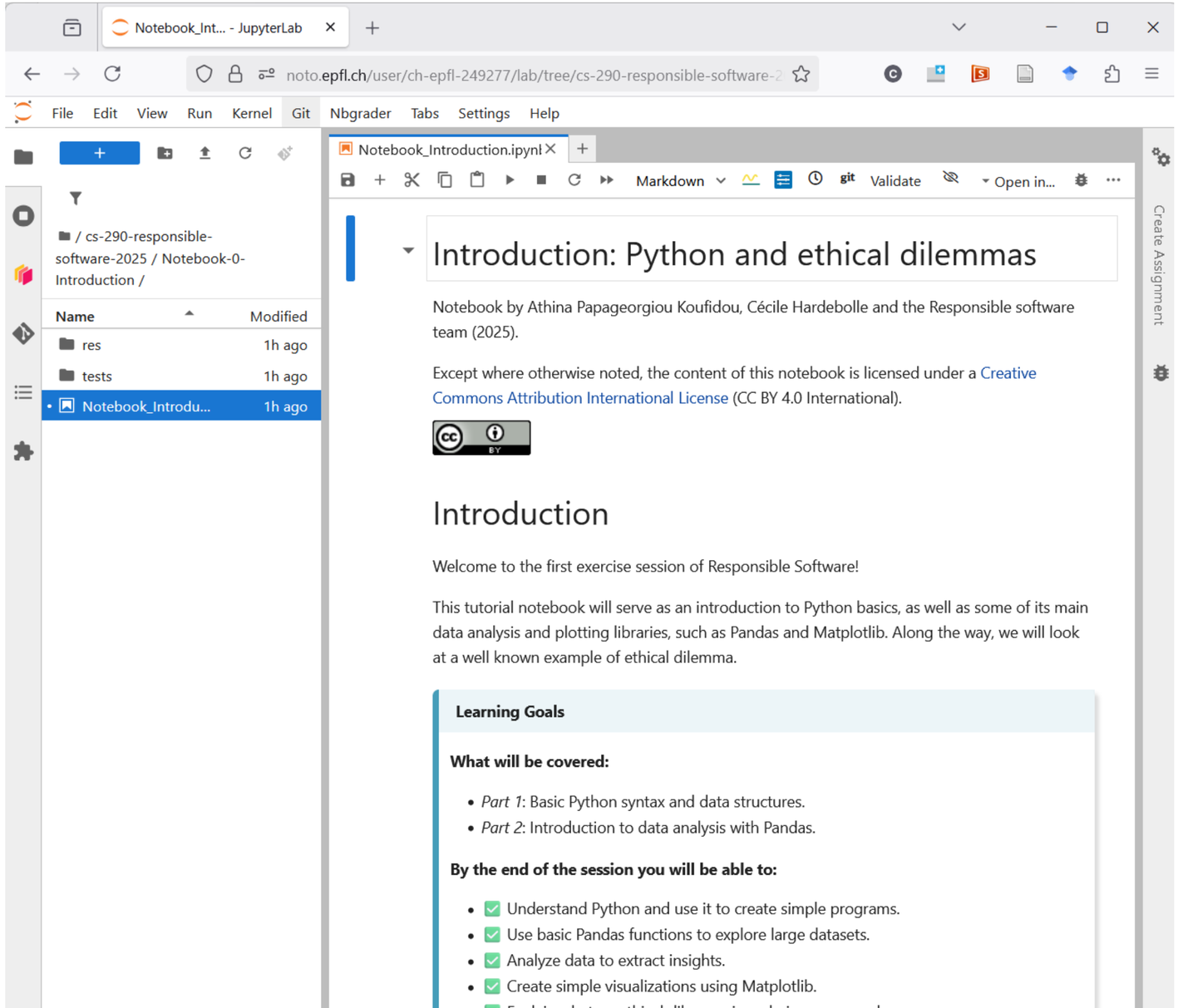
Jupyter Notebooks



- **Interactive documents** with explanations and executable code

- Execute in a **browser** with http://**noto**.epfl.ch

  (as an alternative, VS Code can be used but we don't provide support for it)

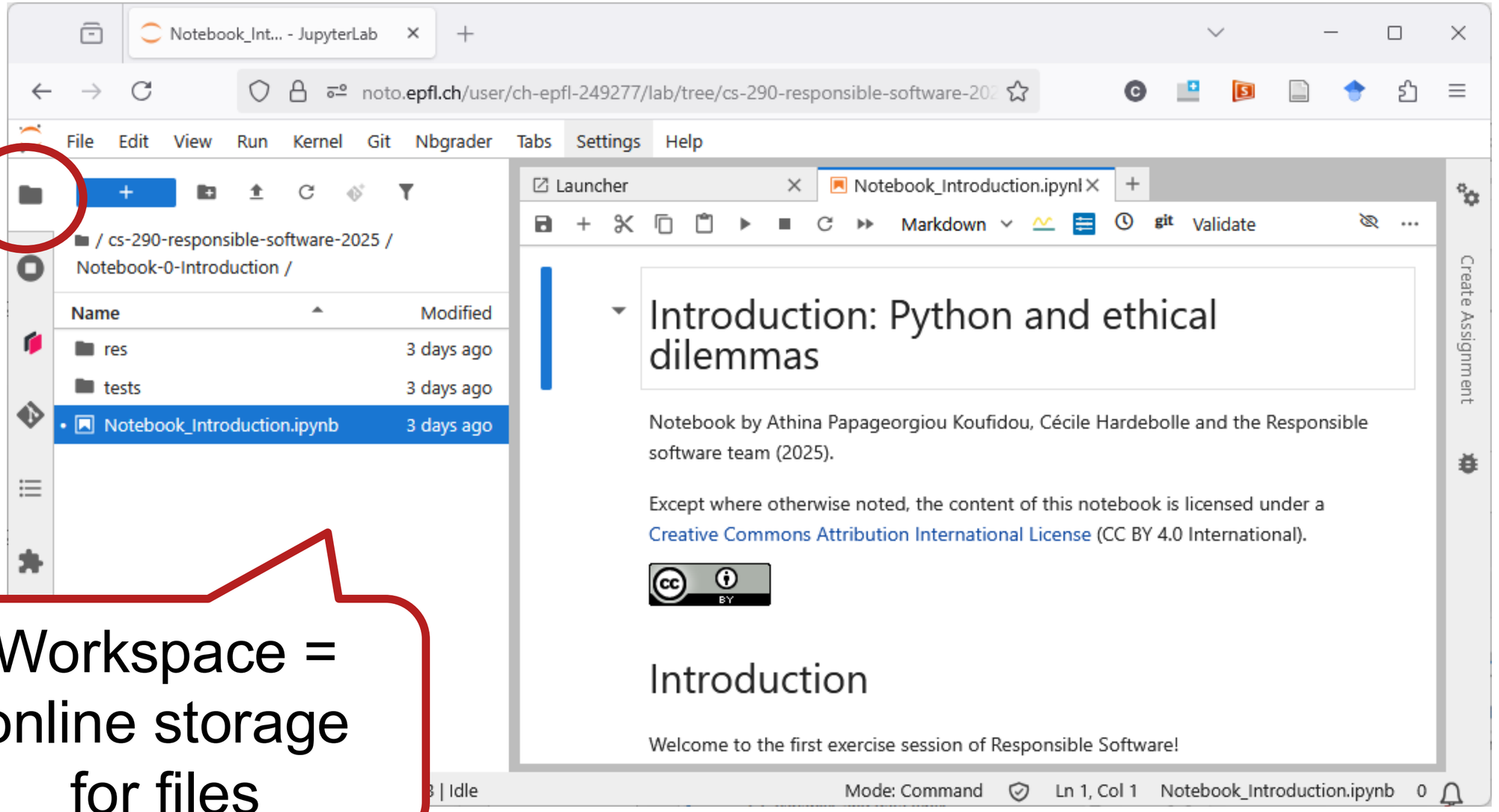
Getting Started with Jupyter Notebooks and noto

Equipment for Using Notebooks in noto

- Computer
  - Personal laptop
  - Machines in the computer rooms:
    - Default OS
    - Or Virtual Machine

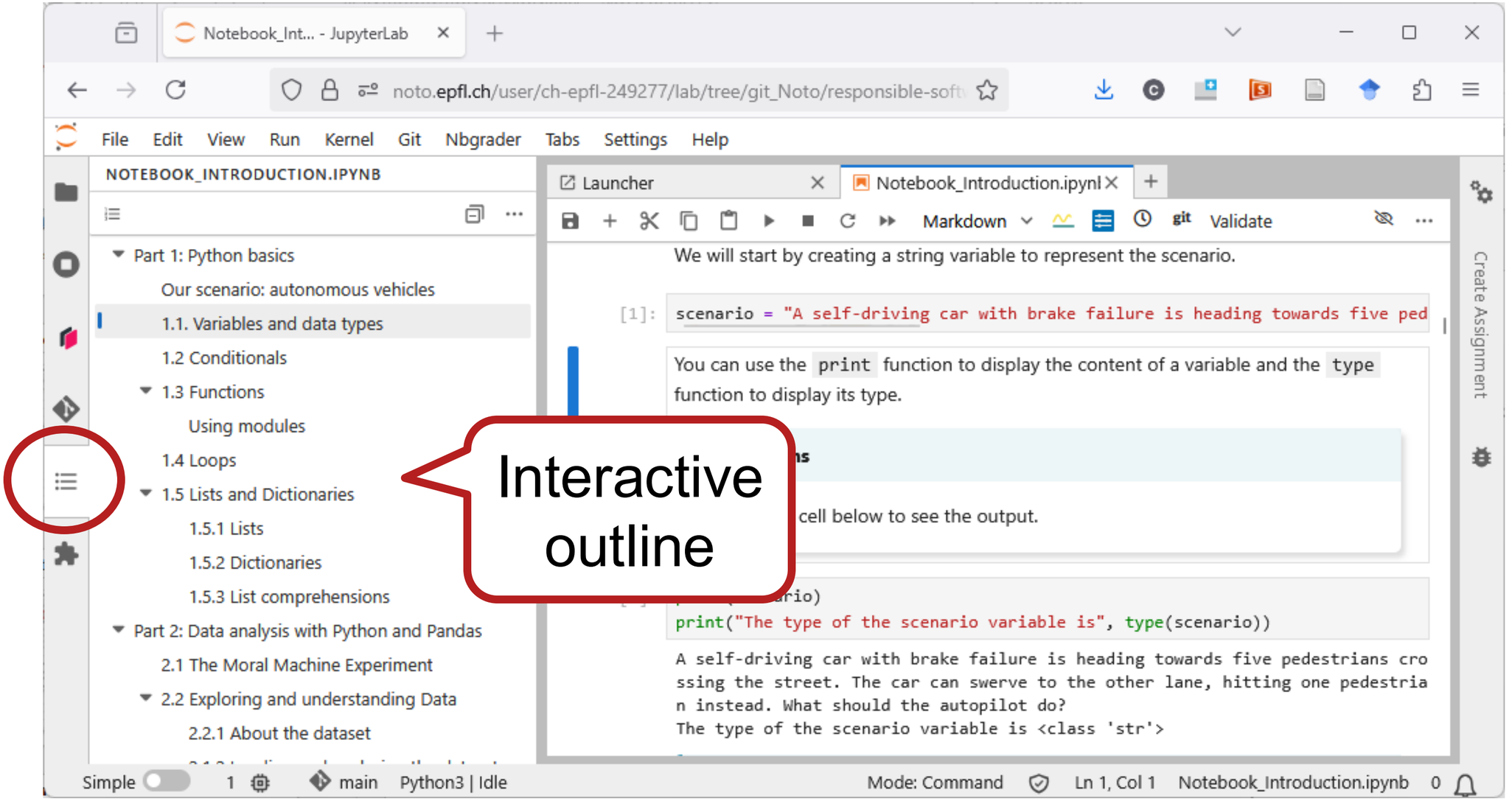
- **Recent** web browser
  - **Firefox, Chrome / Chromium**
  - Avoid Safari or Edge!

Personal Workspace on noto

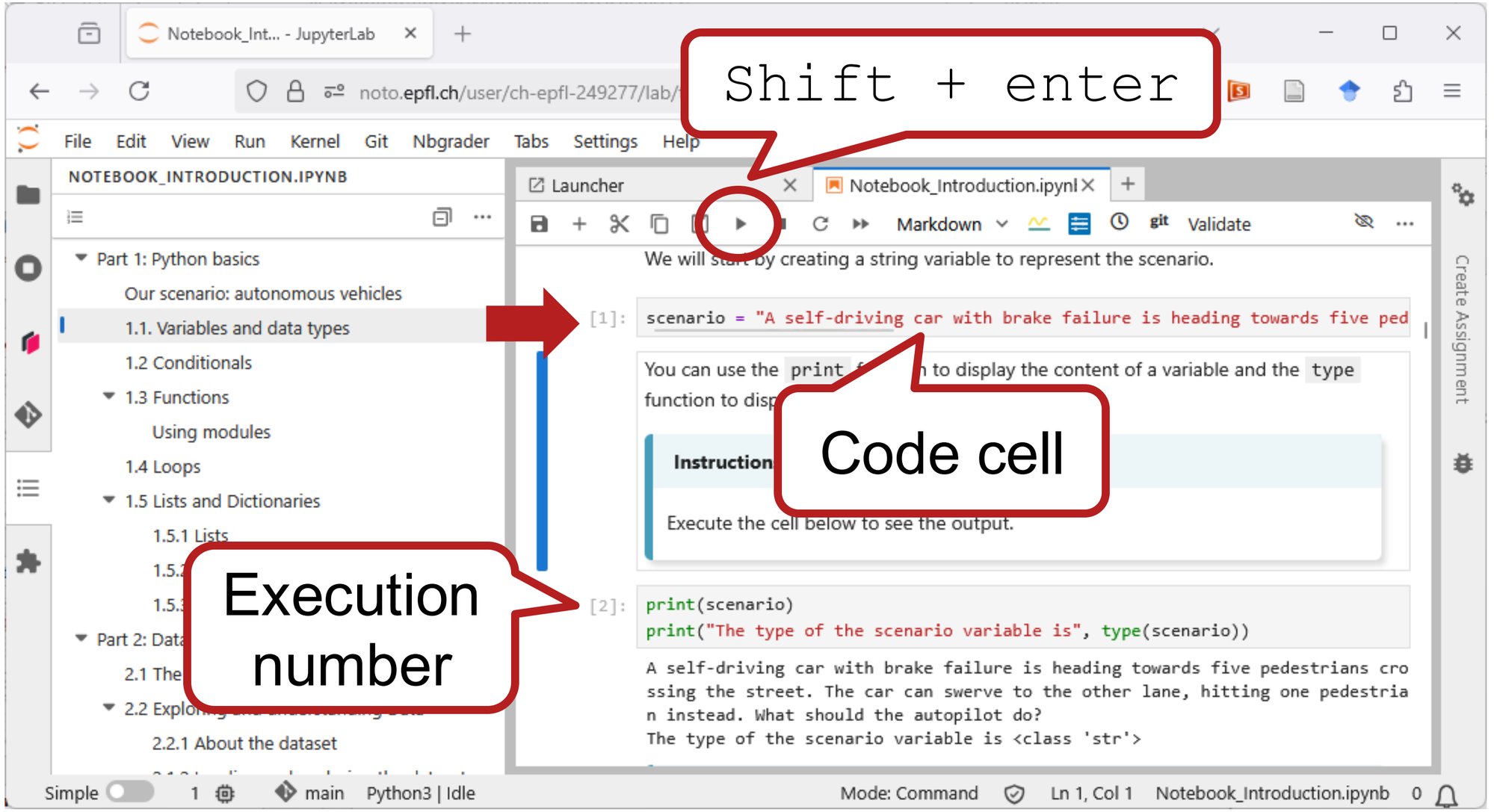


Workspace = online storage for files

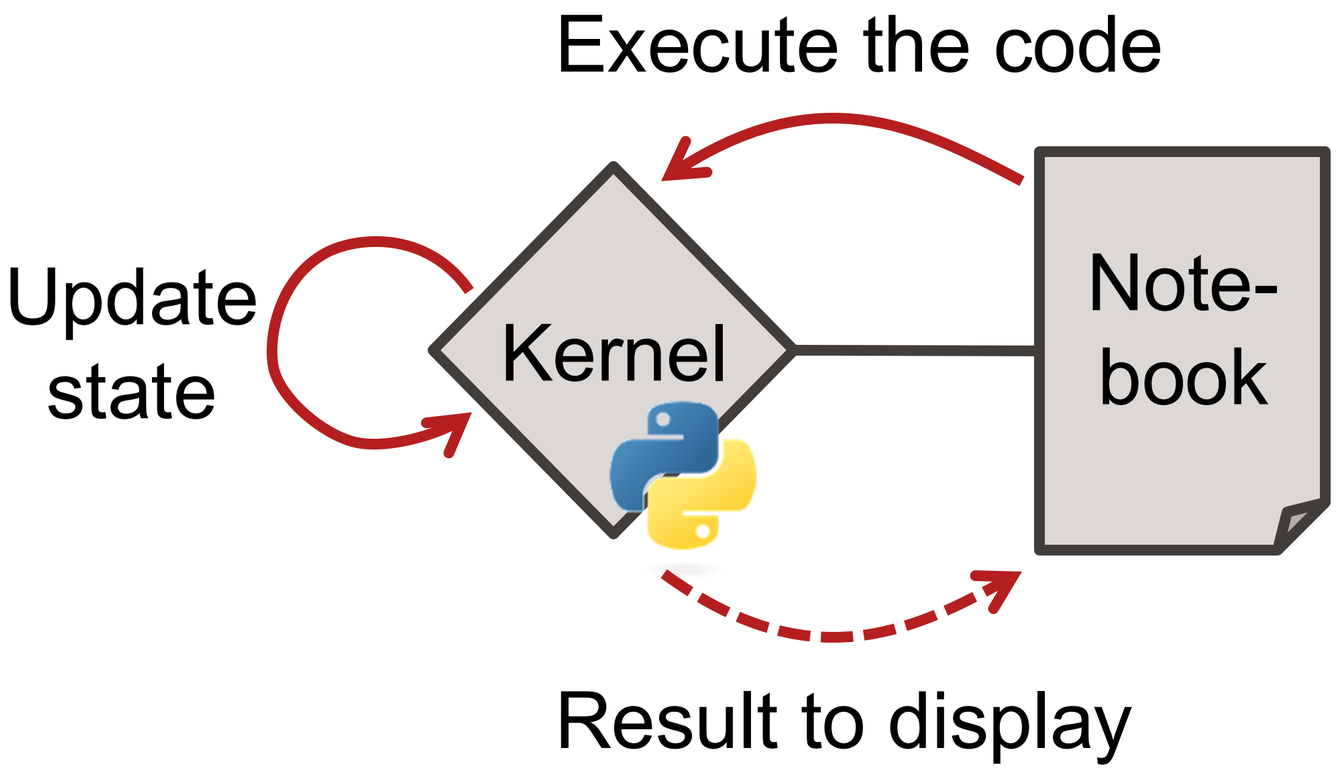
Navigating Notebooks



Executing Code



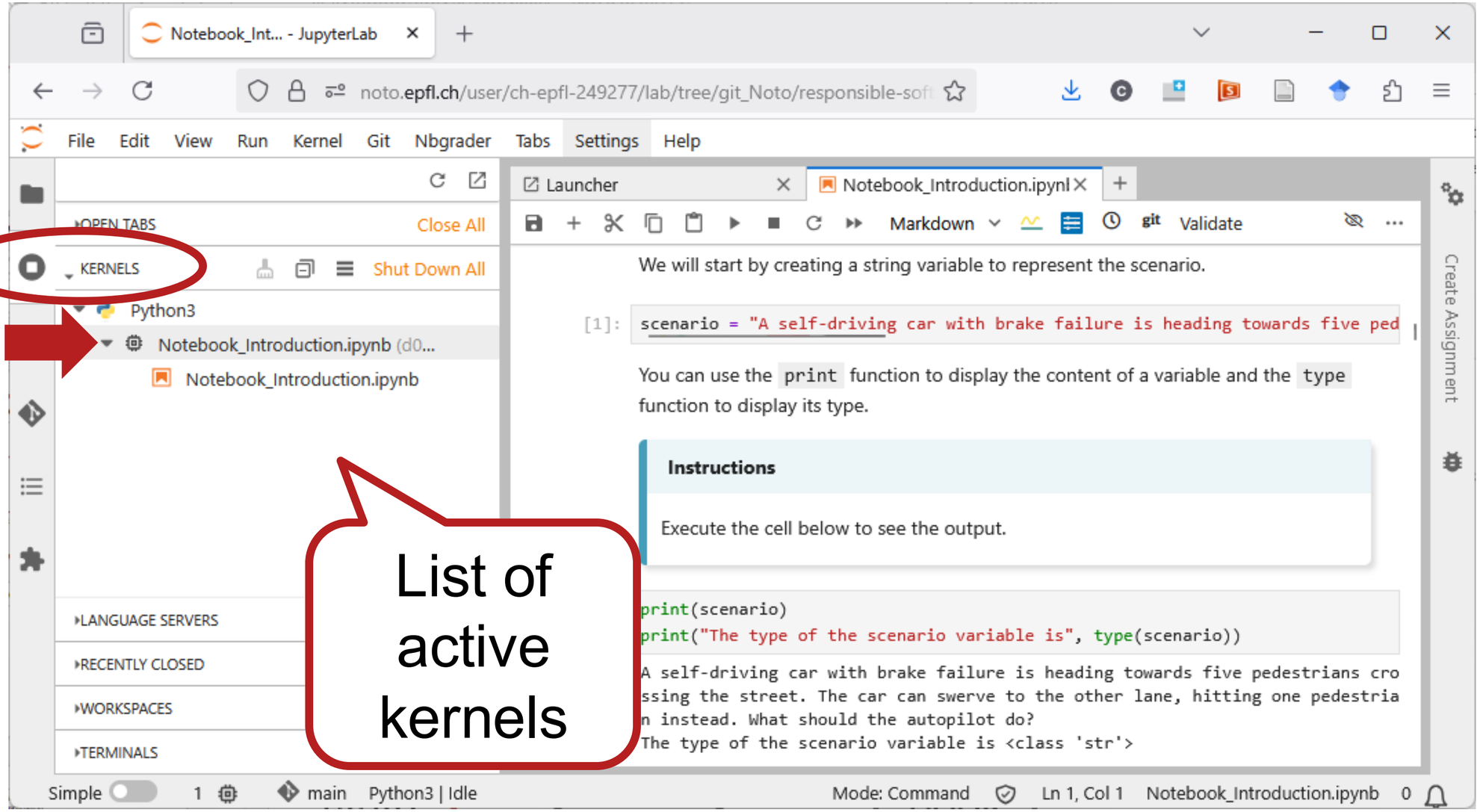
How do Notebooks Work?



The kernel:

- Maintains the **execution state** behind the notebook = all the variables with their values
- Is **separate from the notebook**

Where is the Kernel?



Can I see the Execution State?

Displaying variables in the notebook:

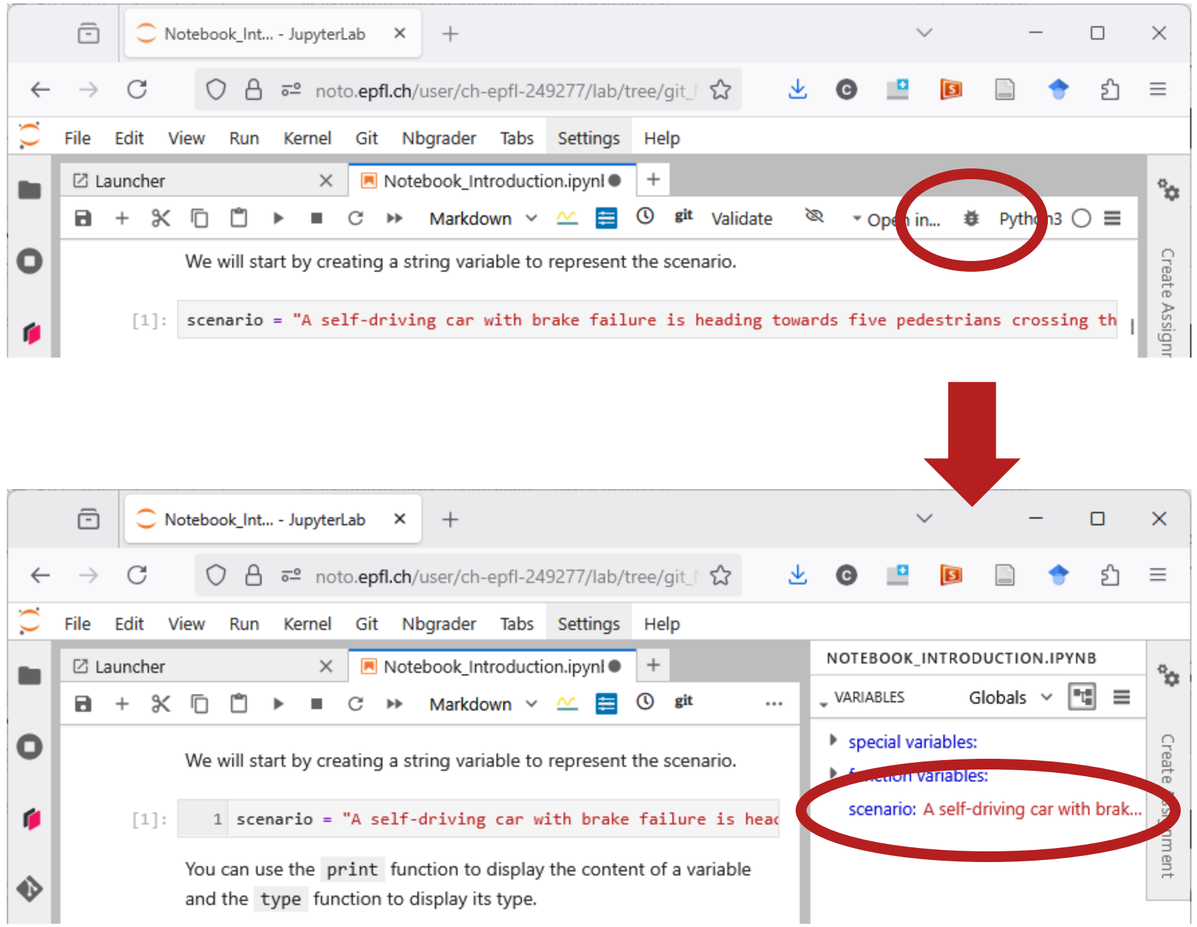
- `print(...)`

```
[5]: scenario = "A self-driving car with brake failure is heading towards five pedest
     print(scenario)

     A self-driving car with brake failure is heading towards five pedestrians crossi
     ng the street. The car can swerve to the other lane, hitting one pedestrian inst
     ead. What should the autopilot do?
```

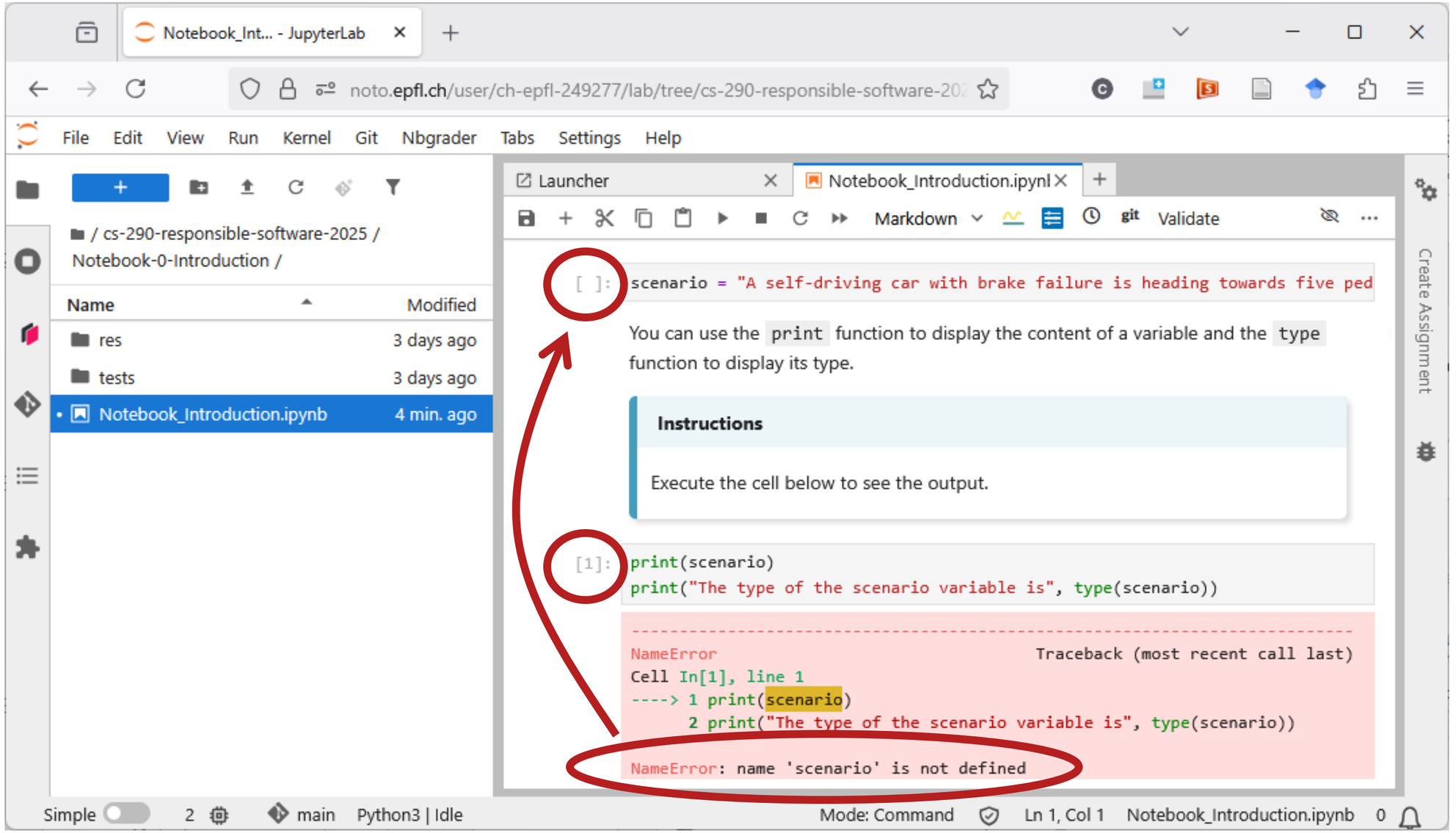
- Last line of cell

```
[4]: scenario = "A self-driving car with brake failure is heading towards five pedest
     scenario

[4]: 'A self-driving car with brake failure is heading towards five pedestrians cross
     ing the street. The car can swerve to the other lane, hitting one pedestrian ins
     tead. What should the autopilot do?'
```

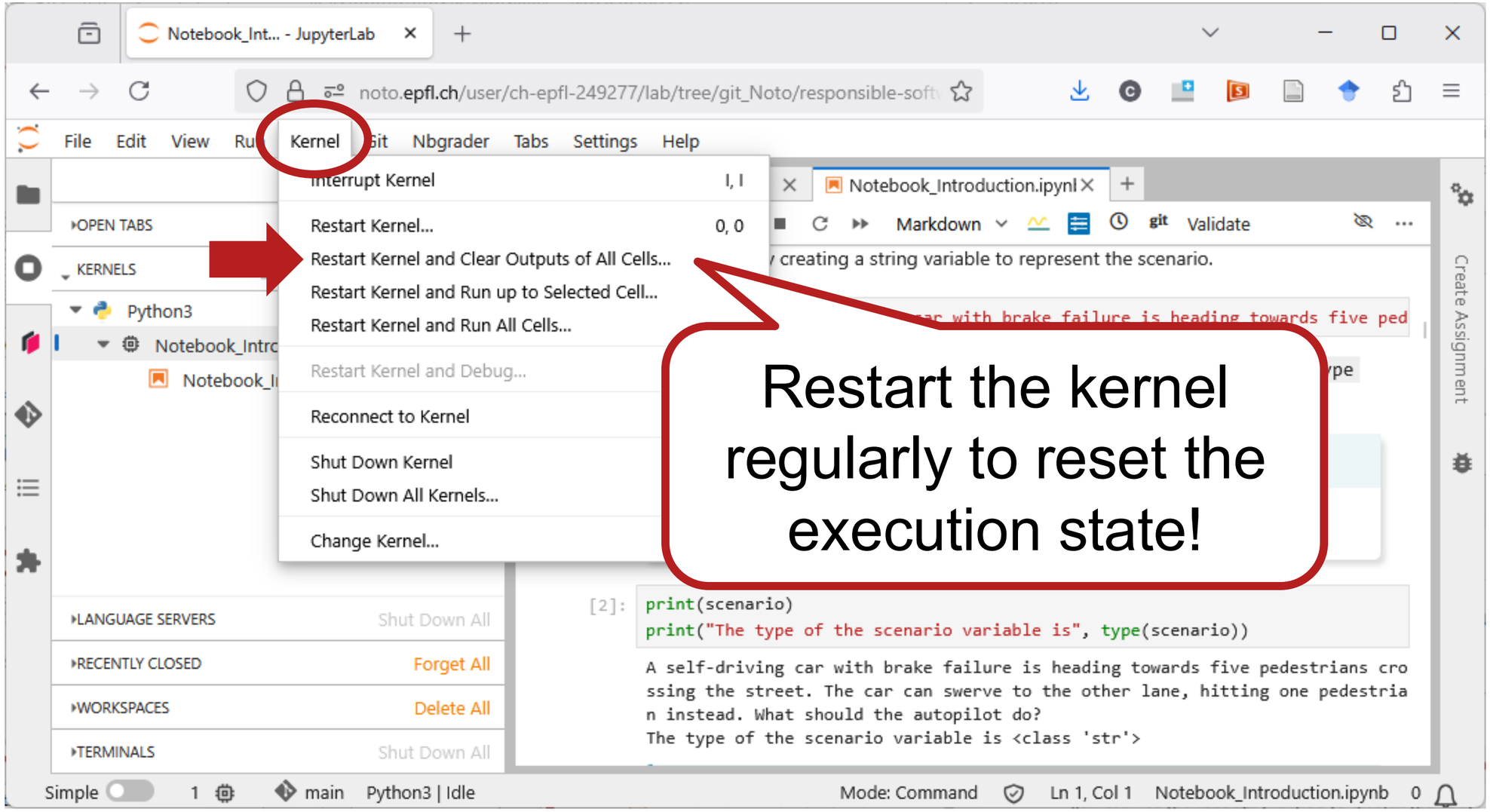
Using the Python debugger:



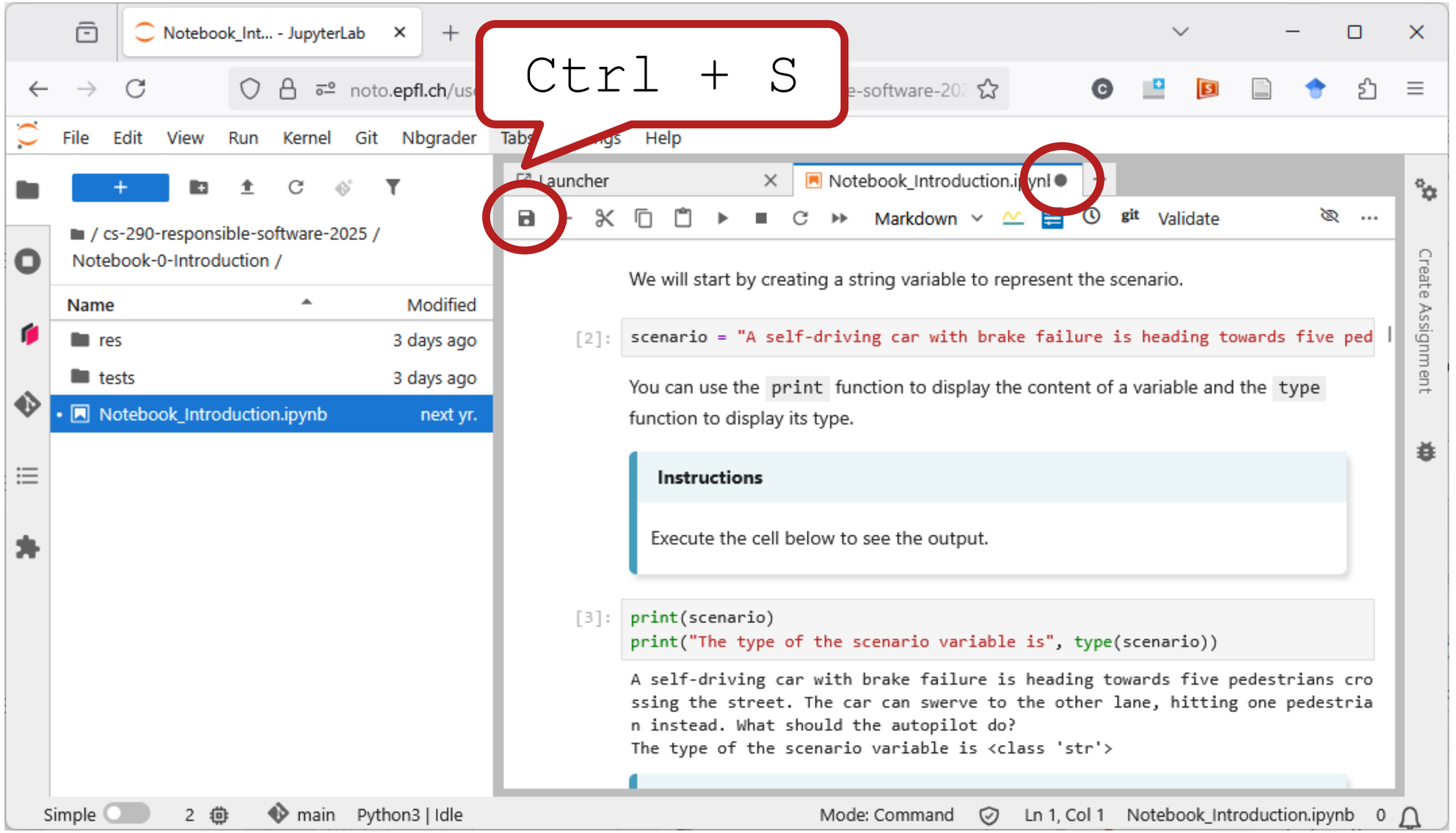
The Order in Which You Run Cells Matters!



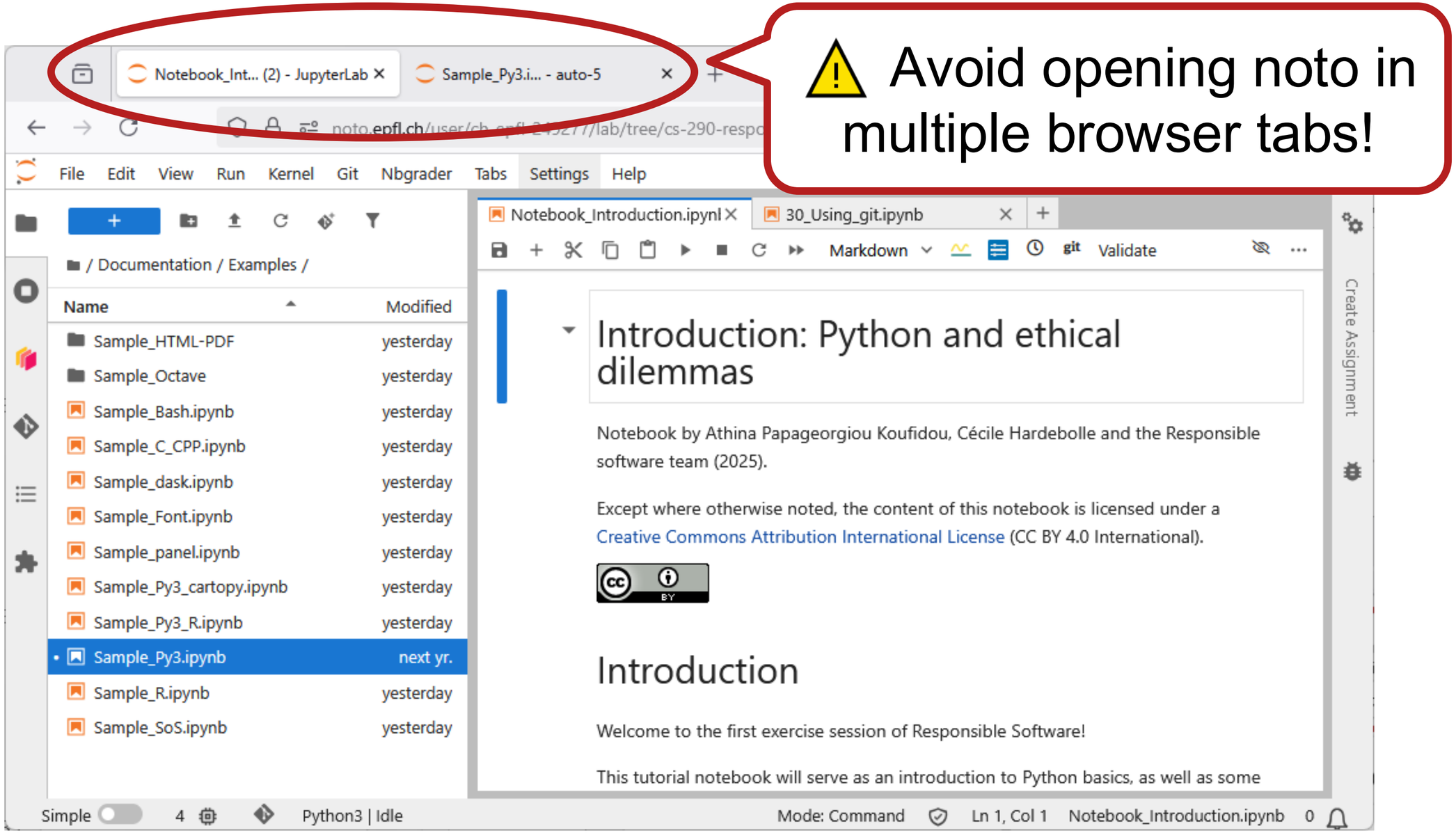
Actions on the Kernel



Saving Work

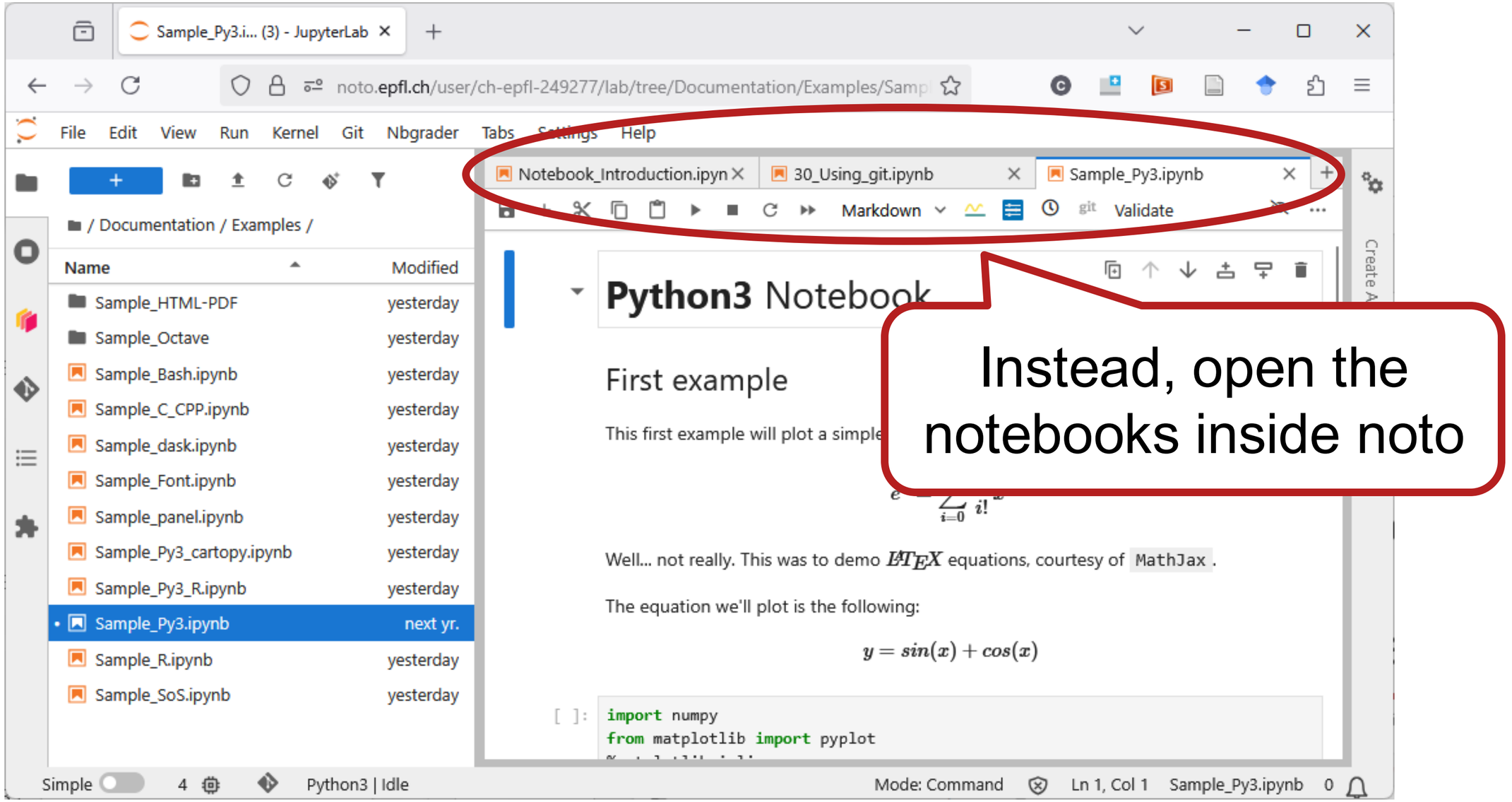

Notebook_Int... - JupyterLab
Ctrl + S
File Edit View Run Kernel Git Nbgrader Tabs Help
Launcher
Notebook_Introduction.ipynb
Markdown
git
Validate
/ cs-290-responsible-software-2025 /
Notebook-0-Introduction /
Name
Modified
res 3 days ago
tests 3 days ago
Notebook_Introduction.ipynb next yr.
We will start by creating a string variable to represent the scenario.
[2]: scenario = "A self-driving car with brake failure is heading towards five ped
You can use the print function to display the content of a variable and the type function to display its type.
Instructions
Execute the cell below to see the output.
[3]: print(scenario)
print("The type of the scenario variable is", type(scenario))
A self-driving car with brake failure is heading towards five pedestrians cro
ssing the street. The car can swerve to the other lane, hitting one pedestria
n instead. What should the autopilot do?
The type of the scenario variable is <class 'str'>
Create Assignment
Simple 2 main Python3 | Idle
Mode: Command Ln 1, Col 1 Notebook_Introduction.ipynb 0

Opening Multiple Notebooks

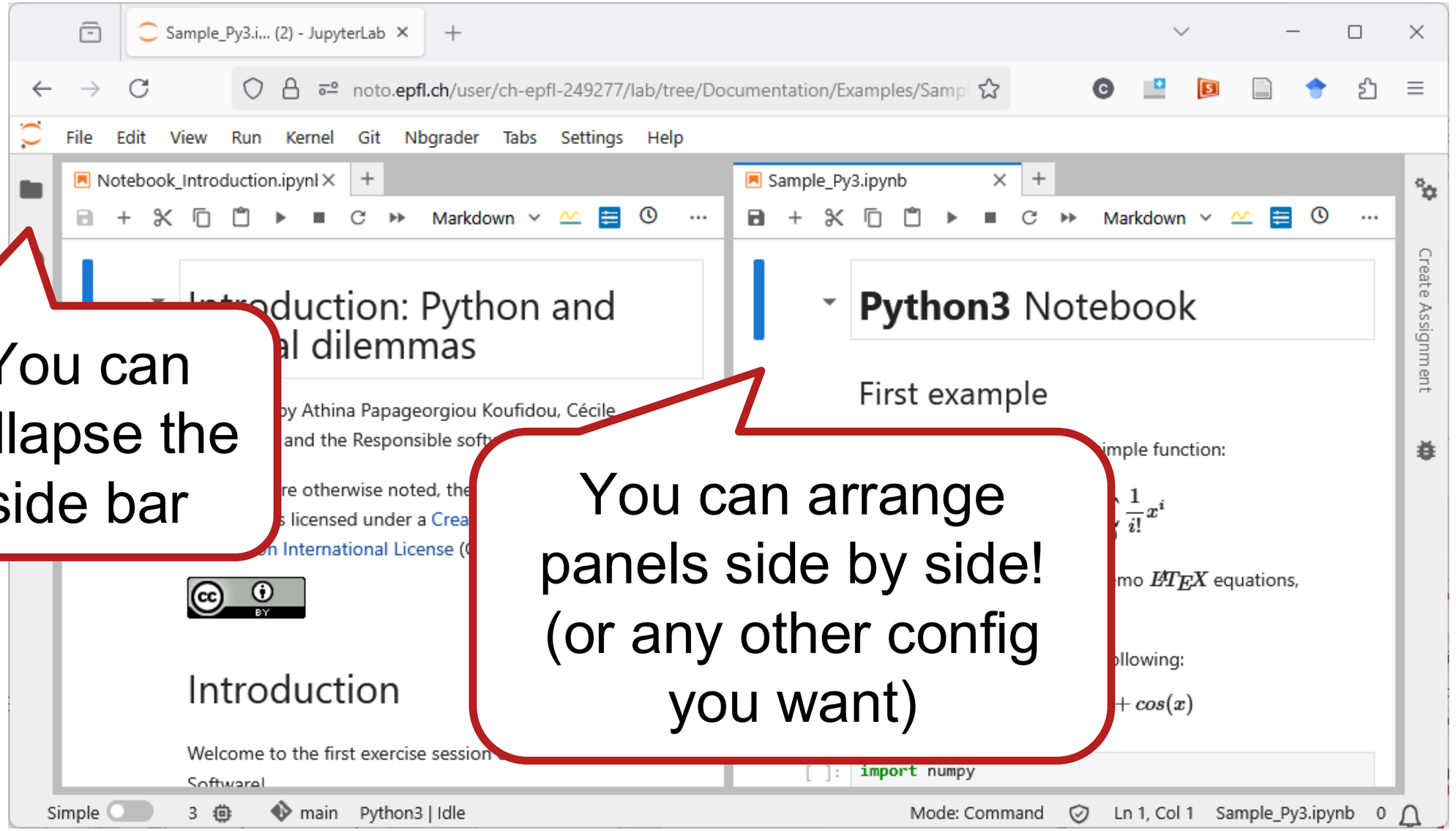


⚠ Avoid opening noto in multiple browser tabs!

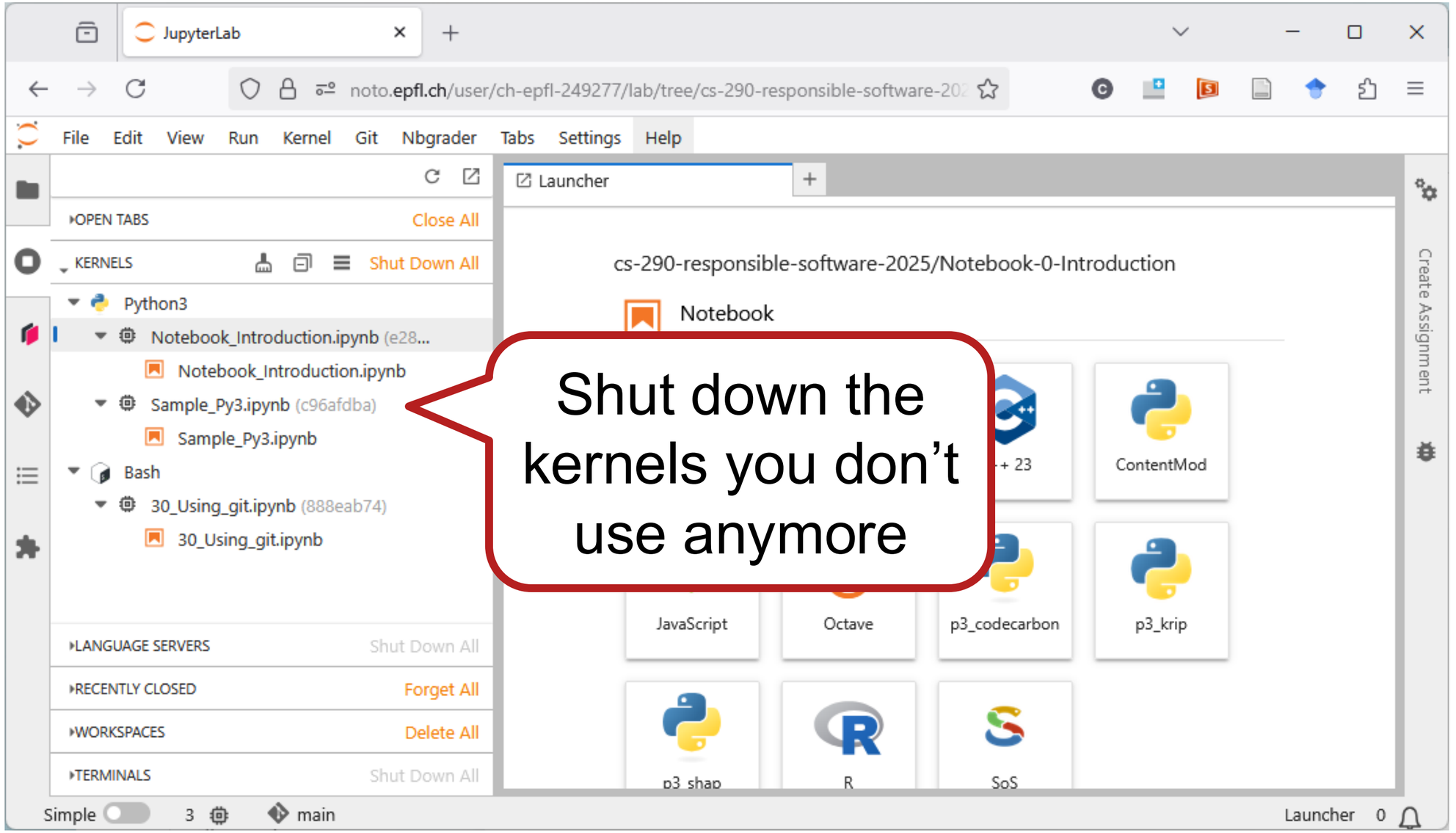
Opening Multiple Notebooks



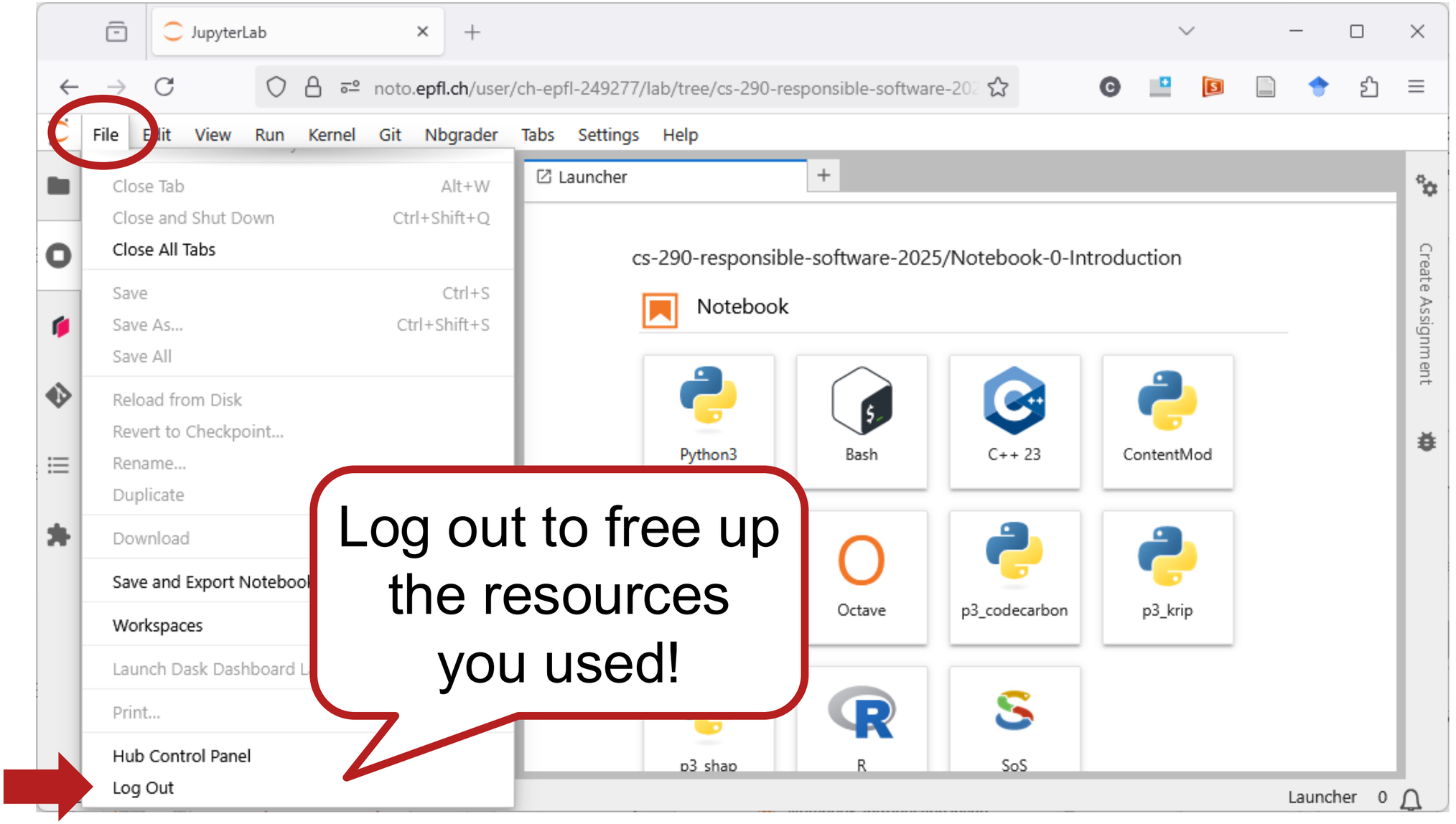
Opening Multiple Notebooks



Save Resources!



Save Resources!



Configuration for a Specific Course

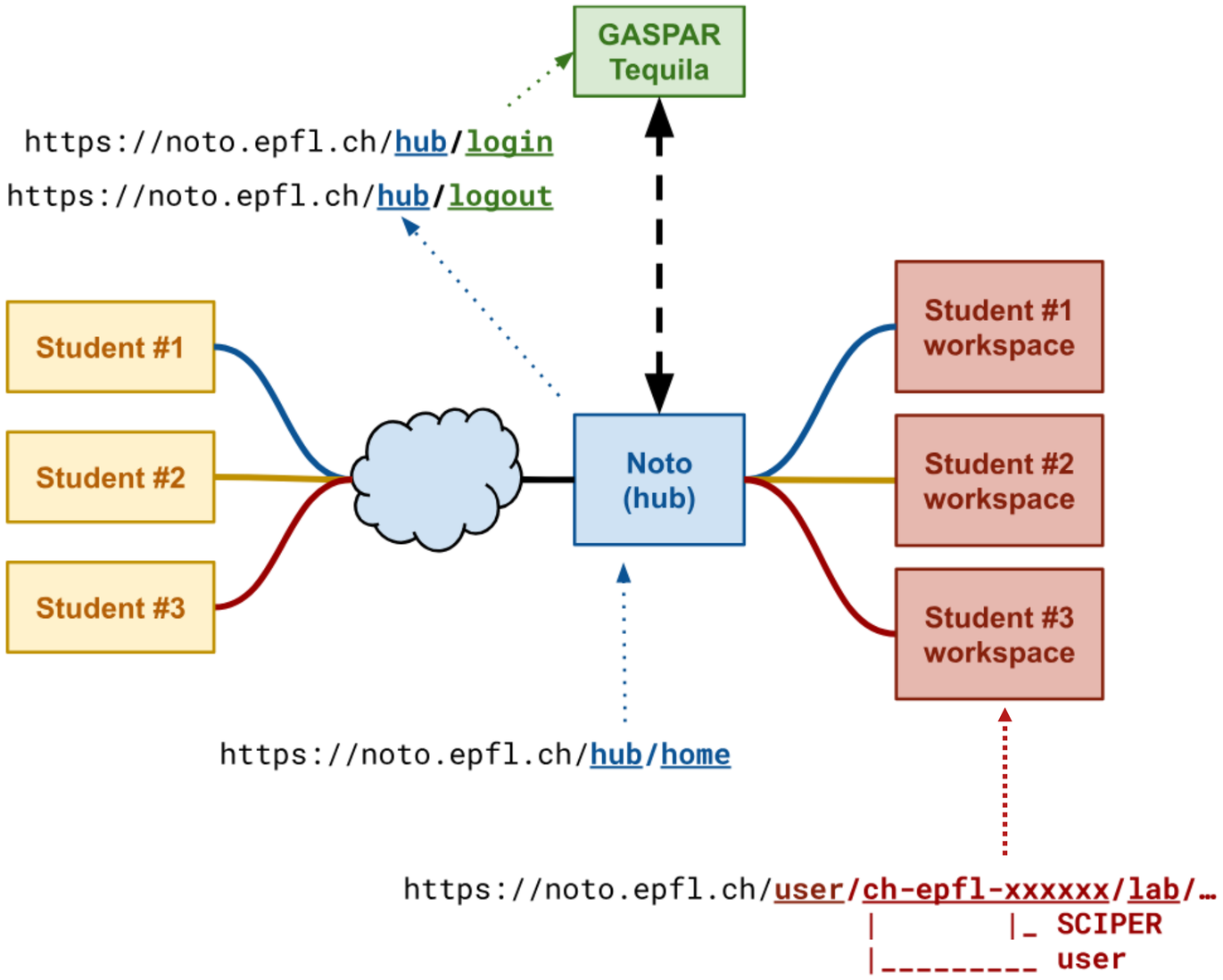
Libraries

- Centrally installed:
  - We install the libraries; students don’t need to worry about it!
    👉Contact us with the list of libraries you need 2 weeks before the start of semester

- Possibility for each user to install libraries in virtual environments
  - ⚠️Risk of breaking the main Jupyter environment of the user
    👉Imperative to use **virtual environments**

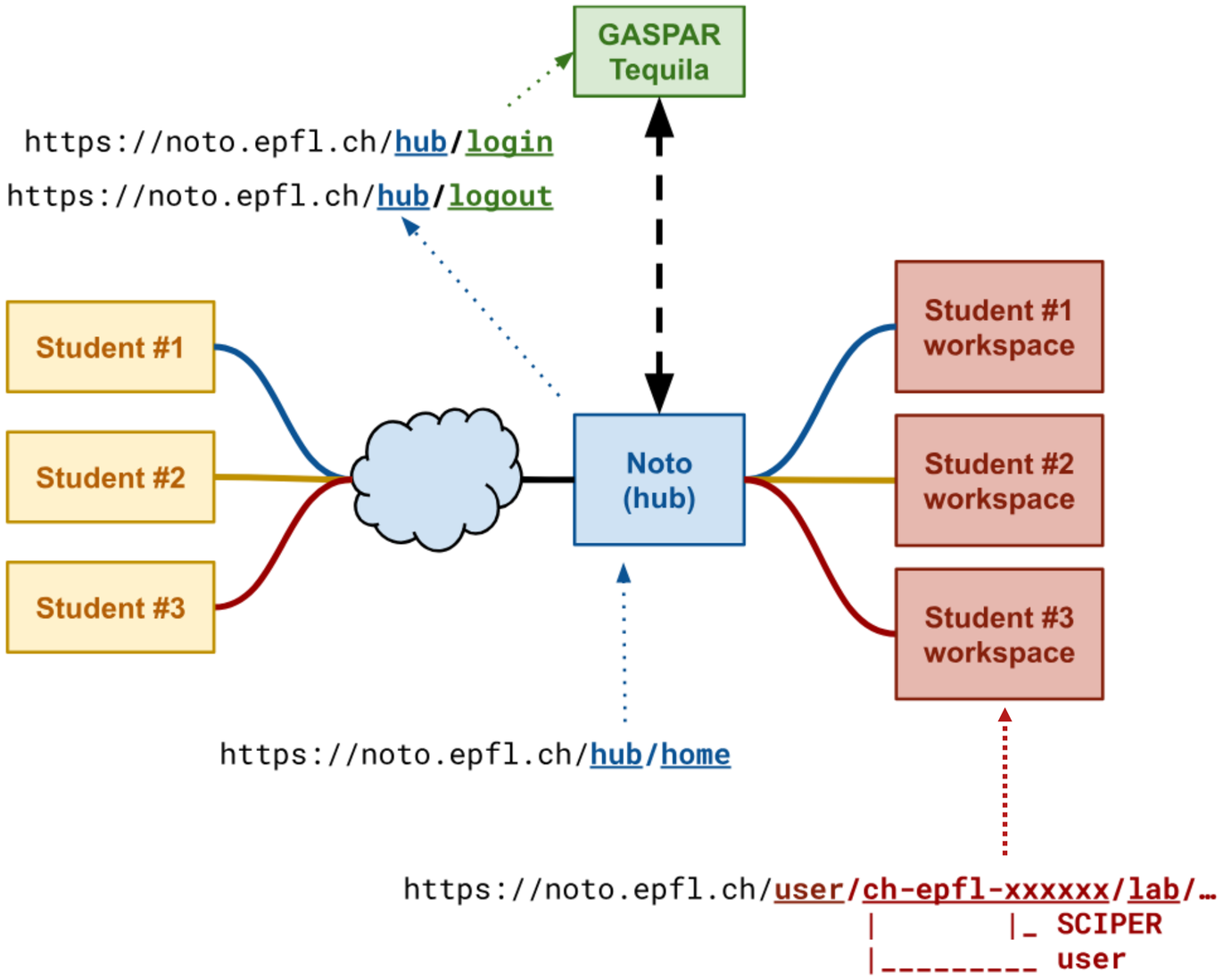
Troubleshooting

Architecture of noto



- **Client** (web browser): renders HTML/JavaScript
- **Hub**: manages users, authentication, and spawns individual Jupyter server instances for each user
- **Personal server**: Jupyter server that runs the notebooks and kernels, individual to each user but resources are shared (run on virtual machine)

Architecture of noto



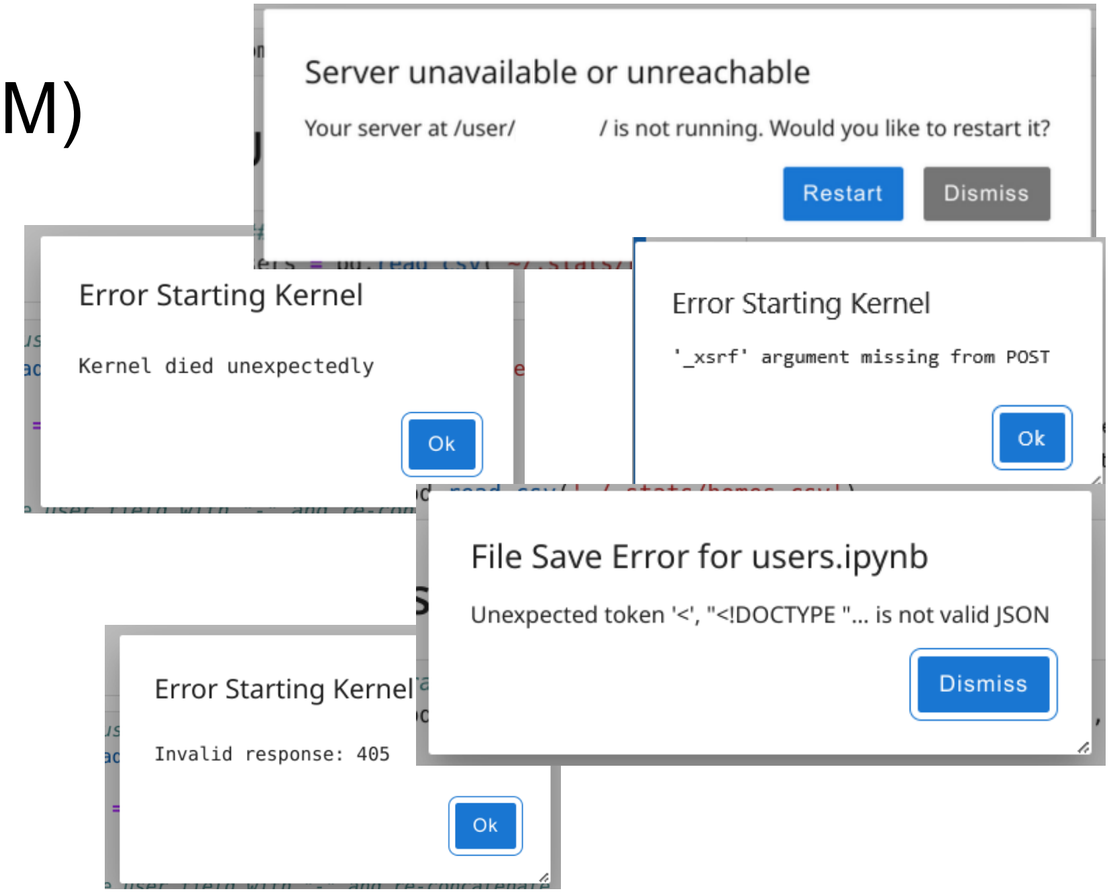
⚠️ session in the web client
≠ session on the hub
≠ session on the personal server

👉 Closing the web session doesn't close the session on noto (hub + personal server)

👉 The hub can work without any session on the personal server

Loss of Personal Server/Kernel

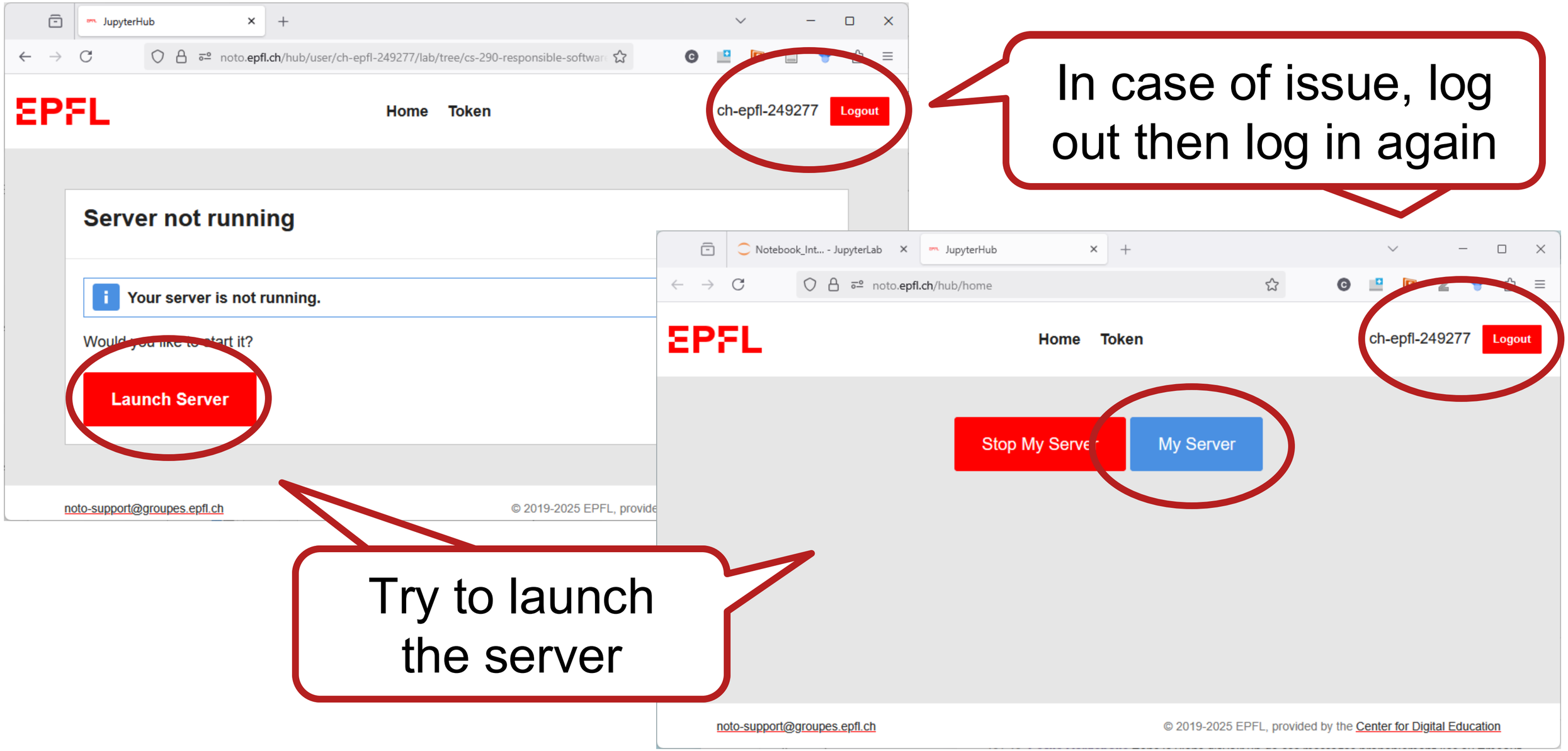
- **Popups with error messages** usually mean that ⚠ the **personal server** is no longer available ⚠
  - Timeout after 20 minutes of inactivity
  - Too many resources used (> 2 GB RAM)



- ⚠ The session on the hub may still be active so the interface looks like it works but it does NOT!

- **Log out** and then log in again:
  - File > Logout
  - https://noto.epfl.ch/hub/logout

Server Not Running



Other Typical Issues

- Spawn failed / Error 503
  - Issue with load on noto or issue with the personal server itself
  - Troubleshoot: logout, wait for 30 sec, login
- White page, interface taking time to load
  - Issue with load on noto
  - Troubleshoot: wait for 1 or 2 mins, if it doesn’t load logout/login
- Cells not running
  - Issue with the kernel
  - Troubleshoot: restart the kernel, check the resources used (top)
- Cells running slowly
  - Too many kernels running, too many resources used
  - Troubleshoot: restart the kernel, check the resources used (top)

Technical Support

- First level: teaching assistants
  - Check for typical programming issues (infinite loops, etc.)
  - Check the resources used (RAM, CPU, GPU)
  - Apply troubleshooting steps: restart kernel, logout/login, etc.

- Second level: noto-support@groupes.epfl.ch
  - Include:
    - Screen captures
    - Error messages
    - SCIPER