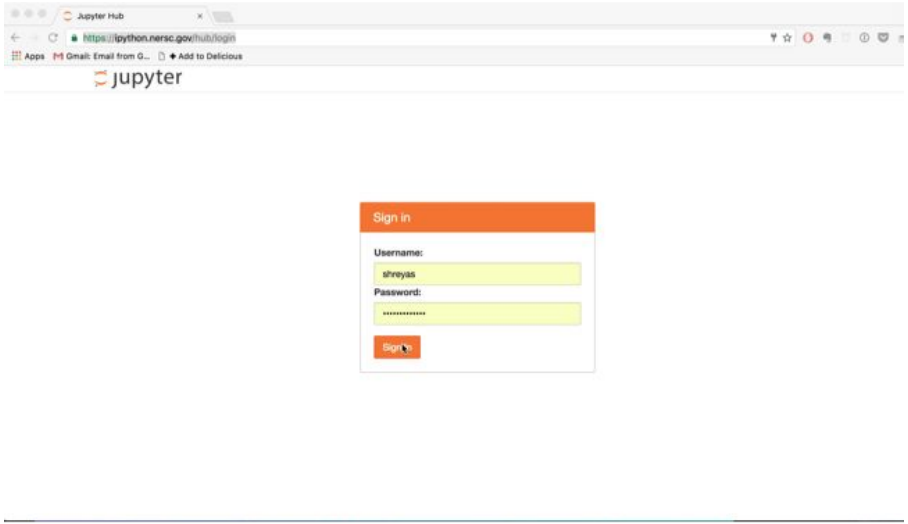
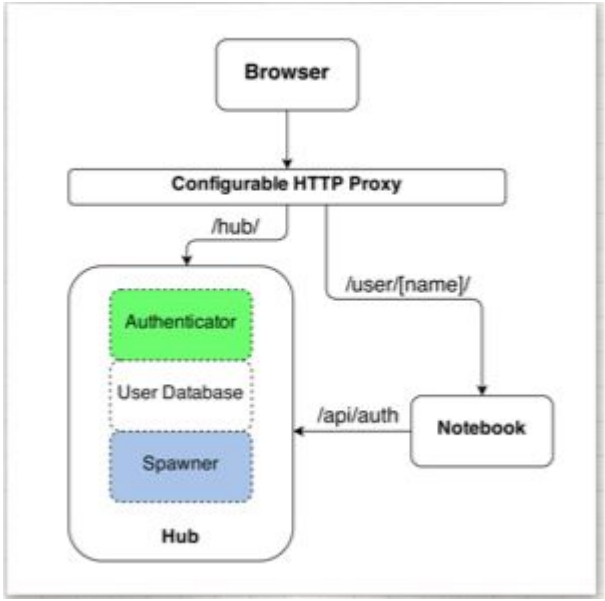
Jupyterhub

Jupyterhub: Jupyter as a Service

- Service to deploy notebooks in a multi-user environment
- Manages user authentication, notebook deployment and web proxies





Motivation

- ✗ Users running their own web servers on a shared cluster makes security folks very nervous.
- ✗ Difficult to support and manage different kernels and environments

Jupyterhub to rescue

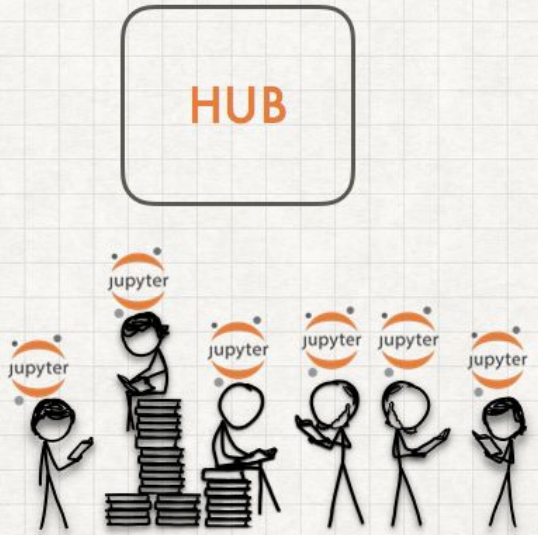
- ✓ Deploy notebooks in a standard SECURE manner
- ✓ Package known kernels out of the box
- ✓ Access shared resources on the platform
  - Filesystems, Batch Queue, Network, DBs

Thanks to Carol Willing from the Jupyter Project for the next few slides (taken from her “Thing Explainer” talk)

https://www.slideshare.net/willingc/jupyterhub-a-thing-explainer-overview

jupyterhub

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



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

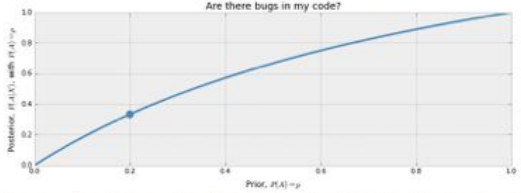
$$P(A|X) = \frac{1 \cdot p}{1 \cdot p + 0.5(1-p)}$$

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

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

Browser

View and Enter Stuff Part

HTTP(S) Websocket

Notebook Server

Important Stuff Organizer and Doing Thing

ZeroMQ

Julia

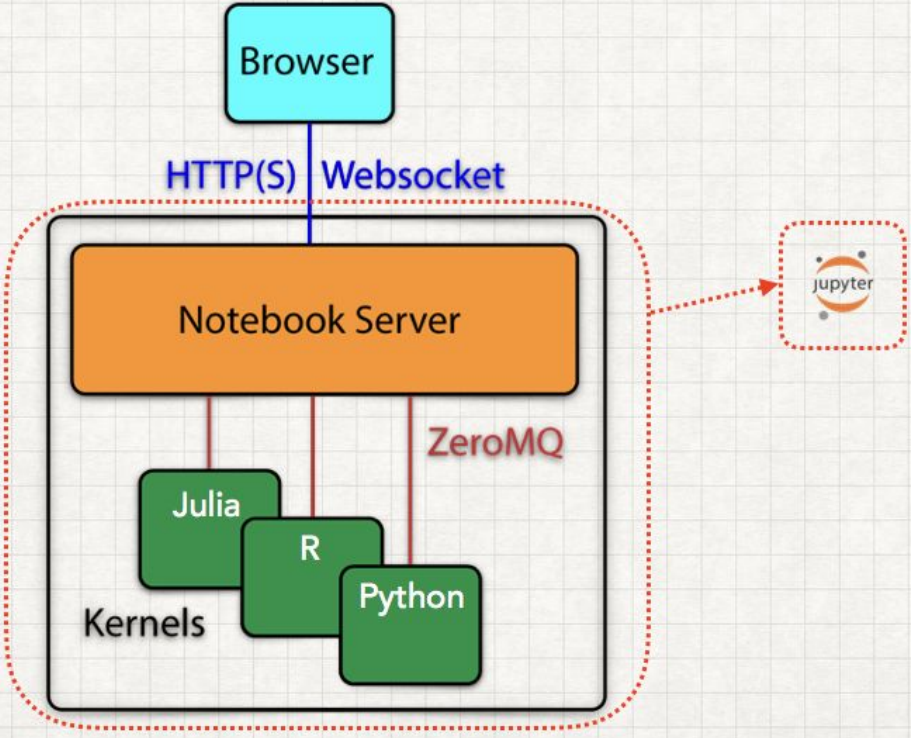
R

Python

Kernels

Language Expert Thing

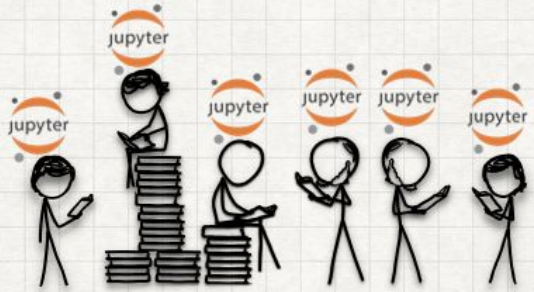
A SINGLE USER JUPYTER NOTEBOOK SERVER



jupyterhub

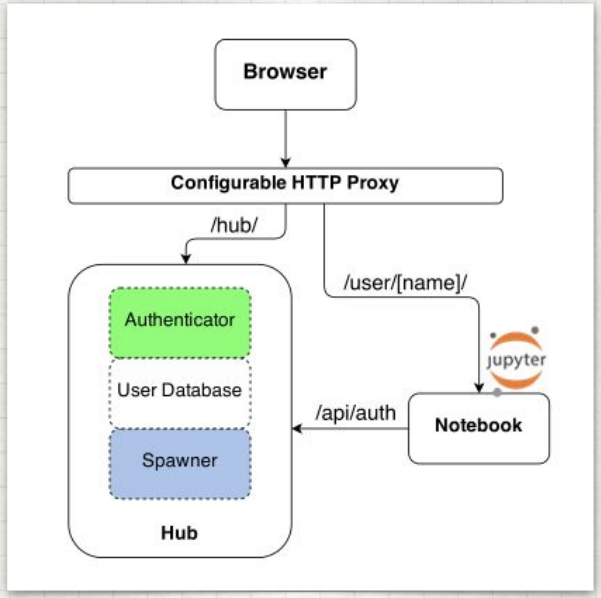
A THING TO GIVE A
JUPYTER
NOTEBOOK SERVER
TO EACH PERSON
IN A GROUP OF

HUB



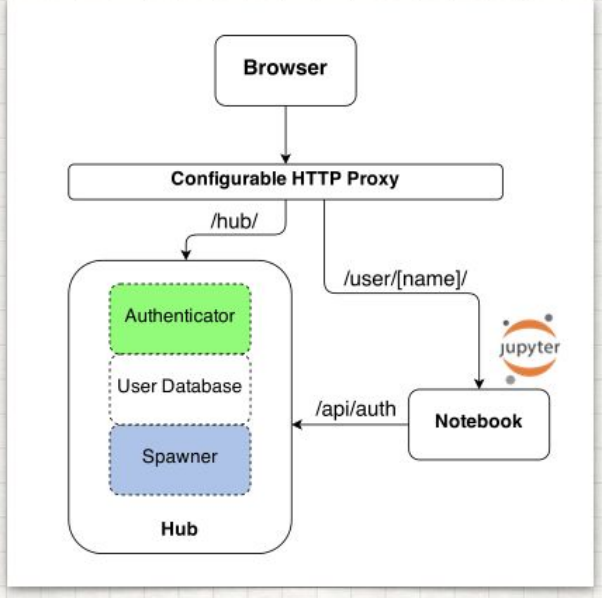
WHAT DOES THE HUB DO?

- 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



Let’s see it in action

Simple demo using docker

If you don’t have docker - just follow along

This is purely a proof of concept - NOT A PRODUCTION DEMO

See link for a more in depth tutorial in a real environment

Run the Jupyterhub Container

```
docker run -d --name jupyterhub \
-p 8000:8000 jupyterhub/jupyterhub jupyterhub
```

Hop Into the container

We need to set up a couple of things …

```
docker exec -it jupyterhub /bin/bash
```

Install Jupyter

Give the hub something to run on login

```
pip install jupyter
```

Add User

```
adduser myuser
```

In Depth Tutorial

See Min Ragan-Kelly's excellent tutorial:

https://github.com/jupyterhub/jupyterhub-tutorial

Includes

- Dockerspawner
- OAuth
- SSL
- kernels