

Introduction to CoCalc

And Jupyter notebooks

Carl Gwilliam

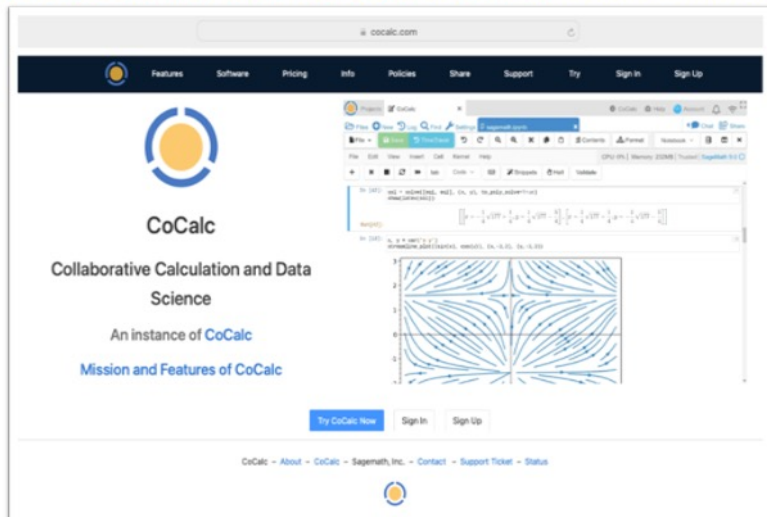
(C.Gwilliam@liverpool.ac.uk)



UNIVERSITY OF
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What is CoCalc?

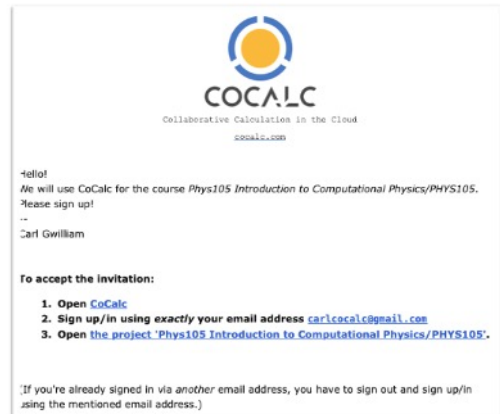
- CoCalc is a virtual online workspace for collaborative learning and research: <https://cocalc.com>
- It provides online resources
 - CPU, memory, storage
 - Via university licence
- Which enables us to
 - Share documents & code
 - Set & collect assignments
 - Work on code together
- You will be using it in
 - Intro to Computational Physics (PHYS105)
 - Practical Physics (PHYS106)
 - Courses in later years



* So what is CoCalc ...?

Signing up and logging in

- The first thing you need to do is to sign up to the CoCalc platform and log in
 - In a way that allows you to use the university license
- You should have received an invite email for PHYS105
 - Click on link or go directly to the CoCalc webpage
 - Sign up with your university email address
 - Important to use exactly the address it was sent to as CoCalc doesn't know about uni email aliases
- If you have not done this, please do so now
 - Let me know if you have not received an invite
 - Or if you have issues signing in with it
- Once you have signed in please navigate to
 - Name – PHYS105 Introduction to Computational Physics/PHYS105_2022
 - PHYS105 Introduction to Computational Physics
 - ComputerClassesStudent
 - Welcome



What are Jupyter notebooks?

- [Jupyter](#) is an interactive development environment for data analysis and software code
 - Used widely across both academia and industry
- It reads files known as Jupyter notebooks (.ipynb) which combine together in a shareable way:
 - Formatted documentation
 - Interactive code development
 - The resulting (graphical) output
- Notebooks are composed of a series of cells
 - Building blocks which can be edited and run
- Cells may contain either
 - [Python](#) computer code
 - [Markdown](#) formatted text
- Can be saved to PDF to submit assignments
 - File → Save and Download as ... → PDF (.pdf) ...

Double-click on a cell to edit



- Within coclac we will be using jupyter notebooks
- Cells shown here
- Double click to edit for both markdown and python code
- Change page before saving

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Press play (▶) or type ctrl+enter to execute



Try this now with [Example.ipynb](#) in your CoCalc folder

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- After editing they are run by pressing play button or ...
- Try this now with the [Example.ipynb](#)
 - If you have trouble opening this please let me know ...
- Saving ...

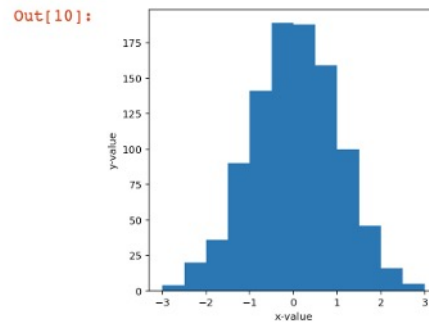
What are Jupyter notebooks?

- Allow powerful data analysis and direct visualisation of outputs inline e.g

Plot some data

```
In [8]: 1 # Create data using numpy
        2
        3 import numpy as np
        4 data = np.random.normal(size=1000)
```

```
In [9]: 1 # Plot data using matplotlib
        2
        3 import matplotlib.pyplot as plt
        4
        5 plt.figure()
        6 plt.xlabel("x-value")
        7 plt.ylabel("y-value")
        8 plt.hist(data, bins=12, range = (-3, 3))
        9 plt.show()
```

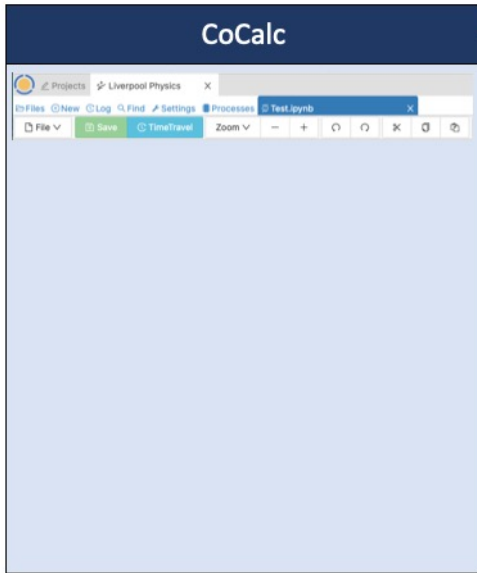


- You will learn all about this, and the tools to do it, in Intro to Computational Physics (PHYS105)
 - You are not expected to know them yet and many terms will be new at the moment!

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- These components will allow us to perform ...

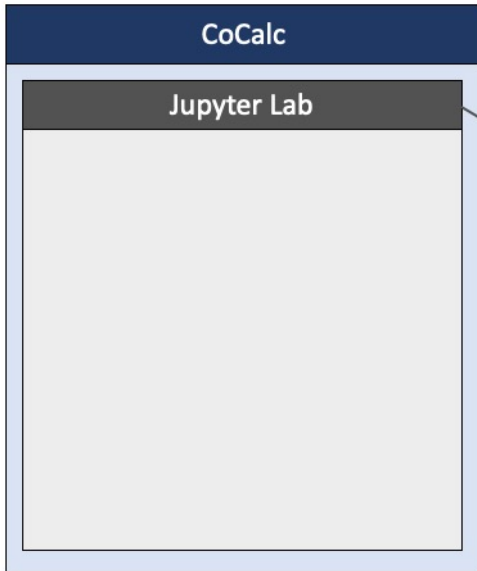
Summary



- Collaborative online coding platform (i.e. website)
 - Allows lectures and students to work together
 - All files are stored, saved and synchronised here

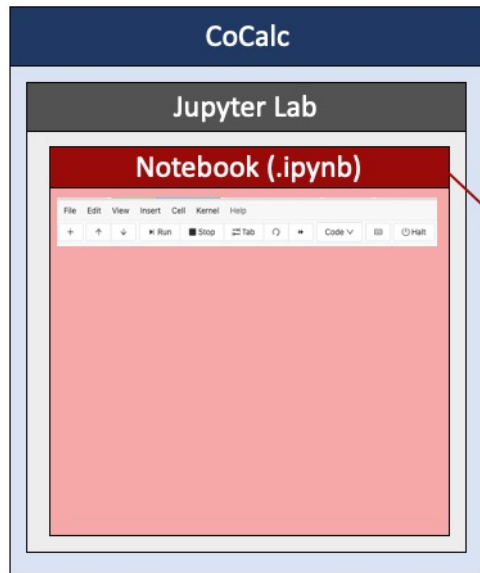
* Since there are lots of tools, I want to finish by outlining how these fit together ...

Summary



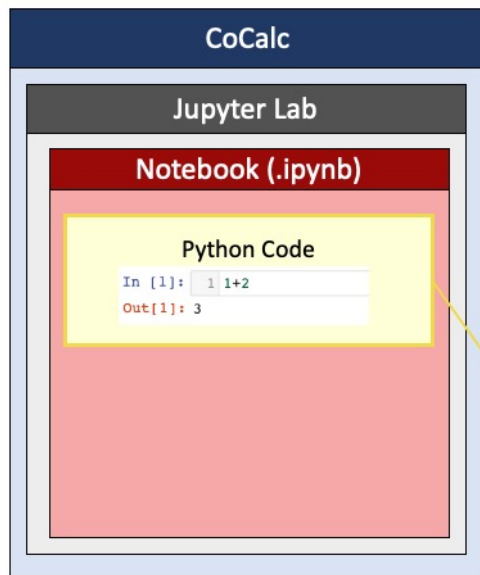
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 - Can also be run directly on your local machine

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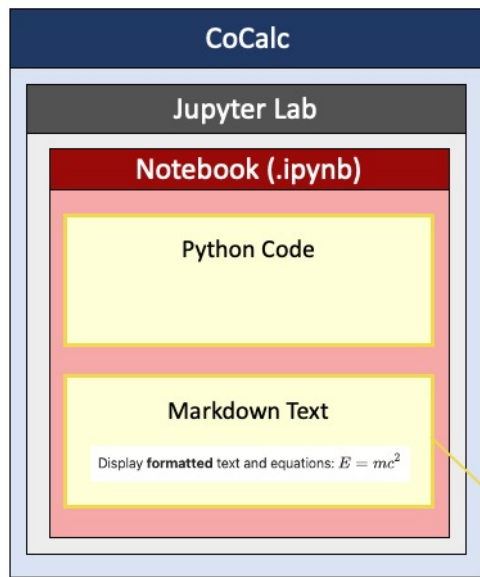
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- A file type containing instructions for displaying markdown and code cells, interpreted by Jupyter Lab
 - Python cells are executed by the python interpreter
 - Markdown cells are rendered by markdown interpreter
 - These are separate entities brought together in Jupyter

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 - Performs calculations and data processing
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- A formatting language to render formatted text
 - Latex is a particular type of markdown designed to render mathematical formulae in a nice way

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