jupyterhub

A "THING EXPLAINER" OVERVIEW

PyData Carolinas
September 16, 2016

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http://bit.ly/jupyterhub-pdc

BIG WORDS THAT TELL YOU WHAT THIS BOOK IS

THING EXPLAINER

COMPLICATED STUFF IN SIMPLE WORDS

LINES WE DRAW TO HELP US REMEMBER STARS

CLOUD OF STARS WE LIVE IN

THE SUN MOVES ALONG THIS PATH

GROUP OF STARS NAMED AFTER A PRETEND HORSE

FIRE COMES OUT HERE

SEA FLOOR

LAND FLOOR

SEA

COOL ROCK

HOT ROCK

LAND GOING AWAY

MY NAME

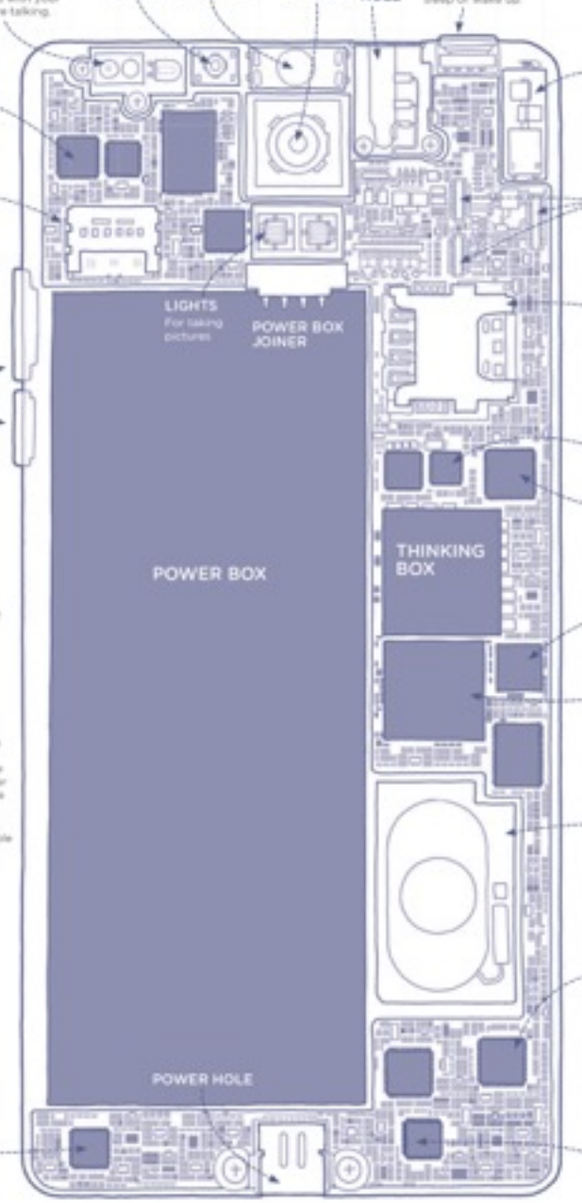
RANDALL MUNROE

author of of xkcd

HAND COMPUTER

These machines began as radios for talking out loud to people who were far away. Over the years, they slowly became more and more like computers.

As these machines turned into computers, they started taking the place of a lot of things we used to carry around—like picture takers, music players, and even books.



UNDERSTANDING JUPYTERHUB

IN 1,000 (AND MAYBE A FEW MORE) COMMON WORDS

https://xkcd.com/simplewriter/

“

THE NOBLEST PLEASURE IS THE JOY OF UNDERSTANDING.

— Leonardo da Vinci

”

UNDERSTANDING JUPYTERHUB

LEONARDO MEETS THING EXPLAINER

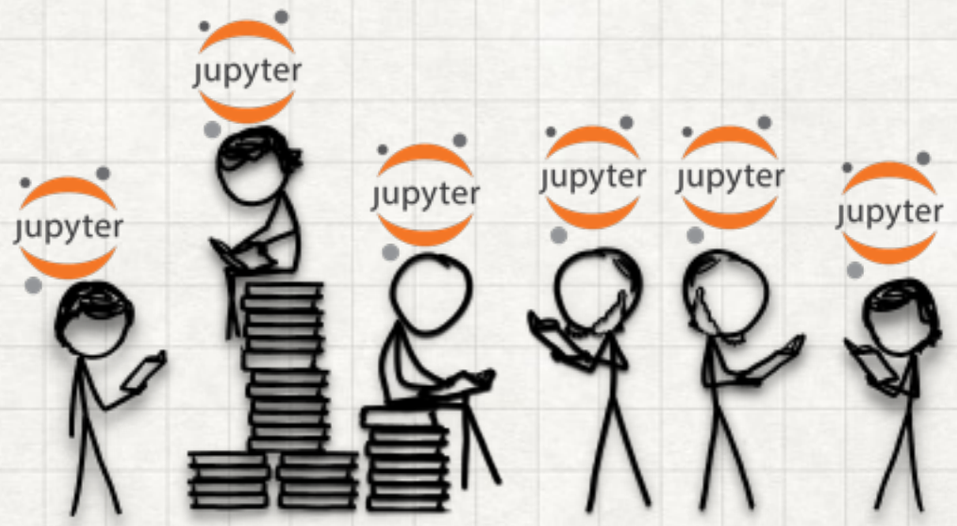
- WHAT THIS TALK IS A user friendly JupyterHub introduction
- WHAT IT IS NOT A deep dive architecture talk or a “hands on” workshop..though I will give you resources to these things along the way
- WHO Scientists, researchers, engineers, managers, teachers, you
- WHY Understanding the major parts that make up JupyterHub to help with planning, trial, and deployment

jupyterhub

BASICS

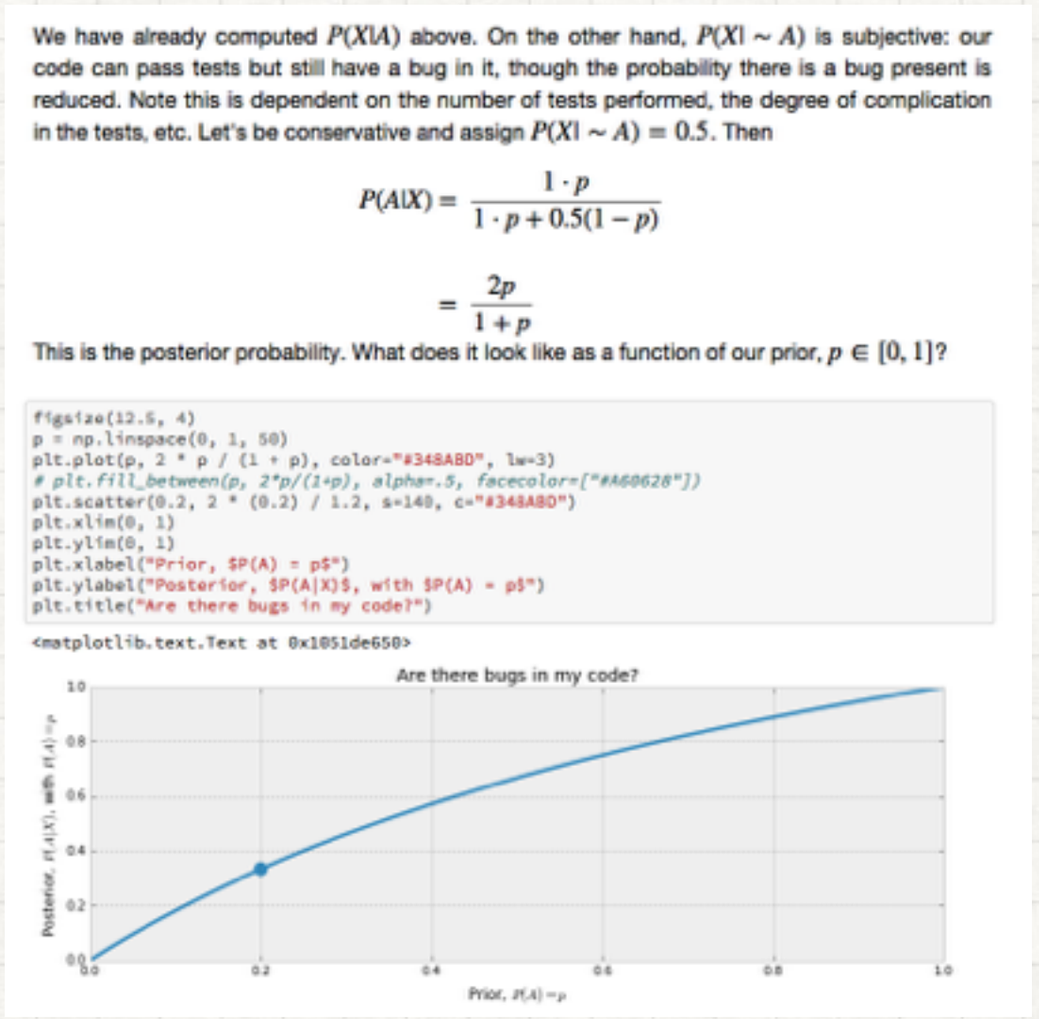
jupyterhub

A WAY TO GIVE A JUPYTER NOTEBOOK SERVER TO EACH PERSON IN A GROUP OF PEOPLE.



WHAT IS A NOTEBOOK?

- Document
- Environment
- **Web app**



We have already computed $P(X|A)$ above. On the other hand, $P(X| \sim A)$ is subjective: our code can pass tests but still have a bug in it, though the probability there is a bug present is reduced. Note this is dependent on the number of tests performed, the degree of complication in the tests, etc. Let's be conservative and assign $P(X| \sim A) = 0.5$. Then

$$P(A|X) = \frac{1 \cdot p}{1 \cdot p + 0.5(1-p)}$$

$$= \frac{2p}{1+p}$$

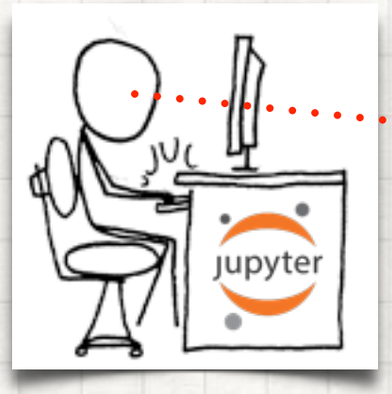
This is the posterior probability. What does it look like as a function of our prior, $p \in [0, 1]$?

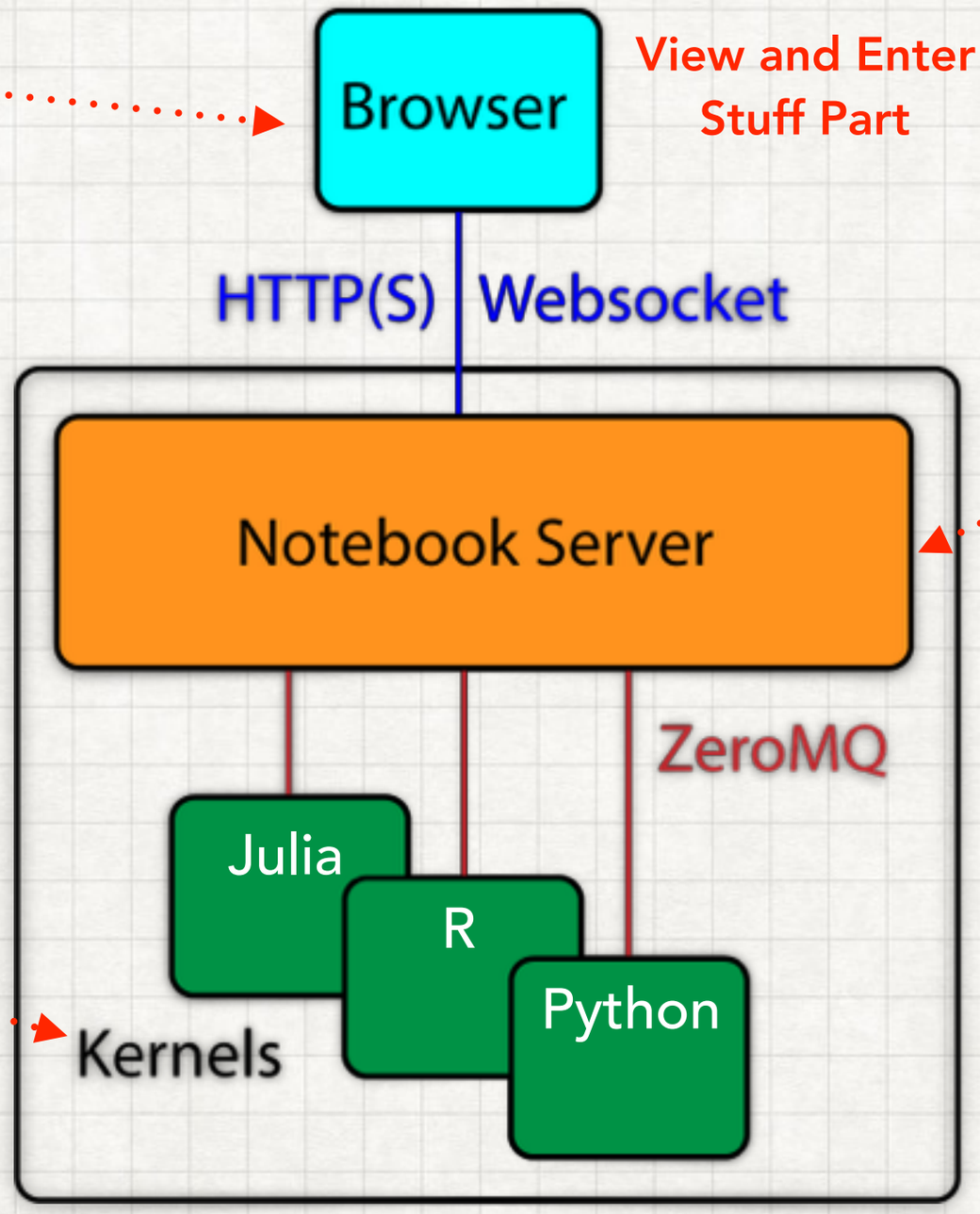
```
figsize(12.5, 4)
p = np.linspace(0, 1, 50)
plt.plot(p, 2 * p / (1 + p), color="#348ABD", lw=3)
# plt.fill_between(p, 2*p/(1+p), alpha=.5, facecolor=["#A60628"])
plt.scatter(0.2, 2 * (0.2) / 1.2, s=140, c="#348ABD")
plt.xlim(0, 1)
plt.ylim(0, 1)
plt.xlabel("Prior, $P(A) = p$")
plt.ylabel("Posterior, $P(A|X)$, with $P(A) = p$")
plt.title("Are there bugs in my code?")
```

```
<matplotlib.text.Text at 0x1051de650>
```


https://github.com/CamDavidsonPilon/Probabilistic-Programming-and-Bayesian-Methods-for-Hackers

JUPYTER NOTEBOOK



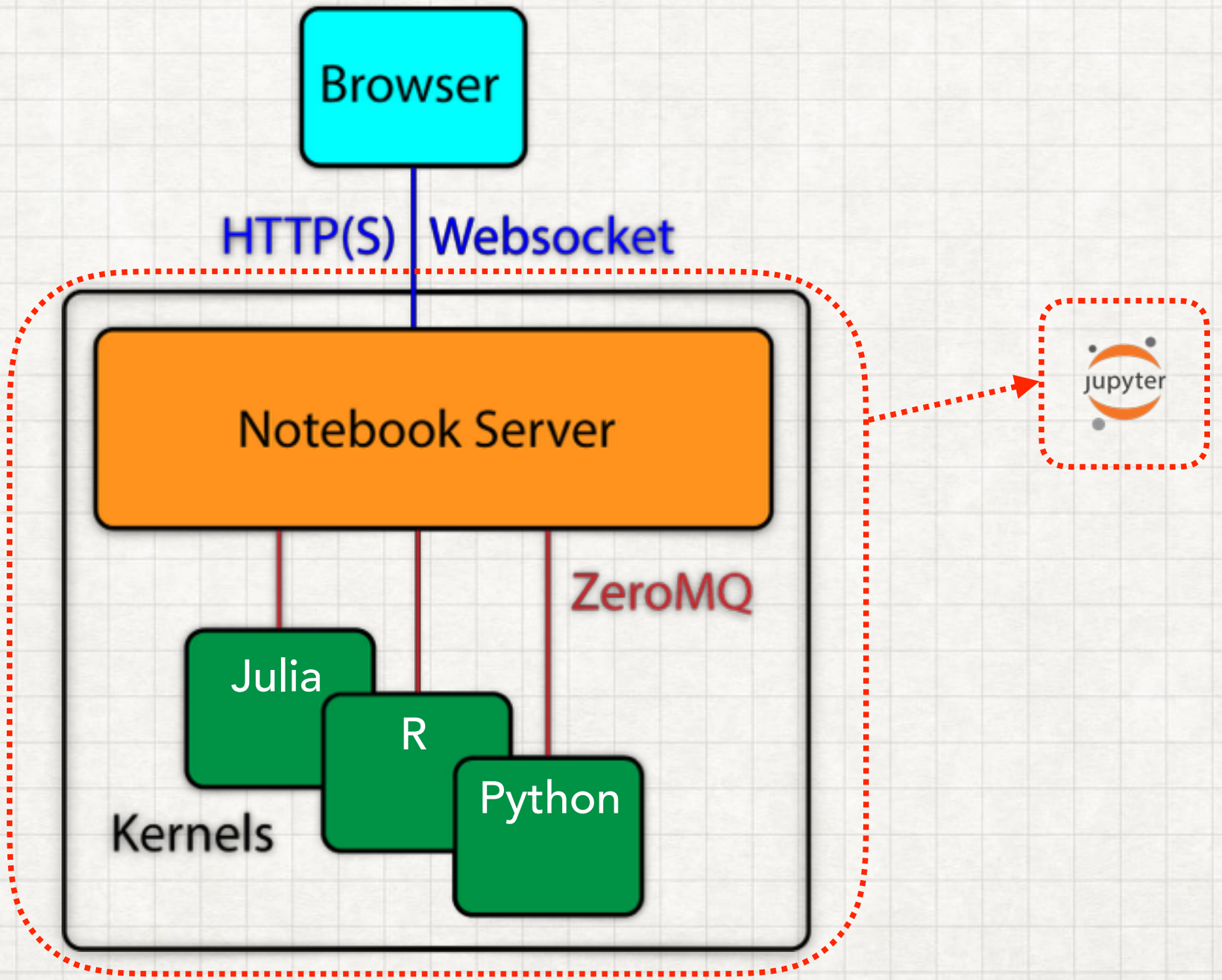


View and Enter Stuff Part

Important Stuff Organizer and Doing Thing

Language Expert Thing

A SINGLE USER JUPYTER NOTEBOOK SERVER



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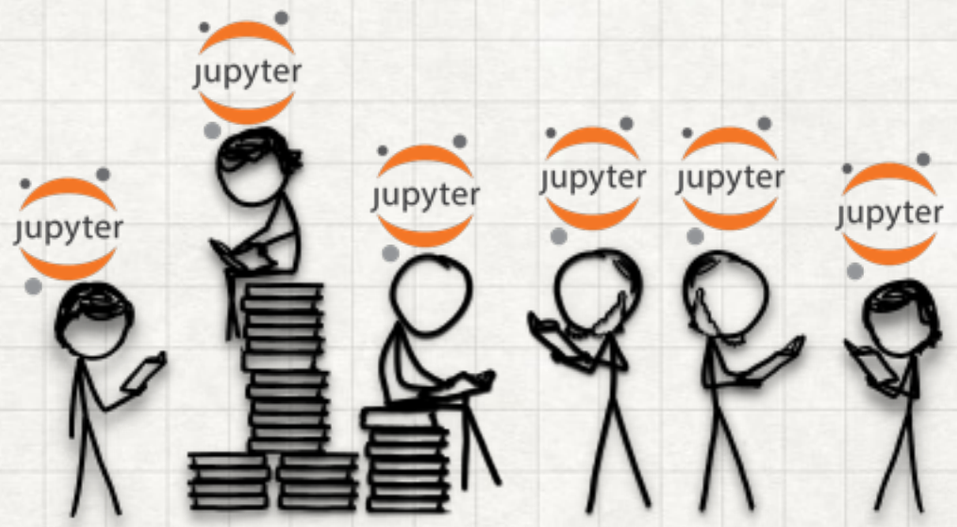
A THING TO GIVE A JUPYTER NOTEBOOK SERVER TO EACH PERSON IN A GROUP OF PEOPLE.



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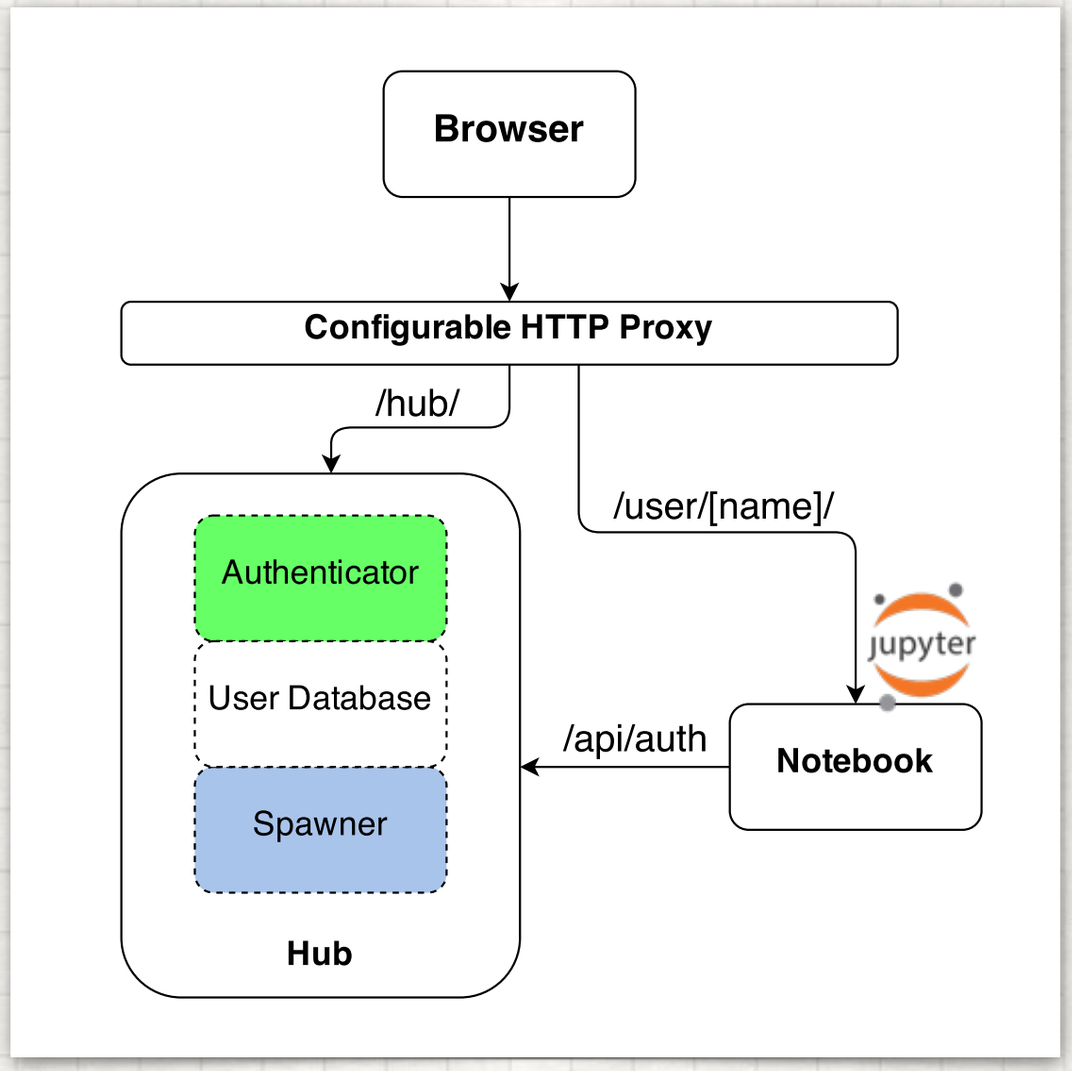
HOW IT WORKS

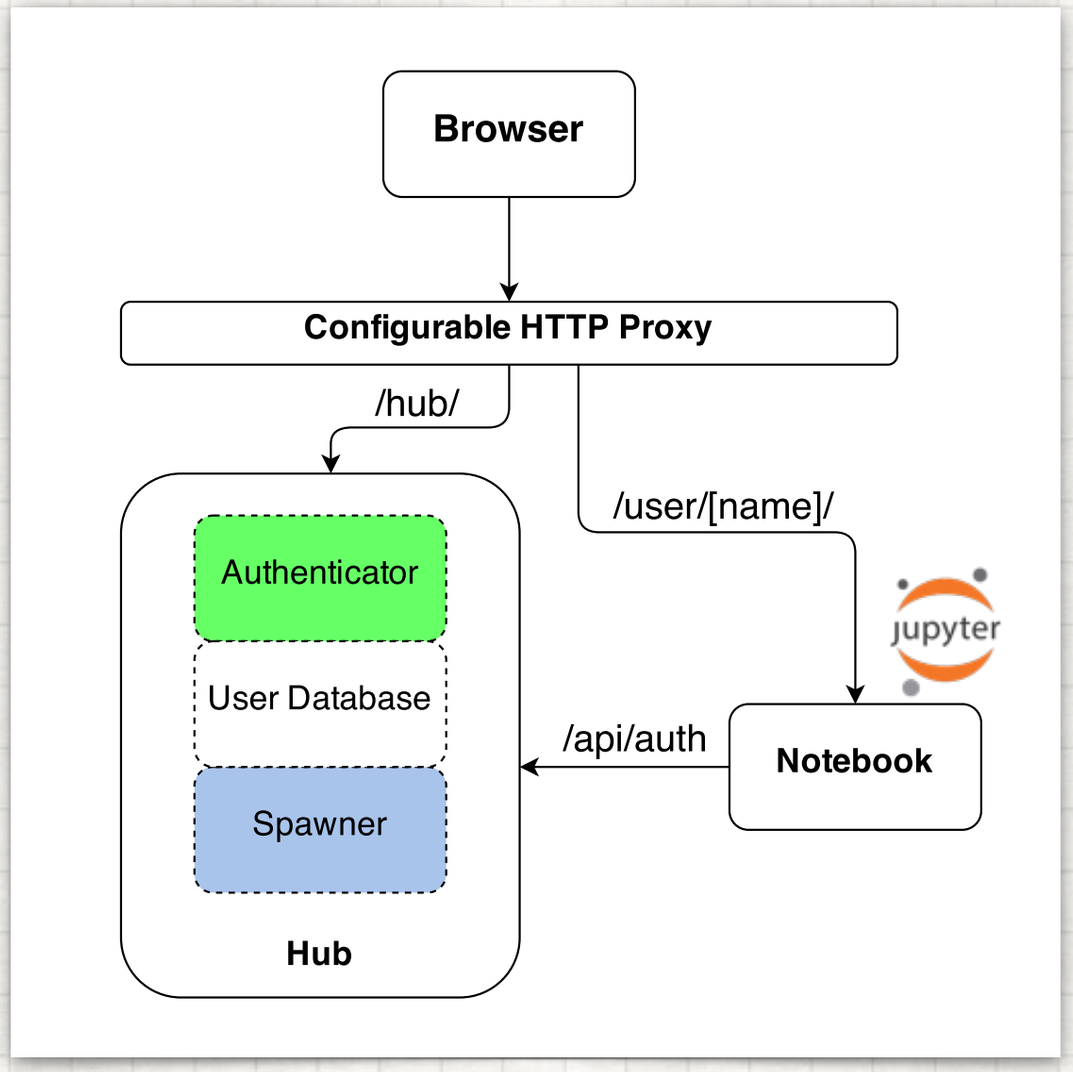
WHAT DOES THE HUB DO?

- Manages authentication
- Spawns single-user notebook servers on-demand
- Gives each user a complete notebook server



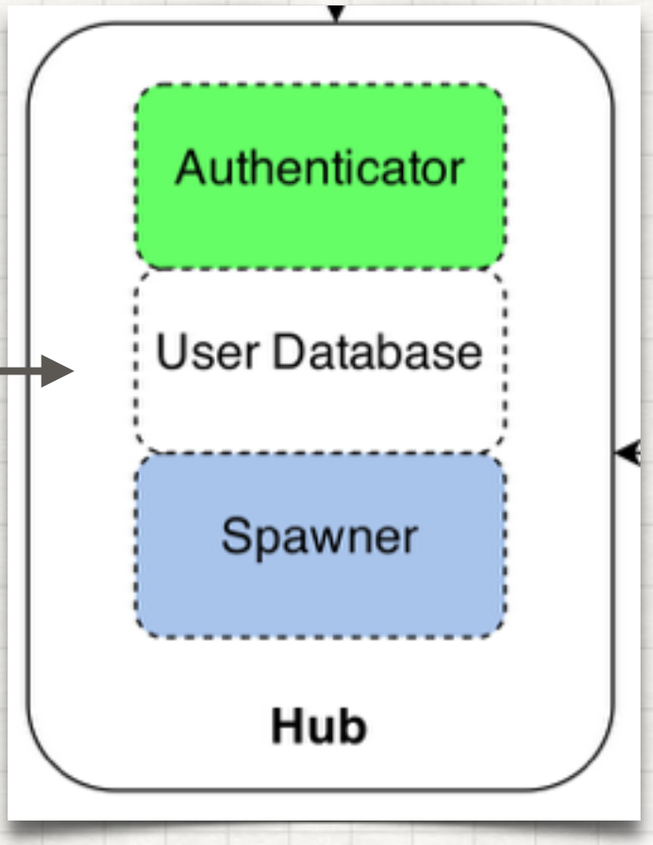
THE PARTS OF JUPYTERHUB

- Hub (User Database, Authenticator, Spawner)
- Users and their individual notebook servers
- Configurable HTTP Proxy



WHAT THE HUB CONTAINS

USER DATABASE



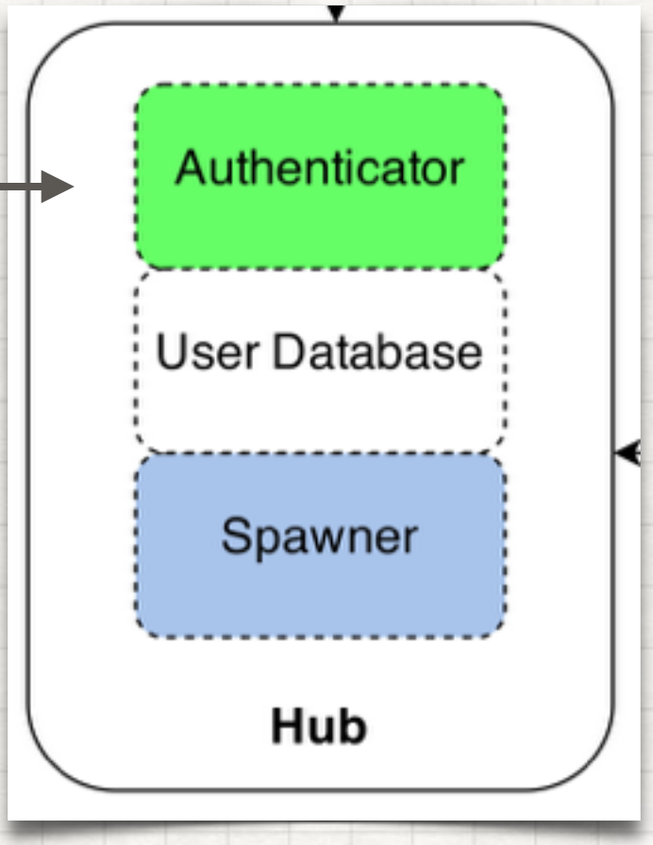
A PLACE TO KEEP
INFORMATION ABOUT PEOPLE
USING JUPYTERHUB

WHAT THE HUB CONTAINS

AUTHENTICATOR

A THING THAT CHECKS:

- IF A PERSON IS WHO THEY CLAIM TO BE
- IF THEY CAN USE THEIR JUPYTERHUB NOTEBOOK SERVER



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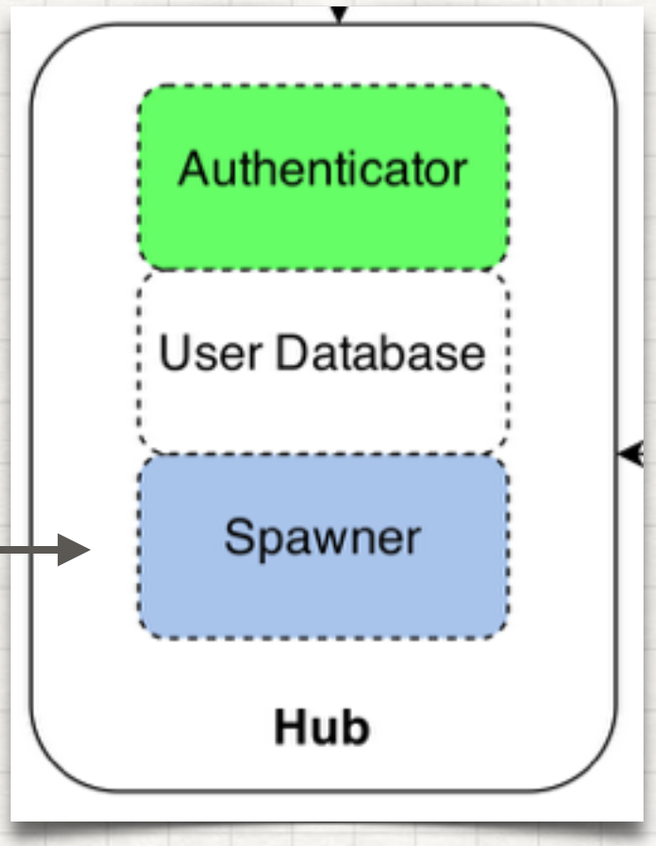
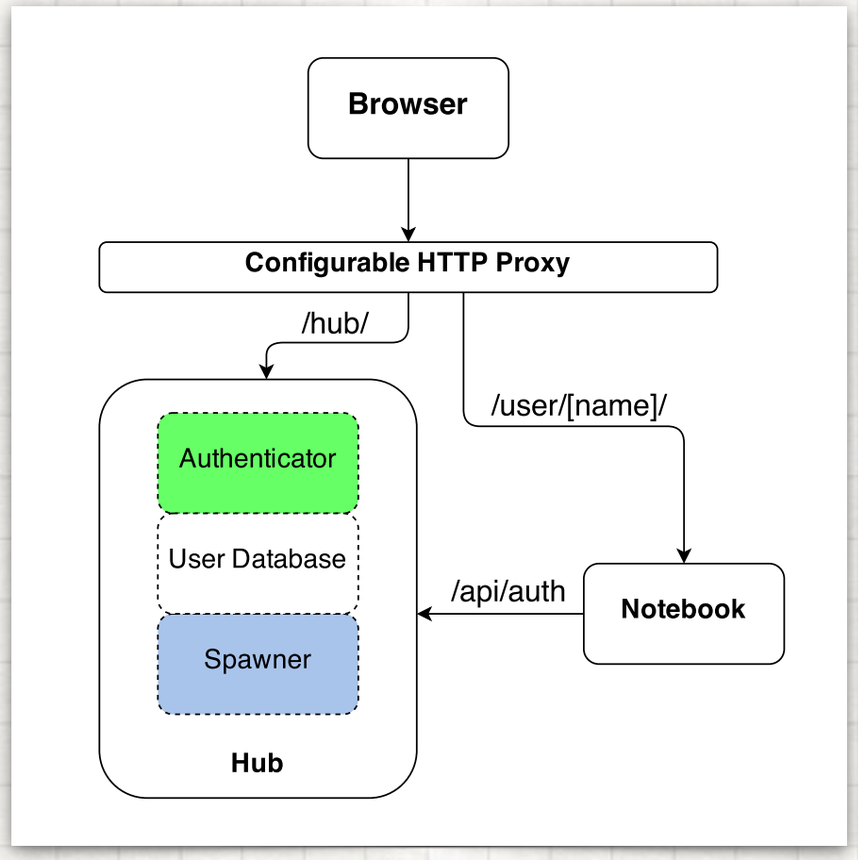
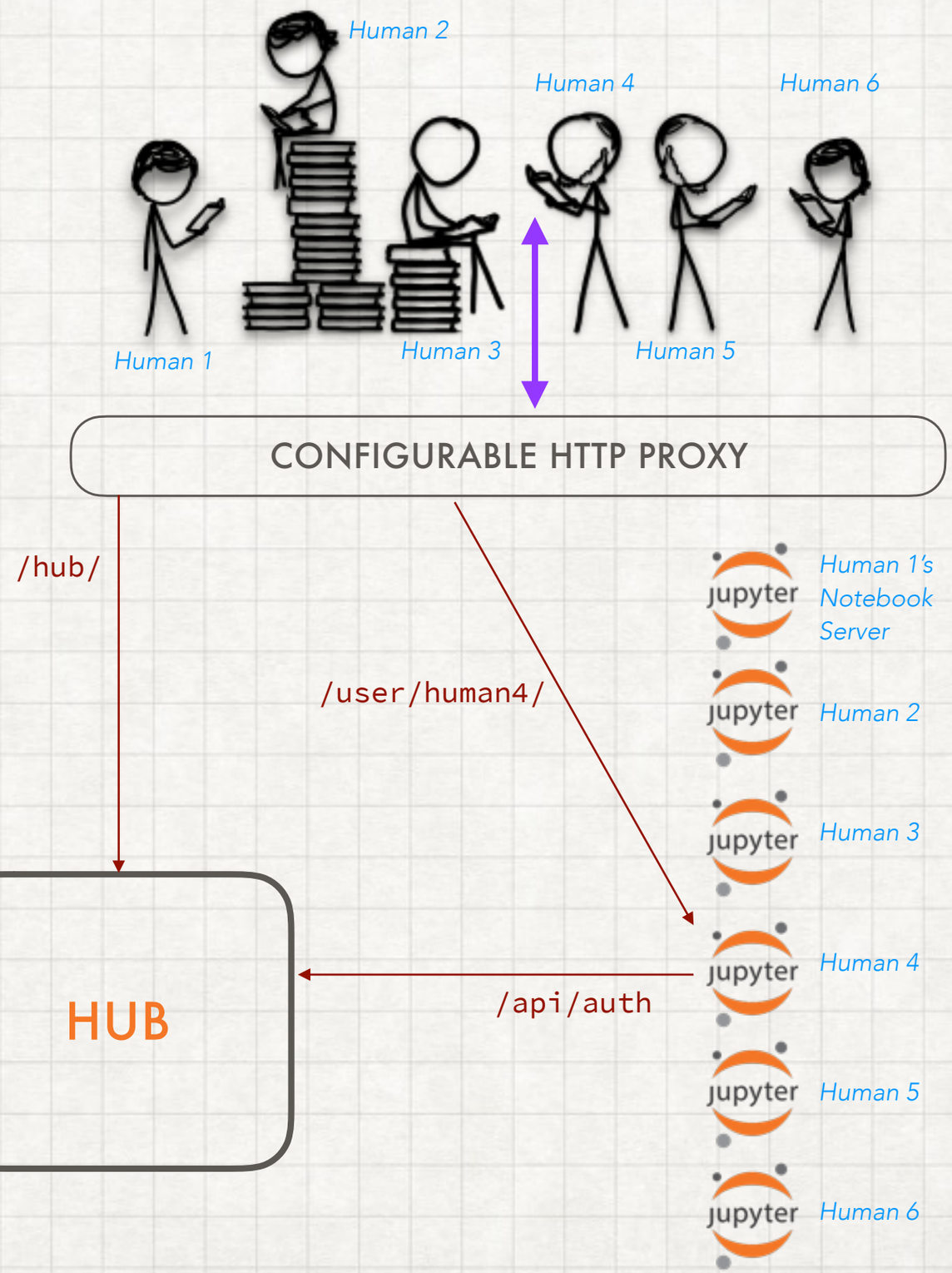


SPAWNER

A WORKER BEE THAT MAKES JUPYTER NOTEBOOK SERVERS FOR PEOPLE

UNDERSTANDING





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WHEN SHOULD I USE IT?

When to use JupyterHub

- A class where students can do homework (nbgrader)
- A short-lived workshop, especially if installation is hard
- A research group with a shared workstation or small cluster
- On-site computing resources for researchers and analysts at an institution

When ***not*** to use JupyterHub

Remember: JupyterHub is Authenticated and Persistent.

- tmpnb: anonymous, ephemeral notebooks

- binder: tmpnb + GitHub repos

- SageMathCloud is *hosted* and provides realtime-collaboration

jupyterhub

RESOURCES AND HELP

Reference Deployments

https://github.com/jupyterhub/jupyterhub-deploy-docker

docker-compose, DockerSpawner, Hub in Docker

https://github.com/jupyterhub/jupyterhub-deploy-teaching

ansible, no docker, nbgrader

Tutorial and Workshop

JupyterHub tutorial
based on PyData London talk by Min Ragan-Kelley
https://github.com/jupyterhub/jupyterhub-tutorial

JupyterHub mini-workshop
July 2016
https://github.com/jupyterhub/jupyterhub-2016-workshop

Help

JupyterHub Documentation
http://jupyterhub.readthedocs.io/en/latest/index.html

All repos in jupyterhub organization
on GitHub
https://github.com/jupyterhub

jupyterhub

THANKS!

http://bit.ly/jupyterhub-pdc

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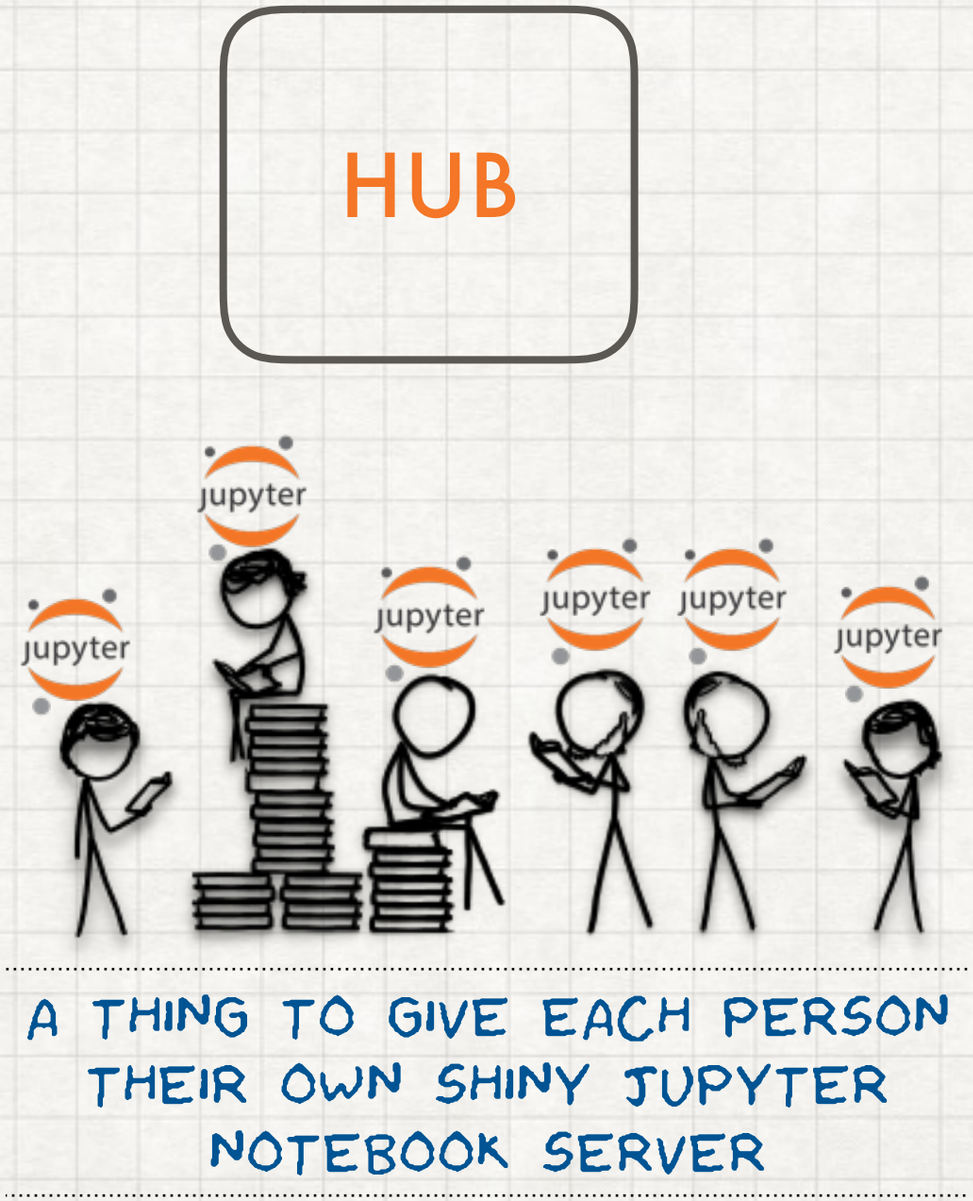

Attribution

- xkcd https://xkcd.com/license.html
- Leonardo da Vinci. BrainyQuote.com, Xplore Inc, 2016. http://www.brainyquote.com/quotes/quotes/l/leonardoda154285.html, accessed August 12, 2016.
- https://xkcd.com/simplewriter/
- https://xkcd.com/386/
- PyData London Talk by Min Ragan-Kelley, Thomas Kluyver, and Kyle Kelly

JUPYTERLAB

PREVIEW

- Repo: https://github.com/jupyter/jupyterlab
- Preview GIF
  `https://raw.githubusercontent.com/jupyter/jupyterlab/master/jupyter-plugins-demo.gif`
- Prerequisite: Jupyter notebook 4.2+
- Install (conda):
  ```
  conda install -c conda-forge jupyterlab
  ```
- Install (pip):
  ```
  pip install jupyterlab
  jupyter serverextension enable --py jupyterlab --sys-prefix
  ```
- Run:
  ```
  jupyter lab
  ```