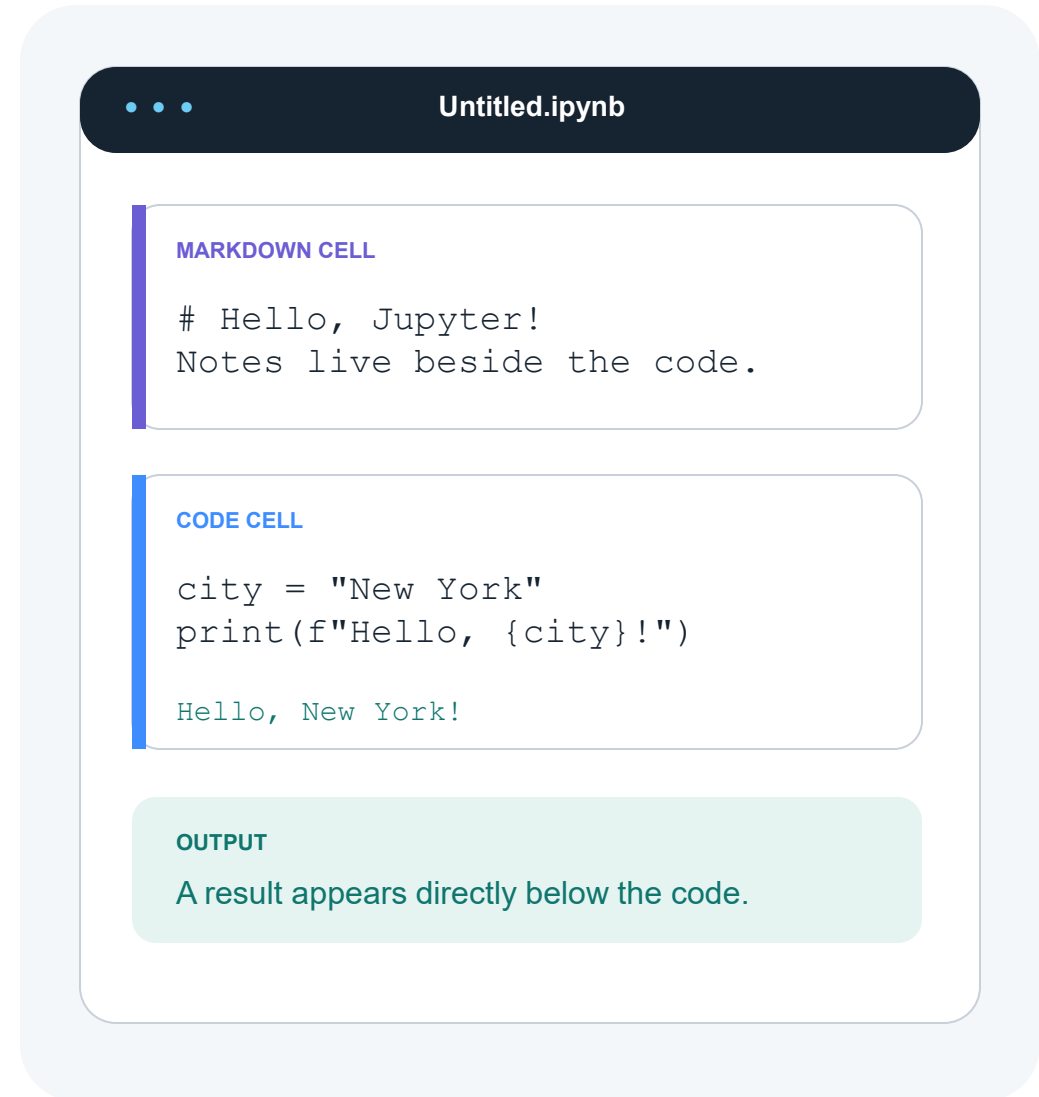


Jupyter Notebook

CSC 405/605/705



[START HERE](#)

A notebook is an executable document

It keeps the explanation, the code, and the results together—so your work is easy to follow and rerun.

WRITE

Narrative and equations

Use Markdown cells for headings, instructions, links, and math.

RUN

Live code

Execute Python—or another language—one cell at a time.

SEE

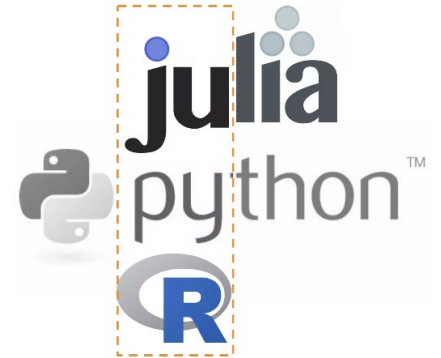
Results in place

Keep tables, charts, outputs, and observations beside the code.

Key idea: a .ipynb file preserves a computational story—not just a script.

Jupyter grew from the IPython project

The name honors three core languages: Julia, Python, and R. Today, the Jupyter ecosystem supports many languages through kernels.



Why this matters: the Notebook is not limited to Python, even though Python is a common starting point.

One notebook file can tell a complete computational story

Read from top to bottom: context → code → result → interpretation.

1

Markdown

Explain the question, assumptions, or steps.

2

Code

Run a small, focused piece of analysis.

3

Output

Inspect text, tables, charts, or errors.

4

Interpretation

Record what the result means and what comes next.

A tiny notebook example

```
# Average quiz score
```

```
scores = [70, 80, 90]  
sum(scores) / len(scores)
```

80.0

The class average is 80.

Notebooks are useful across the learning and data workflow

1

Learn

Test an idea one cell at a time.

2

Analyze

Clean, transform, and explore data.

3

Visualize

Create charts beside the analysis.

4

Document

Write explanations with the work.

5

Share

Export or send a reproducible record.

6

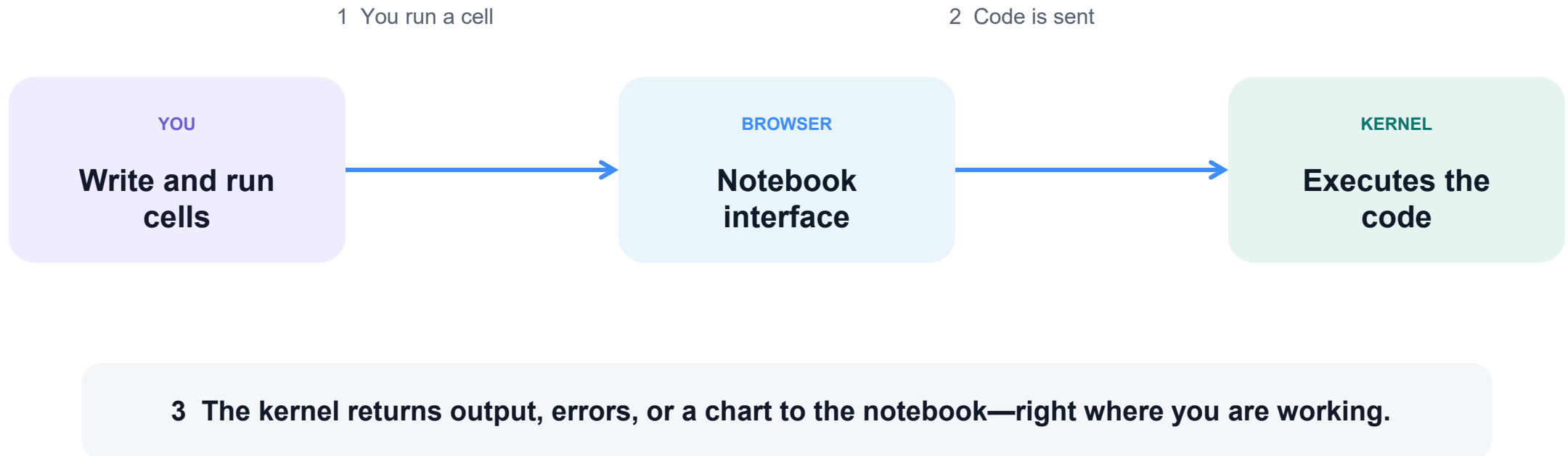
Collaborate

Use a common file for code and discussion.

Best fit: questions where seeing the intermediate steps is part of the learning.

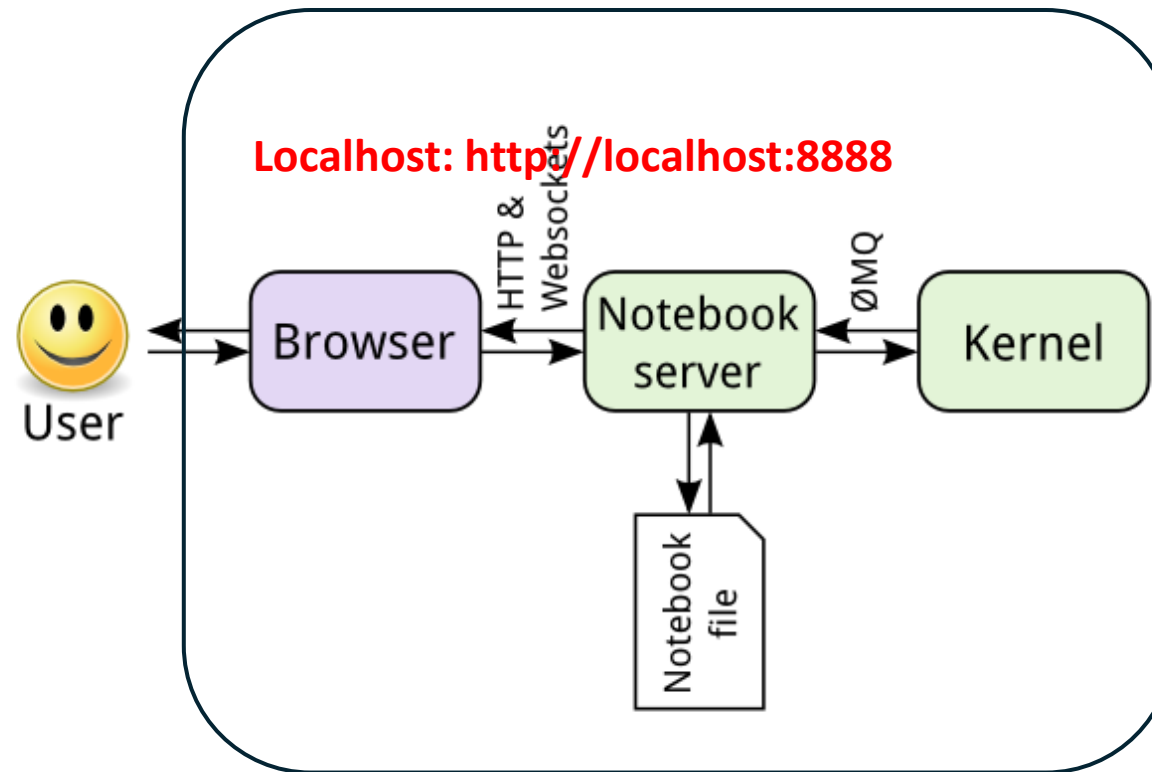
The browser, server, and kernel each have a job

The Notebook interface runs in your browser. A kernel is the process that executes your code and remembers its state.



The browser, server, and kernel each have a job

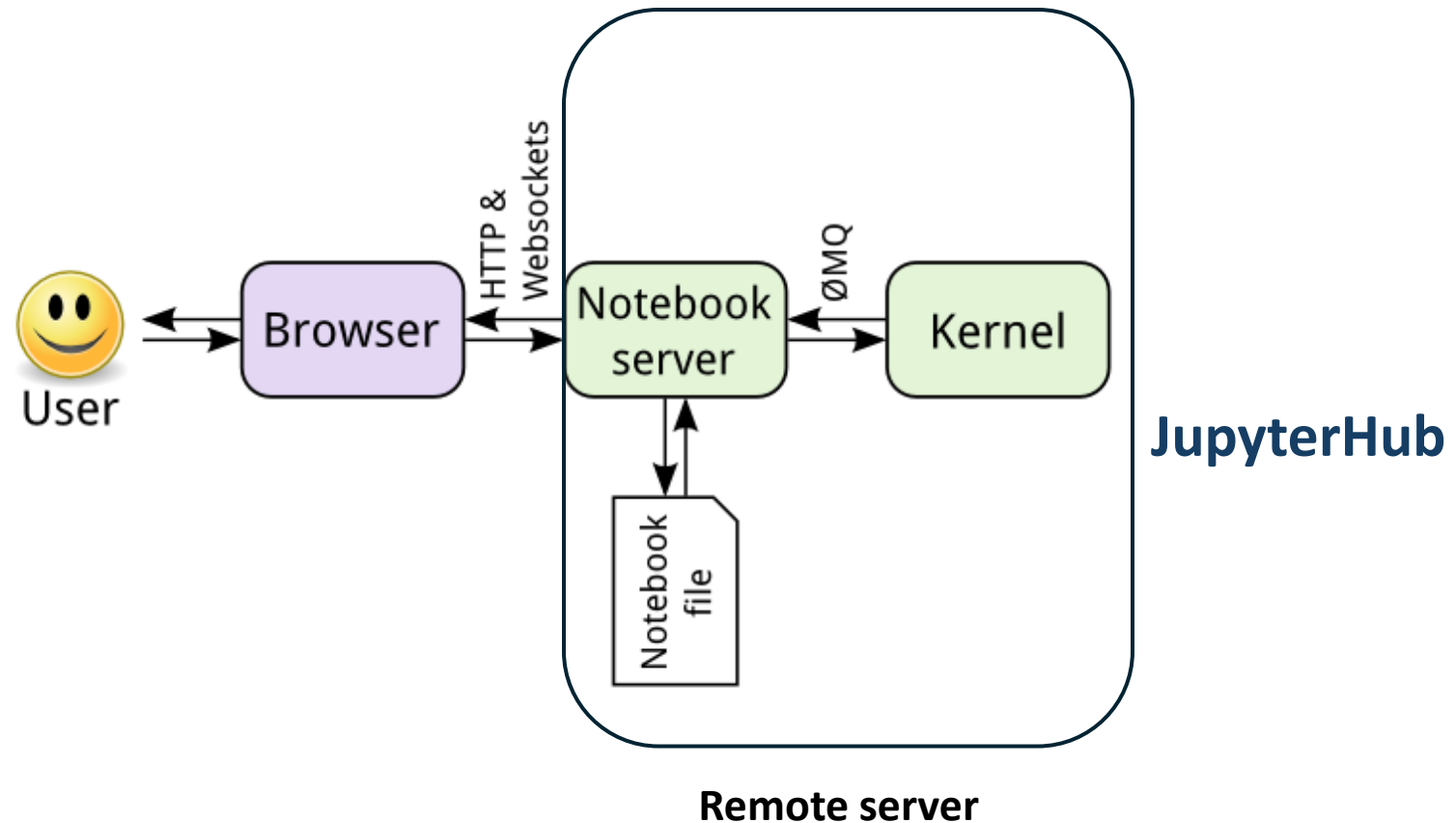
The Notebook interface runs in your browser. A kernel is the process that executes your code and remembers its state.



All on your local computer

The browser, server, and kernel each have a job

The Notebook interface runs in your browser. A kernel is the process that executes your code and remembers its state.



Cells are the basic building blocks

Use Markdown for explanation and code cells for computation. Run the active cell with Shift + Enter.

MARKDOWN CELL

```
# My first notebook  
This is a place for code and notes.
```

Rendered as formatted text

CODE CELL

```
x = 7  
x * 6
```

42

A few helpful moves

● Run

Shift + Enter runs a cell and moves forward.
Ctrl + Enter: Run selected cell(s).
Alt + Enter: Run cell and insert cell below.

● Add

Press Esc then B to add a cell below.

● Switch

Use M for Markdown and Y for Code.

Jupyter Notebook Shortcuts

- **Edit Mode (Typing/Code Actions)**
 - **Enter**: Enter Edit Mode.
 - **Tab**: Code completion or indent.
 - **Shift + Tab**: Show function docstring/tooltip.
 - **Ctrl + /**: Comment/uncomment lines.
 - **Ctrl +]**: Increase indent.
 - **Ctrl + [**: Decrease indent.
 - **Ctrl + Z**: Undo.
 - **Ctrl + Shift + Z** or **Ctrl + Y**: Redo.
 - **Ctrl + F**: Find.

Jupyter Notebook Shortcuts

- **Command Mode (Cell Actions)**

- **Esc**: Enter Command Mode.
- **A**: Insert cell Above.
- **B**: Insert cell Below.
- **D, D**: Delete cell (press D twice).
- **X**: Cut selected cell(s).
- **C**: Copy selected cell(s).
- **V**: Paste cell(s) below.
- **Z**: Undo cell deletion
- **Shift + M**: Merge selected cells.

- **Command Mode (Cell Actions)**

- **Y**: Change cell to Y (Code).
- **M**: Change cell to Markdown.
- **R**: Change cell to Raw.
- **Shift + Enter**: Run cell and select cell below.
- **Ctrl + Enter**: Run selected cell(s).
- **Alt + Enter**: Run cell and insert cell below.
- **S**: Save notebook (also Ctrl + S).

Install Jupyter Notebook in one of two common ways

If Python is new to you, a distribution such as Anaconda can be a comfortable start. If you already manage Python environments, install the Notebook package with pip.

PATH A

Anaconda / conda

1. Download Anaconda
2. Install it
3. Launch from Navigator or a terminal

```
jupyter notebook
```

PATH B

pip (existing Python setup)

Open a terminal, then install and launch:

```
pip install notebook
```

```
jupyter notebook
```

Tip: work in a dedicated project folder before you launch.

<https://jupyter.org/install>

<https://docs.jupyter.org/en/stable/install/notebook-classic.html>

Install Jupyter Notebook in one of two common ways

A Common Error You May Encounter

```
Command Prompt
Microsoft Windows [Version 10.0.26100.7171]
(c) Microsoft Corporation. All rights reserved.

C:\Users\X_LI12>jupyter notebook
'jupyter' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\X_LI12>
```

How to resolve:

```
Command Prompt
Microsoft Windows [Version 10.0.26100.7171]
(c) Microsoft Corporation. All rights reserved.

C:\Users\X_LI12>jupyter notebook
'jupyter' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\X_LI12>python -m jupyter --version
Selected Jupyter core packages...
IPython          : 9.8.0
ipykernel        : 7.1.0
ipywidgets       : not installed
jupyter_client   : 8.7.0
jupyter_core     : 5.9.1
```

```
C:\Users\X_LI12>python -m notebook
[I 2025-12-09 14:23:55.595 ServerApp] Extension package jupyter
[I 2025-12-09 14:23:55.939 ServerApp] Extension package jupyter
[I 2025-12-09 14:23:56.557 ServerApp] jupyter_lsp | extension
[I 2025-12-09 14:23:56.560 ServerApp] jupyter_server_terminal
[I 2025-12-09 14:23:56.564 ServerApp] jupyterlab | extension
[I 2025-12-09 14:23:56.567 ServerApp] notebook | extension wa
[I 2025-12-09 14:23:56.843 ServerApp] notebook_shim | extensi
[I 2025-12-09 14:23:57.104 ServerApp] notebook_shim | extensi
[I 2025-12-09 14:23:57.105 ServerApp] jupyter_lsp | extension
[I 2025-12-09 14:23:57.106 ServerApp] jupyter_server_terminal
[I 2025-12-09 14:23:57.108 LabApp] JupyterLab extension load
eFoundation.Python.3.13_qbz5n2kfra8p0\LocalCache\local-packag
[I 2025-12-09 14:23:57.108 LabApp] JupyterLab application di
wareFoundation.Python.3.13_qbz5n2kfra8p0\LocalCache\local-pac
[I 2025-12-09 14:23:57.109 LabApp] Extension Manager is 'pyp
```

Install Jupyter Notebook in one of two common ways

If you see an error page, try manually opening the browser...



Your file couldn't be accessed

It may have been moved, edited, or deleted.

ERR_FILE_NOT_FOUND

```
C:\Users\X_LI12>python -m notebook --no-browser
[I 2025-12-09 14:28:12.771 ServerApp] jupyter_lsp | extension was successfully linked.
[I 2025-12-09 14:28:12.775 ServerApp] jupyter_server_terminals | extension was successfully linked.
[I 2025-12-09 14:28:12.779 ServerApp] jupyterlab | extension was successfully linked.
[I 2025-12-09 14:28:12.783 ServerApp] notebook | extension was successfully linked.
[I 2025-12-09 14:28:13.035 ServerApp] notebook_shim | extension was successfully linked.
[I 2025-12-09 14:28:13.218 ServerApp] notebook_shim | extension was successfully loaded.
[I 2025-12-09 14:28:13.220 ServerApp] jupyter_lsp | extension was successfully loaded.
[I 2025-12-09 14:28:13.220 ServerApp] jupyter_server_terminals | extension was successfully loaded.
[I 2025-12-09 14:28:13.222 LabApp] JupyterLab extension loaded from C:\Users\X_LI12\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.13_qbz5n2kfra8p0\LocalCache\PackageCache\PythonSoftwareFoundation.Python.3.13_qbz5n2kfra8p0\python313\jupyterlab
[I 2025-12-09 14:28:13.222 LabApp] JupyterLab application directory is C:\Users\X_LI12\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.13_qbz5n2kfra8p0\LocalCache\PackageCache\PythonSoftwareFoundation.Python.3.13_qbz5n2kfra8p0\python313\jupyterlab
[I 2025-12-09 14:28:13.223 LabApp] Extension Manager is 'pypi'.
[I 2025-12-09 14:28:13.486 ServerApp] jupyterlab | extension was successfully loaded.
[I 2025-12-09 14:28:13.489 ServerApp] notebook | extension was successfully loaded.
[I 2025-12-09 14:28:13.490 ServerApp] Serving notebooks from local directory: C:\Users\X_LI12
[I 2025-12-09 14:28:13.490 ServerApp] Jupyter Server 2.17.0 is running at:
[I 2025-12-09 14:28:13.490 ServerApp] http://localhost:8888/tree?token=4e2393d5036c0834b602226993b83a3463ad2c0349532d63
[I 2025-12-09 14:28:13.490 ServerApp] http://127.0.0.1:8888/tree?token=4e2393d5036c0834b602226993b83a3463ad2c0349532d63
[I 2025-12-09 14:28:13.491 ServerApp] Use Control-C to stop this server and shut down all kernels (twice to skip output)

To access the server, open this file in a browser:
file:///C:/Users/X_LI12/AppData/Local/Packages/PythonSoftwareFoundation.Python.3.13_qbz5n2kfra8p0/LocalCache/PackageCache/PythonSoftwareFoundation.Python.3.13_qbz5n2kfra8p0/python313/jupyterlab
Or copy and paste one of these URLs:
http://localhost:8888/tree?token=4e2393d5036c0834b602226993b83a3463ad2c0349532d63
http://127.0.0.1:8888/tree?token=4e2393d5036c0834b602226993b83a3463ad2c0349532d63
[I 2025-12-09 14:28:13.572 ServerApp] Skipped non-installed server(s): basedpyright, bash-language-server, docstring-generator, r-languageserver, sql-language-server, texlab, typescript-language-server, unified-language-server, vscode-languagetool, yamllint
```

Your first five minutes in a notebook

1

Launch

Run jupyter notebook; your browser opens a file dashboard.

2

Create

Choose New → Python 3 (or the installed kernel).

3

Write

Type a small expression, for example $2 + 2$.

4

Run

Press Shift + Enter and read the output.

5

Save

Rename the notebook and use File → Save and Checkpoint.

TRY THIS

```
name = "Ada"
message = f"Hello,
{name}!"
message

'Hello, Ada!'
```

Mini-challenge: change the name, then add a Markdown heading above the code.

Keep learning with the official Jupyter resources

Start with one small notebook and build confidence by changing, running, and explaining what you see.

Install & launch

jupyter.org/install

Current installation commands and options.

Notebook docs

jupyter-notebook.readthedocs.io

Guides, user interface help, and examples.

Try in the browser

try.jupyter.org

Explore Jupyter without a local install.