Deciding Which Technologies to Adopt, and When

Wed June 9, 1:30-2:45pm Central Time

Deciding Which Technologies to Adopt, and When

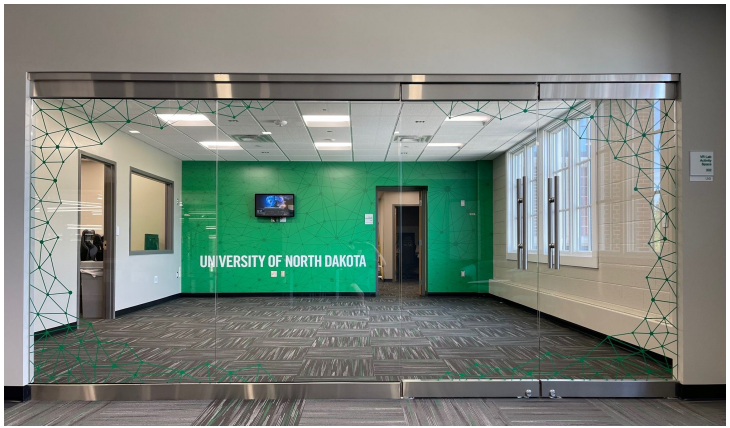
Panelist

- Aaron Bergstrom, University North Dakota
- Sean Cleveland, University of Hawaii - System
- Mahmood M. Shad, Harvard University
- Karsten Siller, University of Virginia
- Prasad Maddumage, Florida State University

Moderator

- Kiran Mhatre, Harvard University

Extended Reality: Virtual, Mixed, and Augmented



Aaron Bergstrom
Computational Research Center
University of North Dakota

Extended Reality: Virtual, Mixed, and Augmented

- **Extended Reality**
  - Category that groups Virtual, Augmented, and Mixed
  - Some form of computer graphics that connects 2D and 3D imagery with the physical world

- **Virtual Reality**
  - An interactive video game “like” environment that uses 3D graphics to display a computer generated reality to the user.
  - Usually with 3D Stereoscopic Displays

- **Mixed Reality**
  - Virtual Reality environment with additional real-time real-world imagery mixed in with the 3D graphics of the interactive environment.

Extended Reality: Virtual, Mixed, and Augmented

- **Virtual Reality**

- **Mixed Reality**

Extended Reality: Virtual, Mixed, and Augmented

- **Augmented Reality**
  - Real-time, real-world display where the real-world imagery takes priority, but the 3D computer graphics augments the information available in the scene

Heads Up Display

Virtual Product Tryouts

Extended Reality: Virtual, Mixed, and Augmented

- **Augmented vs Mixed Reality**
  - Depends largely on the focus of the interactive environment.
  - Can be a continuum that does not have a hard divider.

Other Interfaces and Emerging Technologies

by
Sean B. Cleveland Ph.D.
University of Hawaii -System
Information Technology Services -Cyberinfrastructure

Adoption

Initial

- Cost – Free (vendor grants/free equipment/service/support)
- Grant funded projects (MRI, CC*, domain etc)
- Existing service/infrastructure disappearing (G-Drive for education)
- Researcher/PI Driven need
- Scope (individual, lab, dept, campus, system, multi-institutional ...)
- Can we publish on it? Will it be a catalyst?

Sustainability

- Researcher funding available (service model, collaborative grants, MRI, CC* etc)
- Trending topic within research and funding agencies or national/state/institutional priority so institutional investments
- Current staff experience/expertise related to adoption/maintenance

Science Gateways

What is a Gateway?

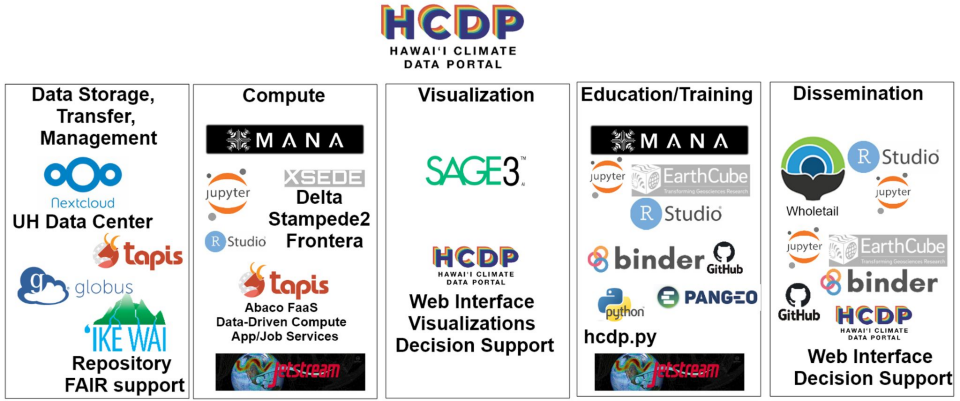
Science gateways allow science & engineering communities to access shared data, software, computing services, instruments, educational materials, and other resources specific to their disciplines

Why?

- Web accessible usually
- Lower barrier to entry
- Collaborative
- Data & Compute together
- Visualization
- Provenance
- Dissemination
- FAIR

- Hosted elsewhere or onsite
- Leverage existing communities

SGCI
Science Gateways Community Institute
sciencegateways.org



Human CI – ITS CI and HI-DSI

HAWAI'I DATA SCIENCE

Emerging

- Data/Event Driven Compute
  - Sensors, Streaming, IoT and Edge
- Serverless (Lambda/Function-as-a-Service)
  - AI services (Sage3 visualization)
- Cloud Integration
  - Virtual Machines/Containers (Jetstream 2)
  - Commercial Cloud offerings (storage,compute, AI, domains like bio)
- Security
  - MFA, Oauth, SciTokens etc (can we afford not too - Vcenter/ransomware attacks etc)

Open OnDemand

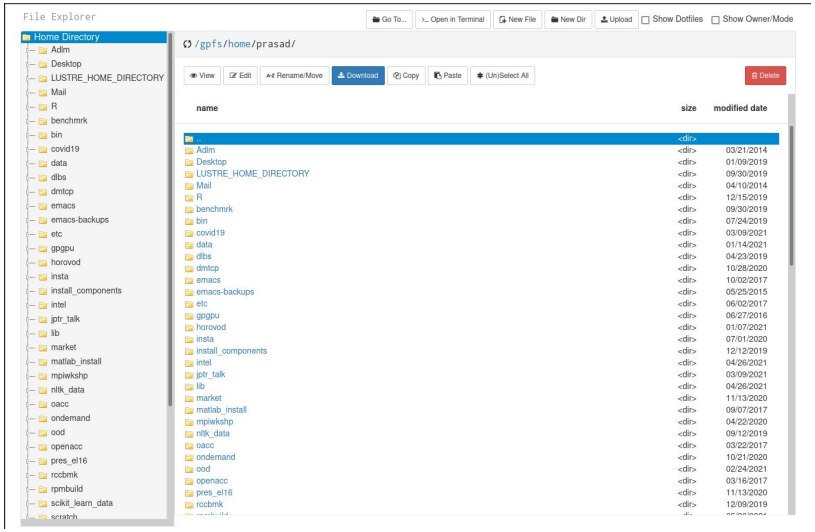
by
Prasad Maddumage
Research Computing Center
Florida State University

What is OPEN OnDemand

- Open-source HPC portal developed by Ohio Supercomputing Center https://openondemand.org
- Easy access to HPC resources through GUI interface
  - No need to learn Linux commands
  - No need of third party software (eg: Putty)
- Only need a web browser to connect to HPC

Features of OpenOnDemand

- Easy file access
  - Upload, download, view, and edit files within the same browser
- Command-line shell access
  - No need to use putty or any other software
- Job management and monitoring
  - Submit, cancel, and check status of jobs.
- Run interactive jobs
  - MATLAB, Jupyter notebook, R Studio, VisIt, ...
- Connect to a compute node to run a graphical desktop environments


File Explorer
Go To...
Open in Terminal
New File
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Show Dotfiles
Show Owner/Mode
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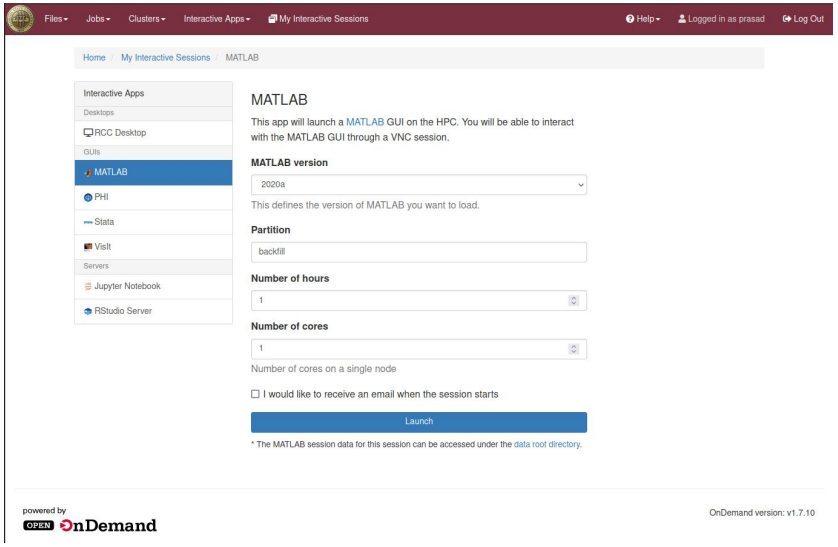
Files
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Interactive Apps
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RCC Desktop
GUIs
MATLAB
PHI
Stata
VisIt
Servers
Jupyter Notebook
RStudio Server
MATLAB
This app will launch a MATLAB GUI on the HPC. You will be able to interact with the MATLAB GUI through a VNC session.
MATLAB version
2020a
This defines the version of MATLAB you want to load.
Partition
backfill
Number of hours
1
Number of cores
1
Number of cores on a single node
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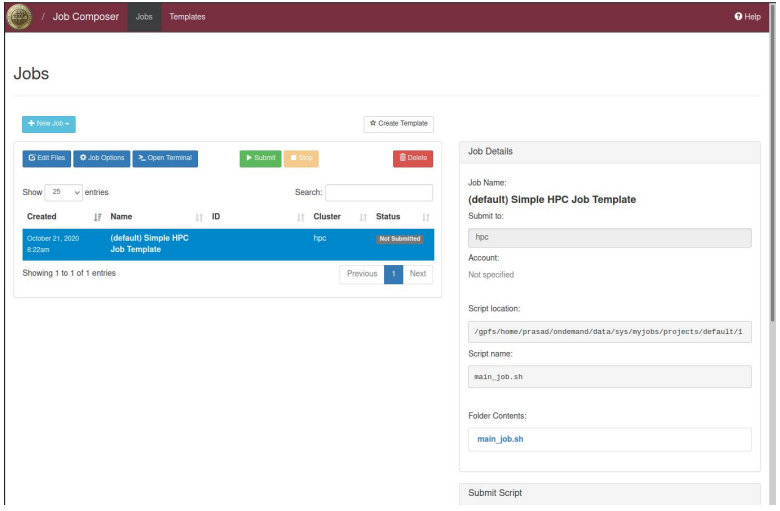
Launch
* The MATLAB session data for this session can be accessed under the data root directory.
powered by
OPEN OnDemand
OnDemand version: v1.7.10


Job Composer
Jobs
Templates
Help
Jobs
New Job
Create Template
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Job Options
Open Terminal
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Job Details
Job Name:
(default) Simple HPC Job Template
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Account:
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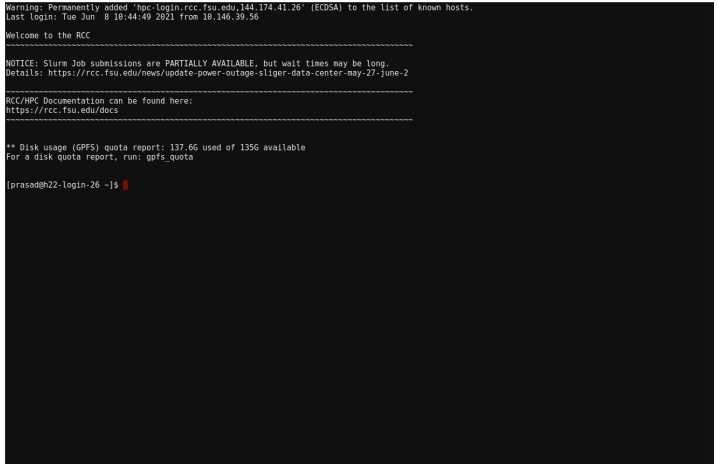
Script location:
/gpfs/home/prasad/ondemand/data/sys/myjobs/projects/default/1
Script name:
main_job.sh
Folder Contents:
main_job.sh
Submit Script


Warning: Permanently added 'hpc-login.rcc.fsu.edu,144.174.41.26' (ECDSA) to the list of known hosts.
Last login: Tue Jun 8 10:44:49 2021 from 10.146.39.56
Welcome to the RCC
NOTICE: Slurm Job submissions are PARTIALLY AVAILABLE, but wait times may be long.
Details: https://rcc.fsu.edu/news/update-power-outage-sliger-data-center-may-27-june-2
RCC/HPC Documentation can be found here:
https://rcc.fsu.edu/docs
** Disk usage (GPFS) quota report: 137.6G used of 135G available
For a disk quota report, run: gpfs_quota
[prasad@h22-login-26 ~]$

JupyterLab & Software Containers

Karsten Siller
Research Computing

JupyterLab and Containers

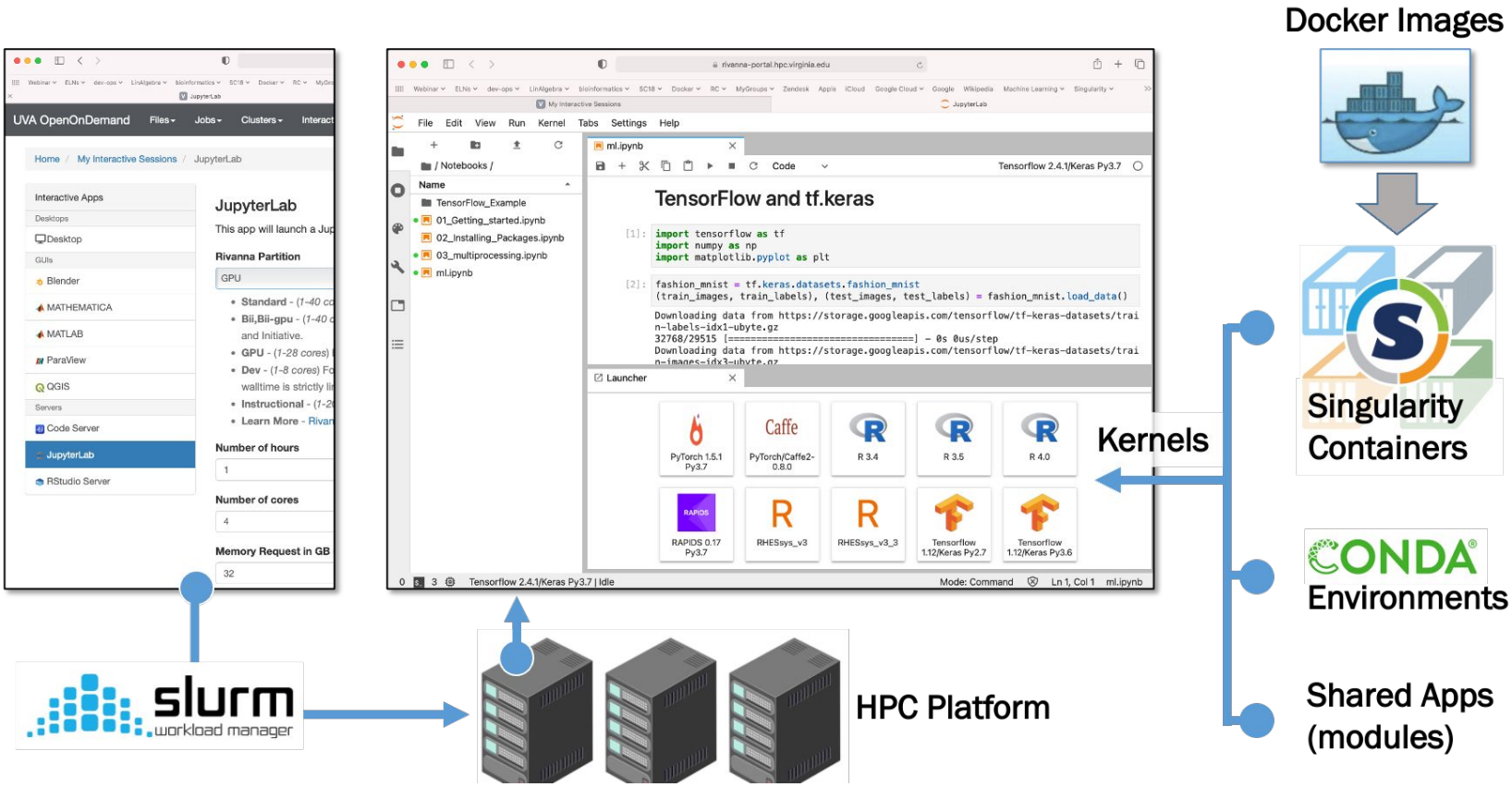
JupyterLab

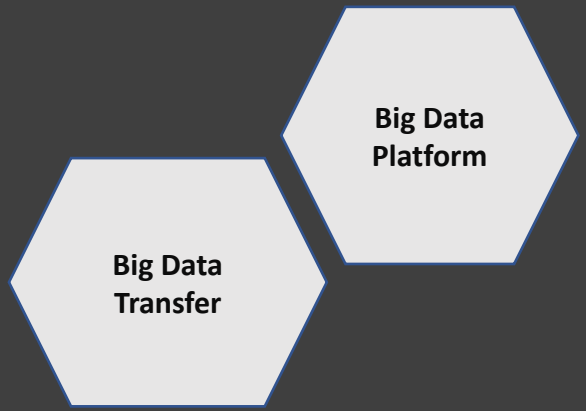
- A web-based interactive development environment for Jupyter notebooks, code, and data.
- Popular in data science, scientific computing, and machine learning.

Containers

- Package application code/executable and all its dependencies needed to run it,
- Provide lightweight virtualization at the operating system level,
- Offer portability of application across the different environments.
- Several container projects are specifically targeted at HPC environments.

JupyterLab and Containers





FAS RESEARCH COMPUTING
HARVARD UNIVERSITY
FACULTY OF ARTS & SCIENCES

Big Data Platform | Big Data Transfer

Mahmood M. Shad

FAS Research Computing

Harvard University

June 9th, 2021

Big Data Platform Diagram

FAS RESEARCH COMPUTING
HARVARD UNIVERSITY
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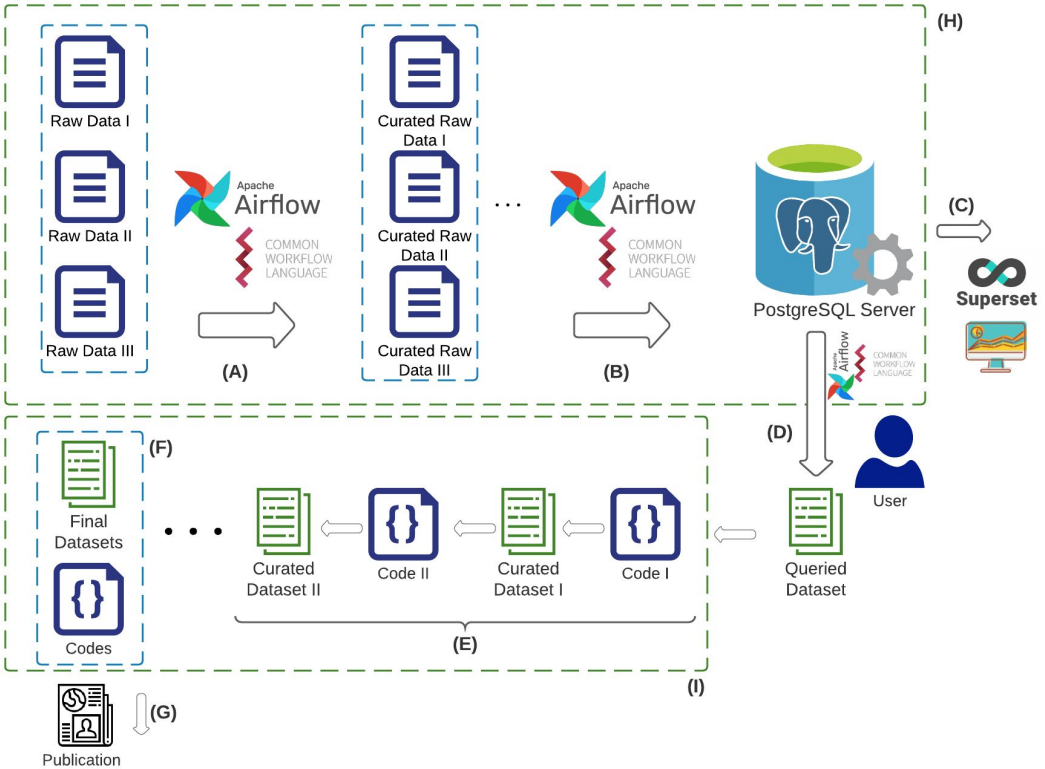
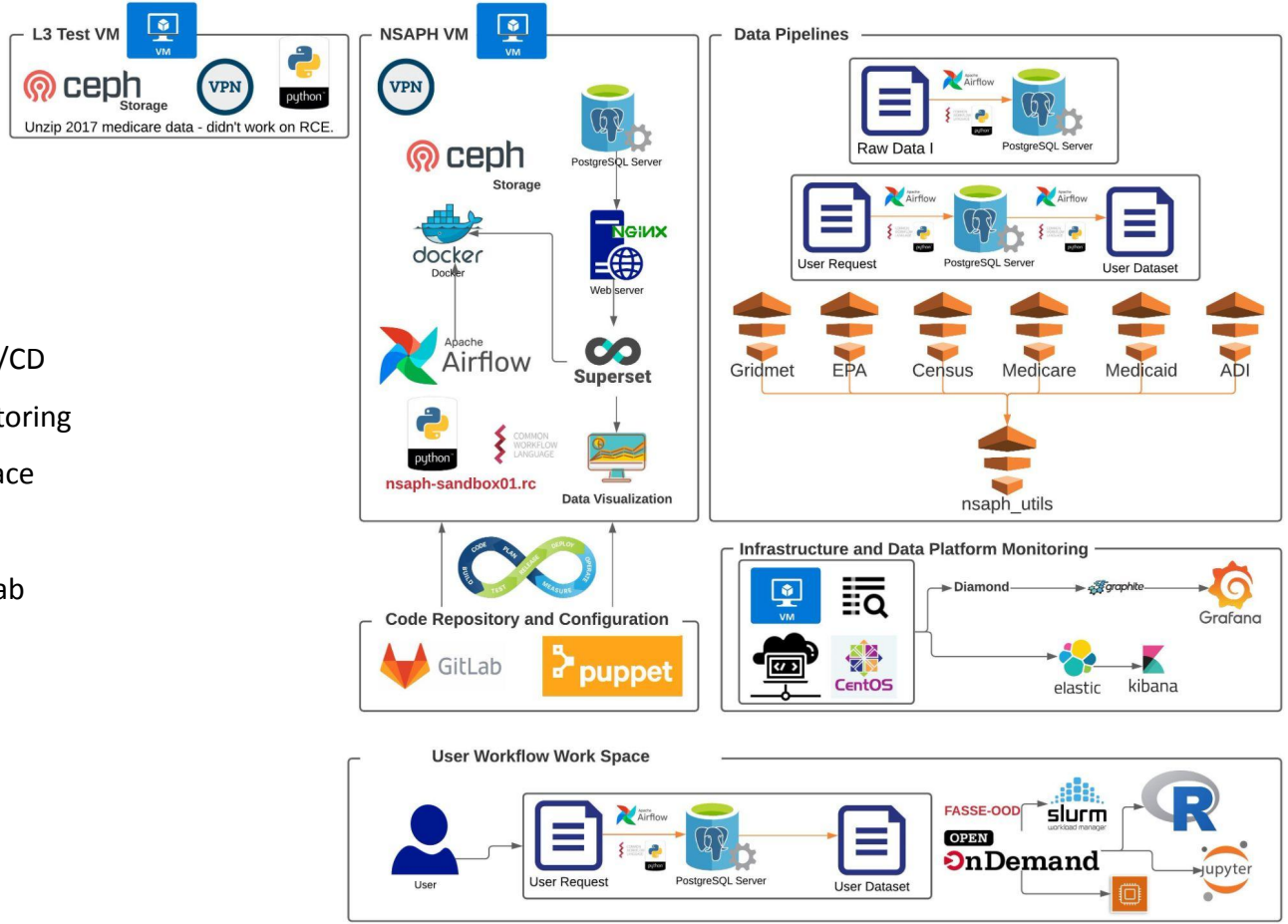
Big Data Platform Components

- Infrastructure: Networking
- Infrastructure: VM
- Infrastructure: Puppet
- Infrastructure: PostgreSQL
- Infrastructure: Superset
- Infrastructure: Security / L3
- Infrastructure: VPN
- Infrastructure: Gitlab-int
- Infrastructure: CI/CD
- Infrastructure: Storage
- Infrastructure: Web Server
- Infrastructure: Vault
- Data: Raw data
- Data: Curated raw data
- Data: Structured data - DB
- User: User datasets
- User: Data request file
- Compute: Secure / FISMA (TBA)
- Monitoring: Grafana / ES-Kibana



Big Data Platform - System Diagrams

- **Components**
  - L3 VM
  - L3 Test VM
  - Data Pipelines
  - Code Repo, Configuration, CI/CD
  - Infrastructure and App Monitoring
  - User Workflow and Work Space
  - Open OnDemand
    - Jupyter Notebook / Lab
    - R Studio
    - MATLAB
    - ….



- **Endpoints**
  - Managed Endpoint
  - Personal Endpoint
  - Different transfer settings
  - Single Sign-On (SSO)