Appendix A1

Getting Started with Jupyter Notebook

A1.1 Overview

Jupyter Notebook is an excellent tool for learning Python, as well as creating and documenting professional Python-based analyses. It allows you to write one or more lines of code in its cells and to run one, several, or all cells at a time. In addition to code cells, you can also intersperse documentation cells that allow you to describe your code with formatted comments. These features make the notebook style of development well suited to coding as well as exploratory data analysis. In this appendix, we'll look at how to get started with Jupyter Notebook.

A1.2 Getting and Installing

You can get Jupyter Notebook in one of a number of ways. It comes with the Anaconda distribution (www.anaconda.com), which also includes Python and a large number of packages. Other options for getting Jupyter Notebook are described at jupyter.org/install.

A1.3 Starting

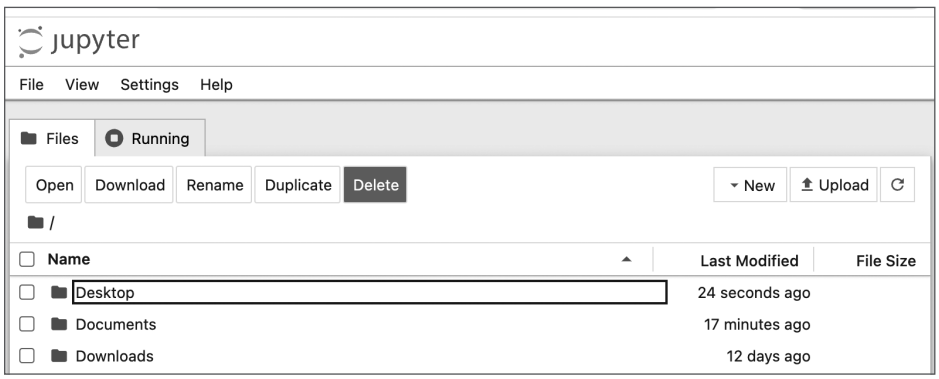
After you've installed Jupyter Notebook, you can start it by opening a command line window and entering:

```
jupyter notebook
```

The command line is available in Windows using the Command Prompt application, which you can start from the Windows Start menu. On the Mac, you can use the command line using the Terminal application, which you can start from the Mac Spotlight Search magnifying glass icon.

As an alternative to using the command line, if you installed Anaconda, you can use the Anaconda Navigator to start Jupyter Notebook. This is described at https://docs.anaconda.com/anaconda/user-guide/getting-started/.

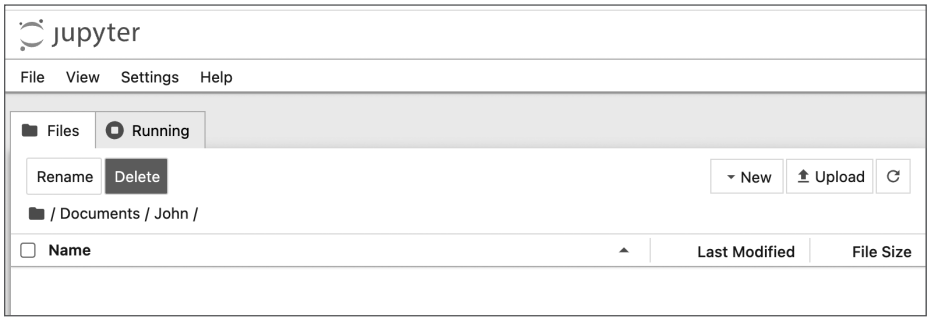
Jupyter Notebook's interface runs in a web browser. After Jupyter Notebook starts, the following is displayed in your web browser (though your list of directory folders will be different):



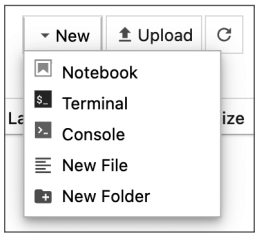
Note that the Jupyter Notebook start-up screen is related to what your current directory was when you entered the `jupyter notebook` command.

A1.4 Navigating and Running Notebooks

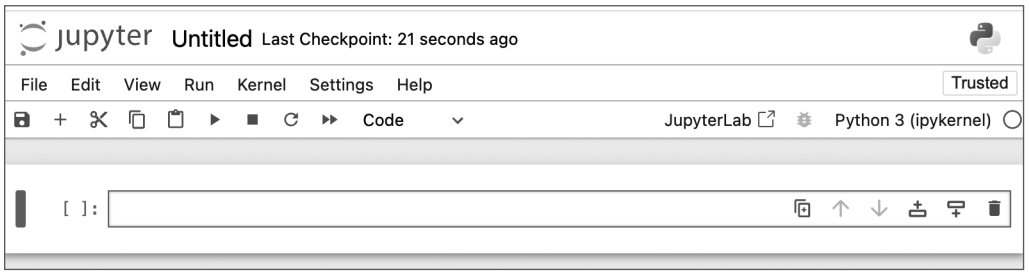
At the initial Jupyter Notebook screen, you can double-click on a directory name next to the folder icon to open it and navigate down your computer's file folder structure. For example, having clicked on Documents and then John, we have the following screen:



The above shows an empty directory. We can create a new notebook file by selecting New in the upper right and then Notebook:



If prompted to "Select Kernel," choose Python 3, then click on [Select].
This opens a new tab or window in your browser, displaying a new empty notebook:

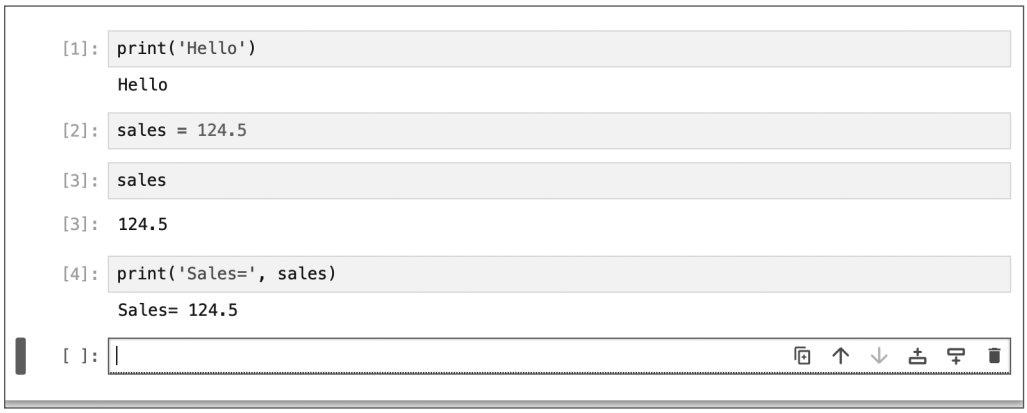


In the cell next to the `In [ ]:` prompt, you can enter one or more lines of code and then click on the Run (triangle) icon in the toolbar. For example:

Above we see that the output of our statement (in this case, `Hello`) is displayed below our input cell.

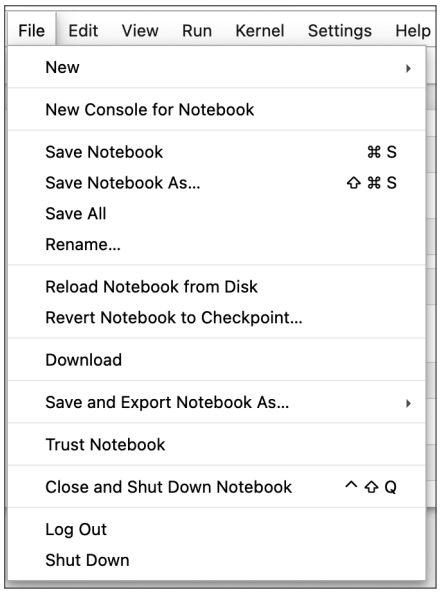
Also above we see Jupyter Notebook provided another input cell where we can further enter one or more statements. Alternatively we can go back to cell [1], edit, and rerun that cell.

If we define a variable and run that cell, that variable is available in subsequent cells. For example:



Jupyter Notebook periodically automatically saves your notebook in a file with the filetype .ipynb (the full path and filename is displayed in the browser URL). A new notebook is given an initial name like Untitled, but you can change this by clicking on the filename, and entering a new name.

To save your notebook, from the File main menu, choose Save Notebook or Save Notebook As . . .

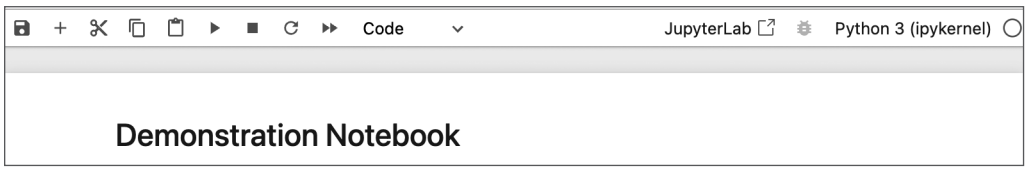


Save Notebook will save your notebook with the current notebook name. Alternatively you can use Save Notebook As . . . to save your notebook with a different name.

A1.5 Markdown

Notebook cells can also contain documentation, with support for highly formatted notes using the ***Markdown*** language.* A cell can be indicated as Markdown using the menu near the top by changing the choice from Code to Markdown:

The simplest formatting can be done by leading a Markdown cell with one or more # signs corresponding to different size headings. Below, ## Demonstration Notebook has been entered in the Markdown cell and, once Run, appears as:



The ability to intersperse formatted notes between code cells is a distinguishing and useful feature of notebooks.

A1.6 Editing and Inserting Cells

You can evolve your notebook by working with cells. This includes:

- deleting one or more cells (Edit > Delete Cells)
- splitting a multi-line cell into two cells (Edit > Split Cell)
- merging two cells together (Edit > Merge Cell Above *or* Merge Cell Below)
- moving one or more cells up or down (up and down at the right of the cell)

You can also insert cells using the insert icons at the right of each cell.

Jupyter Notebook also has an auto-complete feature that you can use with the tab key. For example, if you enter part of a variable name and hit Tab, Jupyter notebook may complete the name of the variable for you or provide a choice list with defined variable names from which you can choose.

A1.7 Running and Clearing All

When developing a notebook, you typically run one cell at a time. As cells take shape, you may want to rerun several or all cells.

- To run all cells, use Run > Run All Cells.
- To run all cells, resetting the cell numbers, use Kernel > Restart Kernel & Run All Cells.

In order to keep your cell inputs but clear all output results:

- Edit > Clear Outputs of All Cells.

* Information about Markdown can be found online. See "Markdown Cells," Jupyter Notebook, accessed January 9, 2024, https://jupyter-notebook.readthedocs.io/en/stable/examples/Notebook/Working%20With%20Markdown%20Cells.html.

A1.8 Creating and Renaming Files and Directories

From within Jupyter Notebook, you can also create new directory folders as well as text files.

To create a directory folder:

1) Click New (upper right menu) and select New Folder. This will create a folder called Untitled Folder (or similar).
2) Check the box to the left of Untitled Folder.
3) Select Rename near the top, then give the folder a new name.

Similarly, you can create a text file:

1) Select File > New > Text File. This will create a file called untitled.txt (or similar) and open an editor for it.
2) Select File > Rename, then give the file a new name.

A1.9 Exiting Notebook Screens

In order to stop working with a notebook, from the File menu, choose Close and Shut Down Notebook.

In order to exit from a Jupyter Notebook directory screen, simply close the tab in your browser.

A1.10 Opening a Previously Saved Notebook

To return to a previously saved notebook, use Jupyter Notebook Files to navigate to the folder where your notebook is saved. Then simply double-click on the name of the notebook (a .ipynb file) and Jupyter Notebook will open it in a new tab in your browser.