



Interactive HPC with Jupyter

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Jens Henrik Göbbert, j.goebbert@fz-juelich.de

Christian Witzler, c.witzler@fz-juelich.de

Jülich Supercomputing Centre (JSC)
Forschungszentrum Jülich (FZJ)



European
Commission

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WELCOME

- Hello !
- Workshop information (live document)
 - <https://gitlab.version.fz-juelich.de/hedgedoc/oo2I4aZHSKO5eIJJOLPk3w?view>
- Workshop interaction
 - Zoom chat
- Workshop repository
 - <https://gitlab.version.fz-juelich.de/jupyter4jsc/CoE-2021.05-jupyter4hpc>

JUPYTERLAB EXTENSIONS

TERMINOLOGY

What is a JupyterLab Extension?

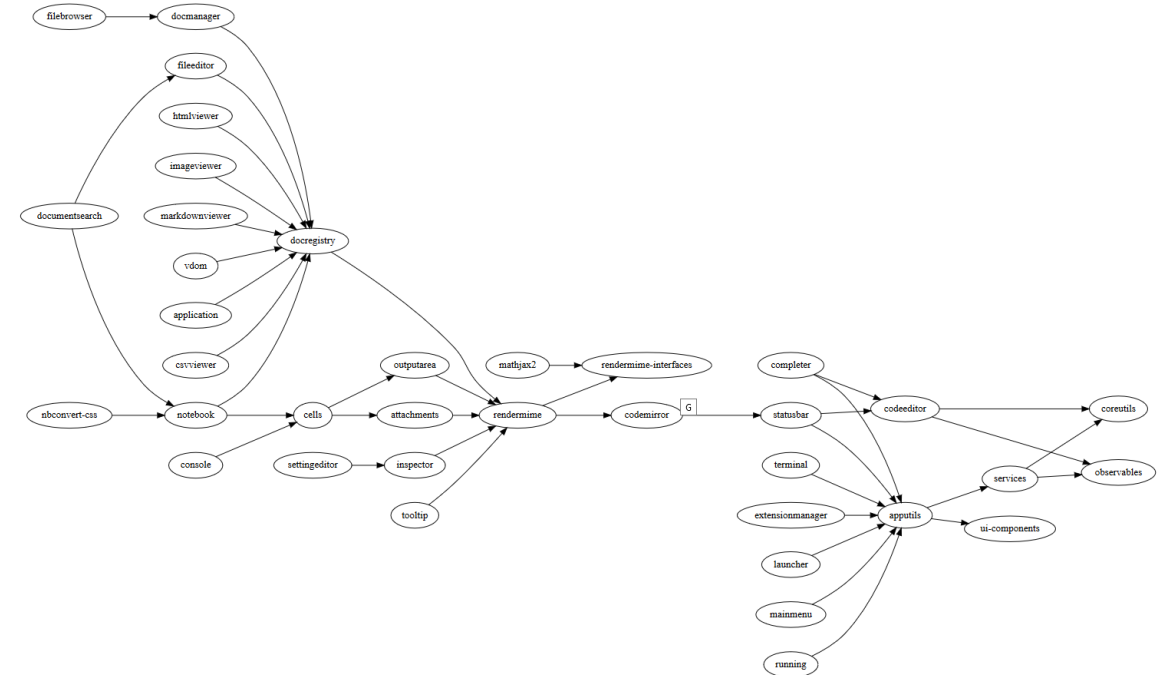
JupyterLab Extension

JupyterLab extensions can customize or enhance any part of JupyterLab.

JupyterLab Extensions

- provide new file viewers, editors, themes
 - provide renderers for rich outputs in notebooks
 - add items to the menu or command palette
 - add keyboard shortcuts
 - add settings in the settings system.
-
- Extensions can even provide an API for other extensions to use and can depend on other extensions.

The whole JupyterLab itself is simply a **collection of extensions** that are no more powerful or privileged than any custom extension.



<https://jupyterlab.readthedocs.io/en/stable/user/extensions.html>
<https://github.com/topics/jupyterlab-extension>

JUPYTER EXTENSIONS

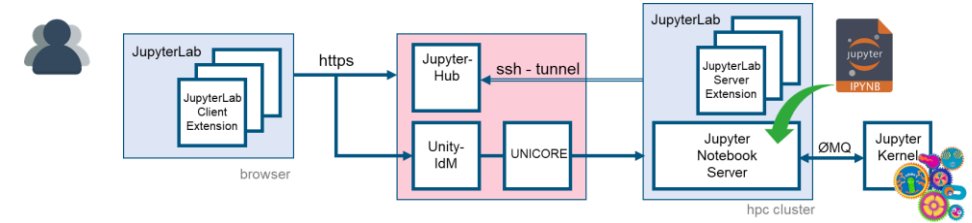
Some general information

List the installed JupyterLab extensions

- Open the Launcher
- Start a Terminal
- Run command `jupyter labextension list`

Extensions are installed in JupyterLab's Application Directory, which

- stores any information that JupyterLab persists
 - including settings and built assets of extensions
- default location is `<sys-prefix>/share/jupyter/lab`
- can be relocated by setting `$JUPYTERLAB_DIR`
- is immutable
 - **any change requires a rebuild** of the whole JupyterLab to take effect!
 - contains the JupyterLab static assets
 - (e.g. `static/index.html`)



```
jovyan@dad3db89c836:~$ jupyter labextension list
JupyterLab v1.2.1
Known labextensions:
  app dir: /opt/conda/share/jupyter/lab
    @bokeh/jupyter_bokeh v1.1.1 enabled OK
    @jupyter-voila/jupyterlab-preview v0.1.3 enabled OK
    @jupyter-widgets/jupyterlab-manager v1.0.3 enabled OK
    @jupyter-widgets/jupyterlab-sidecar v0.4.0 enabled OK
    @jupyterlab/celltags v0.2.0 enabled OK
    @jupyterlab/git v0.8.2 enabled OK
    itkwidgets v0.22.0 enabled OK
    jefileupload v0.1.0 enabled OK
    jupyter-leaflet v0.11.4 enabled OK
    jupyter-matplotlib v0.4.2 enabled OK
    jupyter-threejs v2.1.1 enabled OK
    jupyter-vue v1.0.0 enabled OK
    jupyter-verify v1.1.1 enabled OK
    jupyter-webrtc v0.5.0 enabled OK
    jupyterlab-control v1.0.1 enabled OK
    jupyterlab-datawidgets v6.2.0 enabled OK
    jupyterlab-drawio v0.6.0 enabled OK
    jupyterlab-gitlab v0.3.0 enabled OK
    jupyterlab-logout v0.4.0 enabled OK
    jupyterlab-plotly v1.2.0 enabled OK
    jupyterlab-system-monitor v0.4.1 enabled OK
    jupyterlab-theme-toggle v0.4.2 enabled OK
    jupyterlab-topbar-extension v0.4.0 enabled OK
    jupyterlab-iframe v0.2.1 enabled OK
    nbdtm-jupyterlab v1.0.0 enabled OK
    plotlywidget v1.2.0 enabled OK
    prlink v0.1.2 enabled OK
```

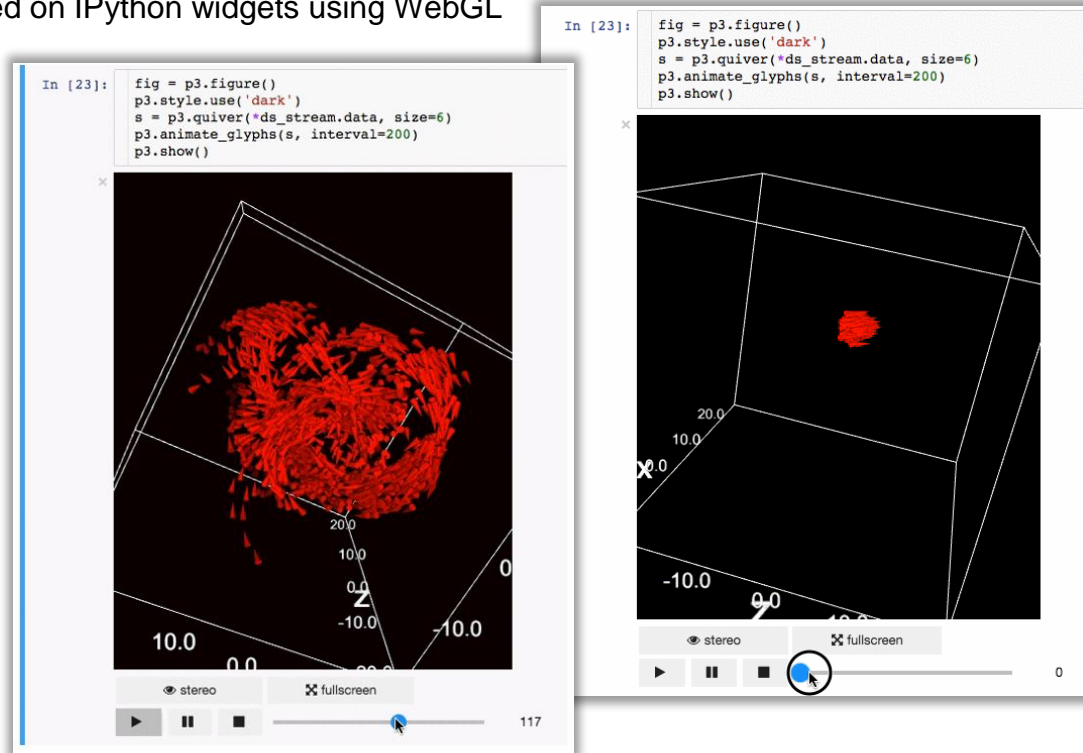
<https://jupyterlab.readthedocs.io/en/stable/user/extensions.html>

JUPYTER-JSC EXTENSIONS

Installed by default

IPyVolume

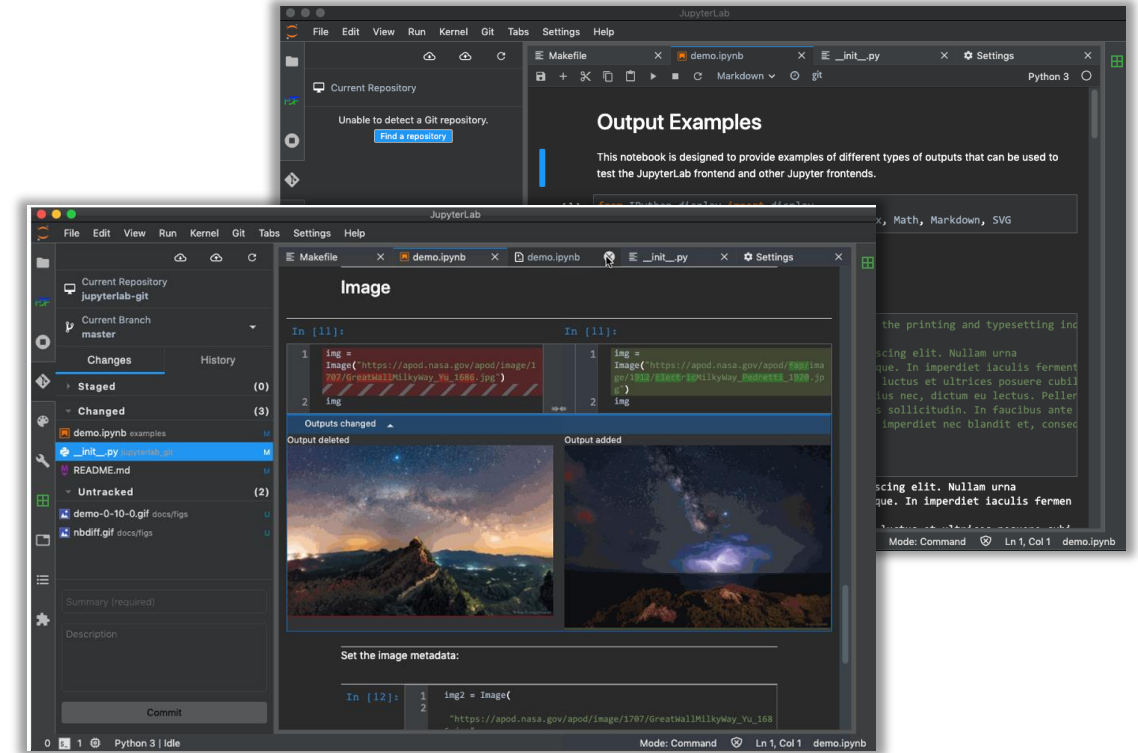
3d plotting for Python in the Jupyter notebook based on IPython widgets using WebGL



<https://github.com/maartenbreddels/ipyvolume>

JupyterLab-Git

JupyterLab extension for version control using Git



<https://github.com/jupyterlab/jupyterlab-git>

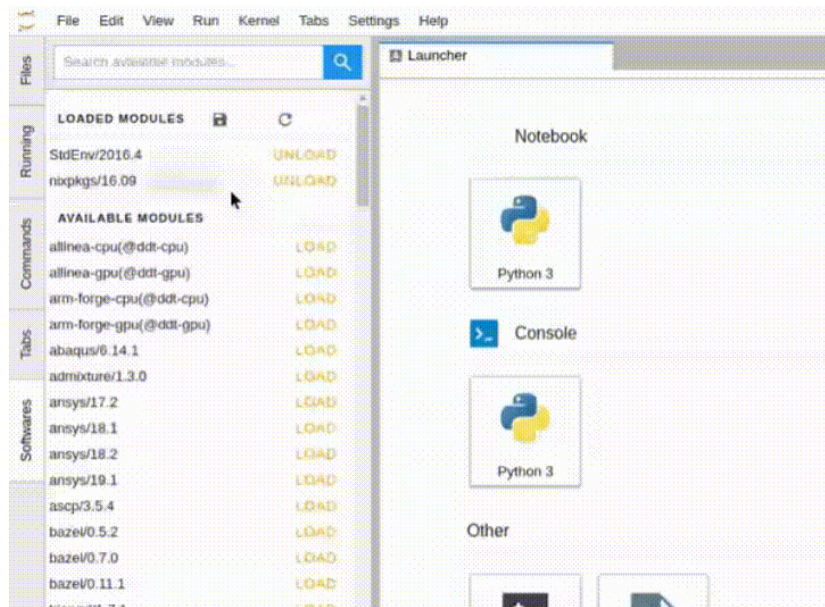
JUPYTER-JSC EXTENSIONS

Installed by default

JupyterLab-Lmod

JupyterLab extension that allows user to interact with environment modules before launching kernels.

- **Remember** to restart the kernel after loading other modules.

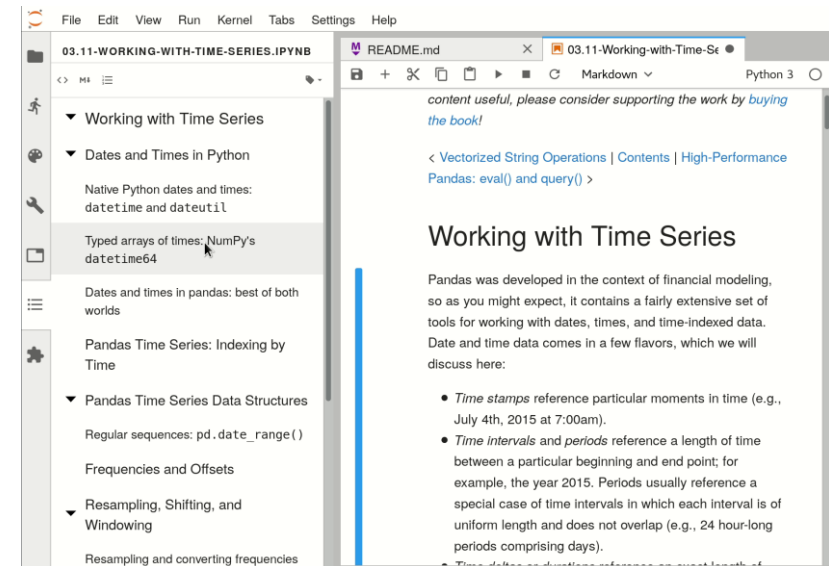


<https://github.com/cmd-ntrf/jupyter-lmod>

JupyterLab-toc

A Table of Contents extension for JupyterLab.

This auto-generates a table of contents in the left area when you have a notebook or markdown document open. The entries are clickable, and scroll the document to the heading in question.



<https://github.com/jupyterlab/jupyterlab-toc>

JUPYTER-JSC EXTENSIONS

Installed by default

PyThreeJS

A Python / ThreeJS bridge utilizing the Jupyter widget infrastructure.
<https://threejs.org> - lightweight, 3D library with a default WebGL renderer.

```
In [9]: f = """
function f(origu,origv) {
  // scale u and v to the ranges I want: [0, 2*pi]
  var u = 2*Math.PI*origu;
  var v = 2*Math.PI*origv;

  var x = Math.sin(u);
  var y = Math.cos(v);
  var z = Math.cos(u*v);

  return new THREE.Vector3(x,y,z)
}
"""
surf_g = ParametricGeometry(func=f);
surf = Mesh(geometry=surf_g, material=LambertMaterial(color='green', side='FrontSide'))
surf2 = Mesh(geometry=surf_g, material=LambertMaterial(color='yellow', side='BackSide'))
scene = Scene(children=[surf, surf2, AmbientLight(color='#777777')])
c = PerspectiveCamera(position=[5, 5, 3], up=[0, 0, 1],
  children=[DirectionalLight(color='white',
    position=[3, 5, 1],
    intensity=0.6)])
renderer = Renderer(camera=c, scene=scene, controls=[OrbitControls(controlling=c)])
display(renderer)
```

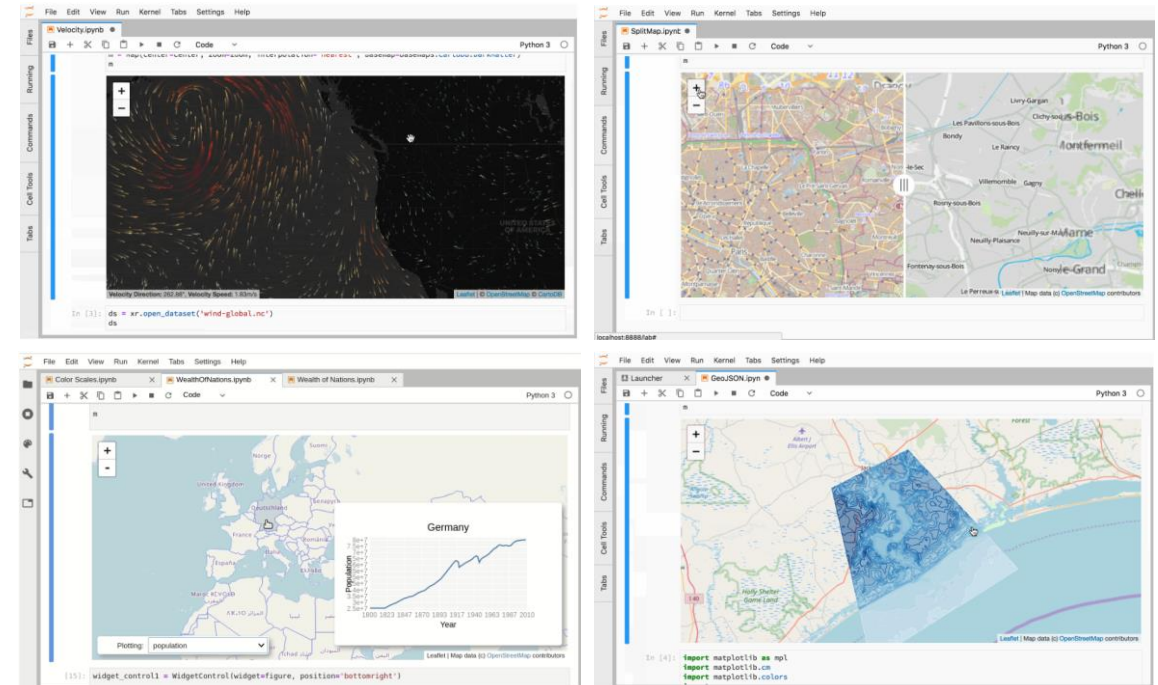


<https://github.com/jupyter-widgets/pythreejs>

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IPyLeaflet

A Jupyter / Leaflet bridge enabling interactive maps in the Jupyter notebook.



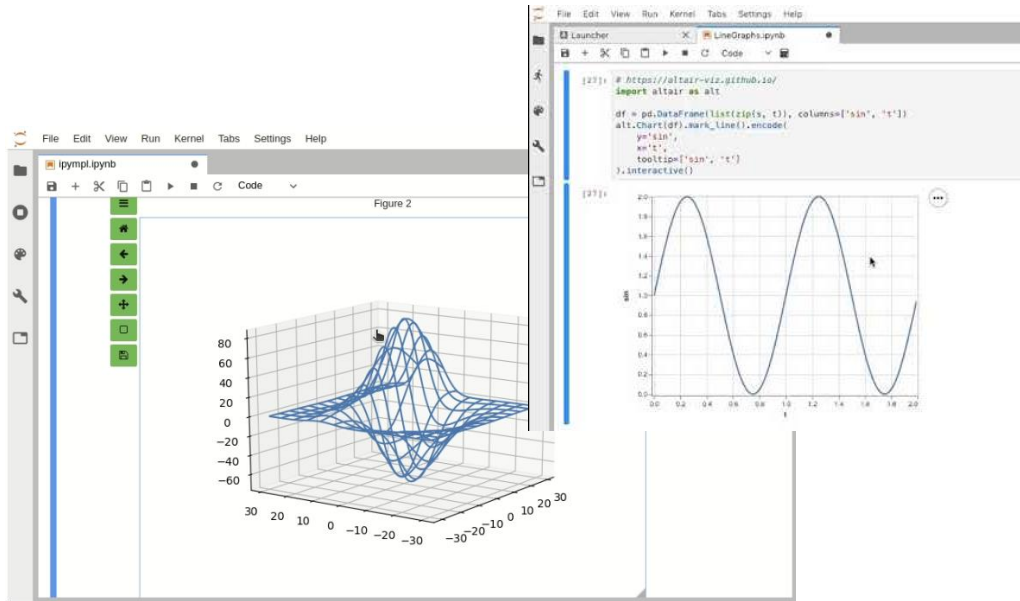
<https://github.com/jupyter-widgets/ipyleaflet>

JUPYTER-JSC EXTENSIONS

Installed by default

IPyMPL - matplotlib

Leveraging the Jupyter interactive widgets framework, ipympl enables the interactive features of matplotlib in the Jupyter notebook and in JupyterLab.

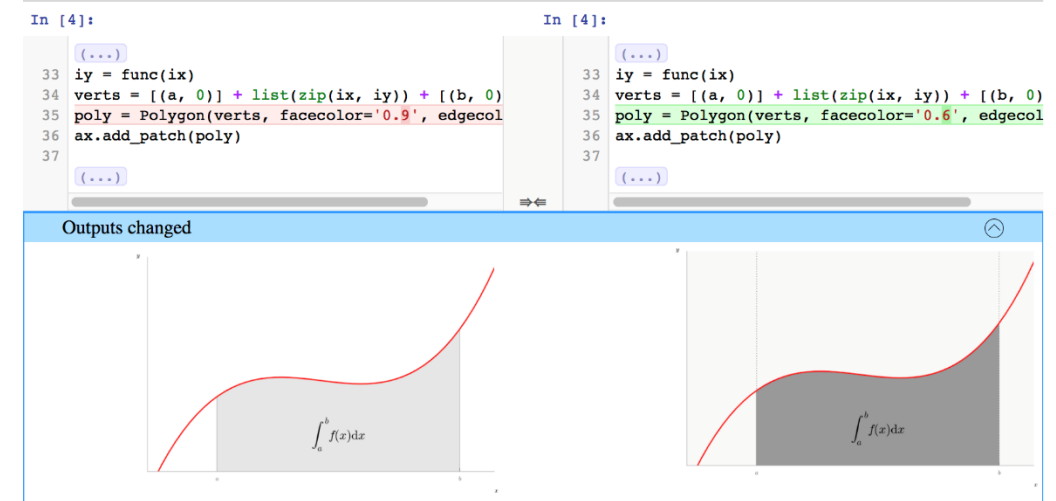


<https://github.com/matplotlib/ipympl>

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NBDime

Tools for diffing and merging of Jupyter notebooks.



<https://github.com/jupyter/nbdime>

JUPYTER-JSC EXTENSIONS

Installed by default

Plotly

JupyterLab extension for the interactive and browser-based graphing library Plotly.
<https://plotly.com/python/>

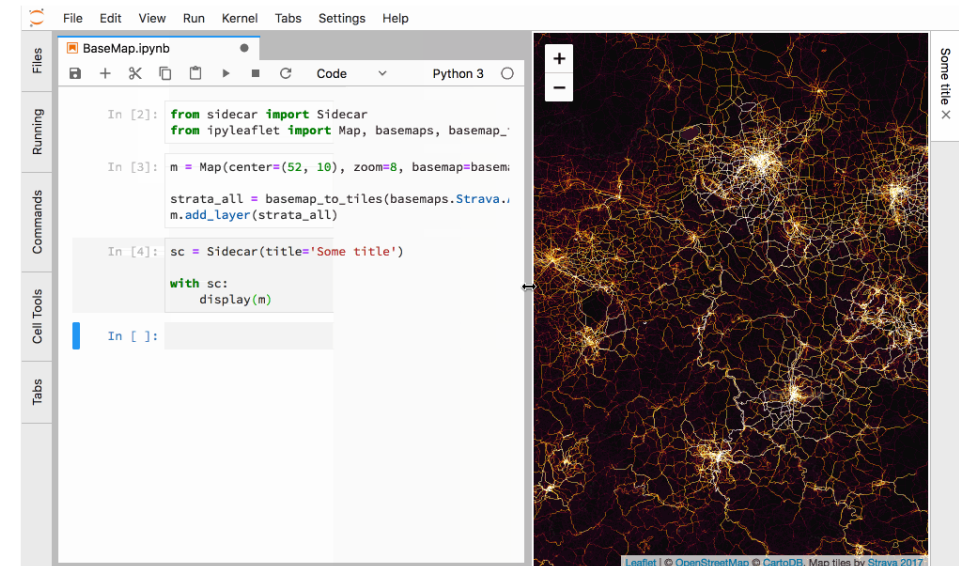


<https://github.com/plotly/plotly.py>

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JupyterLab-Sidecar

A sidecar output widget for JupyterLab.



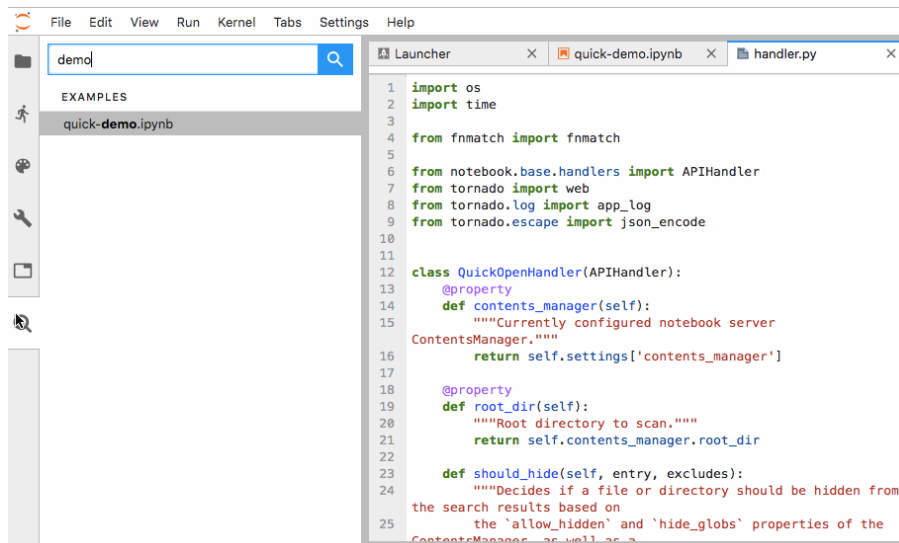
<https://github.com/jupyter-widgets/jupyterlab-sidecar>

JUPYTER-JSC EXTENSIONS

Installed by default

JupyterLab-Quickopen

Quickly open a file in JupyterLab by typing part of its name

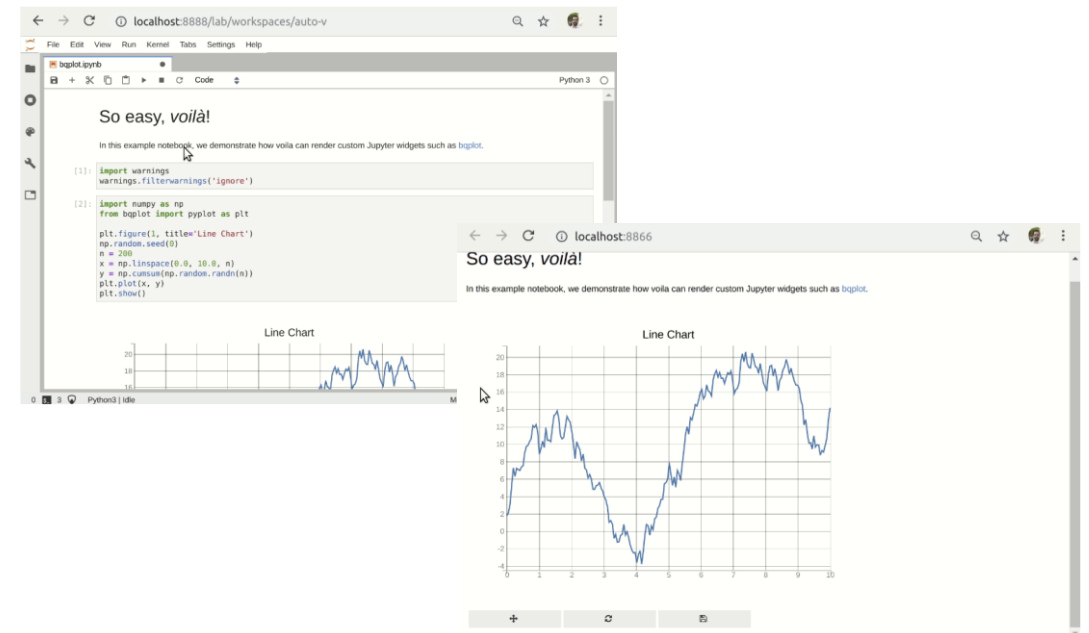


<https://github.com/parente/jupyterlab-quickopen>

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Voilà

Voilà turns Jupyter notebooks into standalone web applications.



<https://github.com/voila-dashboards/voila>

JUPYTER-JSC EXTENSIONS

Installed by default

Presented JupyterLab extensions

- ipyvolumes
- @jupyterlab/git
- **jupyterlab-lmod**
- @jupyterlab/toc
- jupyter-threejs
- jupyter-leaflet
- jupyter-matplotlib
- jupyterlab-plotly
- @jupyter-widgets/jupyterlab-sidecar
- @parente/jupyterlab-quickopen
- @jupyter-voila/jupyterlab-preview

More installed JupyterLab extensions

- @bokeh/jupyter_bokeh
- **dask-labextension**
- jupyterlab-gitlab
- bqplot
- @jupyterlab/latex
- @krassowski/jupyterlab_go_to_definition
- @pyviz/jupyterlab_pyviz
- @ryantam626/jupyterlab_code_formatter
- **@jupyterlab/server-proxy**
- itkwidgets
- jupyter-vue
- @jupyterlab/celltags
- jupyterlab-drawio

https://gitlab.version.fz-juelich.de/jupyter4jsc/j4j_notebooks/-/blob/master/001-Jupyter/List_JupyterExtensions.ipynb

<https://npmjs.com>

QUESTIONS?

<https://jupyter-jsc.fz-juelich.de>

