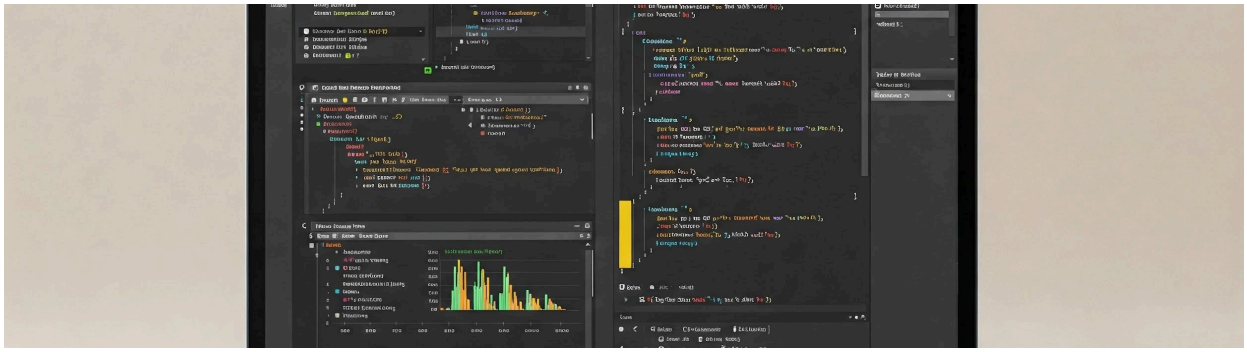

Jupyter Notebook and Kernels: An Expert's Guide

What is Jupyter Notebook?

- Jupyter Notebook is an **interactive computing environment**
- It is widely used in data science, machine learning, education, and scientific research.

Why Use Jupyter Notebook?:

- **Interactive Computing**
- **Data Visualization**
- **Documentation**

How Does Jupyter Notebook Work?

- Jupyter Notebook uses a **client-server model**.
- The **notebook interface** runs in your **web browser**.
- When you execute code, the **kernel processes the code** and **returns** the **output** to **display**.

What is a Kernel in Jupyter?

- A kernel is a program that runs the user's code.

Features of Jupyter Notebook

Markdown

Markdown cells allow you to include **rich text, formatted headers, lists, links, images**, and more. This is great for documenting your code and providing context.

Here's a simple table created using markdown.

Feature	Description
Headers	Use `#`, `##`, `###` for different heading levels.
Lists	Use `*` or `-` for bullet points.
Links	Use `[text](url)` to create hyperlinks.
Images	Use `![alt text](image_url)` to embed images.

Inline Commands

You can execute **shell commands directly** within a Jupyter Notebook cell using `!` before the command. For example:

```
Unset
# windows
! dir

# linux
! ls
```

This command lists the files and directories in the current directory.

Magic Commands

Magic commands are special functions provided by Jupyter that enhance the notebook environment. There are two types:

- **Line Magics:** Prefix with `%` and operate on a single line.
- **Cell Magics:** Prefix with `%%` and operate on the entire cell.

Here are some examples:

- `%timeit`: Times the execution of a single statement.

```
Unset
%timeit [x**2 for x in range(1000)]
```

How to install Jupyter notebook?

step-by-step guide to setting up Jupyter notebook for Python on your system:

- **Install jupyter notebook:**
  - Open command prompt on Windows and activate the virtual environment then type below and press Enter.
  - Note: Jupyter notebook will open from the directory, where you start in command prompt

```
Python
> cd C:\Users\santhosh\<desired folder>

> sample_venv\Scripts\activate

> pip install jupyter
```

- **Install kernel**

- Enter below commands to create kernel

```python
# Install ipykernel
> pip install ipykernel

# Register the Environment as a Jupyter Kernel
> python -m ipykernel install --user
--name={virtual_env_name} --display-name {virtual_env_name}

# Open jupyter notebook
> jupyter notebook

# Browser will open with Notebook - http://localhost:8888/tree

# Note: Once jupyter notebook opened in browser, it will
have access to the directore where jupyter notebook started
```

- **Kernel Selection**
  - Goto http://localhost:8888/tree in a browser
  - Click "**New**" to create a jupyter notebook on the top right side.
  - select created kernel or existing kernel from the drop down.
  - To change kernel in notebook: **Go to Kernel → Change Kernel →** {virtual_env_name}

After completing the setup, you can experiment with Python code in a Jupyter Notebook. A dedicated notebook for this purpose has been created and can be found in the `Courses/week0/Day1` folder within the Courses repository.