

# Kernels

And customizing Jupyter

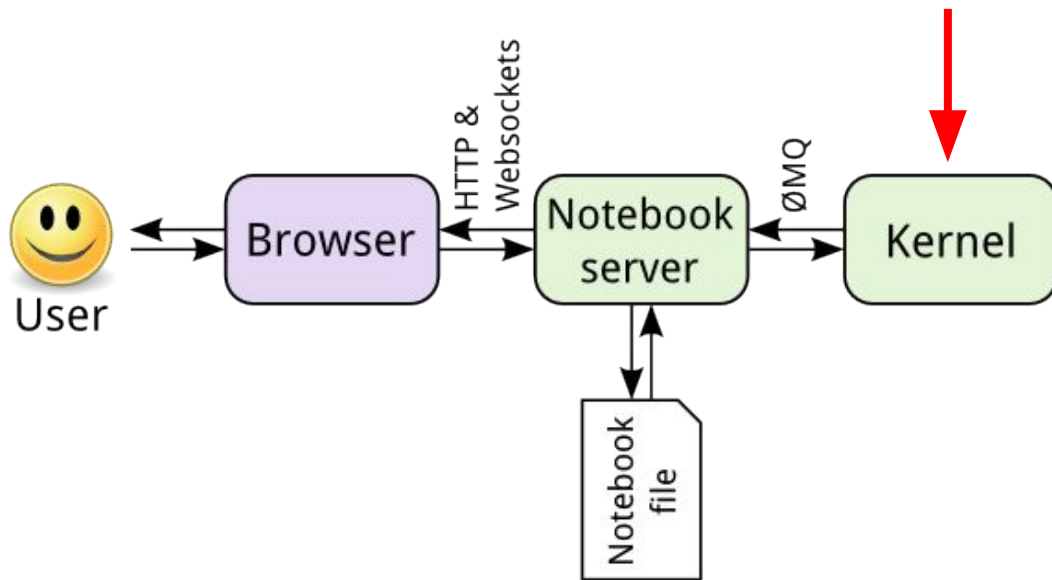
# What is the kernel

A **kernel** provides programming language support in Jupyter. IPython is the default kernel. Additional kernels include R, Julia, and many more.

Fun fact: Jupyter was named after **JULia** **PY**Thon and **R** once the old IPython notebook started supporting other languages

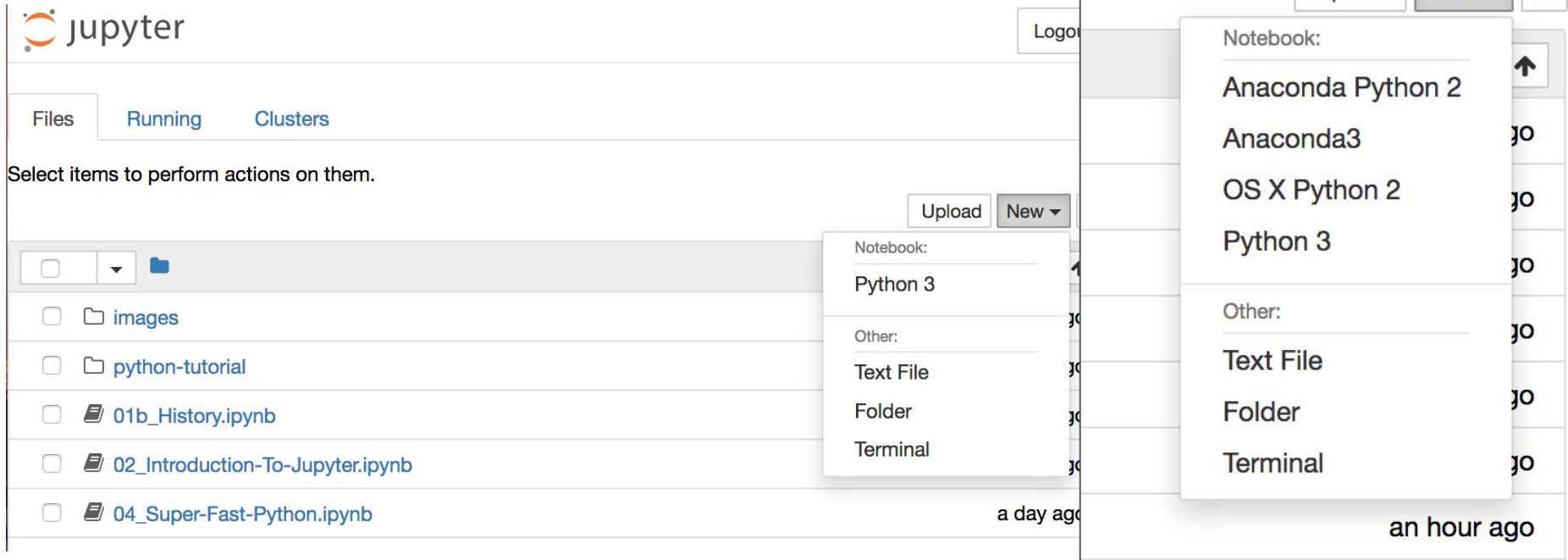


# Under the Covers








# Selecting a Kernel

In the Jupyter File Browser ...



The screenshot displays the Jupyter File Browser interface. At the top left is the Jupyter logo and the word "jupyter". Below it are tabs for "Files", "Running", and "Clusters". A message states "Select items to perform actions on them." The main area shows a file list with checkboxes and icons for folders and notebooks. The file list includes:

- ☐  [images](#)
- ☐  [python-tutorial](#)
- ☐  [01b\\_History.ipynb](#)
- ☐  [02\\_Introduction-To-Jupyter.ipynb](#)
- ☐  [04\\_Super-Fast-Python.ipynb](#)

At the bottom right, there are timestamps "a day ago" and "an hour ago".

Two "New" dropdown menus are open, showing the available kernels and other options:

**Left "New" dropdown:**

- Notebook:
  - Python 3
- Other:
  - Text File
  - Folder
  - Terminal

**Right "New" dropdown:**

- Notebook:
  - Anaconda Python 2
  - Anaconda3
  - OS X Python 2
  - Python 3
- Other:
  - Text File
  - Folder
  - Terminal

# Adding a New Kernel

Instructions will vary from each language but you basically install a package and write a `kernel.json` file

# Python 2

[https://ipython.readthedocs.io/en/latest/install/kernel\\_install.html](https://ipython.readthedocs.io/en/latest/install/kernel_install.html)

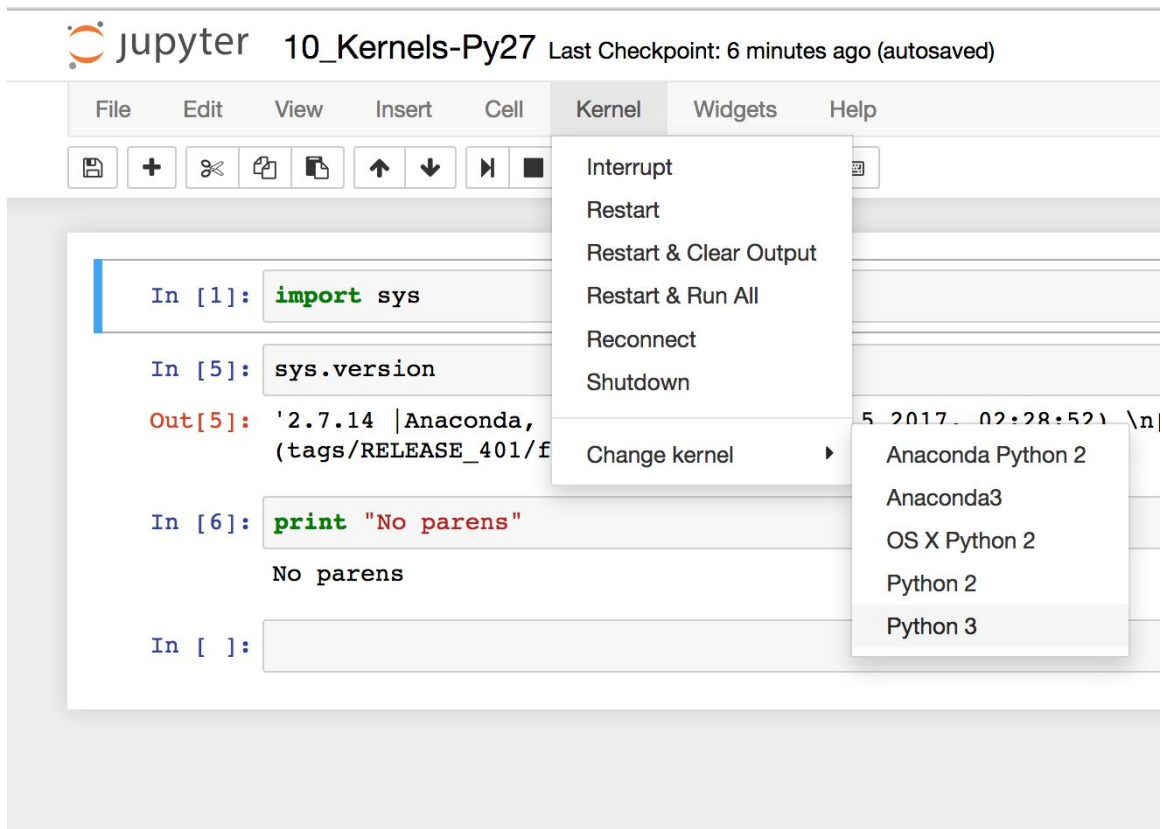
```
> conda create -n ipykernel_py2 python=2 ipykernel  
> source activate ipykernel_py2 # Windows: remove 'source'  
> python -m ipykernel install --user
```

Now restart jupyter and open up notebook 10b\_Kernels-Py27.ipynb

# R

```
> conda install -c r r-essentials
```

# Switching Kernels



The screenshot shows the Jupyter Notebook interface for a notebook named '10\_Kernels-Py27'. The top bar indicates the last checkpoint was 6 minutes ago (autosaved). The 'Kernel' menu is open, showing options: Interrupt, Restart, Restart & Clear Output, Restart & Run All, Reconnect, Shutdown, and Change kernel. The 'Change kernel' option is selected, opening a sub-menu with the following options: Anaconda Python 2, Anaconda3, OS X Python 2, Python 2, and Python 3. The Python 3 option is highlighted. The notebook content shows the following code cells:

```
In [1]: import sys
```

```
In [5]: sys.version
```

```
Out[5]: '2.7.14 |Anaconda,
(tags/RELEASE_401/f
```

```
In [6]: print "No parens"
```

```
No parens
```

```
In [ ]:
```

Re-run the notebook  
with a Python 3  
kernel



# Where do Kernels Live?

Look for a `kernel.json` file in

## UNIX

`~/Library/Jupyter/kernels` (Mac OS)

`~/.local/share/jupyter/kernels` (Linux)

`{sys.prefix}/share/jupyter/kernels`

`/usr/share/jupyter/kernels`

`/usr/local/share/jupyter/kernels`

## WINDOWS

`%APPDATA%\jupyter\kernels`

`%PROGRAMDATA%\jupyter\kernels`

# Customizing the Kernel Spec (kernel.json)

```
{
  "argv": [
    "/Users/shreyas/anaconda2/bin/python",
    "-m",
    "IPython.kernel",
    "-f",
    "{connection_file}"
  ],
  "env": {
    "PATH": "/Users/shreyas/anaconda2/bin:/usr/local/bin:/usr/bin:/bin:/usr/sbin:/sbin",
    "PYTHONPATH": "/my/python/libs",
    "LD_LIBRARY_PATH": "/usr/local/lib"
  },
  "display_name": "Custom Python",
  "language": "python"
}
```

# Jupyter Settings

For command line options see

```
> jupyter notebook --help
```

Options can also be set by creating a file named `jupyter_notebook_config.py` in your Jupyter folder (`$HOME/.jupyter`).

To create a `jupyter_notebook_config.py` file, with all the defaults commented out, you can use the following command line:

```
> jupyter notebook --generate-config
```



# Let's change the Jupyter Default Directory

Edit `.jupyter/jupyter_notebook_config.py`

Change

```
#c.NotebookApp.notebook_dir = ''
```

to

```
c.NotebookApp.notebook_dir = '/'
```

Restart the notebook and notice where you are in the file browser!