

# About Jupyter

# Jupyter Notebook

- The IPython Notebook, now known as the Jupyter Notebook, is an interactive computational environment, in which you can combine code execution, rich text, mathematics, plots and rich media. The code can be written and executed directly on a browser. It is like a notebook that contains your code.

<https://jupyter.org/>

<https://ipython.org/notebook.html>

# Getting started with Jupyter

- For using Jupyter, we will rely on Anaconda installation which is available through the following link:  
<https://docs.anaconda.com/anaconda/install/>
- Anaconda provides a navigator, which is a graphical user interface, for the desktop that allows the launch of various applications for Python and R without using any command-line commands. Anaconda includes Jupyter Notebook as an application within it. Throughout this course, we will write all our code on Jupyter notebook.

# Opening the Jupyter notebook

The screenshot displays the Anaconda Navigator desktop application. The interface includes a top menu bar with 'File' and 'Help', and a 'Sign in to Anaconda Cloud' button. A left sidebar contains navigation options: 'Home', 'Environments', 'Learning', and 'Community'. The main workspace shows a grid of application cards under the heading 'Applications on base (root) Channels'. The cards are:

- JupyterLab** (0.32.1): An extensible environment for interactive and reproducible computing, based on the Jupyter Notebook and Architecture. [Launch]
- Jupyter Notebook** (5.5.0): Web-based, interactive computing notebook environment. Edit and run human-readable docs while describing the data analysis. [Launch]
- Qt Console** (4.3.1): PyQt GUI that supports inline figures, proper multiline editing with syntax highlighting, graphical calltips, and more. [Launch]
- Spyder** (3.2.8): Scientific Python Development Environment. Powerful Python IDE with advanced editing, interactive testing, debugging and introspection features. [Launch]
- VS Code** (1.35.1): Streamlined code editor with support for development operations like debugging, task running and version control. [Launch]
- Glueviz** (0.15.2): Multidimensional data visualization across files. Explore relationships within and among related datasets. [Install]
- Orange 3** (3.23.1): Component based data mining framework. Data visualization and data analysis for novice and expert. Interactive workflows with a large toolbox. [Install]
- RStudio** (1.1.456): A set of integrated tools designed to help you be more productive with R. Includes R essentials and notebooks. [Install]

A blue arrow points from the text 'Click here' to the 'Launch' button of the Jupyter Notebook application.

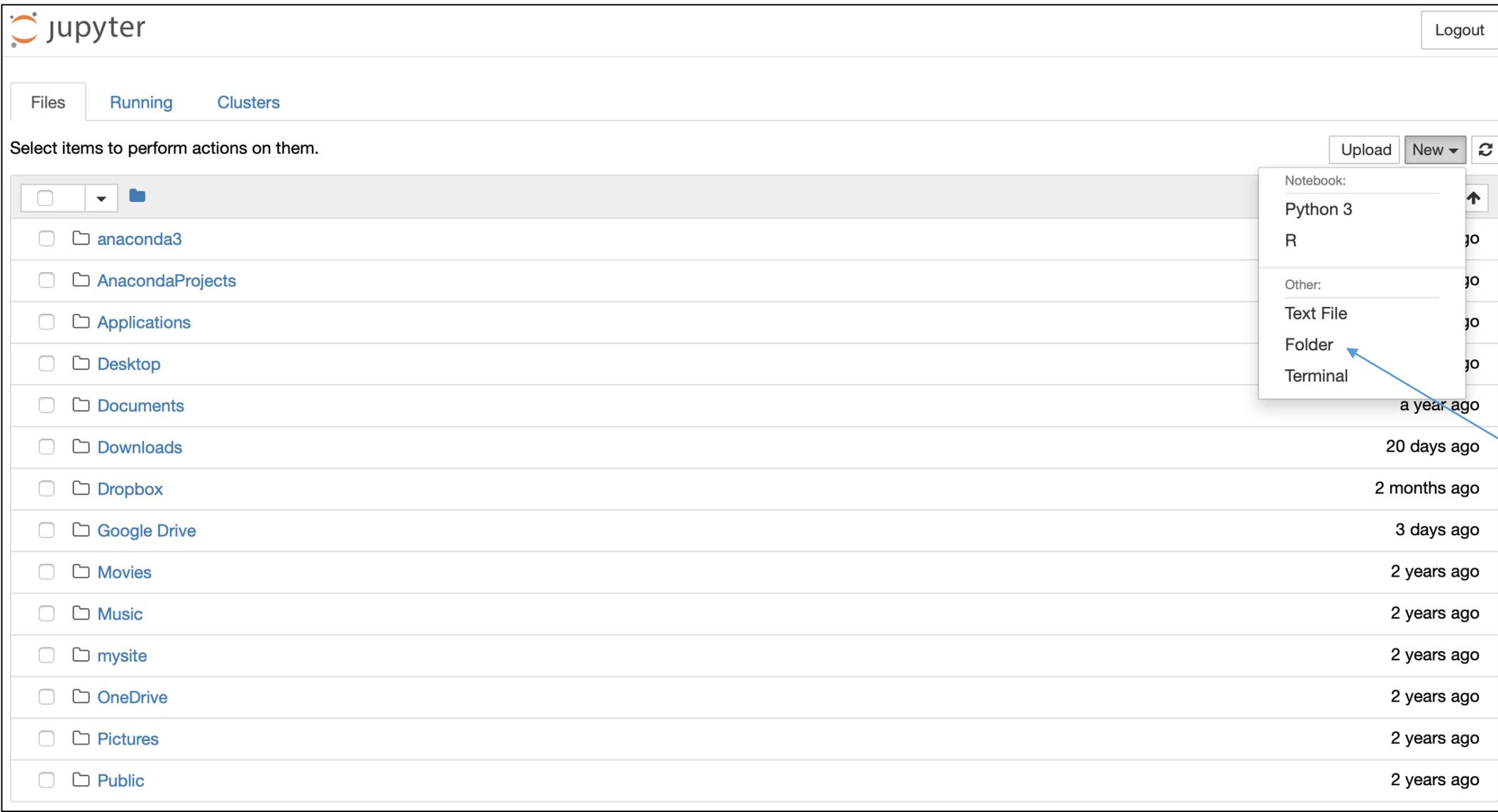
# Opens in browser

The screenshot shows the JupyterLab interface with the 'Files' tab selected. At the top left is the 'jupyter' logo, and at the top right is a 'Logout' button. Below the logo are three tabs: 'Files', 'Running', and 'Clusters'. A message says 'Select items to perform actions on them.' To the right of this message are three buttons: 'Upload', 'New', and a refresh icon. Below this is a table of files and folders. The table has two columns: 'Name' and 'Last Modified'. The 'Last Modified' column is sorted in ascending order. A blue arrow points from the text 'Click here' to the 'New' button.

<input type="checkbox"/>	<input type="checkbox"/>	Name ↑	Last Modified ↑
<input type="checkbox"/>	Folder	anaconda3	9 months ago
<input type="checkbox"/>	Folder	AnacondaProjects	a year ago
<input type="checkbox"/>	Folder	Applications	2 years ago
<input type="checkbox"/>	Folder	Desktop	22 days ago
<input type="checkbox"/>	Folder	Documents	a year ago
<input type="checkbox"/>	Folder	Downloads	20 days ago
<input type="checkbox"/>	Folder	Dropbox	2 months ago
<input type="checkbox"/>	Folder	Google Drive	3 days ago
<input type="checkbox"/>	Folder	Movies	2 years ago
<input type="checkbox"/>	Folder	Music	2 years ago
<input type="checkbox"/>	Folder	mysite	2 years ago
<input type="checkbox"/>	Folder	OneDrive	2 years ago
<input type="checkbox"/>	Folder	Pictures	2 years ago
<input type="checkbox"/>	Folder	Public	2 years ago

Click here

# Create a folder



The screenshot shows the JupyterLab interface. At the top left is the 'jupyter' logo. At the top right is a 'Logout' button. Below the logo are three tabs: 'Files', 'Running', and 'Clusters'. Below the tabs is a message: 'Select items to perform actions on them.' To the right of this message are three buttons: 'Upload', 'New', and a refresh icon. A dropdown menu is open from the 'New' button, showing options: 'Notebook:', 'Python 3', 'R', 'Other:', 'Text File', 'Folder', and 'Terminal'. A blue arrow points from the text 'Click here' to the 'Folder' option in the dropdown menu. The main area of the interface is a list of folders, each with a checkbox and a folder icon. The folders listed are: anaconda3, AnacondaProjects, Applications, Desktop, Documents, Downloads, Dropbox, Google Drive, Movies, Music, mysite, OneDrive, Pictures, and Public. Each folder has a timestamp to its right, such as 'a year ago', '20 days ago', '2 months ago', '3 days ago', '2 years ago', etc.

jupyter Logout

Files Running Clusters

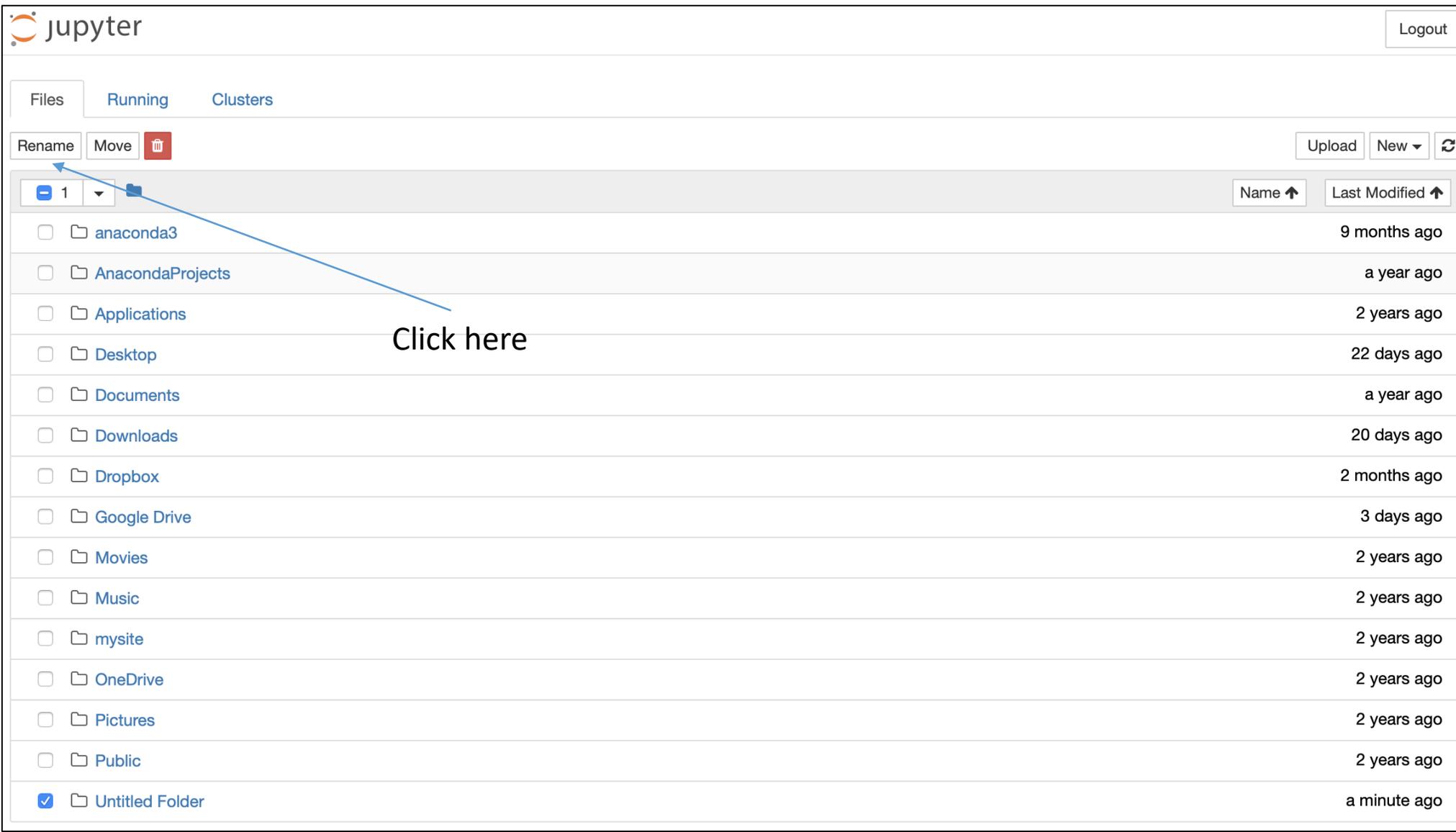
Select items to perform actions on them. Upload New Refresh

Notebook:  
Python 3  
R  
Other:  
Text File  
Folder  
Terminal

Click here

Folder Name	Timestamp
anaconda3	a year ago
AnacondaProjects	20 days ago
Applications	2 months ago
Desktop	3 days ago
Documents	2 years ago
Downloads	2 years ago
Dropbox	2 years ago
Google Drive	2 years ago
Movies	2 years ago
Music	2 years ago
mysite	2 years ago
OneDrive	2 years ago
Pictures	2 years ago
Public	2 years ago

# Select the folder



The screenshot shows the JupyterLab interface with the 'Files' tab selected. The top navigation bar includes 'Files', 'Running', and 'Clusters'. Below this, there are action buttons: 'Rename', 'Move', and a trash icon. On the right, there are 'Upload', 'New', and a refresh icon. The main area displays a list of folders with columns for 'Name' and 'Last Modified'. A blue arrow points to the 'Untitled Folder' at the bottom of the list, with the text 'Click here' next to it.

	Name ↑	Last Modified ↑
<input type="checkbox"/>	anaconda3	9 months ago
<input type="checkbox"/>	AnacondaProjects	a year ago
<input type="checkbox"/>	Applications	2 years ago
<input type="checkbox"/>	Desktop	22 days ago
<input type="checkbox"/>	Documents	a year ago
<input type="checkbox"/>	Downloads	20 days ago
<input type="checkbox"/>	Dropbox	2 months ago
<input type="checkbox"/>	Google Drive	3 days ago
<input type="checkbox"/>	Movies	2 years ago
<input type="checkbox"/>	Music	2 years ago
<input type="checkbox"/>	mysite	2 years ago
<input type="checkbox"/>	OneDrive	2 years ago
<input type="checkbox"/>	Pictures	2 years ago
<input type="checkbox"/>	Public	2 years ago
<input checked="" type="checkbox"/>	Untitled Folder	a minute ago

# Rename it

The image shows a JupyterLab interface with a 'Rename directory' dialog box open. The dialog box has a title bar with 'Rename directory' and a close button. Inside, it says 'Enter a new directory name:' followed by a text input field containing 'data science'. At the bottom of the dialog are 'Cancel' and 'Rename' buttons. The background shows a file browser with a list of folders and their last modified times.

**JupyterLab Interface Elements:**

- Top left: jupyter logo
- Top right: Logout button
- Navigation tabs: Files, Running, Clusters
- File actions: Rename, Move, Delete
- File list: 1 folder selected
- File list items (Name, Last Modified):

Name ↑	Last Modified ↑
anaconda3	9 months ago
AnacondaProjects	a year ago
Applications	2 years ago
Desktop	22 days ago
Documents	a year ago
Downloads	20 days ago
Dropbox	2 months ago
Google Drive	3 days ago
Movies	2 years ago
Music	2 years ago
mysite	2 years ago
OneDrive	2 years ago
Pictures	2 years ago
Public	2 years ago
Untitled Folder	2 minutes ago

# Folder is renamed

The screenshot shows the JupyterLab interface with the 'Files' tab selected. At the top left is the 'jupyter' logo, and at the top right is a 'Logout' button. Below the logo are tabs for 'Files', 'Running', and 'Clusters'. A message says 'Select items to perform actions on them.' To the right of this message are buttons for 'Upload', 'New', and a refresh icon. The main area is a table of folders with columns for 'Name' and 'Last Modified'. The 'data science' folder is highlighted with a blue box, and a blue arrow points from the text 'Click here' to it.

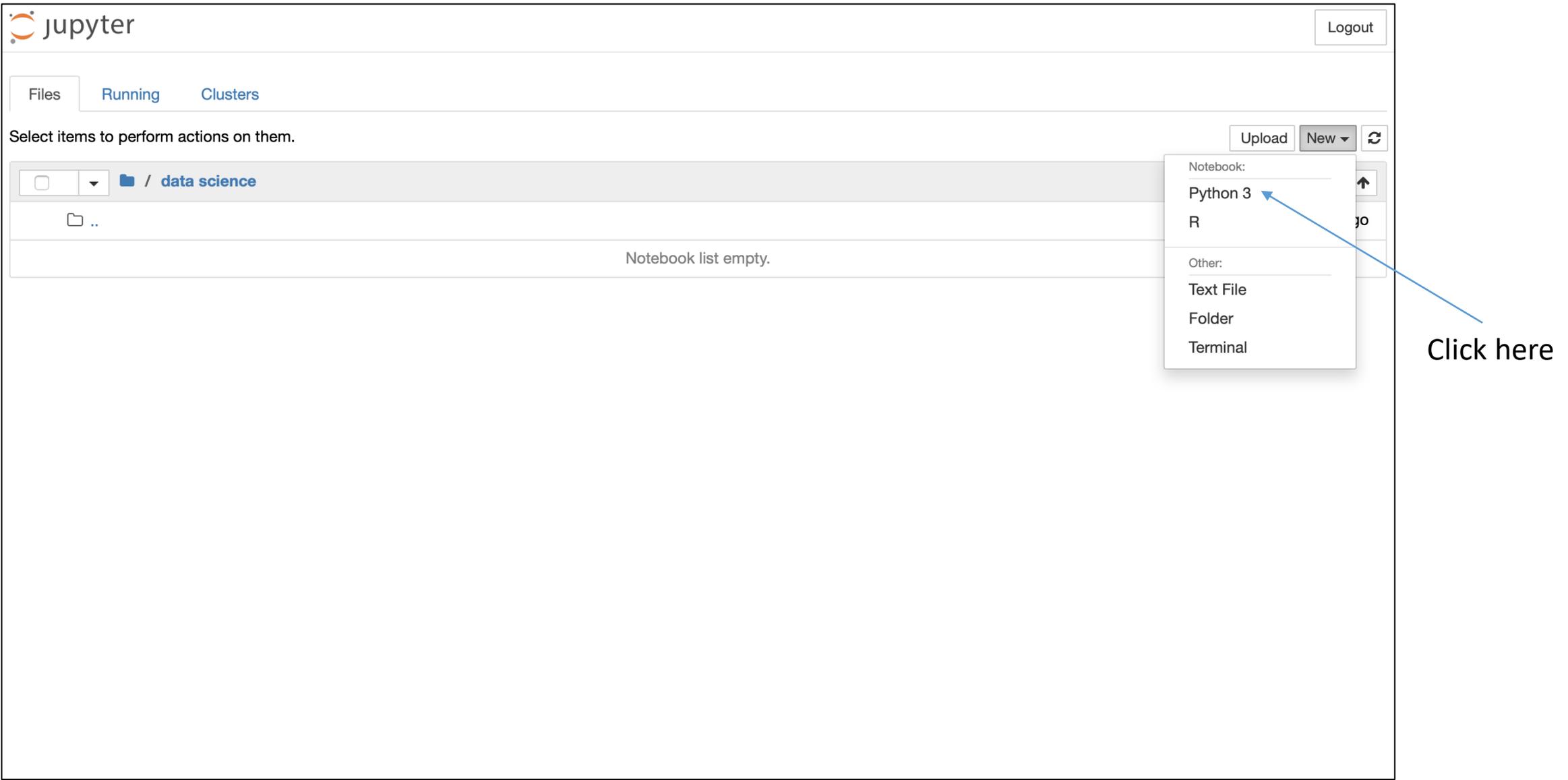
<input type="checkbox"/>	Name ↑	Last Modified ↑
<input type="checkbox"/>	anaconda3	9 months ago
<input type="checkbox"/>	AnacondaProjects	a year ago
<input type="checkbox"/>	Applications	2 years ago
<input checked="" type="checkbox"/>	data science	4 minutes ago
<input type="checkbox"/>	Desktop	22 days ago
<input type="checkbox"/>	Documents	a year ago
<input type="checkbox"/>	Downloads	20 days ago
<input type="checkbox"/>	Dropbox	2 months ago
<input type="checkbox"/>	Google Drive	3 days ago
<input type="checkbox"/>	Movies	2 years ago
<input type="checkbox"/>	Music	2 years ago
<input type="checkbox"/>	mysite	2 years ago
<input type="checkbox"/>	OneDrive	2 years ago
<input type="checkbox"/>	Pictures	2 years ago
<input type="checkbox"/>	Public	2 years ago

# Working folder

The screenshot displays the JupyterLab interface. At the top left is the 'jupyter' logo. At the top right is a 'Logout' button. Below the logo is a navigation bar with three tabs: 'Files' (selected), 'Running', and 'Clusters'. Underneath the navigation bar is a prompt: 'Select items to perform actions on them.' To the right of this prompt are three buttons: 'Upload', 'New' (with a dropdown arrow), and a refresh icon. Below this is a file browser section with a breadcrumb path: a folder icon, a dropdown arrow, and the text '/ data science'. To the right of the breadcrumb are two columns: 'Name' with an upward arrow and 'Last Modified' with an upward arrow. Below the breadcrumb is a folder icon and '..'. Below the file browser is a notebook list area with the text 'Notebook list empty.' and 'seconds ago' on the right. A blue arrow points from the text 'Click here' to the 'New' button.

Click here

# Start Python notebook



The image shows the JupyterLab interface. At the top left is the 'jupyter' logo. In the top right corner, there is a 'Logout' button. Below the logo, there are three tabs: 'Files', 'Running', and 'Clusters'. Underneath these tabs, it says 'Select items to perform actions on them.' In the center, there is a breadcrumb path: a folder icon followed by '/ data science'. Below the breadcrumb, there is a folder icon and '..'. The main area of the interface is empty and contains the text 'Notebook list empty.' On the right side, there are three buttons: 'Upload', 'New', and a refresh icon. The 'New' button is open, showing a dropdown menu. The menu is divided into two sections: 'Notebook:' and 'Other:'. Under 'Notebook:', there are three options: 'Python 3', 'R', and 'Python 2'. Under 'Other:', there are four options: 'Text File', 'Folder', 'Terminal', and 'File'. A blue arrow points from the text 'Click here' to the 'Python 3' option in the dropdown menu.

jupyter Logout

Files Running Clusters

Select items to perform actions on them.

Upload New ↕ ↻

📁 / data science

📁 ..

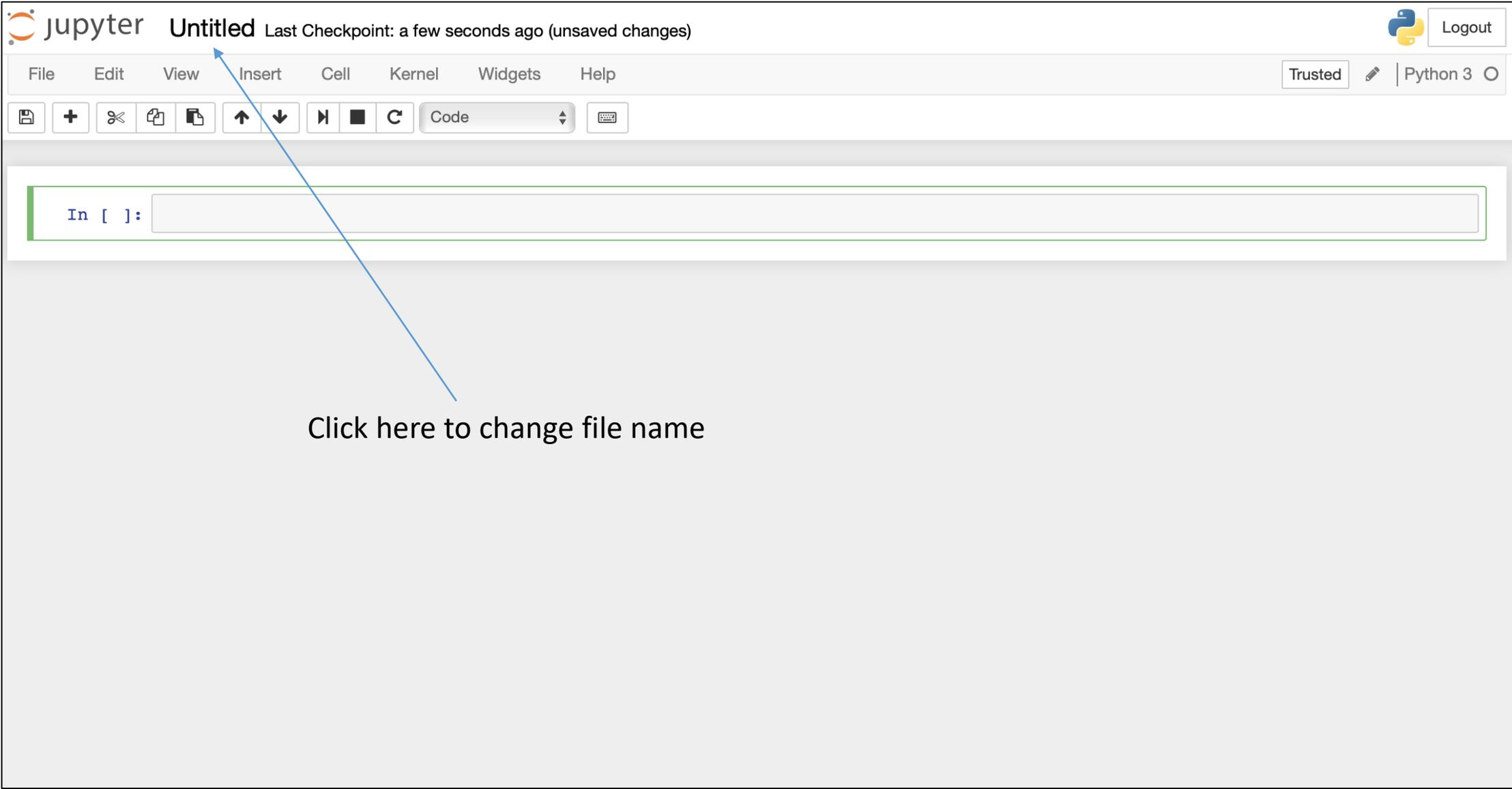
Notebook list empty.

Notebook:  
Python 3  
R

Other:  
Text File  
Folder  
Terminal

Click here

# A notebook is created



The image shows the Jupyter Notebook interface. At the top left, the Jupyter logo is followed by the text "jupyter" and "Untitled". To the right of "Untitled" is the text "Last Checkpoint: a few seconds ago (unsaved changes)". In the top right corner, there is a Python logo and a "Logout" button. Below the title bar is a menu bar with the following items: "File", "Edit", "View", "Insert", "Cell", "Kernel", "Widgets", and "Help". To the right of the menu bar, there is a "Trusted" button, a pencil icon, and "Python 3" with a dropdown arrow. Below the menu bar is a toolbar with icons for saving, adding, deleting, copying, pasting, undo, redo, and a dropdown menu currently set to "Code". Below the toolbar is a code cell with the prompt "In [ ]:" followed by an empty text input field. A blue arrow points from the text "Click here to change file name" at the bottom of the image to the "Untitled" text in the top left corner of the notebook interface.

Click here to change file name

# Rename the file

The image shows a JupyterLab interface. At the top left, the Jupyter logo is followed by the text "jupyter helloWorld" and "Last Checkpoint: a few seconds ago (unsaved changes)". On the top right, there is a Python logo and a "Logout" button. Below this is a menu bar with "File", "Edit", "View", "Insert", "Cell", "Kernel", "Widgets", and "Help". To the right of the menu bar are "Trusted" and "Python 3" with a dropdown arrow. Below the menu bar is a toolbar with icons for saving, adding, deleting, copying, pasting, undo, redo, and a dropdown menu currently set to "Code". Below the toolbar is a code cell with the prompt "In [ ]:" followed by an empty input field. A blue arrow points from the text "Rename it to helloWorld" at the bottom of the image to the "View" menu item in the top menu bar.

Logout

Trusted | Python 3

File Edit View Insert Cell Kernel Widgets Help

Code

In [ ]:

Rename it to helloWorld

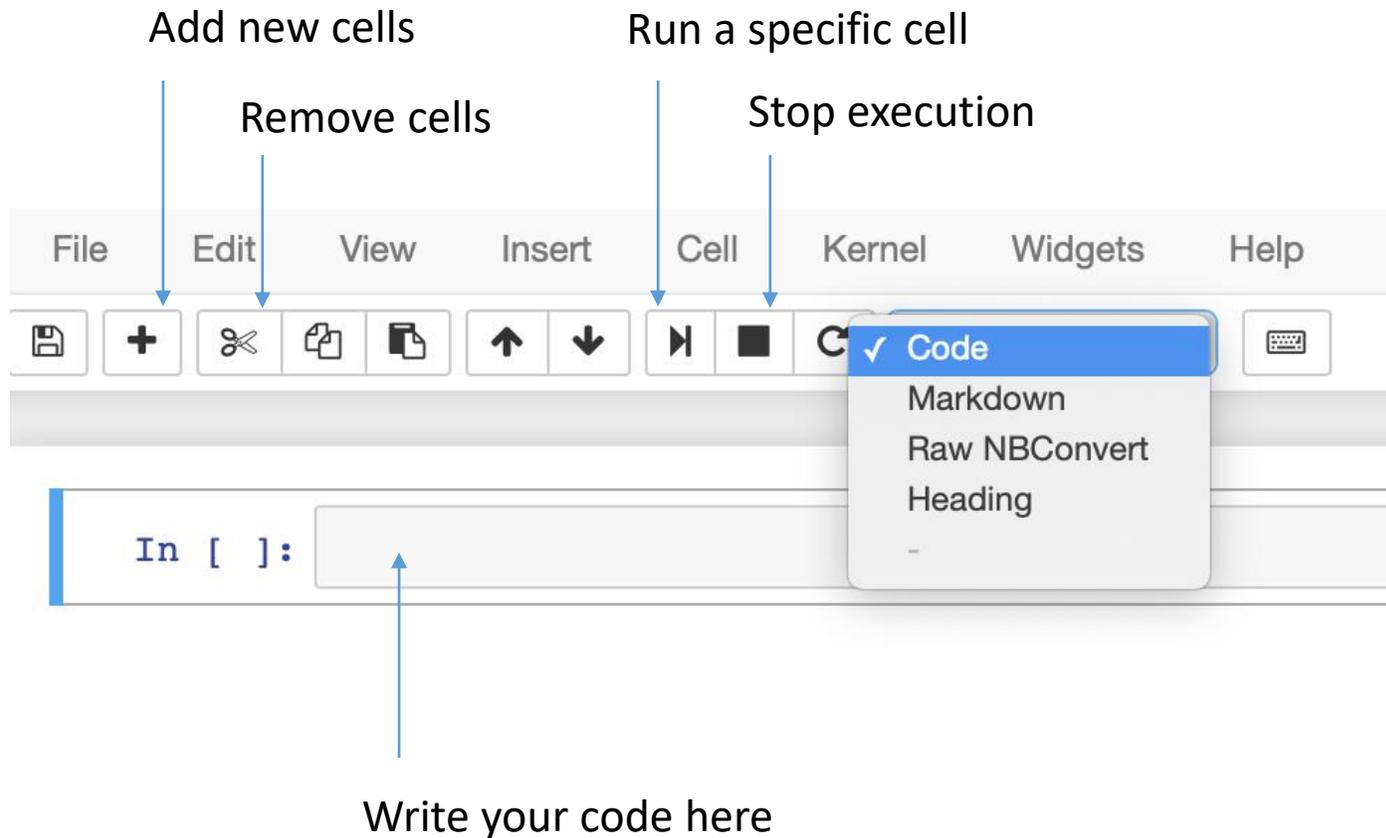
Select items to perform actions on them.

Upload New ↕ ↻

<input type="checkbox"/>	▼	📁 / data science	Name ↑	Last Modified ↑
		📁 ..		seconds ago
<input type="checkbox"/>		📄 helloWorld.ipynb	Running	seconds ago

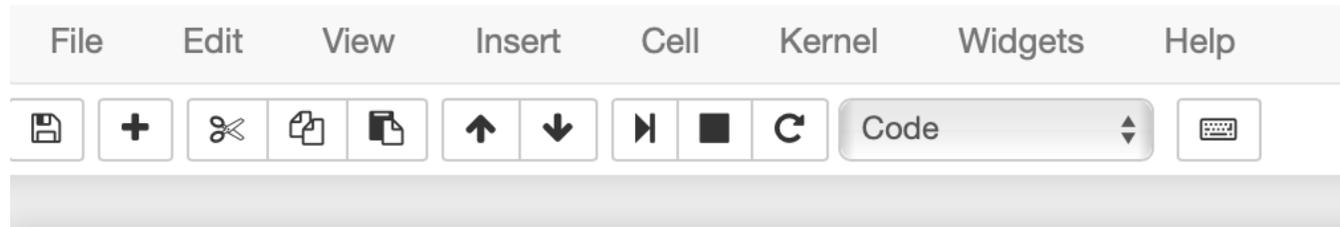
# Code cells

- The code in Jupyter is written in code cells. Each cell represents a piece of code that accomplishes a task.



# Code cells

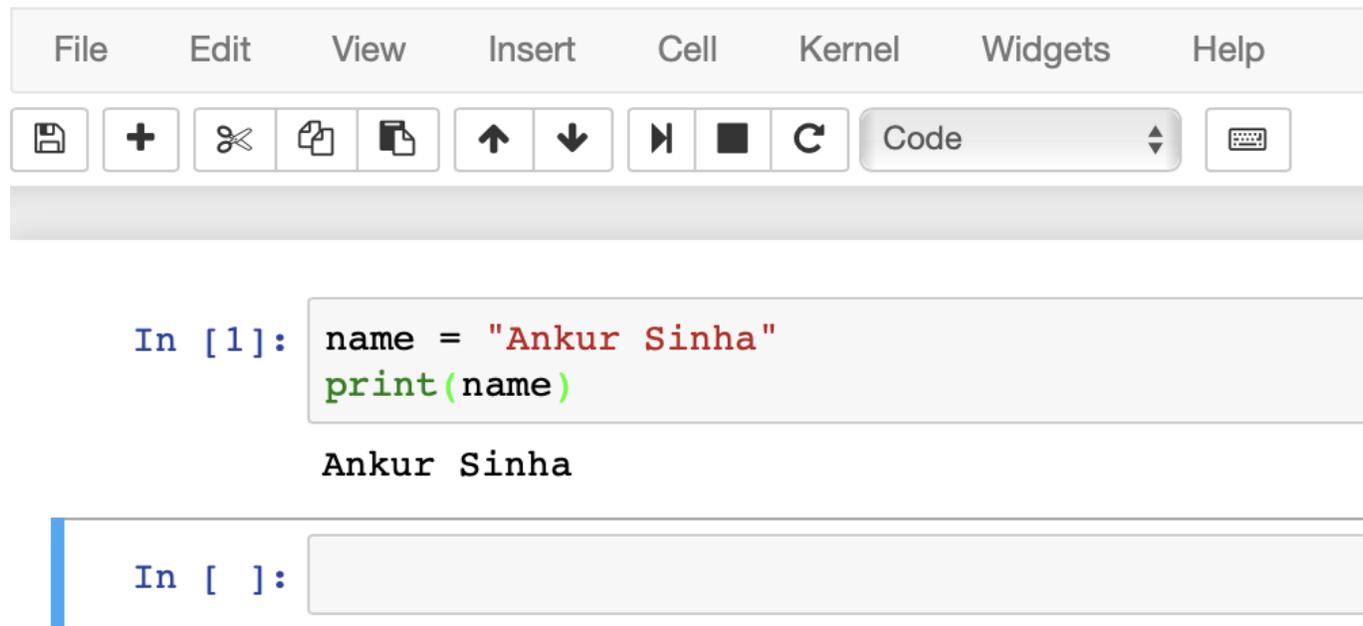
- The shortcut to execute the cells is Shift+Enter



```
In [1]: name = "Ankur Sinha"  
print(name)
```

# Code cells

- The shortcut to execute the cells is Shift+Enter



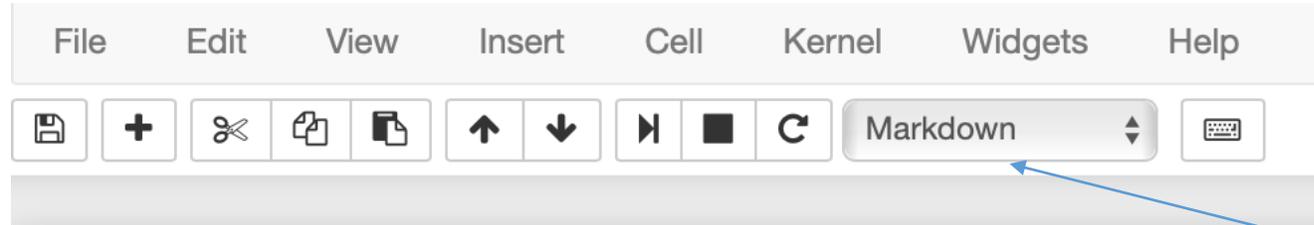
The screenshot displays the top portion of a Jupyter Notebook interface. At the top is a menu bar with the following items: File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. Below the menu bar is a toolbar containing icons for saving, adding a new cell, cutting, copying, pasting, moving up/down, running, stopping, and refreshing. A dropdown menu is currently set to 'Code' with a keyboard icon to its right. Below the toolbar, there are two code cells. The first cell, labeled 'In [1]:', contains the Python code `name = "Ankur Sinha"` and `print(name)`. The output of this cell is 'Ankur Sinha'. The second cell, labeled 'In [ ]:', is currently empty and has a blue vertical bar on its left side.

```
In [1]: name = "Ankur Sinha"
        print(name)
Ankur Sinha
```

```
In [ ]:
```

# Markdown cells

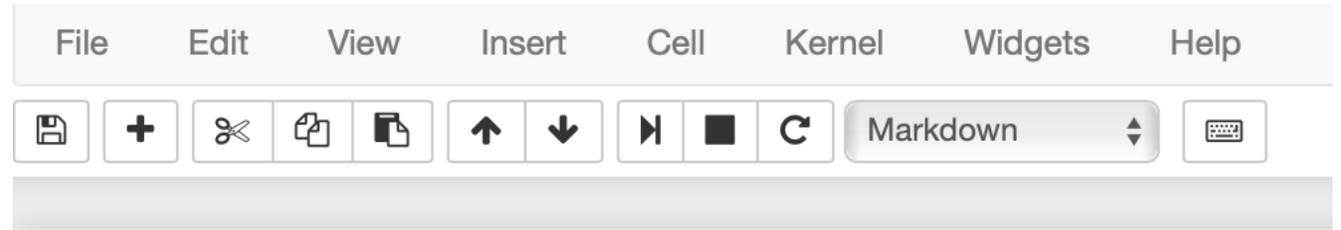
- Text or comments can be added in your code using markdown cells. Jupyter allows text to be written as headings, equations, lists etc.



Change it to Markdown

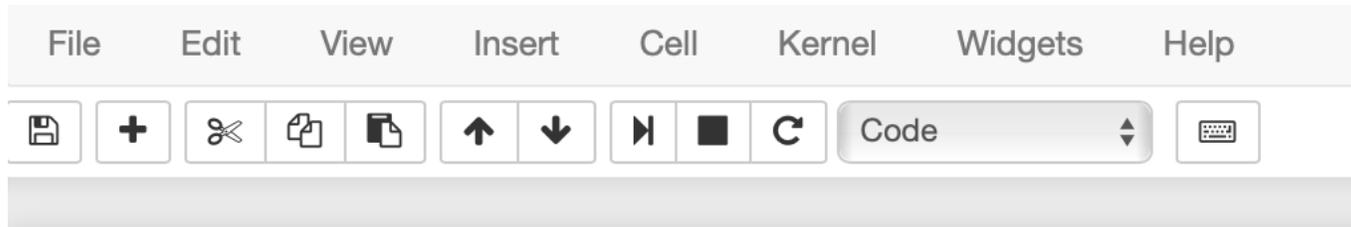
Single, double or multiple # denotes a heading

# Markdown cells



```
## Heading for my code
```

Press Shift+Enter to execute



**Heading for my code**

```
In [ ]:
```



Post execution, it looks like this.

# Raw NBConvert

- This is of use only when you are converting your Python code to other forms like HTML or Latex. When you make this conversion, the Raw NBConvert cells are interpreted in a specific way based on the output.
- Raw NBConvert is ignored by Jupyter while you are writing your Python code in cells.

