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
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 OnDemand

- Open-source HPC portal developed by Ohio Supercomputing Center [https://openondemand.org](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 OnDemand

- **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**
JupyterLab & Software Containers
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
Big Data Platform | Big Data Transfer

Mahmood M. Shad
FAS Research Computing
Harvard University

June 9th, 2021
**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)

1. A user selects file(s) to share and sets access permissions for individuals or groups.

2. Globus tracks shared files - no need to move files to cloud storage.

3. User B logs in to Globus to access shared file(s).