what we have done!

How do we tell people how to run our code? Or what the code is about?

- We do it through the README.md file
- This file is in every single repository and is essential to understand what your code does
- It’s a Markdown file (You can do similar things as in JN)



pandas: powerful Python data analysis toolkit

Testing	Unit Tests failing codecov 96%
Package	pypi v2.1.4 PyPI downloads 149M/month Anaconda.org 2.2.0rc0 Conda downloads 47M
Meta	powered by NumFOCUS DOI 10.5281/zenodo.3509134 license BSD join Slack information

What is it?

pandas is a Python package that provides fast, flexible, and expressive data structures designed to make working with "relational" or "labeled" data both easy and intuitive. It aims to be the fundamental high-level building block for doing practical, **real world** data analysis in Python. Additionally, it has the broader goal of becoming **the most powerful and flexible open source data analysis / manipulation tool available in any language**. It is already well on its way towards this goal.

Table of Contents

- Main Features
- Where to get it
- Dependencies
- Installation from sources
- License

Follow along

- Let’s build our readme and start understanding a bit about what goes in there:
  - Project and repo explanation
  - Commands install and run the code
  - Explanation of the commands
  - Explanation of the CLI Arguments to a certain level

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Topic 3: Final Project

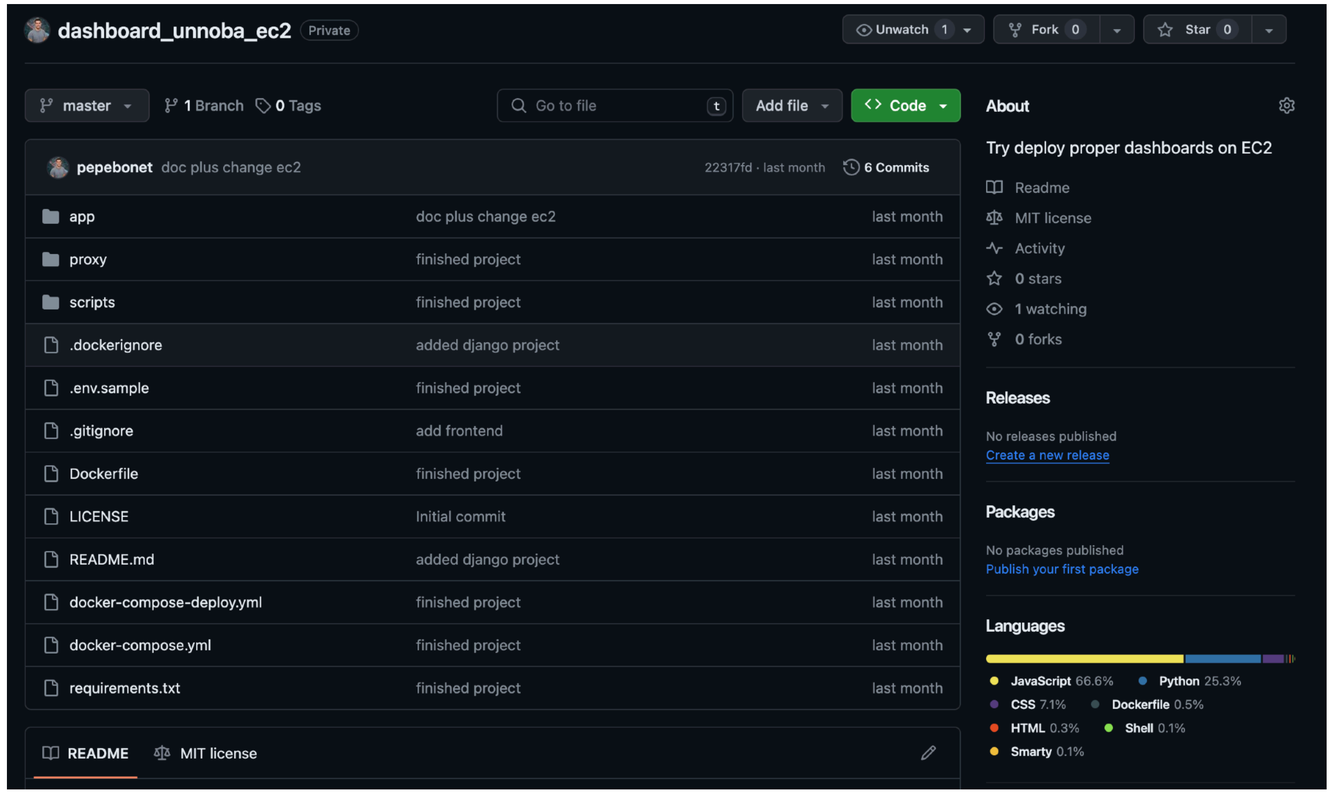
Final Project Objective

- The goal is to apply everything we have learned to a data analysis / EDA / AI task on a dataset
- You can prepare the dataset for ML models and even try some if you want to as well

Final Project Requisites

A GitHub repository containing all the things we see during the course for a given dataset:

- Scripting (VStudio)
- Classes
- Click
- Debugging
- GitHub 1 (Version Control)
- GitHub 2 (CD & CI)
- Project Structure
- Testing
- Linting + Clean Code



Final Project Requisites

- A requirements.txt file with the dependencies and their versions
- At least 2 Different scripts with functions/Classes
- At least I want to see two classes
- One of the scripts at least needs to be using click and should be able to be called using arguments from the command line
- The main script needs to call at least a second script.
- I have to see different commits and that their names correspond with the changes you did to the code
- At least 10 tests (either use pylint or unittest)
- Makefile to install dependencies, run tests, lint, and even run code if you want
- Usage of at least one linting tool
- Usage of try and except statements
- Well-documented project in the README.md
- GitHub Actions for automated testing (and Linting if possible)

I should be able to follow the steps in your README and make the code work

It’s on you how much you want to work on it, but…

I think I am giving you the chance of in two weeks having something in your CV. Maybe it can be nice to have something like this (right image) if it is something people ask for when you are looking for a job

PROJECTS

Auction Final Price Prediction

Tech Stack: Python, CatBoost, SQL
Description: A machine learning model that can predict the final price the match worn shirts in auctions.

- designed the model that first classifies a product into high price or low price product, then use two different models to further predict the precise final price to mitigate the problem of highly skewed product price distribution

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Topic 4: Final Words

Keep Learning!

Job (Projects)

University Courses

Videos

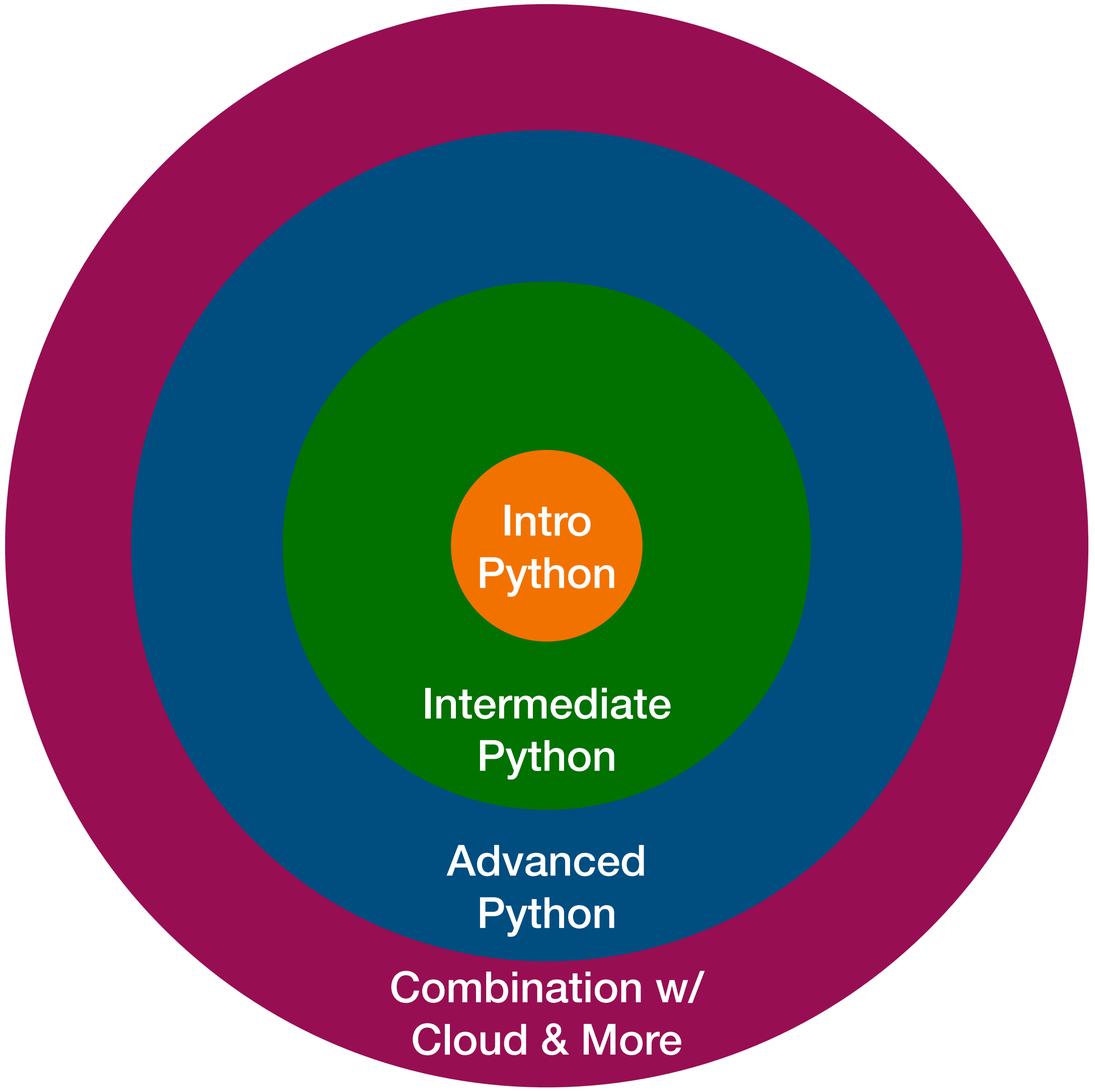
Practice

Own Projects

Online Courses

Books

What is the last layer about?



- 1 Person
- 2-10 People
- 100s People
- 1000s or M People

What is the last layer about?

1000s or M People

- Understanding and good usage of the cloud
- Combination with other programming languages (JS, HTML, CSS, SQL)
- Containerize frameworks (Docker, Kubernetes, Terraform)
- Security
- Web Development
- Code efficiency

But let's make something clear: That's my view

I have an odd perspective where I either do all of that or I cannot develop a product that generates value and (hopefully) revenue

Ideally you have a team and you do the thing on the right. Why? Because unless your are crazy good (I am not there. At least yet), doing it alone can be costly.

Another perspective is: Specialize!
(Probably better to find a job)

- Frontend
- Backend
- Data Science
- Full Stack
- Cloud Engineer
- Data Engineer
- ML Engineer
- Data Analyst

Many more…

We learned a lot in less than two weeks

- Scripting (VStudio)
- Classes
- Click
- Debugging
- GitHub 1 (Version Control)
- GitHub 2 (CD & CI)
- Project Structure
- Testing
- Multiprocessing
- Exceptions + assert
- Linting
- Makefile

Thank you!

Feel Free to contact me!

- Linkedin: Jose Bonet Giner
- Personal mail: pepebogi5@gmail.com
- Company website: hyntsanalytics.com
- Blog: pepesjourney.com

Thank you! / Last exercise ;)

Fill in the survey / Feedback form!