Introduction

In this document, we discuss the basics of using R in Jupyter. This includes how to upload and open files, how to make new folders and navigate file structures, and how to save and shut down files.

Getting Started

Jupyter is a platform that allows you to include text and R code in the same document. To open Jupyter, go to the website (https://sfu.syzygy.ca/) and log in using your SFU id and password. Now click on "Start My Server and wait for it to finish (see Figure 1).

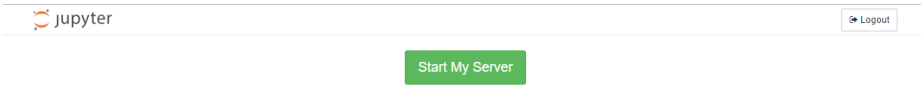

Figure 1: First contact with Jupyter.

The page you are on now is called your home screen. This is where you will upload and open files you want to work on. The home screen should look like Figure 2, but you won't have any folders or files yet.

Figure 2: Home screen.

Making a New File

Next, let's make a new file. You can make new files in Jupyter by pressing the "New" button (see Figure 3).

Figure 3: Creating a new file.

To make a new R file, select "R" from the dropdown menu. This will open a new tab that should look like Figure 4.

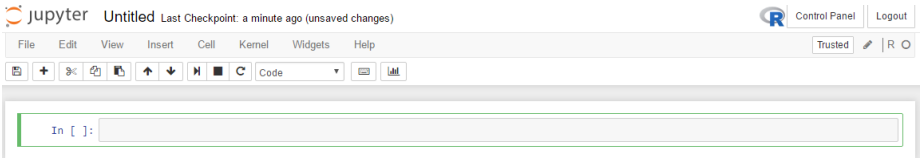

Figure 4: An open file in Jupyter.

Jupyter Notebooks

Jupyter files are called "notebooks". A notebook is made up of "cells". Each cell can contain either text or code. Cells containing text are called "markdown" cells, and cells containing code are called "code" cells. Your notebook currently consists of a single code cell. Let's change it to a markdown cell so that you can write your name and student number.

Start by clicking on the cell (see Figure 5), then click on the word "code" in the menu bar. Select "Markdown" from the drop-down menu to change your cell to a markdown cell (see Figure 6). You can change this back to a code cell by selecting "Code" from the dropdown menu.

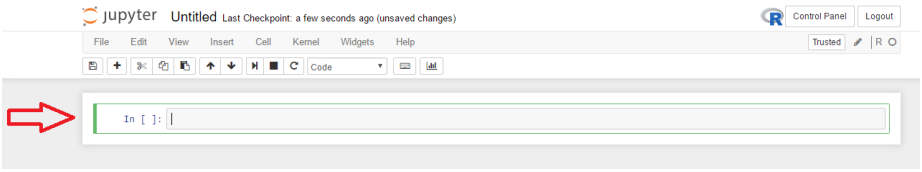

Figure 5: A cell.

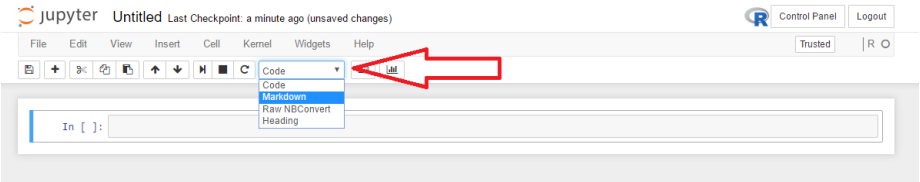

Figure 6: Select cell type.

Click on your cell to start editing it. For practice, enter your name, student number and today's date. Your notebook should now look like Figure 7.

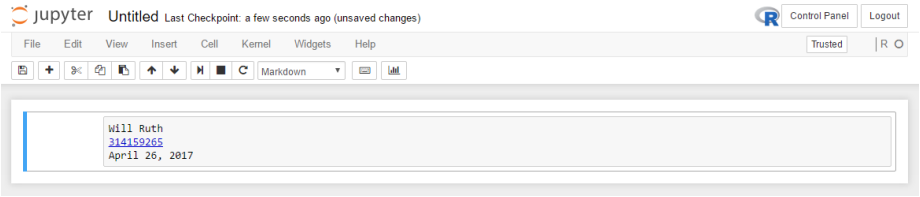

Figure 7: A markdown cell with some content.

Next, let's write some R code (don't panic). Create a new cell by clicking on the "+" button in the toolbar (see Figure 8).

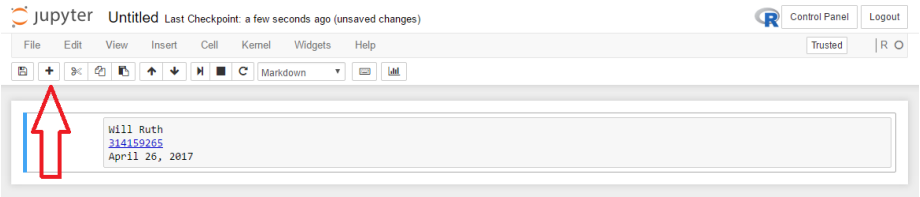

Figure 8: Button for making new cells.

New cells are automatically set as code cells. Click on your new cell and type "2+2". This is the most simple type of R command: an arithmetic expression. We can use R just like a normal calculator to do addition (+), subtraction (−), multiplication (∗) and division (/).

To get the result of our calculation, we have to run the cell. To run a cell, click on the run button, which looks like the play button on a video (see Figure 9).

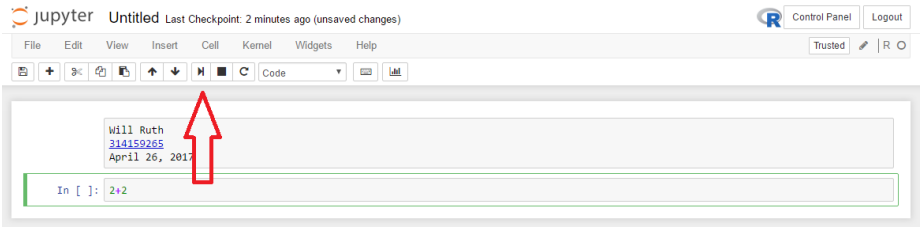

Figure 9: Button for running cells.

Your notebook should now look like Figure 10. Note that Jupyter automatically creates a new cell whenever we run the last cell in a notebook.

Saving, Renaming and Closing

This is all we need for now, so let's save our notebook. To save a file in Jupyter, click on the save button in the toolbar (see Figure 11).

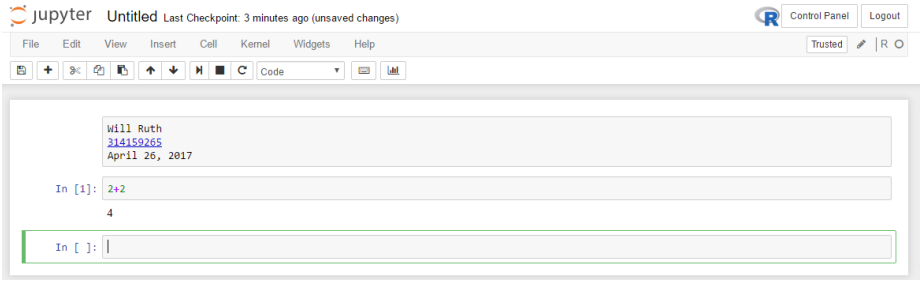

Figure 10: A code cell with some content.

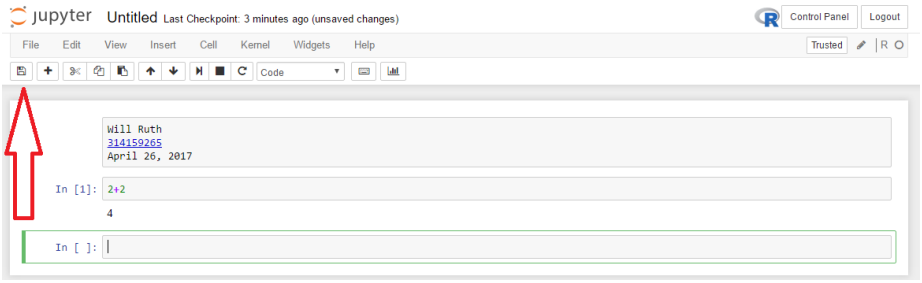

Figure 11: Save button.

The name of our notebook is currently "Untitled". We should pick a better name than that. Let's use something exciting, like "Assignment_0". To rename a notebook in Jupyter, click on its name (see Figure 12). This will bring up a window where you can enter a new name (see Figure 13).

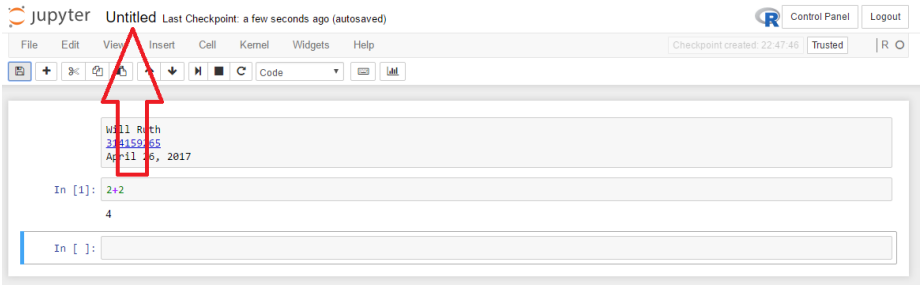

Figure 12: Renaming a notebook.

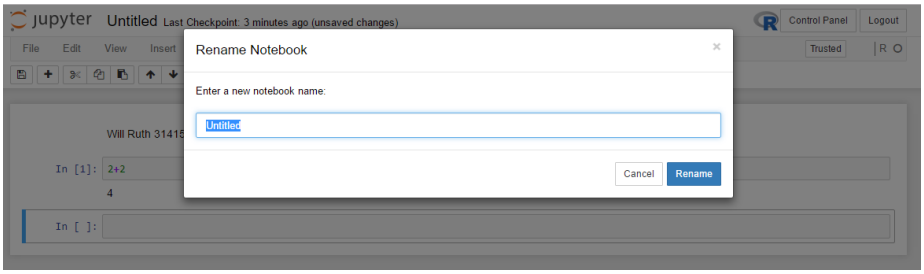

Figure 13: Enter a new name here.

Once you have entered a new name for your file, click the "Rename" button. This should take you back to your notebook, but with the title you just entered at the top of the screen.

For your class, you may need to hand in your assignments as PDF files. There is an option in Jupyter to download a notebook in PDF format, but it doesn't format code properly (longer lines get cut off). To save your notebook so that it is readable, you need to first save it in HTML format, then use your internet browser to save the HTML file as a PDF. The procedure for doing this will vary somewhat between operating systems and browsers. We use Google Chrome on a Windows computer, but the process should be similar for whatever system you use.

To start, click on "File", then hover your house over "Download as", and click on "HTML (.html)" (see Figure14). This will open a new tab and download your notebook in HTML format. Next, click on the downloaded HTML file to open it in your internet browser (we use Google Chrome).

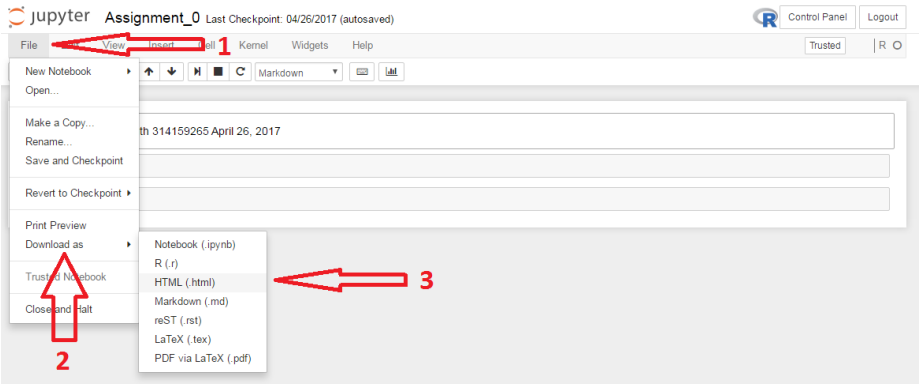

Figure 14: How to download a notebook in HTML format.

Once you have opened the HTML version of your notebook, right-click on it and select "Print..." (see Figure 15). This brings up the print menu in Chrome. From here, press the "Change" button to select a new 'printer' (see Figure 16). Windows has a built-in 'printer' that saves a file in PDF format.

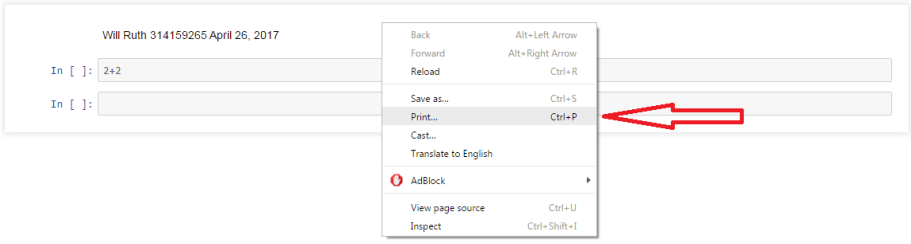

Figure 15: How to open the printer window in Google Chrome.

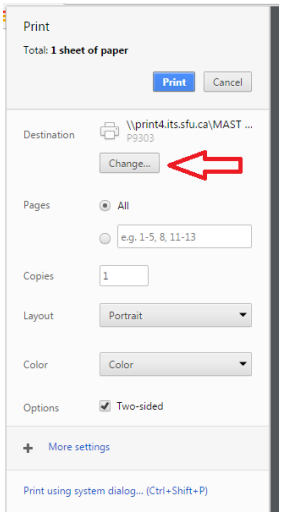

Figure 16: Button to open the menu for selecting a printer.

Now, select "Save as PDF" (see Figure 17). Finally, press "Save" (see Figure 18) and choose where you want to store your document.

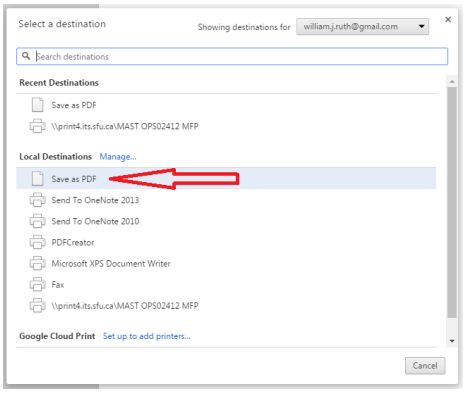

Figure 17: Choose this 'printer' to save a document in PDF format.

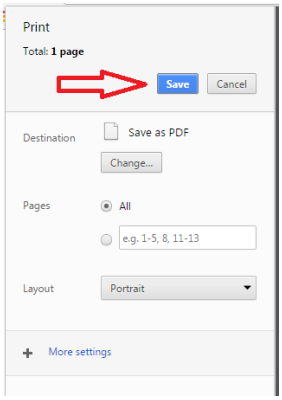

Figure 18: Press this button to save your notebook in PDF format.

Return to your Jupyter home screen. To do this, close the blank tab that just opened, as well as the tab containing our notebook. We have already saved all our work, so we won't lose anything by closing it.

You will probably notice that the name of the file you just closed is now green. That means that the file is still running in Jupyter even though you're not working on it.

Normally, leaving a file open isn't a problem. It will just close automatically when you exit Jupyter. However, if you want to move this file you must shut it down first. To shut down a file, select it (click on the box beside its name) and click the "Shutdown" button (see Figure 19).

Figure 19: Shutdown button.

Another way to shut down files is in the "Running" tab. Click on the word "Running" near the top of the screen to open the "Running" tab (see Figure 20).

Figure 20: Opening the "Running" tab.

Once you are in the "Running" tab, you should see a list of all open files. Across from the name of each open file is a "Shutdown" button (see Figure 21). Clicking on one of these buttons will close the corresponding file.

Figure 21: Shutting down files in the "Running" tab. Click on a "Shutdown" button to close the corresponding file.

This method is much faster if you need to shut down several files.

Once you are finished shutting down files, you can return to your home screen by clicking the "Files" tab next to the "Running" tab.

Making and Renaming Folders

You can make folders in Jupyter to help keep your files organized. Click on the "New" button beside "Upload", and select folder (see Figure 22).

Figure 22: Making a new folder.

Try making a new folder now. You will probably notice that Jupyter does not give you the option to name your folder. It just creates a new folder called "Untitled Folder". This is not a very informative name, so let's rename it to something else.

You can rename folders and files from the home screen in Jupyter. To do this, first select the folder you want to rename by clicking the little box next to its name. Next, click the "Rename" button near the top of the screen (see Figure 23).

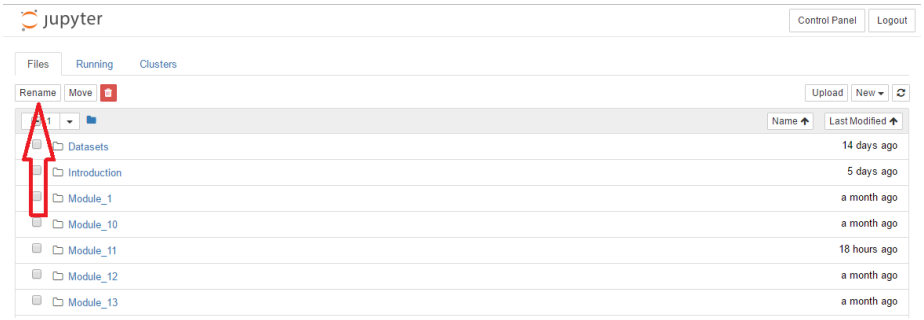

Figure 23: Renaming a folder.

When you hit the "Rename" button, a box should pop-up where you can enter a new name (see Figure 24).

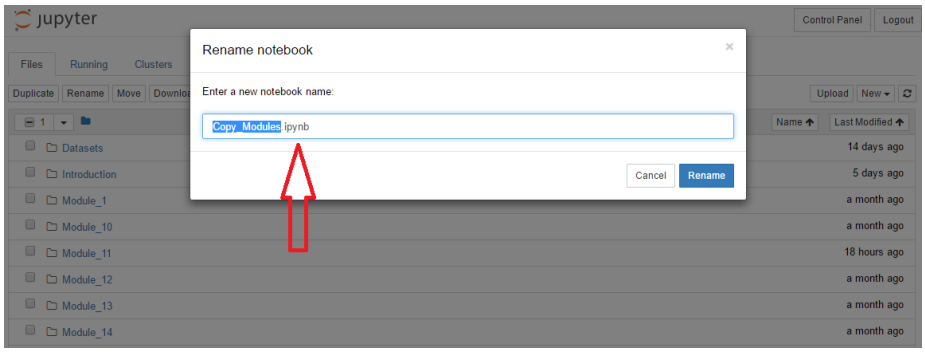

Figure 24: Renaming window. Do not change the ".ipynb" part!

If you are renaming a file this way, you will notice a ".ipynb" at the end of the file's name. This ".ipynb" is the file extension for Jupyter notebooks, and it is important that you do not change it. Note that the file extension only shows up if you rename a file from the home screen, not when you rename an open notebook.

Rename your new folder to something interesting, like "I Love Stats", then click on the name of this folder to navigate to it. Whenever you are inside a folder, the name of that folder will show up in the top left of your screen (see Figure 25). The following picture was taken inside the "Pictures" folder, which is inside the "Introduction" folder. Clicking on the name of either of these folders will navigate to the respective folder. Clicking on the folder icon navigates back to the root directory (the directory you are in when you first open Jupyter). Navigate back to the home screen now.

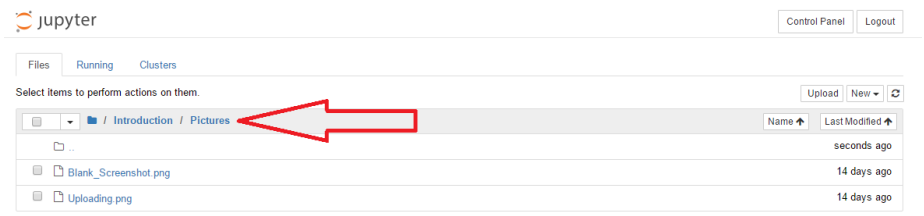

Figure 25: Path to the current folder.

Uploading and Moving Files

You can upload a file to Jupyter by pressing the upload button (see Figure 26). This will allow you to browse the files on your computer. Click on the file you want to upload and then click "Open".

Figure 26: Upload button.

Once you've selected the file you want to upload, you will end up back on your home screen, but now the files you selected will show up. Figure 27 shows that the files "uploading.png", "upload_Button.png", and "Home_Screen.png" have been selected for uploading. The blue "Upload" button must be clicked to complete the upload.

Figure 27: Finishing uploading.

Upload the file "Assignment_0.pdf" from earlier to your root directory. Let's move this file to the "I Love Stats" folder. To move a file, first select it by clicking on the little box next to its name. Next, click on the "Move" button (see Figure 28).

Figure 28: Button for moving files within Jupyter.

This will open a window for you to enter where you want to move the file (see Figure 29). We want to put our file in the "I Love Stats" folder, so we enter "/I Love Stats" and click "Move".

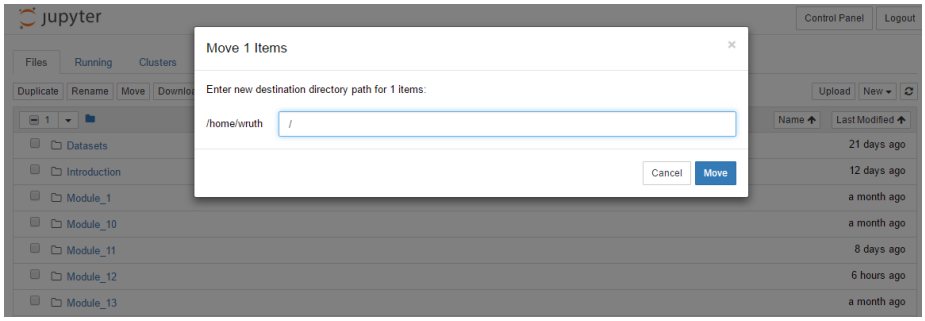

Figure 29: Enter the new address for your file here.

If there was a sub-folder called "Stats is Fun" inside the "I Love Stats" folder, then we would enter "\I Love Stats\Stats is Fun" to put our file inside the subfolder.

Whenever we upload a file, it always goes in the folder that is currently open. Therefore, another way to put a file inside a folder is to navigate to that folder, then upload the file.

Some Technical Bits

Before you can start using the Jupyter Modules, you need to download them. Fortunately, there is a fast way to download all of these modules, and organize them in a reasonable way, using something called a bash script. You don't need to know the details of how bash scripts work, just run them like any other Jupyter notebook.

To download all 17 modules, first upload the bash script called "Copy_Modules.ipynb" into your home directory. Next, open this notebook and run it. Once you close "Copy_Modules.ipynb", you should see all 17 modules in your home directory along with some other files. One of those files is another bash script that tells Jupyter to save the output from your code when saving as a pdf.

The default setting in Jupyter when you download a notebook is to keep only the text and code, not the output. You might want to see what your code does however, and whoever is marking your assignments will definitely want to see the output. To keep your output, open the notebook called "Keep_Output.ipynb" and run it (this notebook will be in your home directory). Now close the "Keep_Output.ipynb" notebook to return to your home screen. All that's left to do now is restart Jupyter.

To restart Jupyter, first click the "Control Pannel" button (see Figure 30). This takes you to a screen with two buttons. Click the red "Stop My Server"

button (see Figure 31). This shuts down your current Jupyter session.

Figure 30: Control Panel button.

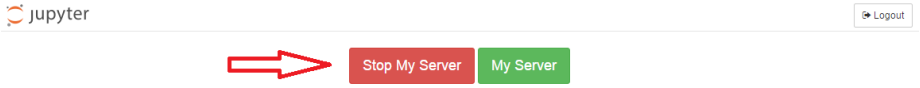

Figure 31: Click this button to shutdown Jupyter.

To complete the process, log back in to Jupyter. Now anytime you download a notebook in HTML format, it will keep the output from your code.

You now know everything you need to get started on Module 1. This module shows you multiple ways to input data to R.