

# Using Open OnDemand for Training and Education



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Ohio Supercomputer Center

# Webinar Agenda

1. **About Open OnDemand**
2. The 1.3 release & upcoming 1.4, 1.5, 1.6 release features
3. Future funding and collaboration
4. Using Open OnDemand for Education & Training



# Staying in Touch

- Visit our website
  - <http://openondemand.org>
- Use our Discourse
  - <https://discourse.osc.edu/c/open-ondemand>
- Join our mailing list
  - <https://lists.osu.edu/mailman/listinfo/ood-users>
- Our webinars are planned roughly quarterly
  - Let us know what you'd like to learn about next

**OPEN OnDemand**

Open-source project based on the Ohio Supercomputer Center's OnDemand platform

[View On GitHub](#) [Read The Docs](#) [Join the Mailing List](#)

Open OnDemand is an NSF-funded open-source HPC portal based on OSC's original OnDemand portal. The goal of Open OnDemand is to provide an easy way for system administrators to provide web access to their HPC resources, including, but not limited to:

- Plugin-free web experience
- Easy file management
- Command-line shell access
- Job management and monitoring across different batch servers and resource managers
- Graphical desktop environments and desktop applications

See the [documentation](#) for installation directions, app development tutorials, and an overview of the components and applications that make up OnDemand.

### Webinars

Date	Title	Slides	Media
2017-03-08	Introducing Open OnDemand	<a href="#">Download</a>	<a href="#">Video</a>
2017-06-07	Open OnDemand: Supporting your HPC needs now more than ever	<a href="#">Download</a>	<a href="#">Video</a>
2017-09-06	Open OnDemand - Jupyter, iHPC, and Authentication	<a href="#">Download</a>	<a href="#">Video - Missing 1st 9.5 min Audio - Complete</a>

Further reading after reading the documentation:

- [OSC App Deployment Strategy](#)
- [OSC CILogon Authentication Strategy](#)

This project is maintained by the Ohio Supercomputer Center (OSC), a member of the Ohio Technology Consortium, the technology and information division of the Ohio Department of Higher Education.

This material is based upon work supported by the National Science Foundation under grant numbers 1534949.

# Supercomputing. Seamlessly.

## Open OnDemand: Open, Interactive HPC Via the Web

Provides an easy to install and use, web-based access to supercomputers, resulting in intuitive, innovative support for interactive supercomputing.

Features include:

- Plugin-free web experience
- Easy file management
- Command-line shell access
- Job management and monitoring
- Graphical desktop environments and applications

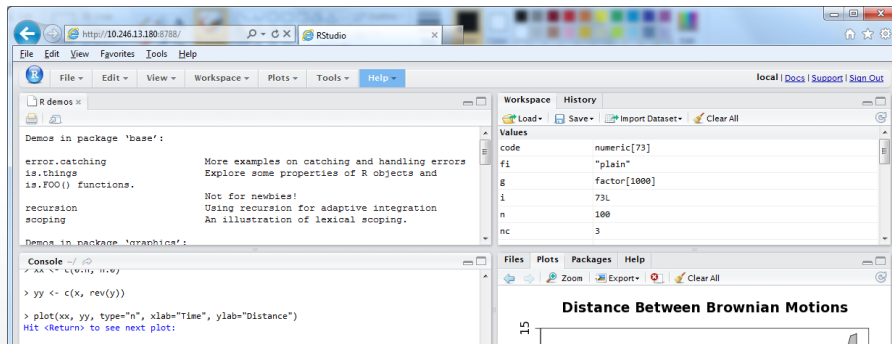


# Interactive Apps

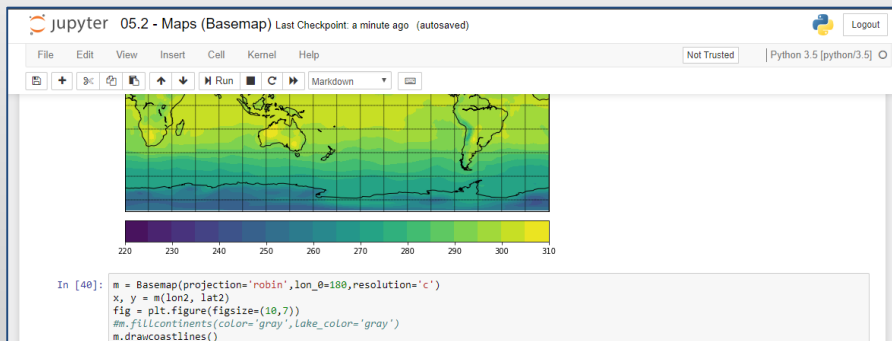
&

# Cluster Access

## RStudio Server – R IDE

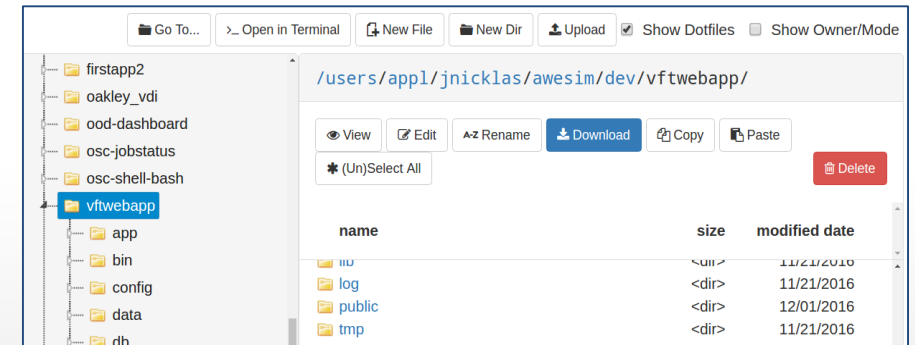


## Jupyter Notebook – Python IDE

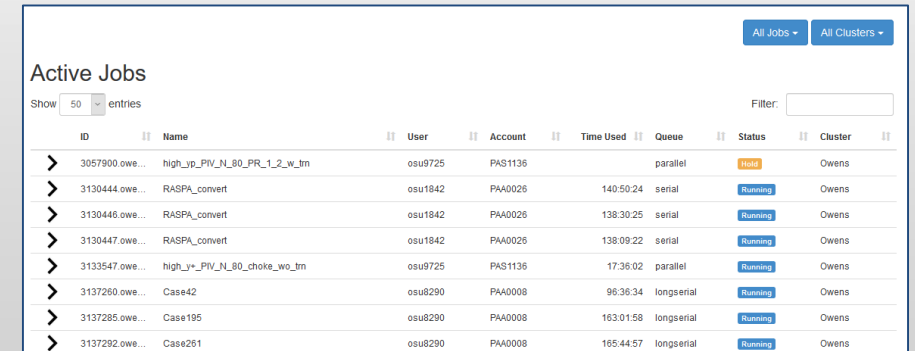


And many more, such as ANSYS Workbench, Abaqus/CAE, MATLAB, Paraview, COMSOL Multiphysics

## File Access (browse, edit, etc)

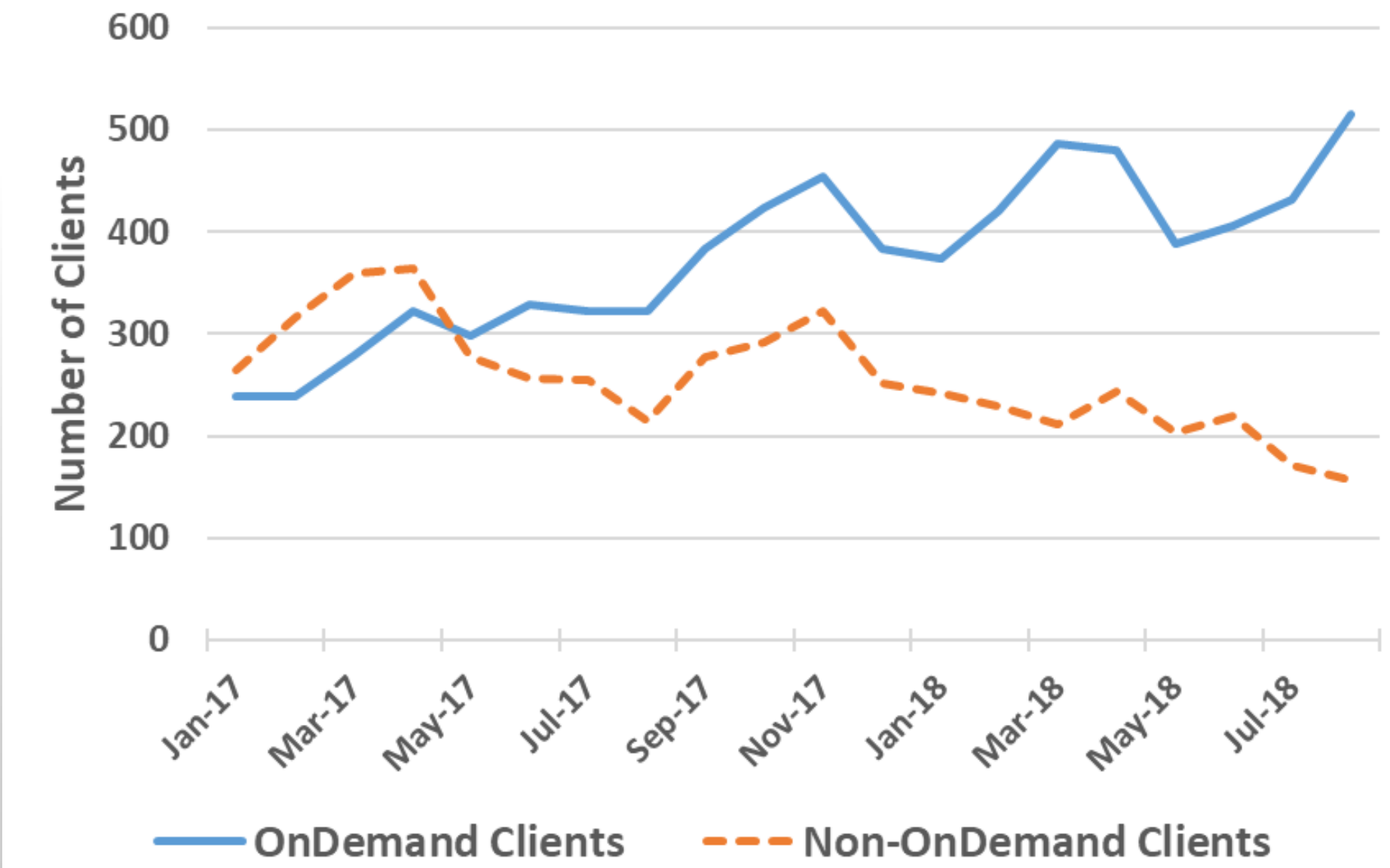


## Manage Jobs (view, submit, etc)

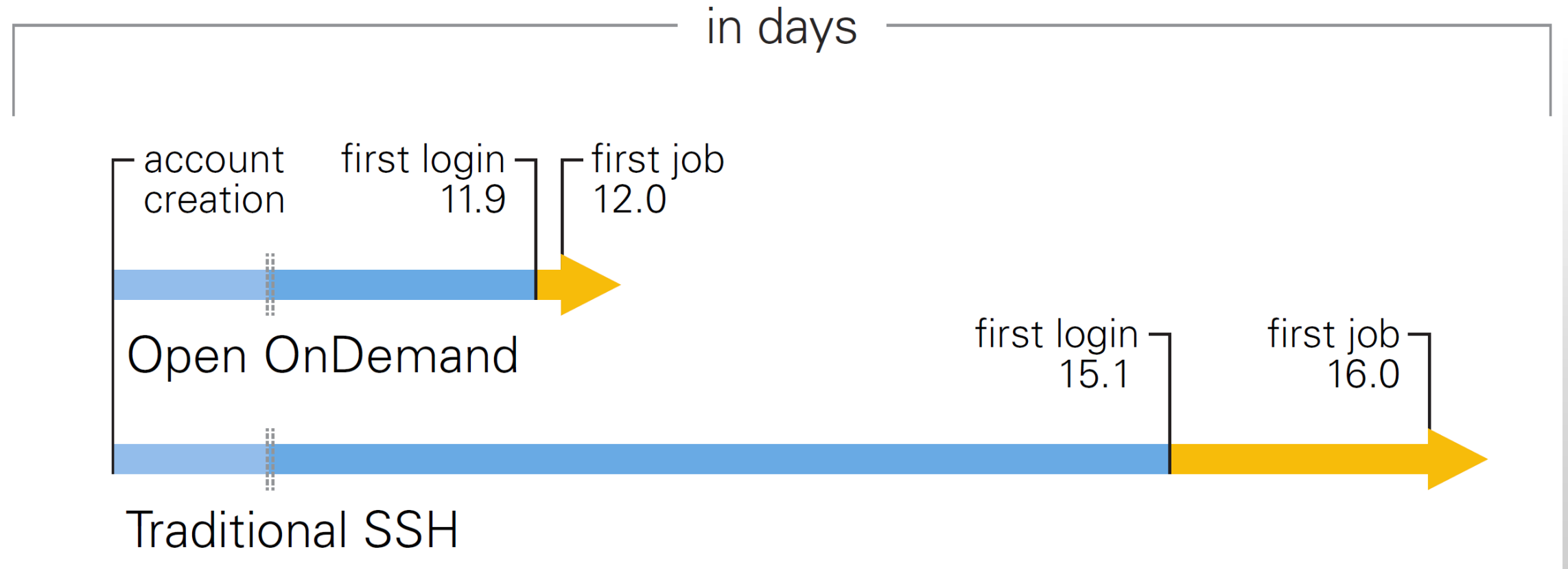


And many more, such as in-browser SSH terminal, job constructors, VNC desktops

# OSC OnDemand Platform Clients



# OSC OnDemand: Faster Time to Science



# Production Deployments



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# In Process of Installing

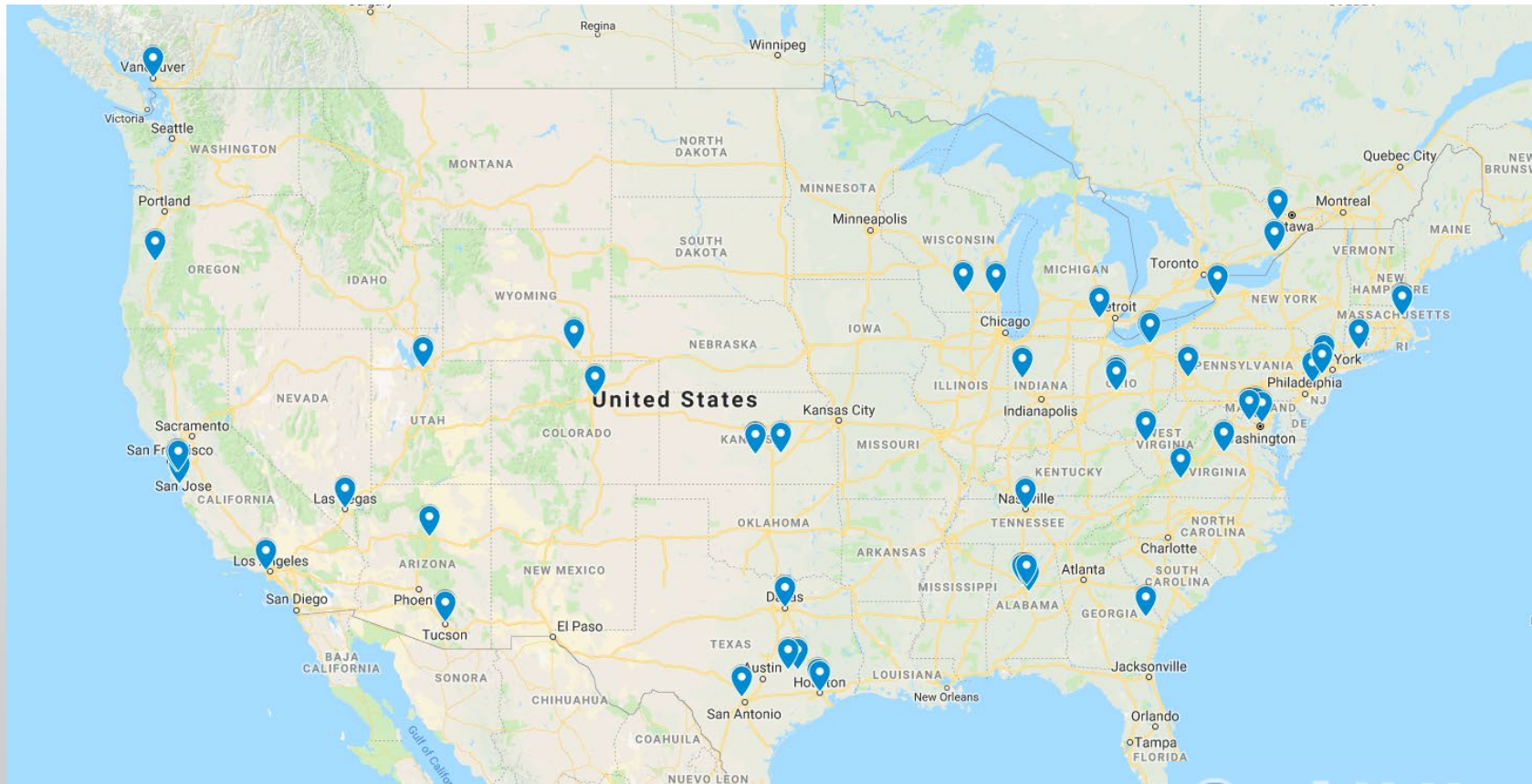


# Interested / Evaluating



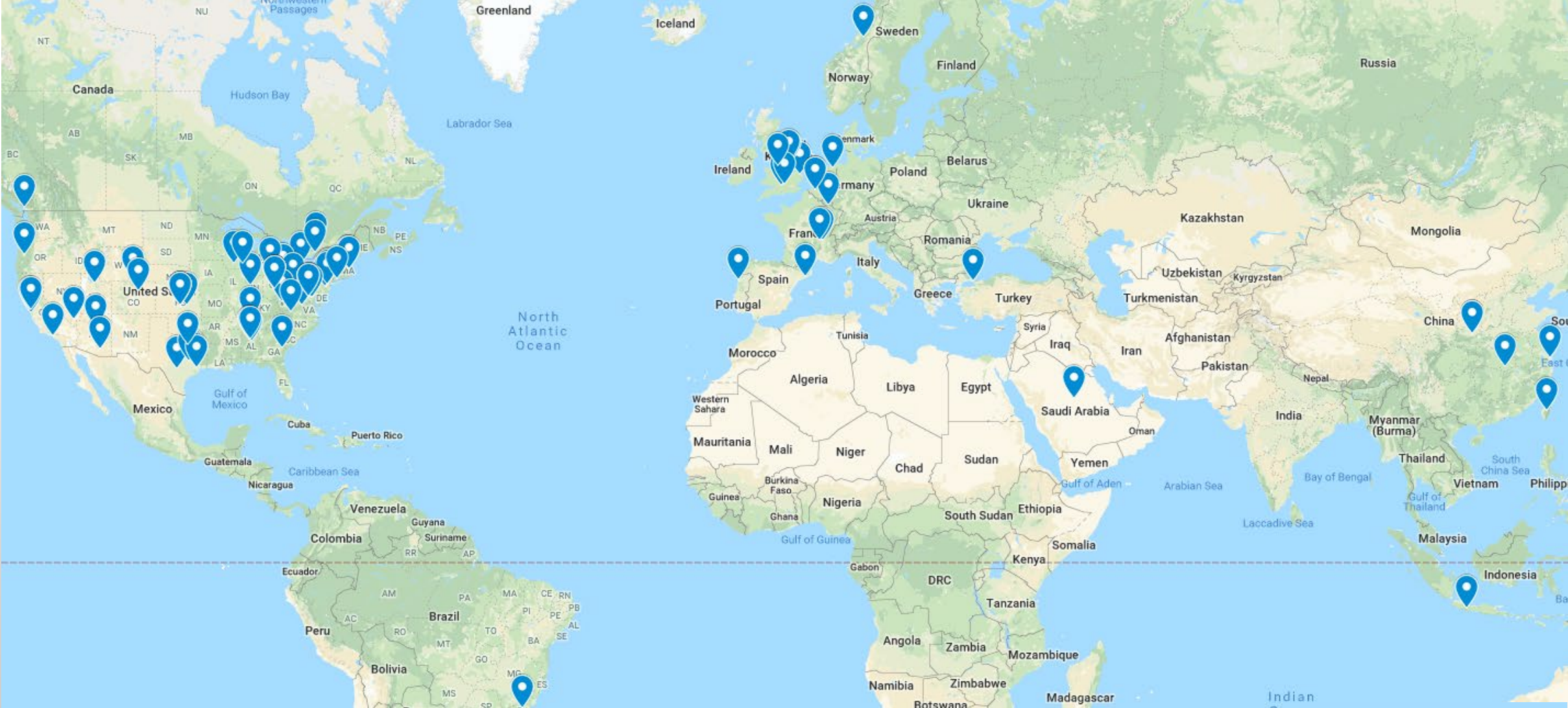
# Approx Number of Institutions based on RPM logs

- 50 US Institutions
- 26 International Institutions



- Map data @2018 Google, INEGI, ORION-ME

# Approx Number of Institutions based on RPM logs



• Map data @2018 Google, INEGI, ORION-ME



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**nDemand**

# Open OnDemand Current Version (1.3 Release, May 8 2018)

- RPM-based installation
- Xfce support in Interactive Apps
- Configuration changes without rebuilding apps
- 9 other features called out in release notes

## Features for upcoming version 1.4 (Sep) include

- Update SCL dependencies to latest supported on both CentOS/RHEL6 & 7 (Ruby, Node.js, Git, Passenger, NGINX)
- Security enhancements, including ability to whitelist directories that a user can navigate to in the files app
- Optional quota limit warnings on dashboard
- More configuration options for interactive app web forms

## Proposed Features for 1.5 (Nov) and 1.6 (Jan) include

- Sun Grid Engine support
- Performance Improvements
- Support for Large File Transfers
- Peer to Peer App Sharing
- Job Array support
- Job Composer to manage jobs from arbitrary paths
- Configurable job options in Job Composer (such as queue)
- Better support for Jupyter and RStudio using Singularity

**Looking for community feedback on features in the next release**  
Visit [openondemand.org](https://openondemand.org) for instructions on how to provide feedback



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# Future Funding and Collaboration

- Currently in year three of an NSF SI2 award (#1534949) to develop OnDemand
- Awarded a follow on NSF CSSI award (#1835725) to develop OnDemand 2.0
  - Project runs from Jan 2019 to Dec 2023
  - Collaborators include SUNY Buffalo and Virginia Tech
  - Project activities include:
    - enhancing OnDemand
    - integrating XDMoD
    - extending the portal to provide other methods of access for other science domains
    - improving the scaling of the system

# Community Outreach

- PEARC'18 Conference
  - OOD User Group BOF
  - Jupyter / Rstudio in OOD Paper
- Gateways'18 Conference
  - OOD Overview Poster
  - Jupyter – Spark in OOD Presentation
- SC'18 Conference
  - Daily demos of OOD in OSC's booth
  - Initial planning discussions for OOD 2.0 project
- PEARC'19 Conference (anticipated)
  - OOD BOF
  - Papers / Posters

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**nDemand**

# Using Open OnDemand for Education & Training

- Easy to get new users started, no need to learn commands
- Great resource for hands-on workshops, everyone's environment is the same (NB: use chrome or firefox)
- Templates can be used across classes
- Apps can be used or built to access software directly

# Main Uses in Training

- Hands On Tutorials – easy to get started
  - Intro to HPC at OSC
  - Big Data with Spark
- Use and create job templates to submit jobs – highlight ease of organization and file editing
- Run an app - visual desktop

# Main Uses in Classrooms

- Interactive Apps & VDI
- Shell Access
- Creating and Running Jobs

# Walkthrough

## Review Features:

- File Explorer – transfer, edit, copy & paste
- Cluster – shell access & system status
- Apps – GUIs, VDI, and interactive jobs (show the difference)
- Jobs – Composer: submit from template, create own template & Active Jobs: queues


Open OnDemand

Files ▾

Jobs ▾

Clusters ▾

Interactive Apps ▾

 My Interactive Sessions



# Connect walkthrough to HPC concepts

- Reliance on network
- Shared resource – login nodes vs. compute, how to use scheduler
- Resources available – how to request correctly

**OPEN**



**nDemand**

# Other Education & Training Tools

- Embed tutorial documents in app
  - Example: Jupyter & Spark



A screenshot of a web-based interface for managing Jupyter environments. On the left is a sidebar menu with categories: Interactive Apps, Desktops, and GUIs. Under Desktops, there are items for Oakley Desktop, Owens Desktop, Ruby Desktop, Oakley VDI, Owens VDI, and Ruby VDI. Under GUIs, there is ANSYS Workbench. The main area displays a session titled "Jupyter + Spark (3940632.owens-batch.ten.osc.edu)" which is "Running" on "2 nodes" with "56 cores". It shows the host "o0515.ten.osc.edu", creation time "2018-10-15 11:24:06 EDT", and "Time Remaining: about 1 hour". A "Delete" button is visible. Below, it lists "Some helpful resources on using Apache Spark in a Jupyter notebook:" with links to "Apache Spark Examples" and "RDD Basics". At the bottom, there are buttons for "Connect to Jupyter" and "Open Tutorials Folder".

- Quickly create custom apps for classroom needs

Thank you! Any questions?

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Ohio Supercomputer Center

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[openondemand.org](http://openondemand.org)

# Appendix Slides

The following slides show screens related to the OnDemand walkthrough Kate demo-ed during this webinar. Please watch the webinar video to see the entire walkthrough content.

# Walkthrough – File Explorer

OSC OnDemand

Files ▾

Jobs ▾

Clusters ▾

Interactive Apps ▾

My Interactive Sessions

Home Directory

/fs/project/PZS0712

/fs/scratch/PZS0712

## Ohio Supercomputer Cen

An OH-TECH Consortium Member

File Explorer

Go To...

>\_ Open in Terminal

New File

New Dir

Upload

Show Dotfiles

Show Owner/Mode

Home Directory

- 7479989.oak-batch.osc.edu
- 7482682.oak-batch.osc.edu
- 7482705.oak-batch.osc.edu
- Amber\_GPU
- Amber\_test
- Desktop
- Documents
- Downloads
- July17-Bigdata
- Mar0917-Bigdata
- Music

/users/apl/kcahill/

View

Edit

A-Z Rename

Download

Copy

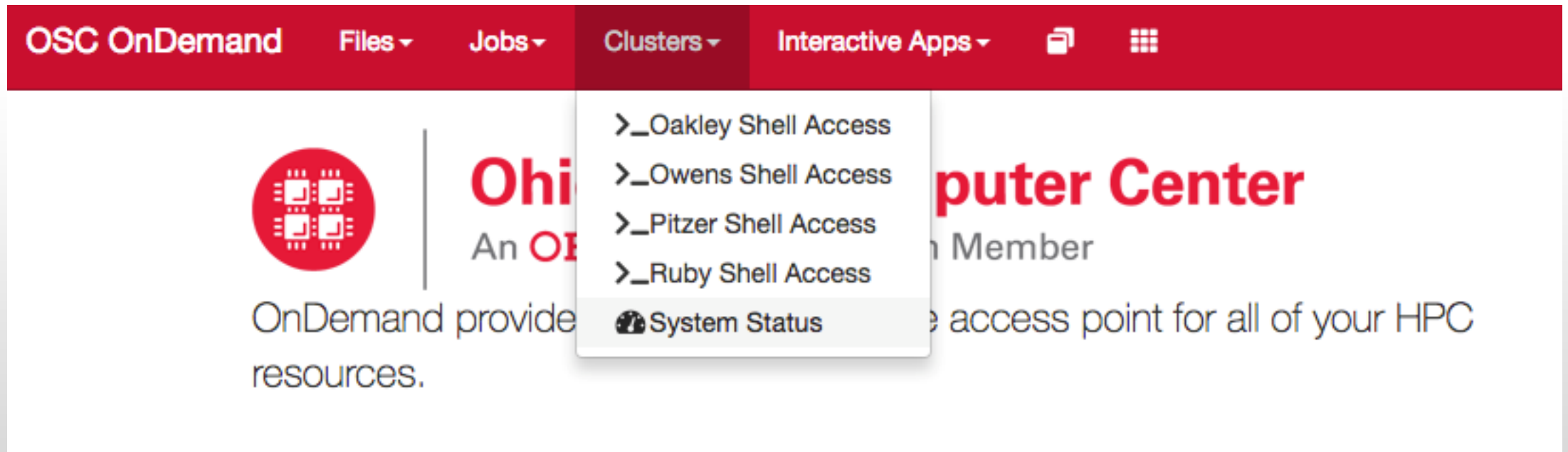
Paste

\*(Un)Select All

Delete

name	size	modified date	owner	mode
..	<dir>	.	---	---
7479989.oak-batch.osc.edu	<dir>	09/12/2016	20238	rwX r-X r-X
7482682.oak-batch.osc.edu	<dir>	09/12/2016	20238	rwX r-X r-X
7482705.oak-batch.osc.edu	<dir>	09/12/2016	20238	rwX r-X r-X
Amber_GPU	<dir>	05/22/2017	20238	rwX r-X r-X
Amber_test	<dir>	02/06/2017	20238	rwX r-X r-X

# Walkthrough – Clusters



The screenshot shows the OSC OnDemand web interface. The top navigation bar is red and contains the following items: "OSC OnDemand", "Files", "Jobs", "Clusters", and "Interactive Apps". The "Clusters" menu is open, showing a list of options: "\_Oakley Shell Access", "\_Owens Shell Access", "\_Pitzer Shell Access", "\_Ruby Shell Access", and "System Status". The "System Status" option is highlighted. Below the navigation bar, the main content area features the Ohio State University logo (a red circle with four white squares) and the text "Ohio State University Computer Center". To the right of the logo, the text "An Ohio State University Member" is visible. Below the logo, the text "OnDemand provides..." is partially visible. To the right of the logo, the text "access point for all of your HPC" is visible.

OSC OnDemand Files Jobs Clusters Interactive Apps

Ohio State University Computer Center

An Ohio State University Member

OnDemand provides... access point for all of your HPC

- > \_Oakley Shell Access
- > \_Owens Shell Access
- > \_Pitzer Shell Access
- > \_Ruby Shell Access
- System Status

# Walkthrough – Apps

The screenshot displays the OSC OnDemand web interface. At the top, a red navigation bar contains the following items: "OSC OnDemand", "Files", "Jobs", "Clusters", "Interactive Apps", a printer icon, and a grid icon. The "Interactive Apps" dropdown menu is open, showing three categories: "Desktops", "GUIs", and "Servers".

**Desktops**

- Oakley Desktop
- Owens Desktop
- Ruby Desktop
- Oakley VDI
- Owens VDI
- Ruby VDI

**GUIs**

- ANSYS Workbench
- Abaqus/CAE
- COMSOL Multiphysics
- MATLAB
- ParaView
- VMD

**Servers**

- Jupyter + Spark
- Jupyter Notebook
- RStudio Server

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OnDemand provides an integrated environment for all of our resources.

## Message of the Day

### 2018-10-15 - DOWNTIME FOR A

A downtime for all HPC systems is scheduled for Friday, Oct. 23, 2018, from 12:00 a.m. to 12:00 p.m. This downtime will affect the Oakley, Ruby and Owens Clusters. Access to my.osc.edu, and access to storage will not be affected.

In preparation for the downtime, the batch system is returned to production status.

For more information, see <https://bit.ly/2O...>


**OBER 23, 2018**  
Friday, Oct. 23, 2018  
Log in servers. Login server  
s that cannot l  
wntime and the


# Walkthrough – Apps: VDI vs. Desktop


Home / My Interactive Sessions / Oakley VDI

## Interactive Apps

### Desktops


 Oakley Desktop

 Owens Desktop


 Ruby Desktop


 Oakley VDI

 Owens VDI

 Ruby VDI

### GUIs

 ANSYS Workbench

 Abaqus/CAE

 COMSOL Multiphysics

 MATLAB

 ParaView

## Oakley VDI

This app will launch an interactive desktop termed a Virtual Desktop Interface (VDI) on a login node as you will be sharing it with others. It is provisioned a desktop nearly immediately.

This is meant for lightweight tasks (such as):

- accessing & viewing files
- submitting jobs
- compiling code
- running visualization software

### Account

You can leave this blank if **not** in multiple projects.

### Number of hours

Home / My Interactive Sessions / Oakley Desktop

## Interactive Apps

### Desktops

 Oakley Desktop

 Owens Desktop

 Ruby Desktop


 Oakley VDI

 Owens VDI

 Ruby VDI

### GUIs

 ANSYS Workbench

 Abaqus/CAE

 COMSOL Multiphysics

 MATLAB

## Oakley Desktop

This app will launch an interactive desktop on one or more compute nodes. You will have full access to the resources these nodes provide. This is analogous to an interactive batch job.

### Account

You can leave this blank if **not** in multiple projects.

### Number of hours

### Number of nodes

### Node type



# Walkthrough – Apps

Home / My Interactive Sessions / ParaView

Interactive Apps

Desktops

- Oakley Desktop
- Owens Desktop
- Ruby Desktop
- Oakley VDI
- Owens VDI
- Ruby VDI

GUIs

- ANSYS Workbench
- Abaqus/CAE
- COMSOL Multiphysics
- MATLAB
- ParaView**

## ParaView

This app will launch a [ParaView](#) GUI on the [Owens Cluster](#) using a **shared node**. You will be able to interact with the ParaView GUI through a VNC session.

**Project**

You can leave this blank if **not** in multiple projects.

**Number of hours**

**Resolution**

width	1536	px	height	864	px
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\* All ParaView session data is generated and stored under the user's home directory in the corresponding [data root directory](#).

# Walkthrough – Jobs

OSC OnDemand Files Jobs Clusters Interactive Apps



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- Active Jobs
- Job Composer

OnDemand provides an integrated, single access point for all of your HPC resources.

## Jobs

+ New Job

☆ Create Template

From Default Template

From Template

From Specified Path

From Selected Job

> Open Terminal

▶ Submit

■ Stop

🗑 Delete

Search:

Created Name ID Cluster Status

September 26, 2018 10:45am	MPI Hello World		Owens	Not Submitted
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### Job Details

Job Name:

**MPI Hello World**

Submit to:

Owens

Account:

Not specified