Introduction to CoCalc

And Jupyter notebooks

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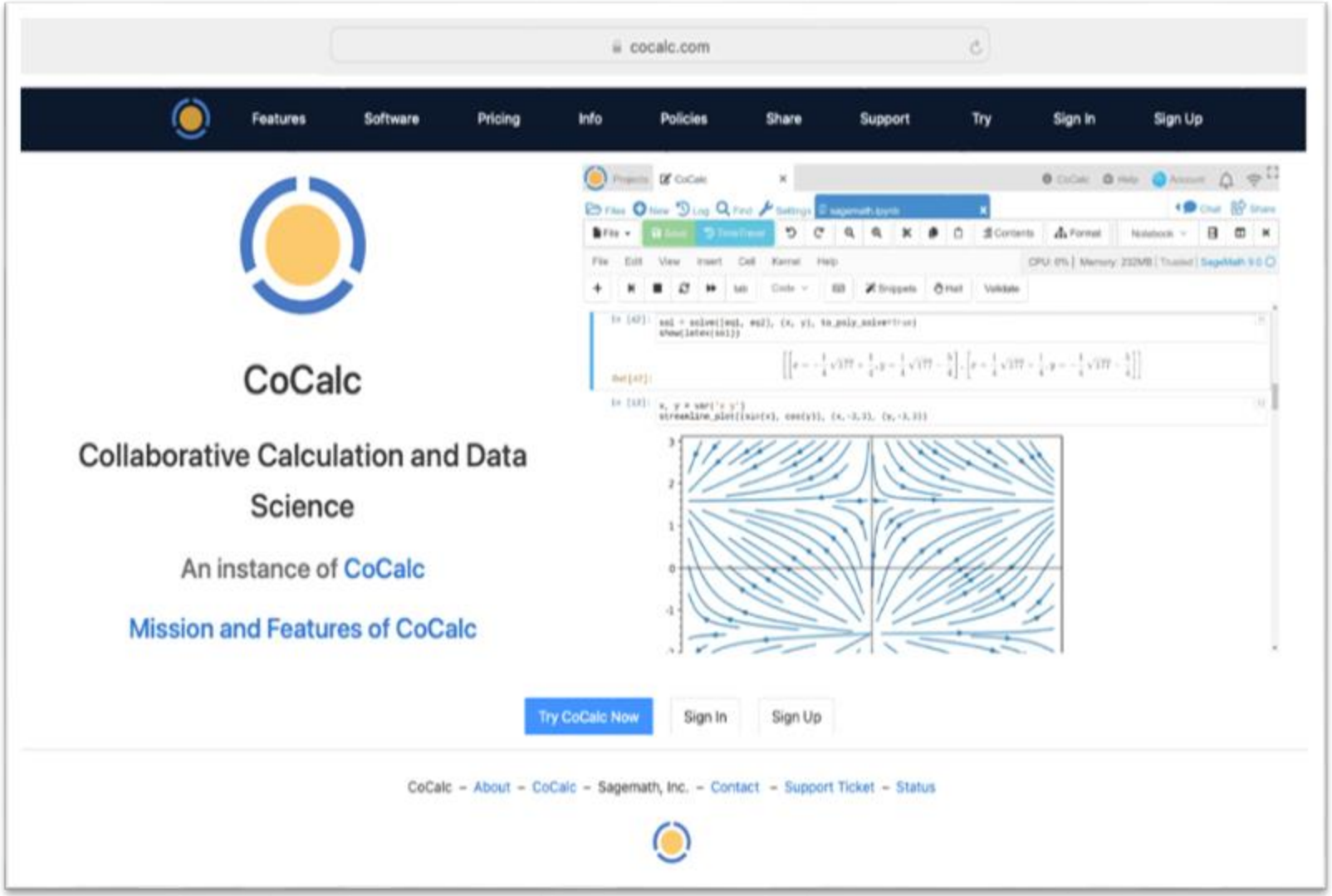
What is CoCalc?

- CoCalc is a virtual online workspace for collaborative learning and research: https://cocalc.com

- It provides online resources
  - CPU, memory, storage
  - Via a 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)
  - Other courses in later years



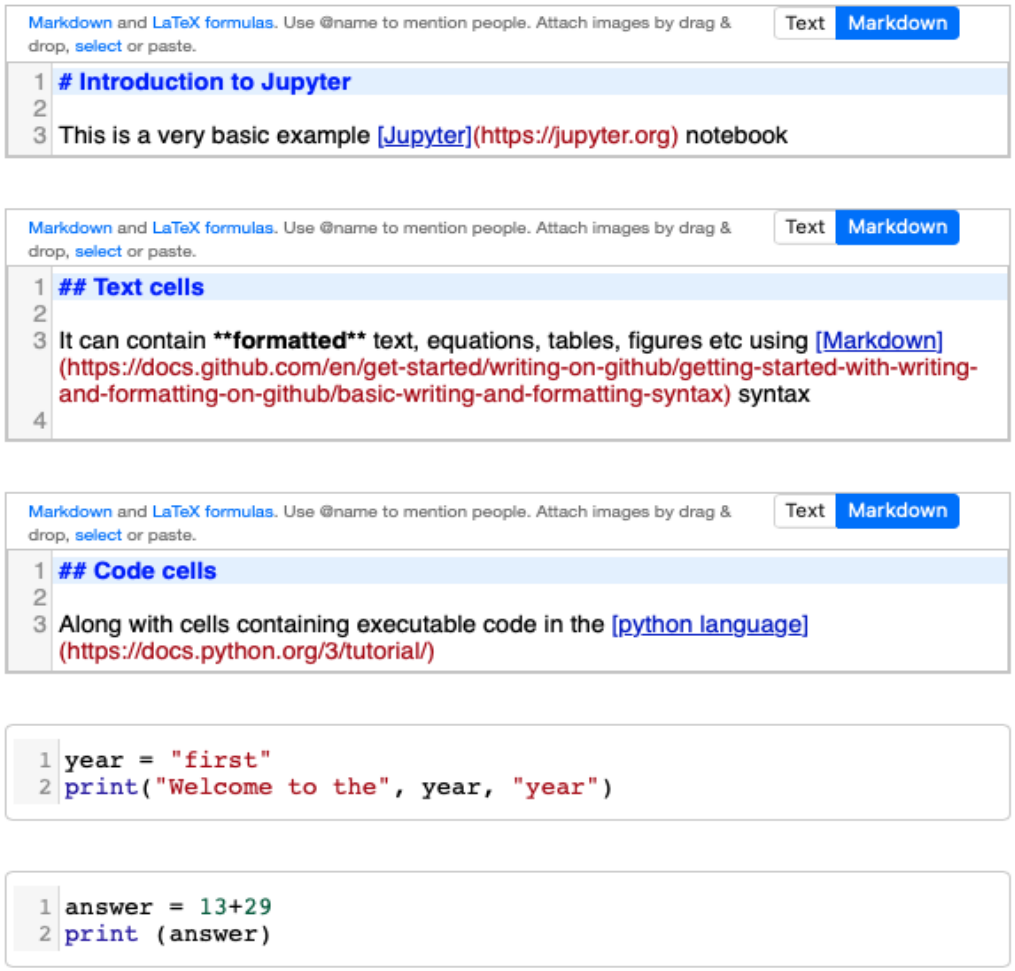
Signing up and logging in

- The first thing you need to do is to sign up to the CoCalc platform and sign up
  - 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 and a password of your choice
    - Important: 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 up with it
- Once signed up, go to `Projects` & navigate to
  - `Name – PHYS105 Introduction to Computational Physi PHYS105_2024`
  - `PHYS105 Introduction to Computational Physics`
  - `ComputerClassesStudent`
  - `Phys105-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 bring 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 Export as PDF → PDF (.pdf)

Double-click on a cell to edit



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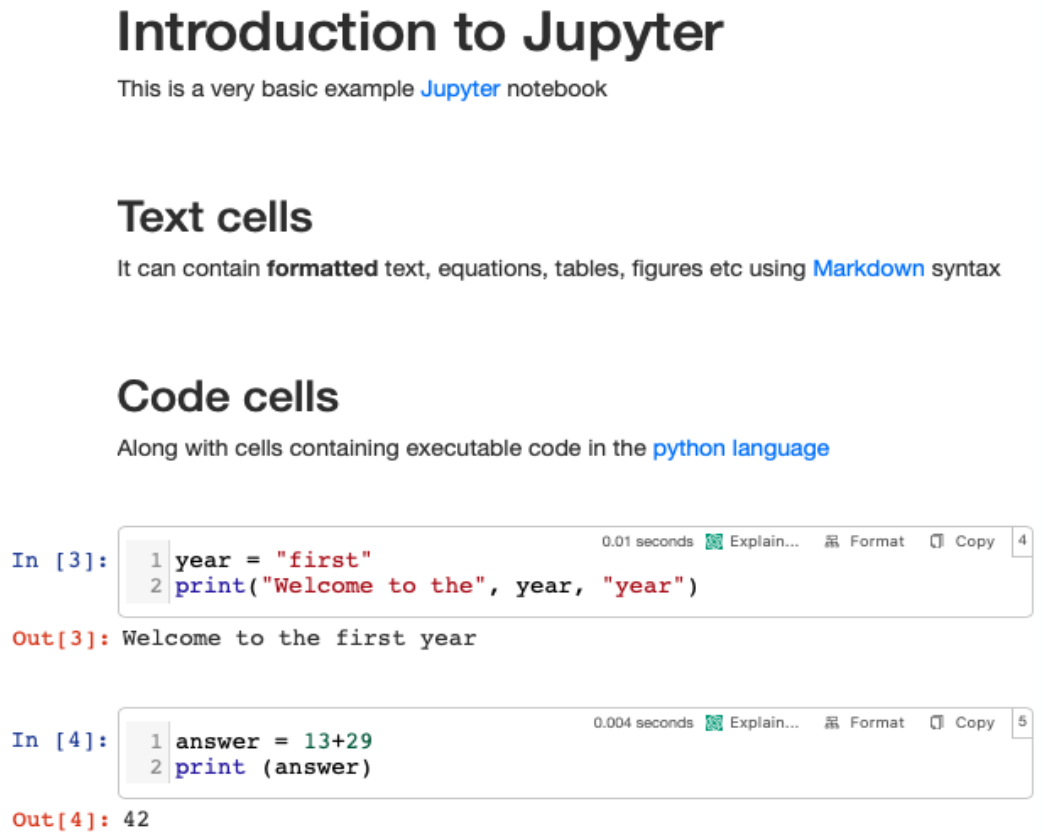
Press run (▶|) or type `shift+enter` to execute



Try this now with Example.ipynb in your CoCalc folder

What are Jupyter notebooks?

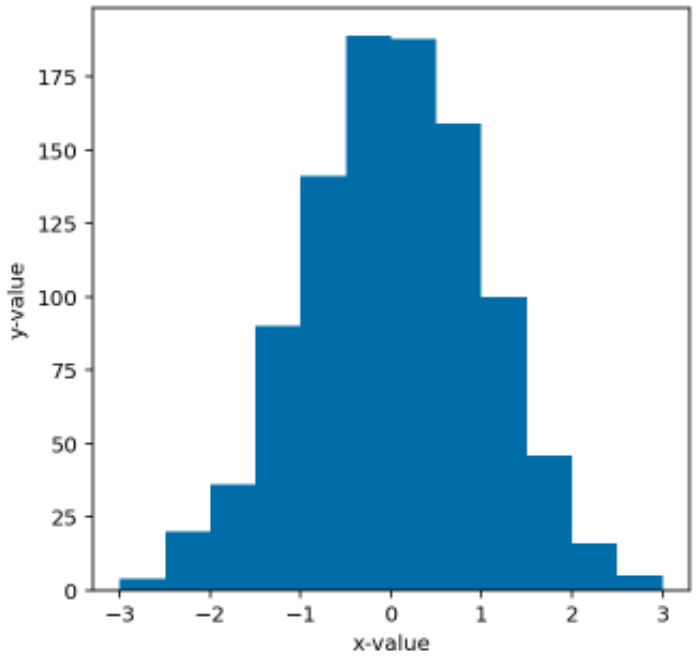
- Allow powerful data analysis and direct visualisation of outputs inline e.g

Plot some data

In [8]:
```
# Create data using numpy

import numpy as np
data = np.random.normal(size=1000)
```

In [9]:
```
# Plot data using matplotlib

import matplotlib.pyplot as plt

plt.figure()
plt.xlabel("x-value")
plt.ylabel("y-value")
plt.hist(data, bins=12, range = (-3, 3))
plt.show()
```

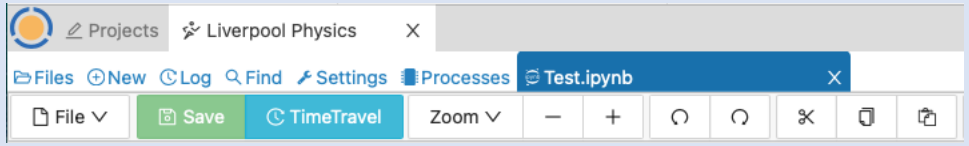
Out[10]:



- 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, so don't worry!

Summary

CoCalc



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  - Allows lecturers and students to work together
  - All files are stored, saved and synchronised here

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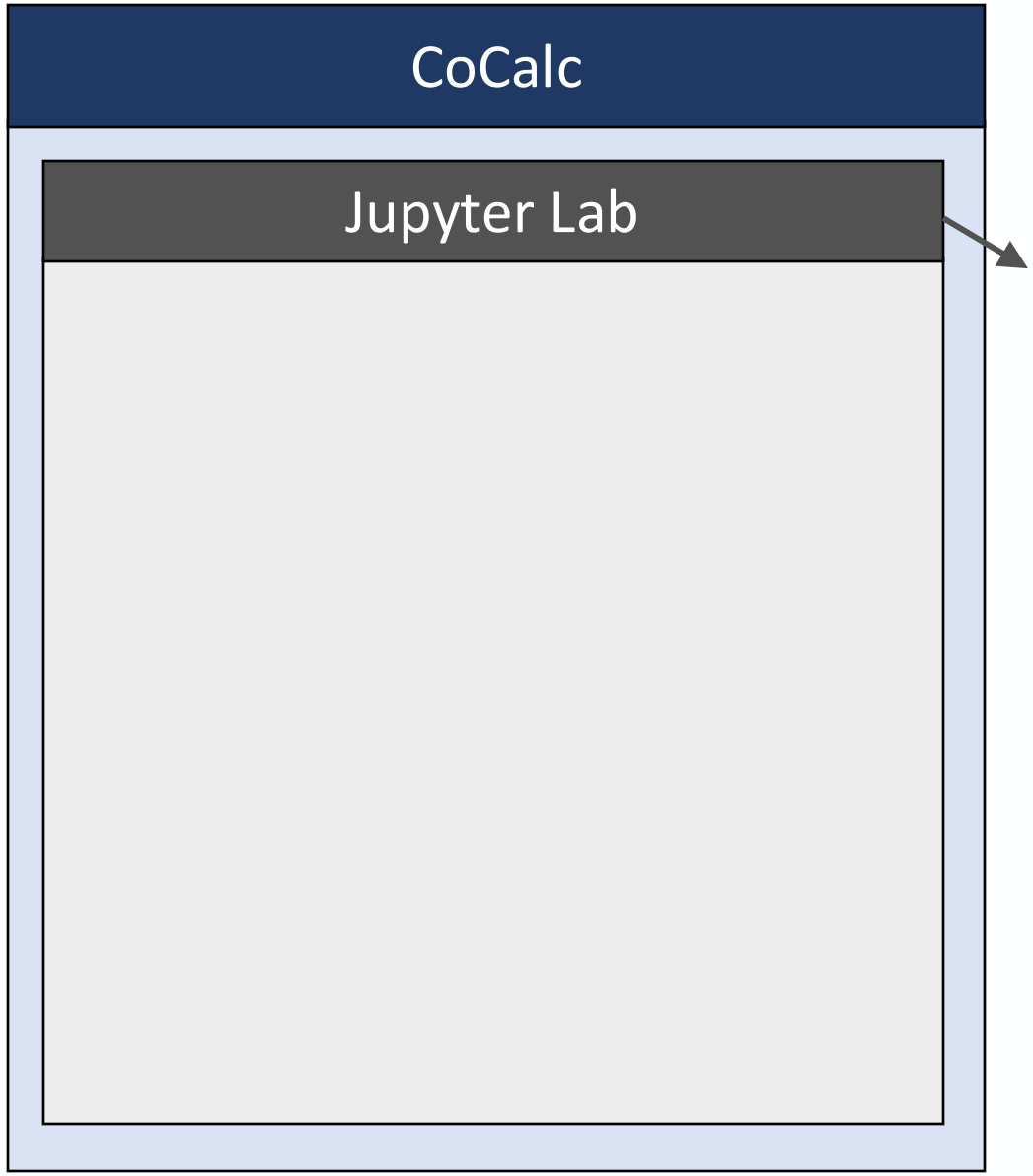

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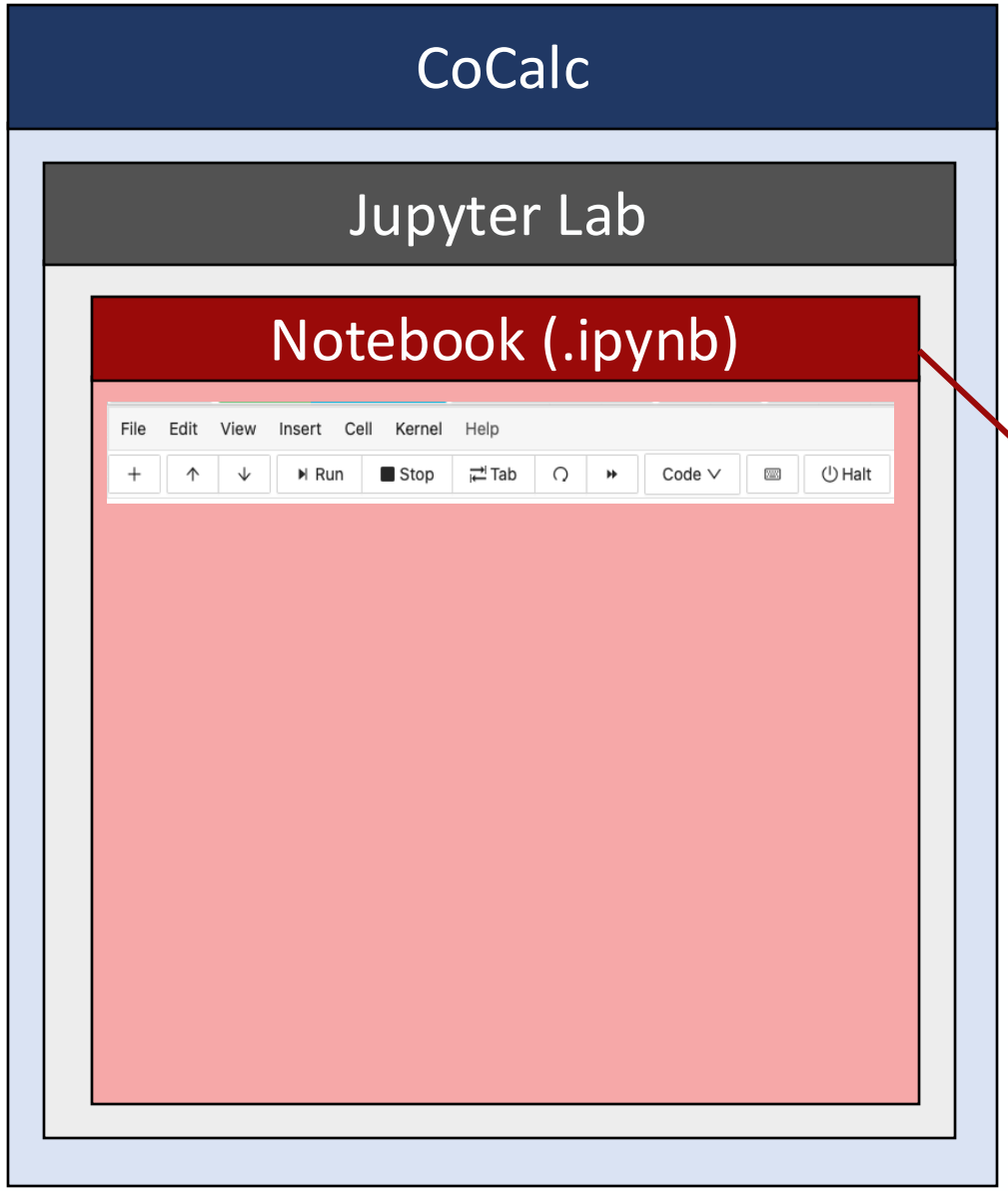

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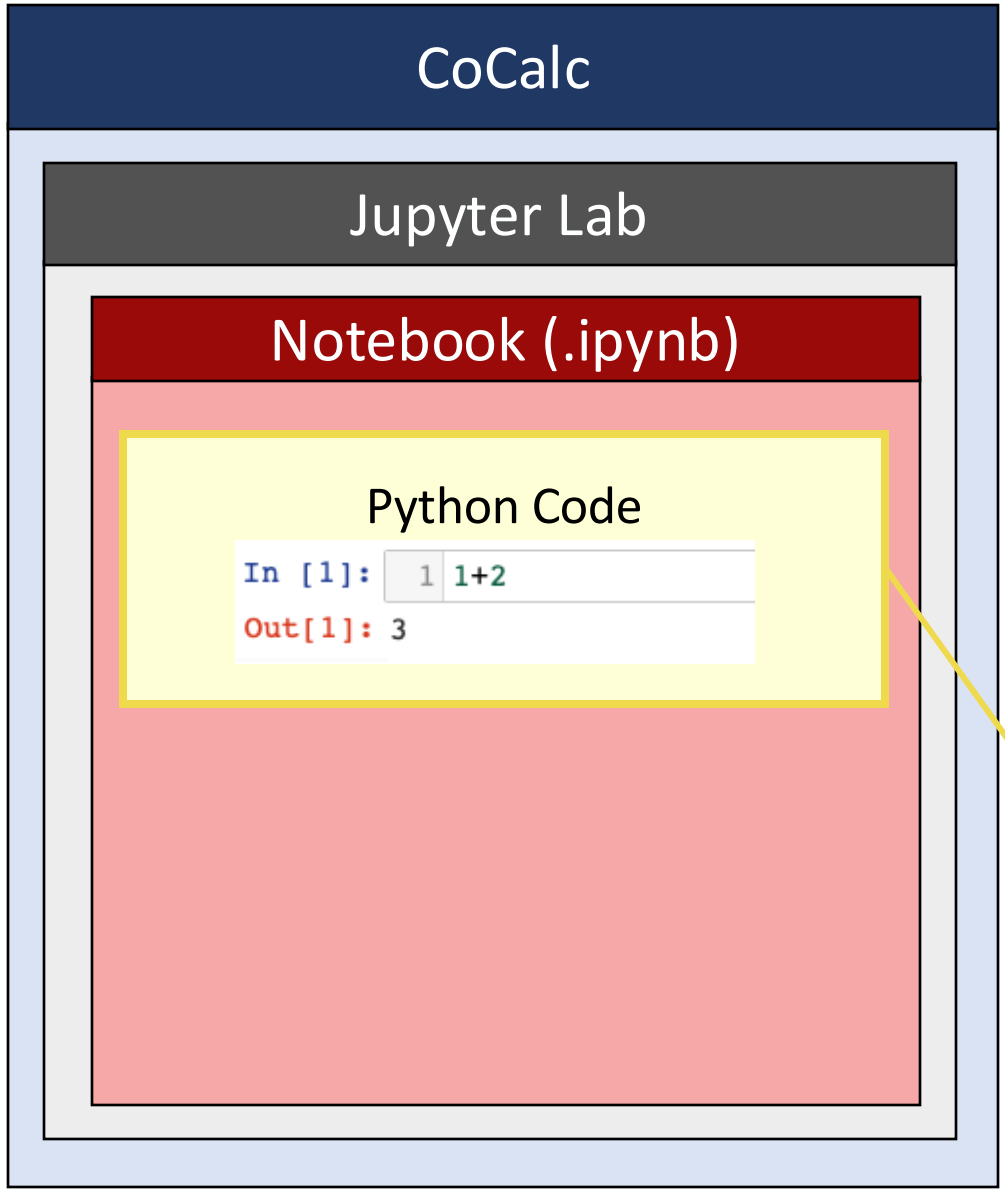

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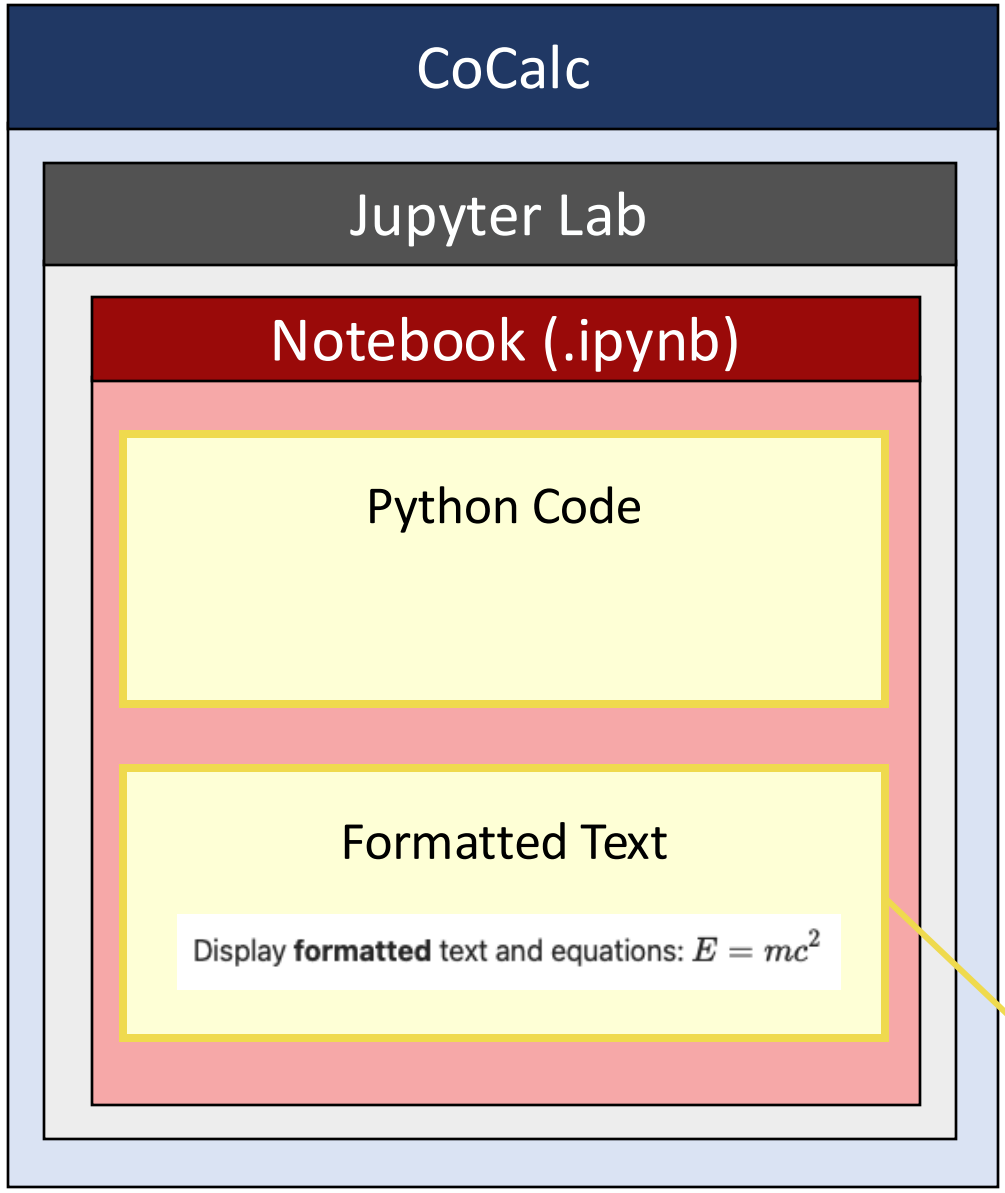

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- Formatted text entered via Markdown syntax
  - CoCalc has a graphical WISYWIG editor interfaced to this