



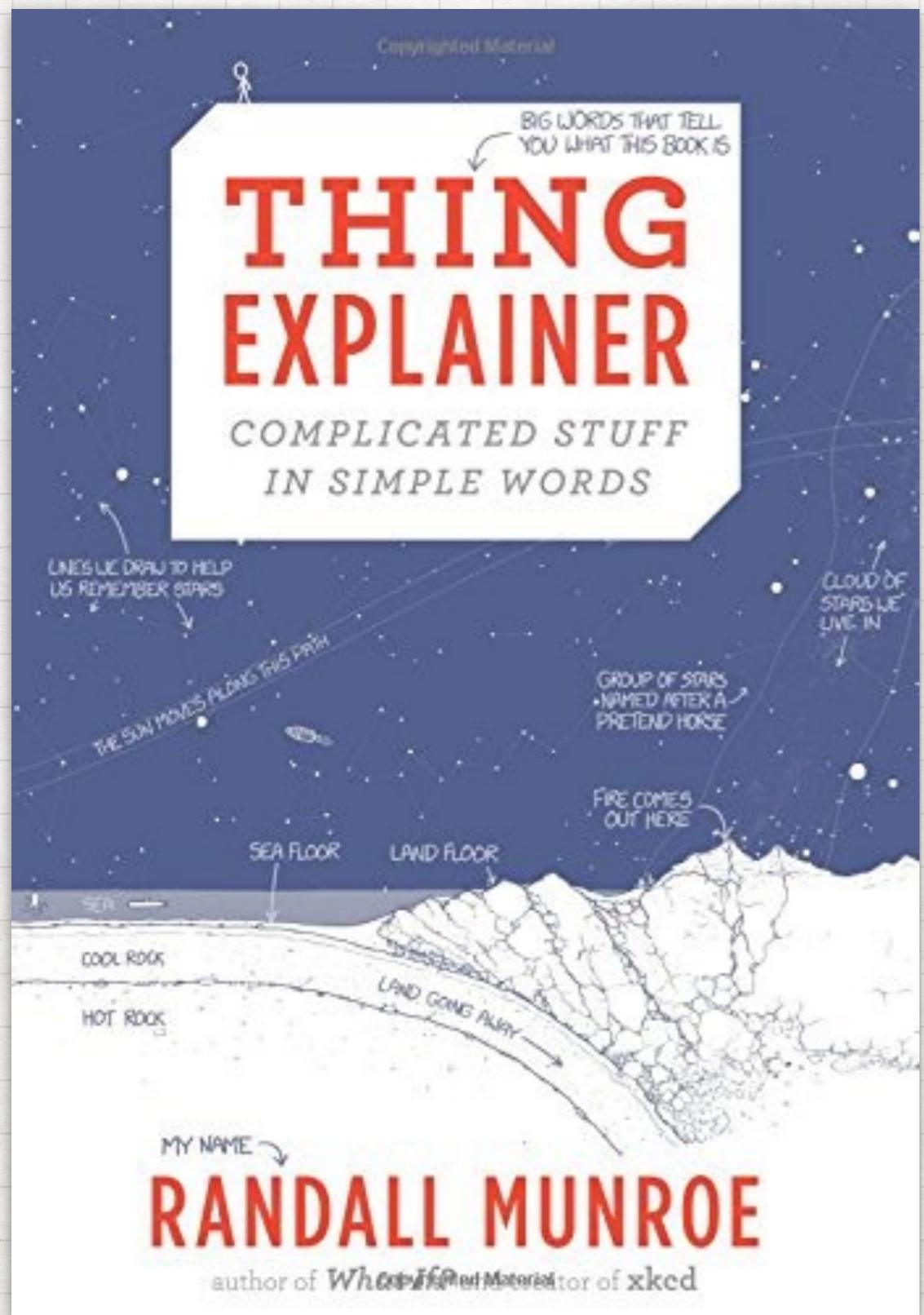
jupyterhub

A "THING EXPLAINER" OVERVIEW

JupyterDay Atlanta
August 13, 2016

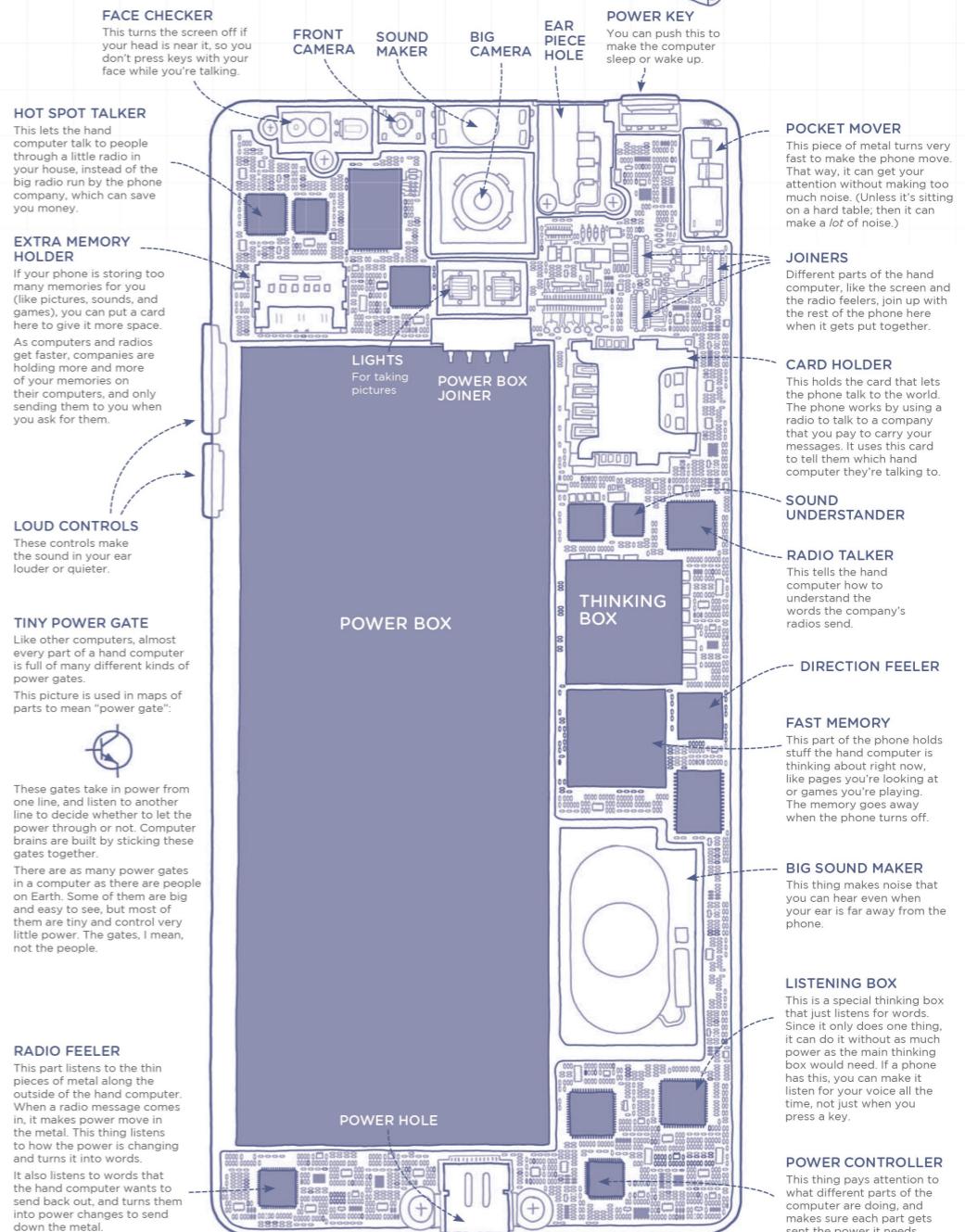
Carol Willing
Project Jupyter at Cal Poly SLO

Twitter: @willingcarol
GitHub: @willingc
<http://bit.ly/jhubatl>



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.



UNDERSTANDING JUPYTERHUB

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



SIMPLE WRITER

WRITE LIKE UP GOER FIVE AND THING EXPLAINER

PUT WORDS HERE

<https://xkcd.com/simplewriter/>

“
THE NOBLEST PLEASURE IS
THE JOY OF
UNDERSTANDING.

— Leonardo da Vinci

”

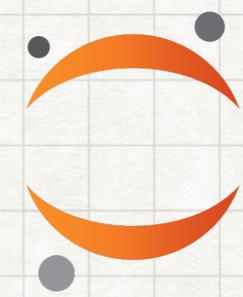
UNDERSTANDING JUPYTERHUB

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



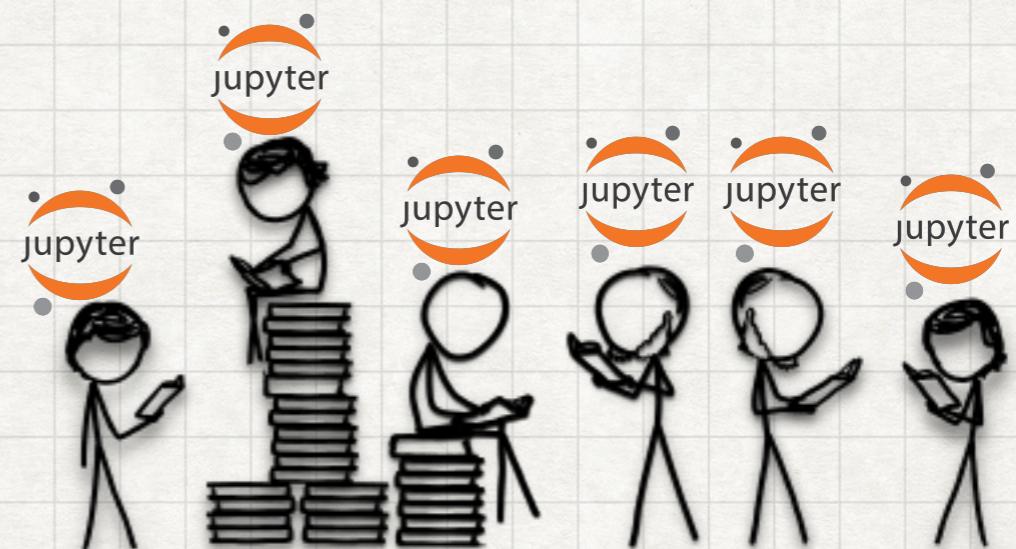
BASICS



jupyterhub

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

HUB



WHAT IS A NOTEBOOK?

- Document
- Environment
- Web app

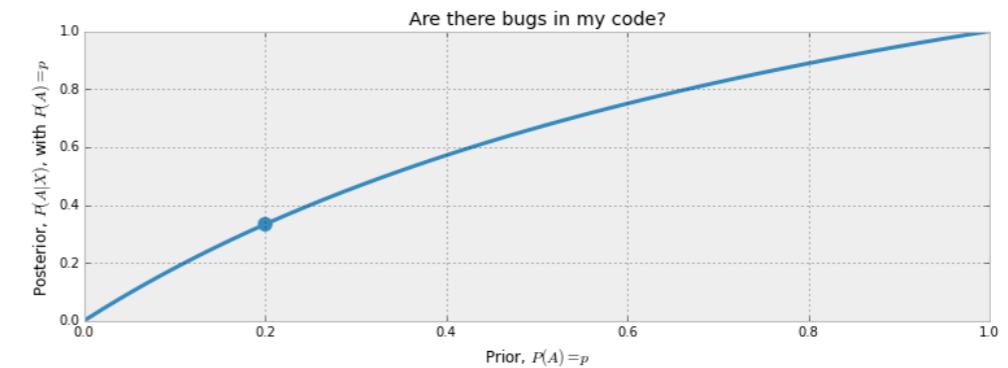
We have already computed $P(X|A)$ above. On the other hand, $P(X \sim A)$ is subjective: our code can pass tests but still have a bug in it, though the probability there is a bug present is reduced. Note this is dependent on the number of tests performed, the degree of complication in the tests, etc. 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, $p \in [0, 1]$?

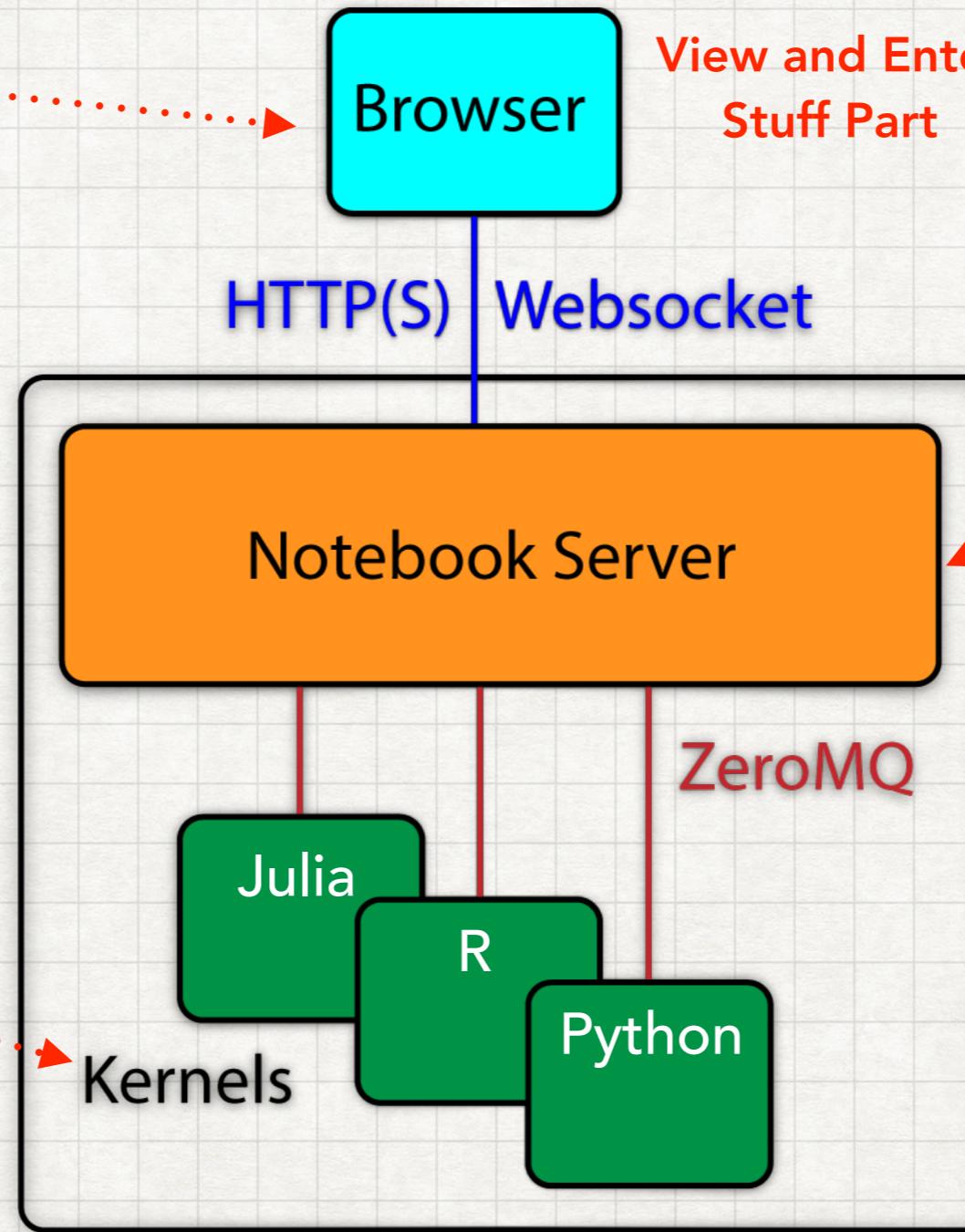
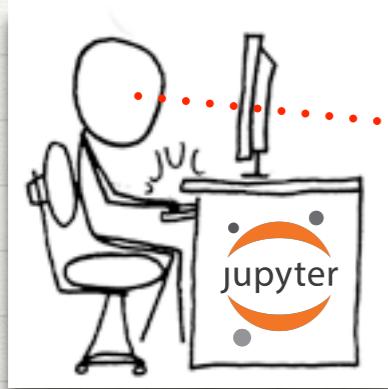
```
figsize(12.5, 4)
p = np.linspace(0, 1, 50)
plt.plot(p, 2 * p / (1 + p), color="#348ABD", lw=3)
# plt.fill_between(p, 2*p/(1+p), alpha=.5, facecolor=["#A60628"])
plt.scatter(0.2, 2 * (0.2) / 1.2, s=140, c="#348ABD")
plt.xlim(0, 1)
plt.ylim(0, 1)
plt.xlabel("Prior, $P(A) = p$")
plt.ylabel("Posterior,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

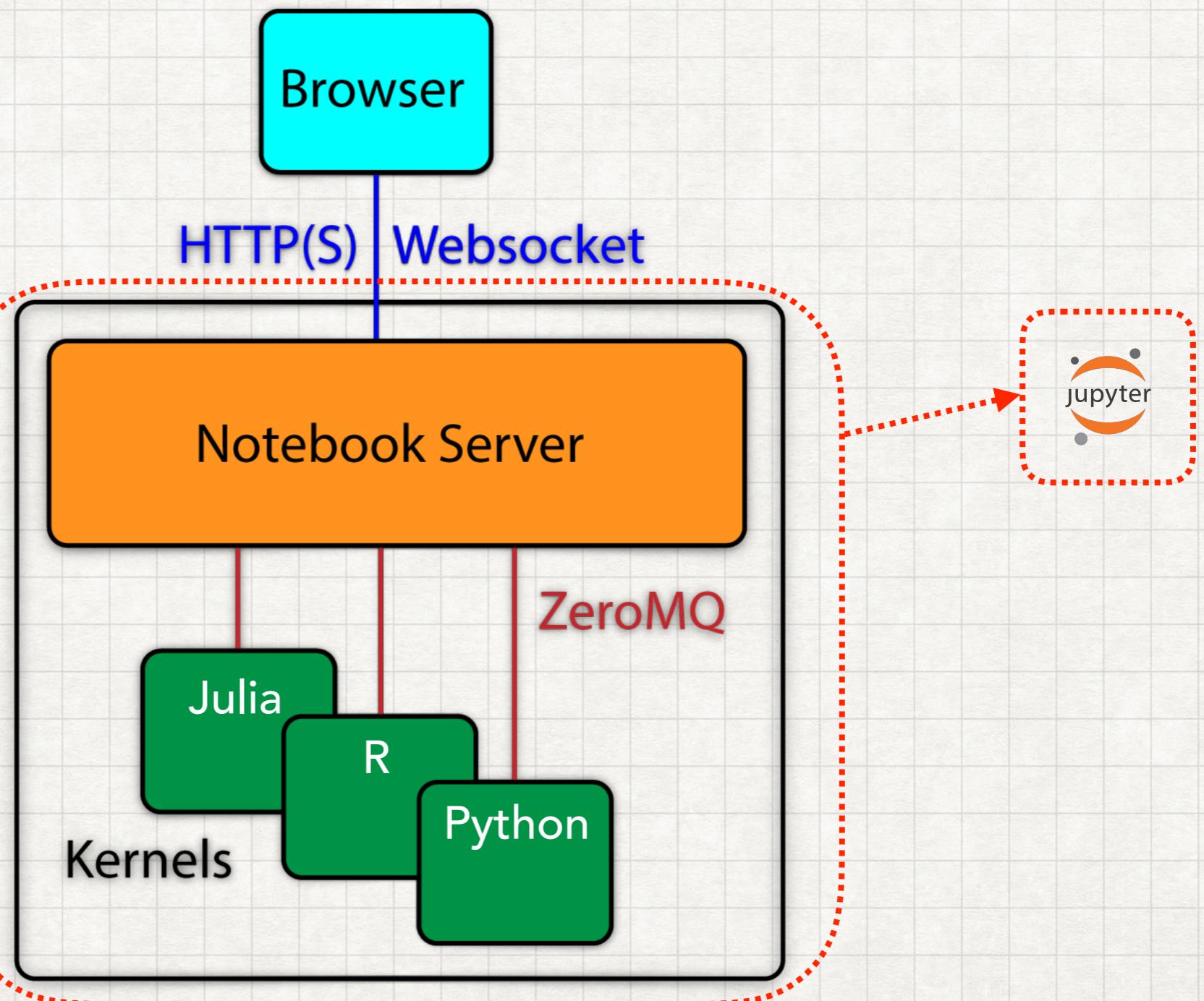
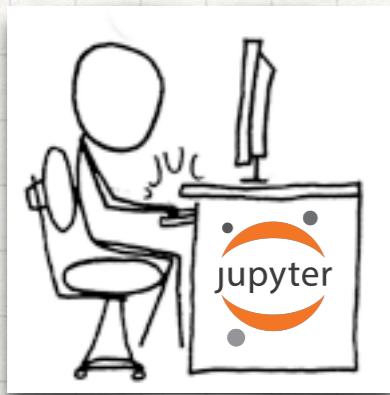


Language Expert Thing

View and Enter
Stuff Part

Important Stuff
Organizer and
Doing Thing

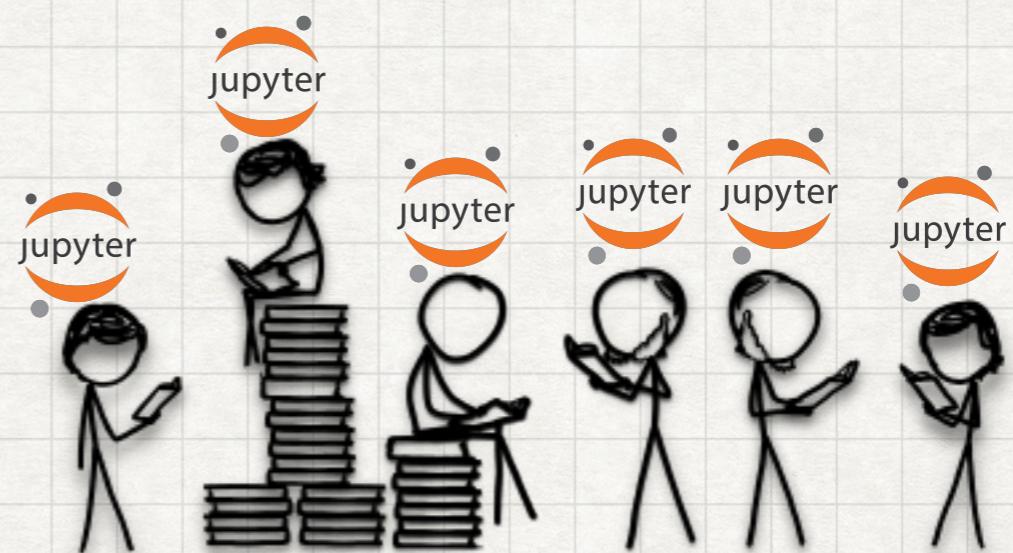
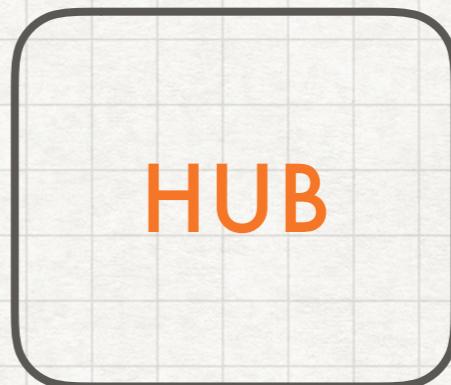
A SINGLE USER JUPYTER NOTEBOOK SERVER





jupyterhub

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

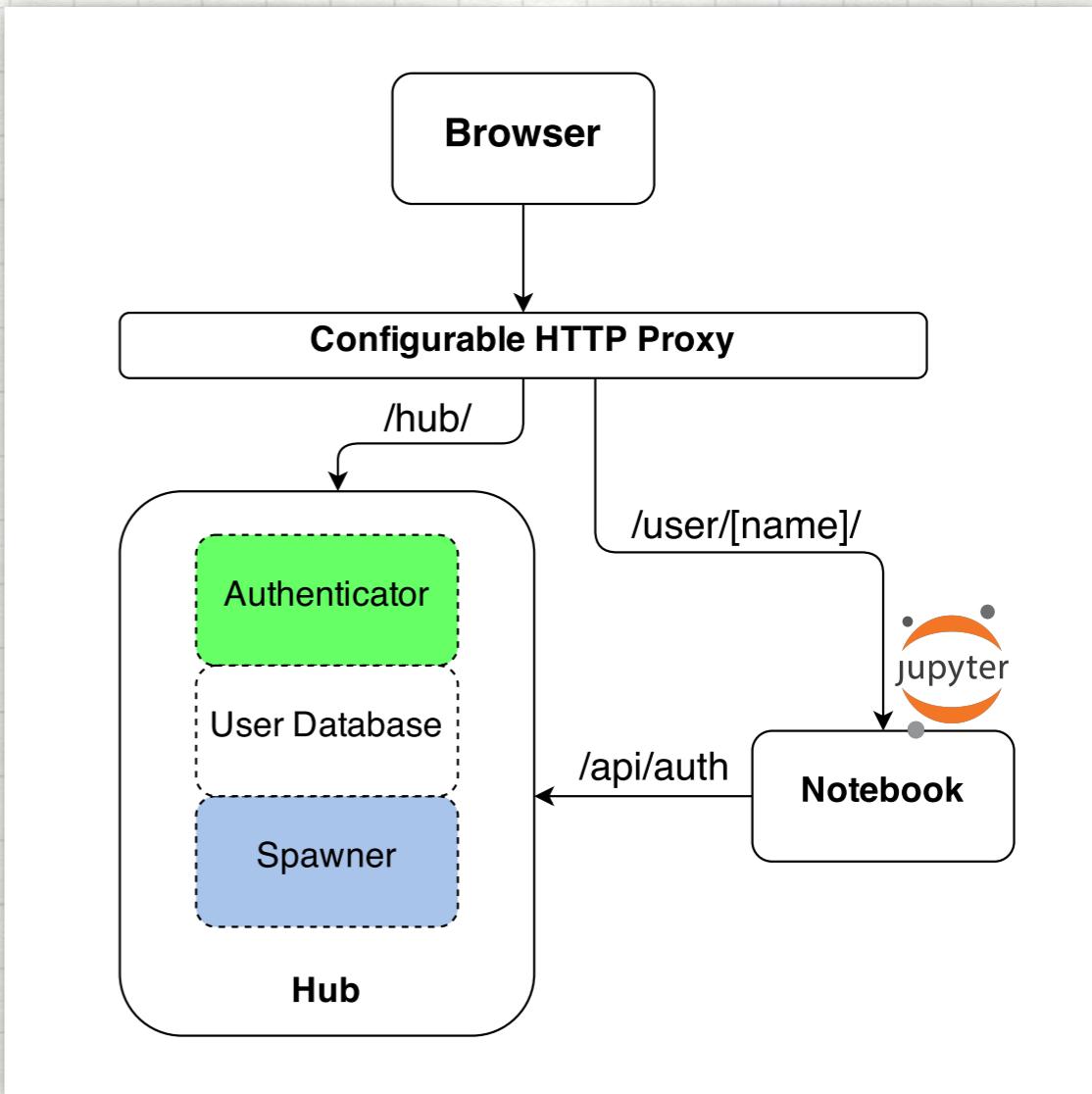




HOW IT WORKS

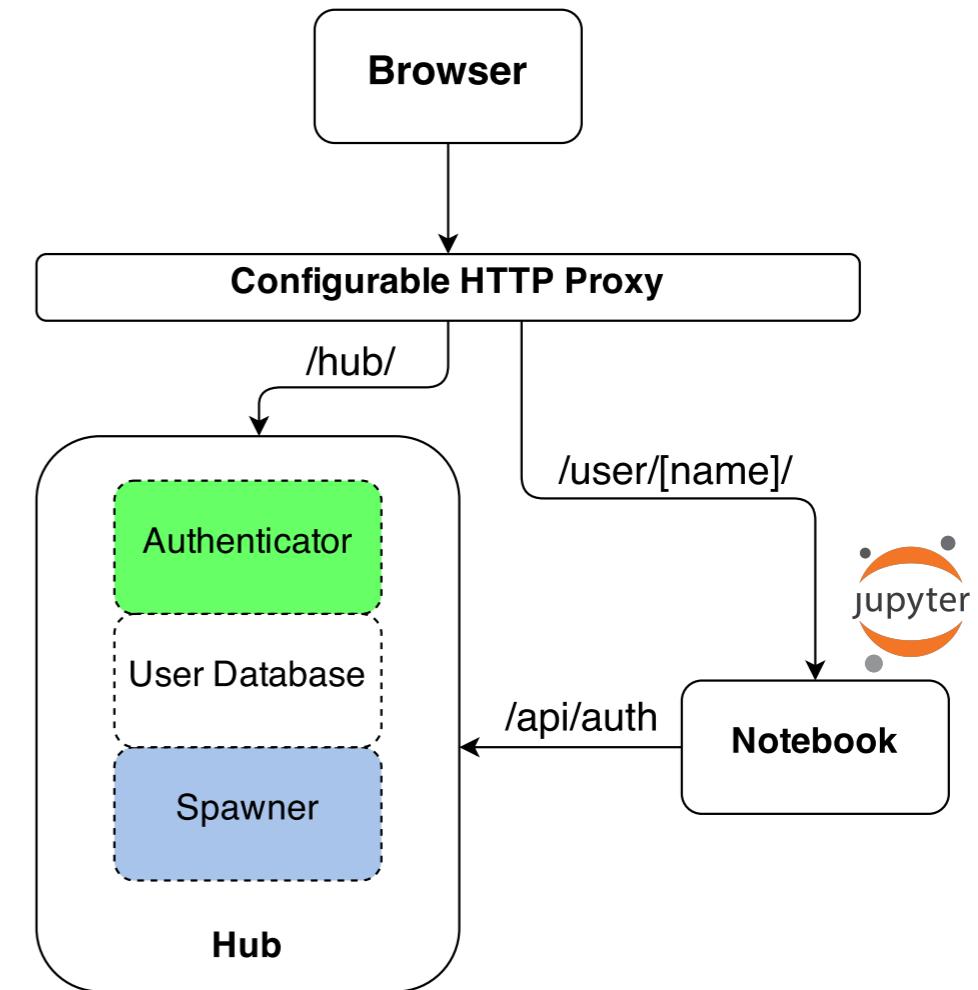
WHAT DOES THE HUB DO?

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



THE PARTS OF JUPYTERHUB

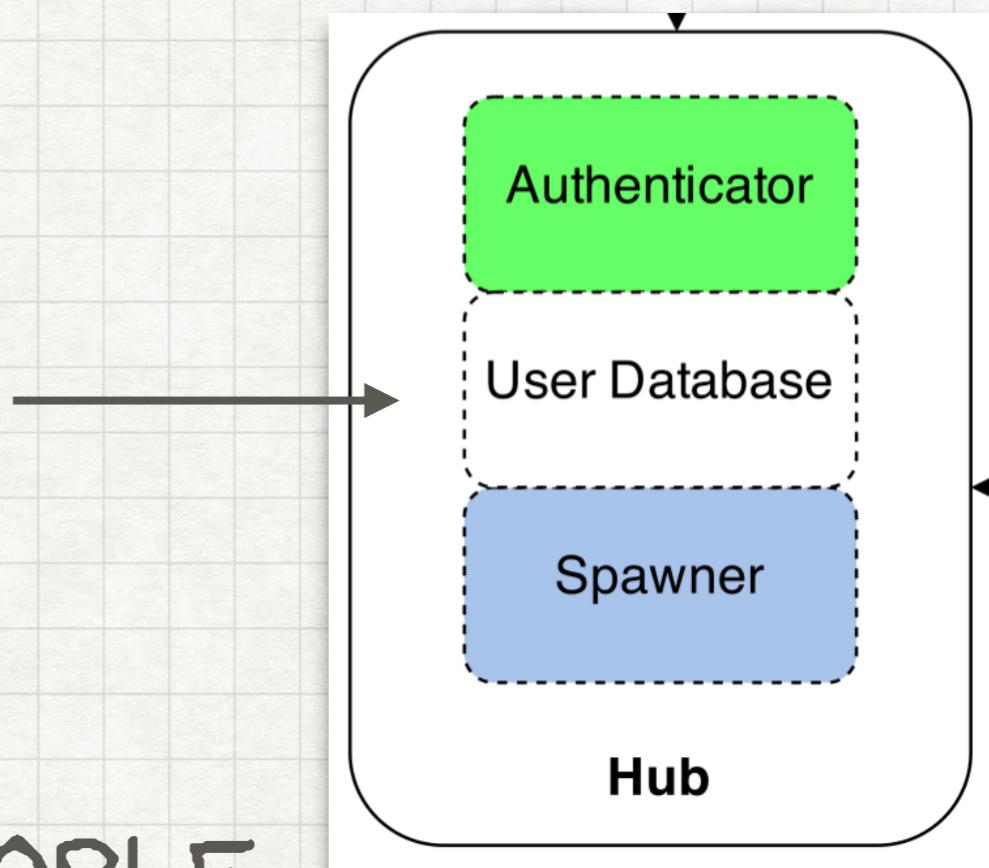
- Hub (User Database, Authenticator, Spawner)
- Users and their individual notebook servers
- Configurable HTTP Proxy



WHAT THE HUB CONTAINS

USER DATABASE

A PLACE TO KEEP
INFORMATION ABOUT PEOPLE
USING JUPYTERHUB

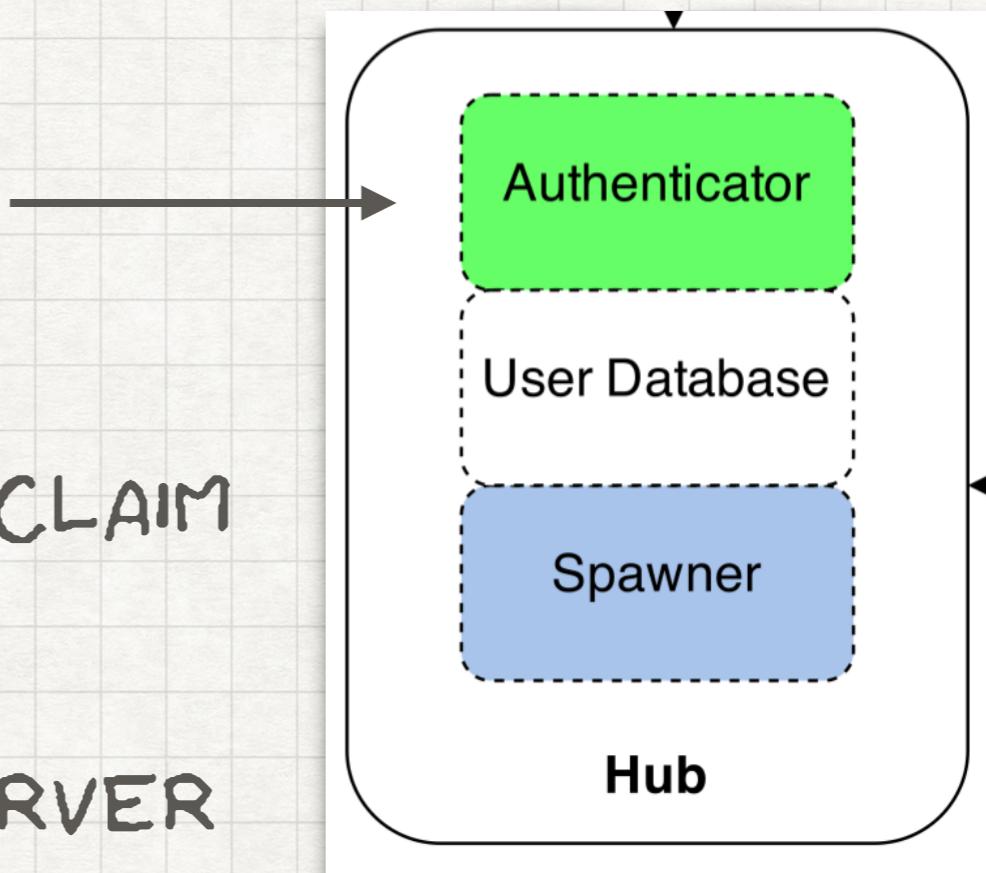


WHAT THE HUB CONTAINS

AUTHENTICATOR

A THING THAT CHECKS:

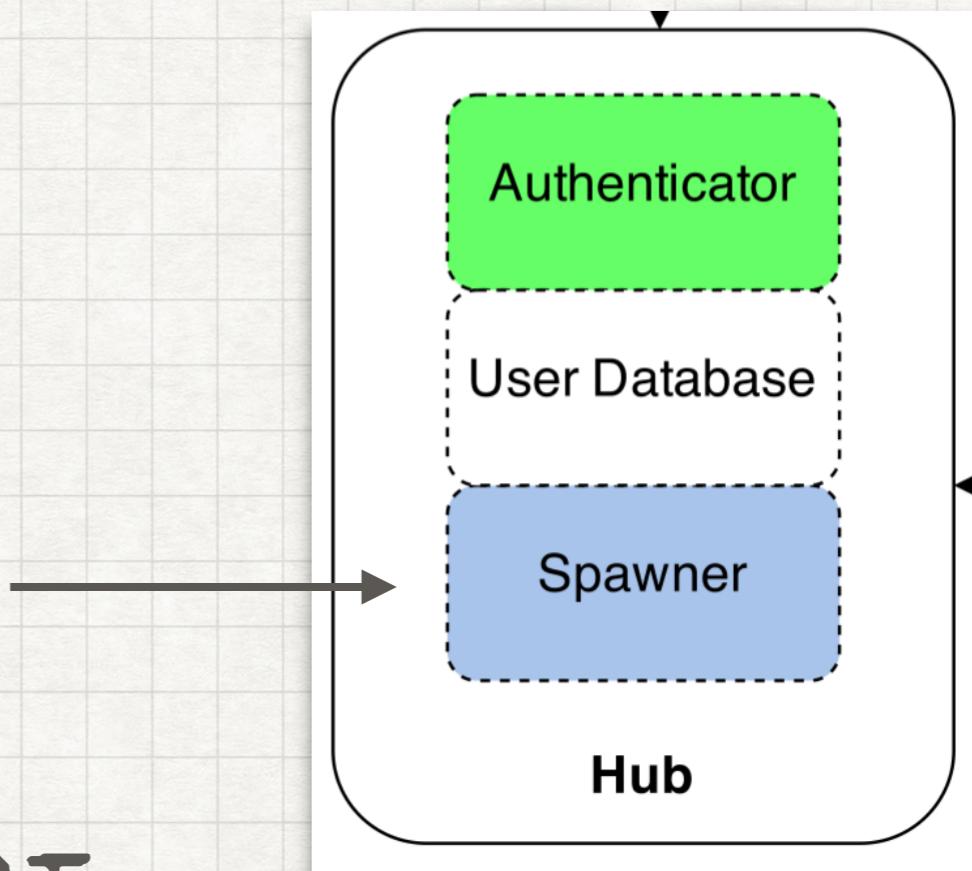
- IF A PERSON IS WHO THEY CLAIM TO BE
- IF THEY CAN USE THEIR JUPYTERHUB NOTEBOOK SERVER



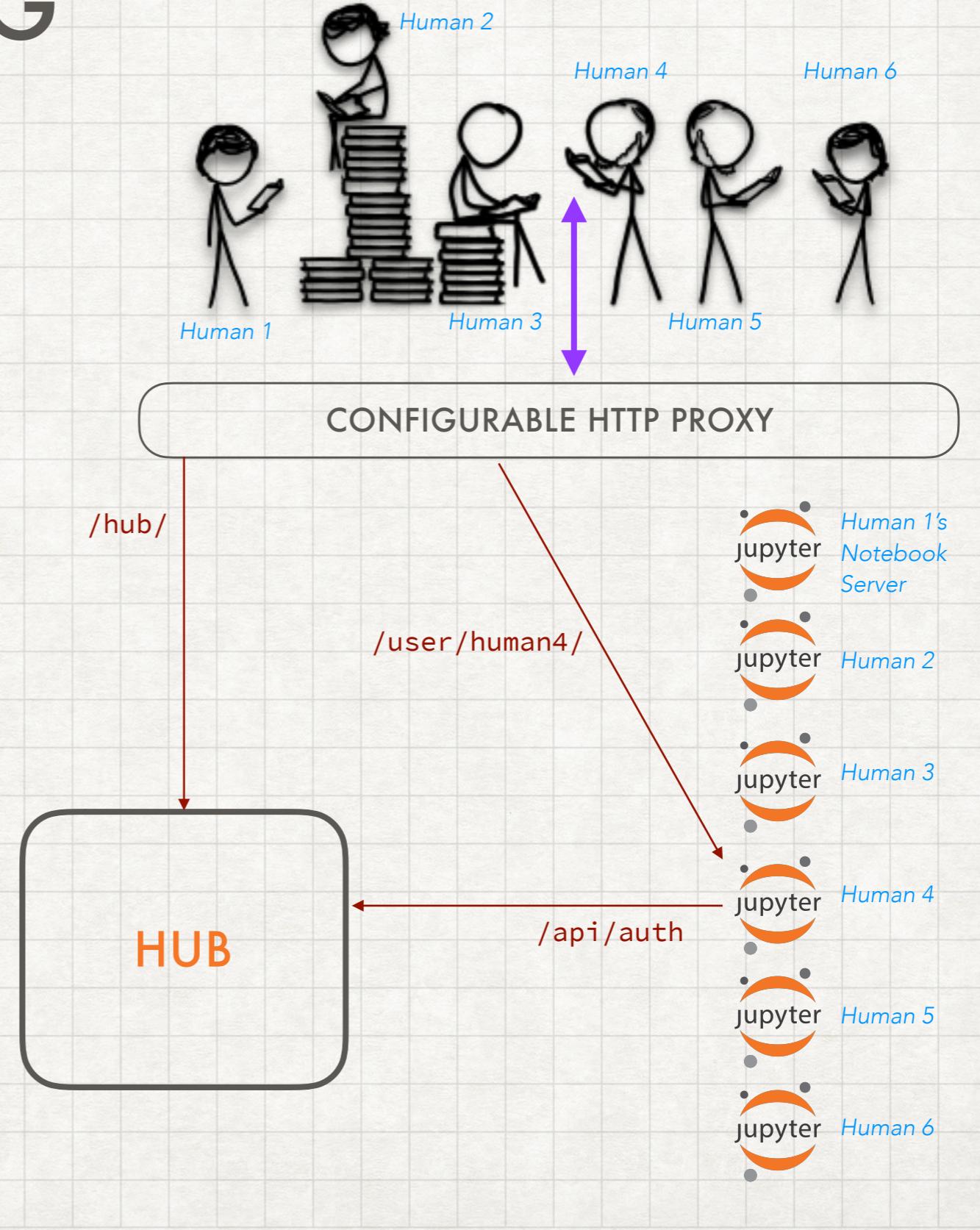
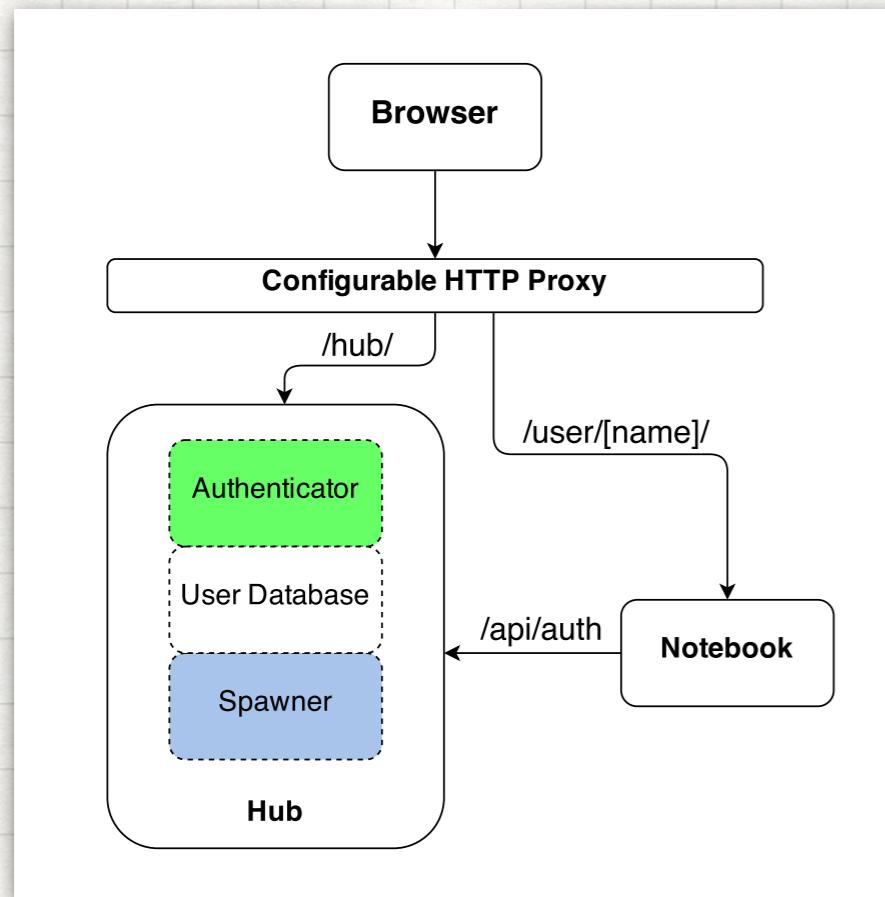
WHAT THE HUB CONTAINS

SPAWNER

A WORKER BEE THAT
MAKES JUPYTER NOTEBOOK
SERVERS FOR PEOPLE



UNDERSTANDING





**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



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>

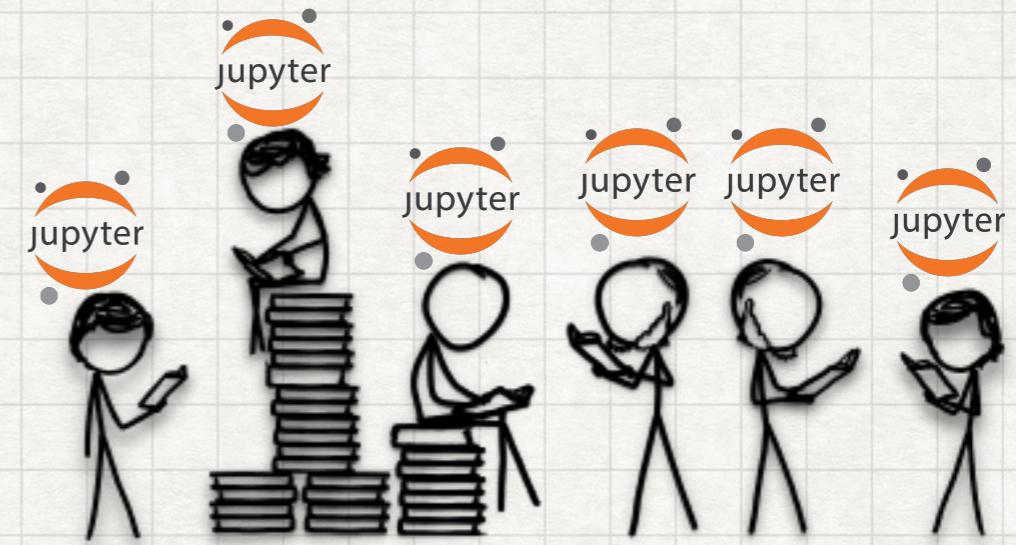


jupyterhub

THANKS!

<http://bit.ly/jhubatl>

Carol Willing
Project Jupyter at Cal Poly SLO
Twitter: @willingcarol
GitHub: @willingc



A THING TO GIVE EACH PERSON
THEIR OWN SHINY JUPYTER
NOTEBOOK SERVER

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