

Adding Your Own Data Apps to JupyterLab

Engineering

Bloomberg

PyData Tel Aviv
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Daniel Goldfarb
Software Engineer
Fixed Income Securitized Product Data Engineering

TechAtBloomberg.com

Jupyter Extensions:

- JupyterLab 
- Jupyter Notebook ≥ v7 

Tutorial

presentation originally designed as first 35-40 minutes of a tutorial; skip some to get it under 30 minutes

- Walk through tutorial
 - Explain Code, Demo
- Links to Repository and Documentation
- Code it yourself!

Prerequisites

- Familiar with Jupyter Notebook
(or JupyterLab)
- Experience coding classes and inheritance

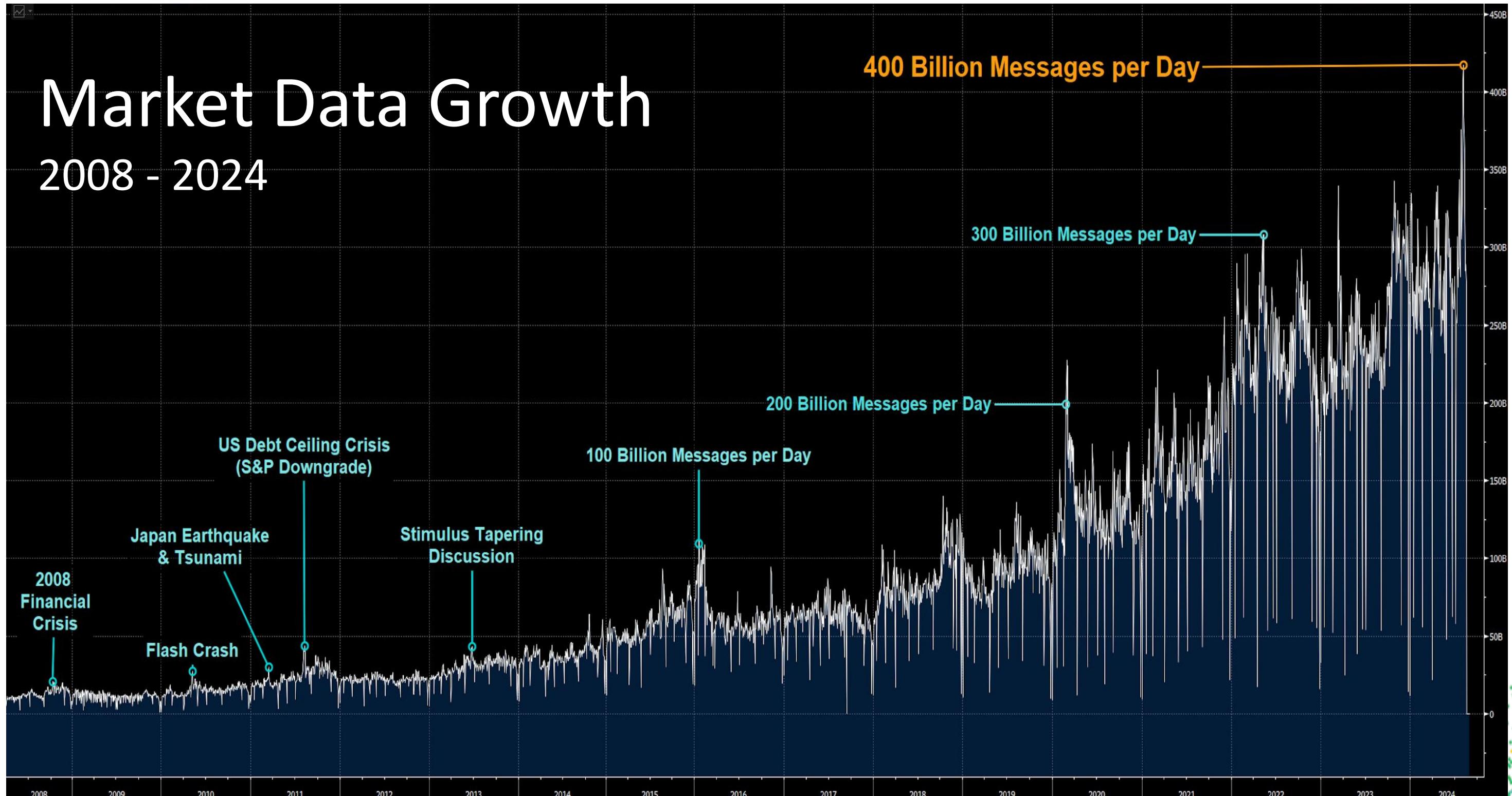
About Bloomberg

- Data, Analytics, APIs, News, Communications & Portfolio Management tools for 350,000+ Financial market professionals
- Financial News: TV / Radio / Online
- Enterprise Products including Trade Management Tools & Data Solutions

About Bloomberg Data

- **70 million securities (financial instruments)**
- **40 thousand fields**
- **400 billion field updates every day**
- **5000+ news stories per day**

About Bloomberg Data



About Bloomberg

- Web Search: **Data Science at Bloomberg**
- Data scientists, AI researchers
- Quantitative researchers
- Machine learning, Deep learning,
- NLP (natural language processing)
- Knowledge Graph technology

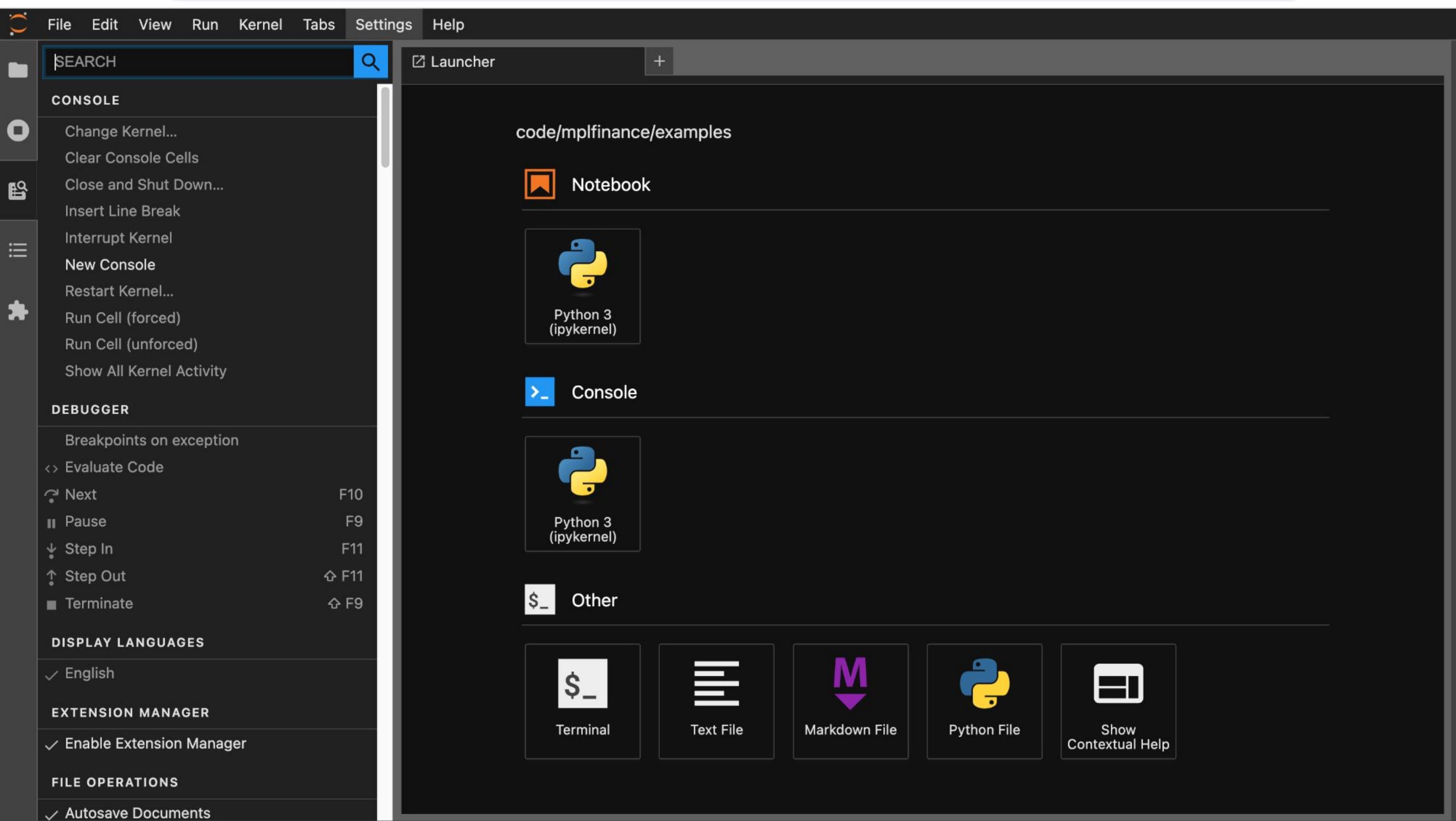
About Bloomberg

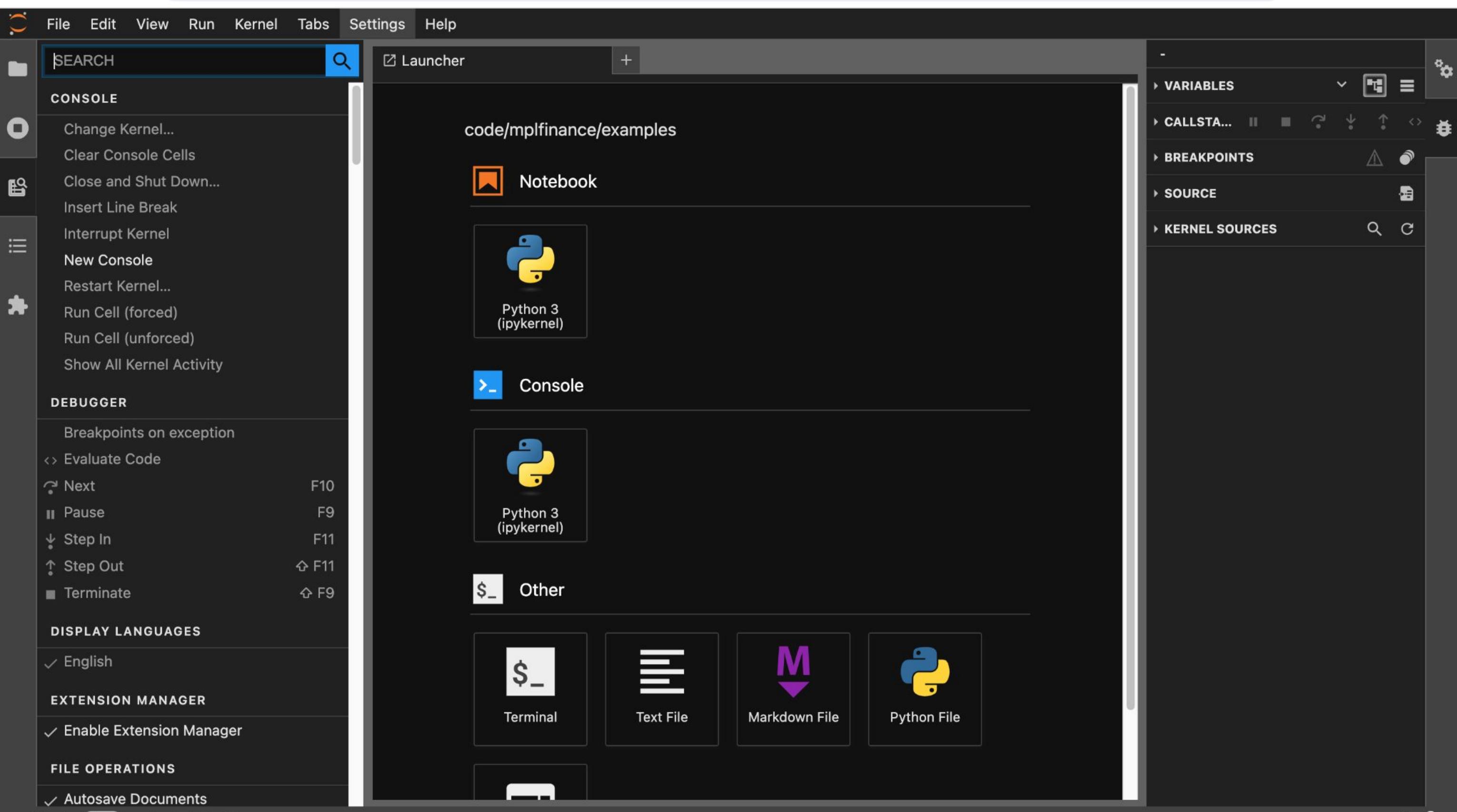
- **21,000+ employees** in 159 locations worldwide
- **9,000+ software engineers**,
including **4,000+ engineers** involved in financial
analysis and data science who **use Python** daily
- **Contribute to, use, and sponsor Open Source**

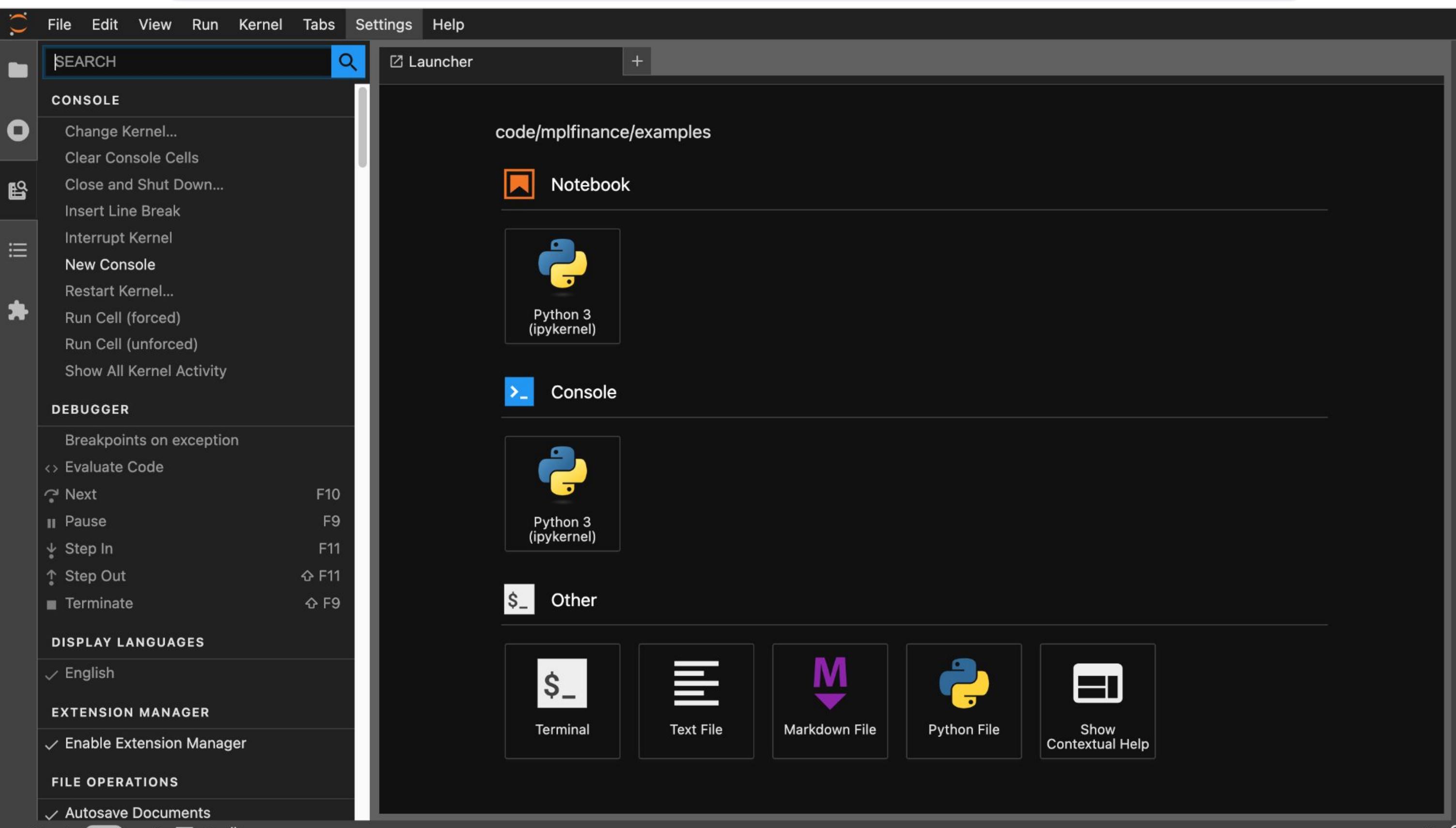
about 35 ta, 1700 europe/london, 6000 ny, 700 nj, 150 sf, other ...

About Me

- Engineer @ Bloomberg
 - Most of my career – server-side C/C++
 - Python / Jupyter Notebook ~ 7 years
 - Open Source Advocate @ Bloomberg
 - Maintainer **matplotlib:mplfinance**
- Chartered Financial Analyst Institute
 - former member ~10 years
- Molecular Biophysics







File Edit View Run Kernel Tabs Settings Help

+ ↻ ⌂

Filter files by name

code / ... / mplfinance / examples /

Name	Modified
data	2 yr. ago
images	2 yr. ago
indicators	7 mo. ago
original_flavor	3 yr. ago
scratch_pad	7 mo. ago
addplot_legends.ipynb	7 mo. ago
addplot.ipynb	26 min. ago
external_axes.ipynb	3 yr. ago
fill_between.ipynb	last yr.
hollow_and_filled_...	2 yr. ago
marketcolor_overri...	last yr.
mpf_animation_de...	3 yr. ago
mpf_animation_de...	3 yr. ago
mpf_animation_gr...	3 yr. ago
mpf_animation_ma...	3 yr. ago
mpf_demo_autocl...	last yr.
mpf_demo_axlabel...	last yr.
mpf_demo.py	last yr.
panels.ipynb	last yr.
plot_customization...	last yr.
price-movement_p...	2 yr. ago
resample10years.i...	2 yr. ago
savefig.ipynb	2 yr. ago

Launcher +

code/mplfinance/examples

Notebook

Python 3 (ipykernel)

Console

Python 3 (ipykernel)

Terminal

Text File

Markdown File

Python File

Show Contextual Help

addplot_lege... - JupyterLab x +

localhost:8888/lab/tree/code/mpffinance/examples/addplot_legends.ipynb

File Edit View Run Kernel Tabs Settings Help

+ Filter files by name

/ ... / mpffinance / examples /

Name	Modified
data	2 yr. ago
images	2 yr. ago
indicators	7 mo. ago
original_flavor	3 yr. ago
scratch_pad	7 mo. ago
• addplot_legends.ip... 7 mo. ago	
• addplot.ipynb 26 min. ago	
external_axes.ipynb 3 yr. ago	
fill_between.ipynb last yr.	
hollow_and_filled_... 2 yr. ago	
marketcolor_overri... last yr.	
mpf_animation_de... 3 yr. ago	
mpf_animation_de... 3 yr. ago	
mpf_animation_gr... 3 yr. ago	
mpf_animation_ma... 3 yr. ago	
mpf_demo_autocl... last yr.	
mpf_demo_axlabel... last yr.	
mpf_demo.py last yr.	
panels.ipynb last yr.	
plot_customization... last yr.	
price-movement_p... 2 yr. ago	
resample10years.i... 2 yr. ago	
savefig.ipynb 2 yr. ago	

[1]: # This allows multiple outputs from a single jupyter notebook cell:
from IPython.core.interactiveshell import InteractiveShell
InteractiveShell.ast_node_interactivity = "all"

[2]: %matplotlib inline
import pandas as pd
pd.__version__ # for the record

[2]: '1.5.1'

Adding plots with *legends* to the basic mpffinance plot()

To add legends to the additional plots, use the keyword `label` in the `make_addplot()` api, .

For example,

```
import mpffinance as mpf
ap = mpf.make_addplot(df['LowerB'], label="LowerB")
mpf.plot(df, addplot=ap)
```

Note: This tutorial assumes you have *already* reviewed the tutorial in examples/addplot.ipynb .

addplot with legend examples

+ + ↑ C

Filter files by name

/ ... / mplfinance / examples /

Name	Modified
data	2 yr. ago
images	2 yr. ago
indicators	7 mo. ago
original_flavor	3 yr. ago
scratch_pad	7 mo. ago
addplot_legends.ipynb	7 mo. ago
addplot.ipynb	27 min. ago
external_axes.ipynb	3 yr. ago
fill_between.ipynb	last yr.
hollow_and_filled_...	2 yr. ago
marketcolor_overri...	last yr.
mpf_animation_de...	3 yr. ago
mpf_animation_de...	3 yr. ago
mpf_animation_gr...	3 yr. ago
mpf_animation_ma...	3 yr. ago
mpf_demo_autocl...	last yr.
mpf_demo_axlabel...	last yr.
mpf_demo.py	last yr.
panels.ipynb	last yr.
plot_customization...	last yr.
price-movement_p...	2 yr. ago
resample10years.i...	2 yr. ago
savefig.ipynb	2 yr. ago

Launcher x addplot_legends.ipynb ● mpf_animation_demo1.py +

```
1 """
2 This file contains a simple animation demo using mplfinance "external axes mode".
3
4 Note that presently mplfinance does not support "blitting" (blitting makes animation
5 more efficient). Nonetheless, the animation is efficient enough to update at least
6 once per second, and typically more frequently depending on the size of the plot.
7 """
8 import pandas as pd
9 import mplfinance as mpf
10 import matplotlib.animation as animation
11
12 idf = pd.read_csv('data/SPY_20110701_20120630_Bollinger.csv', index_col=0, parse_dates=True)
13 idf.shape
14 idf.head(3)
15 idf.tail(3)
16 df = idf.loc['2011-07-01':'2011-12-30', :]
17
18 fig = mpf.figure(style='charles', figsize=(7, 8))
19 ax1 = fig.add_subplot(2, 1, 1)
20 ax2 = fig.add_subplot(3, 1, 3)
21
22 def animate(ival):
23     if (20+ival) > len(df):
24         print('no more data to plot')
25         ani.event_source.interval *= 3
26         if ani.event_source.interval > 12000:
27             exit()
28         return
29     data = df.iloc[0:(20+ival)]
30     ax1.clear()
31     ax2.clear()
32     mpf.plot(data, ax=ax1, volume=ax2, type='candle')
33
34 ani = animation.FuncAnimation(fig, animate, interval=250)
35
```

mpf_demo_autoclose.py - Jupyter

localhost:8888/lab/tree/code/mplfinance/examples/mpf_demo_autoclose.py

File Edit View Run Kernel Tabs Settings Help

+ / ... / mplfinance / examples /

Name	Modified
data	2 yr. ago
images	2 yr. ago
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addplot_legends.ipynb	7 mo. ago
addplot.ipynb	27 min. ago
external_axes.ipynb	3 yr. ago
fill_between.ipynb	last yr.
hollow_and_filled...	2 yr. ago
marketcolor_overri...	last yr.
mpf_animation_de...	3 yr. ago
mpf_animation_de...	3 yr. ago
mpf_animation_gr...	3 yr. ago
mpf_animation_ma...	3 yr. ago
mpf_demo_autocl...	last yr.
mpf_demo_axlabel...	last yr.
mpf_demo.py	last yr.
panels.ipynb	last yr.
plot_customization...	last yr.
price-movement_p...	2 yr. ago
resample10years.i...	2 yr. ago
savefig.ipynb	2 yr. ago

```
1 import pandas as pd
2 import mplfinance as mpf
3
4 import time
5 import matplotlib.pyplot as plt
6
7 infile = 'data/yahoofinance-SPY-20200901-20210113.csv'
8
9 df = pd.read_csv(infile, index_col=0, parse_dates=True)
10
11 # print('len(df)=', len(df))
12
13
14 for jj in (0,1,2):
15     start = jj*35
16     stop = start + 35
17     tdf = df.iloc[start:stop]
18     fig, _ = mpf.plot(tdf, type='candle', volume=True, mav=(10,20), figscale=1.5, returnfig=True)
19     plt.pause(4)
20     plt.close(fig)
21     del fig
22
```

Simple 0 \$ 6 Python Ln 1, Col 1 Spaces: 4 mpf_demo_autoclose.py 0

mpf_animation_demo1.py - Jupyter

localhost:8888/lab/tree/code/mpffinance/examples/mpf_animation_demo1.py

File Edit View Run Kernel Tabs Settings Help

mpf_animation_demo1.py

```
'''  
This file contains a simple animation demo using  
mplfinance "external axes mode".  
  
Note that presently mplfinance does not support  
"blitting" (blitting makes animation  
more efficient). Nonetheless, the animation is  
efficient enough to update at least  
once per second, and typically more frequently  
depending on the size of the plot.  
'''  
  
import pandas as pd  
import mplfinance as mpf  
import matplotlib.animation as animation  
  
idf =  
pd.read_csv('data/SPY_20110701_20120630_Bollinger.csv', index_col=0, parse_dates=True)  
idf.shape  
idf.head(3)  
idf.tail(3)  
df = idf.loc['2011-07-01':'2011-12-30',:]  
  
fig = mpf.figure(style='charles', figsize=(7,8))  
ax1 = fig.add_subplot(2,1,1)  
ax2 = fig.add_subplot(3,1,3)  
  
def animate(ival):  
    if (20+ival) > len(df):  
        print('no more data to plot')  
        ani.event_source.interval *= 3  
        if ani.event_source.interval > 12000:  
            exit()  
    return  
    data = df.iloc[0:(20+ival)]
```

Launcher

```
import pandas as pd  
import mplfinance as mpf  
  
import time  
import matplotlib.pyplot as plt  
  
infile = 'data/yahoofinance-SPY-20200901-20210113.csv'  
  
df = pd.read_csv(infile, index_col=0, parse_dates=True)  
  
# print('len(df)=',len(df))  
  
for jj in (0,1,2):  
    start = jj*35  
    stop = start + 35  
    tdf = df.iloc[start:stop]  
    fig, _ = mpf.plot(tdf, type='candle', volume=True, mav=(10,20), figscale=1.5, returnfig=True)  
    plt.pause(4)  
    plt.close(fig)  
del fig
```

Simple Python 0 \$ 6 Python

Ln 1, Col 1 Spaces: 4 mpf_animation_demo1.py 0

File Edit View Run Kernel Tabs Settings Help

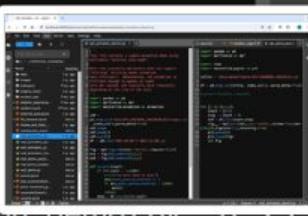
mpf_animation_demo1.py +

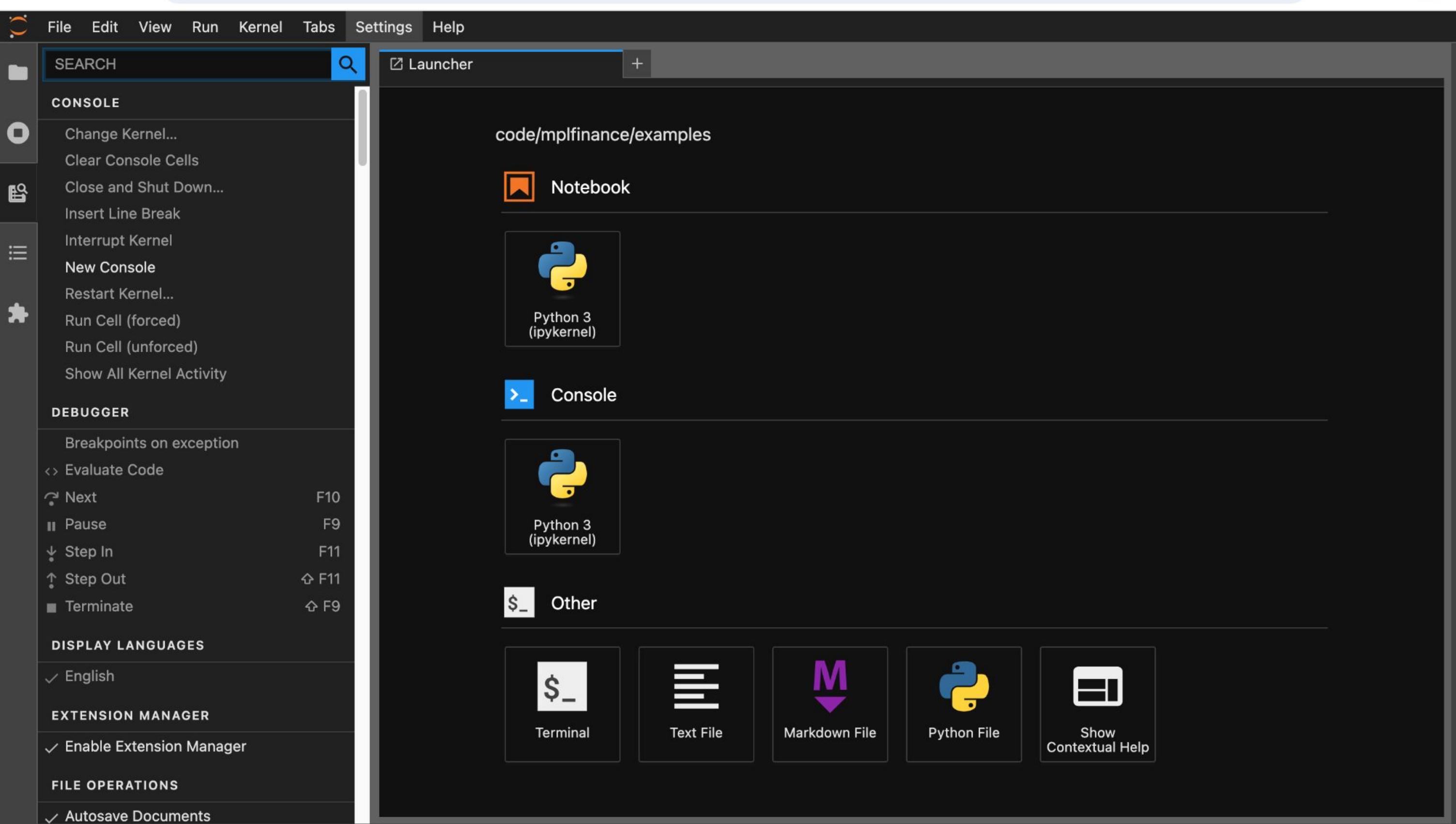
File Browser (F)

```
2 This file contains a simple animation demo using mplfinance "external
axes mode".
3
4 Note that presently mplfinance does not support "blitting" (blitting
makes animation
5 more efficient). Nonetheless, the animation is efficient enough to
update at least
6 once per second, and typically more frequently depending on the size of
the plot.
7 """
8 import pandas as pd
9 import mplfinance as mpf
10 import matplotlib.animation as animation
11
12 idf =
13     pd.read_csv('data/SPY_20110701_20120630_Bollinger.csv', index_col=0, parse_
14 _dates=True)
15 idf.shape
16 idf.head(3)
17 idf.tail(3)
18 df = idf.loc['2011-07-01':'2011-12-30',:]
19
20 fig = mpf.figure(style='charles', figsize=(7,8))
21 ax1 = fig.add_subplot(2,1,1)
22 ax2 = fig.add_subplot(3,1,3)
23
24 def animate(ival):
25     if (20+ival) > len(df):
26         print('no more data to plot')
27         ani.event_source.interval *= 3
28         if ani.event_source.interval > 12000:
29             exit()
30     return
31
32 data = df.iloc[0:(20+ival)]
```

Launcher addplot_legends.ipynb mpf_demo_autoclose.py +

```
1 import pandas as pd
2 import mplfinance as mpf
3
4 import time
5 import matplotlib.pyplot as plt
6
7 infile = 'data/yahoofinance-SPY-20200901-20210113.csv'
8
9 df = pd.read_csv(infile, index_col=0, parse_dates=True)
10
11 # print('len(df)=',len(df))
12
13
14 for jj in (0,1,2):
15     start = jj*35
16     stop = start + 35
17     tdf = df.iloc[start:stop]
18     fig, _ = mpf.plot(tdf, type='candle', volume=True, mav=
19 (10,20), figscale=1.5, returnfig=True)
20     plt.pause(4)
21     plt.close(fig)
22     del fig
```





JupyterLab x +

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH 

Launcher X Hello World X +

ANYTHING

Hello World

CONSOLE

Change Kernel...
Clear Console Cells
Close and Shut Down...
Insert Line Break
Interrupt Kernel
New Console
Restart Kernel...
Run Cell (forced)
Run Cell (unforced)
Show All Kernel Activity

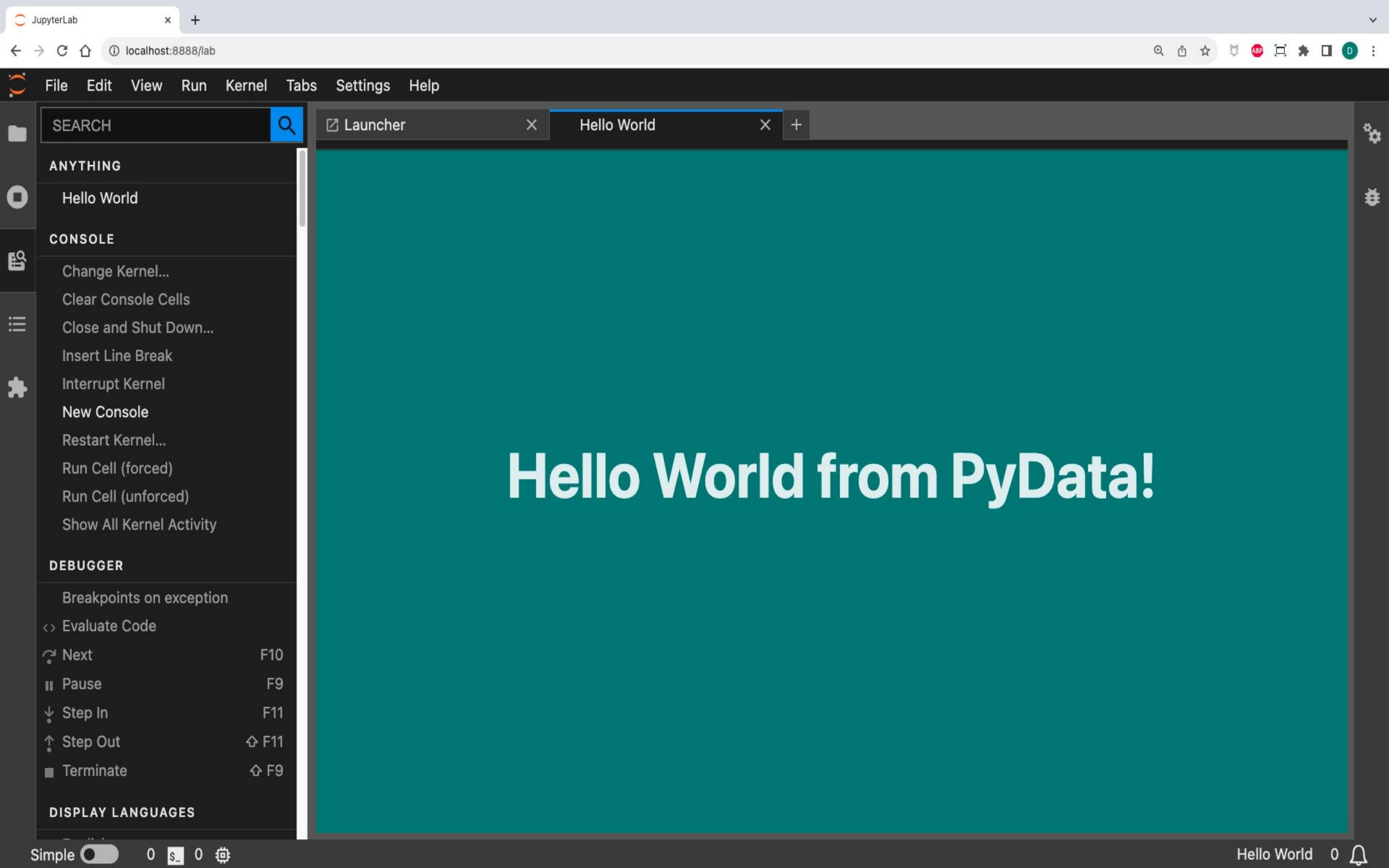
DEBUGGER

Breakpoints on exception
< Evaluate Code
⟳ Next F10
⏸ Pause F9
⌄ Step In F11
↑ Step Out ⌄ F11
■ Terminate ⌄ F9

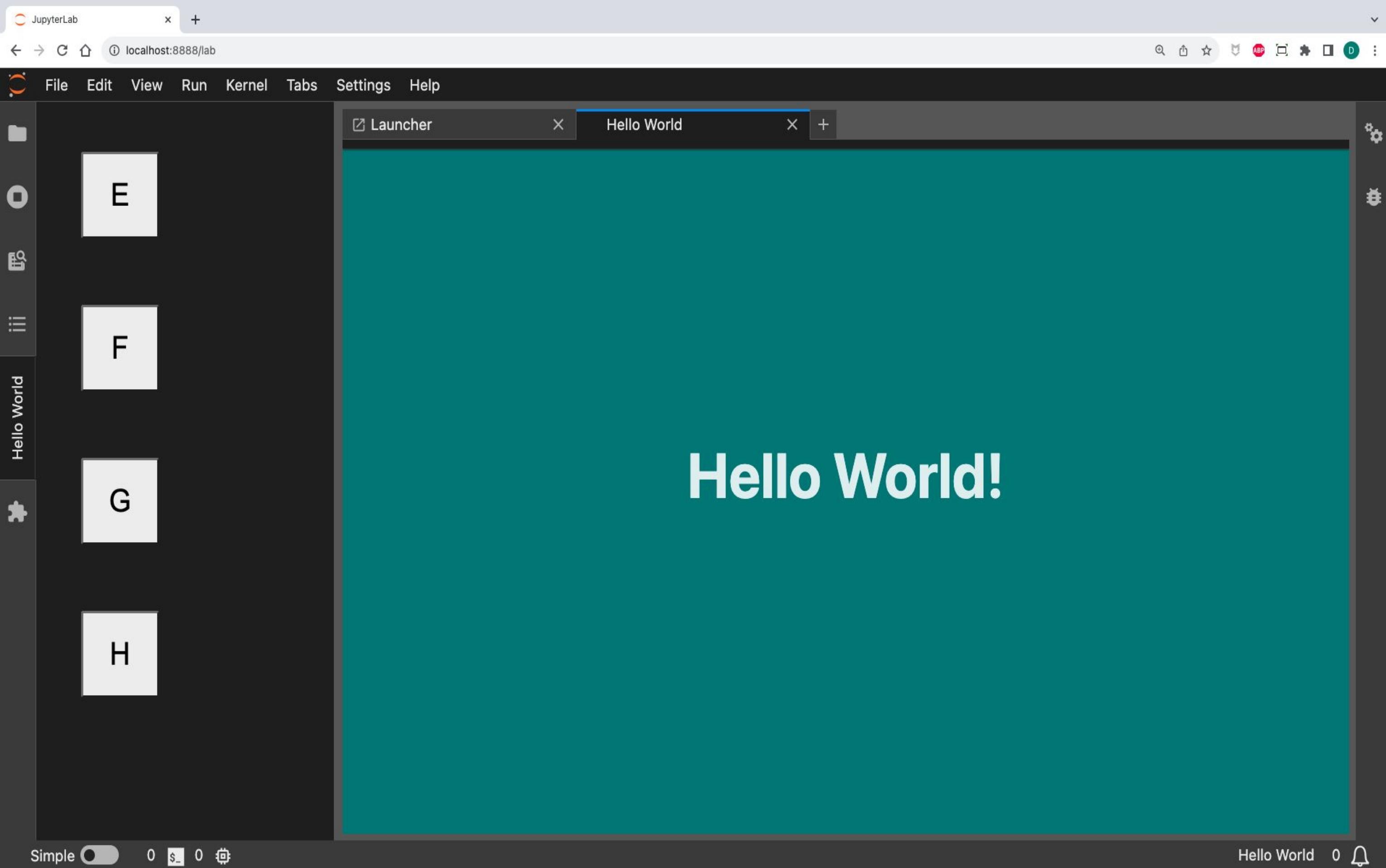
DISPLAY LANGUAGES

Simple  0 \$ 0 @

Hello World 0 



The image shows the JupyterLab interface. At the top, there's a header with tabs for File, Edit, View, Run, Kernel, Tabs, Settings, and Help. Below the header is a search bar with a magnifying glass icon. To the right of the search bar is a 'Launcher' tab with the title 'Hello World'. The main content area features a large, bold, white text 'Hello World from PyData!' on a teal background. On the left side, there's a sidebar with several sections: 'ANYTHING' containing a single item 'Hello World'; 'CONSOLE' with various kernel-related options like 'Change Kernel...', 'Clear Console Cells', and 'Run Cell (forced)'; 'DEBUGGER' with a list of step controls (Next, Pause, Step In, Step Out, Terminate); and 'DISPLAY LANGUAGES' which is currently set to 'Simple'. The bottom navigation bar includes icons for Simple, \$, @, Hello World, and a bell notification.



JupyterLab

x +

localhost:8888/lab

ABP

File Edit View Run Kernel Tabs Settings Help

Launcher

Hello World

x

+

E

F

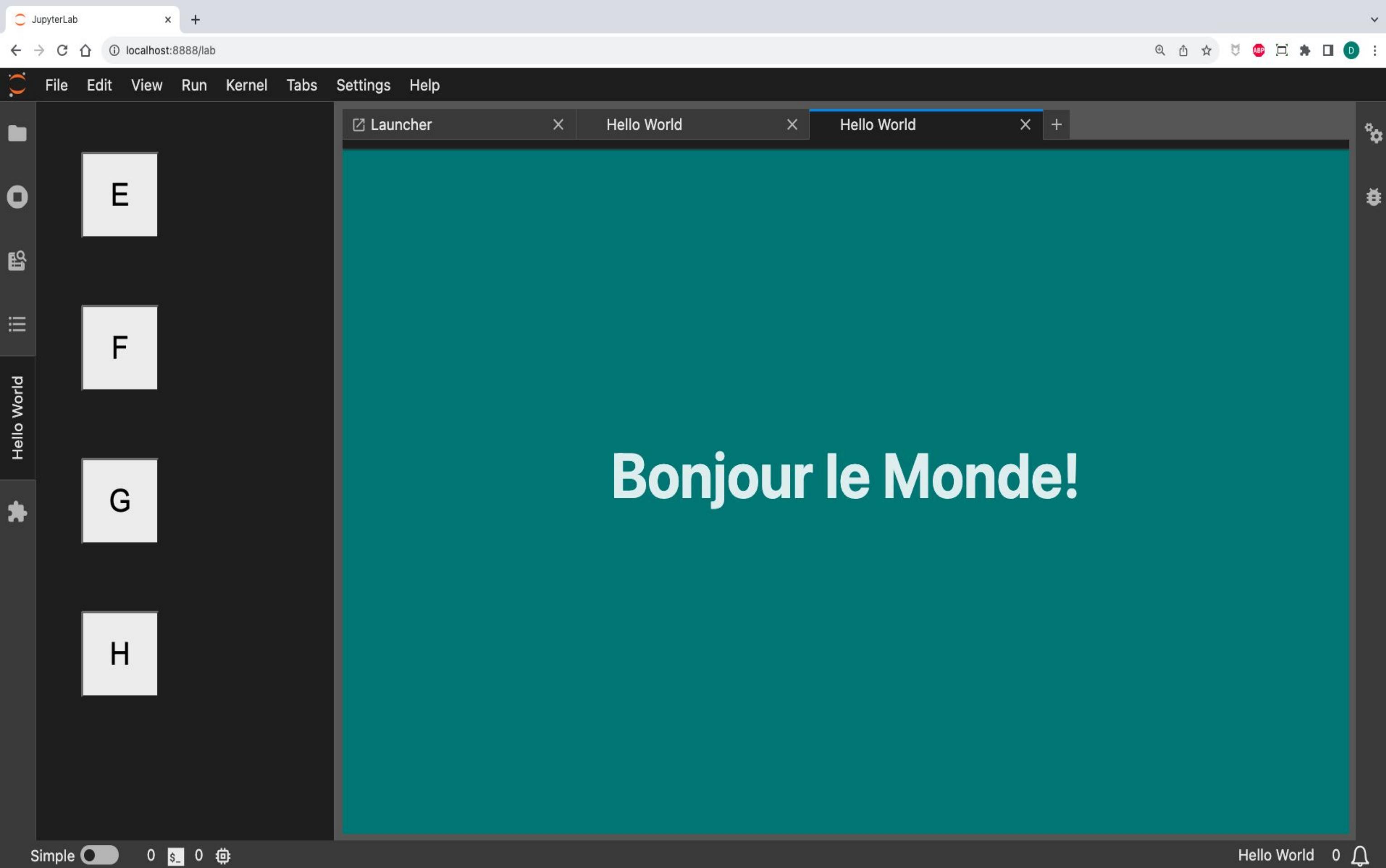
G

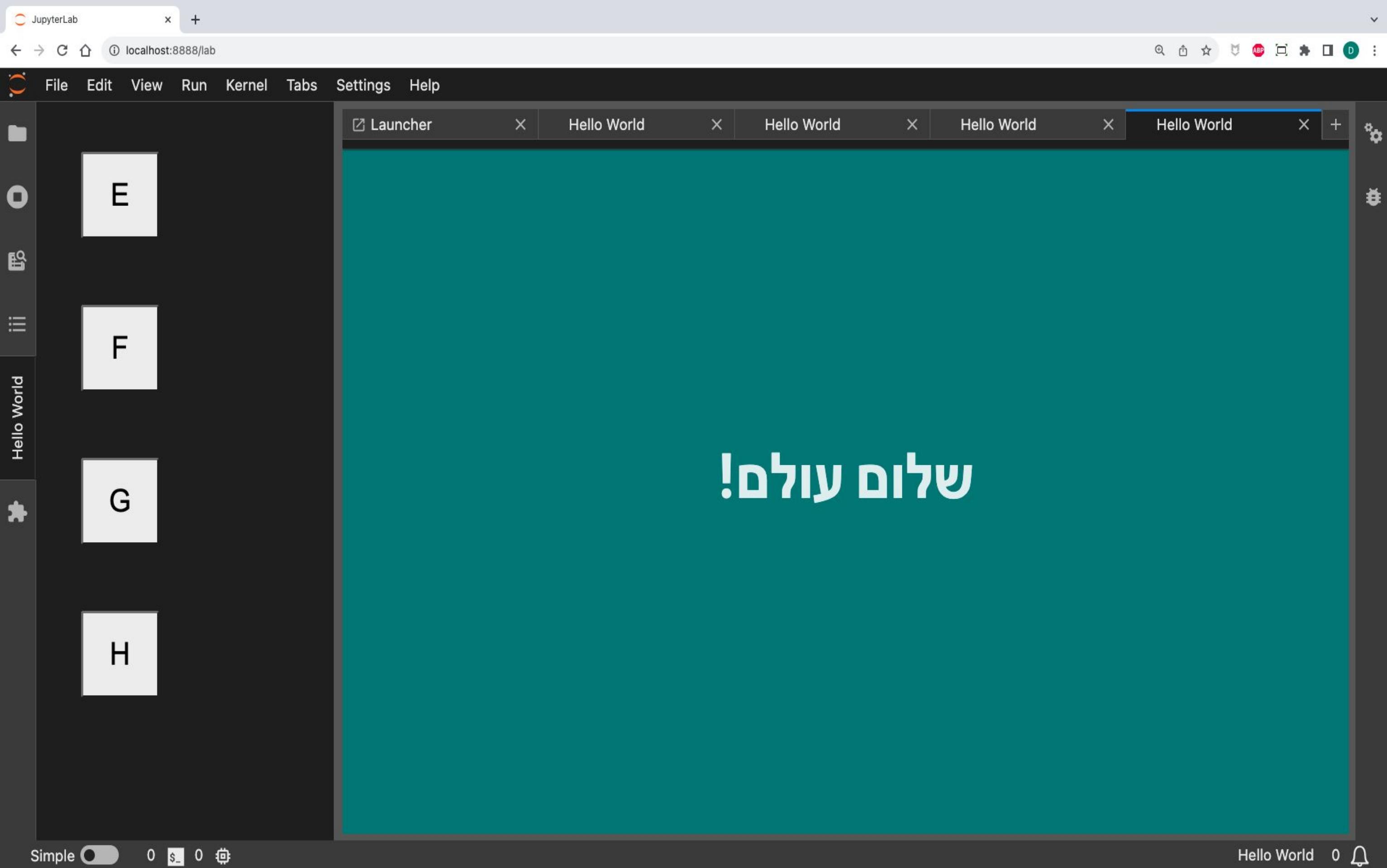
H

Hello World!

Simple 0 \$ 0 @

Hello World 0





File Edit View Run Kernel Tabs Settings Help

Launcher



code/mplfinance/examples



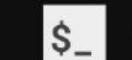
Notebook

Python 3
(ipykernel)

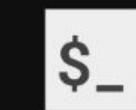
Hello World



Console

Python 3
(ipykernel)

Other



Terminal



Text File



Markdown File



Python File

Show
Contextual Help

Launcher

Candle Chart

+

Enter Ticker Symbol:

SPY



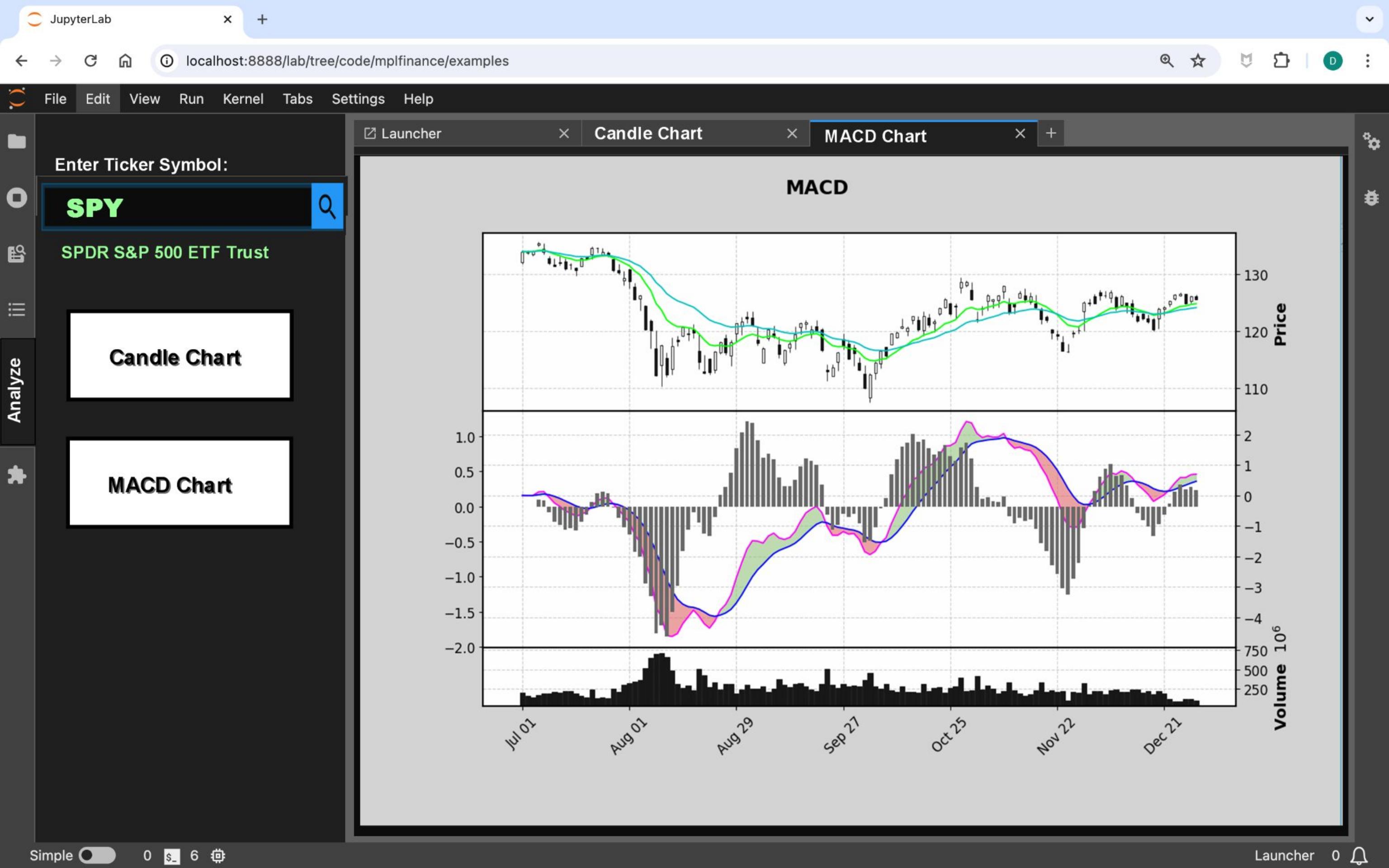
SPDR S&P 500 ETF Trust

Candle Chart

MACD Chart

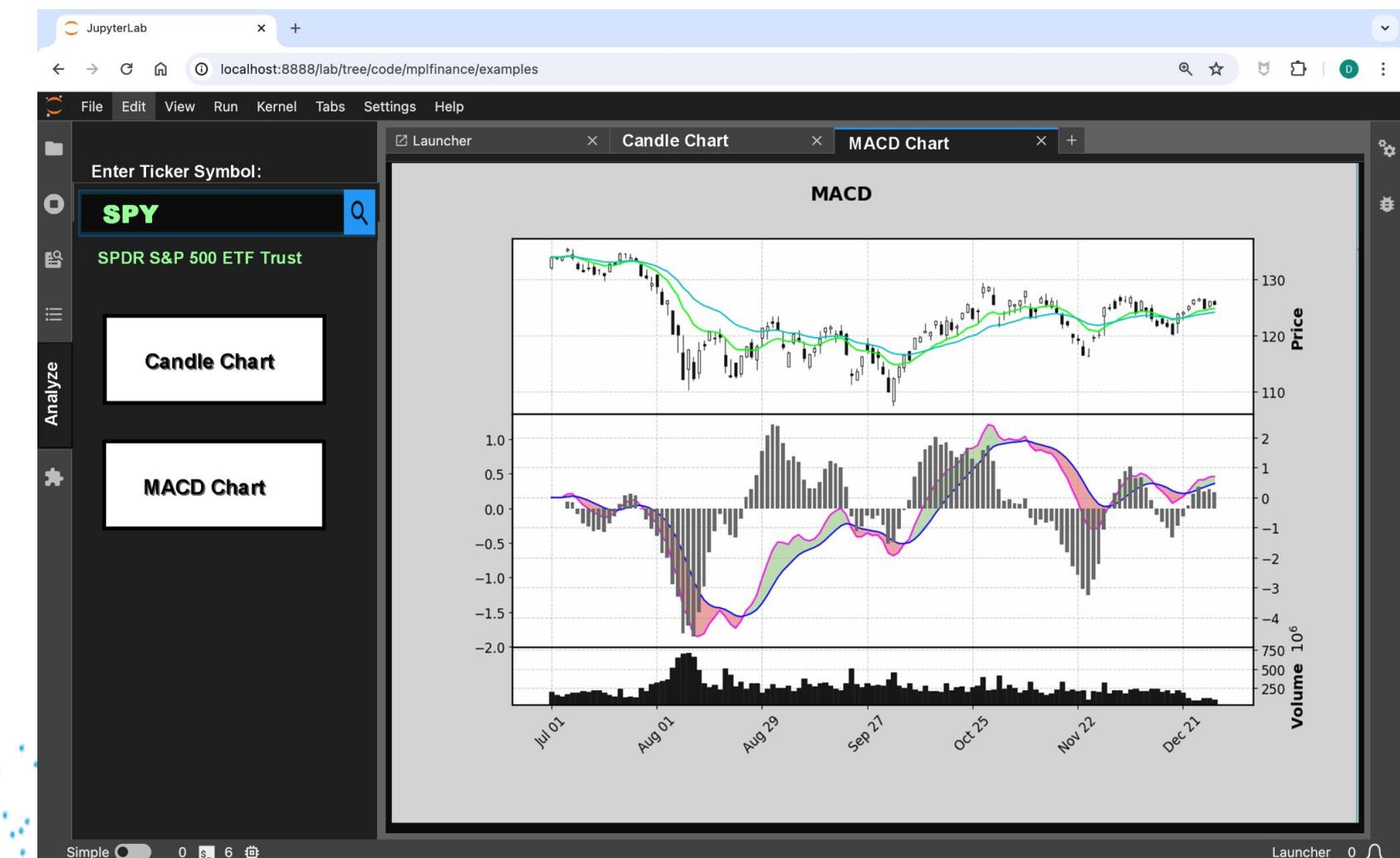
SPY





Jupyter Extension Ideas

- Data Fetch
- Analysis (MACD)
- Visualization



Jupyter Extension Ideas

- Data Fetch
- Analysis
- Visualization
- Select Machine Learning Models

Jupyter Extension Ideas

- Data Fetch
- Analysis
- Visualization
- Select Machine Learning Models
- Collaboration / Data Contribution

Jupyter Extension Ideas

- Data Fetch
- Analysis
- Visualization
- Select Machine Learning Models
- Collaboration / Data Contribution
- Management Data Sets / Annotation

Vocabulary

- **nbextension**
Classic Jupyter notebook extension
(being deprecated)
- **labextension**
JupyterLab and Notebook v7 extension

Vocabulary

- **@lumino** (npm package scope: ts/js packages)
- **@jupyterlab** (npm package scope: ts/js packages)

Vocabulary

- **plugin** – Class providing extension functionality
- **extension** – Package containing one or more plugins
- **token** – Identifier for a **service** provided by a plugin
(i.e., an instance of the Lumino Token class)

Vocabulary

- **commands** – registry of functions (@lumino)
(property of JupyterFrontEnd application object)
- **widgets** – everything on screen
(@lumino widget)
- **jlpm (yarn)** – JupyterLab Packaging Manager

TUTORIAL

0. copier extension template
(basic do-nothing extension)
1. create a command in Command Registry
2. execute command from the Command Palette
3. command add Widget to JupyterLab
(main area)

TUTORIAL

4. style the widget
5. execute the command from the Launcher
6. execute command with arguments
7. create SideBar widget to execute our command with various options

Install virtual environment

```
conda create -n jlx --override-channels \  
--strict-channel-priority -c conda-forge -c nodefaults \  
jupyterlab=4 nodejs=18 git copier=7 jinja2-time
```

create virtual environment for development

miniconda, mamba, micromamba

Install virtual environment

```
conda create -n jlx --override-channels \  
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jupyterlab=4 nodejs=18 git copier=7 jinja2-time
```

Install virtual environment

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conda create -n jlx --override-channels \  
--strict-channel-priority -c conda-forge -c nodefaults \  
jupyterlab=4 nodejs=18 git copier=7 jinja2-time
```

“copier” is a Project Templating Tool similar to “cookiecutter” and “yeoman” and “hygen”

Install virtual environment

```
conda create -n jlx --override-channels \  
--strict-channel-priority -c conda-forge -c nodefaults \  
jupyterlab=4 nodejs=18 git copier=7 jinja2-time
```

```
Dino@MacDino:~/code$  
Dino@MacDino:~/code$ # create the conda environment  
Dino@MacDino:~/code$ conda create -n jlx --override-channels --strict-channel-priority -c conda-forge -c nodefaults jupyterlab=4 nodejs=18 git copier=7 jinja2-time  
Retrieving notices: ...working... done  
Collecting package metadata (current_repodata.json): done  
Solving environment: failed with repodata from current_repodata.json, will retry with next repodata source.  
Collecting package metadata (repodata.json): done  
Solving environment: done
```

```
## Package Plan ##
```

```
environment location: /Users/Dino/miniconda3/envs/jlx
```

```
added / updated specs:
```

- copier=7
- git
- jinja2-time
- jupyterlab=4
- nodejs=18

```
The following packages will be downloaded:
```

package	build			
anyio-4.3.0	pyhd8ed1ab_0	100 KB	conda-forge	
appnope-0.1.4	pyhd8ed1ab_0	10 KB	conda-forge	
argon2-cffi-bindings-21.2.0	py312h104f124_4	32 KB	conda-forge	
asttokens-2.4.1	pyhd8ed1ab_0	28 KB	conda-forge	

attrs-23.2.0		pyh71513ae_0	53 KB	conda-forge
babel-2.14.0		pyhd8ed1ab_0	7.3 MB	conda-forge
bcrypt-4.1.3		py312ha47ea1c_0	226 KB	conda-forge
beautifulsoup4-4.12.3		pyha770c72_0	115 KB	conda-forge
brotli-python-1.1.0		py312heafc425_1	358 KB	conda-forge
bzip2-1.0.8		h10d778d_5	125 KB	conda-forge
c-ares-1.28.1		h10d778d_0	149 KB	conda-forge
ca-certificates-2024.2.2		h8857fd0_0	152 KB	conda-forge
certifi-2024.2.2		pyhd8ed1ab_0	157 KB	conda-forge
cffi-1.16.0		py312h38bf5a0_0	276 KB	conda-forge
charset-normalizer-3.3.2		pyhd8ed1ab_0	46 KB	conda-forge
comm-0.2.2		pyhd8ed1ab_0	12 KB	conda-forge
cryptography-42.0.7		py312h7e81a9d_0	1.2 MB	conda-forge
debugpy-1.8.1		py312hede676d_0	2.0 MB	conda-forge
dunamai-1.21.1		pyhd8ed1ab_0	28 KB	conda-forge
exceptiongroup-1.2.0		pyhd8ed1ab_2	20 KB	conda-forge
executing-2.0.1		pyhd8ed1ab_0	27 KB	conda-forge
git-2.45.1		pl5321h9d8b143_0	11.2 MB	conda-forge
h11-0.14.0		pyhd8ed1ab_0	47 KB	conda-forge
h2-4.1.0		pyhd8ed1ab_0	46 KB	conda-forge
hpack-4.0.0		pyh9f0ad1d_0	25 KB	conda-forge
httpcore-1.0.5		pyhd8ed1ab_0	45 KB	conda-forge
httpx-0.27.0		pyhd8ed1ab_0	63 KB	conda-forge
hyperframe-6.0.1		pyhd8ed1ab_0	14 KB	conda-forge
idna-3.7		pyhd8ed1ab_0	51 KB	conda-forge
importlib-metadata-7.1.0		pyha770c72_0	26 KB	conda-forge
importlib_metadata-7.1.0		hd8ed1ab_0	9 KB	conda-forge
importlib_resources-6.4.0		pyhd8ed1ab_0	32 KB	conda-forge
ipykernel-6.29.3		pyh3cd1d5f_0	117 KB	conda-forge
ipython-8.24.0		pyh707e725_0	582 KB	conda-forge

```
zeromq-4.3.5           |      hde137ed_4          297 KB  conda-forge
zlib-1.2.13             |      h87427d6_6          87  KB  conda-forge
zstd-1.5.6              |      h915ae27_0          487 KB  conda-forge
-----
```

```
                           Total:    92.5 MB
```

The following NEW packages will be INSTALLED:

```
anyio                  conda-forge/noarch::anyio-4.3.0-pyhd8ed1ab_0
appnope                conda-forge/noarch::appnope-0.1.4-pyhd8ed1ab_0
argon2-cffi             conda-forge/noarch::argon2-cffi-23.1.0-pyhd8ed1ab_0
argon2-cffi-bindings~  conda-forge/osx-64::argon2-cffi-bindings-21.2.0-py312h104f124_4
arrow                   conda-forge/noarch::arrow-1.3.0-pyhd8ed1ab_0
asttokens               conda-forge/noarch::asttokens-2.4.1-pyhd8ed1ab_0
async-lru               conda-forge/noarch::async-lru-2.0.4-pyhd8ed1ab_0
attrs                   conda-forge/noarch::attrs-23.2.0-pyh71513ae_0
babel                   conda-forge/noarch::babel-2.14.0-pyhd8ed1ab_0
bcrypt                  conda-forge/osx-64::bcrypt-4.1.3-py312ha47ea1c_0
beautifulsoup4          conda-forge/noarch::beautifulsoup4-4.12.3-pyha770c72_0
bleach                  conda-forge/noarch::bleach-6.1.0-pyhd8ed1ab_0
brotli-python           conda-forge/osx-64::brotli-python-1.1.0-py312heafc425_1
bzip2                   conda-forge/osx-64::bzip2-1.0.8-h10d778d_5
c-ares                  conda-forge/osx-64::c-ares-1.28.1-h10d778d_0
ca-certificates         conda-forge/osx-64::ca-certificates-2024.2.2-h8857fd0_0
cached-property          conda-forge/noarch::cached-property-1.5.2-hd8ed1ab_1
cached_property          conda-forge/noarch::cached_property-1.5.2-pyha770c72_1
certifi                 conda-forge/noarch::certifi-2024.2.2-pyhd8ed1ab_0
cffi                    conda-forge/osx-64::cffi-1.16.0-py312h38bf5a0_0
charset-normalizer       conda-forge/noarch::charset-normalizer-3.3.2-pyhd8ed1ab_0
colorama                conda-forge/noarch::colorama-0.4.6-pyhd8ed1ab_0
```

```
wheel           conda-forge/noarch::wheel-0.43.0-pyhd8ed1ab_1
xz             conda-forge/osx-64::xz-5.2.6-h775f41a_0
yaml           conda-forge/osx-64::yaml-0.2.5-h0d85af4_2
zeromq         conda-forge/osx-64::zeromq-4.3.5-hde137ed_4
zipp           conda-forge/noarch::zipp-3.17.0-pyhd8ed1ab_0
zlib           conda-forge/osx-64::zlib-1.2.13-h87427d6_6
zstd           conda-forge/osx-64::zstd-1.5.6-h915ae27_0
```

Proceed ([y]/n)? y

Downloading and Extracting Packages

`anyio-4.3.0` | 100 KB | ##### | 100%

Preparing transaction: done

Verifying transaction: done

Executing transaction: done

#

```
# To activate this environment, use
```

#

```
$ conda activate jlx
```

#

To deactivate an active environment, use

#

\$ condenses deactivate

Dino@MacDino:~/code\$

```
Dino@MacDino:~/code$ conda activate jlx
```

(jlx) Dino@MacDino:~/code\$

conda activate jlx

```
Dino@MacDino:~/code$ conda activate jlx
(jlx) Dino@MacDino:~/code$ 
(jlx) Dino@MacDino:~/code$ █
```

generate extension from template

```
copier copy \
```

```
https://github.com/jupyterlab/extension-template \  
pydjlx
```

“copier” is a Project Templating Tool similar to “cookiecutter” and “yeoman” and “hygen”

generate extension from template

copier copy \

**https://github.com/jupyterlab/extension-template **

pydjlx

generate extension from template

copier copy \

[https://github.com/jupyterlab/extension-template \](https://github.com/jupyterlab/extension-template)

pydjlx

```
(jlx) Dino@MacDino:~/code$
```

```
(jlx) Dino@MacDino:~/code$
```

```
(jlx) Dino@MacDino:~/code$ copier copy https://github.com/jupyterlab/
```

🎤 What is your extension kind?

(Use arrow keys)

```
» frontend
```

```
mimerenderer
```

```
server
```

```
theme
```

```
(jlx) Dino@MacDino:~/code$ copier copy https://github.com/jupyterlab/extension-template pydjlx
What is your extension kind?
frontend
Extension author name
Daniel Goldfarb
Extension author email
dgoldfarb.github@gmail.com
JavaScript package name
pydjlx
Python package name
pydjlx
Extension short description
A JupyterLab extension demo for PyData
Does the extension have user settings?
No
Do you want to set up Binder example?
No
Do you want to set up tests for the extension?
No
Git remote repository URL
https://github.com/DanielGoldfarb/pydjlx
```

```
(jlx) Dino@MacDino:~/code$ copier copy https://github.com/jupyter/copier
```

What is your extension kind?
frontend

Extension author name
Daniel Goldfarb

Extension author email
dgoldfarb.github@gmail.com

JavaScript package name
pydjlx

Python package name
pydjlx

Extension short description

Extension short description

A JupyterLab extension demo for PyData

Does the extension have user settings?

No

Do you want to set up Binder example?

No

Do you want to set up tests for the extension?

No

Git remote repository URL

<https://github.com/DanielGoldfarb/pydjlx>

Copying from template version 4.2.2

```
create .
create pydjlx
create pydjlx/__init__.py
create .gitignore
create RELEASE.md
create CHANGELOG.md
create .yarnrc.yml
create README.md
create style
create style/base.css
create style/index.css
create style/index.js
create LICENSE
create .prettierignore
create .copier-answers.yml
create setup.py
create package.json
create install.json
create .github
create .github/workflows
create .github/workflows/prep-release.yml
create .github/workflows/check-release.yml
create .github/workflows/build.yml
create .github/workflows/publish-release.yml
create .github/workflows/enforce-label.yml
create tsconfig.json
create pyproject.toml
create src
create src/index.ts
```

```
(jlx) Dino@MacDino:~/code$  
(jlx) Dino@MacDino:~/code$ ls -ld pydjlx  
drwxr-xr-x 19 Dino staff 608 Oct 15 13:10 pydjlx  
(jlx) Dino@MacDino:~/code$ ls -l pydjlx  
total 80  
-rw-r--r-- 1 Dino staff 86 Oct 15 13:10 CHANGELOG.md  
-rw-r--r-- 1 Dino staff 1523 Oct 15 13:10 LICENSE  
-rw-r--r-- 1 Dino staff 2323 Oct 15 13:10 README.md  
-rw-r--r-- 1 Dino staff 3915 Oct 15 13:10 RELEASE.md  
-rw-r--r-- 1 Dino staff 173 Oct 15 13:10 install.json  
-rw-r--r-- 1 Dino staff 6155 Oct 15 13:10 package.json  
drwxr-xr-x 3 Dino staff 96 Oct 15 13:10 pydjlx  
-rw-r--r-- 1 Dino staff 2207 Oct 15 13:10 pyproject.toml  
-rw-r--r-- 1 Dino staff 33 Oct 15 13:10 setup.py  
drwxr-xr-x 3 Dino staff 96 Oct 15 13:10 src  
drwxr-xr-x 5 Dino staff 160 Oct 15 13:10 style  
-rw-r--r-- 1 Dino staff 537 Oct 15 13:10 tsconfig.json  
(jlx) Dino@MacDino:~/code$
```

```
(jlx) Dino@MacDino:~/code$  
(jlx) Dino@MacDino:~/code$ ls -ld pydjlx  
drwxr-xr-x 19 Dino staff 608 Oct 15 13:10 pydjlx  
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total 80  
-rw-r--r-- 1 Dino staff 86 Oct 15 13:10 CHANGELOG.md  
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drwxr-xr-x 5 Dino staff 160 Oct 15 13:10 style  
-rw-r--r-- 1 Dino staff 537 Oct 15 13:10 tsconfig.json  
(jlx) Dino@MacDino:~/code$
```

```
1 {
2     "name": "pydjlx",
3     "version": "0.1.0",
4     "description": "A JupyterLab extension demo for PyData",
5     "keywords": [
6         "jupyter",
7         "jupyterlab",
8         "jupyterlab-extension"
9     ],
10    "homepage": "https://github.com/DanielGoldfarb/pydjlx",
11    "bugs": {
12        "url": "https://github.com/DanielGoldfarb/pydjlx/issues"
13    },
14    "license": "BSD-3-Clause",
15    "author": {
16        "name": "Daniel Goldfarb",
17        "email": "dgoldfarb.github@gmail.com"
18    },
19    "files": [
20        "lib/**/*.{d.ts,eot,gif,html,jpg,js,js.map,json,png,svg,woff2,ttf}",
21        "style/**/*.{css,js,eot,gif,html,jpg,json,png,svg,woff2,ttf}"
22    ],
"package.json" 185L, 6155B
```

```
21     "style/**/*.{css,js,eot,gif,html,jpg,json,png,svg,woff2,ttf}"
22 ],
23   "main": "lib/index.js",
24   "types": "lib/index.d.ts",
25   "style": "style/index.css",
26   "repository": {
27     "type": "git",
28     "url": "https://github.com/DanielGoldfarb/pydjlx.git"
29   },
30   "scripts": {
31     "build": "jlpm build:lib && jlpm build:labextension:dev",
32     "build:prod": "jlpm clean && jlpm build:lib:prod && jlpm build:labextension",
33     "build:labextension": "jupyter labextension build .",
34     "build:labextension:dev": "jupyter labextension build --development True .",
35     "build:lib": "tsc --sourceMap",
36     "build:lib:prod": "tsc",
37     "clean": "jlpm clean:lib",
38     "clean:lib": "rimraf lib tsconfig.tsbuildinfo",
39     "clean:lintcache": "rimraf .eslintcache .stylelintcache",
40     "clean:labextension": "rimraf pydjlx/labextension pydjlx/_version.py",
41     "clean:all": "jlpm clean:lib && jlpm clean:labextension && jlpm clean:lintcache"
```

```
23 "main": "lib/index.js",
24 "types": "lib/index.d.ts",
25 "style": "style/index.css",
26 "repository": {
27     "type": "git",
28     "url": "https://github.com/DanielGoldfarb/pydjlx.git"
29 },
30 "scripts": {
31     "build": "jlpm build:lib && jlpm build:labextension:dev",
32     "build:prod": "jlpm clean && jlpm build:lib:prod && jlpm build:labextension",
33     "build:labextension": "jupyter labextension build .",
34     "build:labextension:dev": "jupyter labextension build --development True .",
35     "build:lib": "tsc --sourceMap",
36     "build:lib:prod": "tsc",
37     "clean": "jlpm clean:lib",
38     "clean:lib": "rimraf lib tsconfig.tsbuildinfo",
39     "clean:lintcache": "rimraf .eslintcache .stylelintcache",
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41     "clean:all": "jlpm clean:lib && jlpm clean:labextension && jlpm clean:lintcache"
},
```

```
26 "repository": {  
27     "type": "git",  
28     "url": "https://github.com/DanielGoldfarb/pydjlx.git"  
29 },  
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31     "build": "jlpm build:lib && jlpm build:labextension:dev",  
32     "build:prod": "jlpm clean && jlpm build:lib:prod && jlpm build:labexten  
33     "build:labextension": "jupyter labextension build .",  
34     "build:labextension:dev": "jupyter labextension build --development",  
35     "build:lib": "tsc --sourceMap",  
36     "build:lib:prod": "tsc",  
37     "clean": "jlpm clean:lib",  
38     "clean:lib": "rimraf lib tsconfig.tsbuildinfo",  
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```

```
26 "repository": {  
27     "type": "git",  
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29 },  
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31     "build": "jlpm build:lib && jlpm build:labextension:dev",  
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33     "build:labextension": "jupyter labextension build .",  
34     "build:labextension:dev": "jupyter labextension build --development  
35     "build:lib": "tsc --sourceMap",  
36     "build:lib:prod": "tsc",  
37     "clean": "jlpm clean:lib",  
38     "clean:lib": "rimraf lib tsconfig.tsbuildinfo",  
39     "clean:lintcache": "rimraf .eslintcache .stylelintcache",  
40     "clean:labextension": "rimraf pydjlx/labextension pydjlx/_version.py",  
41     "clean:all": "jlpm clean:lib && jlpm clean:labextension && jlpm clea
```

```
26 "repository": {  
27     "type": "git",  
28     "url": "https://github.com/DanielGoldfarb/pydjlx.git"  
29 },  
30 "scripts": {  
31     "build": "jlpm build:lib && jlpm build:labextension:dev",  
32     "build:prod": "jlpm clean && jlpm build:lib:prod && jlpm build:lab  
33     "build:labextension": "jupyter labextension build .",  
34     "build:labextension:dev": "jupyter labextension build --development  
35     "build:lib": "tsc --sourceMap",  
36     "build:lib:prod": "tsc",  
37     "clean": "jlpm clean:lib",  
38     "clean:lib": "rimraf lib tsconfig.tsbuildinfo",  
39     "clean:lintcache": "rimraf .eslintcache .stylelintcache",  
40     "clean:labextension": "rimraf pydjlx/labextension pydjlx/_version.p  
41     "clean:all": "jlpm clean:lib && jlpm clean:labextension && jlpm cle
```

```
26 "repository": {  
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34     "build:labextension:dev": "jupyter labextension build --development  
35     "build:lib": "tsc --sourceMap",  
36     "build:lib:prod": "tsc",  
37     "clean": "jlpm clean:lib",  
38     "clean:lib": "rimraf lib tsconfig.tsbuildinfo",  
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```
26 "repository": {  
27     "type": "git",  
28     "url": "https://github.com/DanielGoldfarb/pydjlx.git"  
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30 "scripts": {  
31     "build": "jlpm build:lib && jlpm build:labextension:dev",  
32     "build:prod": "jlpm clean && jlpm build:lib:prod && jlpm build:labexten  
33     "build:labextension": "jupyter labextension build .",  
34     "build:labextension:dev": "jupyter labextension build --development  
35     "build:lib": "tsc --sourceMap",  
36     "build:lib:prod": "tsc",  
37     "clean": "jlpm clean:lib",  
38     "clean:lib": "rimraf lib tsconfig.tsbuildinfo",  
39     "clean:lintcache": "rimraf .eslintcache .stylelintcache",  
40     "clean:labextension": "rimraf pydjlx/labextension pydjlx/_version.py",  
41     "clean:all": "jlpm clean:lib && jlpm clean:labextension && jlpm clea
```

```
43   "eslint:check": "eslint . --cache --ext .ts,.tsx",
44   "install:extension": "jlpm build",
45   "lint": "jlpm stylelint && jlpm prettier && jlpm eslint",
46   "lint:check": "jlpm stylelint:check && jlpm prettier:check && jlpm e
,
47   "prettier": "jlpm prettier:base --write --list-different",
48   "prettier:base": "prettier \"/**/*{.ts,.tsx,.js,.jsx,.css,.json,.md}\\"
49   "prettier:check": "jlpm prettier:base --check",
50   "stylelint": "jlpm stylelint:check --fix",
51   "stylelint:check": "stylelint --cache \"style/**/*.css\"",
52   "watch": "run-p watch:src watch:labextension",
53   "watch:src": "tsc -w --sourceMap",
54   "watch:labextension": "jupyter labextension watch ."
55 },
56 "dependencies": {
57   "@jupyterlab/application": "^4.0.0"
58 },
59 "devDependencies": {
60   "@jupyterlab/builder": "^4.0.0",
61   "@types/json-schema": "^7.0.11",
62   "@types/react": "^18.0.26",
63   "@types/react-addons-linked-state-mixin": "^0.14.22",
```

```
43   "eslint:check": "eslint . --cache --ext .ts,.tsx",
44   "install:extension": "jlpm build",
45   "lint": "jlpm stylelint && jlpm prettier && jlpm eslint",
46   "lint:check": "jlpm stylelint:check && jlpm prettier:check && jlpm e
 ,
47   "prettier": "jlpm prettier:base --write --list-different",
48   "prettier:base": "prettier \"/**/*{.ts,.tsx,.js,.jsx,.css,.json,.md}\\"
49   "prettier:check": "jlpm prettier:base --check",
50   "stylelint": "jlpm stylelint:check --fix",
51   "stylelint:check": "stylelint --cache \"style/**/*.css\"",
52   "watch": "run-p watch:src watch:labextension",
53   "watch:src": "tsc -w --sourceMap",
54   "watch:labextension": "jupyter labextension watch ."
55 },
56 "dependencies": {
57   "@jupyterlab/application": "^4.0.0"
58 },
59 "devDependencies": [
60   "@jupyterlab/builder": "^4.0.0",
61   "@types/json-schema": "^7.0.11",
62   "@types/react": "^18.0.26",
63   "@types/react-addons-linked-state-mixin": "^0.14.22",
```

```
-rw-r--r-- 1 Dino staff 86 Oct 15 13:10 CHANGELOG.md
-rw-r--r-- 1 Dino staff 1523 Oct 15 13:10 LICENSE
-rw-r--r-- 1 Dino staff 2323 Oct 15 13:10 README.md
-rw-r--r-- 1 Dino staff 3915 Oct 15 13:10 RELEASE.md
-rw-r--r-- 1 Dino staff 173 Oct 15 13:10 install.json
-rw-r--r-- 1 Dino staff 6155 Oct 15 13:10 package.json
drwxr-xr-x 3 Dino staff 96 Oct 15 13:10 pydjlx
-rw-r--r-- 1 Dino staff 2207 Oct 15 13:10 pyproject.toml
-rw-r--r-- 1 Dino staff 33 Oct 15 13:10 setup.py
drwxr-xr-x 3 Dino staff 96 Oct 15 13:10 src
drwxr-xr-x 5 Dino staff 160 Oct 15 13:10 style
-rw-r--r-- 1 Dino staff 537 Oct 15 13:10 tsconfig.json
(jlx) Dino@MacDino:~/code/pydjlx$
```

```
-rw-r--r-- 1 Dino staff 1523 Oct 15 13:10 LICENSE
-rw-r--r-- 1 Dino staff 2323 Oct 15 13:10 README.md
-rw-r--r-- 1 Dino staff 3915 Oct 15 13:10 RELEASE.md
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-rw-r--r-- 1 Dino staff 537 Oct 15 13:10 tsconfig.json
(jlx) Dino@MacDino:~/code/pydjlx$ 
(jlx) Dino@MacDino:~/code/pydjlx$ ls -l src/*
-rw-r--r-- 1 Dino staff 422 Oct 15 13:10 src/index.ts
(jlx) Dino@MacDino:~/code/pydjlx$ 
```

```
1 import {
2   JupyterFrontEnd,
3   JupyterFrontEndPlugin
4 } from '@jupyterlab/application';
5
6 /**
7  * Initialization data for the pydjlx extension.
8 */
9 const plugin: JupyterFrontEndPlugin<void> = {
10   id: 'pydjlx:plugin',
11   description: 'A JupyterLab extension demo for PyData',
12   autoStart: true,
13   activate: (app: JupyterFrontEnd) => {
14     console.log('JupyterLab extension pydjlx is activated!');
15   }
16 };
17
18 export default plugin;
```

initialize package repository

```
$ git init
```

Initialized empty Git repository in code/pydjlx/.git/

```
$ git add .
```

```
$ git commit -m 'step0: template extension'
```

-rw-r--r--	452	Oct 29 17:10	.copier-answers.yml
drwxr-xr-x	96	Oct 29 17:10	.github
-rw-r--r--	1557	Oct 29 17:10	.gitignore
-rw-r--r--	74	Oct 29 17:10	.prettierignore
-rw-r--r--	25	Oct 29 17:10	.yarnrc.yml
drwxr-xr-x	512	Oct 31 11:36	.git

building the project

```
$ jlpm install # installs dependencies (not the extension)
```

```
$ jlpm run build
```



```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ jlpm install  
▶ YN0000: Resolution step  
▶ YN0002: @jupyterlab/services@npm:7.0.7 doesn't provide react (p1e5c9), requested by @jupyterlab/services@v1.0.0  
/settingregistry  
▶ YN0002: pydjlx@workspace:. doesn't provide webpack (p67dd7), requested by css-loader  
▶ YN0002: pydjlx@workspace:. doesn't provide webpack (p8ad17), requested by source-map-loader  
▶ YN0002: pydjlx@workspace:. doesn't provide webpack (p9acd8), requested by style-loader  
▶ YN0000: Some peer dependencies are incorrectly met; run yarn explain peer-requirements <hash> for details, where <hash> is the six-letter p-prefixed code  
▶ YN0000: Completed in 10s 55ms  
▶ YN0000: Fetch step  
▶ YN0013: y-protocols@npm:1.0.6 can't be found in the cache and will be fetched from the remote  
▶ YN0013: yallist@npm:4.0.0 can't be found in the cache and will be fetched from the remote  
▶ YN0013: yargs-parser@npm:20.2.9 can't be found in the cache and will be fetched from the remote  
▶ YN0013: yjs@npm:13.6.8 can't be found in the cache and will be fetched from the remote  
▶ YN0013: yocto-queue@npm:0.1.0 can't be found in the cache and will be fetched from the remote  
▶ YN0000: Completed in 4s 315ms  
▶ YN0000: Link step  
▶ YN0007: @fortawesome/fontawesome-free@npm:5.15.4 must be built because it never has been built or the last one failed  
▶ YN0000: Completed in 5s 601ms  
▶ YN0000: Done with warnings in 20s 75ms  
(jlx) Dino@MacDino:~/code/pydjlx$
```

```
(jlx) Dino@MacDino:~/code/pydjlx$ ls -ltr
total 472
drwxr-xr-x    3 Dino  staff      96 Oct 15 13:10 pydjlx
-rw-r--r--    1 Dino  staff    3915 Oct 15 13:10 RELEASE.md
-rw-r--r--    1 Dino  staff     86 Oct 15 13:10 CHANGELOG.md
-rw-r--r--    1 Dino  staff   2323 Oct 15 13:10 README.md
drwxr-xr-x    5 Dino  staff    160 Oct 15 13:10 style
-rw-r--r--    1 Dino  staff   1523 Oct 15 13:10 LICENSE
-rw-r--r--    1 Dino  staff     33 Oct 15 13:10 setup.py
-rw-r--r--    1 Dino  staff   6155 Oct 15 13:10 package.json
-rw-r--r--    1 Dino  staff    173 Oct 15 13:10 install.json
-rw-r--r--    1 Dino  staff    537 Oct 15 13:10 tsconfig.json
-rw-r--r--    1 Dino  staff   2207 Oct 15 13:10 pyproject.toml
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:48 src
-rw-r--r--    1 Dino  staff  200113 Oct 15 15:56 yarn.lock
drwxr-xr-x  440 Dino  staff   14080 Oct 15 15:56 node_modules
(jlx) Dino@MacDino:~/code/pydjlx$
```

```
(jlx) Dino@MacDino:~/code/pydjlx$ ls -ld node_modules/* | head -18
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@aashutoshrathi
drwxr-xr-x    5 Dino  staff     160 Oct 15 15:56 node_modules/@babel
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@codemirror
drwxr-xr-x    6 Dino  staff     192 Oct 15 15:56 node_modules/@csstools
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@discoveryjs
drwxr-xr-x    4 Dino  staff     128 Oct 15 15:56 node_modules/@eslint
drwxr-xr-x    4 Dino  staff     128 Oct 15 15:56 node_modules/@eslint-community
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@fortawesome
drwxr-xr-x    5 Dino  staff     160 Oct 15 15:56 node_modules/@humanwhocodes
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@isaacs
drwxr-xr-x    8 Dino  staff     256 Oct 15 15:56 node_modules/@jridgewell
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@jupyter
drwxr-xr-x   18 Dino  staff     576 Oct 15 15:56 node_modules/@jupyterlab
drwxr-xr-x   17 Dino  staff     544 Oct 15 15:56 node_modules/@lumino
drwxr-xr-x    5 Dino  staff     160 Oct 15 15:56 node_modules/@nodelib
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@pkgjs
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@pkgr
drwxr-xr-x    4 Dino  staff     128 Oct 15 15:56 node_modules/@rjsf
(jlx) Dino@MacDino:~/code/pydjlx$ ls -ld node_modules/* | wc -l
```

```
(jlx) Dino@MacDino:~/code/pydjlx$ ls -ld node_modules/* | head -18
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@aashutoshrathi
drwxr-xr-x    5 Dino  staff     160 Oct 15 15:56 node_modules/@babel
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@codemirror
drwxr-xr-x    6 Dino  staff     192 Oct 15 15:56 node_modules/@csstools
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@discoveryjs
drwxr-xr-x    4 Dino  staff     128 Oct 15 15:56 node_modules/@eslint
drwxr-xr-x    4 Dino  staff     128 Oct 15 15:56 node_modules/@eslint-community
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@fortawesome
drwxr-xr-x    5 Dino  staff     160 Oct 15 15:56 node_modules/@humanwhocodes
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@isaacs
drwxr-xr-x    8 Dino  staff    256 Oct 15 15:56 node_modules/@jridgewell
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@jupyter
drwxr-xr-x   18 Dino  staff    576 Oct 15 15:56 node_modules/@jupyterlab
drwxr-xr-x   17 Dino  staff    544 Oct 15 15:56 node_modules/@lumino
drwxr-xr-x    5 Dino  staff     160 Oct 15 15:56 node_modules/@nodelib
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@pkgjs
drwxr-xr-x    3 Dino  staff      96 Oct 15 15:56 node_modules/@pkgr
drwxr-xr-x    4 Dino  staff     128 Oct 15 15:56 node_modules/@rjsf
(jlx) Dino@MacDino:~/code/pydjlx$ ls -ld node_modules/* | wc -l
436
(jlx) Dino@MacDino:~/code/pydjlx$
```

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ ls -ld node_modules/@jupyterlab/*  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 node_modules/@jupyterlab/application  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 node_modules/@jupyterlab/apputils  
drwxr-xr-x 8 Dino staff 256 Oct 15 15:56 node_modules/@jupyterlab/builder  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 node_modules/@jupyterlab/codeeditor  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 node_modules/@jupyterlab/coreutils  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 node_modules/@jupyterlab/docregistry  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 node_modules/@jupyterlab/nbformat  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 node_modules/@jupyterlab/observables  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 node_modules/@jupyterlab/rendermime  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 node_modules/@jupyterlab/rendermime-interfaces  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 node_modules/@jupyterlab/services  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 node_modules/@jupyterlab/settingregistry  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 node_modules/@jupyterlab/statedb  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 node_modules/@jupyterlab/statusbar  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 node_modules/@jupyterlab/translation  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 node_modules/@jupyterlab/ui-components  
(jlx) Dino@MacDino:~/code/pydjlx$
```

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ ls -ld node_modules/@jupyterlab/*  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 node_modules/@jupyterlab/application  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 node_modules/@jupyterlab/apputils  
drwxr-xr-x 8 Dino staff 256 Oct 15 15:56 node_modules/@jupyterlab/builder  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 node_modules/@jupyterlab/codeeditor  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 node_modules/@jupyterlab/coreutils  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 node_modules/@jupyterlab/docregistry  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 node_modules/@jupyterlab/nbformat  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 node_modules/@jupyterlab/observables  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 node_modules/@jupyterlab/rendermime  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 node_modules/@jupyterlab/rendermime-interfaces  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 node_modules/@jupyterlab/services  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 node_modules/@jupyterlab/settingregistry  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 node_modules/@jupyterlab/statedb  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 node_modules/@jupyterlab/statusbar  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 node_modules/@jupyterlab/translation  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 node_modules/@jupyterlab/ui-components  
(jlx) Dino@MacDino:~/code/pydjlx$
```

building the project

`$ jlpm install # installs dependencies (not the extension)`

`$ jlpm run build`

```
(jlx) Dino@MacDino: /code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ jlpm run build  
Building extension in .  
  
Compilation starting...  
  
Compilation finished  
  
asset style_index_js.4e1f4ab8cfdf0e0a58ba.js 18.9 KiB [emitted] [immutable] 1 related asset  
asset remoteEntry.5a45330209bf00cc16d7.js 16.1 KiB [emitted] [immutable] (name: pydjlx) 1 related asset  
asset lib_index_js.10560475f9a1f51428e9.js 927 bytes [emitted] [immutable] 1 related asset  
runtime modules 9.08 KiB 13 modules  
built modules 10.9 KiB (javascript) 42 bytes (share-init) [built]  
  cacheable modules 10.8 KiB  
    modules by path ./node_modules/ 8.58 KiB  
      modules by path ./node_modules/style-loader/dist/runtime/*.js 5.84 KiB 6 modules  
      modules by path ./node_modules/css-loader/dist/runtime/*.js 2.74 KiB  
        ./node_modules/css-loader/dist/runtime/sourceMaps.js 505 bytes [built] [code generated]  
        ./node_modules/css-loader/dist/runtime/api.js 2.25 KiB [built] [code generated]  
    modules by path ./style/ 1.94 KiB  
      ./style/index.js 21 bytes [built] [code generated]  
      ./style/base.css 1.11 KiB [built] [code generated]  
      ./node_modules/css-loader/dist/cjs.js!./style/base.css 829 bytes [built] [code generated]  
    ./lib/index.js 302 bytes [built] [code generated]  
  container entry 42 bytes [built] [code generated]  
  provide shared module (default) pydjlx@0.1.0 = ./lib/index.js 42 bytes [built] [code generated]  
webpack 5.89.0 compiled successfully in 353 ms  
(jlx) Dino@MacDino:~/code/pydjlx$
```

install the extension

```
jupyter labextension list # list installed extensions  
ls -l .../share/jupyter/labextensions/  
  
# pip install ./  
jupyter labextension develop --overwrite ./  
  
jupyter labextension list  
ls -l .../share/jupyter/labextensions/
```

install the extension

```
jupyter labextension list # list installed extensions
```

```
ls -l .../share/jupyter/labextensions/
```

```
# pip install ./
```

```
jupyter labextension develop --overwrite ./
```

```
jupyter labextension list
```

```
ls -l .../share/jupyter/labextensions/
```

install the extension

```
jupyter labextension list # list installed extensions  
ls -l .../share/jupyter/labextensions/
```

```
# pip install ./
```

```
jupyter labextension develop --overwrite ./
```

```
jupyter labextension list
```

```
ls -l .../share/jupyter/labextensions/
```

install the extension

```
jupyter labextension list # list installed extensions  
ls -l .../share/jupyter/labextensions/
```

```
# pip install ./
```

```
jupyter labextension develop --overwrite ./
```

```
jupyter labextension list
```

```
ls -l .../share/jupyter/labextensions/
```

install the extension

```
jupyter labextension list # list installed extensions  
ls -l .../share/jupyter/labextensions/
```

```
# pip install ./
```

```
jupyter labextension develop --overwrite ./
```

```
jupyter labextension list
```

```
ls -l .../share/jupyter/labextensions/
```

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ jupyter labextension list  
JupyterLab v4.0.7  
/Users/Dino/miniconda3/envs/jlx/share/jupyter/labextensions  
→ jupyterlab_pygments v0.2.2 enabled (python, jupyterlab_pygments)
```

The following extensions are outdated:

jupyterlab_pygments

Consider checking if an update is available for these packages.

```
(jlx) Dino@MacDino:~/code/pydjlx$ ls -l /Users/Dino/miniconda3/envs/jlx/share/jupyter/labextensions/  
total 0  
drwxr-xr-x 5 Dino staff 160 Oct 15 13:00 jupyterlab_pygments  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ █
```

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ jupyter labextension list  
JupyterLab v4.0.7  
/Users/Dino/miniconda3/envs/jlx/share/jupyter/labextensions  
    jupyterlab_pygments v0.2.2 enabled      (python, jupyterlab_pygments)
```

The following extensions are outdated:

jupyterlab_pygments

Consider checking if an update is available for these packages.

```
(jlx) Dino@MacDino:~/code/pydjlx$ ls -l /Users/Dino/miniconda3/envs/jlx/share/jupyter/labextensions/  
total 0  
drwxr-xr-x  5 Dino  staff  160 Oct 15 13:00 jupyterlab_pygments  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ █
```

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ jupyter labextension list  
JupyterLab v4.0.7  
/Users/Dino/miniconda3/envs/jlx/share/jupyter/labextensions  
jupyterlab_pygments v0.2.2 enabled (python, jupyterlab_pygments)
```

The following extensions are outdated:

jupyterlab_pygments

Consider checking if an update is available for these packages.

```
(jlx) Dino@MacDino:~/code/pydjlx$ ls -l /Users/Dino/miniconda3/envs/jlx/share/jupyter/labextensions/  
total 0  
drwxr-xr-x 5 Dino staff 160 Oct 15 13:00 jupyterlab_pygments  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ █
```

install the extension

```
jupyter labextension list # list installed  
extensions
```

```
ls -l .../share/jupyter/labextensions/
```

```
# pip install ./
```

```
jupyter labextension develop --overwrite ./
```

```
jupyter labextension list
```

```
ls -l .../share/jupyter/labextensions/
```

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ jupyter labextension develop ./  
Installing /Users/Dino/code/pydjlx/pydjlx/labextension -> pydjlx  
Symlinking: /Users/Dino/miniconda3/envs/jlx/share/jupyter/labextensions/pydjlx -> /Users/Dino/cod  
/pydjlx/labextension  
(jlx) Dino@MacDino:~/code/pydjlx$ jupyter labextension list  
JupyterLab v4.0.7  
/Users/Dino/miniconda3/envs/jlx/share/jupyter/labextensions  
    jupyterlab_pygments v0.2.2 enabled      (python, jupyterlab_pygments)  
    pydjlx v0.1.0 enabled OK
```

The following extensions are outdated:

 jupyterlab_pygments

Consider checking if an update is available for these packages.

```
(jlx) Dino@MacDino:~/code/pydjlx$ ls -l /Users/Dino/miniconda3/envs/jlx/share/jupyter/labextensio  
total 0  
drwxr-xr-x  5 Dino  staff  160 Oct 15 13:00 jupyterlab_pygments  
lrwxr-xr-x  1 Dino  staff   43 Oct 16 14:25 pydjlx -> /Users/Dino/code/pydjlx/pydjlx/labextension  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ █
```

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ jupyter labextension develop ./  
Installing /Users/Dino/code/pydjlx/pydjlx/labextension -> pydjlx  
Symlinking: /Users/Dino/miniconda3/envs/jlx/share/jupyter/labextensions/pydjlx -> /Users/Dino/cod  
/pydjlx/labextension  
(jlx) Dino@MacDino:~/code/pydjlx$ jupyter labextension list  
JupyterLab v4.0.7  
/Users/Dino/miniconda3/envs/jlx/share/jupyter/labextensions  
→ jupyterlab_pygments v0.2.2 enabled (python, jupyterlab_pygments)  
→ pydjlx v0.1.0 enabled OK
```

The following extensions are outdated:

jupyterlab_pygments

Consider checking if an update is available for these packages.

```
(jlx) Dino@MacDino:~/code/pydjlx$ ls -l /Users/Dino/miniconda3/envs/jlx/share/jupyter/labextensio  
total 0  
drwxr-xr-x 5 Dino staff 160 Oct 15 13:00 jupyterlab_pygments  
lrwxr-xr-x 1 Dino staff 43 Oct 16 14:25 pydjlx -> /Users/Dino/code/pydjlx/pydjlx/labextension  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ █
```

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ jupyter labextension develop ./  
Installing /Users/Dino/code/pydjlx/pydjlx/labextension -> pydjlx  
Symlinking: /Users/Dino/miniconda3/envs/jlx/share/jupyter/labextensions/pydjlx -> /Users/Dino/cod  
/pydjlx/labextension  
(jlx) Dino@MacDino:~/code/pydjlx$ jupyter labextension list  
JupyterLab v4.0.7  
/Users/Dino/miniconda3/envs/jlx/share/jupyter/labextensions  
    jupyterlab_pygments v0.2.2 enabled      (python, jupyterlab_pygments)  
    pydjlx v0.1.0 enabled OK
```

The following extensions are outdated:

jupyterlab_pygments

Consider checking if an update is available for these packages.

```
(jlx) Dino@MacDino:~/code/pydjlx$ ls -l /Users/Dino/miniconda3/envs/jlx/share/jupyter/labextensi  
total 0  
drwxr-xr-x  5 Dino  staff  160 Oct 15 13:00 jupyterlab_pygments  
lrwxr-xr-x  1 Dino  staff   43 Oct 16 14:25 pydjlx -> /Users/Dino/code/pydjlx/pydjlx/labextensi  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ █
```

test run JupyterLab

new window:

```
conda activate jlx
```

```
jupyter lab
```

JupyterLab x +

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH

CONSOLE

- Change Kernel...
- Clear Console Cells
- Close and Shut Down...
- Insert Line Break
- Interrupt Kernel
- New Console
- Restart Kernel...
- Run Cell (forced)
- Run Cell (unforced)
- Show All Kernel Activity

DEBUGGER

- Breakpoints on exception
- Evaluate Code
- Next F10
- Pause F9
- Step In F11
- Step Out F11
- Terminate F9

DISPLAY LANGUAGES

- English

EXTENSION MANAGER

Launcher +

Notebook

Python 3 (ipykernel)

Console

Python 3 (ipykernel)

Other

Terminal

Text File

Markdown File

Python File

Show Contextual Help

Simple 0 \$ 0 @

Launcher 0

JupyterLab

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH

CONSOLE

- Change Kernel...
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- Terminate F9

DISPLAY LANGUAGES

- English

EXTENSION MANAGER

Launcher

Notebook

Python 3 (ipykernel)

Console

Python 3 (ipykernel)

Other

Terminal

Text File

Markdown File

Python File

Show Contextual Help

New Tab ⌘T

New Window ⌘N

New Incognito Window ⌘⌘N

History

Downloads ⌘⌘L

Bookmarks

Google Password Manager New

Extensions

Zoom - 150% +

Print... ⌘P

Cast...

Find... ⌘F

Save Page As... ⌘S

Create Shortcut...

Name Window...

Settings ⌘,

Clear Browsing Data... ⌘⌘⌫

Performance

Task Manager

Developer Tools ⌘I

Simple 0 \$ 0 @

Launcher 0

JupyterLab

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH

CONSOLE

- Change Kernel...
- Clear Console Cells
- Close and Shut Down...
- Insert Line Break
- Interrupt Kernel
- New Console
- Restart Kernel...
- Run Cell (forced)
- Run Cell (unforced)
- Show All Kernel Activity

DEBUGGER

- Breakpoints on exception
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- Next F10
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- Step In F11
- Step Out F11
- Terminate F9

DISPLAY LANGUAGES

- English

EXTENSION MANAGER

Launcher +

Notebook

Python 3 (ipykernel)

Console

Python 3 (ipykernel)

Other

Terminal

Text File

Markdown File

R L > A 1 T 8 D : X

top 2 hidden

Filter

Info only ▾ 8 Issues: 8

Jupyter lib_index_js.1056047...js:22
rLab extension pydjlx is activated!

Simple 0 \$ 0 @

Launcher 0

TUTORIAL

0. copier extension template
(basic do-nothing extension)
1. create a command to do something
2. execute command from the Command Palette
3. command adds a Widget to JupyterLab
(main area)

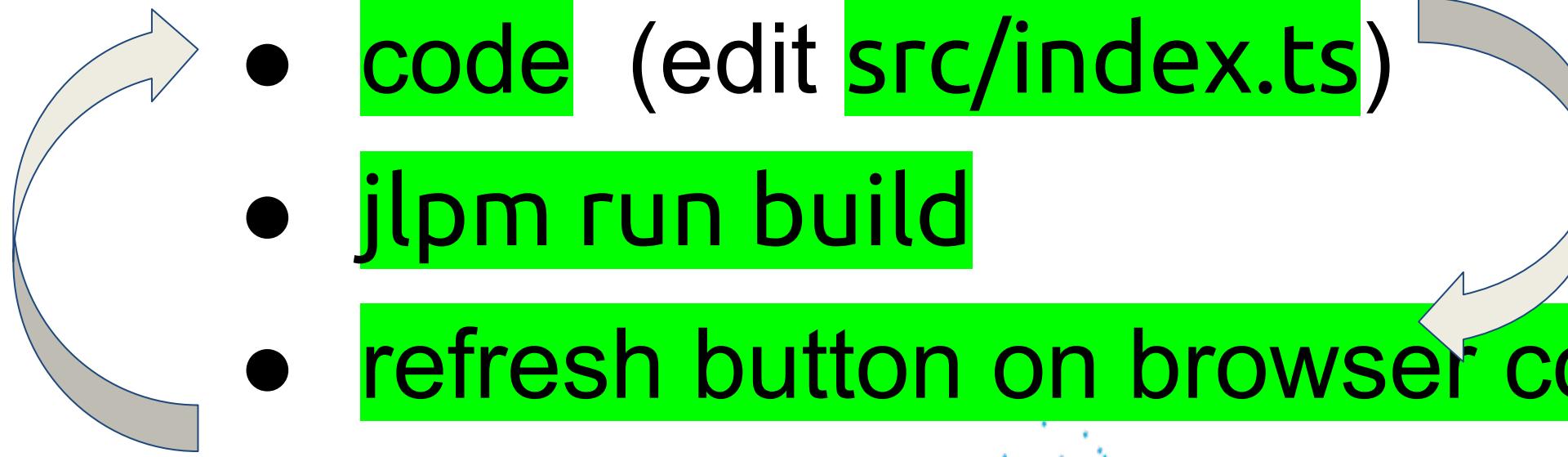
TUTORIAL

0. copier extension template
(basic do-nothing extension)
1. **create a command to do something**
2. execute command from the Command Palette
3. command adds a Widget to JupyterLab
(main area)

TUTORIAL

0. copier extension template
(basic do-nothing extension)

1. create a command to do something

- 
- `code` (edit `src/index.ts`)
 - `jlpm run build`
 - refresh button on browser containing JupyterLab

▼ ⌂ 11 src/index.ts

...

↑ @@ -12,7 +12,18 @@ const plugin: JupyterFrontEndPlugin<void> = {

12 autoStart: true,
13 activate: (app: JupyterFrontEnd) => {
14 console.log('JupyterLab extension pydjlx is activated!');

15 + }
16 };
17

18 export default plugin;

12 autoStart: true,
13 activate: (app: JupyterFrontEnd) => {
14 console.log('JupyterLab extension pydjlx is activated!');
15 + let commandId = 'pydjlx:Hello';
16 + app.commands.addCommand(commandId,
17 + { label: 'Hello World',
18 + execute: say_hello
19 + });
20 +
21 + app.commands.execute(commandId);
22 }
23 };
24
25 + function say_hello() {
26 + console.log('pydjlx says "Hello World!"');
27 + }
28 +
29 export default plugin;

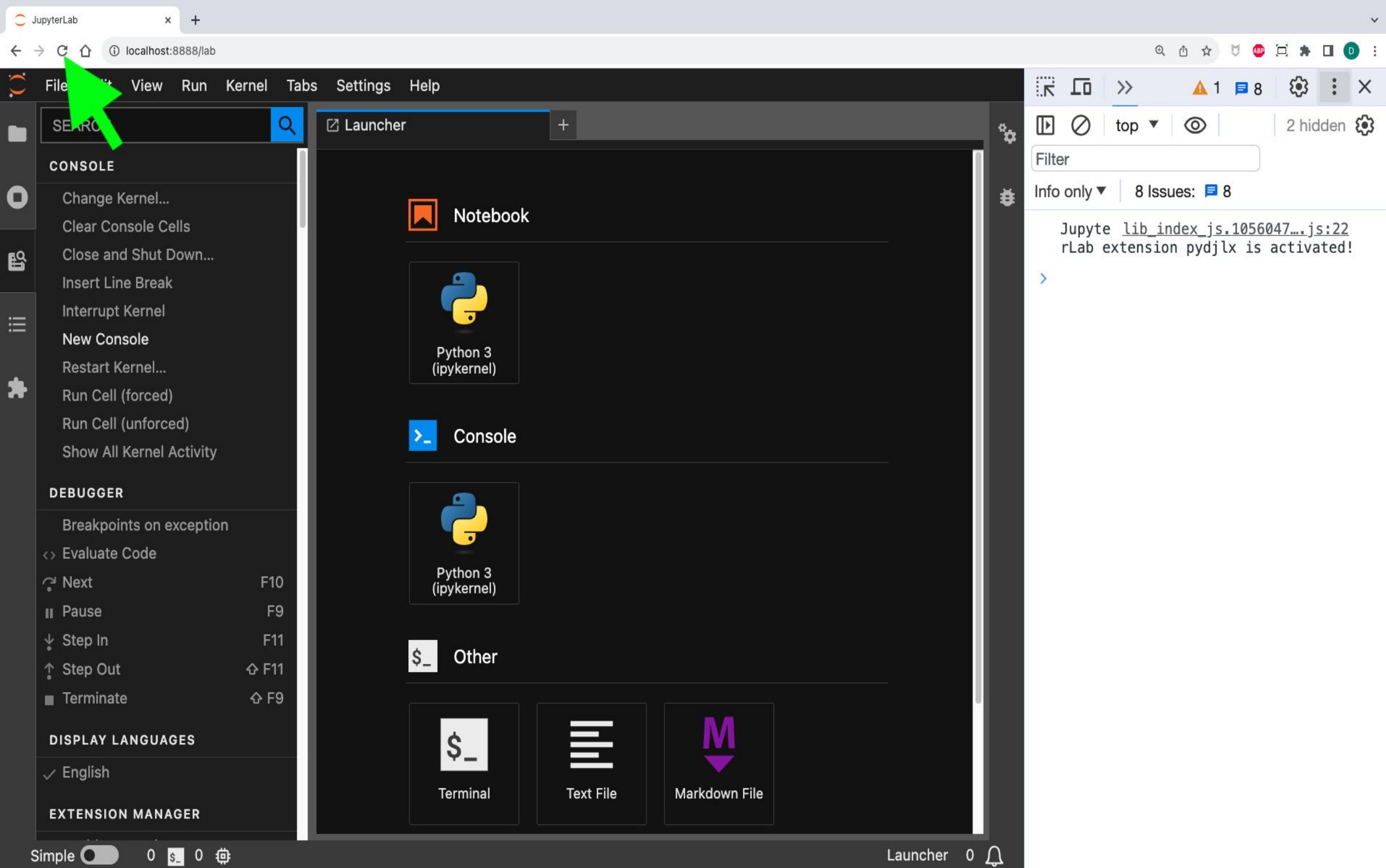
```
n: JupyterFrontEndPlugin<void> = {  
  autoStart: true,  
  activate: (app: JupyterFrontEnd) => {  
    console.log('JupyterLab extension pydjlx is activated!');  
    let commandId = 'pydjlx:Hello';  
    app.commands.addCommand(commandId,  
      { label: 'Hello World',  
        execute: say_hello  
      });  
    app.commands.execute(commandId);  
  }  
};  
  
function say_hello() {  
  console.log('pydjlx says "Hello World!"');  
}  
  
export default plugin;
```

TUTORIAL

- **jlpm run build**
- **refresh JupyterLab browser**

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ jlpm run build ←  
Building extension in .  
  
Compilation starting...  
  
Compilation finished  
  
asset remoteEntry.0cf2effff510efef0eea.js 26.7 KiB [emitted] [immutable] (name: pydjlx) 1 related asset  
asset style_index_js.4e1f4ab8cfdf0e0a58ba.js 18.9 KiB [emitted] [immutable] 1 related asset  
asset lib_index_js.629eee99200c505f31cb.js 1.65 KiB [emitted] [immutable] 1 related asset  
runtime modules 17.7 KiB 13 modules  
built modules 11.3 KiB (javascript) 42 bytes (share-init) 42 bytes (consume-shared) [built]  
cacheable modules 11.2 KiB  
  modules by path ./node_modules/ 8.58 KiB  
    modules by path ./node_modules/style-loader/dist/runtime/*.js 5.84 KiB 6 modules  
    modules by path ./node_modules/css-loader/dist/runtime/*.js 2.74 KiB 2 modules  
  modules by path ./style/ 1.94 KiB  
    ./style/index.js 21 bytes [built] [code generated]  
    ./style/base.css 1.11 KiB [built] [code generated]  
    ./node_modules/css-loader/dist/cjs.js!./style/base.css 829 bytes [built] [code generated]  
  ./lib/index.js 713 bytes [built] [code generated]  
  container entry 42 bytes [built] [code generated]  
  provide shared module (default) pydjlx@0.1.0 = ./lib/index.js 42 bytes [built] [code generated]  
  consume shared module (default) @jupyterlab/apputils@^4.1.7 (singleton) 42 bytes [built] [code generated]  
webpack 5.89.0 compiled successfully in 343 ms ←  
(jlx) Dino@MacDino:~/code/pydjlx$
```

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ jlpm run build ←  
Building extension in .  
  
Compilation starting...  
  
Compilation finished  
  
asset remoteEntry.0cf2effff510efef0eea.js 26.7 KiB [emitted] [immutable] (name: pydjlx) 1 related asset  
asset style_index_js.4e1f4ab8cfdf0e0a58ba.js 18.9 KiB [emitted] [immutable] 1 related asset  
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    ./style/index.js 21 bytes [built] [code generated]  
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  ./lib/index.js 713 bytes [built] [code generated]  
  container entry 42 bytes [built] [code generated]  
  provide shared module (default) pydjlx@0.1.0 = ./lib/index.js 42 bytes [built] [code generated]  
  consume shared module (default) @jupyterlab/apputils@^4.1.7 (singleton) 42 bytes [built] [code generated]  
webpack 5.89.0 compiled successfully in 343 ms ←  
(jlx) Dino@MacDino:~/code/pydjlx$
```



JupyterLab x +

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH

CONSOLE

- Change Kernel...
- Clear Console Cells
- Close and Shut Down...
- Insert Line Break
- Interrupt Kernel
- New Console
- Restart Kernel...
- Run Cell (forced)
- Run Cell (unforced)
- Show All Kernel Activity

DEBUGGER

- Breakpoints on exception
- Evaluate Code
- Next F10
- Pause F9
- Step In F11
- Step Out F11
- Terminate F9

DISPLAY LANGUAGES

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EXTENSION MANAGER

Launcher +

R L > A 1 T 8 D X

top 2 hidden

Filter

Info only ▾ 8 Issues: 8

Jupyter lib_index_js.b0585cc...js:22
rLab extension pyd1x is activated!

jlxdr lib_index_js.b0585cc...js:31
says "Hello World!"

Simple 0 \$ 0 @

Launcher 0

Terminal

Text File

Markdown File

TUTORIAL

0. copier extension template (basic do-nothing extension)
1. create a command to do something
2. execute command from the Command Palette
3. command adds a Widget to JupyterLab (main area)

↑ @@ -3,22 +3,29 @@ import {

```
3   JupyterFrontEndPlugin
4 } from '@jupyterlab/application';
5
6 /**
7  * Initialization data for the pydjlx extension.
8 */
9 const plugin: JupyterFrontEndPlugin<void> = {
10   id: 'pydjlx:plugin',
11   description: 'A JupyterLab extension demo for PyData',
12   autoStart: true,
13 - activate: (app: JupyterFrontEnd) => {
14   console.log('JupyterLab extension pydjlx is activated!');
15   let commandId = 'pydjlx:Hello';
16   app.commands.addCommand(commandId,
17     { label: 'Hello World',
18      execute: say_hello
19    });
20
21 - app.commands.execute(commandId);
22 }
23 };
24
```

```
3   JupyterFrontEndPlugin
4 } from '@jupyterlab/application';
5
6 + import { ICommandPalette } from '@jupyterlab/apputils'
7 +
8 /**
9  * Initialization data for the pydjlx extension.
10 */
11 const plugin: JupyterFrontEndPlugin<void> = {
12   id: 'pydjlx:plugin',
13   description: 'A JupyterLab extension demo for PyData',
14   autoStart: true,
15 + requires: [ ICommandPalette ],
16 + activate: (app: JupyterFrontEnd,
17 +           palette: ICommandPalette ) => {
18   console.log('JupyterLab extension pydjlx is activated!');
19   let commandId = 'pydjlx:Hello';
20   app.commands.addCommand(commandId,
21     { label: 'Hello World',
22       execute: say_hello
23     });
24
25 + palette.addItem(
26 +   { command: commandId,
27 +     category: 'Anything'
28 +   });
29 }
30 };
31
```

↓

extension.

`<void>` = {

'n demo for PyData',

{

pydjlx is activated!');

,

```
3      JupyterFrontEndPlugin
4  } from '@jupyterlab/application';
5
6  + import { ICommandPalette } from '@jupyterlab/apputils'
7  +
8  /**
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18     console.log('JupyterLab extension pydjlx is activated!');
19     let commandId = 'pydjlx:Hello';
20     app.commands.addCommand(commandId,
21       { label: 'Hello World',
22         execute: say_hello
23       });
24 }
```

```
10  },
11  const plugin: JupyterFrontEndPlugin<void> = {
12    id: 'pydjlx:plugin',
13    description: 'A JupyterLab extension demo for PyData',
14    autoStart: true,
15  +   requires: [ ICommandPalette ],
16  +   activate: (app: JupyterFrontEnd,
17  +               palette: ICommandPalette ) => {
18    console.log('JupyterLab extension pydjlx is activated!');
19    let commandId = 'pydjlx:Hello';
20    app.commands.addCommand(commandId,
21      { label: 'Hello World',
22        execute: say_hello
23      });
24
25  +   palette.addItem(
26  +     { command: commandId,
27  +       category: 'Anything'
28  +     });
29  }
30  };
31
```

TUTORIAL

- **jlpm run build**
- **refresh JupyterLab browser**

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$  
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Compilation finished  
  
asset remoteEntry.0cf2effff510efef0eea.js 26.7 KiB [emitted] [immutable] (name: pydjlx) 1 related asset  
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cacheable modules 11.2 KiB  
modules by path ./node_modules/ 8.58 KiB  
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modules by path ./style/ 1.94 KiB  
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webpack 5.89.0 compiled successfully in 343 ms ←  
(jlx) Dino@MacDino:~/code/pydjlx$
```

JupyterLab

localhost:8888/lab

File View Run Kernel Tabs Settings Help

SEARCH

CONSOLE

- Change Kernel...
- Clear Console Cells
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- Interrupt Kernel
- New Console
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EXTENSION MANAGER

Launcher 0

R L > Info only 8 Issues: 8

Jupyter lib_index_js.b0585cc...js:22
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Simple 0 \$ 0 @

Launcher 0

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EXTENSION MANAGER

Launcher 0

R L > Info only 8 Issues: 8

Jupyter lib_index_js.b0585cc...js:22
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Simple 0 \$ 0 @

Launcher 0

JupyterLab

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH

ANYTHING

- Hello World

CONSOLE

- Change Kernel...
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DEBUGGER

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DISPLAY LANGUAGES

Launcher

Notebook

Python 3 (ipykernel)

Console

Python 3 (ipykernel)

Other

Terminal

Text File

Markdown File

Simple 0 0 0 0

Launcher 0

Press F to exit full screen

1 55

top 2 hidden

Filter

Info only 55 Issues: 55

Jupyter lib_index_js.629eee9...js:26
rLab extension pydjlx is activated!

JupyterLab x +

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH 

ANYTHING

Hello World

CONSOLE

Change Kernel...
Clear Console Cells
Close and Shut Down...
Insert Line Break
Interrupt Kernel
New Console
Restart Kernel...
Run Cell (forced)
Run Cell (unforced)
Show All Kernel Activity

DEBUGGER

Breakpoints on exception
Evaluate Code

Next F10
Pause F9
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DISPLAY LANGUAGES

Launcher +

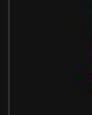
Notebook  Python 3 (ipykernel)

Console  Python 3 (ipykernel)

Other 

Terminal 

Text File 

Markdown File 

Filter

Info only ▾ 55 Issues: 55

Jupyter lib_index_js.629eee9...js:26
rLab extension pydjlx is activated!

pydjlx lib_index_js.629eee9...js:37
says "Hello World!"

Simple 0 \$ 0 @

Launcher 0

TUTORIAL

0. copier extension template (basic do-nothing extension)
1. do something (create a command)
2. execute command from the Command Palette
3. **command adds a widget to JupyterLab (main area)**

JupyterLab (auto-J) x +

localhost:8888/lab/workspaces/auto-J

File Edit View Run Kernel Tabs Settings Help

SEARCH 

Launcher  +

ANYTHING

- Hello World

CONSOLE

- Change Kernel...
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- Run Cell (unforced)
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DEBUGGER

- Breakpoints on exception
- <> Evaluate Code
- ⟳ Next F10
- ⏸ Pause F9

Notebook 

Python 3 (ipykernel)

Console 

Python 3 (ipykernel)

Other 

Simple  0 \$ 3 ⚙

Launcher 0 

Step 3a:

activate() function *not* anonymous

Step 3b:

Modify command to

create a Main Area Widget

▼ 28 src/index.ts

```
↑ @@ -3,7 +3,9 @@ import {
3   JupyterFrontEndPlugin
4 } from '@jupyterlab/application';
5
6 - import { ICommandPalette } from '@jupyterlab/apputils'
7
8 /**
9 * Initialization data for the pydjlx extension.
10 */
11 * Initialization data for the pydjlx extension.

@@ -16,13 +18,27 @@ const plugin: JupyterFrontEndPlugin<void> = {
16   activate: _activate
17 }
18
19 function _activate(app: JupyterFrontEnd,
20   palette: ICommandPalette ) {
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
```

	34	+	
19	function _activate(app: JupyterFrontEnd,	35	function _activate(app: JupyterFrontEnd,
20	palette: ICommandPalette) {	36	palette: ICommandPalette) {
21	console.log('JupyterLab extension pydjlx is activated!');	37	console.log('JupyterLab extension pydjlx is activated!');
22	let commandId = 'pydjlx:Hello';	38	let commandId = 'pydjlx:Hello';
23	app.commands.addCommand(commandId,	39	app.commands.addCommand(commandId,
24	{ label: 'Hello World',	40	{ label: 'Hello World',
25	- execute: say_hello	41	+ execute: () => {say_hello(app)}
26	});	42	});
27		43	
28	palette.addItem(44	palette.addItem(
29	@@ -31,8 +47,12 @@ function _activate(app: JupyterFrontEnd,	45	@@ -31,8 +47,12 @@ function _activate(app: JupyterFrontEnd,
30	});	46	});
31	}	47	});
32		48	}
33		49	
34	- function say_hello() {	50	+ function say_hello(app: JupyterFrontEnd) {
35	- console.log('pydjlx says "Hello World!"');	51	+ let content = new HelloWorldWidget();
36	}	52	+ let widget = new MainAreaWidget({content});
37		53	+
38	export default plugin;	54	+ app.shell.add(widget, 'main');
		55	+ app.shell.activateById(widget.id);
		56	}
		57	
		58	export default plugin;

jupyterlab/apputils'

```
3      JupyterFrontEndPlugin
4    } from '@jupyterlab/application';
5
6    + import { ICommandPalette } from '@jupyterlab/apputils';
7    + import { Widget } from '@lumino/widgets';
8    + import { MainAreaWidget } from '@jupyterlab/apputils';
9
10   /**
11    * Initialization data for the pydjlx extension.
```

.x extension.

```
JupyterFrontEndPlugin<void> = {
```

```
18    activate: _activate
19  }
20
21  + class HelloWorldWidget extends Widget {
22  +   constructor() {
23  +     super();
24  +     this.id = 'hello-world';
25  +     this.title.label = 'Hello World';
26  +     this.title.closable = true;
27  +     let body = document.createElement('body');
```

```
18     activate: _activate
19 }
20
21 + class HelloWorldWidget extends Widget {
22 +   constructor() {
23 +     super();
24 +     this.id = 'hello-world';
25 +     this.title.label = 'Hello World';
26 +     this.title.closable = true;
27 +     let body = document.createElement('body');
28 +     let heading = document.createElement('h1');
29 +     heading.innerText = 'Hello World from PyData!';
30 +     body.appendChild(heading);
31 +     this.node.appendChild(body);
32 +   }
33 + }
34 +
```

	34 +	
19		35 function _activate(app: JupyterFrontEnd,
20		36 palette: ICommandPalette) {
21		37 console.log('JupyterLab extension pydjlx is activated!');
22		38 let commandId = 'pydjlx:Hello';
23		39 app.commands.addCommand(commandId,
24		40 { label: 'Hello World',
25 -	execute: say_hello	41 + execute: () => {say_hello(app)}
26	}	42);
27		43
28	palette.addItem(44 palette.addItem(
↑ ↓	@@ -31,8 +47,12 @@	function _activate(app: JupyterFrontEnd,
31) ;	47);
32	}	48 }
33		49
34 -	function say_hello() {	50 + function say_hello(app: JupyterFrontEnd) {
35 -	console.log('pydjlx says "Hello World!"');	51 + let content = new HelloWorldWidget();
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37		53 +
38	export default plugin;	54 + app.shell.add(widget,'main');
		55 + app.shell.activateById(widget.id);
		56 }
		57
		58 export default plugin;

```
44     palette.addItem(  
rontEnd,  
47     });  
48 }  
49  
50 + function say_hello(app: JupyterFrontEnd) {  
51 +   let content = new HelloWorldWidget();  
52 +   let widget = new MainAreaWidget({content});  
53 +  
54 +   app.shell.add(widget, 'main');  
55 +   app.shell.activateById(widget.id);  
56 }
```

	34 +	
19 function _activate(app: JupyterFrontEnd, 20 palette: ICommandPalette) { 21 console.log('JupyterLab extension pydjlx is activated!'); 22 let commandId = 'pydjlx:Hello'; 23 app.commands.addCommand(commandId, 24 { label: 'Hello World', 25 - execute: say_hello 26 }); 27 28 palette.addItem(29 { 30 - iconClass: 'fa fa-globe', 31 - label: 'Hello World', 32 - command: commandId 33 }); 34 - function say_hello() { 35 - console.log('pydjlx says "Hello World!"'); 36 } 37 38 export default plugin;	35 function _activate(app: JupyterFrontEnd, 36 palette: ICommandPalette) { 37 console.log('JupyterLab extension pydjlx is activated!'); 38 let commandId = 'pydjlx:Hello'; 39 app.commands.addCommand(commandId, 40 { label: 'Hello World', 41 + execute: () => {say_hello(app)} 42 }); 43 44 palette.addItem(45 { 46 - iconClass: 'fa fa-globe', 47 - label: 'Hello World', 48 - command: commandId 49 }); 50 + function say_hello(app: JupyterFrontEnd) { 51 + let content = new HelloWorldWidget(); 52 + let widget = new MainAreaWidget({content}); 53 + 54 + app.shell.add(widget,'main'); 55 + app.shell.activateById(widget.id); 56 } 57 58 export default plugin;	

```
35     function _activate(app: JupyterFrontEnd,
36                           palette: ICommandPalette ) {
37         console.log('JupyterLab extension pydjlx is activated!');
38         let commandId = 'pydjlx:Hello';
39         app.commands.addCommand(commandId,
40             { label: 'Hello World',
41             +         execute: () => {say_hello(app)}
42             });
43
44         palette.addItem(
;
JupyterFrontEnd,
45             { label: 'Hello World',
46             +         iconClass: 'fa fa-globe',
47             +         command: commandId
48             });
49
50         + function say_hello(app: JupyterFrontEnd) {
51             +     let content = new HelloWorldWidget();
52             +     let widget  = new MainAreaWidget({content});
53             + }
```

TUTORIAL

- **jlpm run build**
- **refresh JupyterLab browser**

JupyterLab (auto-J) x +

localhost:8888/lab/workspaces/auto-J

File Edit View Run Kernel Tabs Settings Help

SEARCH 

ANYTHING

Hello World 

CONSOLE

Change Kernel...
Clear Console Cells
Close and Shut Down...
Insert Line Break
Interrupt Kernel
New Console
Restart Kernel...
Run Cell (forced)
Run Cell (unforced)
Show All Kernel Activity

DEBUGGER

Breakpoints on exception
Evaluate Code
Next F10
Pause F9
Step In F11
Step Out F11
Terminate F9

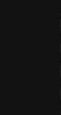
DISPLAY LANGUAGES

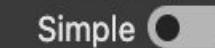
Launcher  +

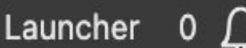
Notebook 
Python 3 (ipykernel)

Console 
Python 3 (ipykernel)

Other 

Terminal 
Text File 
Markdown File 
Python File 
Show Contextual Help 

Simple  0  3  @

Launcher 0 

JupyterLab (auto-J) x +

localhost:8888/lab/workspaces/auto-J

File Edit View Run Kernel Tabs Settings Help

SEARCH 

Launcher  Hello World  +

ANYTHING

Hello World

CONSOLE

Change Kernel...
Clear Console Cells
Close and Shut Down...
Insert Line Break
Interrupt Kernel
New Console
Restart Kernel...
Run Cell (forced)
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Show All Kernel Activity

DEBUGGER

Breakpoints on exception
Evaluate Code
Next F10
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DISPLAY LANGUAGES

Simple  0  3 

Hello World 0 

JupyterLab (auto-J) x +

localhost:8888/lab/workspaces/auto-J

File Edit View Run Kernel Tabs Settings Help

SEARCH 

ANYTHING

Hello World

CONSOLE

Change Kernel...
Clear Console Cells
Close and Shut Down...
Insert Line Break
Interrupt Kernel
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Restart Kernel...
Run Cell (forced)
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Show All Kernel Activity

DEBUGGER

Breakpoints on exception
Evaluate Code

Next F10
Pause F9
Step In F11
Step Out F11
Terminate F9

DISPLAY LANGUAGES

Launcher x +

Notebook  Python 3 (ipykernel)

Console  Python 3 (ipykernel)

Other 

Terminal  \$

Text File  _

Hello World x +

Hello World from PyData!

Simple 0 \$ 3 @

Hello World 0

JupyterLab (auto-J) x +

localhost:8888/lab/workspaces/auto-J

File Edit View Run Kernel Tabs Settings Help

SEARCH 

ANYTHING

Hello World

CONSOLE

Change Kernel...
Clear Console Cells
Close and Shut Down...
Insert Line Break
Interrupt Kernel
New Console
Restart Kernel...
Run Cell (forced)
Run Cell (unforced)
Show All Kernel Activity

DEBUGGER

Breakpoints on exception
Evaluate Code
Next F10
Pause F9
Step In F11
Step Out F11
Terminate F9

DISPLAY LANGUAGES

Launcher  

Notebook 

Python 3 (ipykernel)

Console 

Hello World  

Hello World from PyData!

Simple  0 \$ 3 @

Hello World 0 

JupyterLab (auto-J) x +

localhost:8888/lab/workspaces/auto-J

File Edit View Run Kernel Tabs Settings Help

SEARCH 

ANYTHING

Hello World

CONSOLE

Change Kernel...
Clear Console Cells
Close and Shut Down...
Insert Line Break
Interrupt Kernel
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Show All Kernel Activity

DEBUGGER

Breakpoints on exception
Evaluate Code
Next F10
Pause F9
Step In F11
Step Out F11
Terminate F9

DISPLAY LANGUAGES

Launcher x +

Notebook

 Python 3 (ipykernel)

Console

Hello World x +

Hello World from PyData!

Simple 0 \$ 3 @ Hello World 0

This image shows a screenshot of the JupyterLab interface. At the top, there's a header bar with tabs for 'File', 'Edit', 'View', 'Run', 'Kernel', 'Tabs', 'Settings', and 'Help'. Below the header is a search bar with a magnifying glass icon. On the left, there's a sidebar with sections for 'ANYTHING' (containing 'Hello World'), 'CONSOLE' (with options like 'Change Kernel...', 'Clear Console Cells', etc.), 'DEBUGGER' (with breakpoints and step controls), and 'DISPLAY LANGUAGES'. The main area has three tabs: 'Launcher', 'Notebook', and 'Hello World'. The 'Hello World' tab is active, showing the text 'Hello World from PyData!' and a dark gray background. The 'Notebook' tab shows a Python 3 kernel icon and the text 'Python 3 (ipykernel)'. The 'Launcher' tab shows a 'Console' icon. At the bottom, there are status indicators for 'Simple' (0), '\$' (0), '3' (0), '@' (0), 'Hello World' (0), and a bell icon.

TUTORIAL

4. **style the widget**
5. execute the command from the Launcher
6. execute command with arguments
7. create SideBar widget to execute our command with various options

```
(jlx) Dino@MacDino:~/code/pydjlx$ ls -l
total 640
-rw-r--r-- 1 Dino staff 86 Oct 17 13:47 CHANGELOG.md
-rw-r--r-- 1 Dino staff 1523 Oct 17 13:47 LICENSE
-rw-r--r-- 1 Dino staff 2323 Oct 17 13:47 README.md
-rw-r--r-- 1 Dino staff 3915 Oct 17 13:47 RELEASE.md
-rw-r--r-- 1 Dino staff 173 Oct 17 13:47 install.json
drwxr-xr-x 5 Dino staff 160 Oct 15 19:50 lib
drwxr-xr-x 440 Dino staff 14080 Oct 15 15:56 node_modules
-rw-r--r-- 1 Dino staff 6155 Oct 17 13:47 package.json
drwxr-xr-x 6 Dino staff 192 Oct 17 13:47 pydjlx
-rw-r--r-- 1 Dino staff 2207 Oct 17 13:47 pyproject.toml
-rw-r--r-- 1 Dino staff 33 Oct 17 13:47 setup.py
drwxr-xr-x 3 Dino staff 96 Oct 17 18:05 src
drwxr-xr-x 5 Dino staff 160 Oct 17 13:47 style
-rw-r--r-- 1 Dino staff 537 Oct 17 13:47 tsconfig.json
-rw-r--r-- 1 Dino staff 85538 Oct 17 18:05 tsconfig.tsbuildinfo
-rw-r--r-- 1 Dino staff 200113 Oct 15 15:56 yarn.lock
(jlx) Dino@MacDino:~/code/pydjlx$
(jlx) Dino@MacDino:~/code/pydjlx$ ls -l style/*
-rw-r--r-- 1 Dino staff 138 Oct 17 13:47 style/base.css ←
-rw-r--r-- 1 Dino staff 25 Oct 17 13:47 style/index.css
-rw-r--r-- 1 Dino staff 21 Oct 17 13:47 style/index.js
(jlx) Dino@MacDino:~/code/pydjlx$
```

```
1 /*  
2  See the JupyterLab Developer Guide for useful CSS Patterns:  
3  
4  https://jupyterlab.readthedocs.io/en/stable/developer/css.html  
5 */
```



```
1 /*  
2  See the JupyterLab Developer Guide for useful CSS Patterns:  
3  
4  https://jupyterlab.readthedocs.io/en/stable/developer/css.html  
5 */  
6  
7 .hww body {  
8     height: 100%;  
9     position: relative;  
10    text-align: center;  
11    background-color: teal;  
12 }  
13  
14 .hww h1 {  
15     position: absolute;  
16     top: 36%;  
17     left: 0;  
18     right: 0;  
19     font-size: 400%;  
20 }
```

```
Widget {  
 20  
 21   class HelloWorldWidget extends Widget {  
 22     constructor() {  
 23       super();  
 24       this.id = 'hello-world';  
 25       this.title.label = 'Hello World';  
 26       this.title.closable = true;  
 27     +     this.addClass('hww')  
 28       let body = document.createElement('body');  
 29       let heading = document.createElement('h1');  
 30       heading.innerText = 'Hello World from PyData!'  
 31       body.appendChild(heading);  
 32       this.node.appendChild(body);  
 33     }  
 34   }  
 35 }
```

TUTORIAL

- **jlpm run build**
- **refresh JupyterLab browser**

JupyterLab (auto-J) x +

localhost:8888/lab/workspaces/auto-J

File Edit View Run Kernel Tabs Settings Help

SEARCH 

Launcher  Hello World  +

ANYTHING

Hello World

CONSOLE

Change Kernel...
Clear Console Cells
Close and Shut Down...
Insert Line Break
Interrupt Kernel
New Console
Restart Kernel...
Run Cell (forced)
Run Cell (unforced)
Show All Kernel Activity

DEBUGGER

Breakpoints on exception
Evaluate Code
Next F10
Pause F9
Step In F11
Step Out F11
Terminate F9

DISPLAY LANGUAGES

Simple  0  3 

Hello World 0 

JupyterLab x +

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH 

Launcher X Hello World X +

ANYTHING

Hello World

CONSOLE

Change Kernel...
Clear Console Cells
Close and Shut Down...
Insert Line Break
Interrupt Kernel
New Console
Restart Kernel...
Run Cell (forced)
Run Cell (unforced)
Show All Kernel Activity

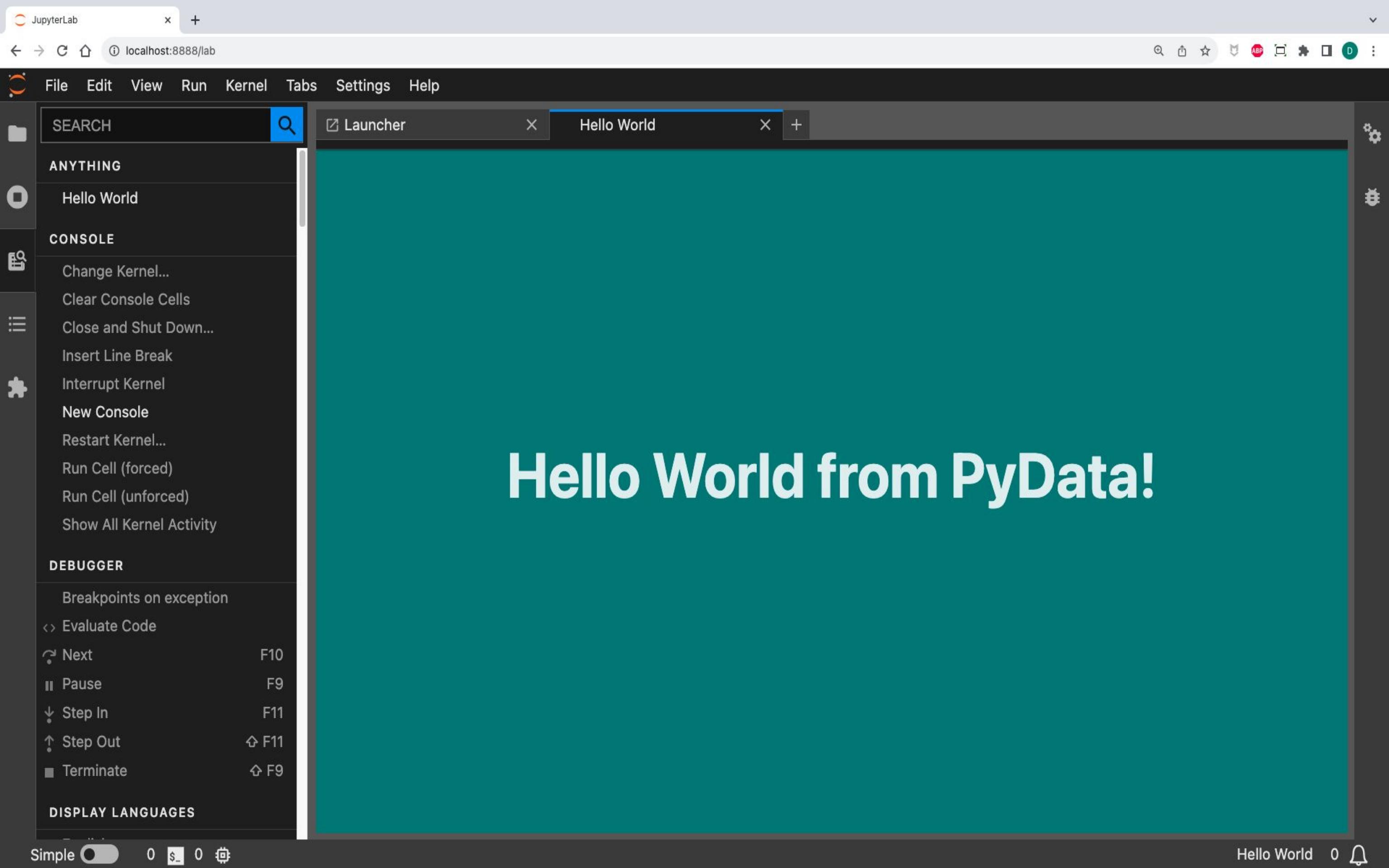
DEBUGGER

Breakpoints on exception
< Evaluate Code
⟳ Next F10
⏸ Pause F9
⌄ Step In F11
↑ Step Out ⌄ F11
■ Terminate ⌄ F9

DISPLAY LANGUAGES

Simple  0 \$ 0 @

Hello World 0 



The image shows the JupyterLab interface. At the top, there's a header bar with tabs for 'File', 'Edit', 'View', 'Run', 'Kernel', 'Tabs', 'Settings', and 'Help'. Below the header is a search bar with a magnifying glass icon. A sidebar on the left contains sections for 'ANYTHING' (with 'Hello World' listed) and 'CONSOLE' (with various kernel-related options like 'Change Kernel...', 'Clear Console Cells', etc.). A 'DEBUGGER' section is also present. The main area of the interface is teal-colored and features a large, bold white text 'Hello World from PyData!'. At the bottom, there are some status indicators and a footer bar.

TUTORIAL

4. style the widget
5. **execute the command from the Launcher**
6. execute command with arguments
7. create SideBar widget to execute our command with various options

JupyterLab x +

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH

CONSOLE

- Change Kernel...
- Clear Console Cells
- Close and Shut Down...
- Insert Line Break
- Interrupt Kernel
- New Console
- Restart Kernel...
- Run Cell (forced)
- Run Cell (unforced)
- Show All Kernel Activity

DEBUGGER

- Breakpoints on exception
- Evaluate Code
- Next F10
- Pause F9
- Step In F11
- Step Out F11
- Terminate F9

DISPLAY LANGUAGES

- English

EXTENSION MANAGER

Launcher +

Notebook

Python 3 (ipykernel)

Console

Python 3 (ipykernel)

Other

Terminal

Text File

Markdown File

Python File

Show Contextual Help

Simple 0 \$ 0 @

Launcher 0

```
↑ @@ -6,6 +6,7 @@ import {  
6   import { ICommandPalette } from '@jupyterlab/apputils';  
7   import { Widget } from '@lumino/widgets';  
8   import { MainAreaWidget } from '@jupyterlab/apputils';  
9  
10  /**  
11   * Initialization data for the pydjlx extension.  
12  */  
13  const plugin: JupyterFrontEndPlugin<void> = {  
14    id: 'pydjlx:plugin',  
15    description: 'A JupyterLab extension demo for PyData',  
16    autoStart: true,  
17    requires: [ ICommandPalette ],  
18    activate: _activate  
19  }  
20  
6   import { ICommandPalette } from '@jupyterlab/apputils';  
7   import { Widget } from '@lumino/widgets';  
8   import { MainAreaWidget } from '@jupyterlab/apputils';  
9 + import { ILauncher } from '@jupyterlab/launcher';  
10  
11  /**  
12   * Initialization data for the pydjlx extension.  
13  */  
14  const plugin: JupyterFrontEndPlugin<void> = {  
15    id: 'pydjlx:plugin',  
16    description: 'A JupyterLab extension demo for PyData',  
17    autoStart: true,  
18    requires: [ ICommandPalette ],  
19 +   optional: [ ILauncher ],  
20    activate: _activate  
21  }  
22
```

```
terlab/apputils';
6   import { ICommandPalette } from '@jupyterlab/apputils';
no/widgets';
7   import { Widget } from '@lumino/widgets';
terlab/apputils';
8   import { MainAreaWidget } from '@jupyterlab/apputils';
9 + import { ILauncher } from '@jupyterlab/launcher';
10
11 /**
12  * Initialization data for the pydjlx extension.
13 */
14 const plugin: JupyterFrontEndPlugin<void> = {
15   id: 'pydjlx:plugin',
16   description: 'A JupyterLab extension demo for PyData',
17   autoStart: true,
18   requires: [ ICommandPalette ],
19 + optional: [ ILauncher ],
20   activate: _activate
21 }
22
```

```
ntEnd,  
lette ) {  
djlx is activated!');  
38   function _activate(app: JupyterFrontEnd,  
39   + palette: ICommandPalette,  
40   + launcher: ILauncher|null ) {  
41     console.log('JupyterLab extension pydjlx is activated!');  
42     let commandId = 'pydjlx:Hello';  
43     app.commands.addCommand(commandId,  
44       { label: 'Hello World',  
45         execute: () => {say_hello(app)}  
46       });  
47  
48     palette.addItem(  
49       { command: commandId,  
50         category: 'Anything'  
51       });  
52     +  
53     + if (launcher) {  
54     +   launcher.add(  
55     +     { command: commandId,  
56     +       category: 'Notebook'  
57     +     });  
58     + } else {  
59     +   console.log('ILauncher is not available');  
60     + }  
61   }  
62 }  
63  
64 export default _activate;
```

TUTORIAL

- **jlpm run build**
- **refresh JupyterLab browser**

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ jlpm run build  
src/index.ts:9:33 - error TS2307: Cannot find module '@jupyterlab/launcher'  
or its corresponding type declarations.
```

```
9 import { ILauncher } from '@jupyterlab/launcher';  
~~~~~
```

Found 1 error in src/index.ts:9

```
(jlx) Dino@MacDino:~/code/pydjlx$ █
```

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ ls -l node_modules/@jupyterlab  
total 0  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 application  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 apputils  
drwxr-xr-x 8 Dino staff 256 Oct 15 15:56 builder  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 codeeditor  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 coreutils  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 docregistry  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 nbformat  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 observables  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 rendermime  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 rendermime-interfaces  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 services  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 settingregistry  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 statedb  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 statusbar  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 translation  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 ui-components  
(jlx) Dino@MacDino:~/code/pydjlx$
```

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ ls -l node_modules/@jupyterlab  
total 0  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 application  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 apputils  
drwxr-xr-x 8 Dino staff 256 Oct 15 15:56 builder  
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drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 services  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 settingregistry  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 statedb  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 statusbar  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 translation  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 ui-components  
(jlx) Dino@MacDino:~/code/pydjlx$
```

jlpm add @jupyterlab/launcher

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ jlpm add @jupyterlab/launcher  
▶ YN0000: Resolution step  
▶ YN0002: @jupyterlab/services@npm:7.0.7 doesn't provide react (p1e5c9), requested by @jupyterlab/settingregistry  
▶ YN0002: pydjlx@workspace:.. doesn't provide webpack (p67dd7), requested by css-loader  
▶ YN0002: pydjlx@workspace:.. doesn't provide webpack (p8ad17), requested by source-map-loader  
▶ YN0002: pydjlx@workspace:.. doesn't provide webpack (p9acd8), requested by style-loader  
▶ YN0000: Some peer dependencies are incorrectly met; run yarn explain peer-requirements <hash>  
for details, where <hash> is the six-letter p-prefixed code  
▶ YN0000: └ Completed in 0s 351ms  
▶ YN0000: Fetch step  
▶ YN0013: @jupyterlab/launcher@npm:4.0.7 can't be found in the cache and will be fetched from t  
▶ YN0000: └ Completed in 0s 218ms  
▶ YN0000: Link step  
▶ YN0000: └ Completed in 0s 259ms  
▶ YN0000: Done with warnings in 0s 921ms  
(jlx) Dino@MacDino:~/code/pydjlx$
```

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ ls -l node_modules/@jupyterlab  
total 0  
  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 application  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 apputils  
drwxr-xr-x 8 Dino staff 256 Oct 15 15:56 builder  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 codeeditor  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 coreutils  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 docregistry  
drwxr-xr-x 7 Dino staff 224 Oct 19 19:38 launcher  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 nbformat  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 observables  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 rendermime  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 rendermime-interfaces  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 services  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 settingregistry  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 statedb  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 statusbar  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 translation  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 ui-components  
(jlx) Dino@MacDino:~/code/pydjlx$
```

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ ls -l node_modules/@jupyterlab  
total 0  
  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 application  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 apputils  
drwxr-xr-x 8 Dino staff 256 Oct 15 15:56 builder  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 codeeditor  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 coreutils  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 docregistry  
drwxr-xr-x 7 Dino staff 224 Oct 19 19:38 launcher ←  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 nbformat  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 observables  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 rendermime  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 rendermime-interfaces  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 services  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 settingregistry  
drwxr-xr-x 5 Dino staff 160 Oct 15 15:56 statedb  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 statusbar  
drwxr-xr-x 6 Dino staff 192 Oct 15 15:56 translation  
drwxr-xr-x 7 Dino staff 224 Oct 15 15:56 ui-components  
(jlx) Dino@MacDino:~/code/pydjlx$
```

```
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ git status  
On branch main  
Your branch is ahead of 'origin/main' by 1 commit.  
(use "git push" to publish your local commits)  
  
Changes not staged for commit:  
(use "git add <file>..." to update what will be committed)  
(use "git restore <file>..." to discard changes in working directory)  
modified:   package.json  
  
Untracked files:  
(use "git add <file>..." to include in what will be committed)  
yarn.lock  
  
no changes added to commit (use "git add" and/or "git commit -a")  
(jlx) Dino@MacDino:~/code/pydjlx$  
(jlx) Dino@MacDino:~/code/pydjlx$ █
```

1 changed file with 2 additions and 1 deletion.

Split

Unified

- 3 package.json



@@ -54,7 +54,8 @@

```
"watch:labextension": "jupyter labextension watch ."  
},  
"dependencies": {  
    "@jupyterlab/application": "^4.0.0"  
},  
"devDependencies": {  
    "@jupyterlab/builder": "^4.0.0",  
    "jupyterlab": "  
54        "watch:labextension": "jupyter labextension watch ."  
55    },  
56    "dependencies": {  
57        "+      "@jupyterlab/application": "^4.0.0",  
58        "+      "@jupyterlab/launcher": "^4.0.7"  
59    },  
60    "devDependencies": {  
61        "@jupyterlab/builder": "^4.0.0",  
62    }  
63}
```

jlpm add

1. **Installs** package into **node_modules** directory
2. **Edits** “dependencies” section of packages.json

TUTORIAL

- **jlpm run build**
- **refresh JupyterLab browser**

JupyterLab x +

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH 

ANYTHING

Hello World

CONSOLE

Change Kernel...
Clear Console Cells
Close and Shut Down...
Insert Line Break
Interrupt Kernel
New Console
Restart Kernel...
Run Cell (forced)
Run Cell (unforced)
Show All Kernel Activity

DEBUGGER

Breakpoints on exception
Evaluate Code
Next F10
Pause F9
Step In F11
Step Out F11
Terminate F9

DISPLAY LANGUAGES

Launcher 

Notebook

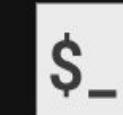
 Python 3 (ipykernel)

 Hello World

Console

 Python 3 (ipykernel)

Other

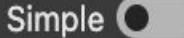
 Terminal

 Text File

 Markdown File

 Python File

 Show Contextual Help

Simple  0 \$ 0 @

Launcher 0

JupyterLab x +

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH 

Launcher  Hello World  +

ANYTHING

Hello World

CONSOLE

Change Kernel...
Clear Console Cells
Close and Shut Down...
Insert Line Break
Interrupt Kernel
New Console
Restart Kernel...
Run Cell (forced)
Run Cell (unforced)
Show All Kernel Activity

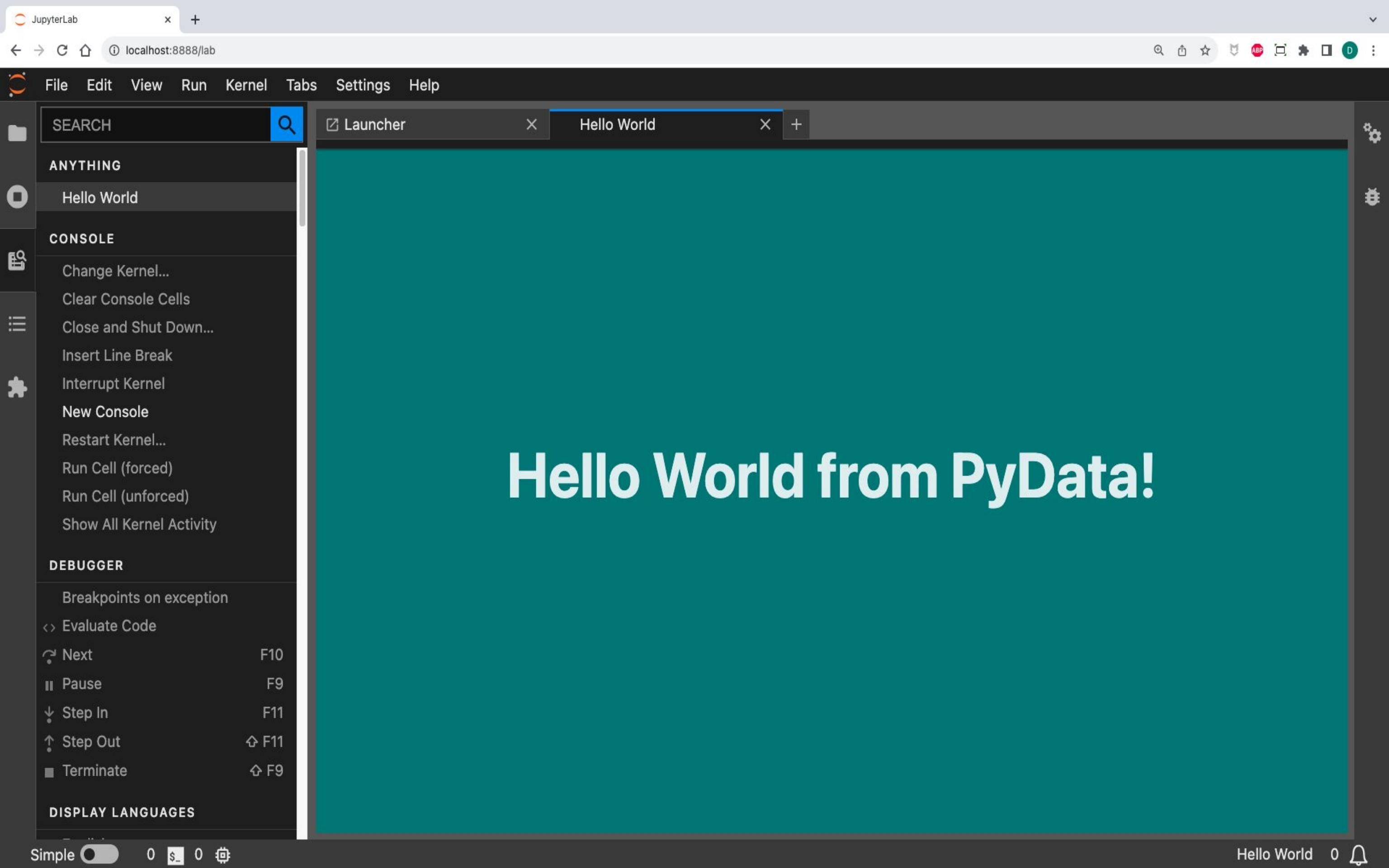
DEBUGGER

Breakpoints on exception
Evaluate Code
Next F10
Pause F9
Step In F11
Step Out F11
Terminate F9

DISPLAY LANGUAGES

Simple  0 \$ 0 @

Hello World 0 



JupyterLab x +

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH 

Launcher  Hello World  +

Hello World  +

ANYTHING

Hello World

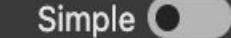
CONSOLE

Change Kernel...
Clear Console Cells
Close and Shut Down...
Insert Line Break
Interrupt Kernel
New Console
Restart Kernel...
Run Cell (forced)
Run Cell (unforced)
Show All Kernel Activity

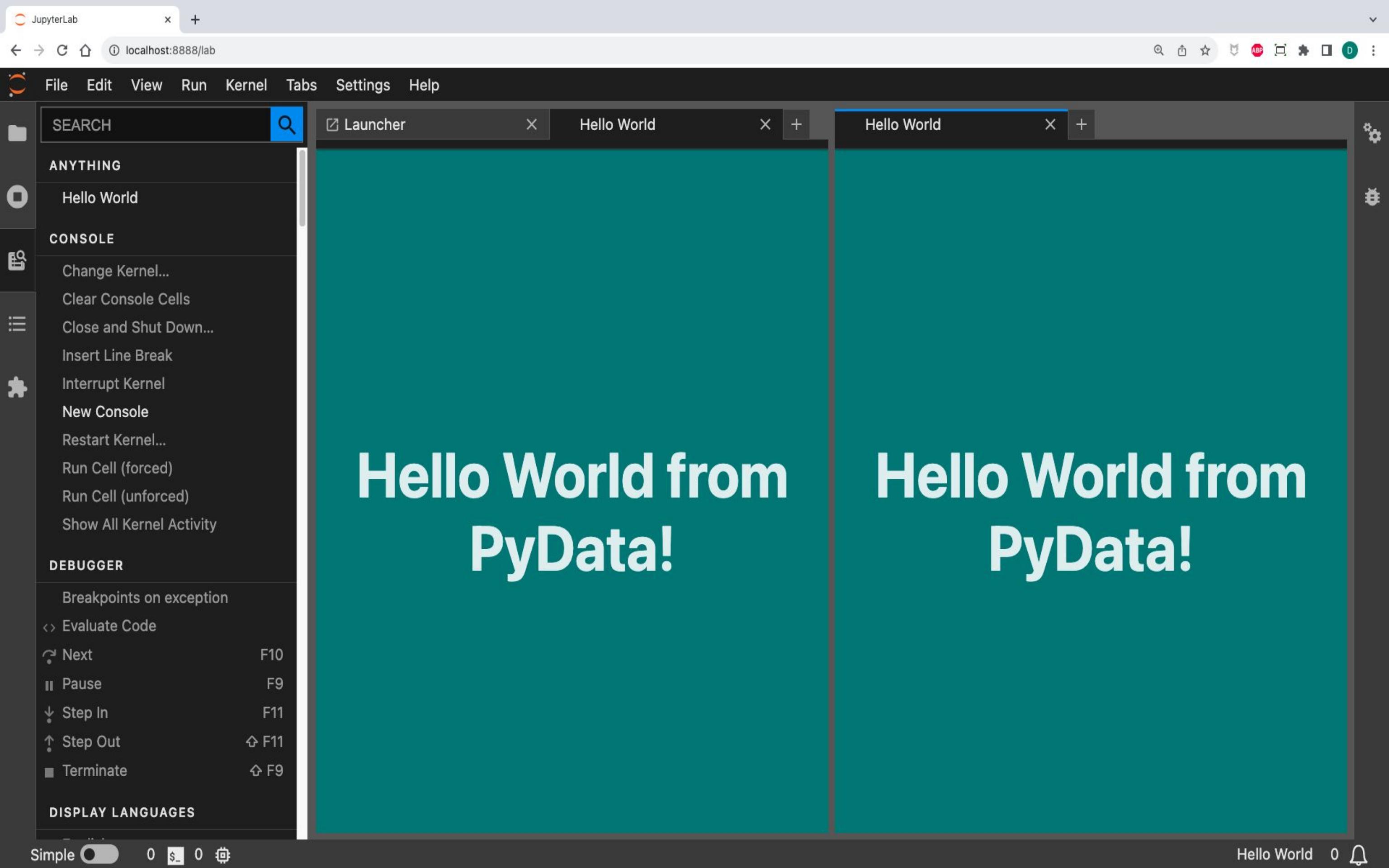
DEBUGGER

Breakpoints on exception
Evaluate Code
Next F10
Pause F9
Step In F11
Step Out F11
Terminate F9

DISPLAY LANGUAGES

Simple  0 \$ 0 @

Hello World 0 



The screenshot shows a JupyterLab interface with two parallel notebooks running. Both notebooks have tabs titled "Hello World". The left notebook's tab is faded, while the right one is in sharp focus. The notebooks display the text "Hello World from PyData!" in large white font. On the far left, there is a sidebar with various options like "ANYTHING", "CONSOLE", and "DEBUGGER". The "DEBUGGER" section includes keyboard shortcuts for breakpoints, evaluation, and step operations. At the bottom, there are status indicators for "Simple", "0 \$ 0 @", and "Hello World 0". The top bar includes standard browser navigation and search icons.

TUTORIAL

4. style the widget
5. execute the command from the Launcher
- 6. execute command with arguments**
7. create SideBar widget to execute our command with various options

```
function _activate(app: JupyterFrontEnd,
                  palette: ICommandPalette,
                  launcher: ILauncher|null ) {
    console.log('JupyterLab extension pydjlx is activated!');
    let commandId = 'pydjlx:Hello';
    app.commands.addCommand(commandId,
        { label: 'Hello World',
          execute: () => {say_hello(app)} });
}

palette.addItem(
    { command: commandId,
      category: 'Anything' });

};

if (launcher) {
    launcher.add(
        { command: commandId,
          category: 'Notebook' });
} else {
    console.log('ILauncher is not available');
}
```

```
42 function _activate(app: JupyterFrontEnd,
43                     palette: ICommandPalette,
44                     launcher: ILauncher|null ) {
45     console.log('JupyterLab extension pydjlx is activated!');
46     let commandId = 'pydjlx:Hello';
47     app.commands.addCommand(commandId,
48         { label: 'Hello World',
49         ! execute: (args: any) => {say_hello(app,args)}
50     });
51
52     palette.addItem(
53         { command: commandId,
54         ! category: 'Anything',
55         ! args: {greeting: 'Hello from the Command Palette!'}
56     });
57
58     if (launcher) {
59         launcher.add(
60             { command: commandId,
61             category: 'Notebook'
62             });
63     } else {
64         console.log('ILauncher is not available');
65     }
66
67 }
```

```
41
42     function _activate(app: JupyterFrontEnd,
43                           palette: ICommandPalette,
44                           launcher: ILauncher|null ) {
45         console.log('JupyterLab extension pydjlx is activated!');
46         let commandId = 'pydjlx:Hello';
47         app.commands.addCommand(commandId,
48             { label: 'Hello World',
49               execute: (args: any) => {say_hello(app,args)}
50             });
51
52         palette.addItem(
53             { command: commandId,
54               category: 'Anything',
55               args: {greeting: 'Hello from the Command Palette!'}
56             });
57
58         if (launcher) {
59             launcher.add(
60                 { command: commandId,
61                   category: 'Notebook'
62                 });
63         } else {
64             console.log('ILauncher is not available');
```

```
66
67 }
68
69 ! function say_hello(app: JupyterFrontEnd, args: any) {
70 !   let content = new HelloWorldWidget(args['greeting']);
71   let widget  = new MainAreaWidget({content});
72
73   app.shell.add(widget, 'main');
74   app.shell.activateById(widget.id);
75 }
76
77 export default plugin;
```

```
class HelloWorldWidget extends Widget {  
  constructor() {  
    super();  
    this.id = 'hello-world';  
    this.title.label = 'Hello World';  
    this.title.closable = true;  
    this.addClass('hww')  
    let body = document.createElement('body');  
    let heading = document.createElement('h1');  
    heading.innerText = 'Hello World from PyData!';  
  
    body.appendChild(heading);  
    this.node.appendChild(body);  
  }  
}  
  
function _activate(app: JupyterFrontEnd,  
  palette: ICommandPalette,  
  /* ... */)
```

```
22  
23 class HelloWorldWidget extends Widget {  
24   constructor(greeting: string|null) {  
25     super();  
26     this.id = 'hello-world';  
27     this.title.label = 'Hello World';  
28     this.title.closable = true;  
29     this.addClass('hww')  
30     let body = document.createElement('body');  
31     let heading = document.createElement('h1');  
32     if (greeting) {  
33       heading.innerText = greeting;  
34     } else {  
35       heading.innerText = 'Hello World from PyData!';  
36     }  
37     body.appendChild(heading);  
38     this.node.appendChild(body);  
39   }  
40 }  
41  
42 function _activate(app: JupyterFrontEnd,  
43   palette: ICommandPalette,  
  /* ... */)
```

```
22
23 class HelloWorldWidget extends Widget {
24   constructor(greeting: string|null) {
25     super();
26     this.id = 'hello-world';
27     this.title.label = 'Hello World';
28     this.title.closable = true;
29     this.addClass('hww')
30     let body = document.createElement('body');
31     let heading = document.createElement('h1');
32     if (greeting) {
33       heading.innerText = greeting;
34     } else {
35       heading.innerText = 'Hello World from PyData!';
36     }
37     body.appendChild(heading);
38     this.node.appendChild(body);
39   }
40 }
```

TUTORIAL

- **jlpm run build**
- **refresh JupyterLab browser**

JupyterLab

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH 

ANYTHING

Hello World

CONSOLE

Change Kernel...
Clear Console Cells
Close and Shut Down...
Insert Line Break
Interrupt Kernel
New Console
Restart Kernel...
Run Cell (forced)
Run Cell (unforced)
Show All Kernel Activity

DEBUGGER

Breakpoints on exception
Evaluate Code
Next F10
Pause F9
Step In F11
Step Out F11
Terminate F9

DISPLAY LANGUAGES

Launcher  +

Notebook

 Python 3 (ipykernel)

 Hello World

Console

 Python 3 (ipykernel)

Other

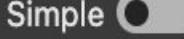
 Terminal

 Text File

 Markdown File

 Python File

Show Contextual Help

Simple  0 \$ 0 @

Launcher 0

JupyterLab x +

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH 

ANYTHING

Hello World

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DEBUGGER

Breakpoints on exception
Evaluate Code
Next F10
Pause F9
Step In F11
Step Out F11
Terminate F9

DISPLAY LANGUAGES

Launcher Hello World +

Hello World from PyData!

Simple 0 \$ 0 @

Hello World 0

JupyterLab x +

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH 

ANYTHING

Hello World

CONSOLE

Change Kernel...
Clear Console Cells
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DEBUGGER

Breakpoints on exception
Evaluate Code
Next F10
Pause F9
Step In F11
Step Out F11
Terminate F9

DISPLAY LANGUAGES

Launcher Hello World Hello World +

Hello from the Command Palette!

Simple 0 \$ 0 @

Hello World 0

JupyterLab x +

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH 

ANYTHING

Hello World

CONSOLE

Change Kernel...
Clear Console Cells
Close and Shut Down...
Insert Line Break
Interrupt Kernel
New Console
Restart Kernel...
Run Cell (forced)
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Show All Kernel Activity

DEBUGGER

Breakpoints on exception
< Evaluate Code
Next F10
Pause F9
Step In F11
Step Out F11
Terminate F9

DISPLAY LANGUAGES

 Launcher X Hello World X +

 Hello World X +

 Hello World X +

Simple 0 \$ 0 @

Hello World 0

Hello World from PyData!

Hello from the Command Palette!

TUTORIAL

4. style the widget
5. execute the command from the Launcher
6. execute command with arguments
7. **create SideBar widget to execute our command with various options**

TUTORIAL

7. create SideBar widget to execute our command with various options
 - a. **SideBar widget with buttons**
 - b. style SideBar widget
 - c. event listeners on buttons to create main-area widgets on click

```
42 class SideBarHelloWidget extends Widget {  
43   constructor() {  
44     super();  
45     this.id = 'sidebar-hello';  
46     this.title.label = 'Hello World';  
47     this.title.closable = true;  
48     this.addClass('sbhw');  
49     let body = document.createElement('body');  
50     let b1 = document.createElement('button');  
51     let b2 = document.createElement('button');  
52     let b3 = document.createElement('button');  
53     let b4 = document.createElement('button');  
54     b1.innerText = 'E';  
55     b2.innerText = 'F';  
56     b3.innerText = 'G';  
57     b4.innerText = 'H';  
58     body.append(b1,b2,b3,b4);  
59     this.node.appendChild(body);  
60   }  
61 }
```

```
function _activate(app: JupyterFrontEnd,
                  palette: ICommandPalette,
                  launcher: ILauncher|null ) {
  console.log('JupyterLab extension pydjlx is activated!');
  let commandId = 'pydjlx:Hello';
  app.commands.addCommand(commandId,
    { label: 'Hello World',
      execute: (args: any) => {say_hello(app,args)}
  });

  palette.addItem(
    { command: commandId,
      category: 'Anything',
      args: {greeting: 'Hello from the Command Palette!'}
  );

  if (launcher) {
    launcher.add(
      { command: commandId,
        category: 'Notebook'
      });
  } else {
    console.log('ILauncher is not available');
  }
}

}


```

```
63 function _activate(app: JupyterFrontEnd,
64   palette: ICommandPalette,
65   launcher: ILauncher|null ) {
66   console.log('JupyterLab extension pydjlx is activated!');
67   let commandId = 'pydjlx:Hello';
68   app.commands.addCommand(commandId,
69     { label: 'Hello World',
70       execute: (args: any) => {say_hello(app,args)}
71     });

72 palette.addItem(
73   { command: commandId,
74     category: 'Anything',
75     args: {greeting: 'Hello from the Command Palette!'}
76   });

77 if (launcher) {
78   launcher.add(
79     { command: commandId,
80       category: 'Notebook'
81     });
82 } else {
83   console.log('ILauncher is not available');
84 }

85 let sbwidget = new SideBarHelloWidget();
86 app.shell.add(sbwidget,'left');
87 app.shell.activateById(sbwidget.id);
88
89
90
91
92 }
```

```
78
79     if (launcher) {
80         launcher.add(
81             { command: commandId,
82                 category: 'Notebook'
83             });
84     } else {
85         console.log('ILauncher is not available');
86     }
87
88     let sbwidget = new SideBarHelloWidget();
89     app.shell.add(sbwidget, 'left');
90     app.shell.activateById(sbwidget.id);
91 }
92
```

TUTORIAL

- **jlpm run build**
- **refresh JupyterLab browser**

JupyterLab

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH 

Launcher 

ANYTHING

Hello World

CONSOLE

Change Kernel...
Clear Console Cells
Close and Shut Down...
Insert Line Break
Interrupt Kernel
New Console
Restart Kernel...
Run Cell (forced)
Run Cell (unforced)
Show All Kernel Activity

DEBUGGER

Breakpoints on exception
Evaluate Code

Next F10
Pause F9
Step In F11
Step Out F11
Terminate F9

DISPLAY LANGUAGES

Notebook

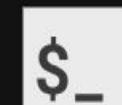
 Python 3 (ipykernel)

 Hello World

Console

 Python 3 (ipykernel)

Other

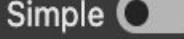
 Terminal

 Text File

 Markdown File

 Python File

Show Contextual Help

Simple  0 \$ 0 @

Launcher 0

JupyterLab

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

SEARCH 

Launcher 

ANYTHING

Hello World

CONSOLE

Change Kernel...
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DEBUGGER

Breakpoints on exception
Evaluate Code
Next F10
Pause F9
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DISPLAY LANGUAGES

Notebook

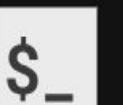
 Python 3 (ipykernel)

 Hello World

Console

 Python 3 (ipykernel)

Other

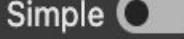
 Terminal

 Text File

 Markdown File

 Python File

Show Contextual Help

Simple  0 \$ 0 @

Launcher 0

0

JupyterLab

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

E F G H

Launcher

Notebook

Python 3 (ipykernel)

Hello World

Console

Python 3 (ipykernel)

Other

Terminal

Text File

Markdown File

Python File

Show Contextual Help

Simple 0 \$ 0 @

Launcher 0

ABP

Search icon

Home icon

Star icon

Bookmark icon

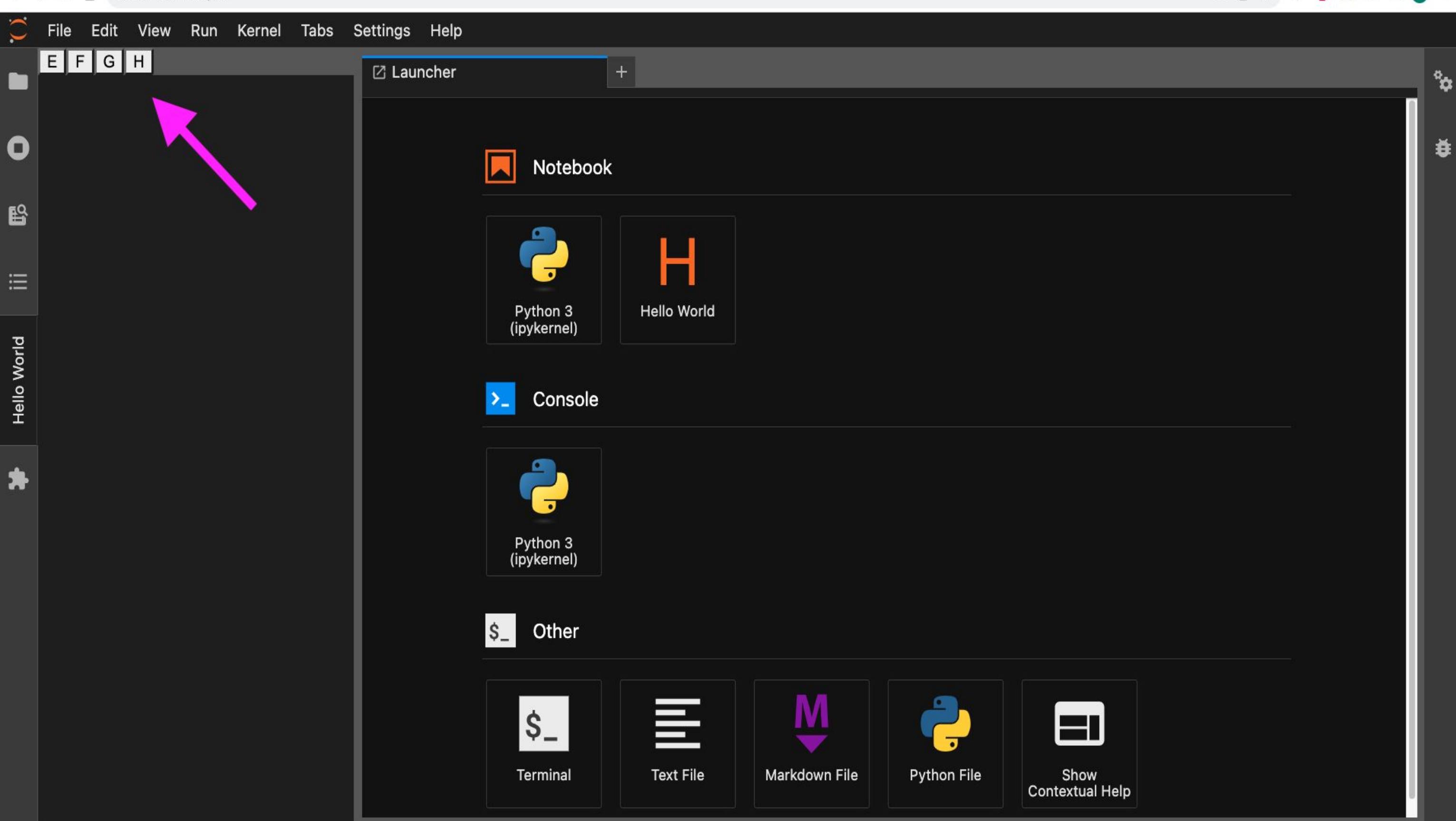
Print icon

Copy icon

Help icon

Gears icon

Ellipsis icon



TUTORIAL

7. create SideBar widget to execute our command with various options
 - a. SideBar widget with buttons
 - b. **style SideBar widget**
 - c. event listeners on buttons to create main-area widgets on click.

↑ @@ -4,8 +4,11 @@

```
4      https://jupyterlab.readthedocs.io/en/stable/developer/css.html
5  */
6
7 - .hww body {
8   height: 100%;
9   position: relative;
10  text-align: center;
11  background-color: teal;
```

↓ @@ -18,3 +21,15 @@

```
18  right: 0;
19  font-size: 400%;
20 }
```

```
4      https://jupyterlab.readthedocs.io/en/stable/developer/css.html
5  */
6
7 + .html, body, .hww {
8   height: 100%;
9 +
10 +
11 + .hww body {
12   position: relative;
13   text-align: center;
14   background-color: teal;
```

```
21  right: 0;
22  font-size: 400%;
23 }
24 +
25 + .sbhw body {
26 +   background-color: #212121;
27 + }
28 +
29 + .sbhw button {
30 +   width: 72px;
31 +   height: 72px;
32 +   margin: 15%;
33 +   margin-bottom: 5%;
34 +   font-size: 200%;
35 + }
```

TUTORIAL

- **jlpm run build**
- **refresh JupyterLab browser**

JupyterLab x +

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

Launcher

E

F

G

H

Hello World

Simple 0 \$ 0 @

Launcher 0

+

Notebook

Python 3 (ipykernel)

Hello World

Console

Python 3 (ipykernel)

Other

Terminal

Text File

Markdown File

Python File

Show Contextual Help

Simple 0 \$ 0 @

Launcher 0

TUTORIAL

7. create SideBar widget to execute our command with various options
 - a. SideBar widget with buttons
 - b. style SideBar widget
 - c. **event listeners on buttons to create main-area widgets on click.**

```

@@ -40,22 +40,27 @@ class HelloWorldWidget extends Widget {
40 }
41
42 class SideBarHelloWidget extends Widget {
43 - constructor() {
44     super();
45     this.id = 'sidebar-hello';
46     this.title.label = 'Hello World';
47     this.title.closable = true;
48     this.addClass('sbhw');
49     let body = document.createElement('body');
50 - let b1 = document.createElement('button');
51 - let b2 = document.createElement('button');
52 - let b3 = document.createElement('button');
53 - let b4 = document.createElement('button');
54 - b1.innerText = 'E';
55 - b2.innerText = 'F';
56 - b3.innerText = 'G';
57 - b4.innerText = 'H';
58 - body.append(b1,b2,b3,b4);
59     this.node.appendChild(body);
60 }
61 }

@@ -85,7 +90,7 @@ function _activate(app: JupyterFrontEnd,
85     console.log('ILauncher is not available');
86 }
87
88 - let sbwidget = new SideBarHelloWidget();
89     app.shell.add(sbwidget,'left');
90     app.shell.activateById(sbwidget.id);
91 }

40 }
41
42 class SideBarHelloWidget extends Widget {
43 + constructor(app: JupyterFrontEnd, commandId: string) {
44     super();
45     this.id = 'sidebar-hello';
46     this.title.label = 'Hello World';
47     this.title.closable = true;
48     this.addClass('sbhw');
49     let body = document.createElement('body');
50 + let button_info: Record<string,string> = {
51 +     'E' : 'Hello World!',
52 +     'F' : 'Bonjour le Monde!',
53 +     'G' : 'Hàlo a Shaoghail!',
54 +     'H' : '!אָהָן נִזְעָמָן'
55 + }
56 + for (const key in button_info) {
57 +     let b = document.createElement('button');
58 +     b.innerText = key;
59 +     b.addEventListener('click', () => {
60 +         app.commands.execute(commandId,{greeting:button_info[key]});
61 +     });
62 +     body.appendChild(b);
63 + }
64     this.node.appendChild(body);
65 }
66 }

90     console.log('ILauncher is not available');
91 }
92
93 + let sbwidget = new SideBarHelloWidget(app, commandId);
94     app.shell.add(sbwidget,'left');
95     app.shell.activateById(sbwidget.id);
96 }

```

```
get {  
    42     class SideBarHelloWidget extends Widget {  
    43     +     constructor(app: JupyterFrontEnd, commandId: string) {  
    44         super();  
    45         this.id = 'sidebar-hello';  
    46         this.title.label = 'Hello World';  
    47         this.title.closable = true;  
    48         this.addClass('sbhw');  
    49         let body = document.createElement('body');  
    50     +     let button_info: Record<string, string> = {  
    51     +         'E' : 'Hello World!',  
    52     +         'F' : 'Bonjour le Monde!',  
    53     +         'G' : 'Hàlo a Shaoghail!',  
    54     +         'H' : 'שלום מילס'  
    55     +     }  
    56     +     for (const key in button_info) {  
    57     +         let b = document.createElement('button');  
    58     +         b.innerText = key;  
    59     +         b.addEventListener('click', () => {  
    60     +             app.commands.execute(commandId, {greeting:button_info[key]});  
    61     +         });  
    62     +         body.appendChild(b);  
    63     +     }  
    64         this.node.appendChild(body);  
    65     }  
    66 }  
  
(app: JupyterFrontEnd,  
available);  
get();  
);  
    90         console.log('ILauncher is not available');  
    91     }  
    92  
    93     +     let sbwidget = new SideBarHelloWidget(app, commandId);  
    94     app.shell.add(sbwidget, 'left');  
    95     app.shell.activateById(sbwidget.id);  
    96 }
```

```
42 class SideBarHelloWidget extends Widget {  
43   constructor(app: JupyterFrontEnd, commandId: string) {  
44     super();  
45     this.id = 'sidebar-hello';  
46     this.title.label = 'Hello World';  
47     this.title.closable = true;  
48     this.addClass('sbhw');  
49     let body = document.createElement('body');  
50     let button_info: Record<string, string> = {  
51       'E' : 'Hello World!',  
52       'F' : 'Bonjour le Monde!',  
53       'G' : 'Hàlo a Shaoghail!',  
54       'H' : '!שלום בעולם'  
55     }  
56     for (const key in button_info) {  
57       let b = document.createElement('button');  
58       b.innerText = key;  
59       b.addEventListener('click', () => {  
60         app.commands.execute(commandId, {greeting:button_info[key]});  
61       });  
62       body.appendChild(b);  
63     }  
64     this.node.appendChild(body);  
65   }  
66 }
```

```
62 +         body.appendChild(b);
63 +
64     this.node.appendChild(body);
65 }
66 }

90     console.log('ILauncher is not available');
91 }
92
93 +     let sbwidget = new SideBarHelloWidget(app, commandId);
94     app.shell.add(sbwidget, 'left');
95     app.shell.activateById(sbwidget.id);
96 }
```

TUTORIAL

- **jlpm run build**
- **refresh JupyterLab browser**

JupyterLab x +

localhost:8888/lab

File Edit View Run Kernel Tabs Settings Help

Launcher

E

F

G

H

Hello World

Launcher

Notebook

Python 3 (ipykernel)

Hello World

Console

Python 3 (ipykernel)

Other

Terminal

Text File

Markdown File

Python File

Show Contextual Help

Simple 0 \$ 0 @

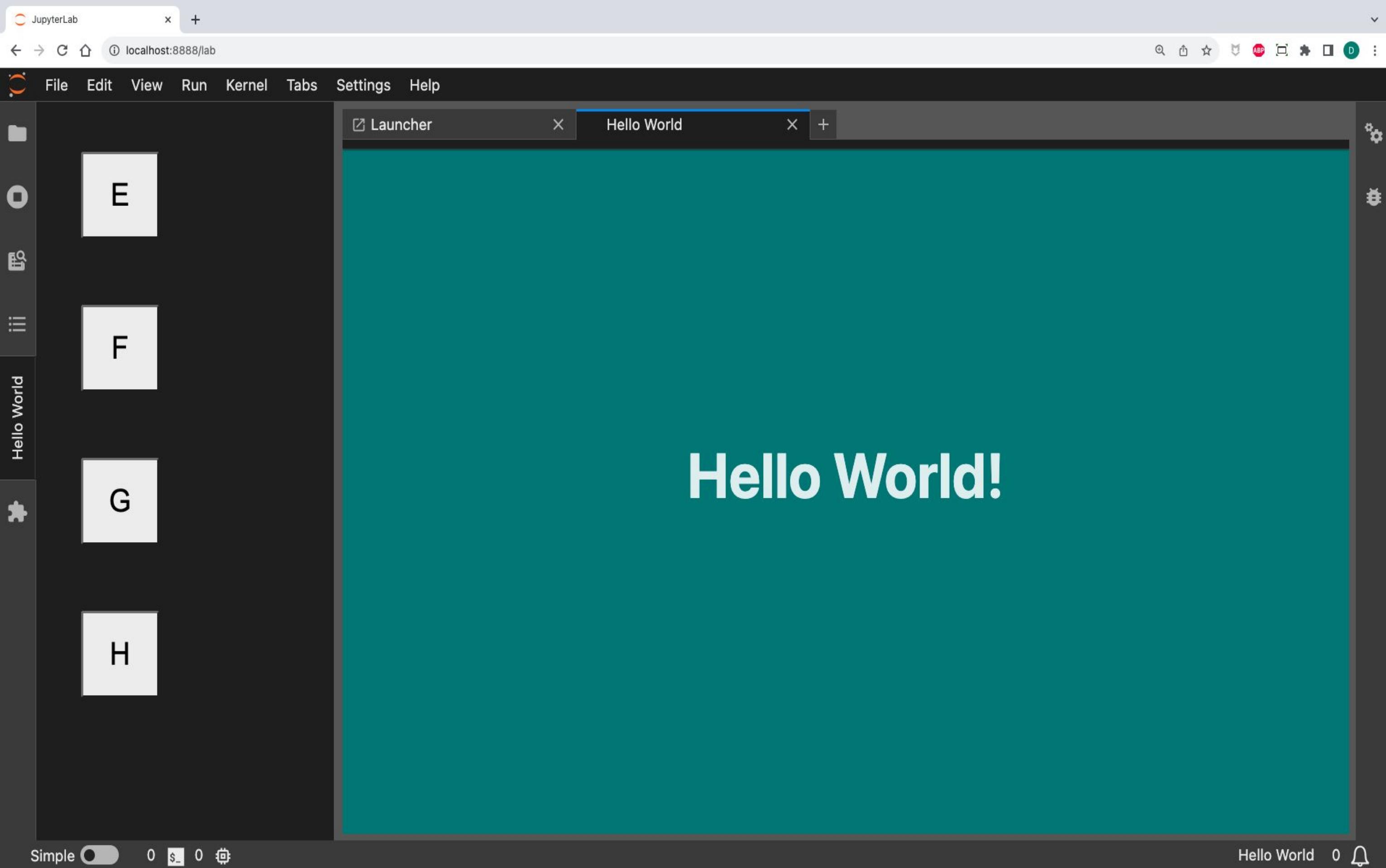
Launcher 0

ABP

D

Simple 0 \$ 0 @

Launcher 0



JupyterLab

x +

localhost:8888/lab

ABP

File Edit View Run Kernel Tabs Settings Help

Launcher

Hello World

x

+

E

F

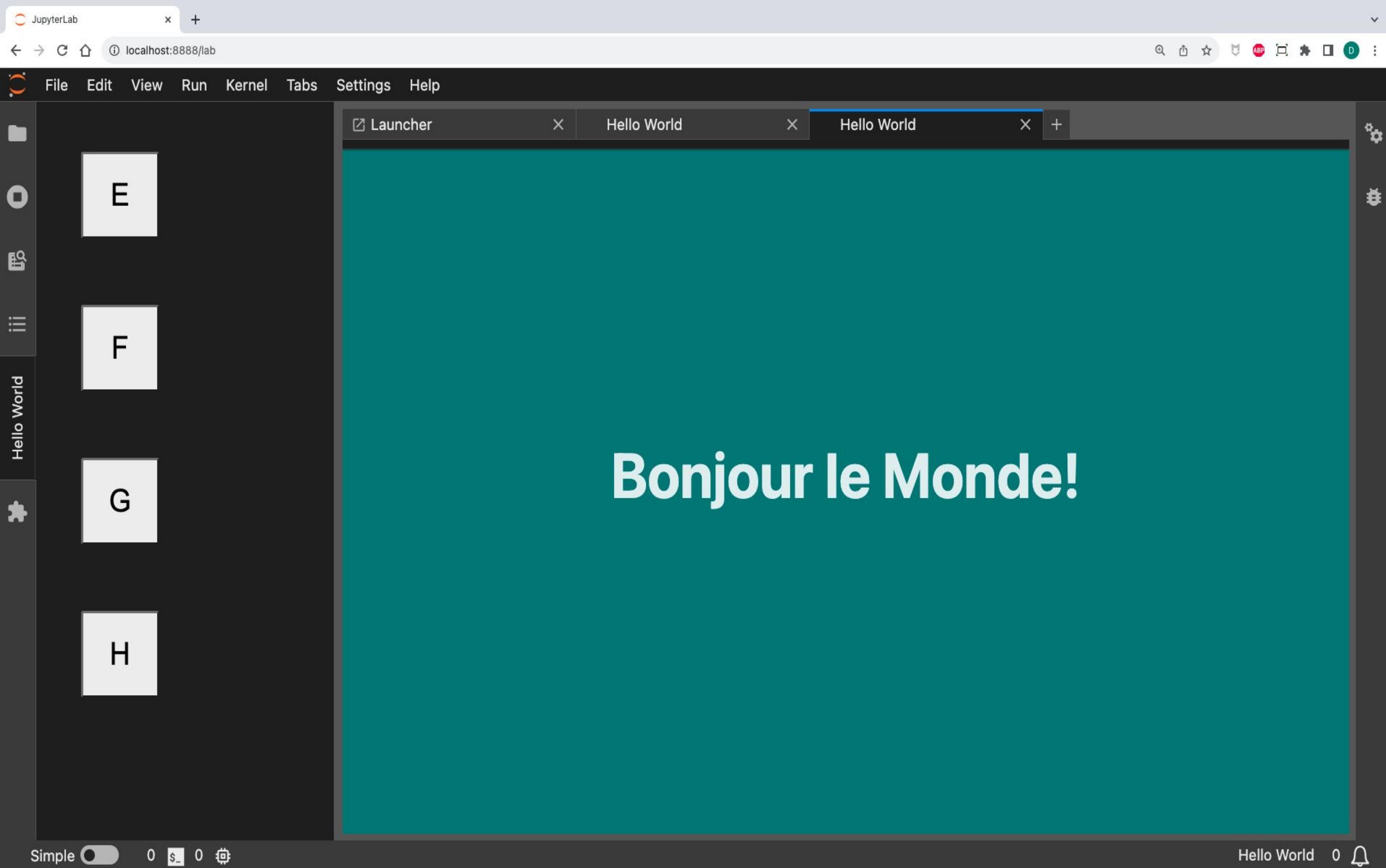
G

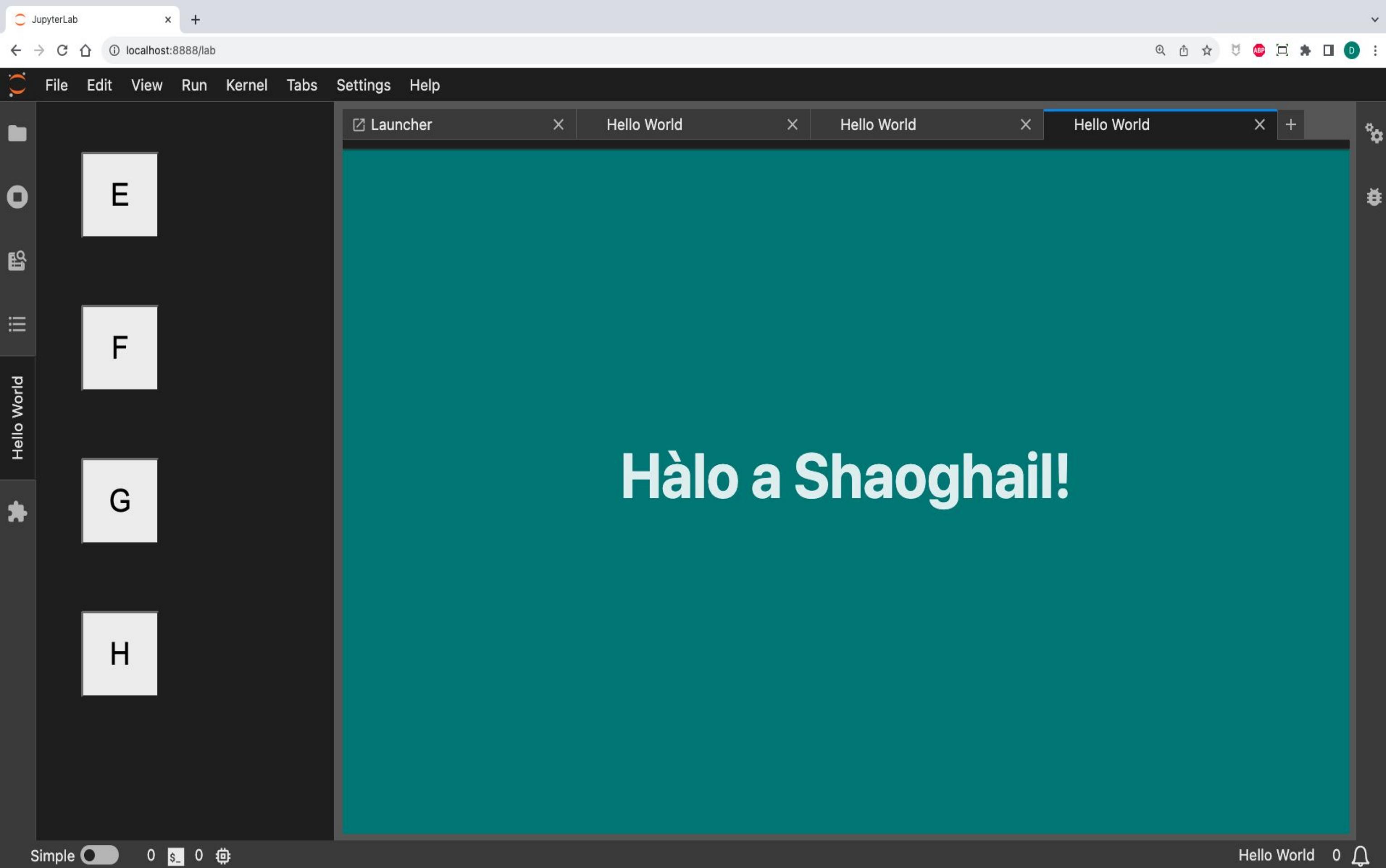
H

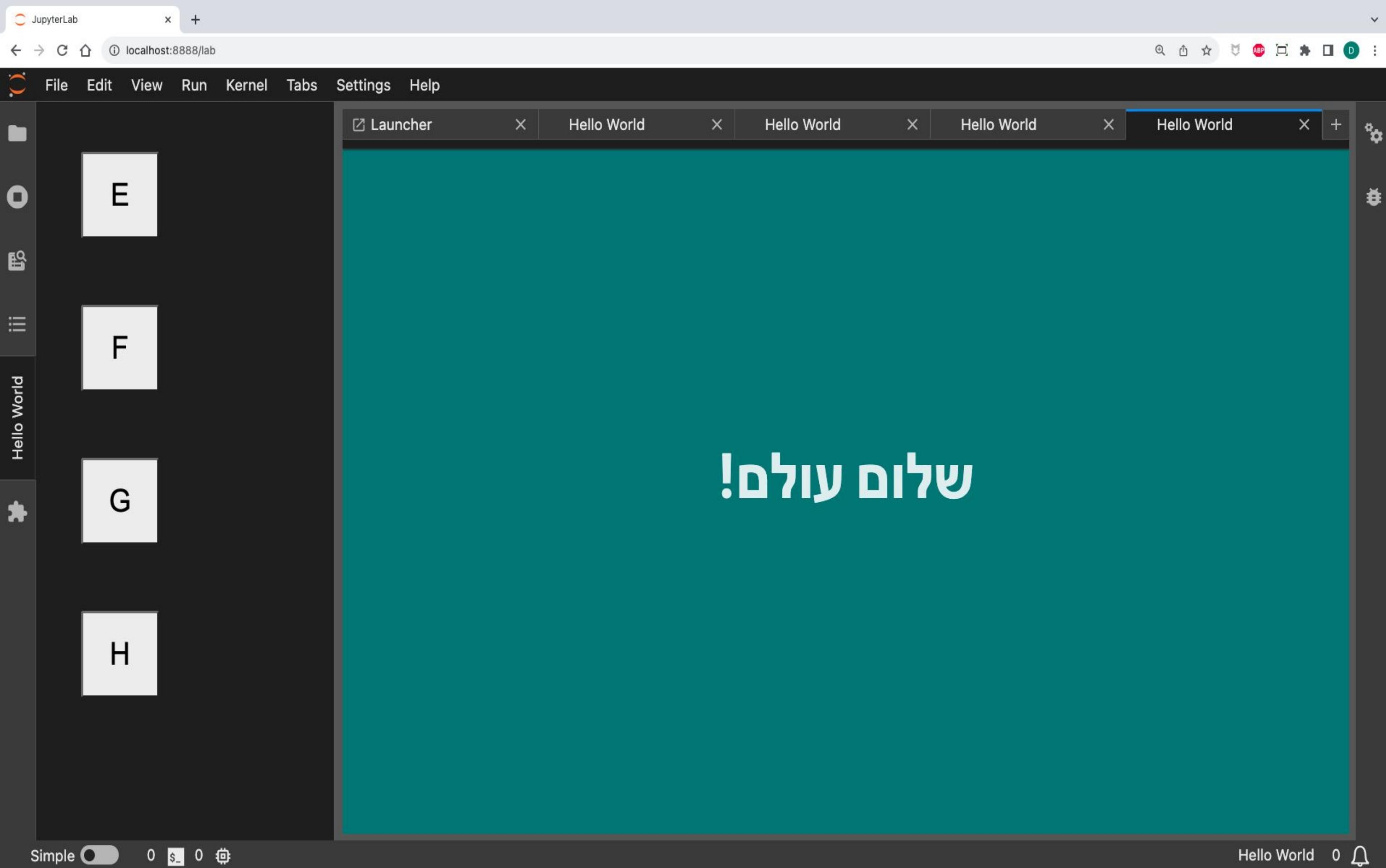
Hello World!

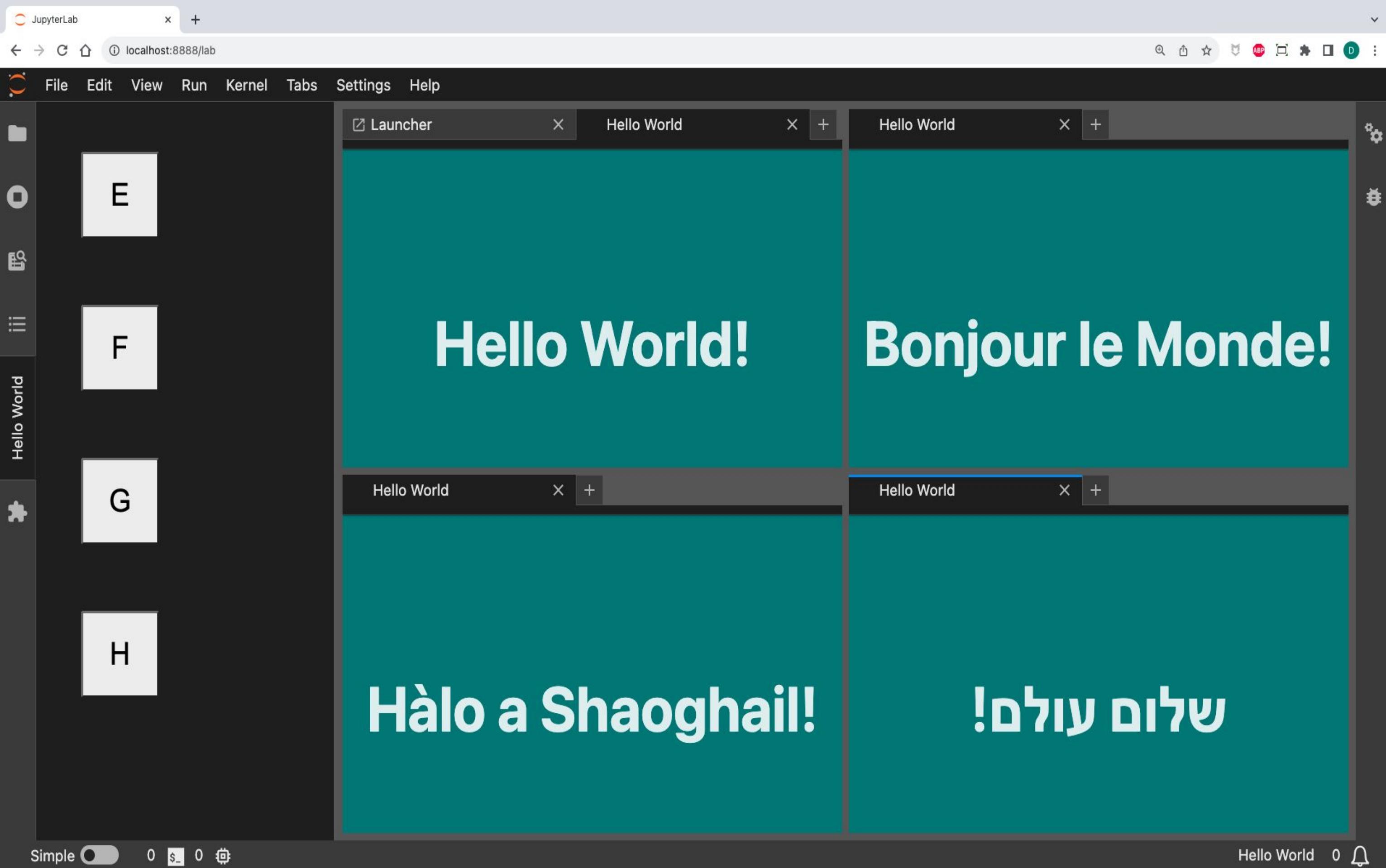
Simple 0 \$ 0 @

Hello World 0









Useful LabExtension Links

- Core Tokens
 - ICommandPalette, ILauncher
 - IMainMenu
 - ILayoutRestorer
 - ISettingsRegistry
 - Trackers: ex: INotebookTracker, ISettingEditorTracker

Useful LabExtension Links

- github.com/DanielGoldfarb/pydjlx
- [JupyterLab Extension Developer Guide](#)
- [Front-End Shell](#)
- [Random Astronomy Picture Extension Tutorial](#)
- [Extension Examples Repository](#)

Thank you!

Engineering

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github.com/DanielGoldfarb/pydjlx

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Thank you!

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