



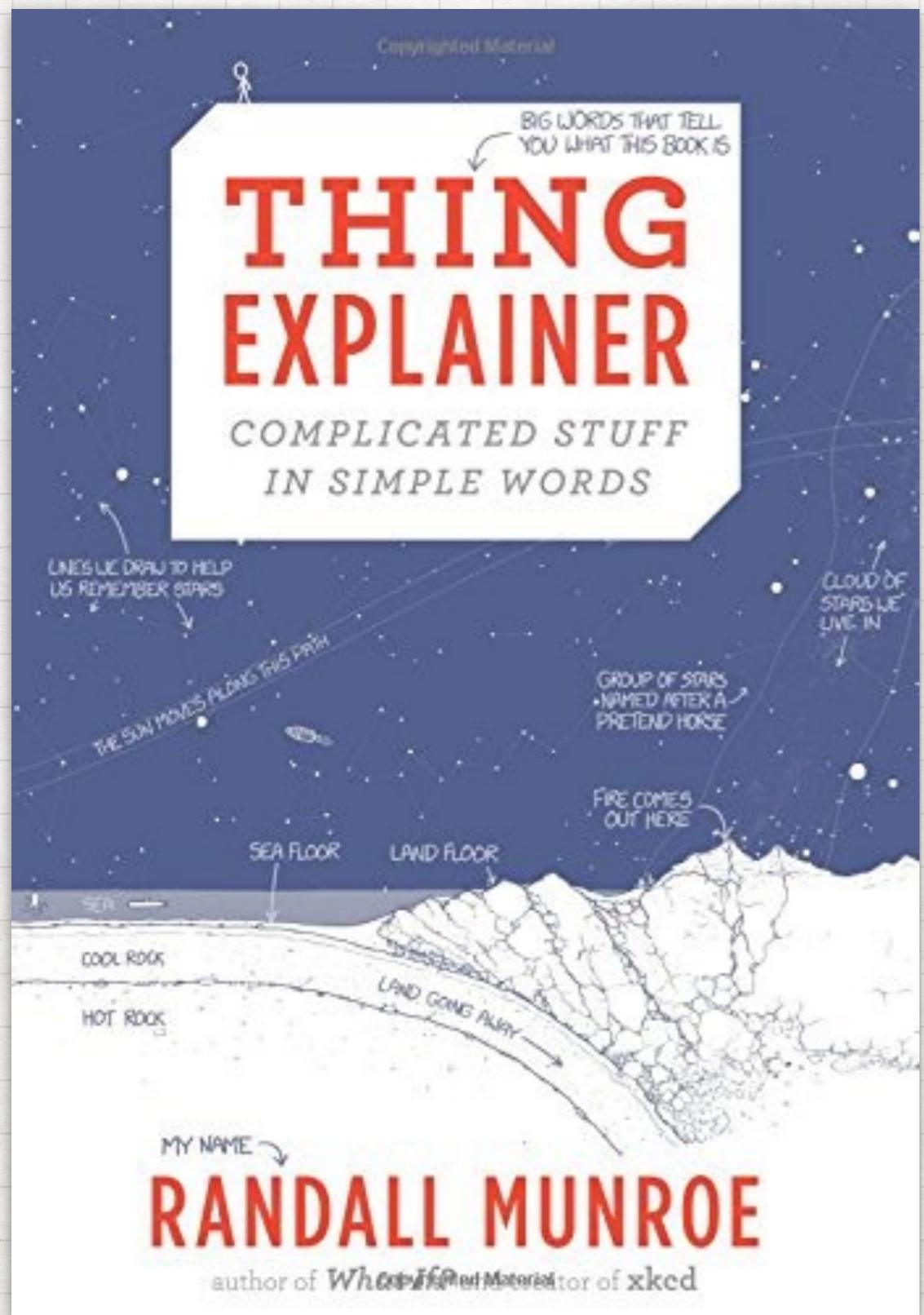
# jupyterhub

## A "THING EXPLAINER" OVERVIEW

JupyterDay Atlanta  
August 13, 2016

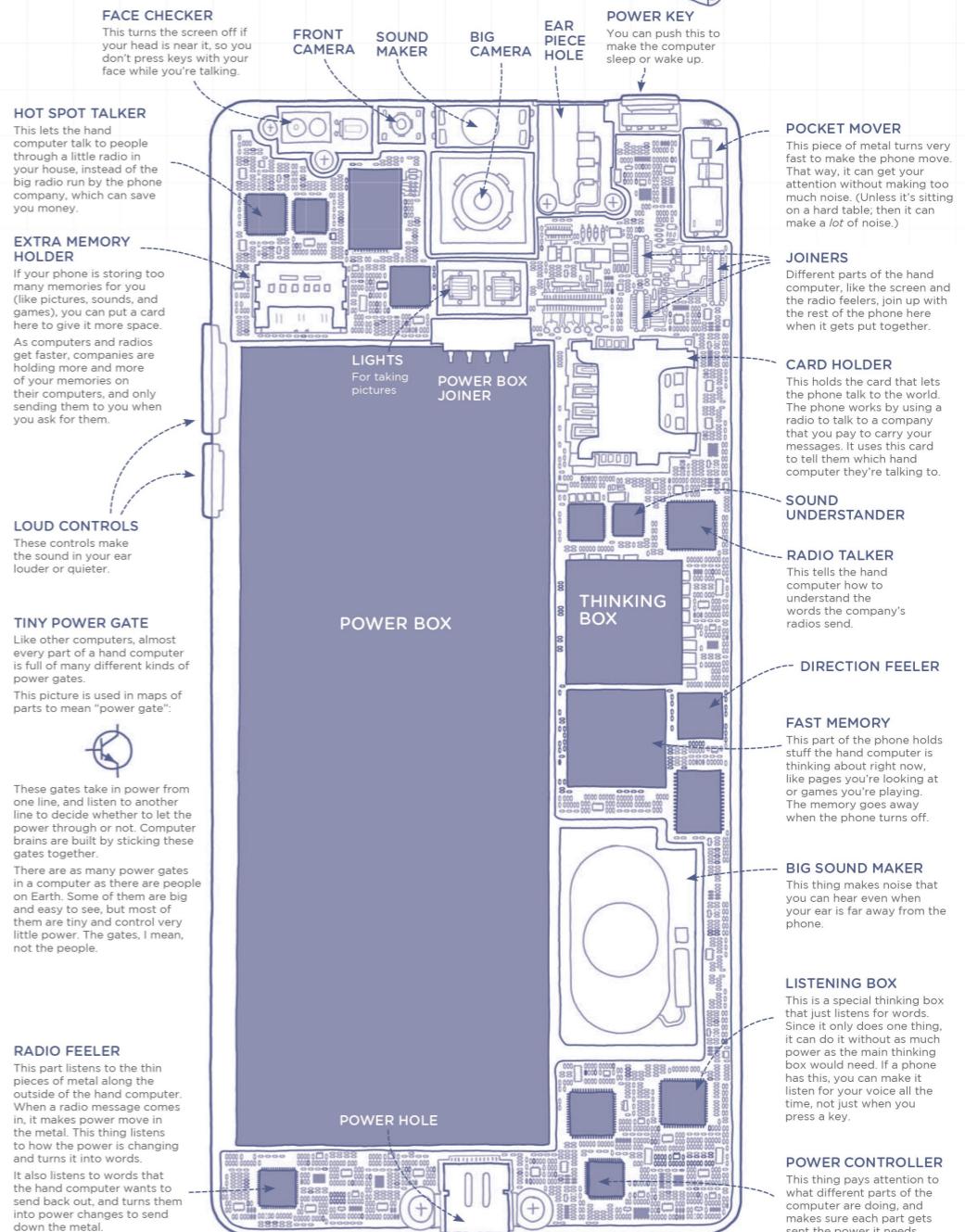
Carol Willing  
Project Jupyter at Cal Poly SLO

Twitter: @willingcarol  
GitHub: @willingc



## 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

”

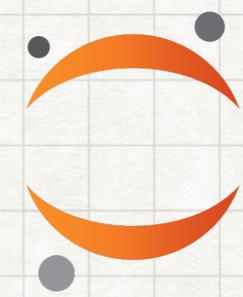
# UNDERSTANDING JUPYTERHUB

## 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



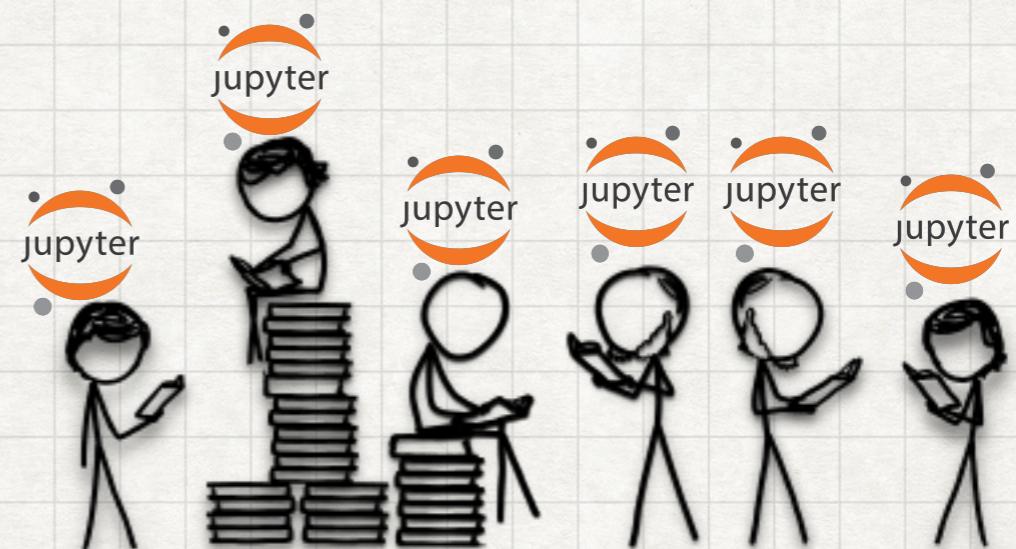
# BASICS



# 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

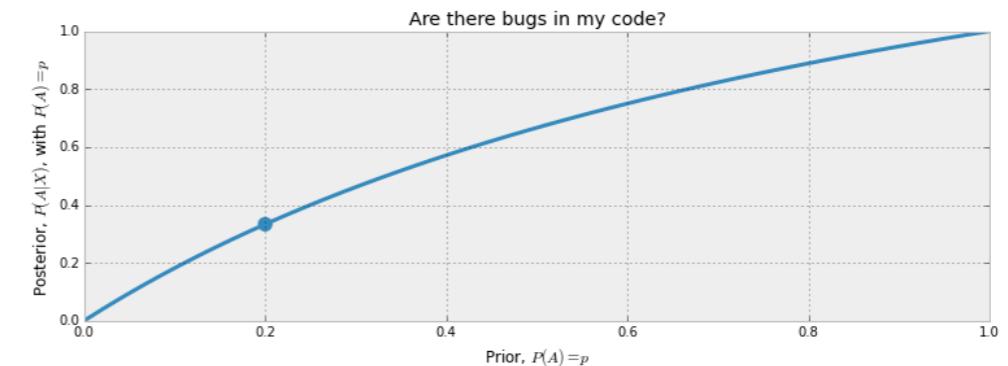
We have already computed  $P(X|A)$  above. On the other hand,  $P(X \sim A)$  is subjective: our code can pass tests but still have a bug in it, though the probability there is a bug present is reduced. Note this is dependent on the number of tests performed, the degree of complication in the tests,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

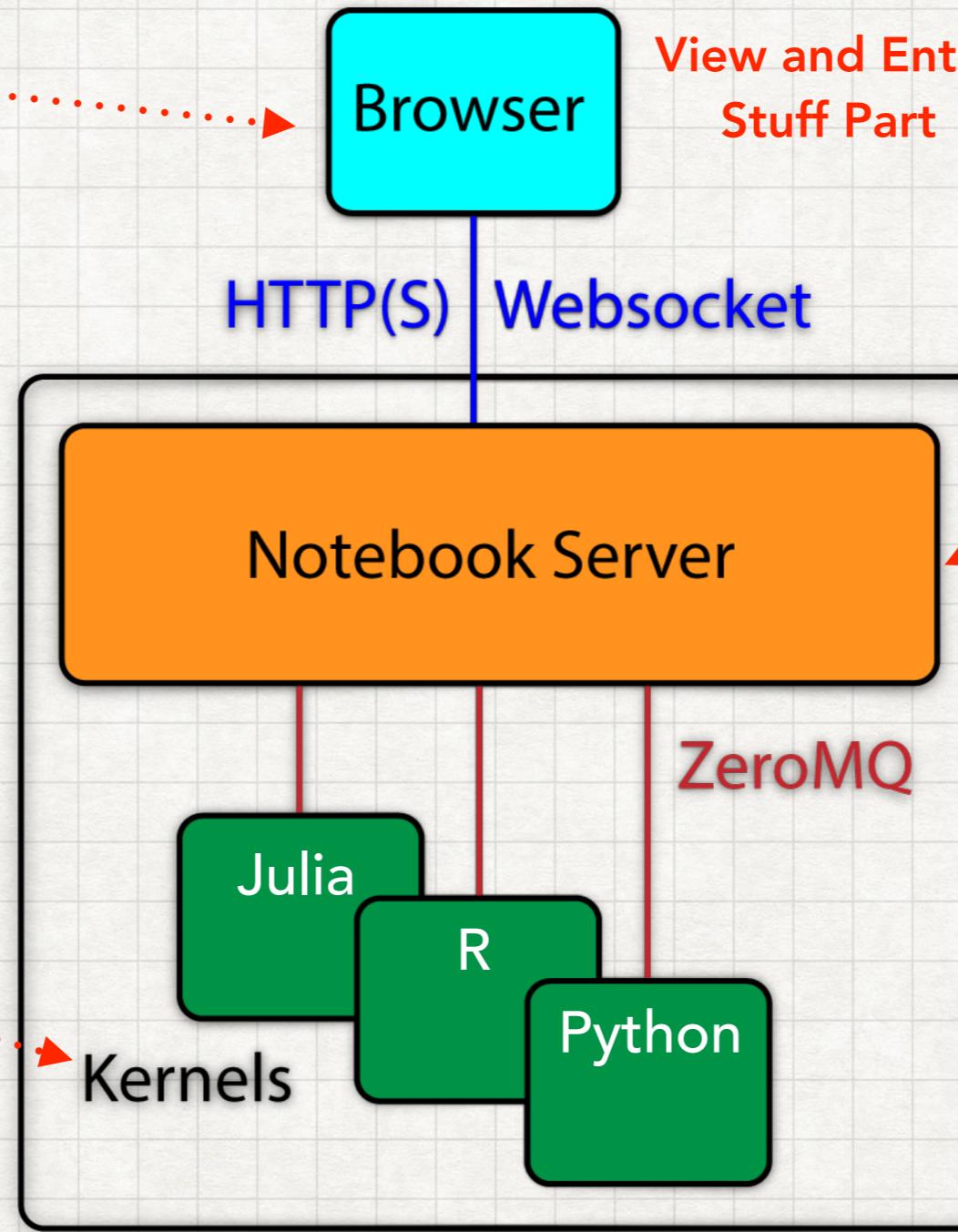
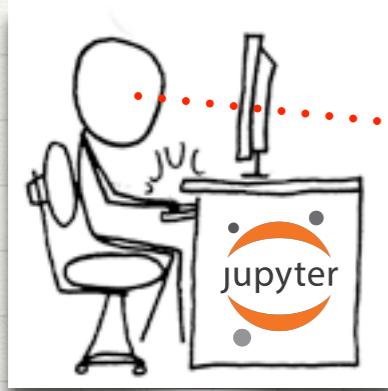
```
figsize(12.5, 4)
p = np.linspace(0, 1, 50)
plt.plot(p, 2 * p / (1 + p), color="#348ABD", lw=3)
# plt.fill_between(p, 2*p/(1+p), alpha=.5, facecolor=["#A60628"])
plt.scatter(0.2, 2 * (0.2) / 1.2, s=140, c="#348ABD")
plt.xlim(0, 1)
plt.ylim(0, 1)
plt.xlabel("Prior, $P(A) = p$")
plt.ylabel("Posterior,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

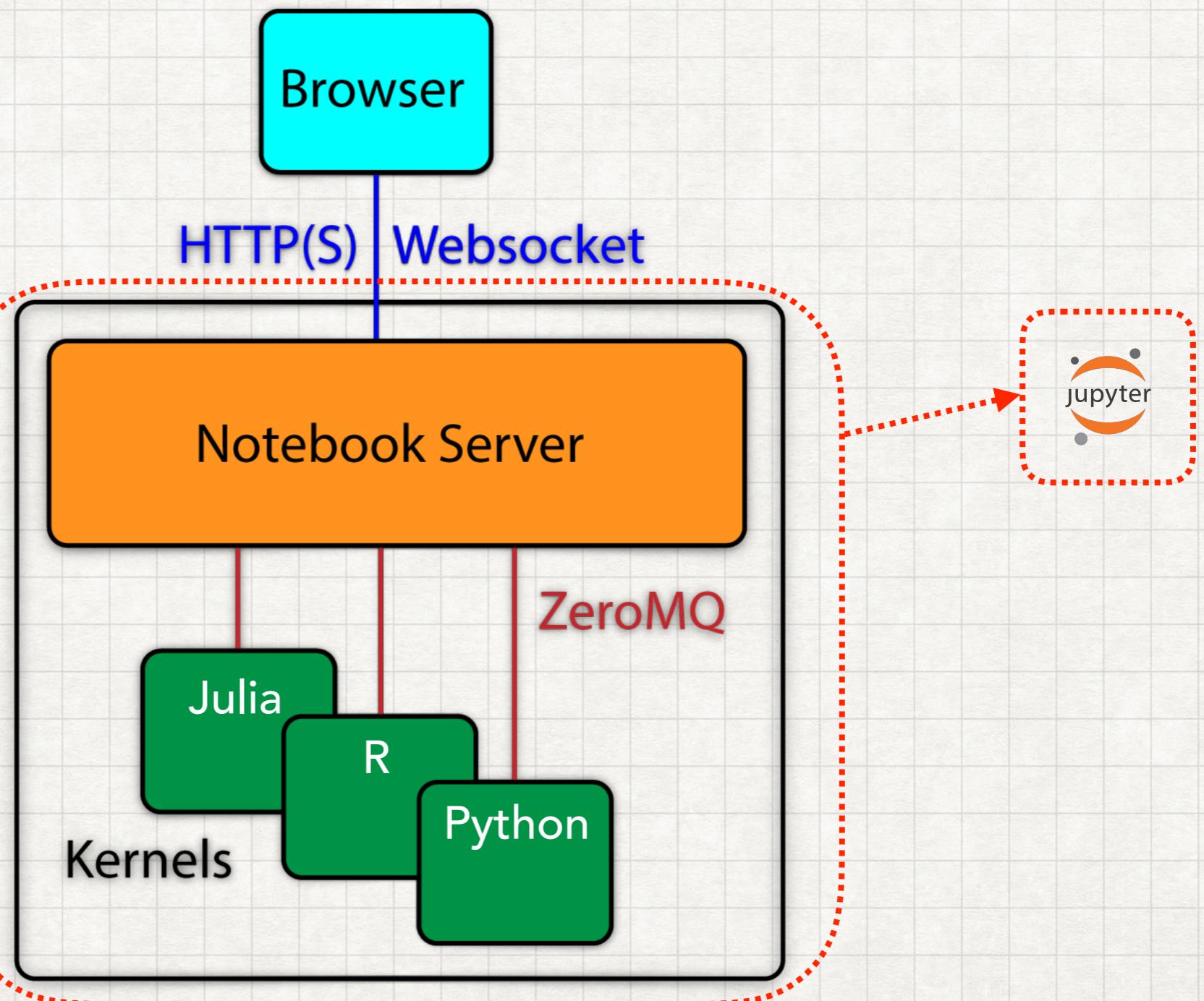
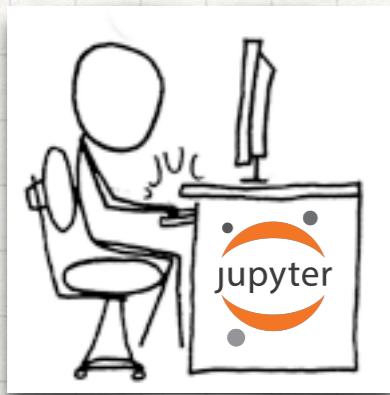


Language Expert Thing

View and Enter  
Stuff Part

Important Stuff  
Organizer and  
Doing Thing

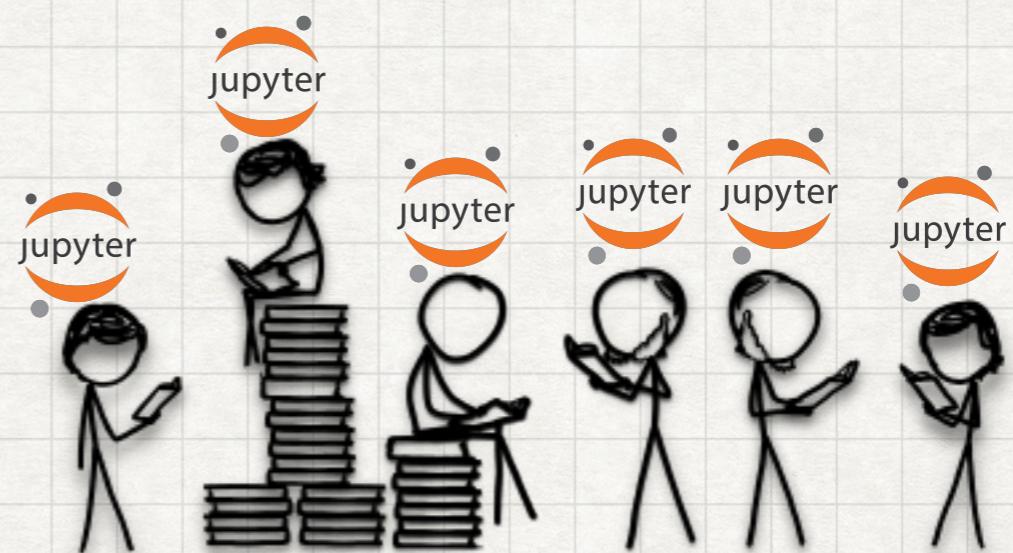
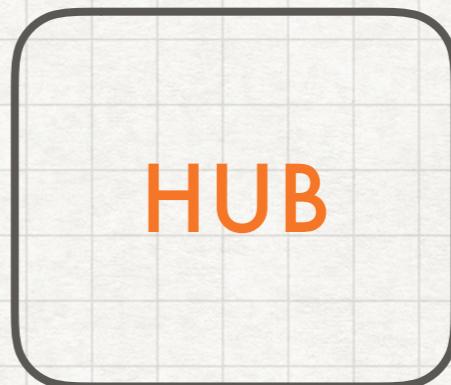
# A SINGLE USER JUPYTER NOTEBOOK SERVER





# jupyterhub

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

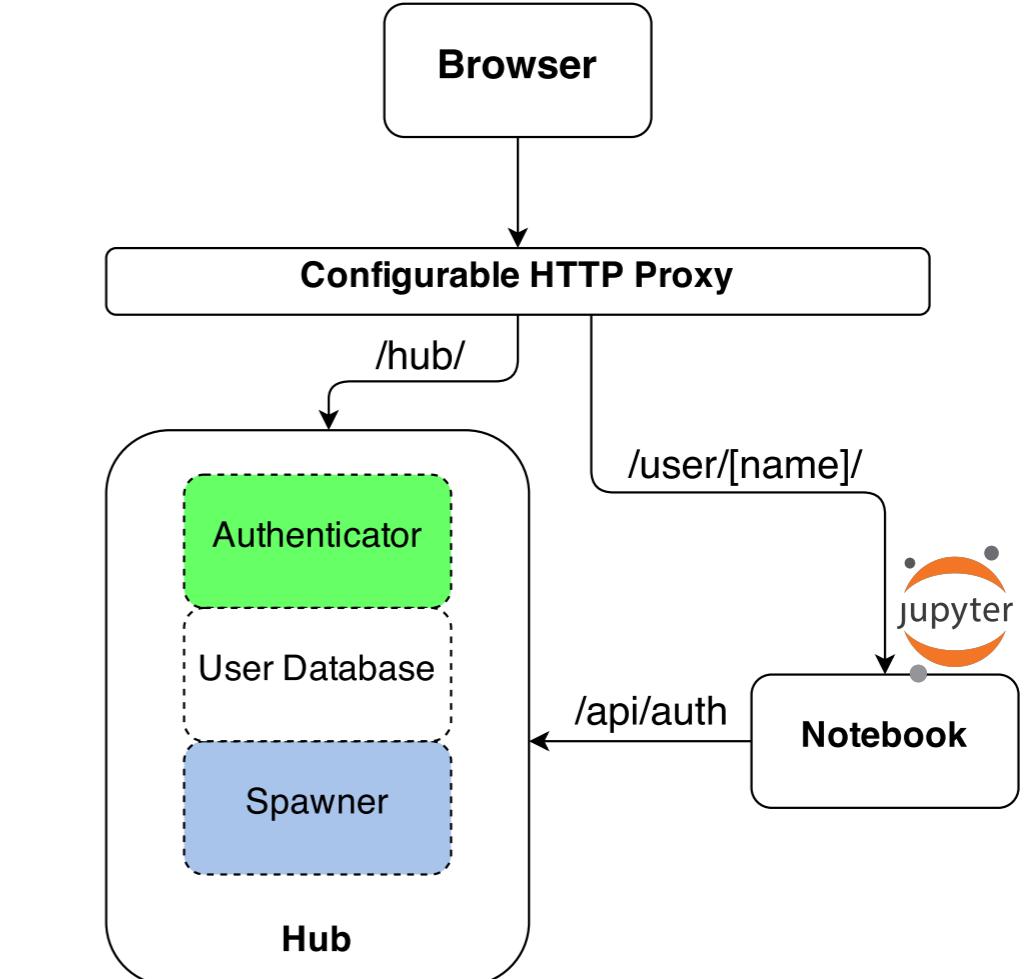




# HOW IT WORKS

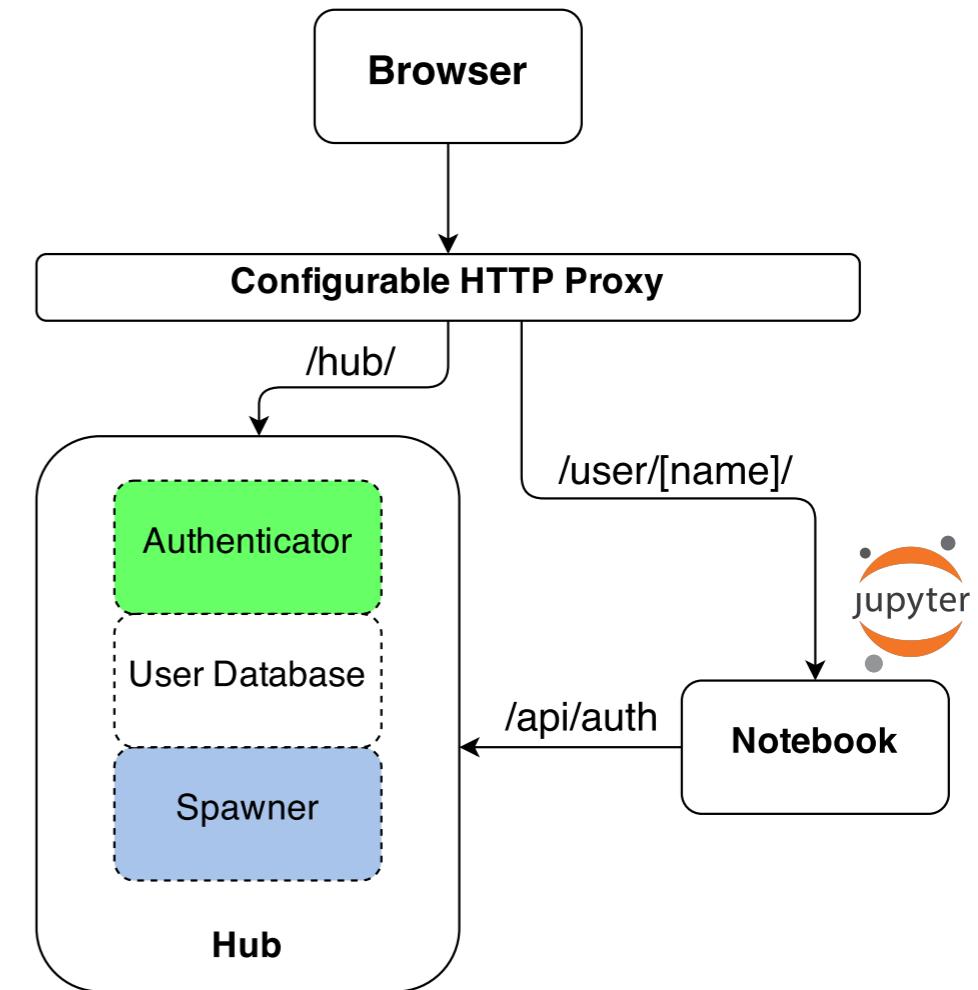
# WHAT DOES THE HUB DO?

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



# THE PARTS OF JUPYTERHUB

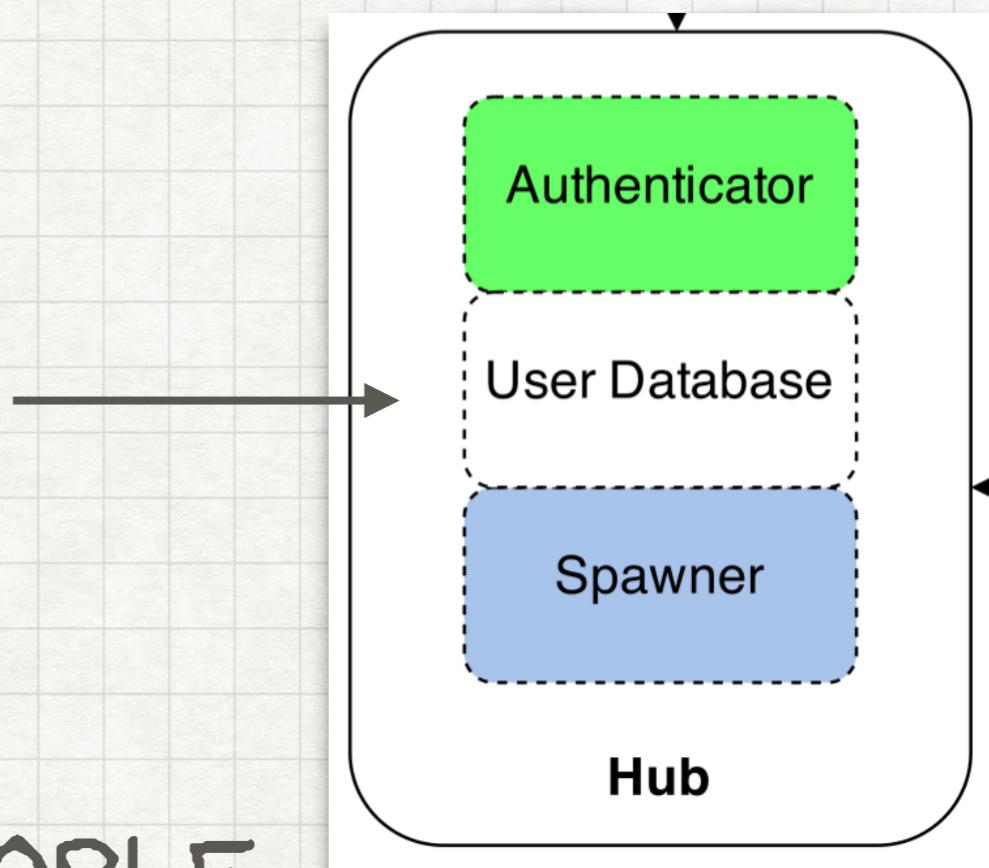
- Hub (User Database, Authenticator, Spawner)
- Users and their individual notebook servers
- Configurable HTTP Proxy



# WHAT THE HUB CONTAINS

USER DATABASE

A PLACE TO KEEP  
INFORMATION ABOUT PEOPLE  
USING JUPYTERHUB

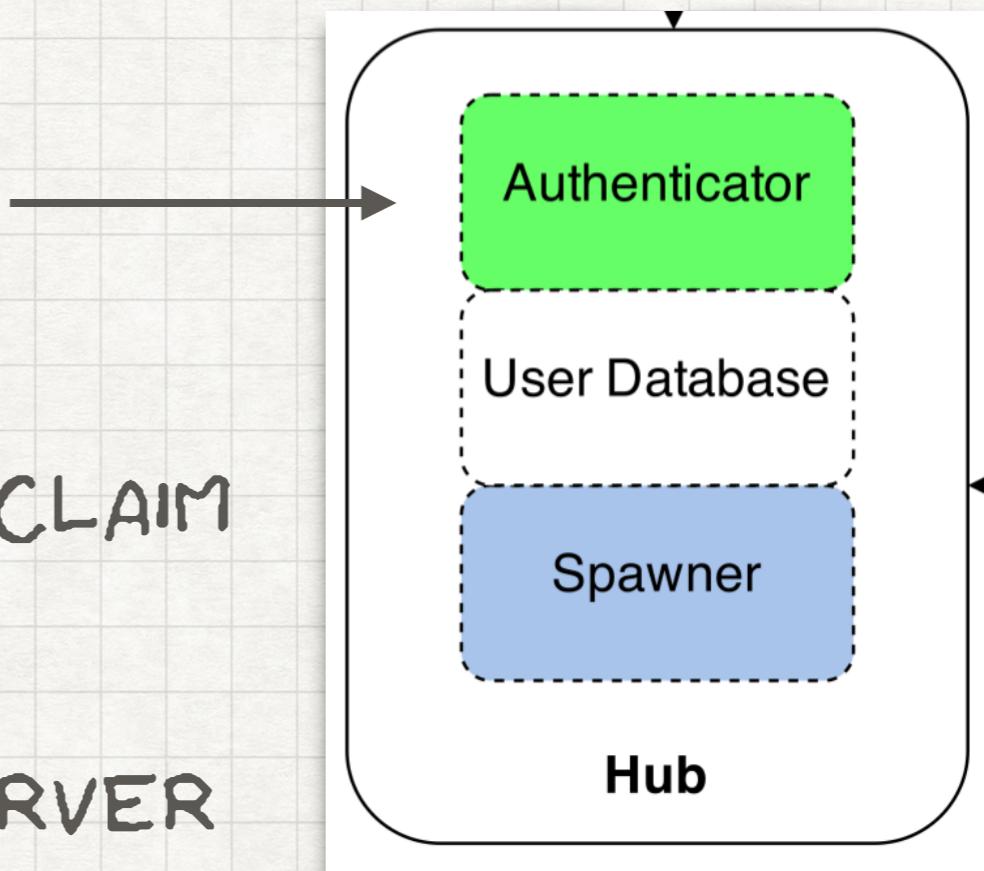


# WHAT THE HUB CONTAINS

## AUTHENTICATOR

A THING THAT CHECKS:

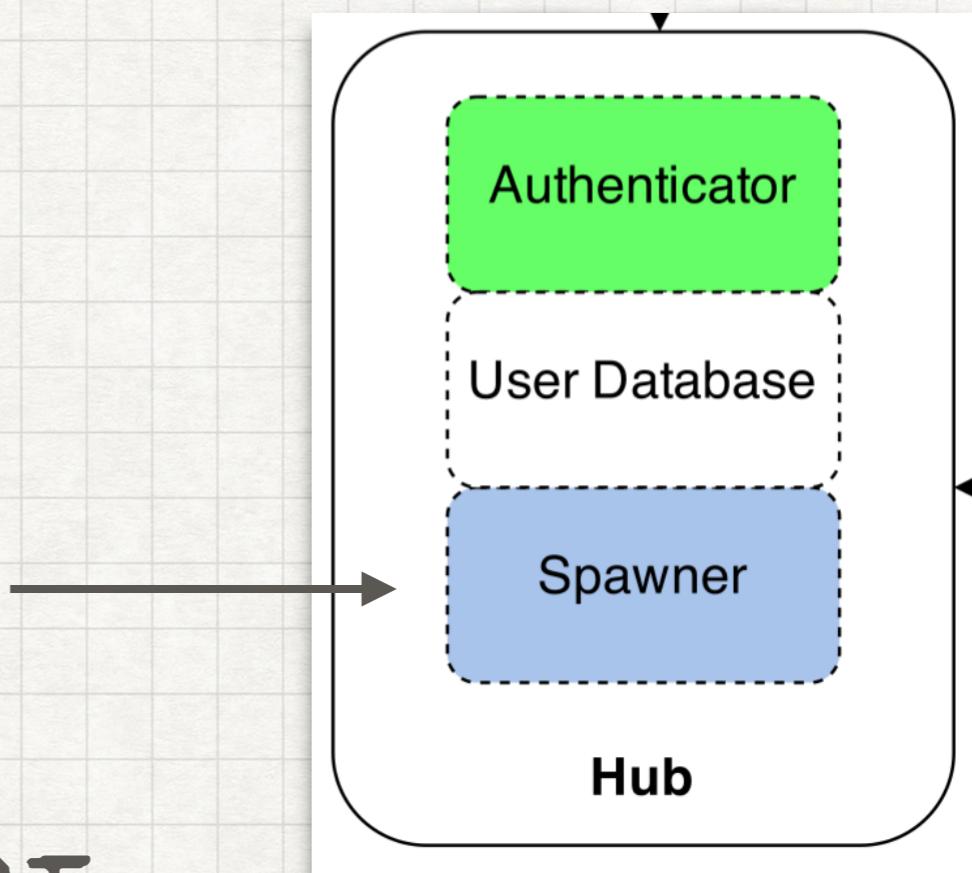
- IF A PERSON IS WHO THEY CLAIM TO BE
- IF THEY CAN USE THEIR JUPYTERHUB NOTEBOOK SERVER



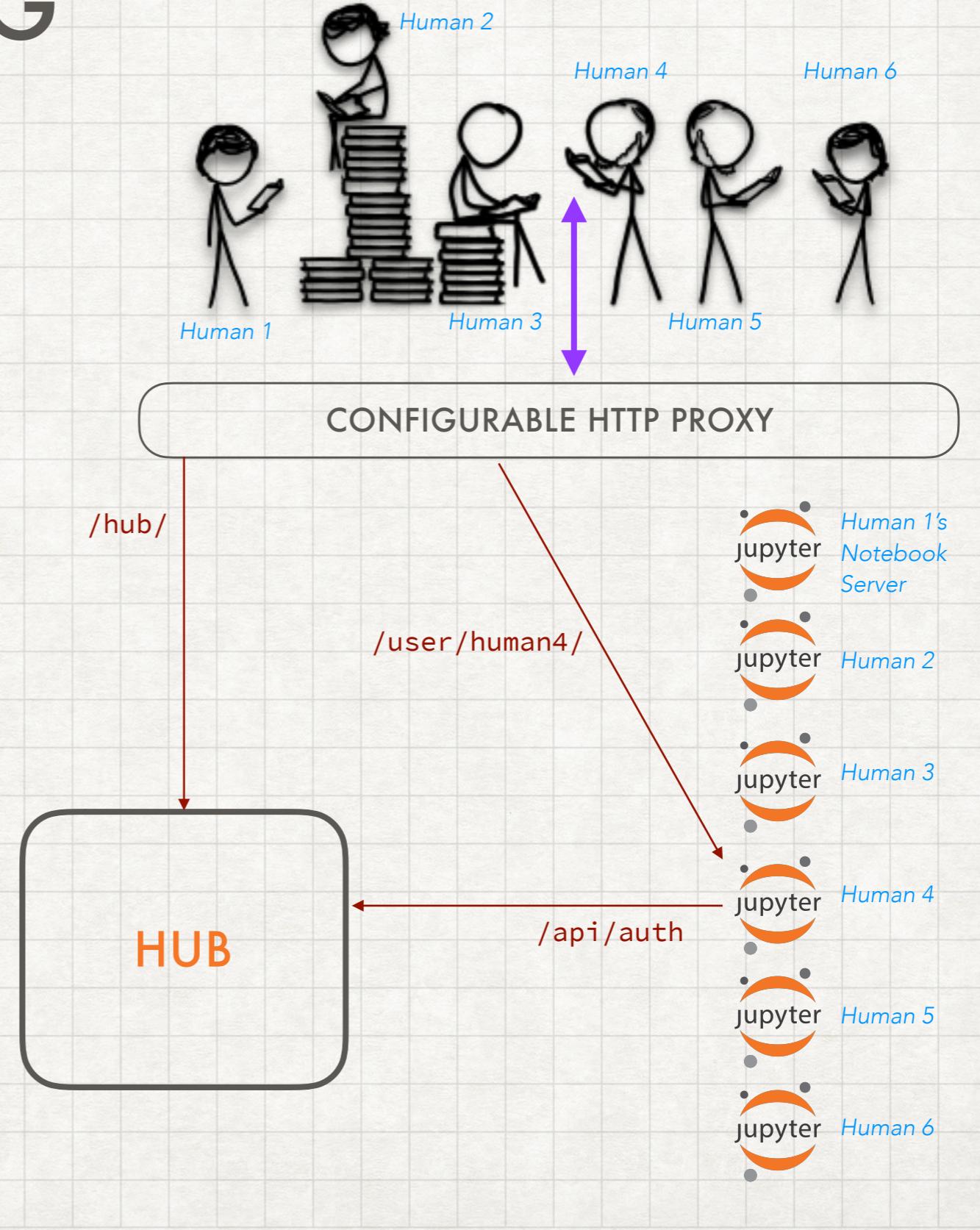
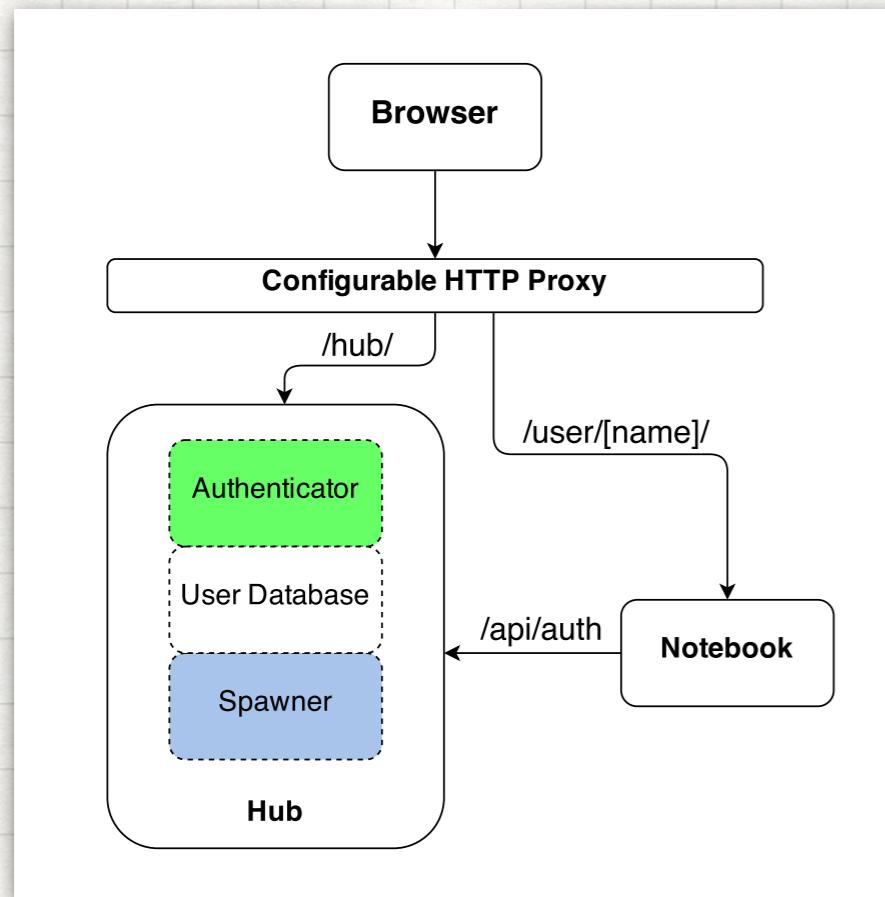
# WHAT THE HUB CONTAINS

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

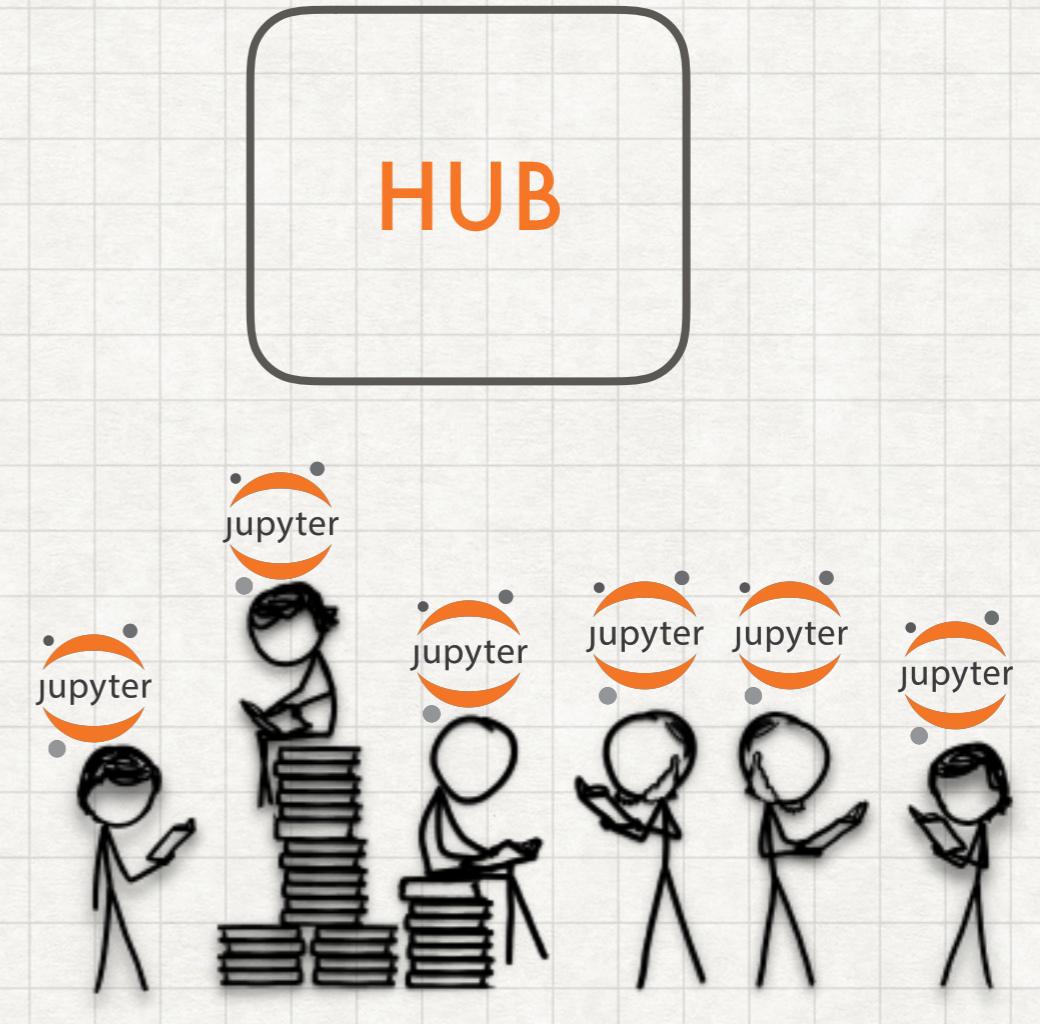
<https://github.com/jupyterhub>



# jupyterhub

# THANKS!

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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