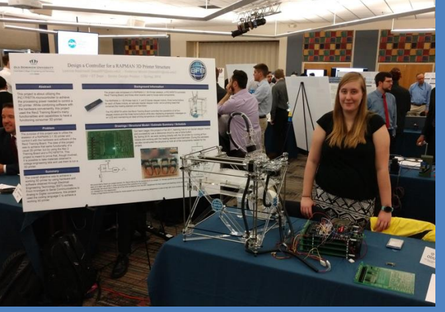
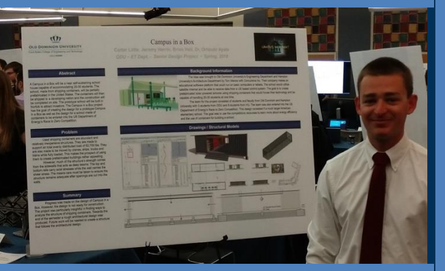




OLD DOMINION UNIVERSITY

ENGT 375:
Applied Machine Learning for Engineering Technology

Lecture 1B: Introduction to Anaconda and Jupyter Notebook

- Dr. Murat Kuzlu
- Department of Engineering Technology

Content

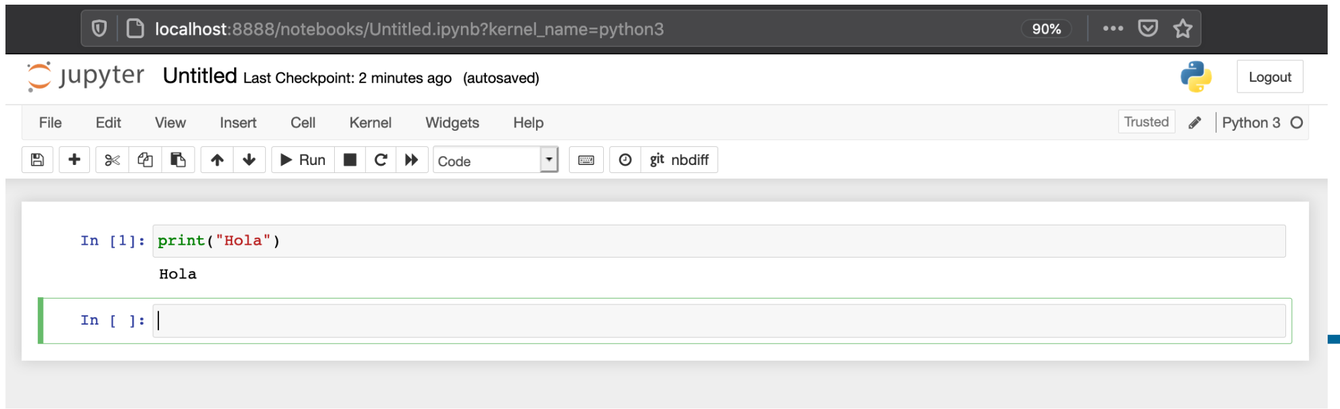
- Intro to Anaconda Navigator and Installation
- Jupyter Notebook App
- Jupyter Notebook
- Hand-on Activities
- Converting Jupyter Notebooks Formats
- Sharing Jupyter Notebooks

What is Jupyter Notebook?

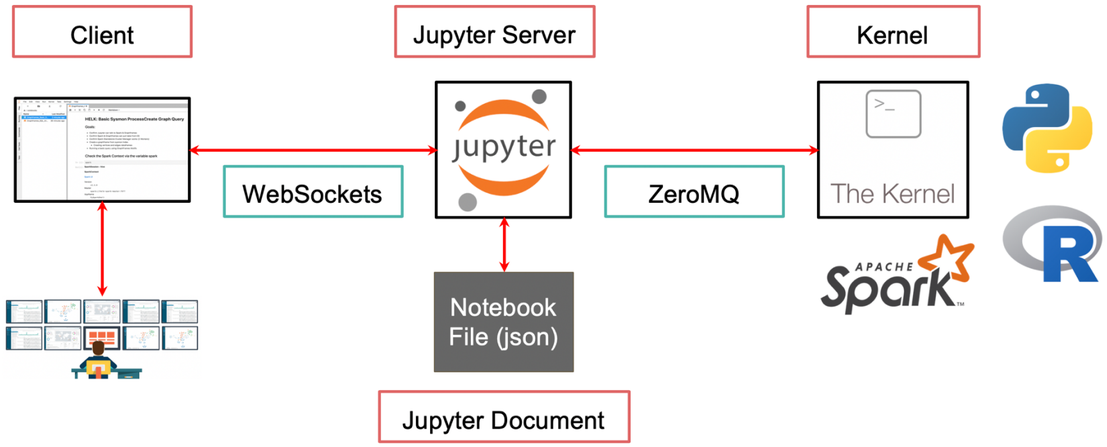
Jupyter Notebook is an **interactive client-server coding environment** kind of like a digital notebook that lets you write and run **code, text, equations, and visualizations** all in one place.

- **Jupyter Notebook** is an open-source tool often used for:
  - Data analysis
  - Machine learning and AI
  - Scientific research
  - Teaching and presentations

- It runs in your **web browser**, but executes code on your **local computer** (or a server).



Jupyter Notebook Architecture



Jupyter Client

- It allows a user to send code to the kernel in a form of a Qt Console or a browser via notebook documents.
- Notebooks are hosted by a Jupyter web server which uses Tornado to serve HTTP requests.

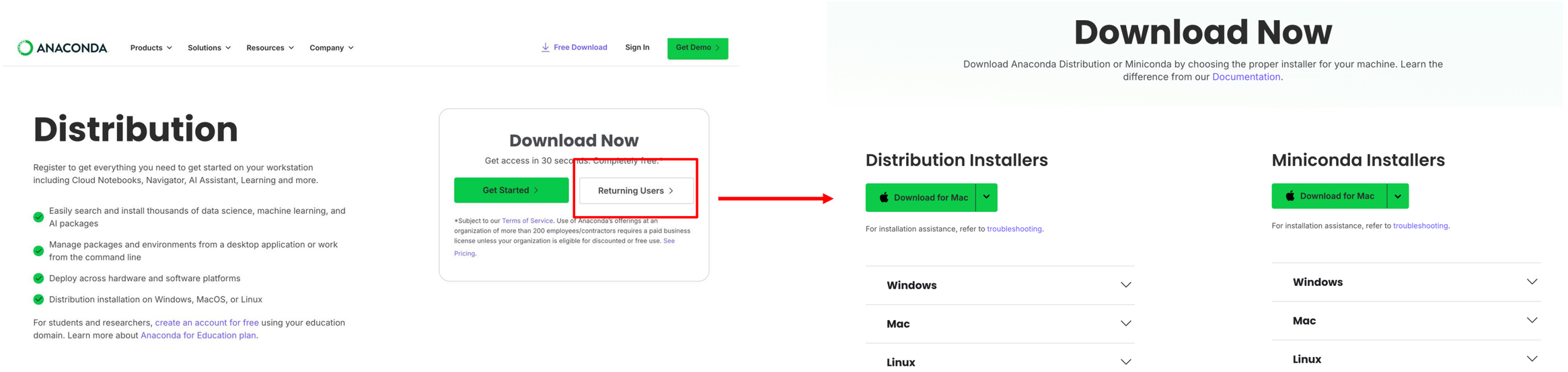
Jupyter Kernel

- It receives the code sent by the client, executes it, and returns the results back to the client for display.
- kernel and clients communicate via an interactive computing protocol based on an asynchronous messaging library named ZeroMQ (low-level transport layer) and WebSockets (TCP-based)
- Makes Jupyter a language agnostic application (Julia, Python, R, etc.)
-

https://infosecjupyterbook.com/getting-started/architecture.html

Download & Install Anaconda

- Anaconda is a free, open-source distribution of Python and R that makes it easy to install, manage, and use data science and machine learning tools.
- 👉 Anaconda = Python + Jupyter + All the scientific libraries you need + Easy management tools
- Download and install the latest version for your operating system (https://www.anaconda.com/download)



Download Anaconda

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- 👉 Anaconda = Python + Jupyter + All the scientific libraries you need + Easy management tools
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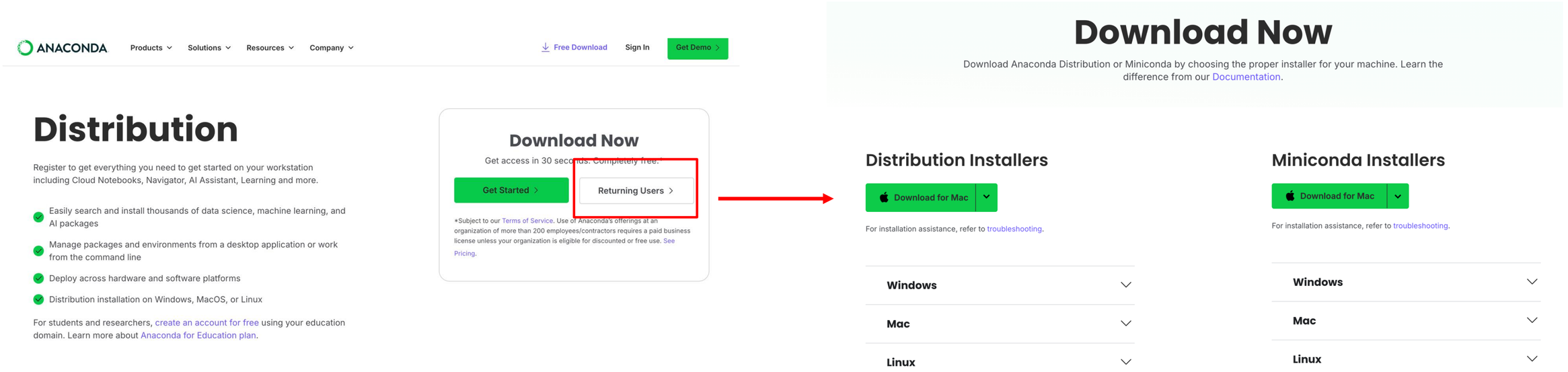
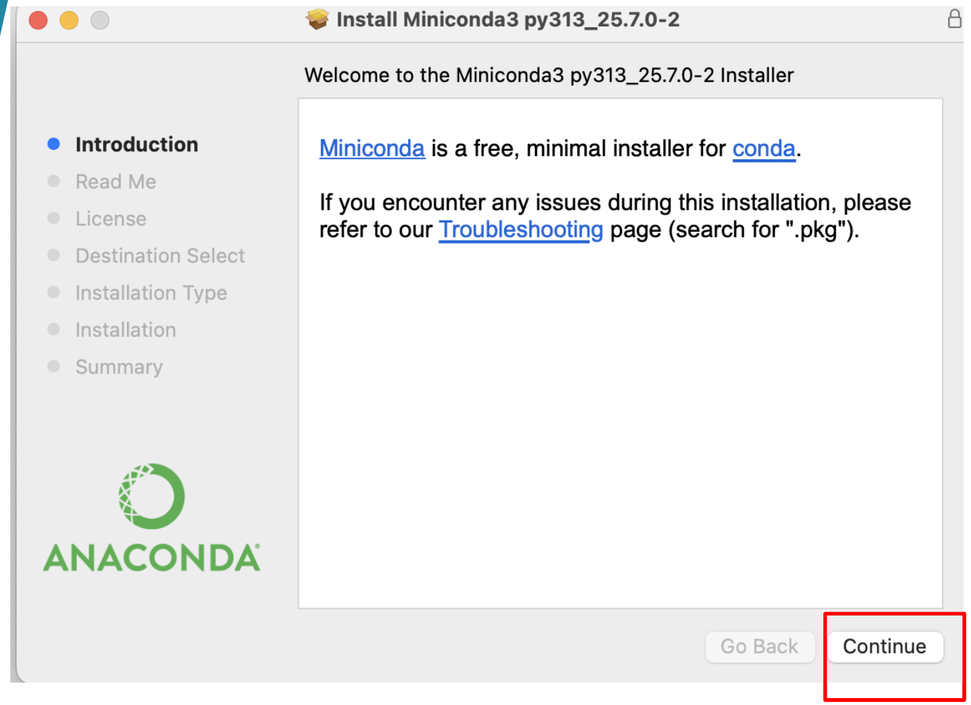
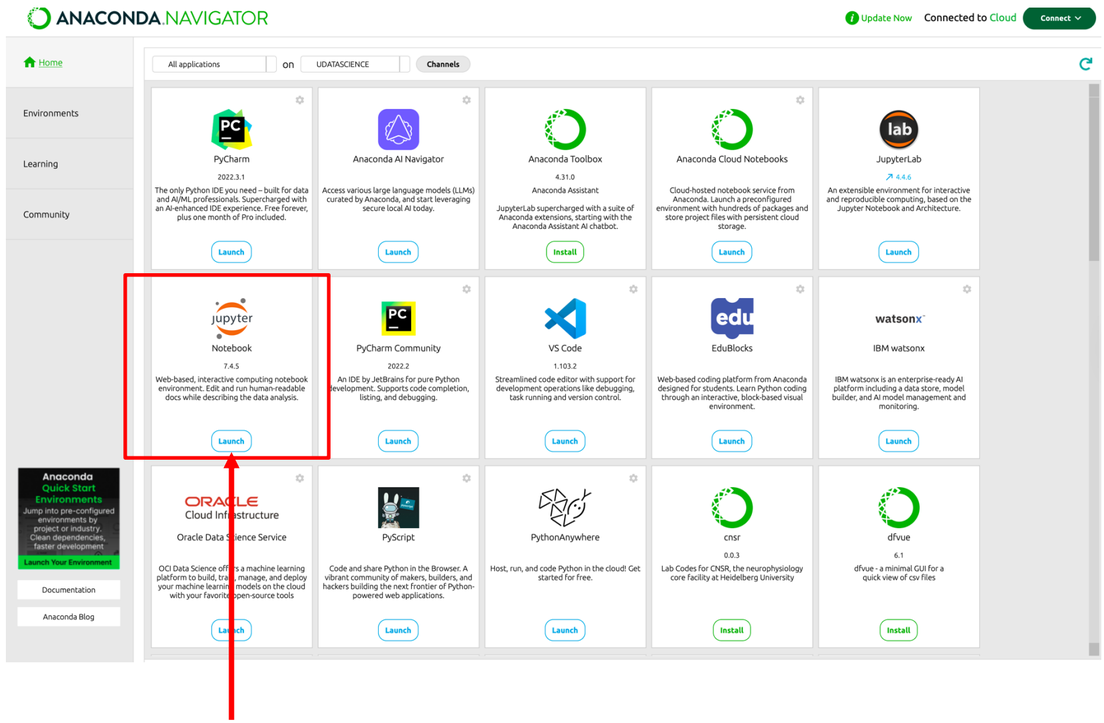


Install Anaconda & Launch Jupyter

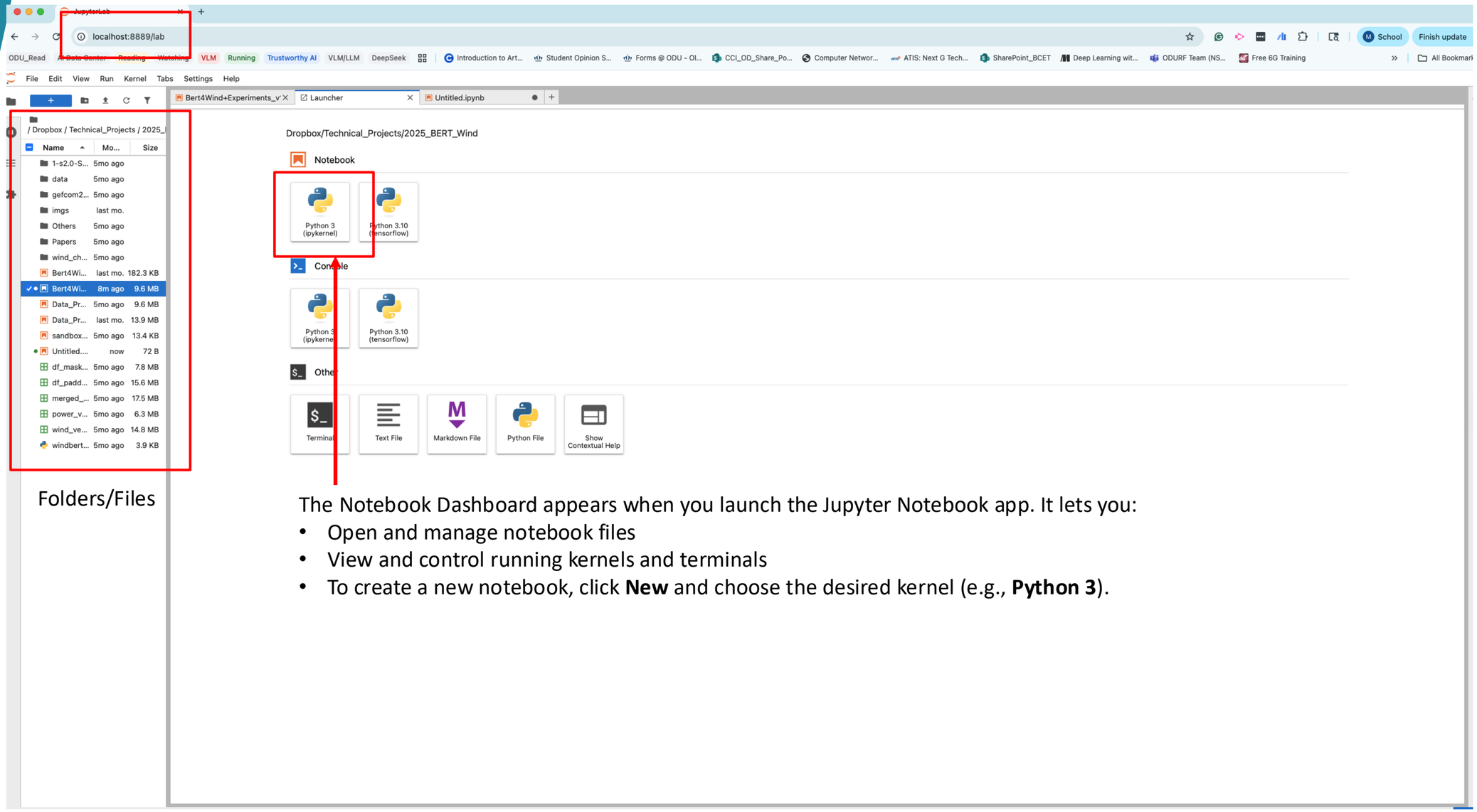




Click the Jupyter Notebook app. This action will start a local server on port 8888 and open the Notebook Dashboard in a new browser tab.

Jupyter Notebook Running in a Web Browser

localhost@link



Folders/Files

The Notebook Dashboard appears when you launch the Jupyter Notebook app. It lets you:

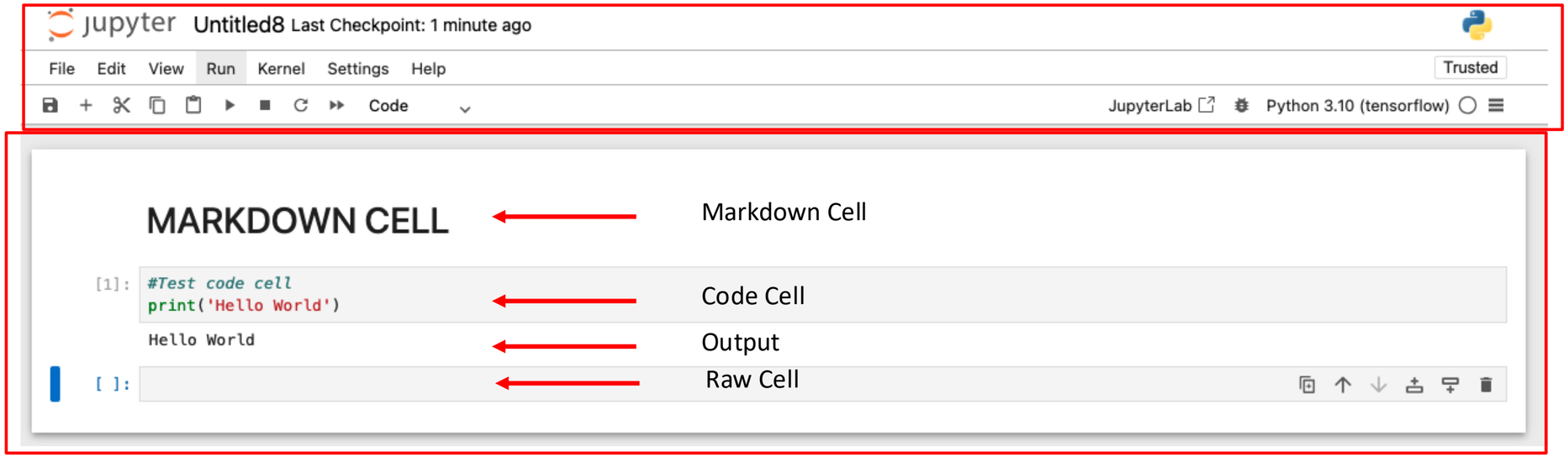
- Open and manage notebook files
- View and control running kernels and terminals
- To create a new notebook, click **New** and choose the desired kernel (e.g., **Python 3**).

Jupyter Notebook Interface

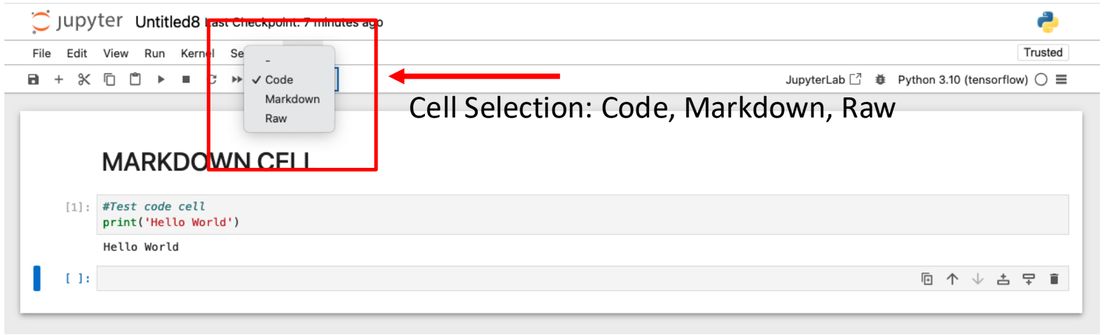
When you open a notebook, it appears in a new browser tab with an interface (UI) that lets you write and run code interactively.

- **Header:** At the top, you'll see the notebook title, menu bar, and toolbar for navigation and document control.
- **Body:** The main area contains **cells**. Each cell can hold **code**, **text (Markdown)**, or **output**.

Header



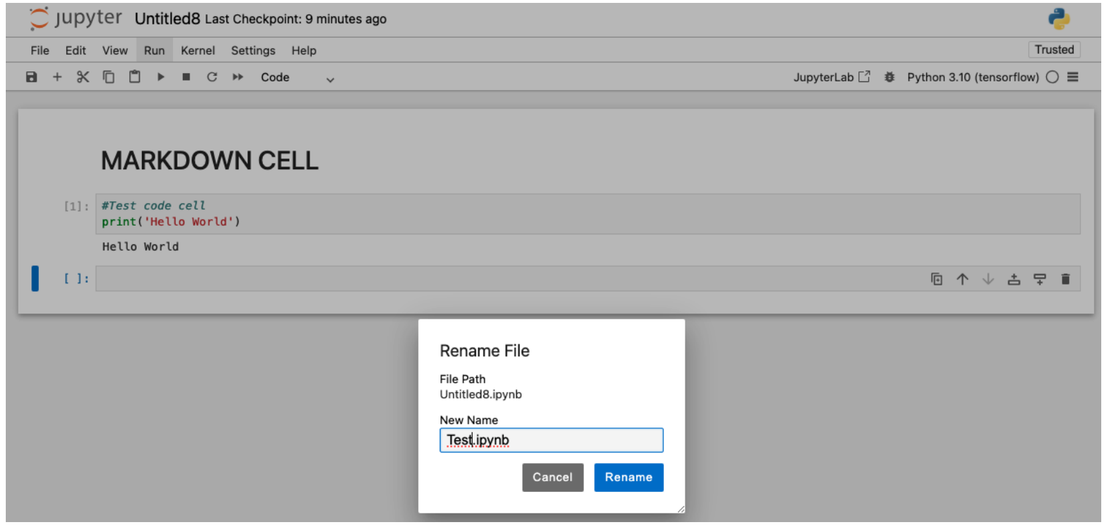
Body



Jupyter Notebook File

Notebook Files or Documents: .ipynb File

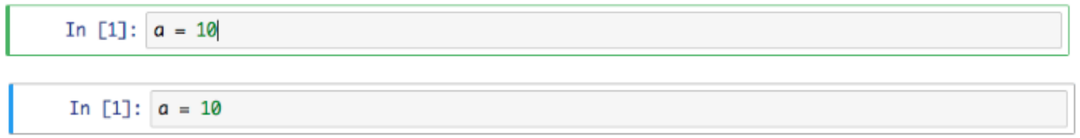
- Created by the **Jupyter Notebook App**.
- The **file format used by Jupyter Notebook**
- Stores both **code** and **text** (Markdown, equations, images, etc.).
- The file content is actually written in **JSON** (a structured text format), but you open and run it inside **Jupyter Notebook or JupyterLab**.



Cell Modes and Notebook Kernel

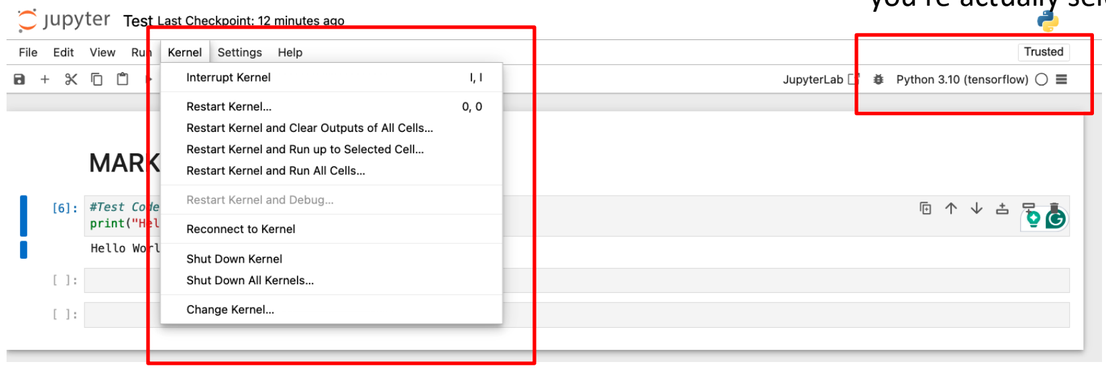
Cell Modes in Jupyter Notebook

- Each notebook has one **active cell** at a time.
- **Green border → Edit mode:** you can type or change code/text.
- **Blue border → Command mode:** you can run, delete, or move cells.



Toggle between command mode (blue) and edit mode (green) with Esc and Enter, respectively

Recall! When you create a new notebook and choose a Python version, you're actually selecting the **kernel** — the engine that runs your code.



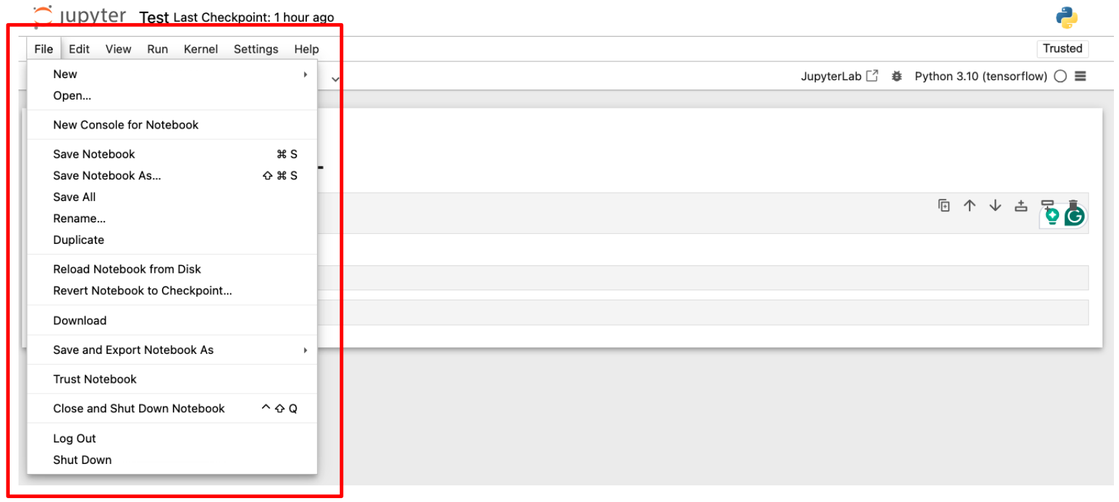
Kernel Commands in Jupyter Notebook

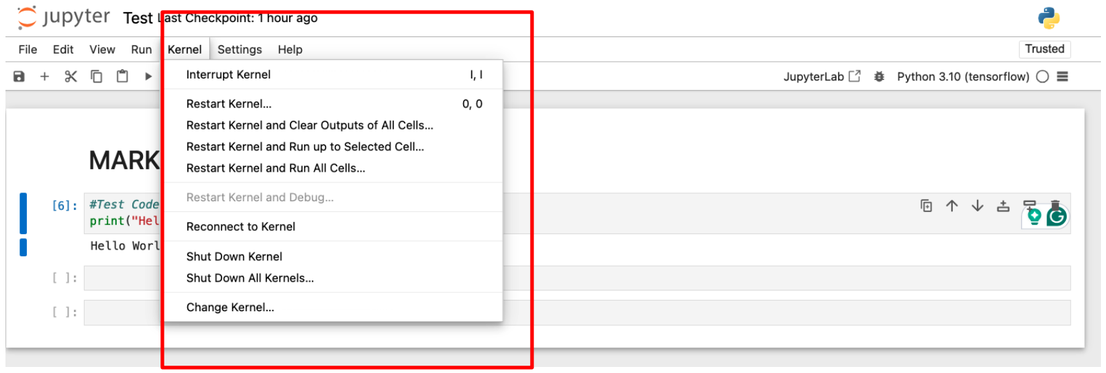
- **Restart:** Restarts the kernel and clears all variables.
- **Restart & Clear Output:** Also removes all cell outputs.
- **Restart & Run All:** Restarts and runs all cells from top to bottom.
- **Interrupt:** Stops a running process if it gets stuck.

Shutdown Jupyter

Launching Jupyter starts both the **browser interface** and the **kernel** (background engine).
To close a notebook:

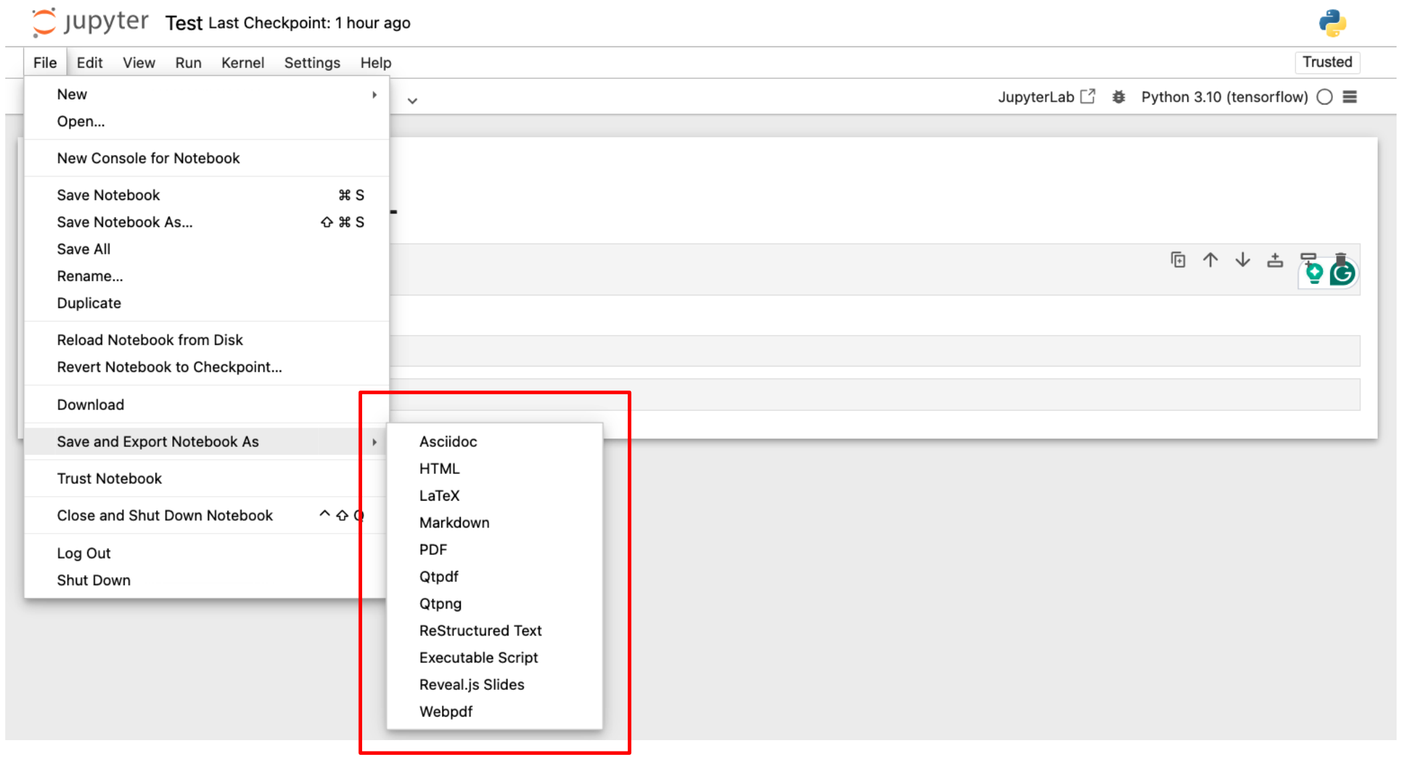
- Close its **browser tab**, then **shut down the kernel** from the *Running* tab, **or**
- Use **File → Close and Shutdown Notebook**.
- Just closing the **dashboard tab** does **not** stop Jupyter running on port **8888**.





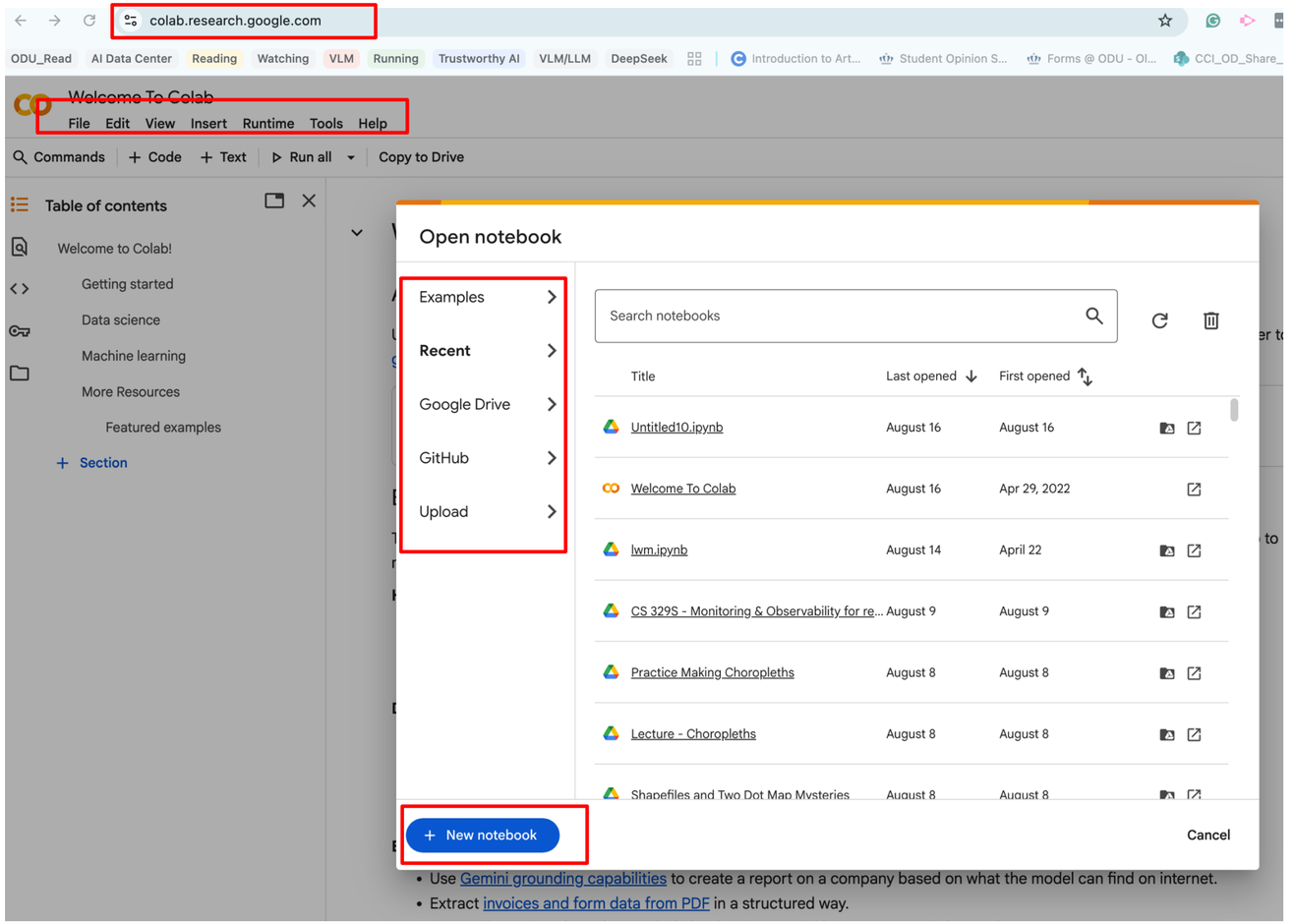
Exporting Jupyter Notebooks

Jupyter can export .ipynb files to **HTML, PDF, LaTeX**, and more.
Use **Nbconvert** to convert notebooks into static formats for sharing.
The **“Download as”** option in Jupyter lets you save your work in different formats to share with others.



Google Colab and Jupyter Notebook

Google Colab (Colaboratory) is a **cloud-based version** of Jupyter Notebook.
Lets you **write and run Python code** directly in your browser — no installation needed.
Supports **Jupyter (.ipynb)** files and offers **free GPU/TPU** resources.
Ideal for **machine learning, data analysis**, and **collaboration** via Google Drive.



Your Turn

- **Install** Anaconda Navigator on your system.
- **Explore** Jupyter Notebook — create multiple notebooks and learn about **kernels**, **code cells**, and **Markdown cells**.
- **Practice** writing basic Python code using **Google Colab**.
- **Convert** your .ipynb files into different formats and **share** them with others.

Hand-on Activities


THANK YOU