



ENGT 375: Applied Machine Learning for Engineering Technology

Lecture 1B: Introduction to Anaconda and Jupyter Notebook

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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.

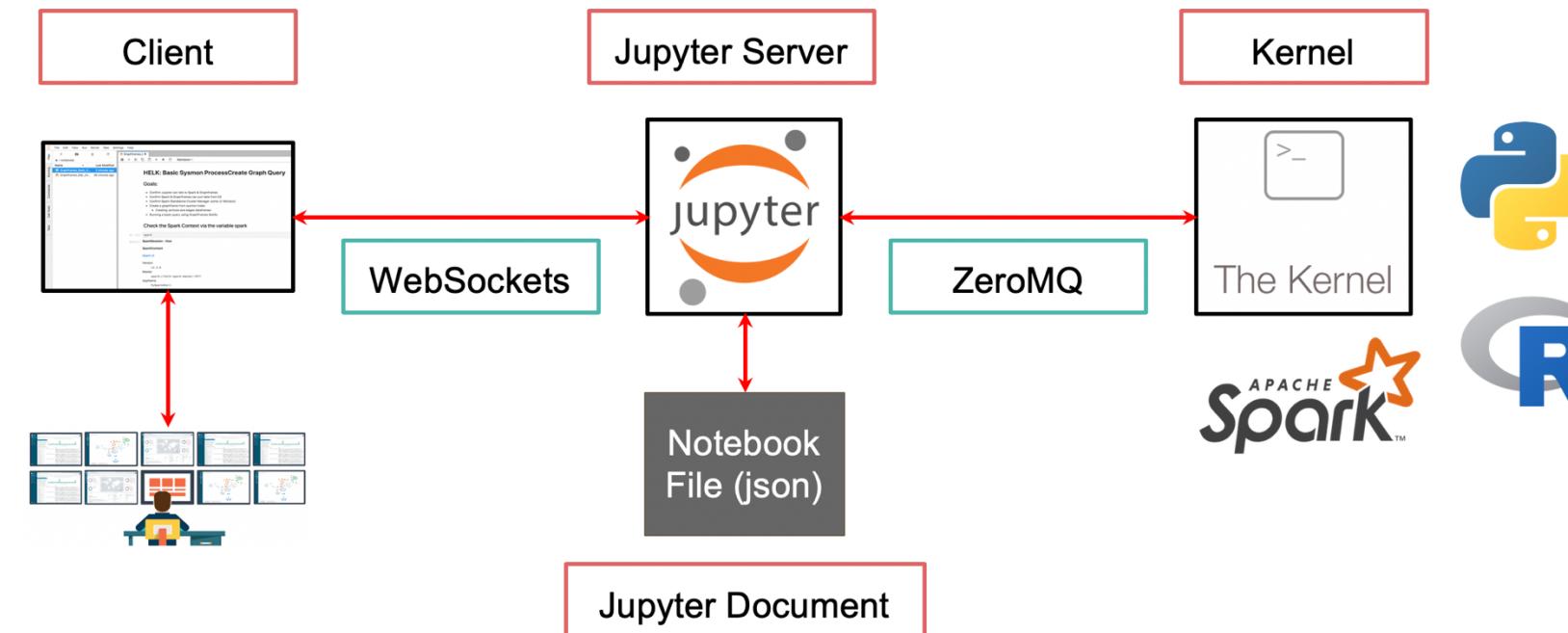
- **Jupyter Notebook** is an open-source tool often used for:
 - Data analysis
 - Machine learning and AI
 - Scientific research
 - Teaching and presentations
- It runs in your **web browser**, but executes code on your **local computer** (or a server).

A screenshot of a Jupyter Notebook interface. The browser address bar shows 'localhost:8888/notebooks/Untitled.ipynb?kernel_name=python3'. The main window title is 'jupyter Untitled Last Checkpoint: 2 minutes ago (autosaved)'. The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, Help, Trusted, Python 3, and git nbdiff. Below the menu is a toolbar with icons for file operations. A code cell contains the Python code 'In [1]: print("Hola")' and its output 'Hola'. A new code cell 'In []:' is at the bottom.





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.)
-



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>)

The screenshot shows the Anaconda website's download page. At the top, there's a navigation bar with links for ANACONDA, Products, Solutions, Resources, Company, Free Download, Sign In, and Get Demo. Below the navigation is a large 'Download Now' button. A red arrow points from the 'Returning Users' link on the main page to the 'Distribution Installers' section. The 'Distribution Installers' section includes dropdown menus for Mac, Windows, and Linux. The 'Miniconda Installers' section also has dropdown menus for Mac, Windows, and Linux.

Distribution

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- Easily search and install thousands of data science, machine learning, and AI packages
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Distribution Installers

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For installation assistance, refer to [troubleshooting](#).

Windows ▾

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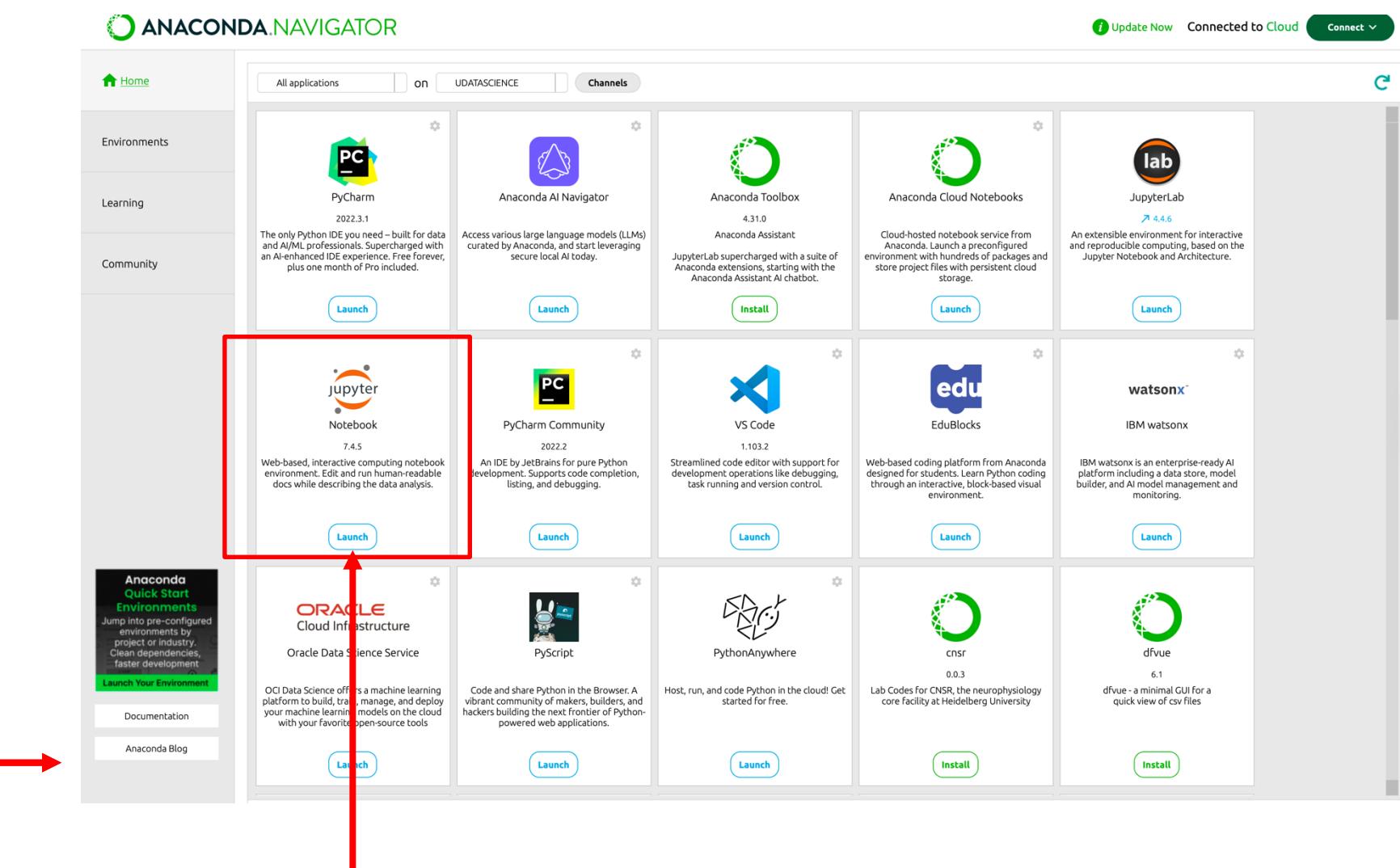
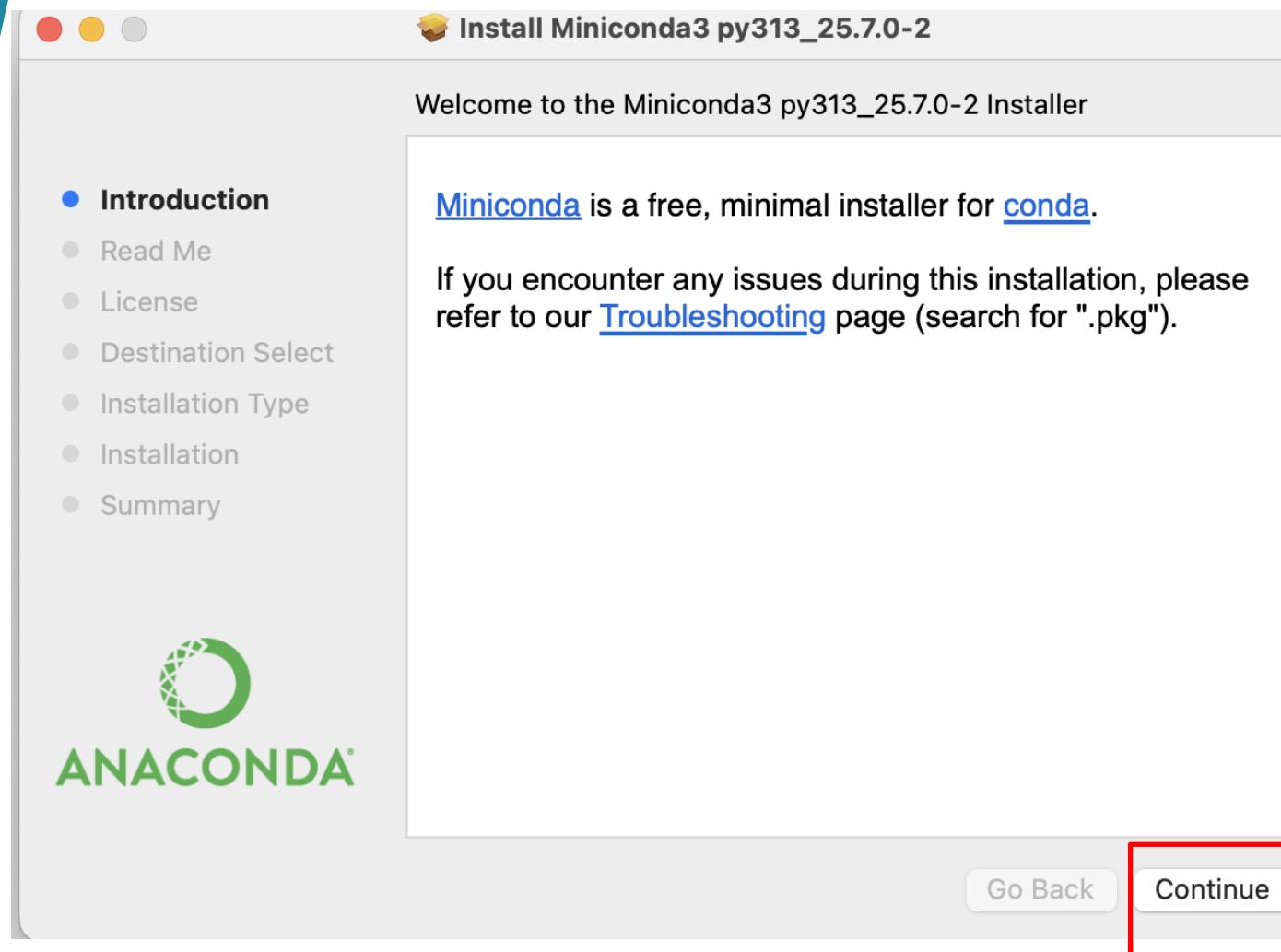
Windows ▾

Mac ▾

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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

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**).

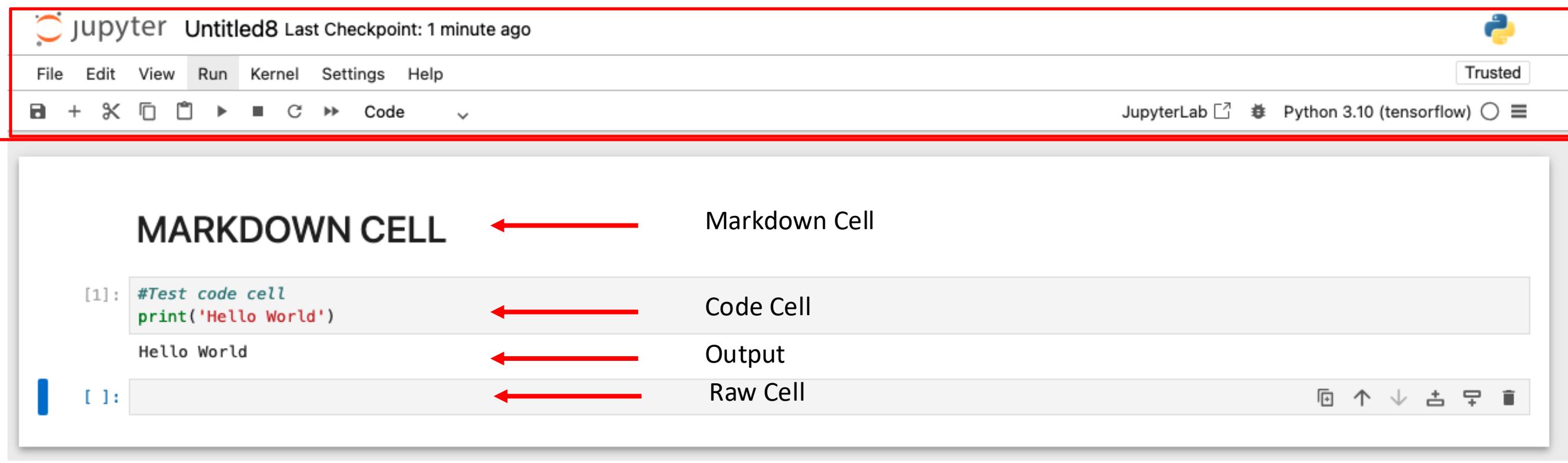


Jupyter Notebook Interface

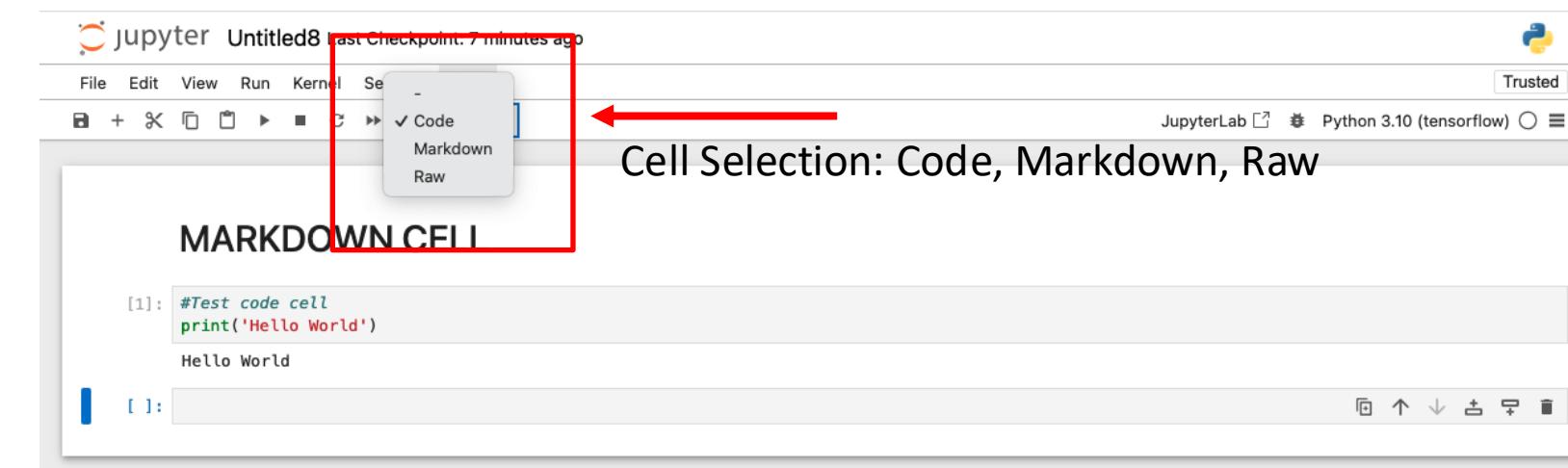
When you open a notebook, it appears in a new browser tab with an interface (UI) that lets you write and run code interactively.

- **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

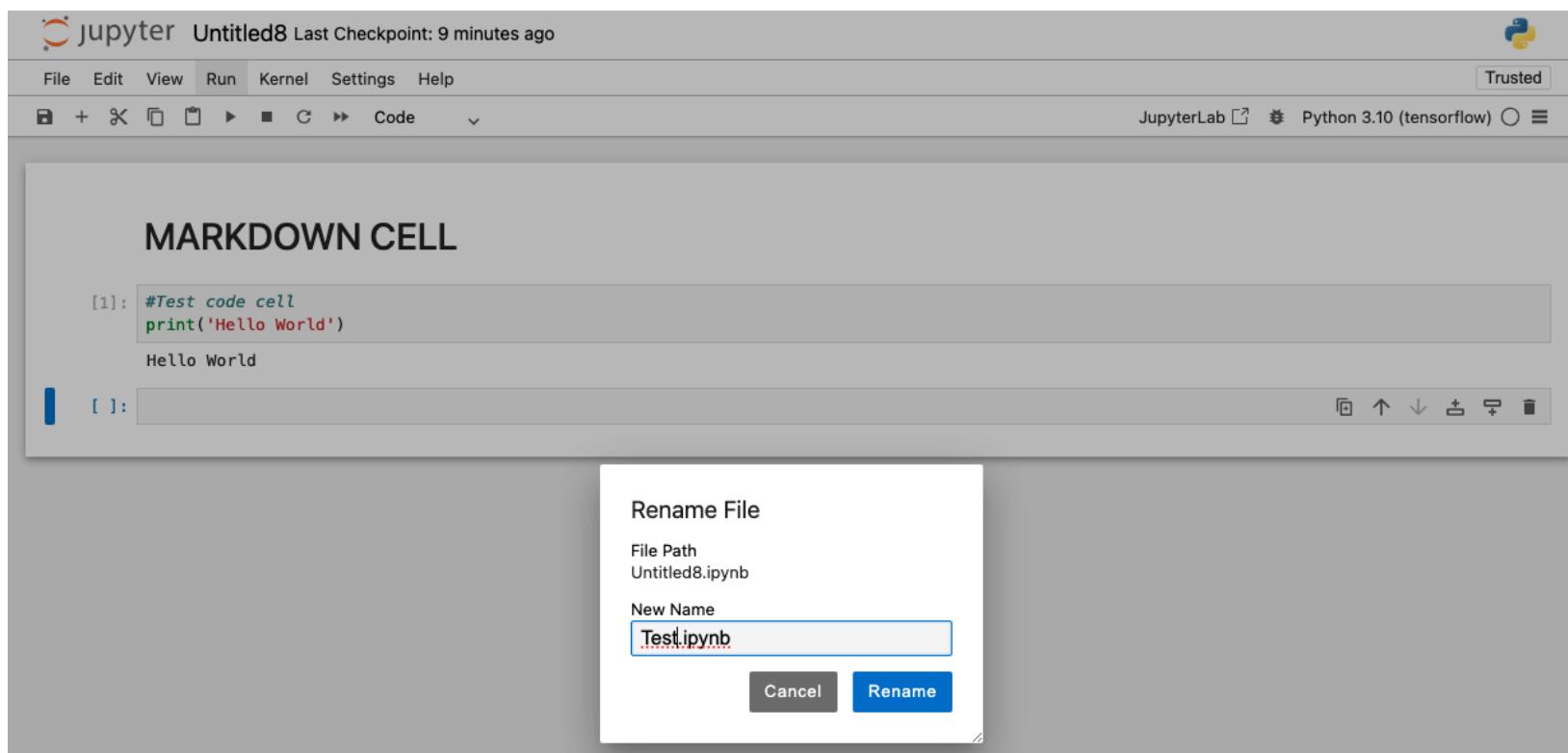




Jupyter Notebook File

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**.





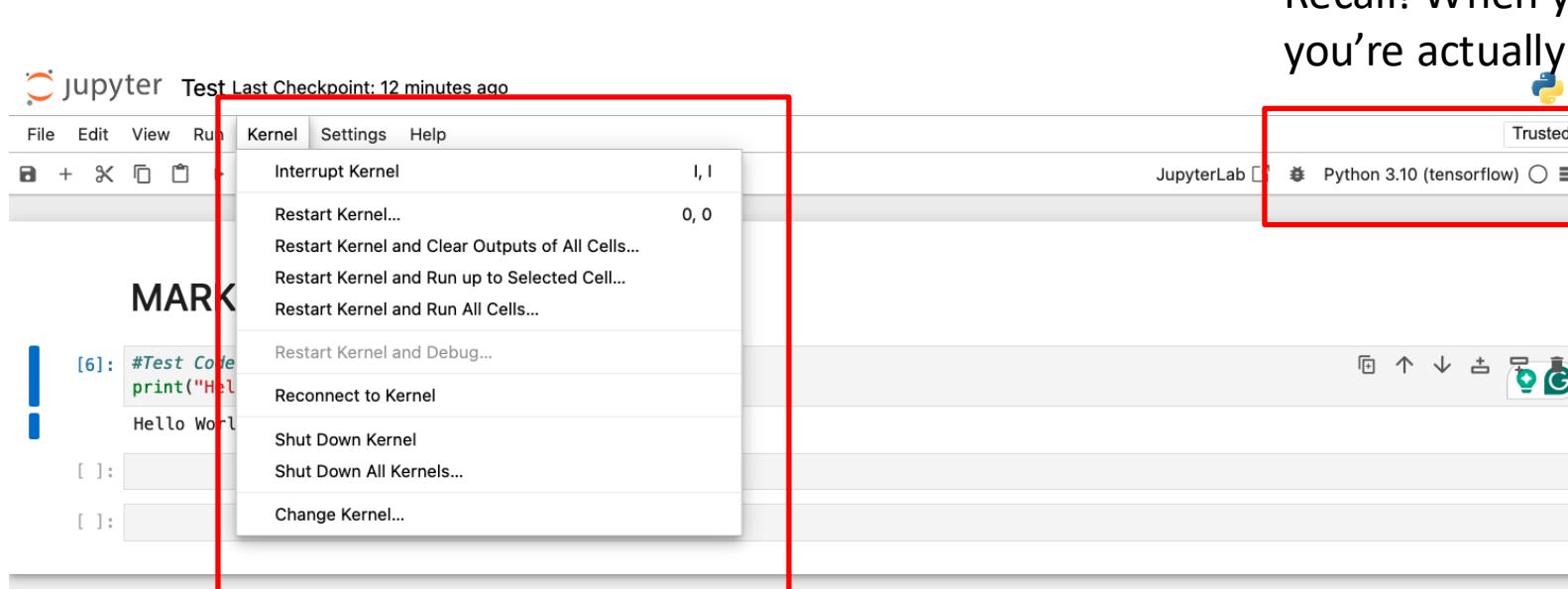
Cell Modes and Notebook Kernel

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.

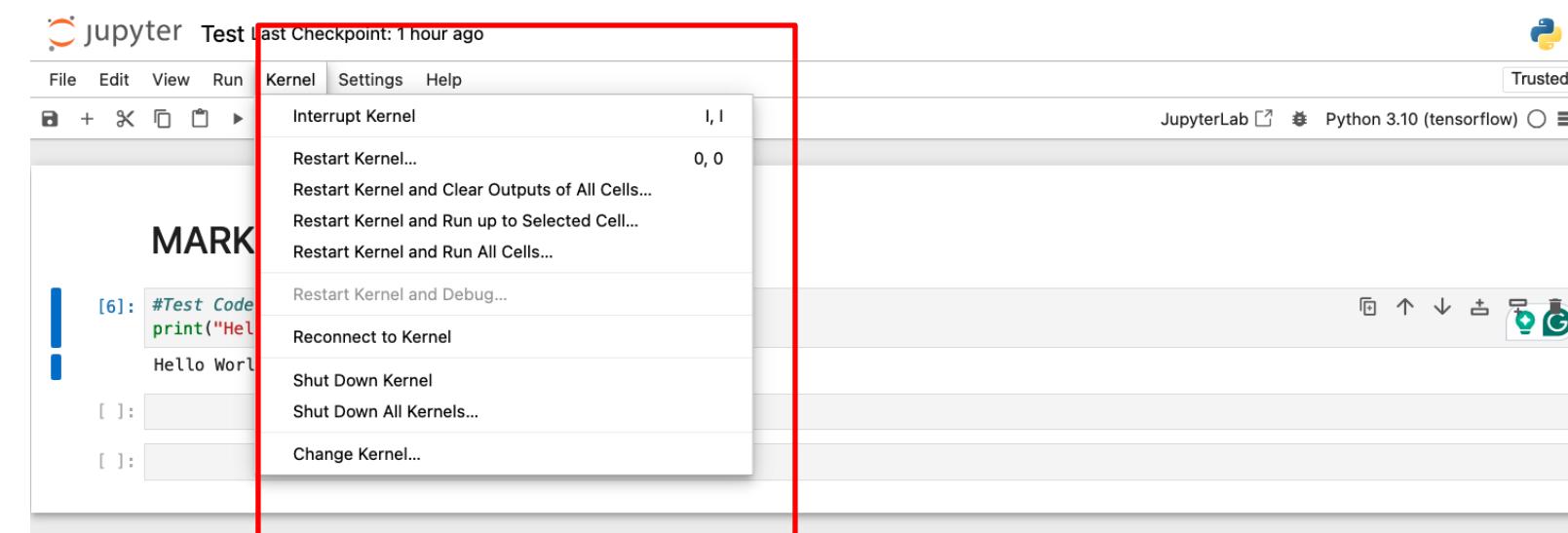
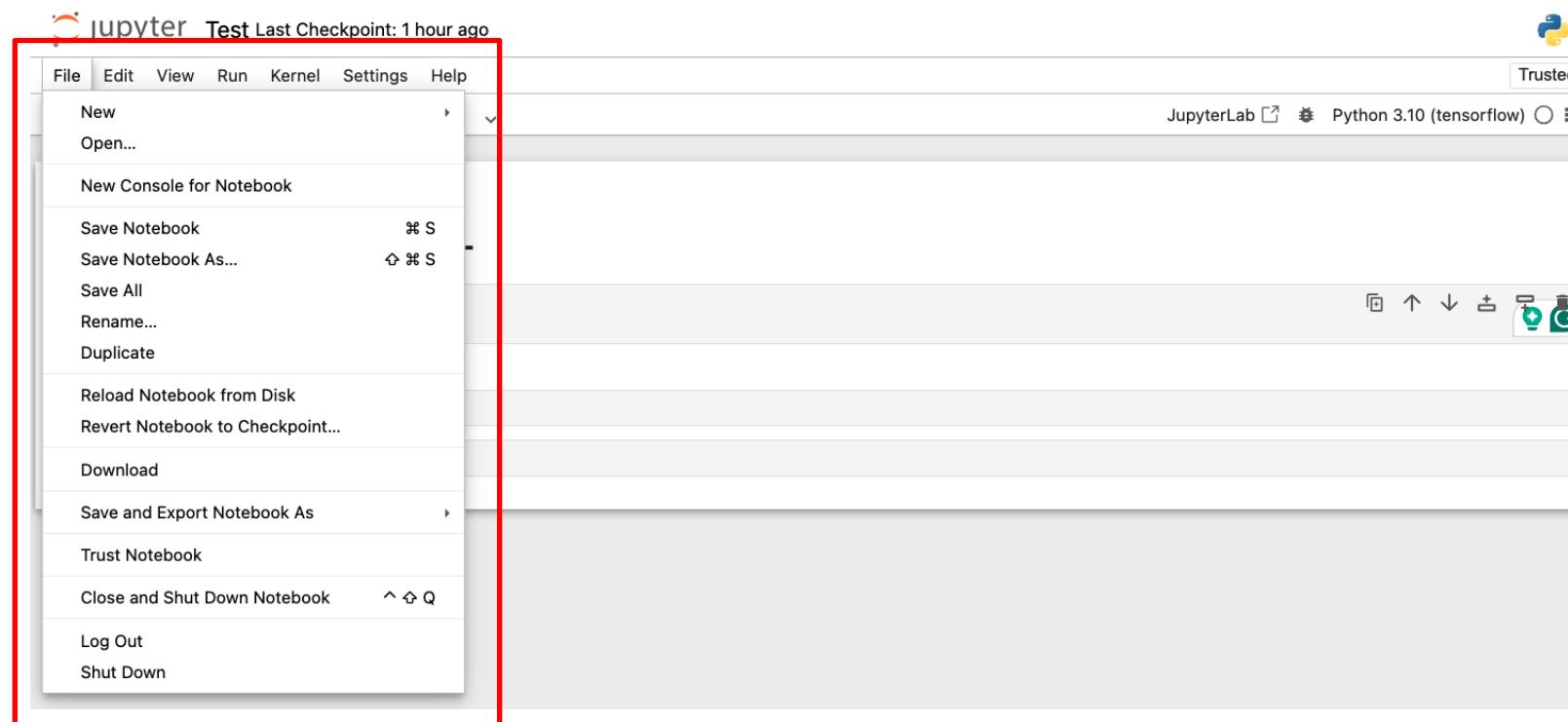


Shutdown Jupyter

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**.



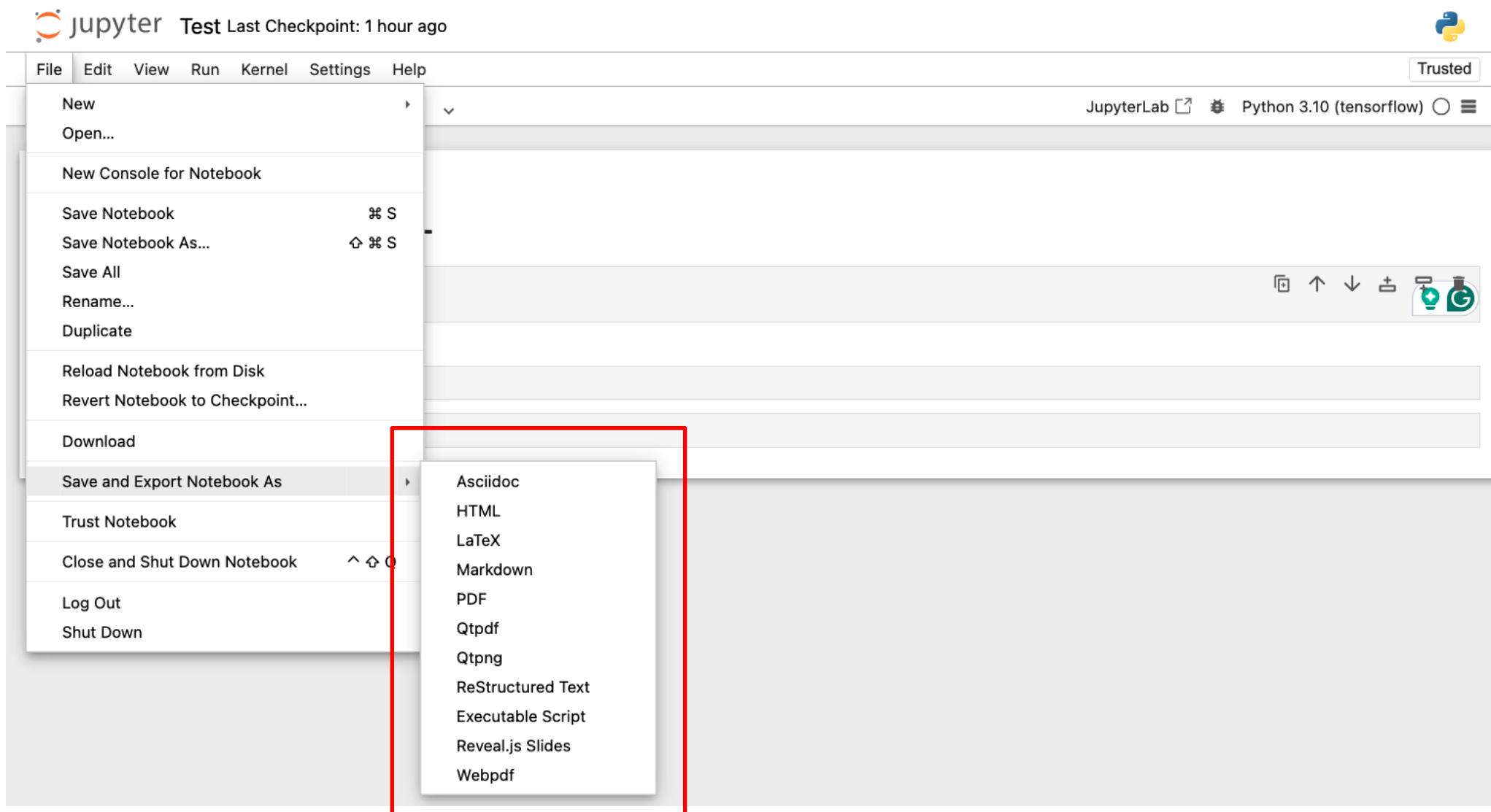


Exporting Jupyter Notebooks

Jupyter can export .ipynb files to **HTML**, **PDF**, **LaTeX**, and more.

Use **Nbconvert** to convert notebooks into static formats for sharing.

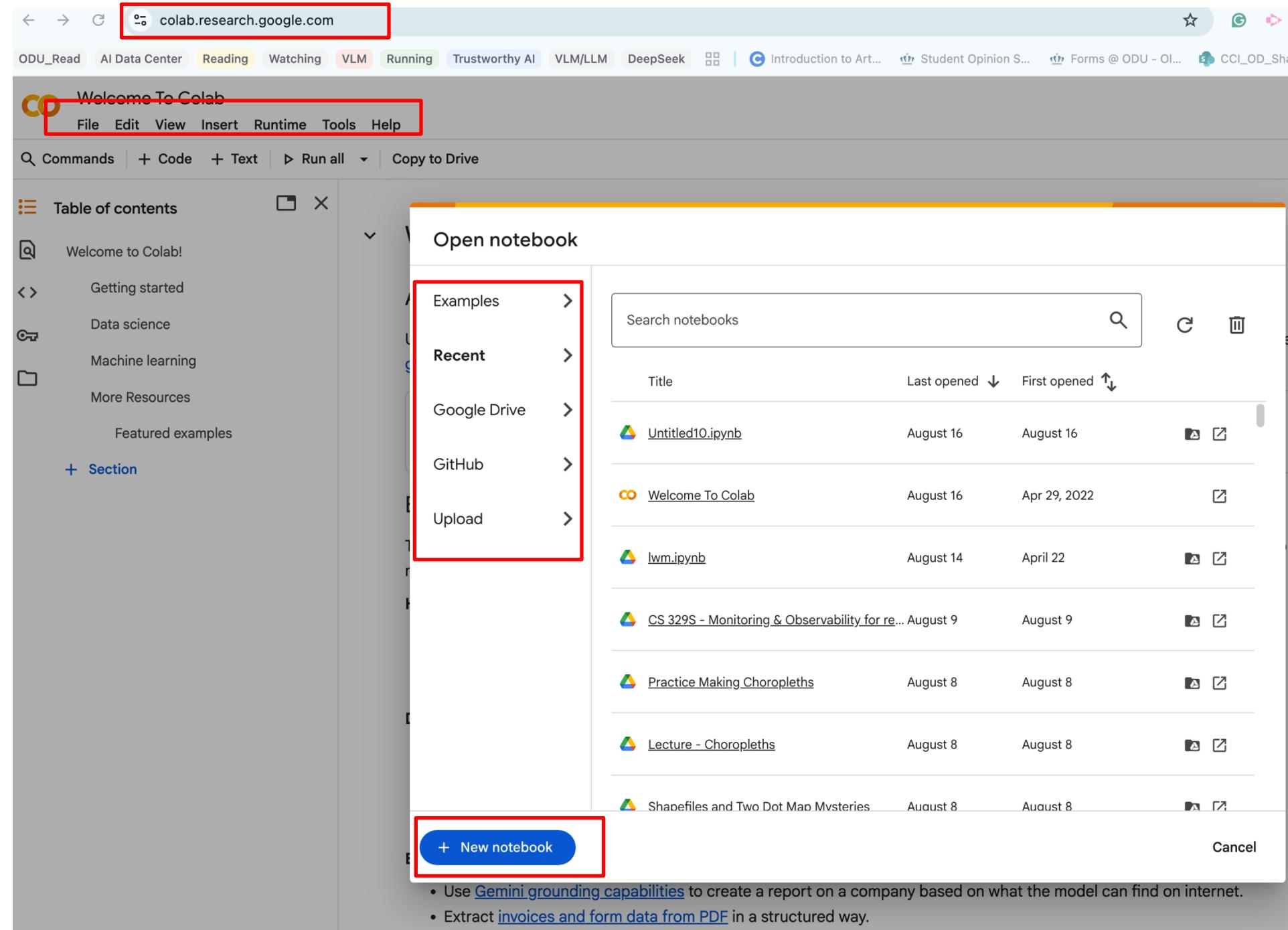
The “**Download as**” option in Jupyter lets you save your work in different formats to share with others.





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

