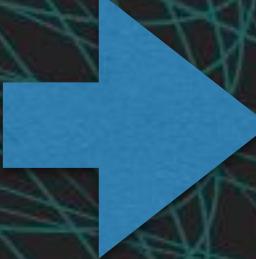


# jupyter<sup>°</sup> Pop-up

@JupyterCon | #JupyterPopUp



Luciano Resende & Kevin Bates	30 min talk	09:10 - 09:40
Scott Sanderson	30 min talk	09:40 - 10:10
<b>30 min Coffee Break</b>	Coffee Break	10:10 - 10:40
Matthias Bussonnier	50 min keynote	10:40 - 11:30
Chelsea Douglas	30 min talk	11:30 - 12:00
Chakri Cherukuri	30 min talk	12:00 - 12:30
<b>30 min Lunch</b>	Lunch	12:30 - 13:00
Douglas Blank	30 min talk	13:00 - 13:30
Panel - Allen Downey	45 min panel	13:30 - 14:15
Panel - Taylor Martin	45 min panel	13:30 - 14:15
Panel - Douglas Blank	45 min panel	13:30 - 14:15
<b>15 min Coffee Break</b>	Coffee Break	14:15 - 14:30
Colin Carroll	30 min talk	14:30 - 15:00
Ryan Cooper & David Koop	30 min talk	15:00 - 15:30
Colin Brown	30 min talk	15:30 - 16:00
Dave Stuart	30 min talk	16:00 - 16:30
Roope Astala	30 min talk	16:30 - 17:00
Aaron Williams	30 min talk	17:00 - 17:30



# State of Jupyter

March 21st, 2018

**Matthias Bussonnier**

[bussonniermatthias@gmail.com](mailto:bussonniermatthias@gmail.com)

GitHub: [@carreau](https://github.com/@carreau)

Twitter: [@mbussonn](https://twitter.com/@mbussonn)



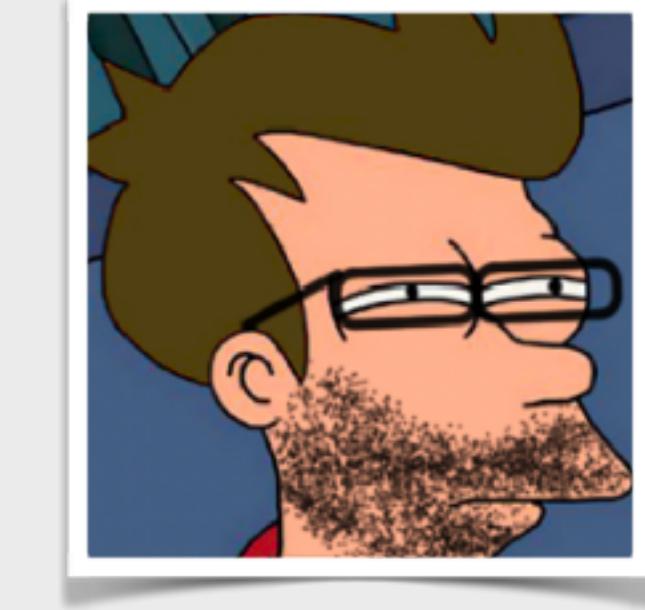


NUMFOCUS  
OPEN CODE = BETTER SCIENCE

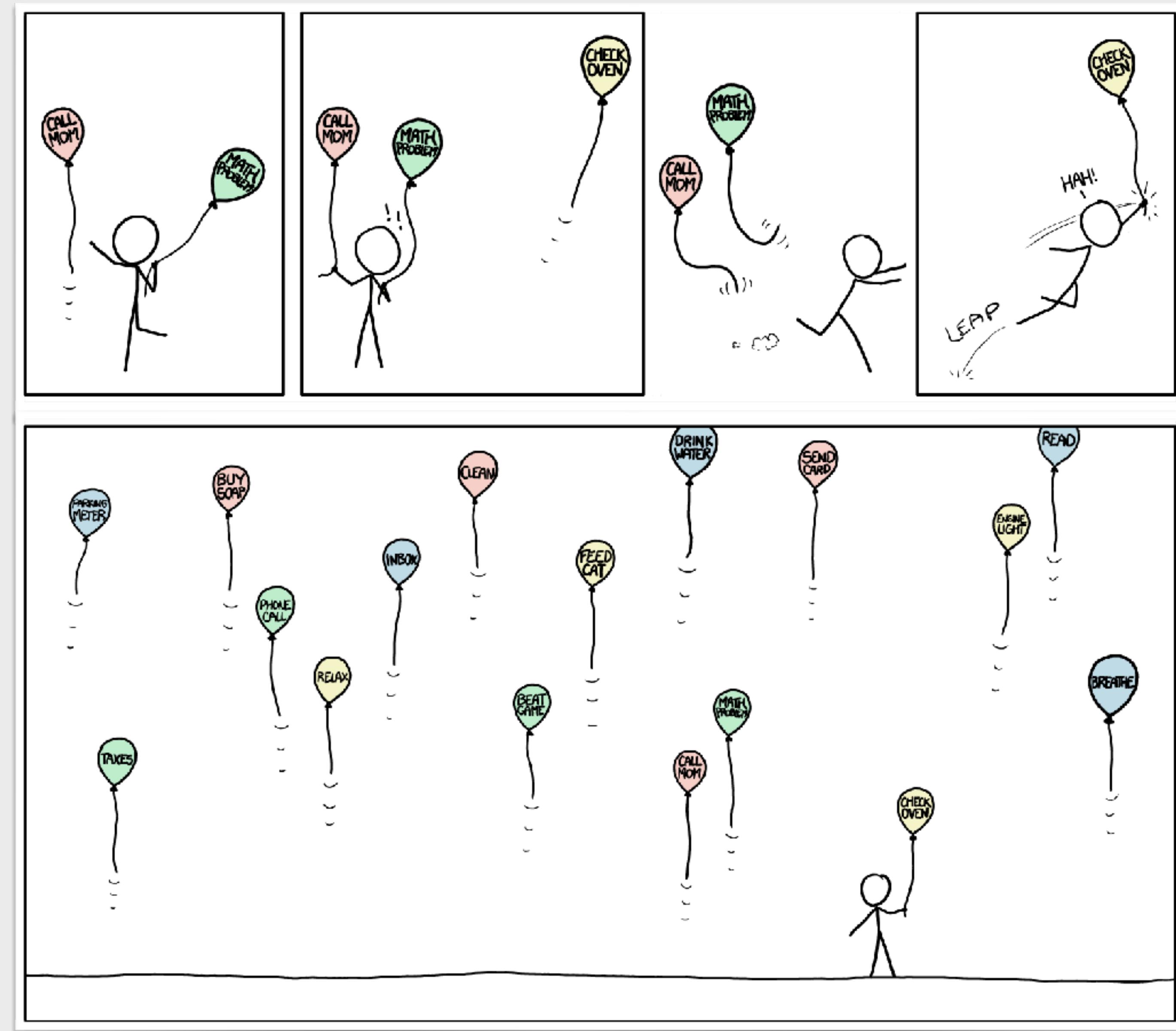
# About Me



# Matthias Bussonnier



Core developer of IPython/Jupyter since 2012,  
Founding and Steering Council member.



Randall Munroe  
(<https://xkcd.com/1106/>)

# IPython – 2001



IPython

```
$ ipython
Python 3.6.0
Type 'copyright', 'credits' or 'license' for more information
IPython 6.0.0.dev -- An enhanced Interactive Python. Type '?' for help.

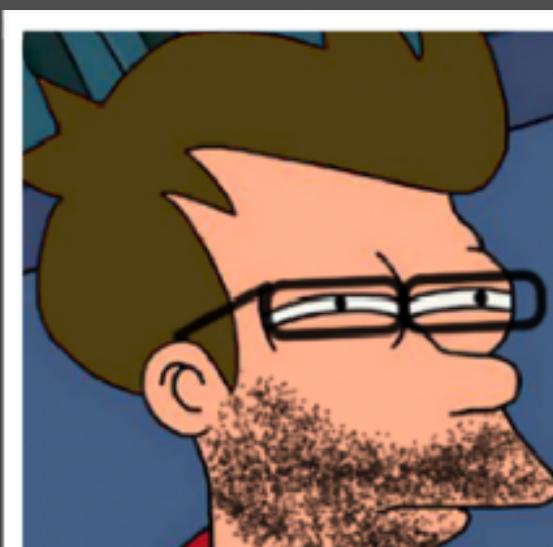
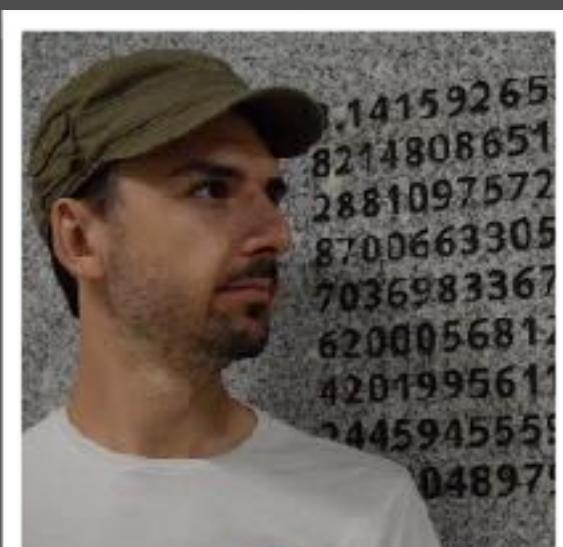
In [1]: from string import hexdigits
....: from random import choice
....:
....: def randhex(length=10):
....:     return '0x'+''.join([choice(hexdigits) for x in range(10)]).l
....:

ljust
lower
lstrip
```

(BTW, IPython is uppercase I)



# The Notebook – 2012



Jupyter Welcome to P

This Notebook Server was created by:

**WARNING**  
Don't rely on this serv

Your server is hosted there

**Run some Python code**

To run the code below:

1. Click on the cell to select it.
2. Press SHIFT+ENTER

A full tutorial for using the Jupyter Notebook is available here.

```
In [ ]: #matplotlib inline
```

```
import pandas as pd
import numpy as np
import matplotlib
```

jupyter Lorenz Differential Equations (autosaved)

File Edit View Insert Cell Kernel Help

Python 3 O

## Exploring the Lorenz System

In this Notebook we explore the [Lorenz system](#) of differential equations:

$$\dot{x} = \sigma(y - x)$$
$$\dot{y} = \rho x - y - xz$$
$$\dot{z} = -\beta z + xy$$

This is one of the classic systems in non-linear differential equations. It exhibits a range of complex behaviors as the parameters ( $\sigma$ ,  $\beta$ ,  $\rho$ ) are varied, including what are known as *chaotic solutions*. The system was originally developed as a simplified mathematical model for atmospheric convection in 1963.

```
In [7]: interact(Lorenz, N=fixed(10), angle=(0.,360.),
sigma=(0.0,50.0),beta=(0.,5), rho=(0.0,50.0))
```

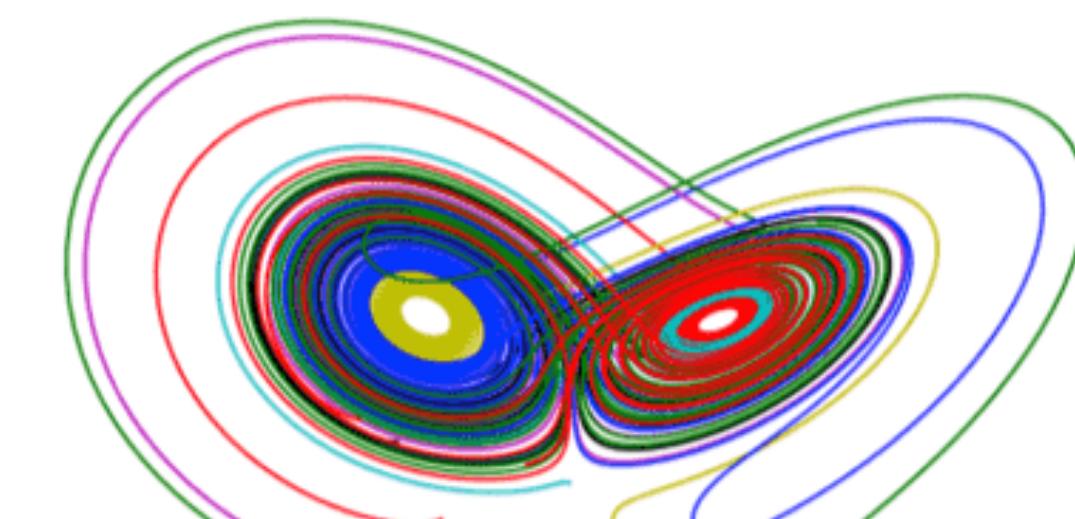
angle: 308.2

max\_time: 12

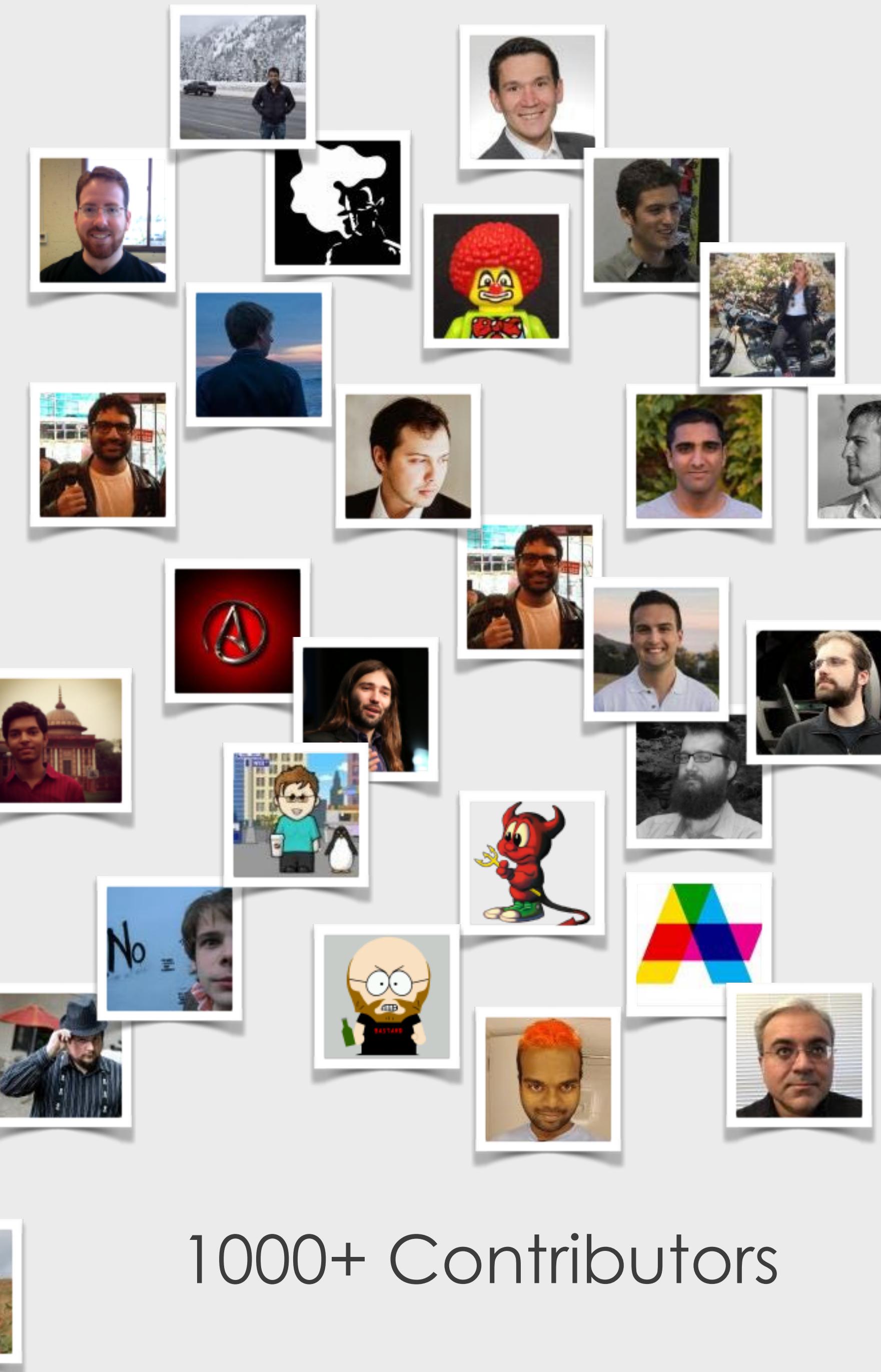
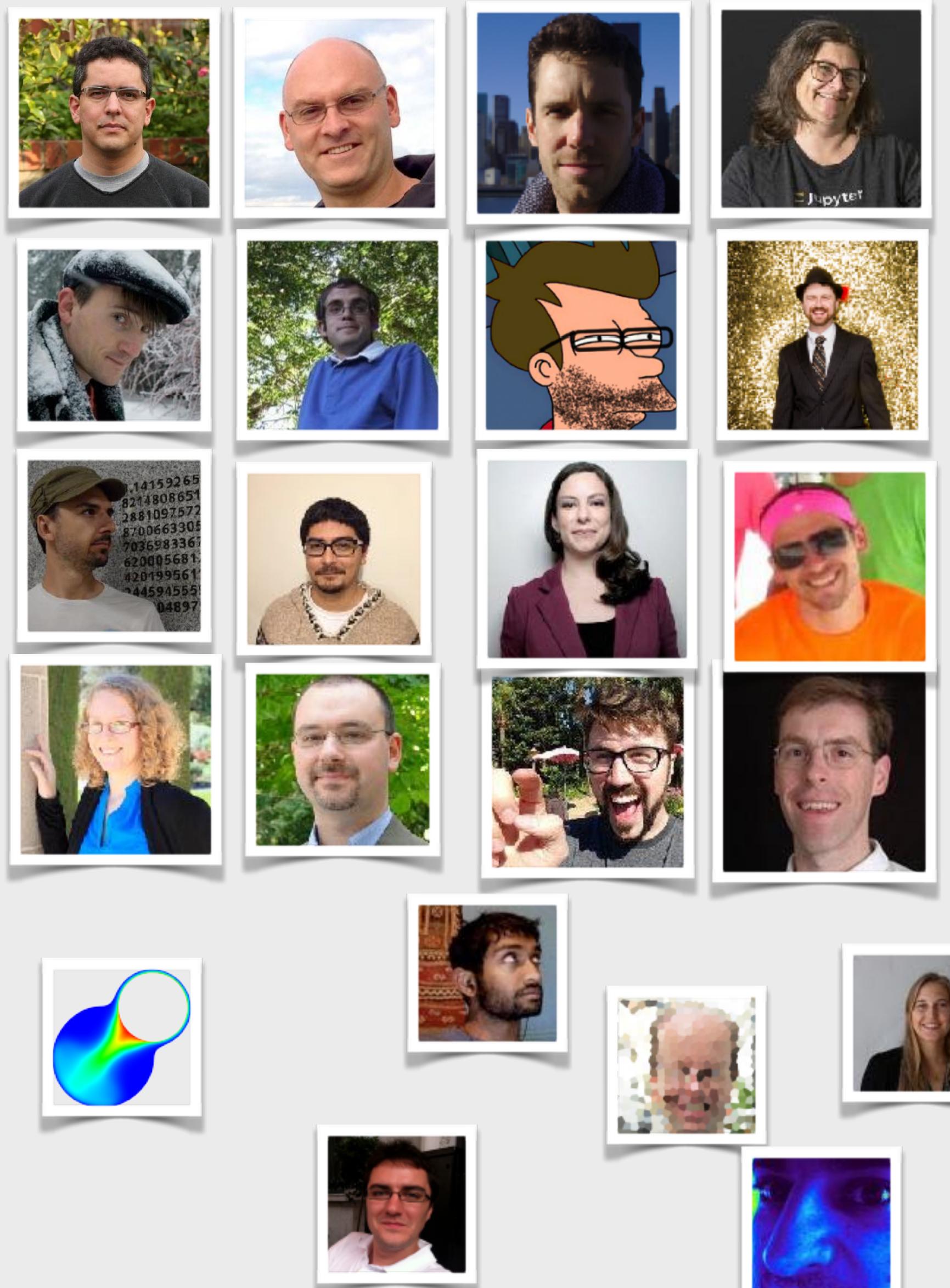
$\sigma$ : 10

$\beta$ : 2.6

$\rho$ : 28



# Jupyter: 2014-Present



1000+ Contributors



~ 20 core members  
~1/2 academics  
&1/2 private sector

For the majority:  
Not a Full-Time Job



Berkeley  
UNIVERSITY OF CALIFORNIA

GORDON AND BETTY  
**MOORE**  
FOUNDATION

O'REILLY®

Bloomberg

QuantStack  
Scientific Computing



Alfred P. Sloan  
FOUNDATION

NETFLIX

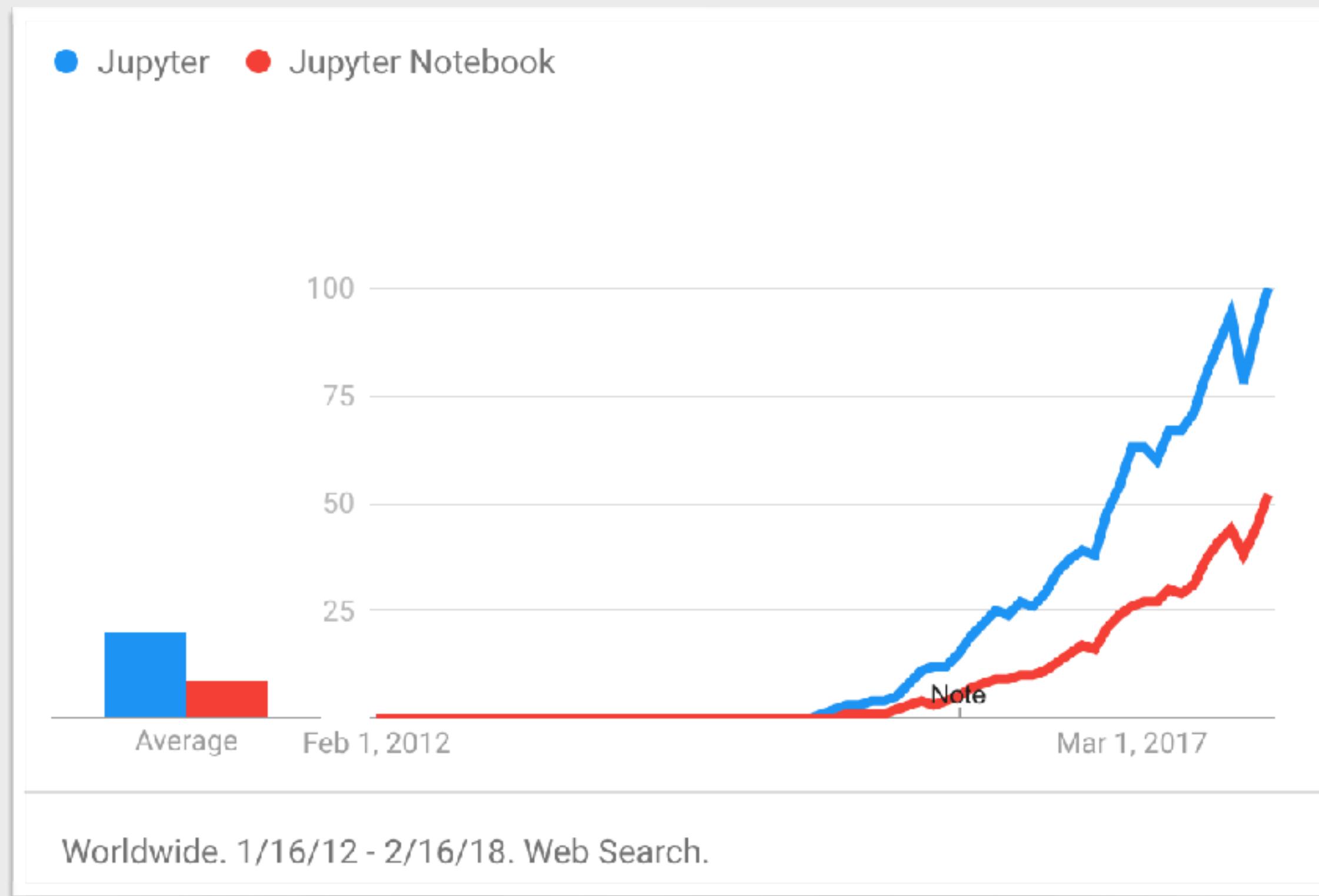
QUANSIGHT

CAL POLY  
SAN LUIS OBISPO

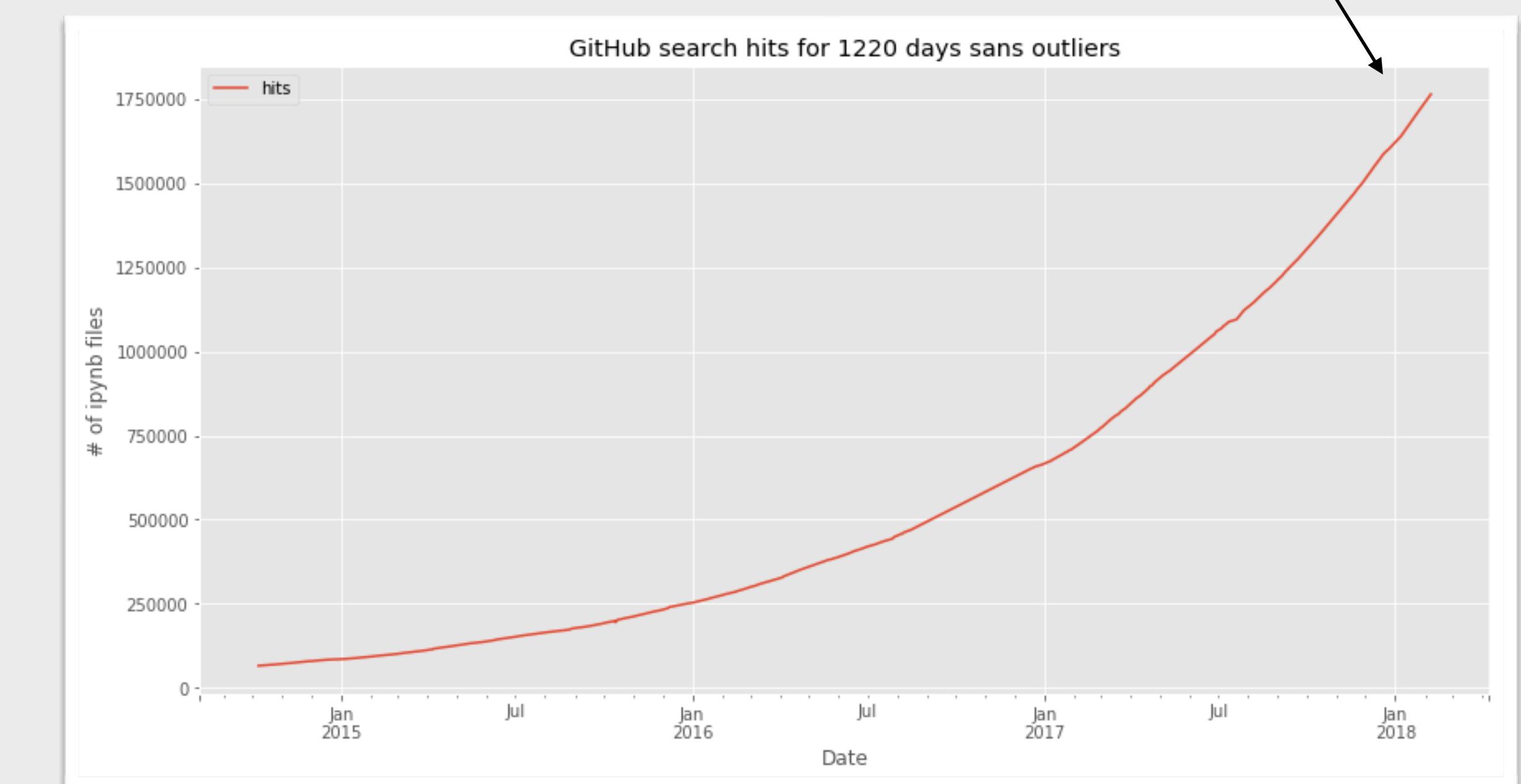
THE LEONA M. AND HARRY B.  
**HELMSLEY**  
CHARITABLE TRUST

NUMFOCUS  
OPEN CODE = BETTER SCIENCE

# A few Numbers



~1.7M notebooks  
on GitHub in Jan 2018



<https://github.com/parente/nbestimate>



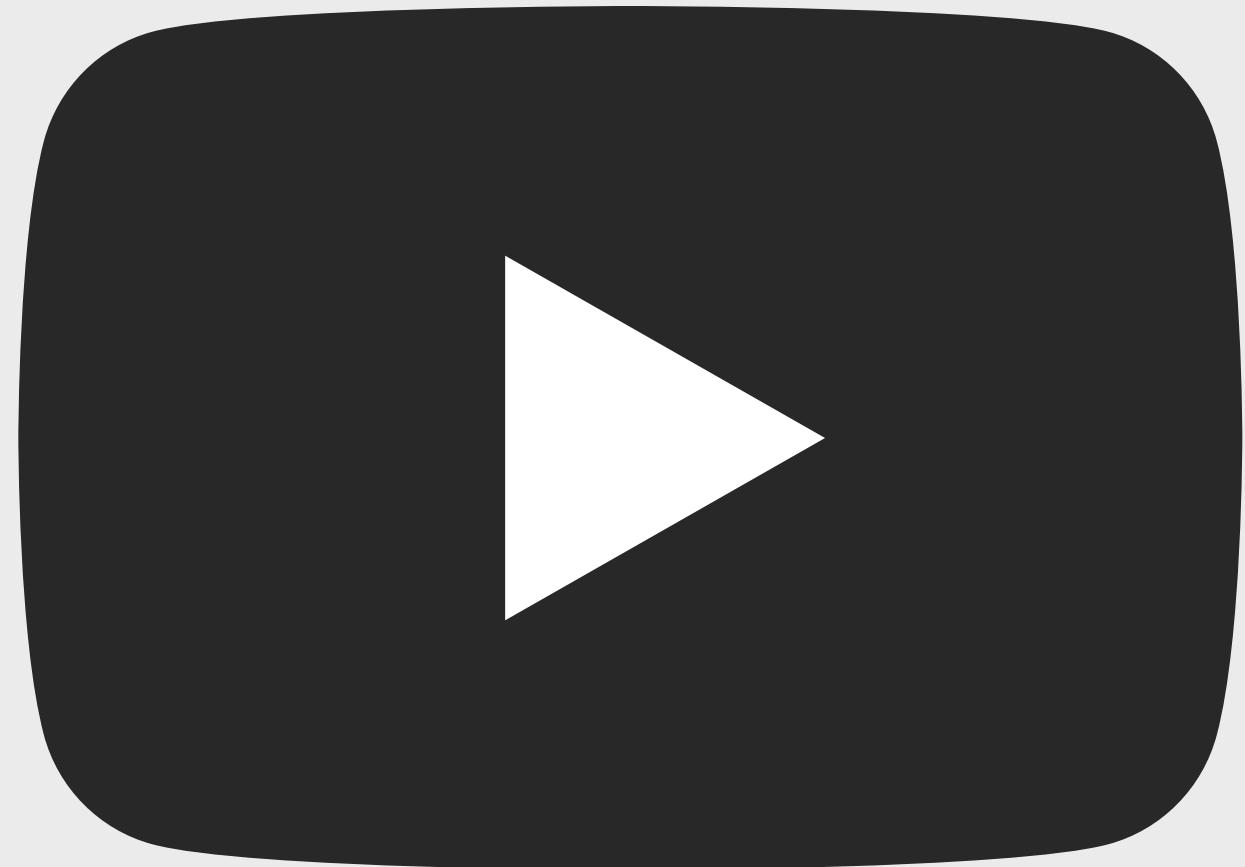


150+ repositories across multiple organisations  
(IPython, Jupyter, JupyterHub, JupyterLab, ...)  
at 2 release/year that's ~ 1 release per day

1000+ Contributors

8+ Millions Users,  
(with conservative estimates)

Worldwide ~21M developers – North America ~4.4M  
VS Code ~2.6 M Active Users  
GitHub 24M Users



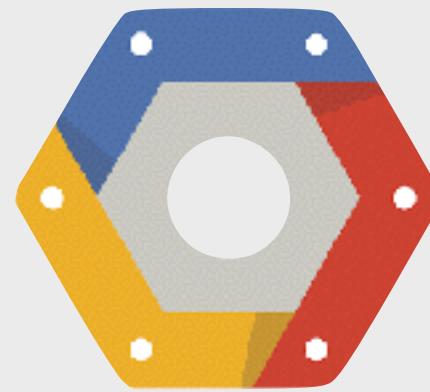
[youtube.com/c/ipython](https://youtube.com/c/ipython)

Developers meetings are recorded and available online

# Education



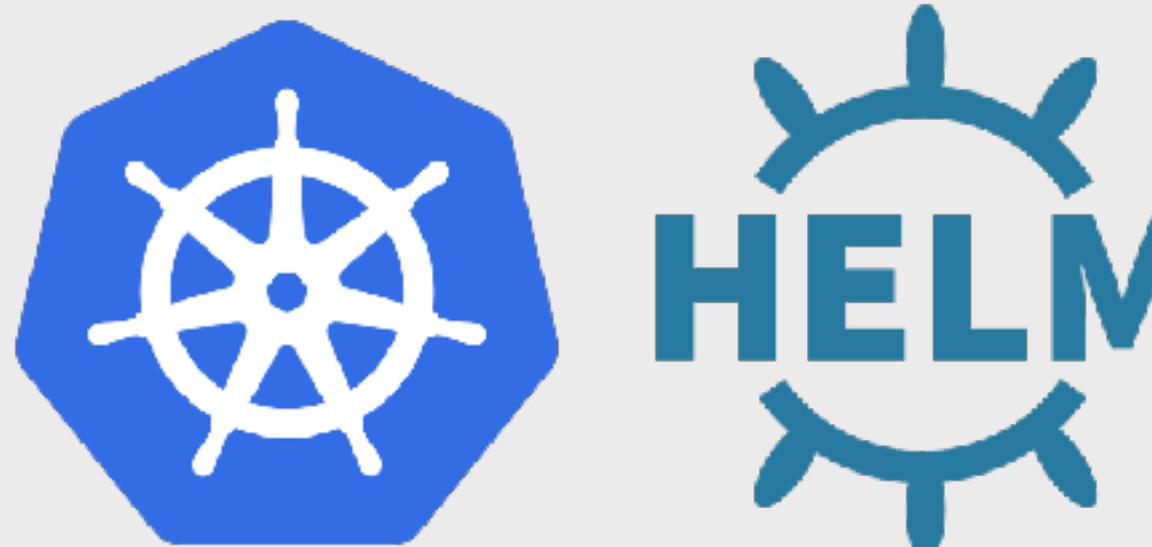
# Jupyter in education



Azure Notebook



...



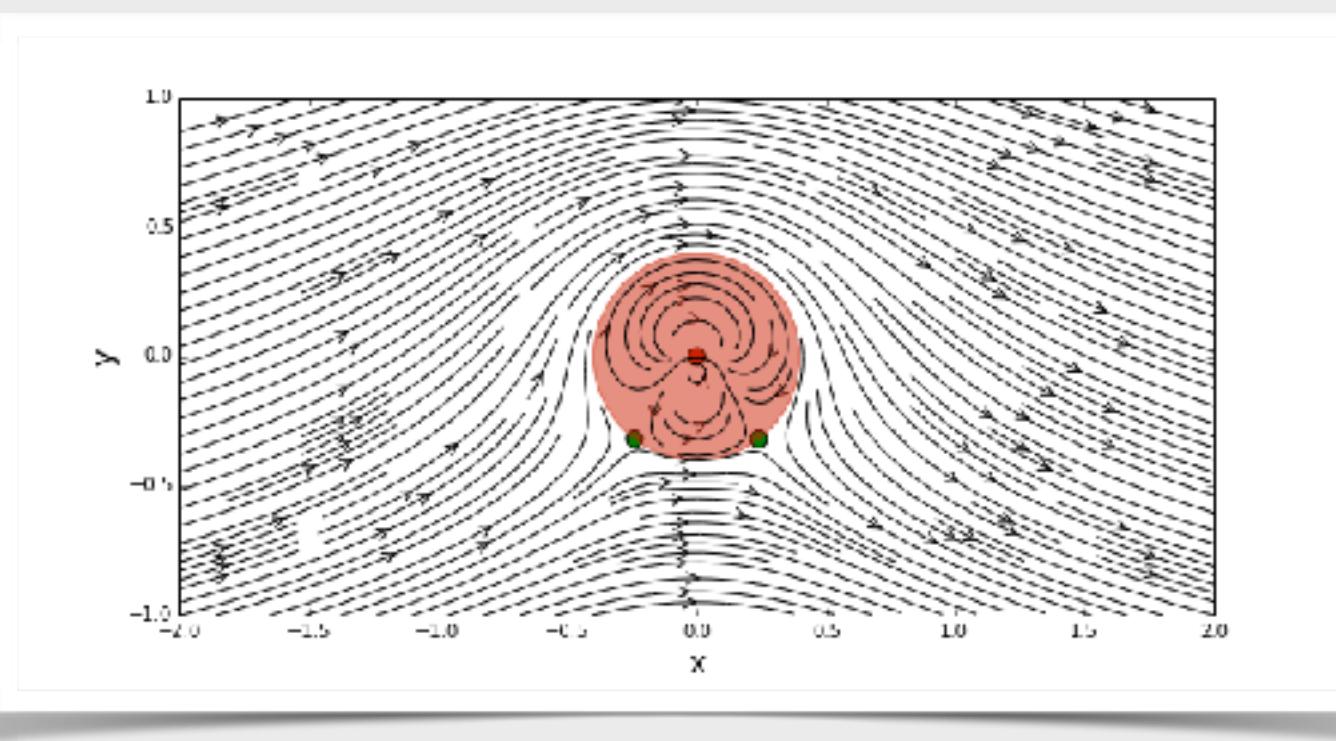
- NBGrader
- Multiple Extensions



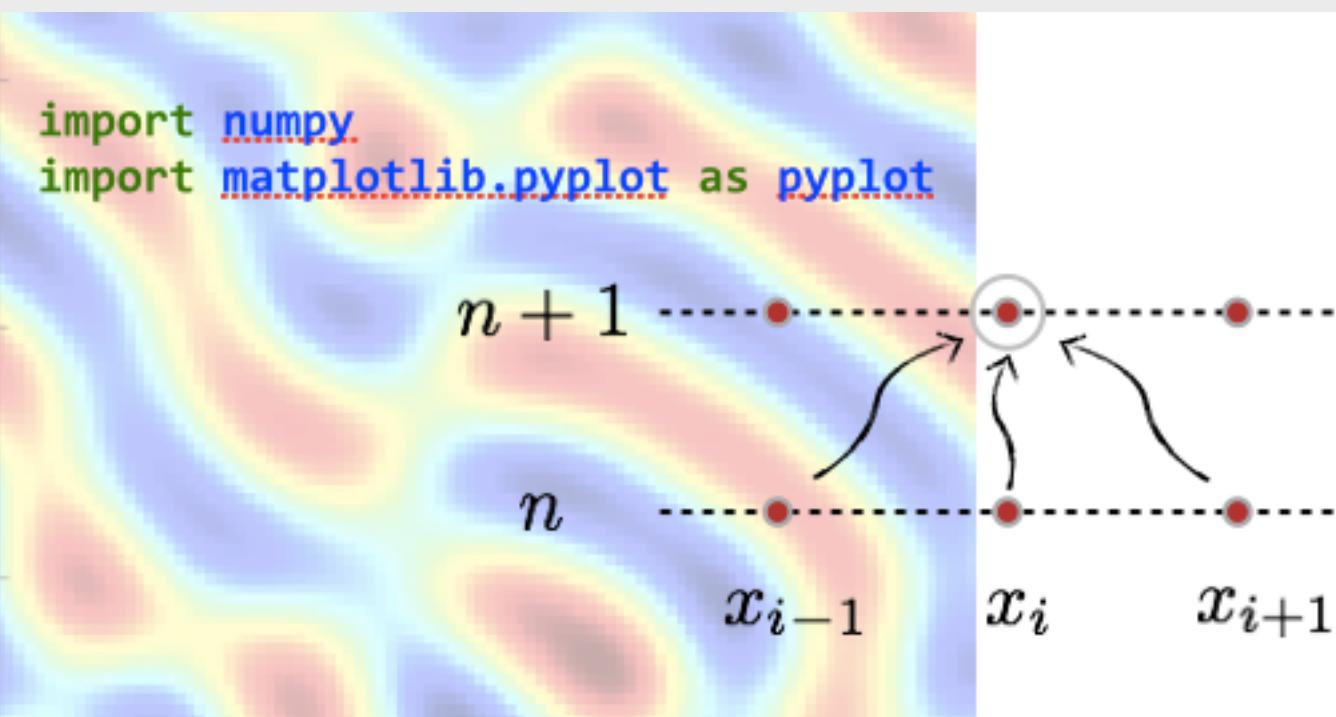
DataHub  
datahub.berkeley.edu

2 500+ Students

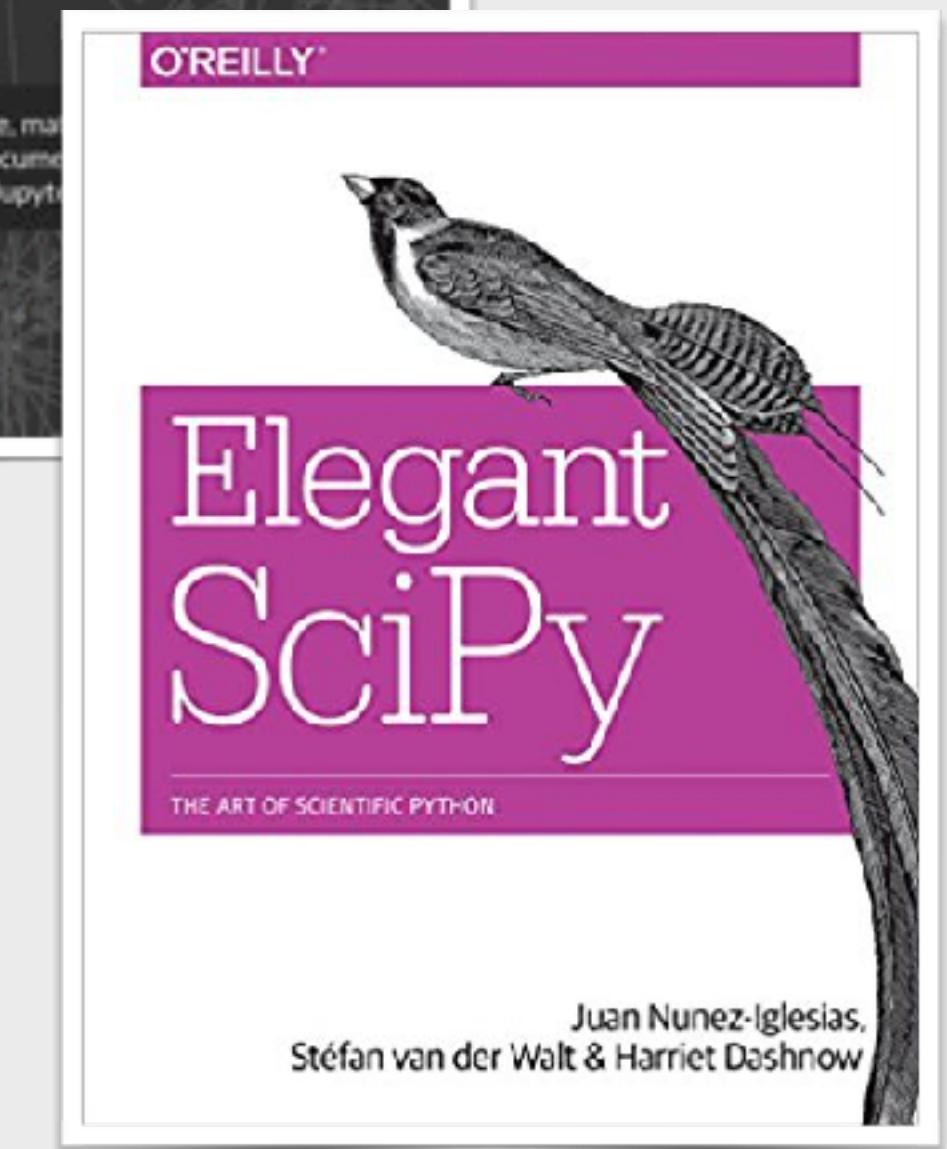
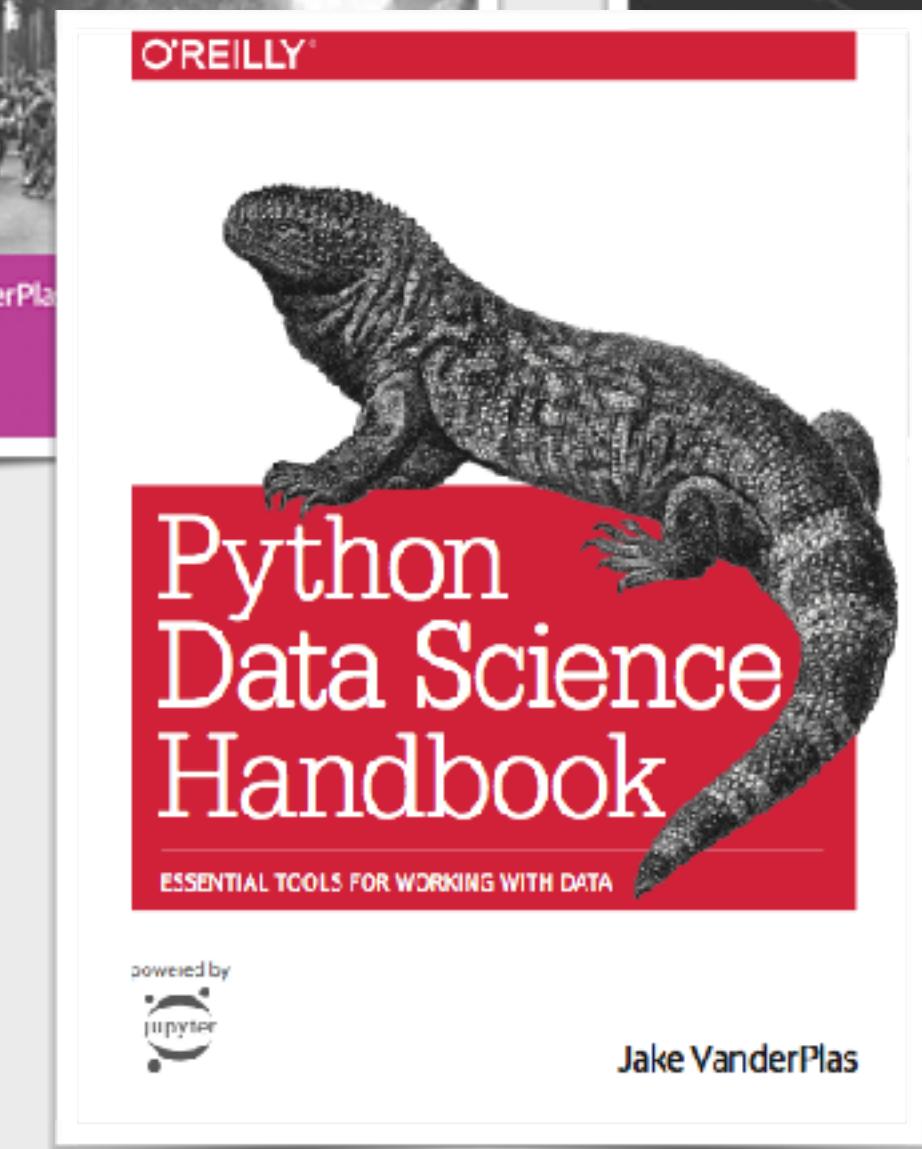




## AeroPython



## Numerical Mooc



Jupyter Notebook is and will be the platform used in Data Science

# Education Mailing List



jupyter-education@googlegroups.com

# Jupyter ❤ Machine Learning/AI



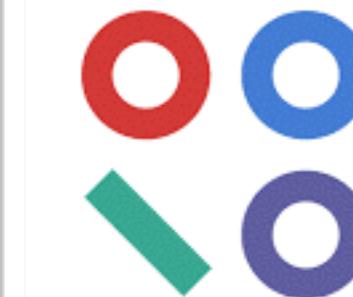
kaggle

K Keras

TensorFlow



Amazon SageMaker



R-Brain



Google Colaboratory

GRYD



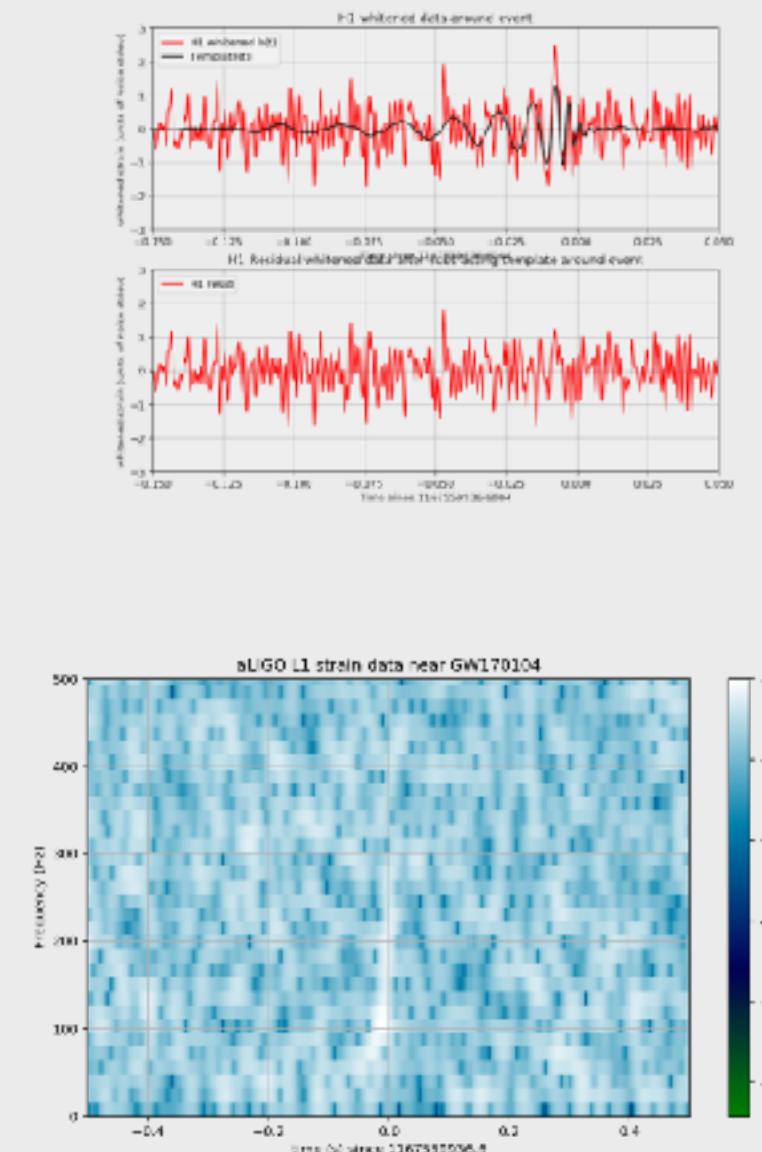
...

CODE OCEAN

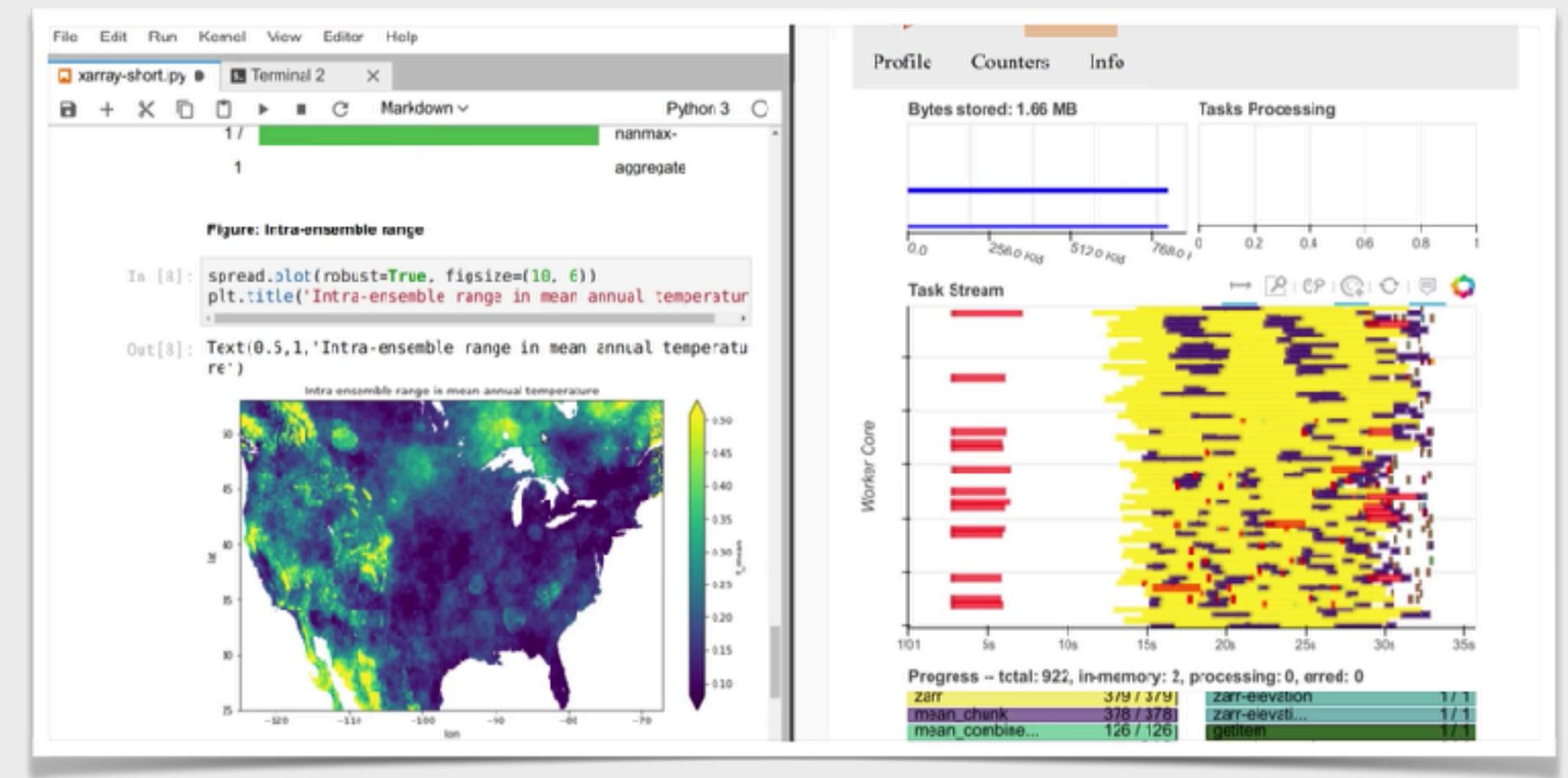
# Jupyter in Science and HPC



# Ligo (Gravitational waves discovery)



# In the cloud Climate Science (Pangeo)



[pangeo-data.github.io](https://pangeo-data.github.io)

Replacing traditional HPC/SSH workflow ?

# Customised Notebooks



# Knowledge Repo



Feed   Favorites   About   Stats   Write a Post!

## Knowledge Feed

Search for Knowledge

prev ⏪ next ⏩

### How Well Does NPS Predict Rebooking?

Author(s) : Lisa Qian  
Date: 2016-02-24  
Tags: #topics/reviews, #other/nps, #other/rebooking, #other/external-blog, #metrics/nps, #topics/rebooking

Data scientists at Airbnb collect and use data to optimize products, identify problem areas, and inform business decisions. For most guests, however, the defining moments of the Airbnb experience happen in the real world when they are traveling to their listing, being greeted by their host, settling into the listing, and exploring the destination. These are the moments that make or break the Airbnb experience, no matter how great we make our website. The purpose of this post is to show how we can use data to understand the quality of the trip experience, and in particular how the Net promoter score adds value.

[Read post](#)

2 1 0

1 Year Rebooking Rate by Trip Length

Trip Length (Nights)	Rebooking Rate (%)
5	~8.5
6	~8.2
7	~8.0
8	~7.8
9	~7.6
10	~7.4
11	~7.5
12	~7.7
13	~7.6
14	~7.8
15	~7.9

### New Metric Historically Performed Better On Experiments

Author(s) : Junshuo Liao  
Date: 2016-02-24  
Tags: #topics/experiments, #metrics/blog-post-metric

The booking team developed a new metric to measure \_\_\_\_\_. Following **prior research** that showed the metric may be useful for measuring \_\_\_\_\_, we decided to see how previous successful experiments changed the metric. We found that:

- \_\_\_\_ types of experiments consistently showed lift in the metric
- \_\_\_\_ types of experiments did not show consistent effects on the metric.
- We were generally able to get sufficient power for the metric on 80% of the experiments

These results lead us to believe this metric may be a good submetric for judging ancillary benefits of our product changes.

[Read post](#)

2 0 0

Previous Experiments on \_\_\_\_\_ metric

Experiment	Delta %	Color
1	~ -5%	Negative
2	~ +2%	Positive
3	~ +5%	Positive
4	~ +3%	Positive
5	~ +1%	Neutral
6	~ -2%	Negative
7	~ +4%	Positive
8	~ +2%	Positive
9	~ +1%	Neutral
10	~ -1%	Negative

# NodeBook



STITCH FIX

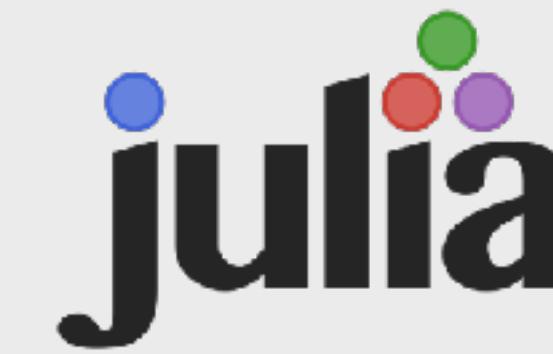
Nodebook

# Tools Integrations



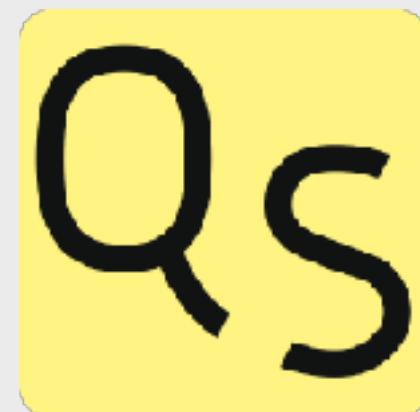
# Tools Integrations

**Kernels:** Python, Julia, R, Haskell, Perl, Fortran, Ruby, Javascript, C/C++, Go, Scala, Elixir... 60+





eUS  
Cling



QuantStack

```
In [3]: #include <string>
#include <fstream>

#include "xtl/xbase64.hpp"
#include "xeus/xjson.hpp"

namespace au
{
    struct audio
    {
        inline audio(const std::string& filename)
        {
            std::ifstream fin(filename);
            m_buffer << fin.rdbuf();
        }

        std::stringstream m_buffer;
    };

    xeus::xjson mime_bundle_repr() const
    {
        auto bundle = xeus::xjson::object();
        bundle["text/html"] = std::string("<audio controls>" + xtl::base64_encode(im->m_buffer.str()) + "</audio>");
        return bundle;
    }
}

In [4]: au::audio drums("audio/audio.wav")
drums
```

Out[4]: ▶ 0:00 / 0:02 ⏪ ⏴ ⏵

```
In [1]: #include <string>
#include <fstream>

#include "xtl/xbase64.hpp"
#include "xeus/xjson.hpp"

namespace im
{
    struct image
    {
        inline image(const std::string& filename)
        {
            std::ifstream fin(filename, std::ios::binary);
            m_buffer << fin.rdbuf();
        }

        std::stringstream m_buffer;
    };

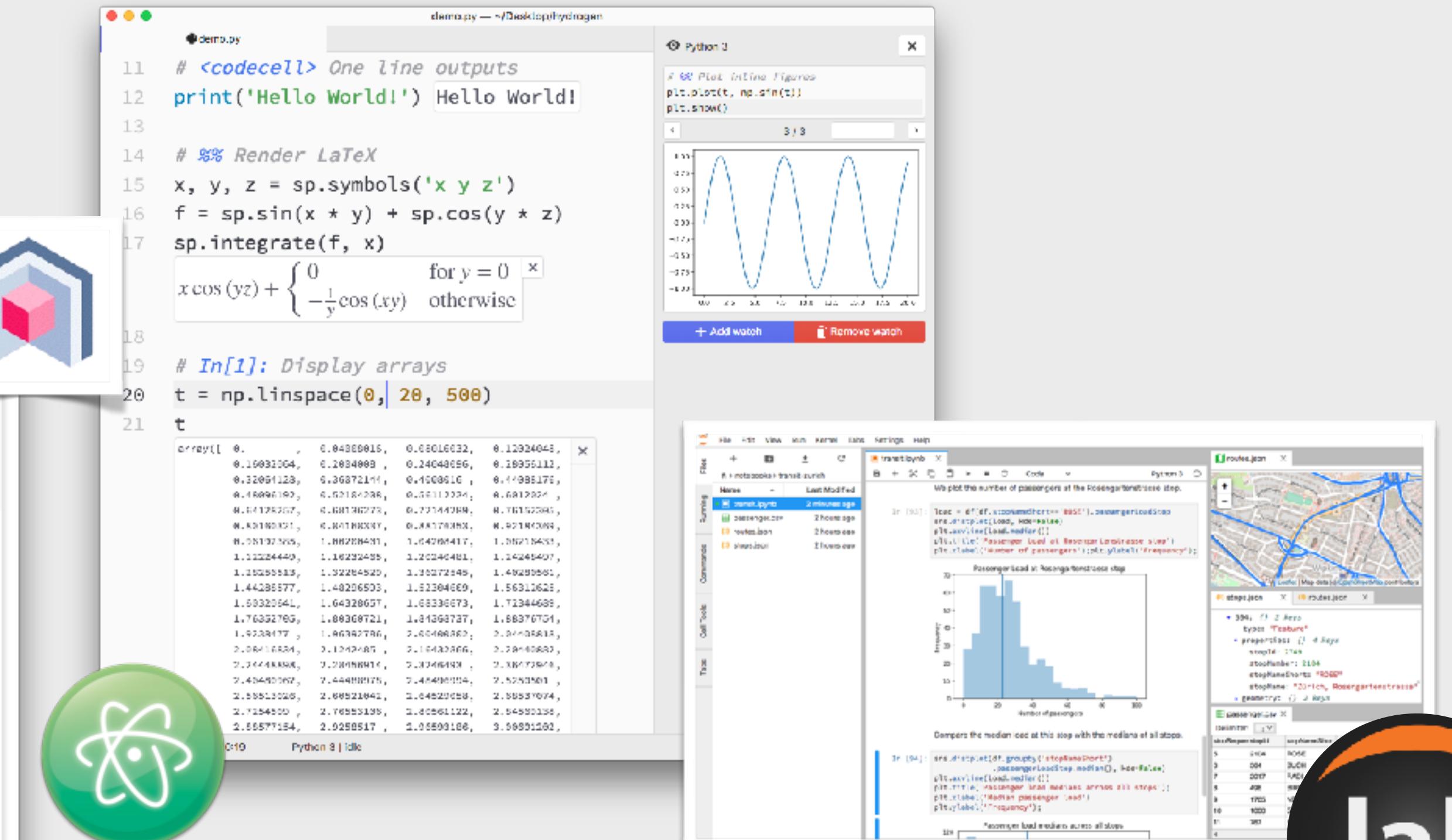
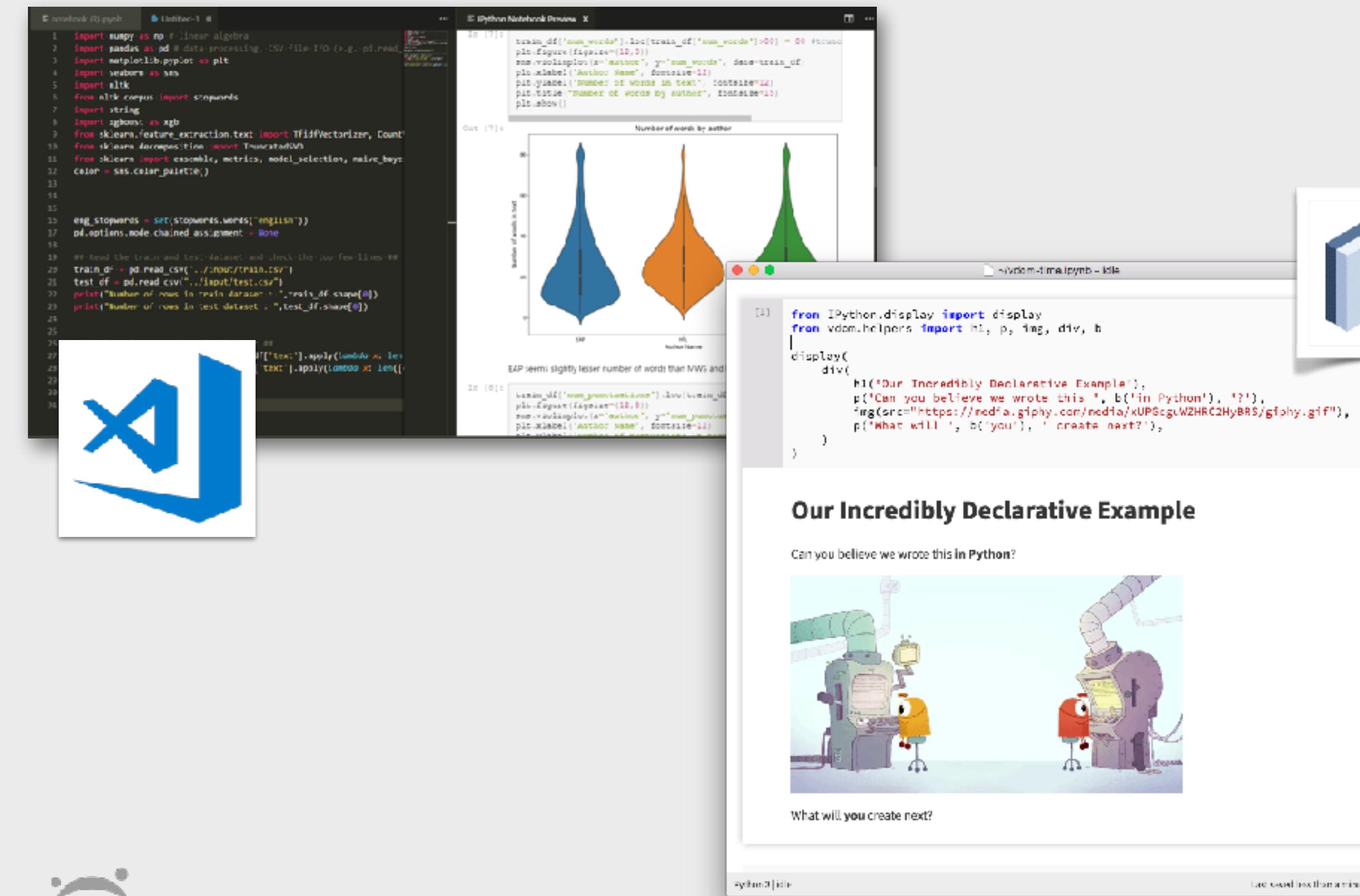
    xeus::xjson mime_bundle_repr(const image* im) const
    {
        auto bundle = xeus::xjson::object();
        bundle["image/png"] = xtl::base64_encode(im->m_buffer.str());
        return bundle;
    }
}

In [2]: im::image marie("images/marie.png");
marie
```

Out[2]:

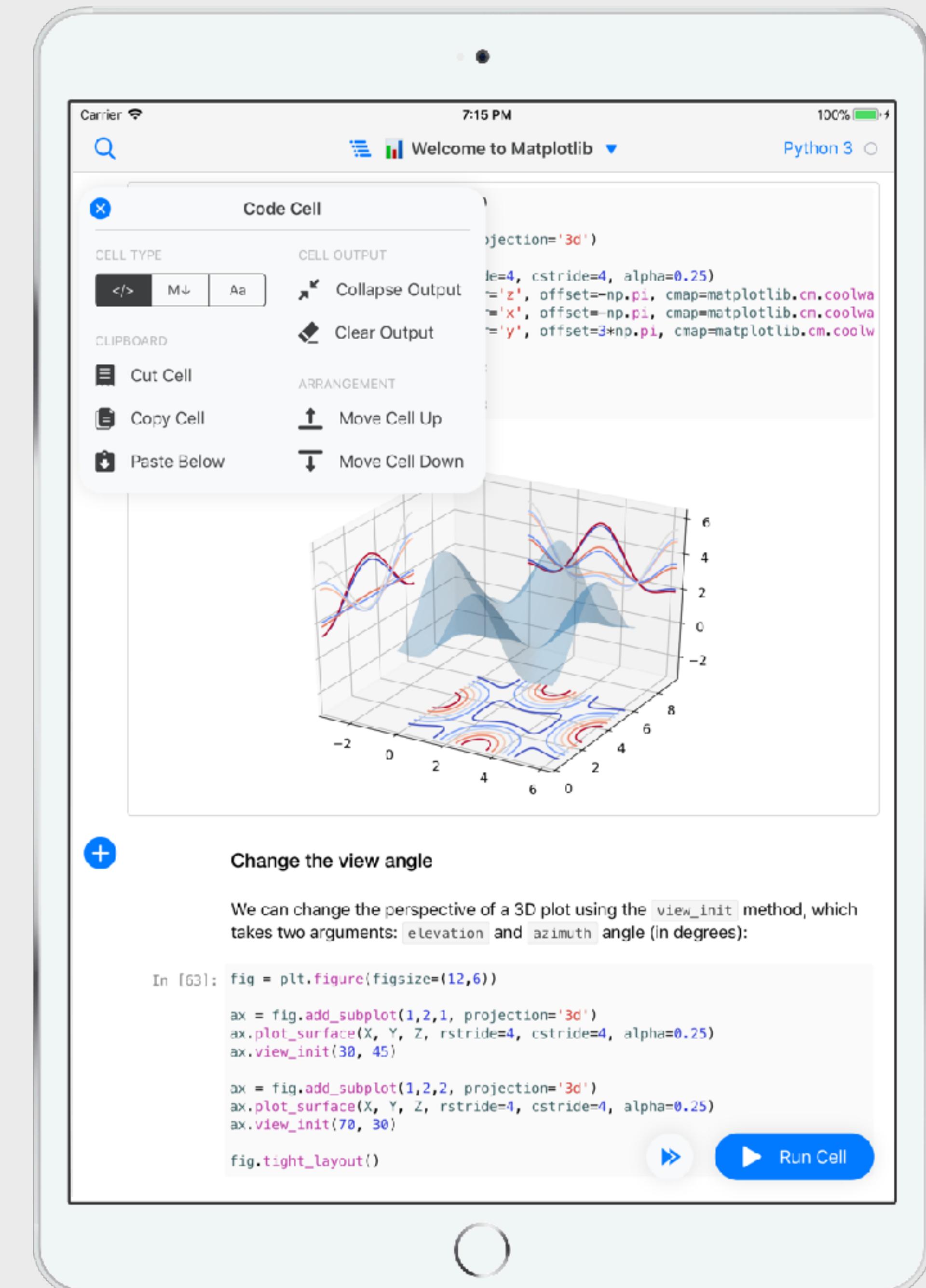
# Tools Integrations

**Frontends:** Notebook, JupyterLab, CLI, Vim, Emacs,  
Visual Studio Code, Atom, Nteract, Juno...





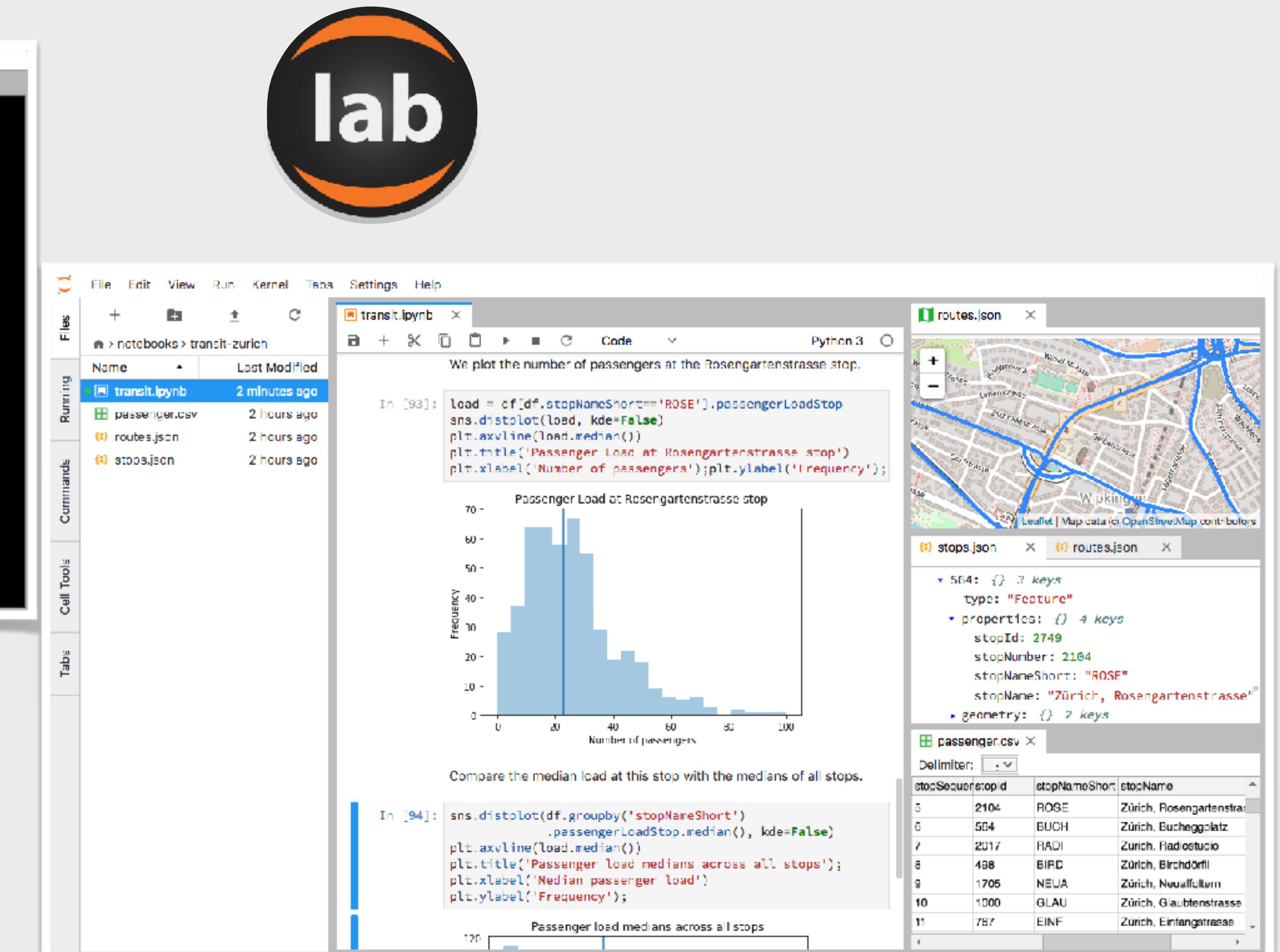
# Juno



<https://juno.sh>

# JupyterLab

A screenshot of the JupyterLab interface. On the left is a file browser showing a list of files and notebooks. In the center is a terminal window titled "Terminal 1" running "bash-3.2\$". On the right is a code editor window titled "color\_scatterplot.ipynb" containing Python code for generating a scatter plot. A preview of the scatter plot is shown in the editor.

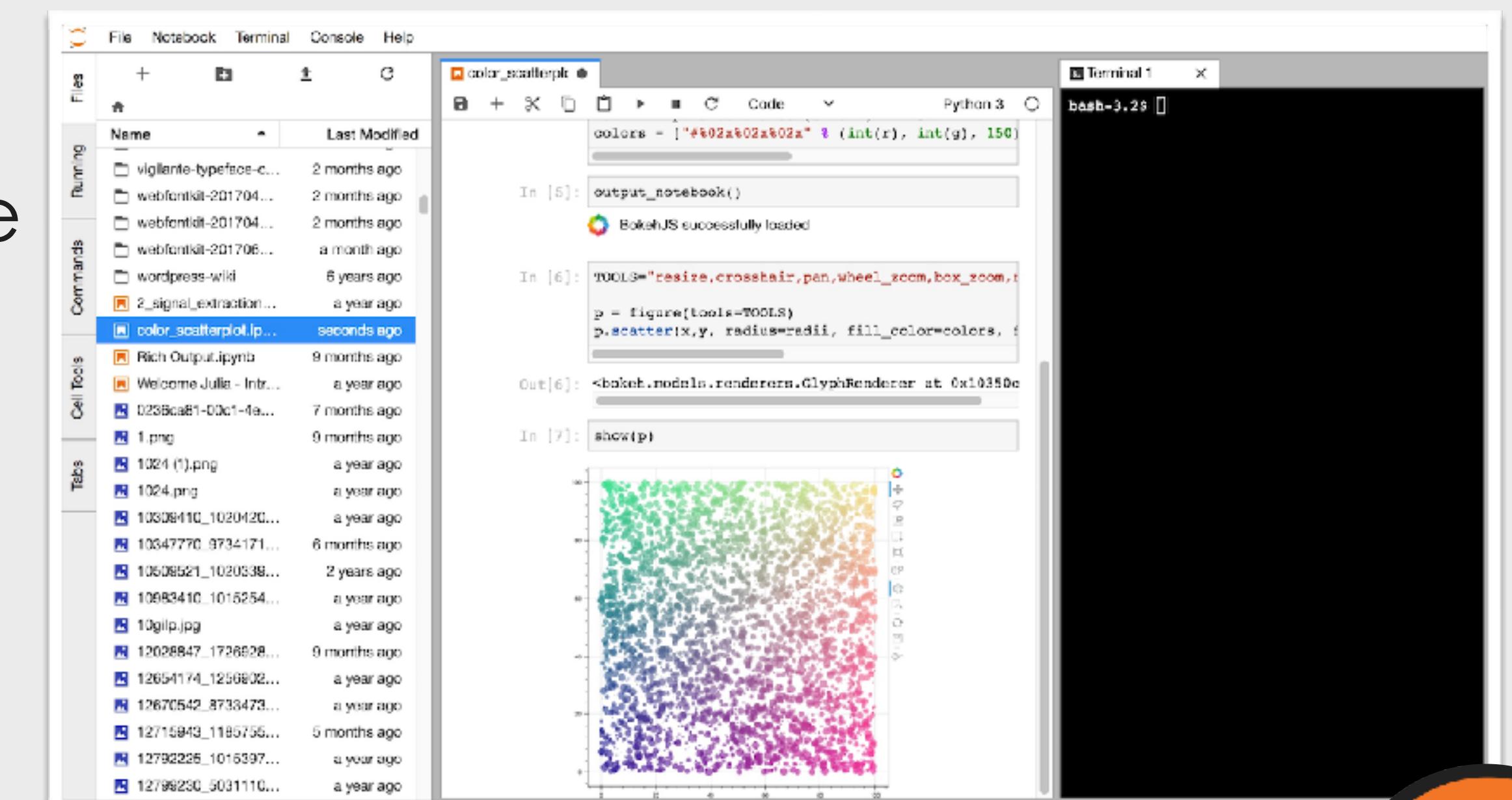
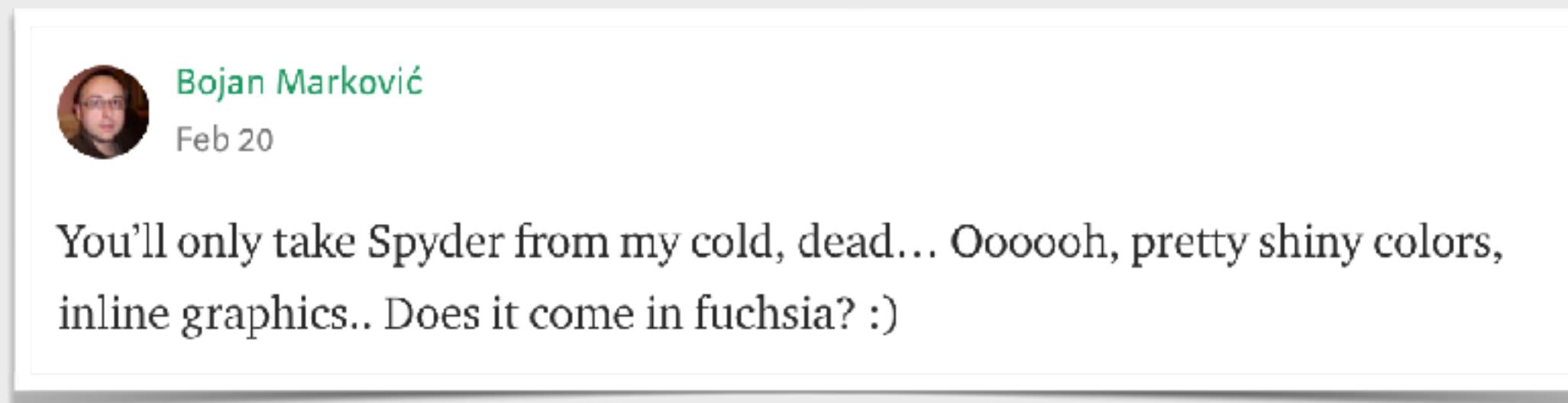


# JupyterLab

- Install Side by Side with Classic Notebook

- No Change in File Format, or protocol

- Better Architecture (all extensions are first class)

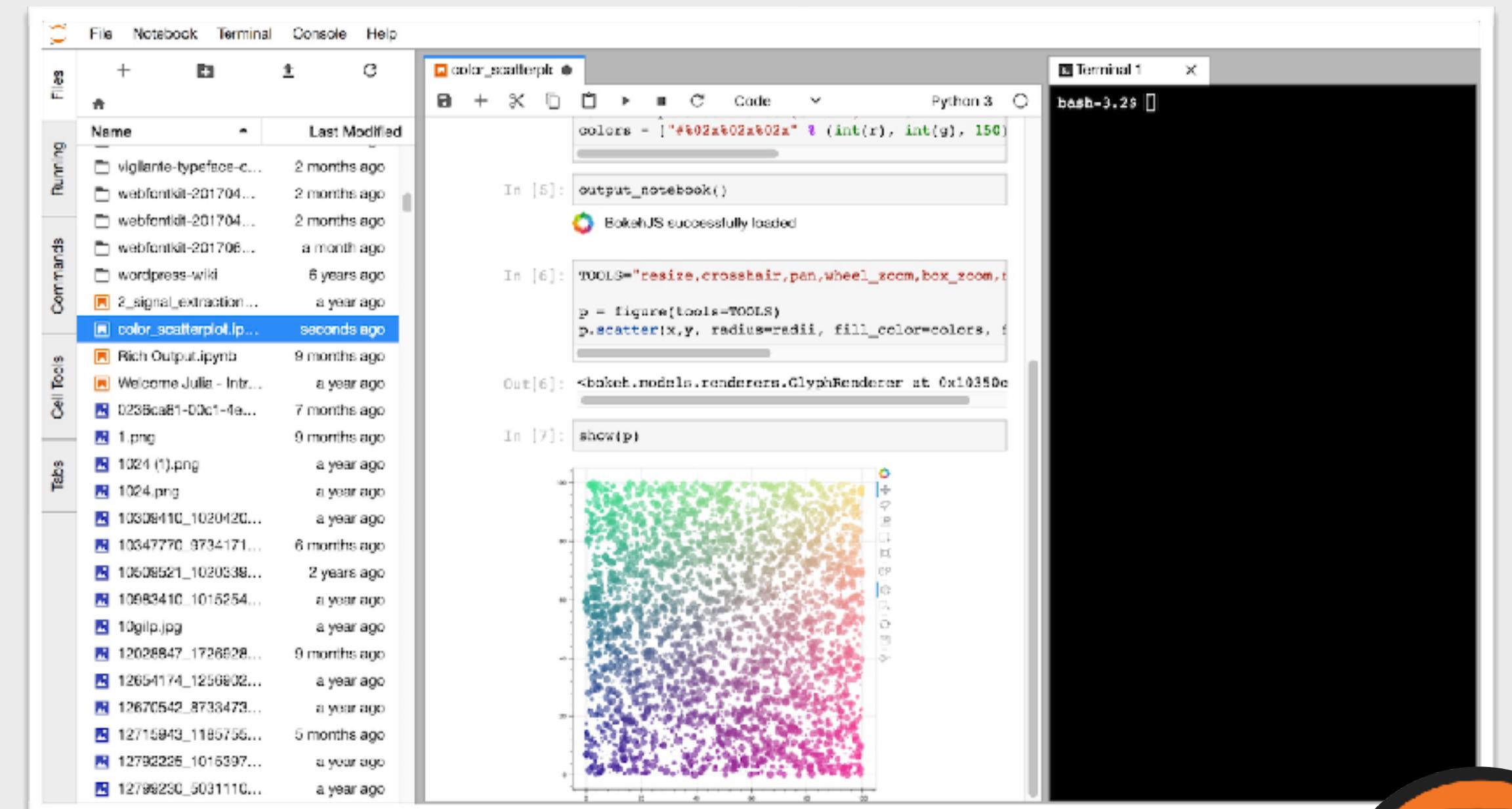


- Classic Notebook will be deprecated at some point



# JupyterLab

- Ready for users
- Ready for Classic Extensions to be ported
- Will have all the new features





# JupyterHub

- Key Infrastructure for Multi-tenant system
- Not limited to Notebook



...

- Key Piece in reproducible research



- Integration into existing environment



# Things to Come



# Real Time Collaboration



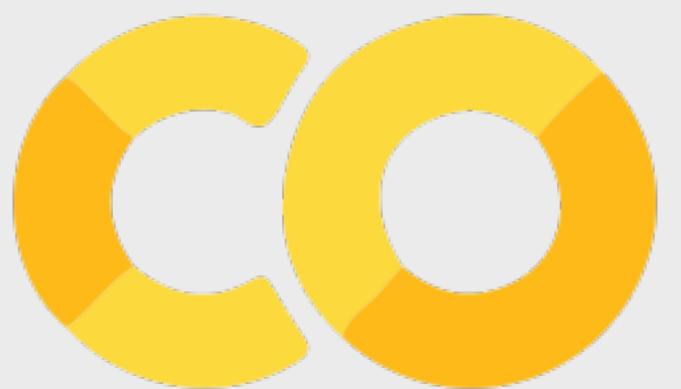
The Good:

It works\* !

The Bad

Google Drive RT API is deprecated

## Services implementing Real-Time



Google Colaboratory



# Road to 1.0



- Scaling horizontally and Vertically
  - 100k+ Users
- Sharing/Integration with RT collaboration
- Binder and Federation
- Auditability (Hippa, GDPR...)



O'REILLY®

# jupytercon

Brought to you by NumFOCUS Foundation and O'Reilly Media Inc.

August 21-24, 2018

New York, NY

[jupytercon.com](http://jupytercon.com)



You



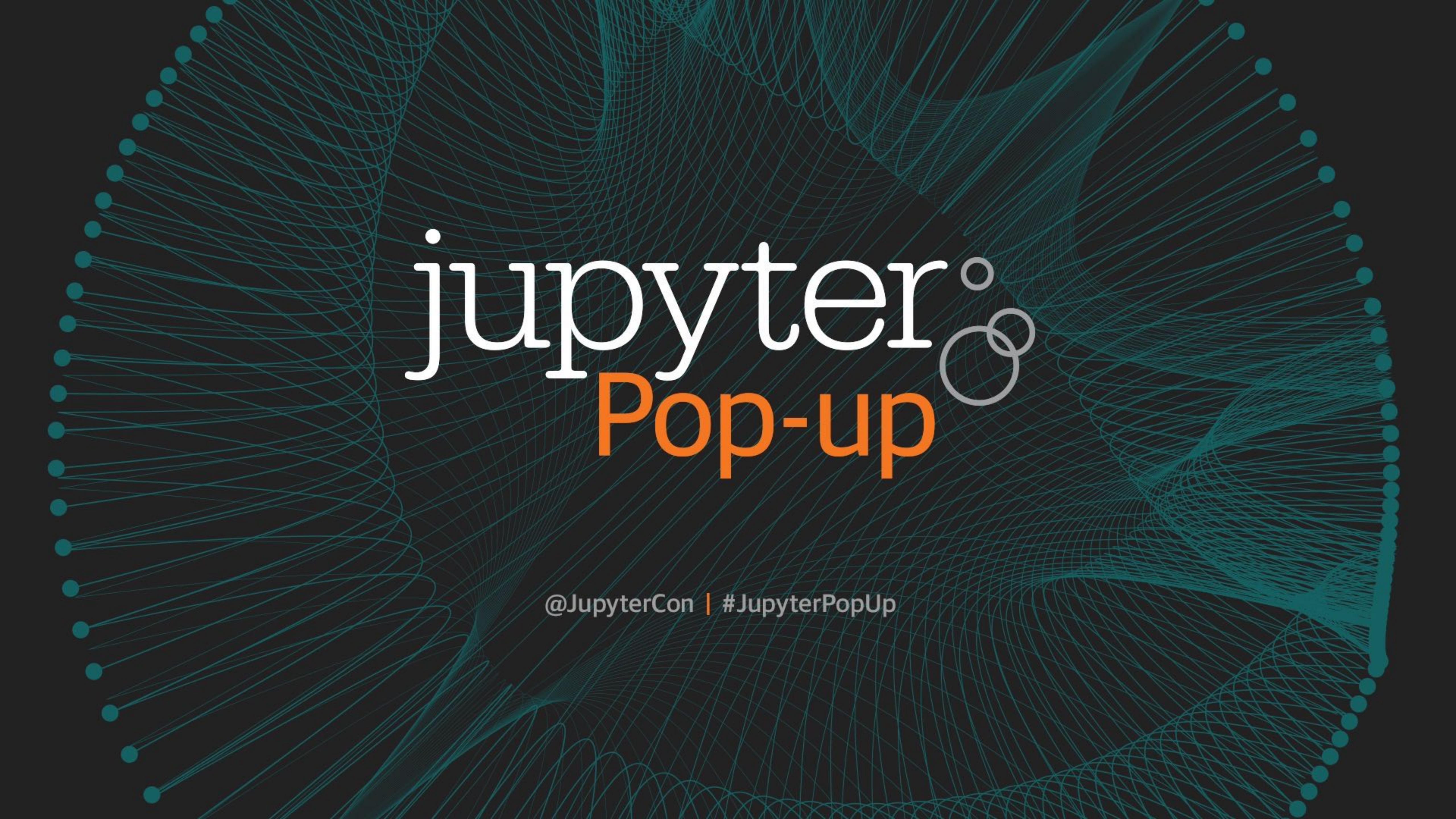
**Give Feedback**

**Participate**

**Showcase**

Thanks !





# jupyter<sup>°</sup> Pop-up

@JupyterCon | #JupyterPopUp