

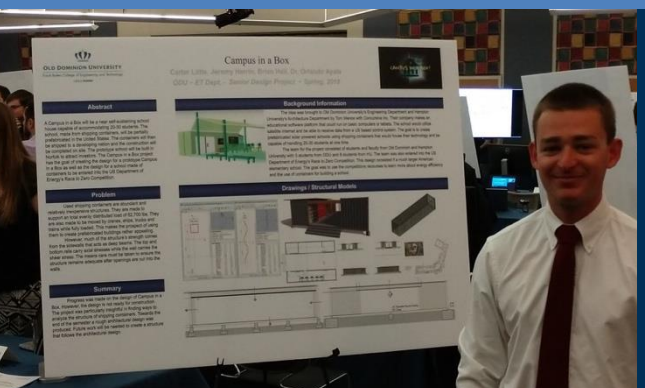
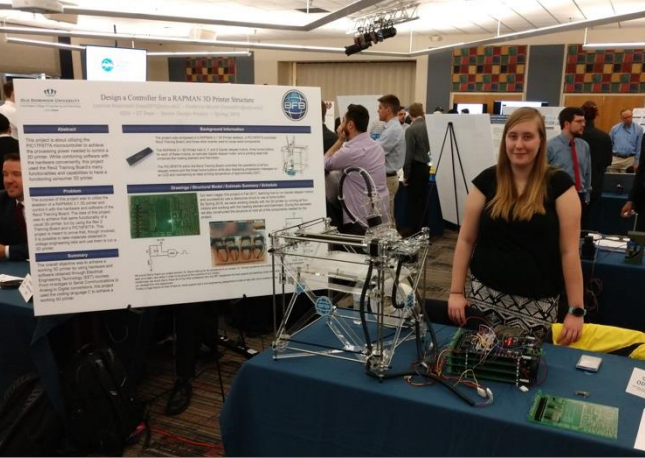


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ENGT 375: Applied Machine Learning for Engineering Technology

Lecture 1B: Introduction to Anaconda and Jupyter Notebook

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- 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

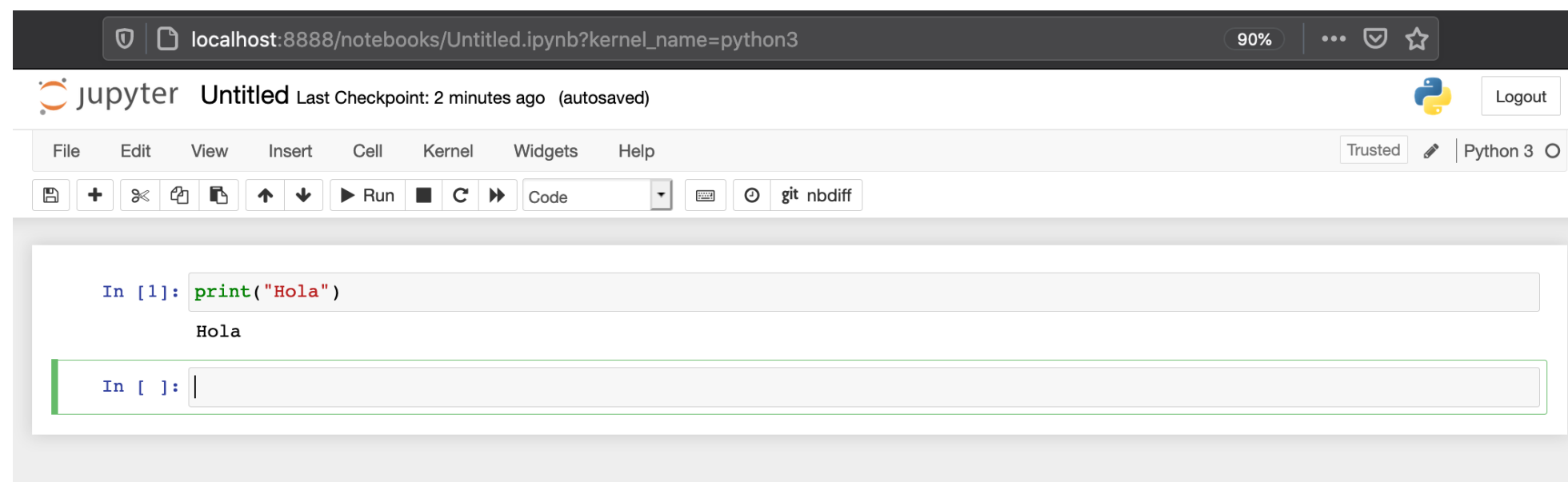


What is Jupyter Notebook?

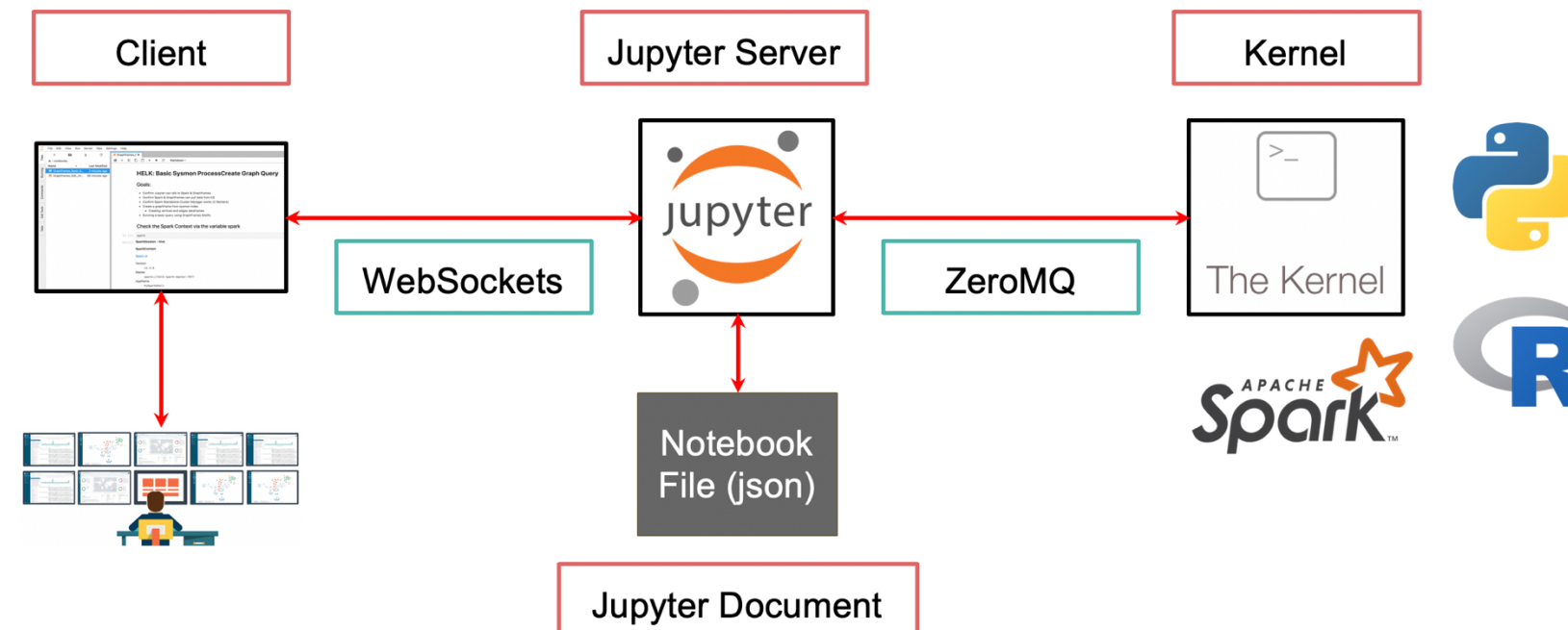


Jupyter Notebook is an **interactive client-server coding environment** kind of like a digital notebook that lets you write and run **code, text, equations, and visualizations** all in one place.

- **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 ³executes 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.)
-



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 displays the Anaconda website's download page. At the top, the navigation bar includes the Anaconda logo, links for Products, Solutions, Resources, and Company, and buttons for Free Download, Sign In, and Get Demo. The main heading is 'Download Now', with a subtext explaining that users can download Anaconda Distribution or Miniconda by choosing the proper installer. Below this, the 'Distribution' section offers a 'Get Started' button and a 'Returning Users' button (highlighted with a red box). A red arrow points from the 'Returning Users' button to the 'Distribution Installers' section. This section lists installers for Windows, Mac, and Linux, with the 'Download for Mac' button highlighted. To the right, the 'Miniconda Installers' section also lists installers for Windows, Mac, and Linux, with the 'Download for Mac' button highlighted. The bottom of the page features a 'Distribution' section with a list of benefits and a note for students and researchers.

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

- Windows
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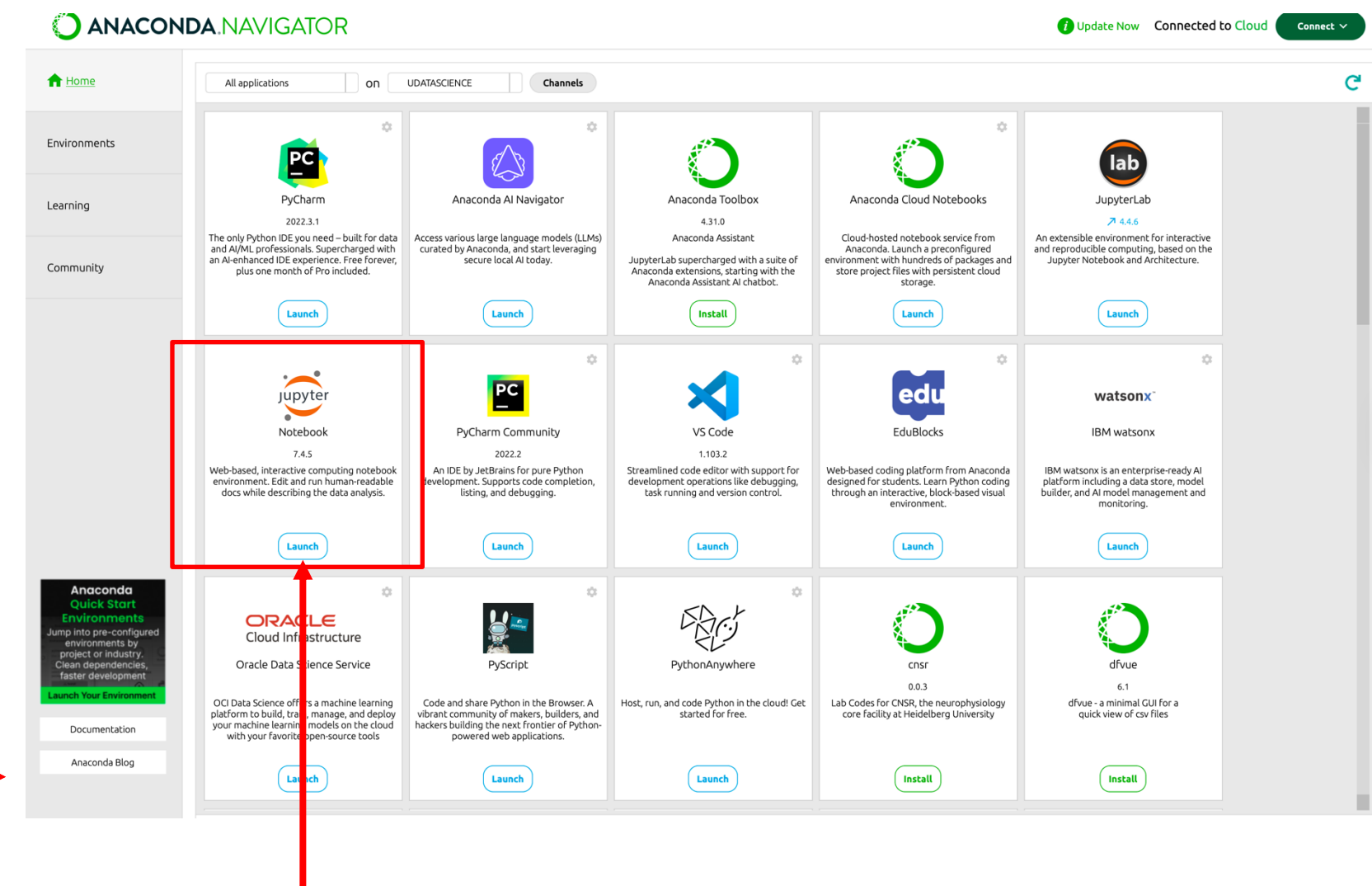
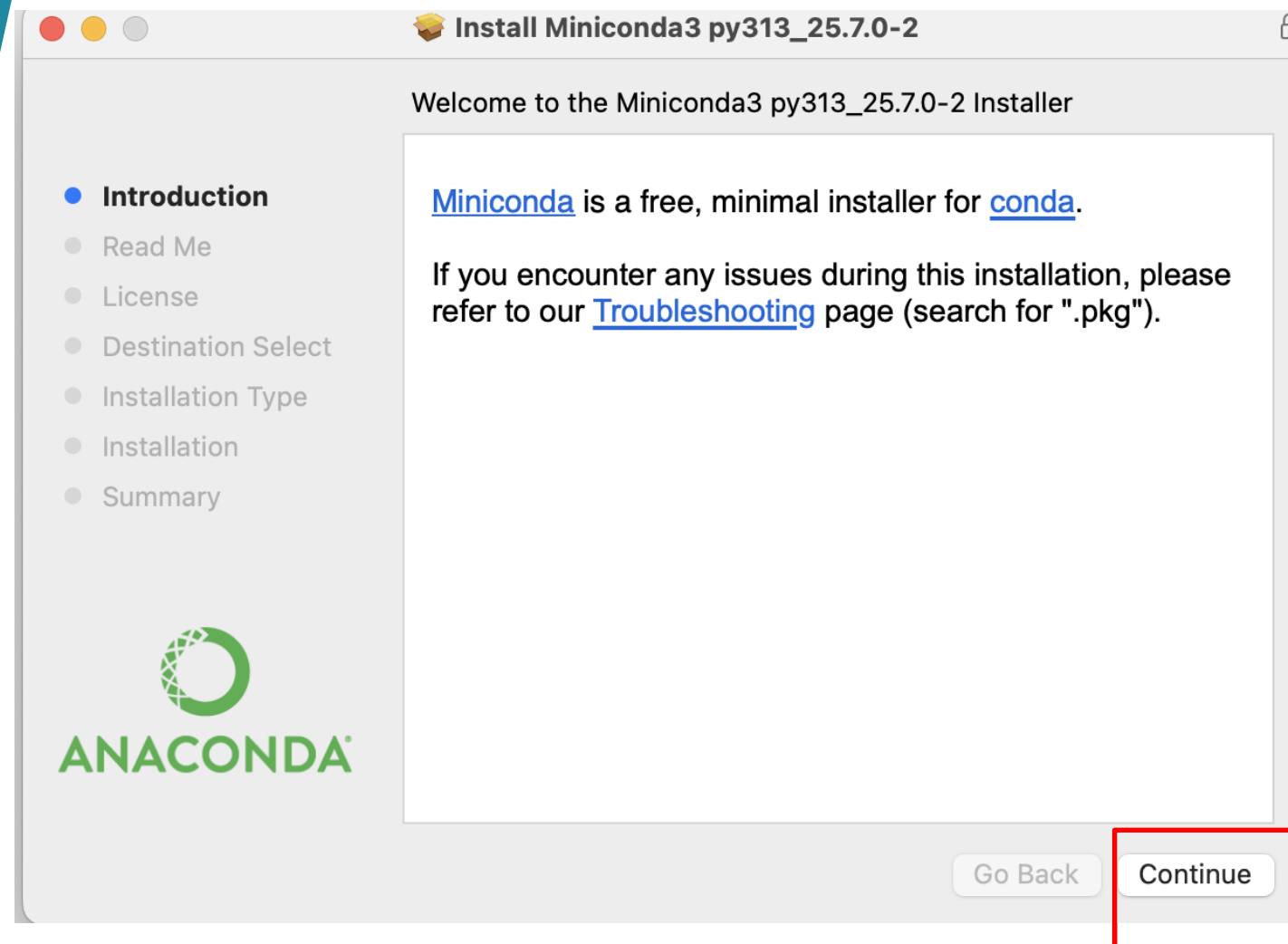
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Windows	▼
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Linux	▼

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 screenshot shows the Jupyter Notebook interface in a web browser. The browser address bar displays 'localhost:8889/lab'. The Jupyter Notebook interface includes a file browser on the left, a central area for notebooks and consoles, and a bottom toolbar. A red box highlights the file browser, and another red box highlights the 'New' button and the 'Python 3 (ipykernel)' option. A red arrow points from the 'New' button to the 'Python 3 (ipykernel)' option.

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

The screenshot shows the Jupyter Notebook interface. The header section includes the Jupyter logo, the notebook title 'Untitled8', the last checkpoint time '1 minute ago', a menu bar (File, Edit, View, Run, Kernel, Settings, Help), a toolbar with icons for file operations and execution, and a status bar showing 'JupyterLab' and 'Python 3.10 (tensorflow)'. The body section contains three cells: a Markdown cell with the text 'MARKDOWN CELL', a code cell with the code '#Test code cell' and 'print("Hello World")' followed by the output 'Hello World', and a raw cell. Red arrows point from labels on the right to each cell type.

Body

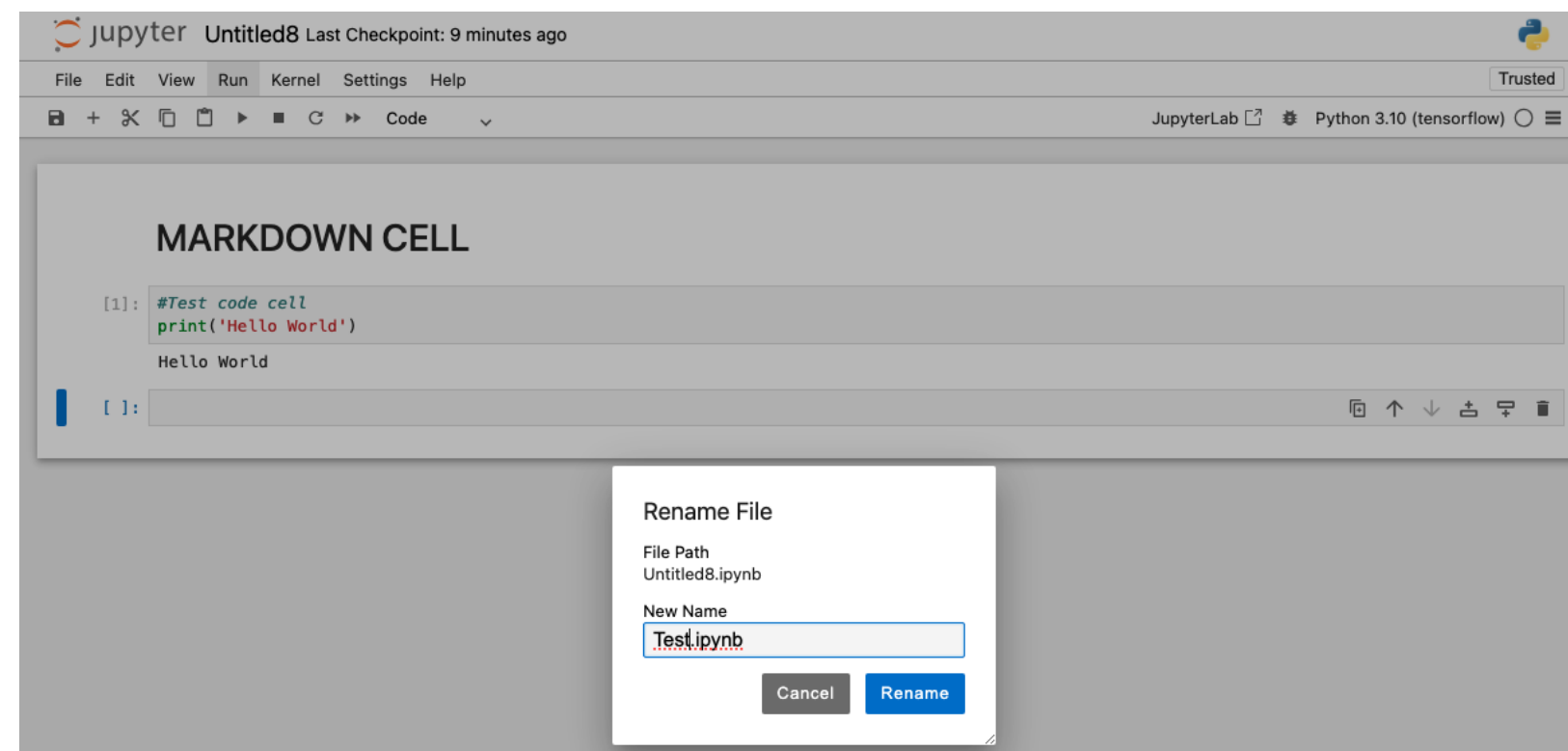
The screenshot shows the Jupyter Notebook interface with the cell selection menu open. The menu is open, showing options for Code, Markdown, and Raw. A red arrow points from the label 'Cell Selection: Code, Markdown, Raw' to the menu.



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

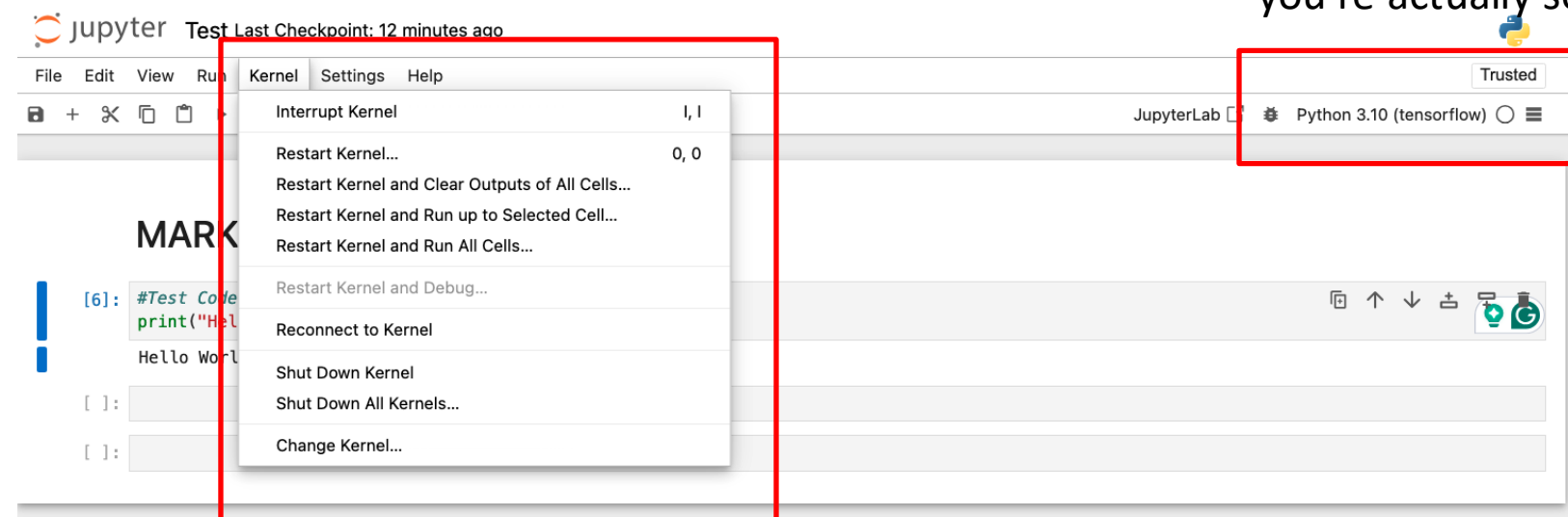
- Each notebook has one **active cell** at a time.
- **Green border → Edit mode:** you can type or change code/text.
- **Blue border → Command mode:** you can run, delete, or move cells.

```
In [1]: a = 10
```

```
In [1]: a = 10
```

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

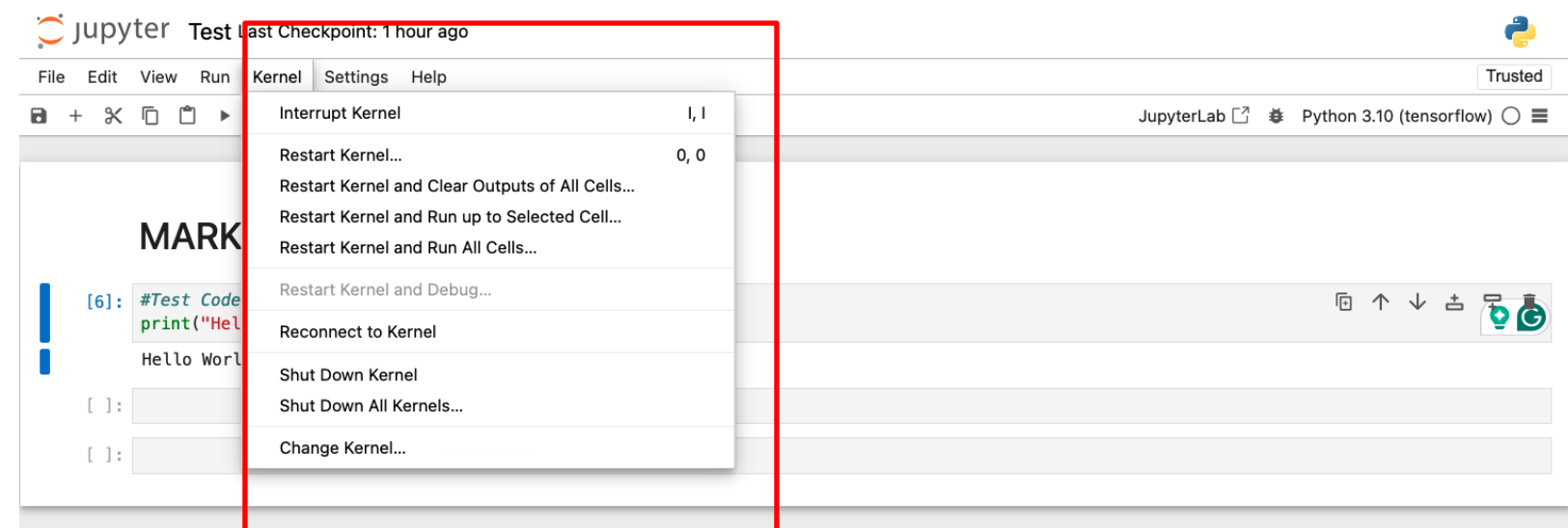
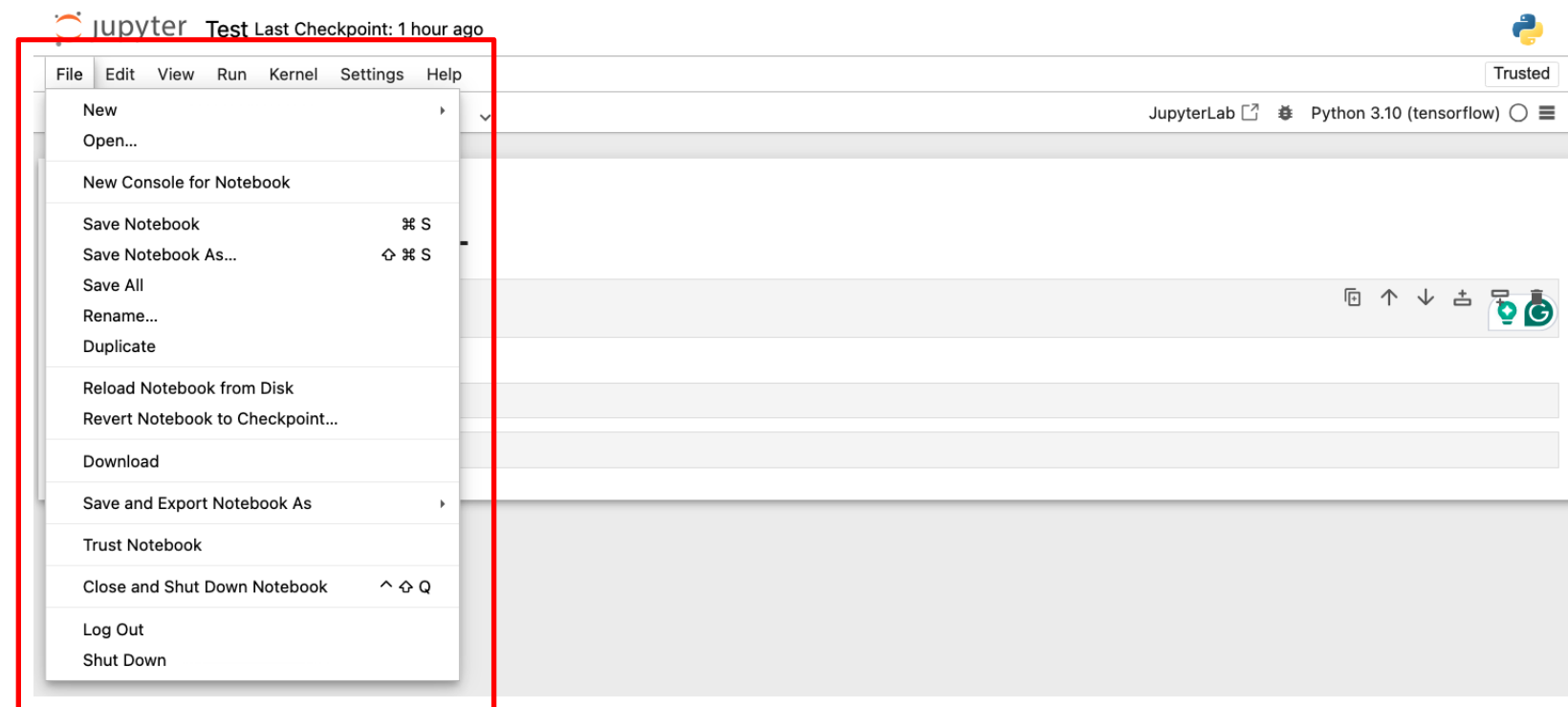
- **Restart:** Restarts the kernel and clears all variables.
- **Restart & Clear Output:** Also removes all cell outputs.
- **Restart & Run All:** Restarts and runs all cells from top to bottom.
- **Interrupt:** Stops a running process if it gets stuck.



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**.



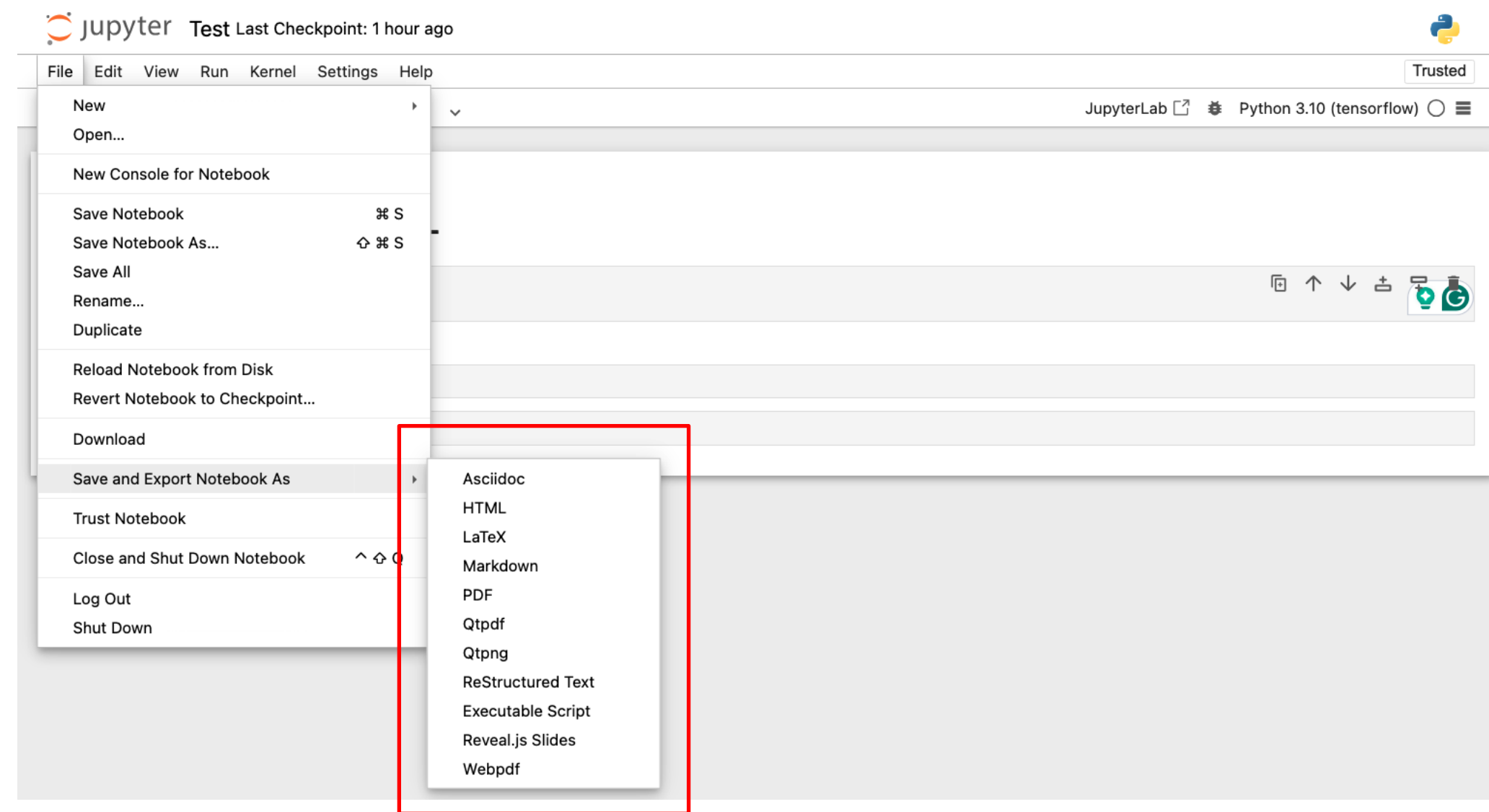


Exporting Jupyter Notebooks

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

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

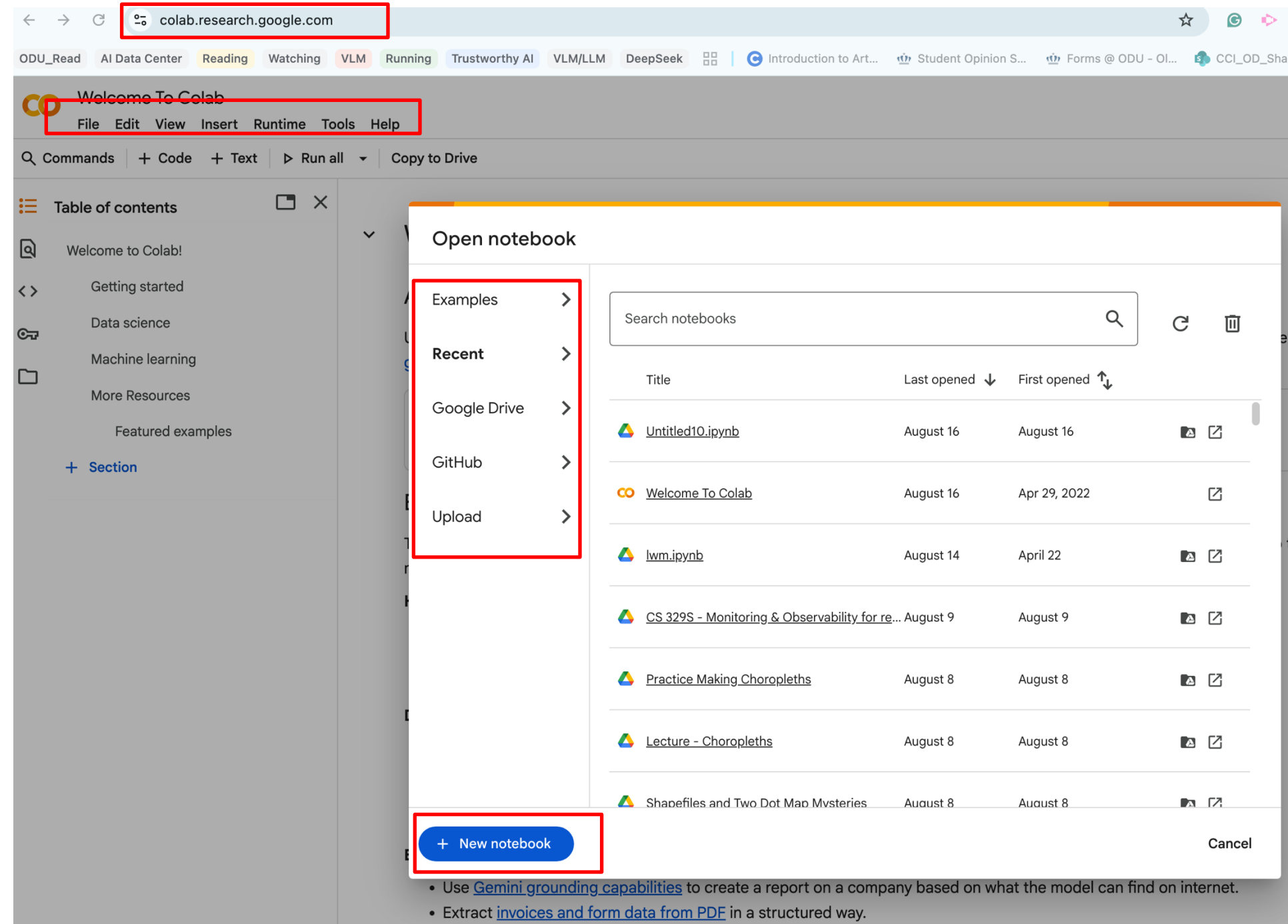
The “**Download as**” option in Jupyter lets you save your work in different formats to share with others.



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

