Jupyter Notebooks for Ops

LISA 2019

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Objectives

- An introduction/history of Jupyter Notebooks (aka "How Did We Get Here?")
- How they can be used in ways pertinent to ops folks (aka "What Do We Do Here?")
- How they can be maintained to facilitate use for non-ops folks (aka "How Can We Help These Folks Here?")
- What's next? (aka "What's Next?")

Introduction

Who are you? What do you do?

- Current employer: N/A
- A tech professional for ~20 years in various sectors (consulting, telecommunications, public sector, manufacturing)
    - System administration (Linux mostly, some other UNIX, some Windows)
    - many technical hats
- Enjoy trying to use tools to provide solutions in novel ways
- My fifth LISA (FIF!)

How did we get here?

What are Jupyter Notebooks?

Formal definition from [Project Jupyter (https://jupyter.org)](https://jupyter.org):

> *"The Jupyter Notebook is an open-source web application that allows you to create and share documents that contain live code, equations, visualizations and explanatory text. Uses include: data cleaning and transformation, numerical simulation, statistical modeling, machine learning and much more."*

How did we get here?

What specifically is a Jupyter Notebook?

Jupyter Notebooks are a mix of three distinct components (all maintained by Project Jupyter: The entire project is 100% open source under the 3-clause BSD license.

- The notebook document format, (based on JSON)
- The interactive computing protocol, (based on ZeroMQ and Websockets
- The kernel, (the default is iPython's Python kernel)*
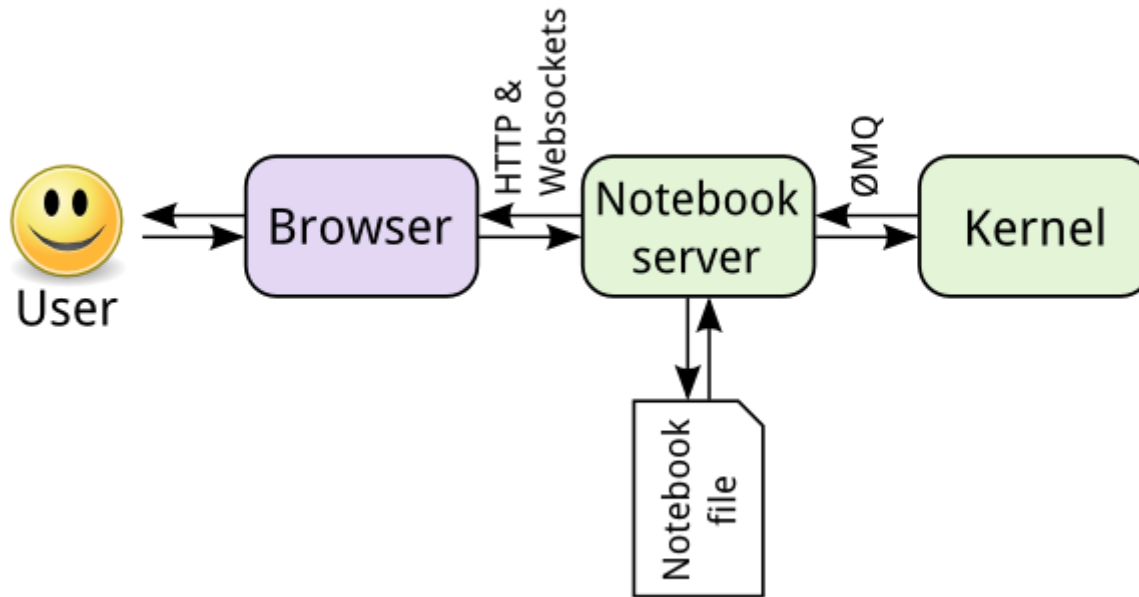
* more on this later

How did we get here?

What is iPython?

- iPython runs the Python in the notebook
- Reference for any other kernel for Jupyter Notebooks
- interesting way to run Python in its own right

What Do We Do Here?

Installing Jupyter Notebooks

- pip install jupyter
- conda install jupyter

PSA: Please use virtual environments or, put another way...

Please don't use system Python for applications. You will likely regret it later.

What Do We Do Here?

- Run Python

- Runboooks with better documentation

- Experimentation/Consumption with web data (e.g. REST API)

- Use as a presentation tool

- Now let's do it in (enter name of language here)
    - Python == default language
    - With additional kernels, the number of supported languages > 100 [Jupyter Kernels (https://github.com/jupyter/jupyter/wiki/Jupyter-kernels)](https://github.com/jupyter/jupyter/wiki/Jupyter-kernels)

How Can We Help These Folks Here?

- JupyterHub == Multi-user Jupyter Notebook instance
    - [The Littlest JupyterHub (https://the-littlest-jupyterhub.readthedocs.io/en/latest/)](https://the-littlest-jupyterhub.readthedocs.io/en/latest/)
    - [Zero to JupyterHub in Kubernetes (https://zero-to-jupyterhub.readthedocs.io/en/latest/)](https://zero-to-jupyterhub.readthedocs.io/en/latest/)

What's Next?

- JupyterLab
    - Next iteration of Jupyter Notebooks
    - "JupyterLab is a web-based interactive development environment for Jupyter notebooks, code, and data. JupyterLab is flexible: configure and arrange the user interface to support a wide range of workflows in data science, scientific computing, and machine learning. JupyterLab is extensible and modular: write plugins that add new components and integrate with existing ones."

What's Next?

- Azure Notebooks
    - Cloud-based hosting of Jupyter Notebooks
    - Provides support for R & F# in addition to Python

What's Next?

- Polynote (from Netflix)
    - At the time of this talk, has only been open sourced for a week. For more info, visit the website [polynote (https://polynote.org)](https://polynote.org)

Contact

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References/Resources

- Jupyter Project Website https://www.jupyter.org (https://www.jupyter.org)
- Jupyter Notebook Documentation https://jupyter-notebook.readthedocs.io/ (https://jupyter-notebook.readthedocs.io/)
- iPython Documentation https://ipython.readthedocs.io/en/stable/overview.html (https://ipython.readthedocs.io/en/stable/overview.html)
- Azure Notebooks Documentation https://docs.microsoft.com/en-us/azure/notebooks (https://docs.microsoft.com/en-us/azure/notebooks)
- RISE Documentation https://rise.readthedocs.io/en/maint-5.5/ (https://rise.readthedocs.io/en/maint-5.5/)
- Real Python:"Jupyter Notebook: An Introduction https://realpython.com/jupyter-notebook-introduction/ (https://realpython.com/jupyter-notebook-introduction/)
- Python Data Science Handbook by Jake VanderPlas https://github.com/jakevdp/PythonDataScienceHandbook (https://github.com/jakevdp/PythonDataScienceHandbook)

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