Customizing and Extending OnDemand

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Ohio Supercomputer Center

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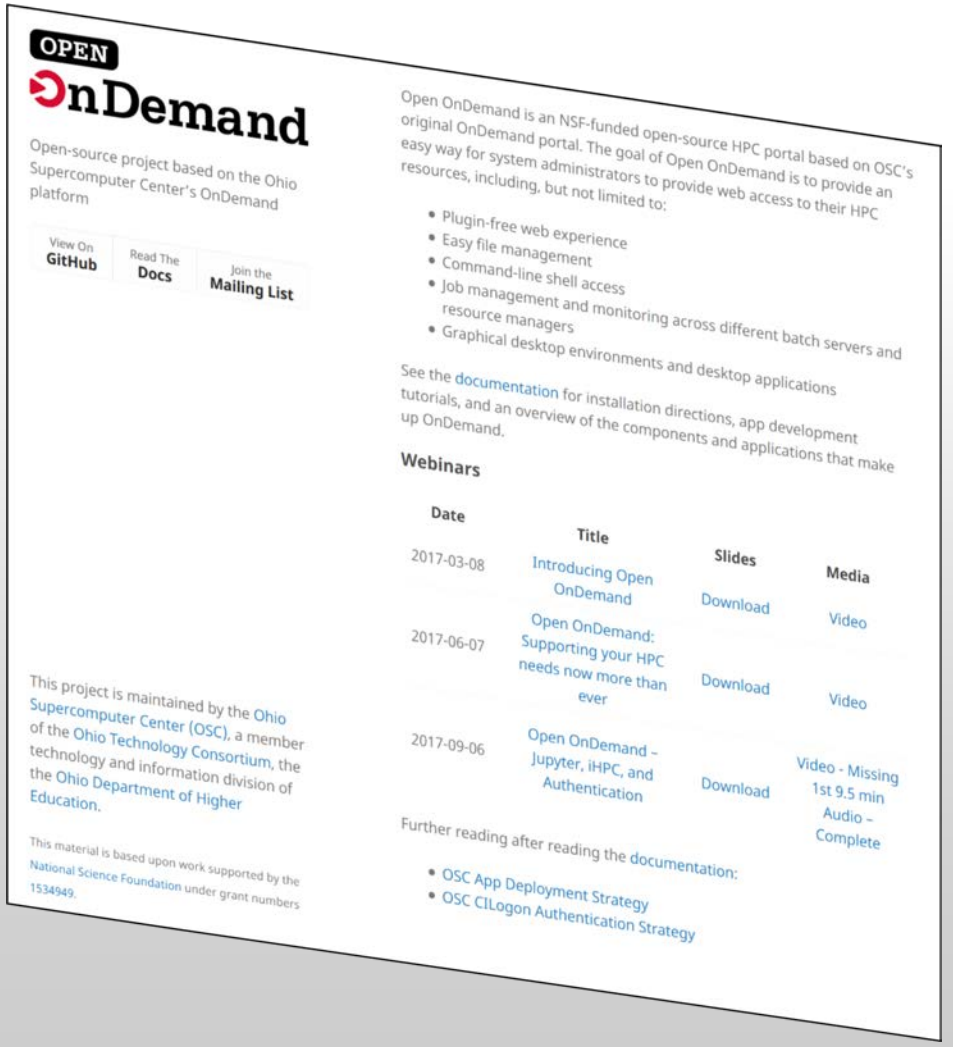
Webinar Agenda

1. **About Open OnDemand**
2. Open OnDemand 1.2 release and upcoming 1.3 release features
3. Future funding and collaboration
4. Customizing OnDemand
5. Extending OnDemand
6. Demos
    1. PSC demo of OnDemand with Jupyter
    2. Tufts demo of OnDemand with custom apps
    3. OSC demo of OnDemand with multiple GUI apps

OPEN OnDemand

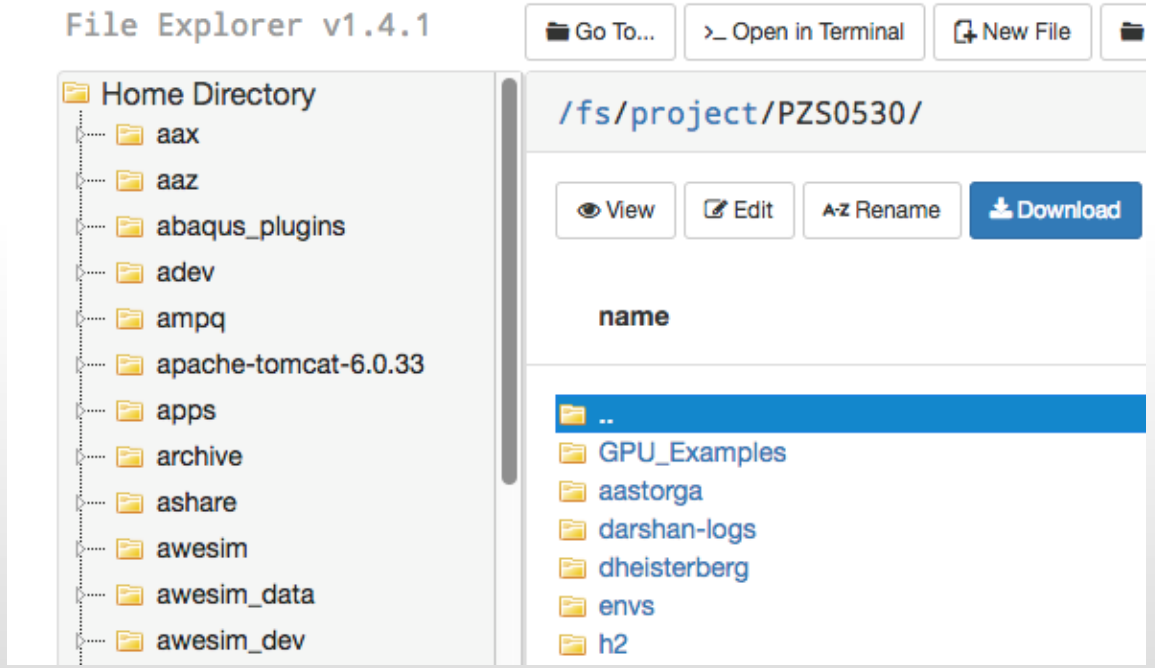
Staying in Touch

- Visit our website
  - http://go.osu.edu/ood
- 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



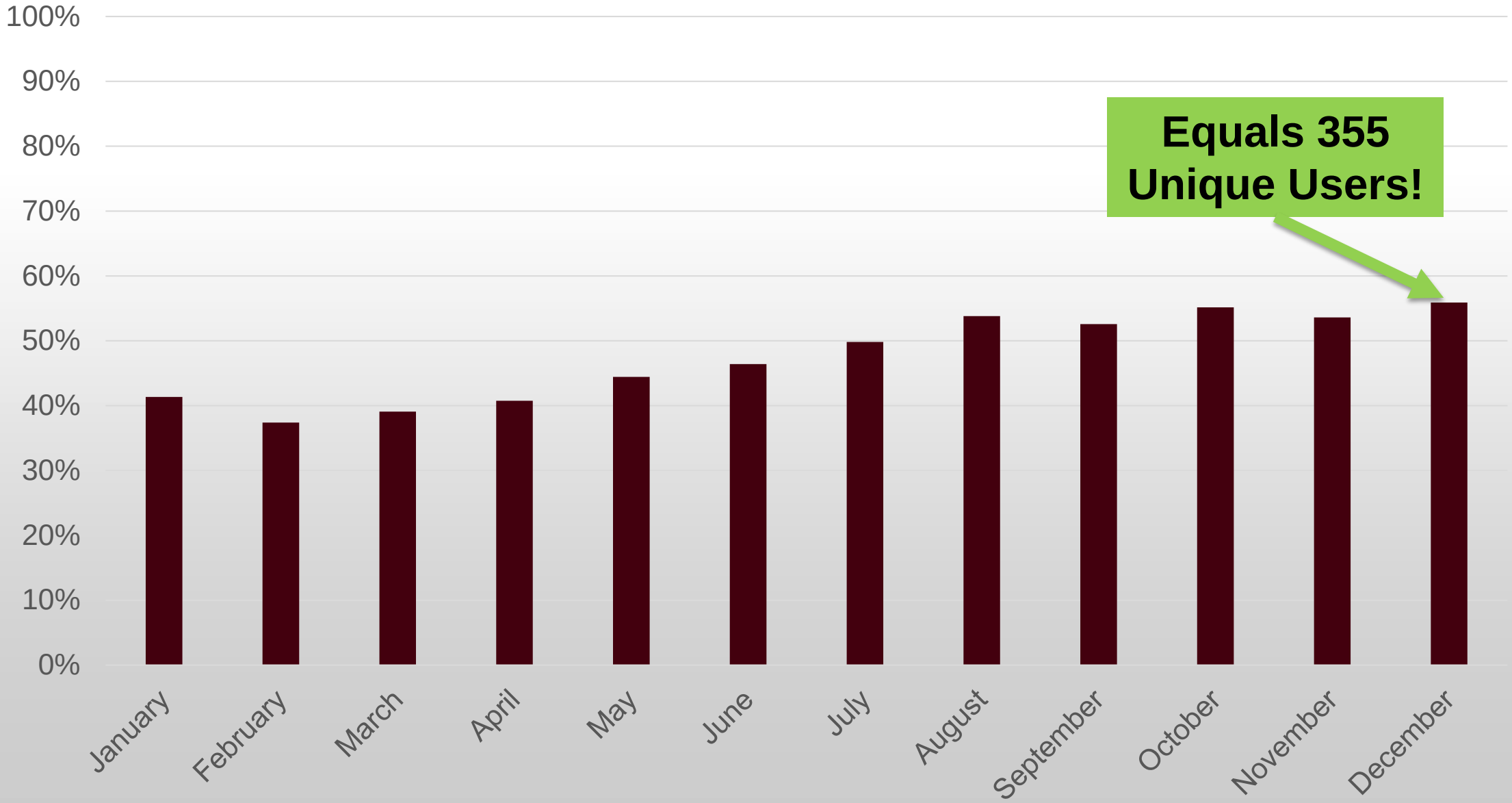
Provides Single Web-based Point of Entry for HPC Access

- User benefits
  - HPC Access
    - File access (browse, view, edit)
    - Job control (submit, monitor, delete)
    - Terminal access
    - VNC and interactive access
  - Single sign-on
  - Zero install (Completely browser based)

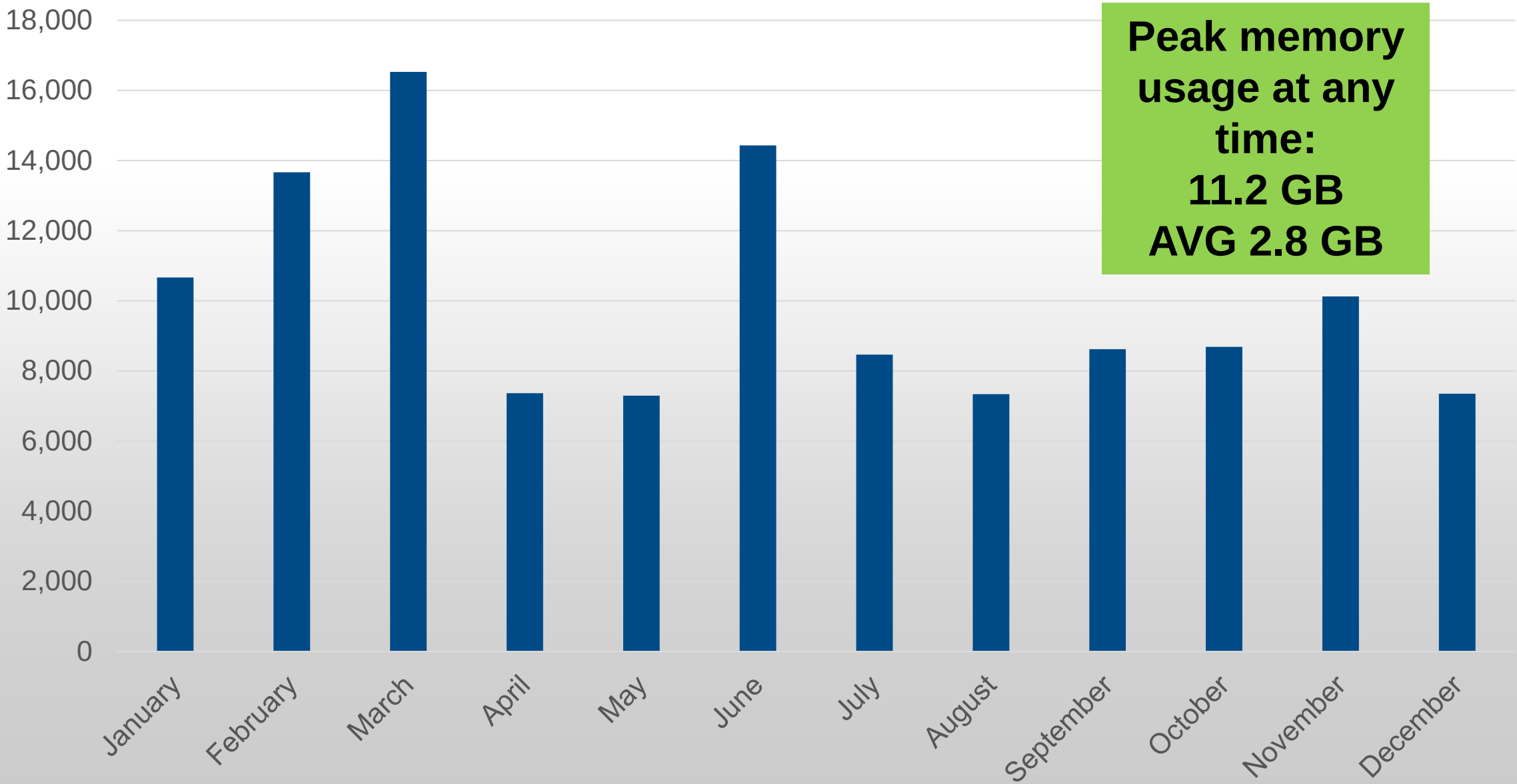


- Admin benefits
  - Firewall friendly (Keep traffic on https port)
  - Installable on a range of cluster sizes and architectures
  - Easy onboarding of users new to HPC

% OSC Users Using OSC OnDemand in 2017



OSC OnDemand: App Launches Per Month



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OPEN OnDemand

Open OnDemand Current Version (1.2 Release, Nov 3 2017)

- 1.1 Release (Sep 29, 2017)
  - Interactive apps (Jupyter)
  - App development interface
- 1.2 Release (Nov 3, 2017)
  - Bug fixes and improve documentation for 1.1 features
  - Improved documentation for configuring authentication

Some of these improvements were in direct response to community feedback

Proposed Features for 1.3 and Future Releases

- RPM based installation
- Built in usage reporting
- Better support for apps like Paraview, MATLAB and RStudio
- Community requested features, such as:
  - Job Composer usability enhancements
  - File Explorer usability enhancements
  - Better support for two factor authentication

Looking for community feedback on features in the next release

Visit go.osu.edu/ood for instructions on how to provide feedback

New Branding for Open OnDemand

- Stacked logo

- Horizontal logo

- Powered by logo

- Favicon

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OPEN OnDemand

Future Funding and Collaboration

- In year three of an NSF award to develop OnDemand
- Looking for collaborators for an NSF CSSI proposal
- Interested in collaborating on other related proposals

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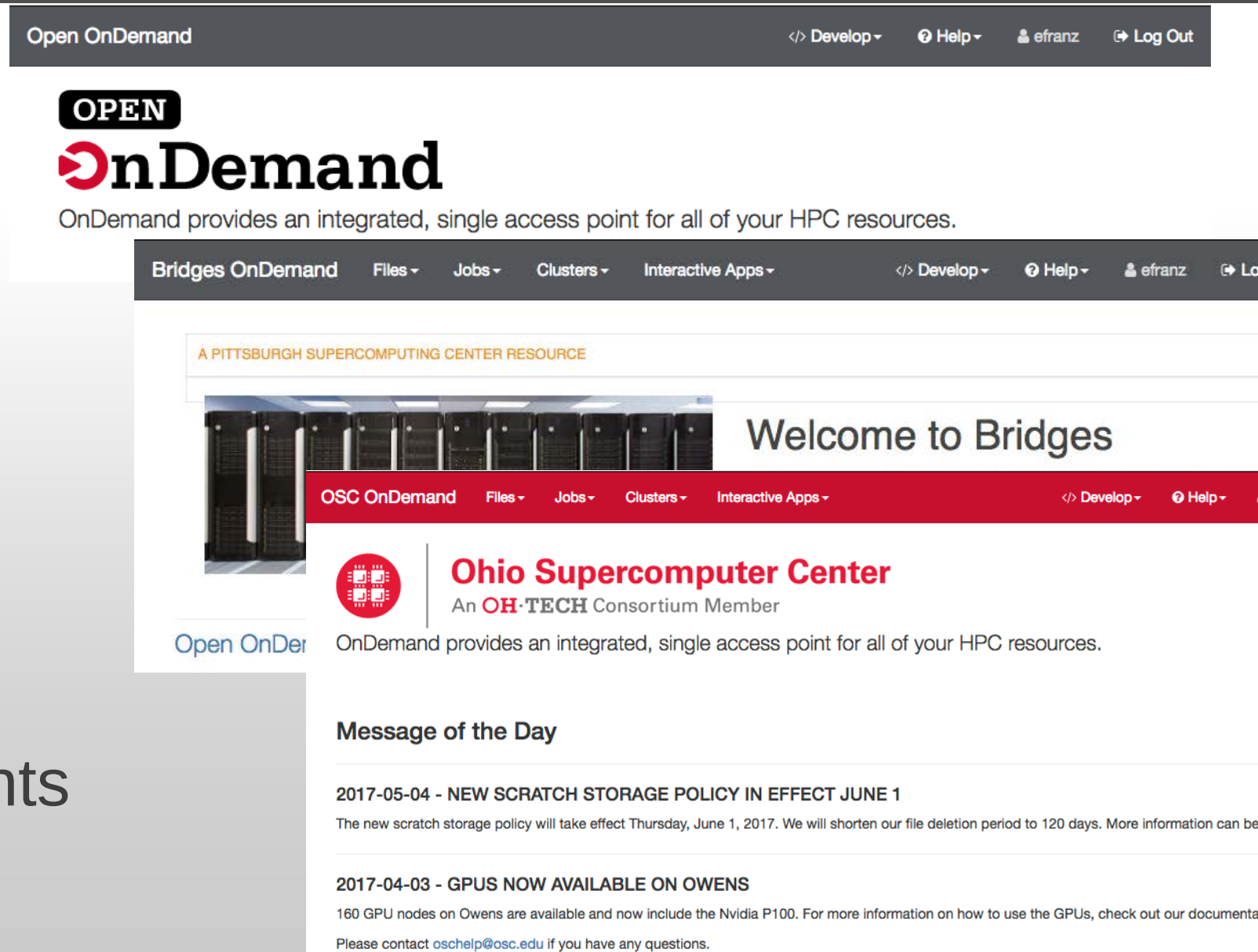
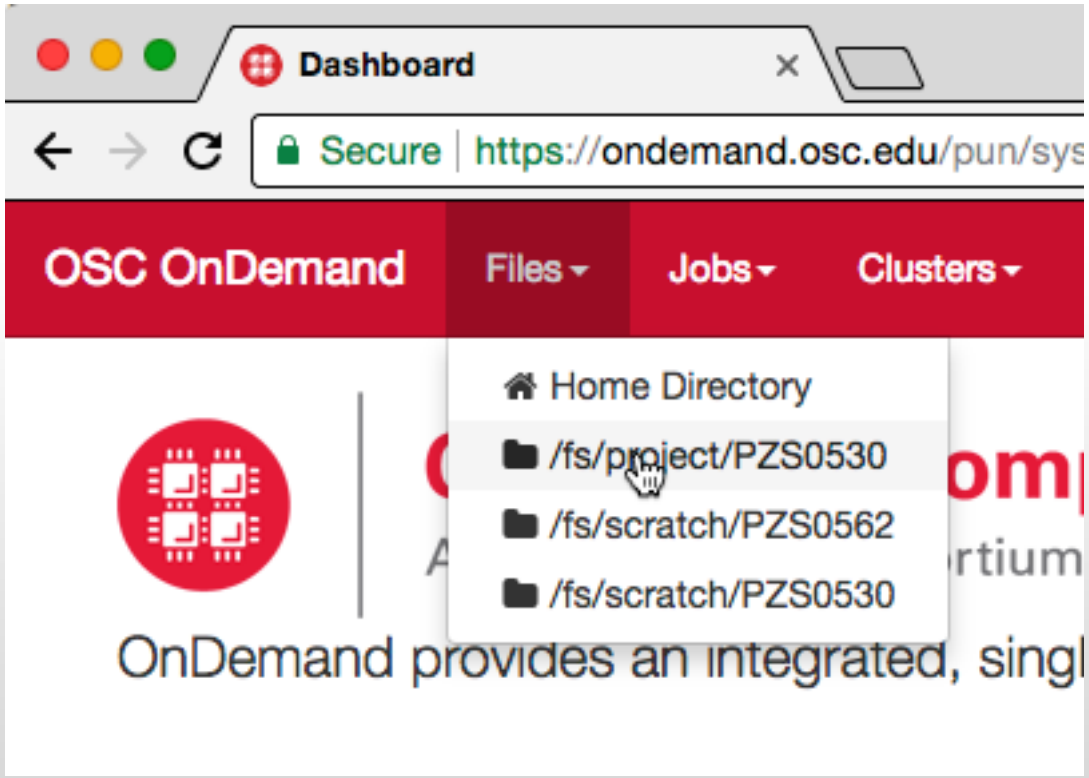
OPEN OnDemand

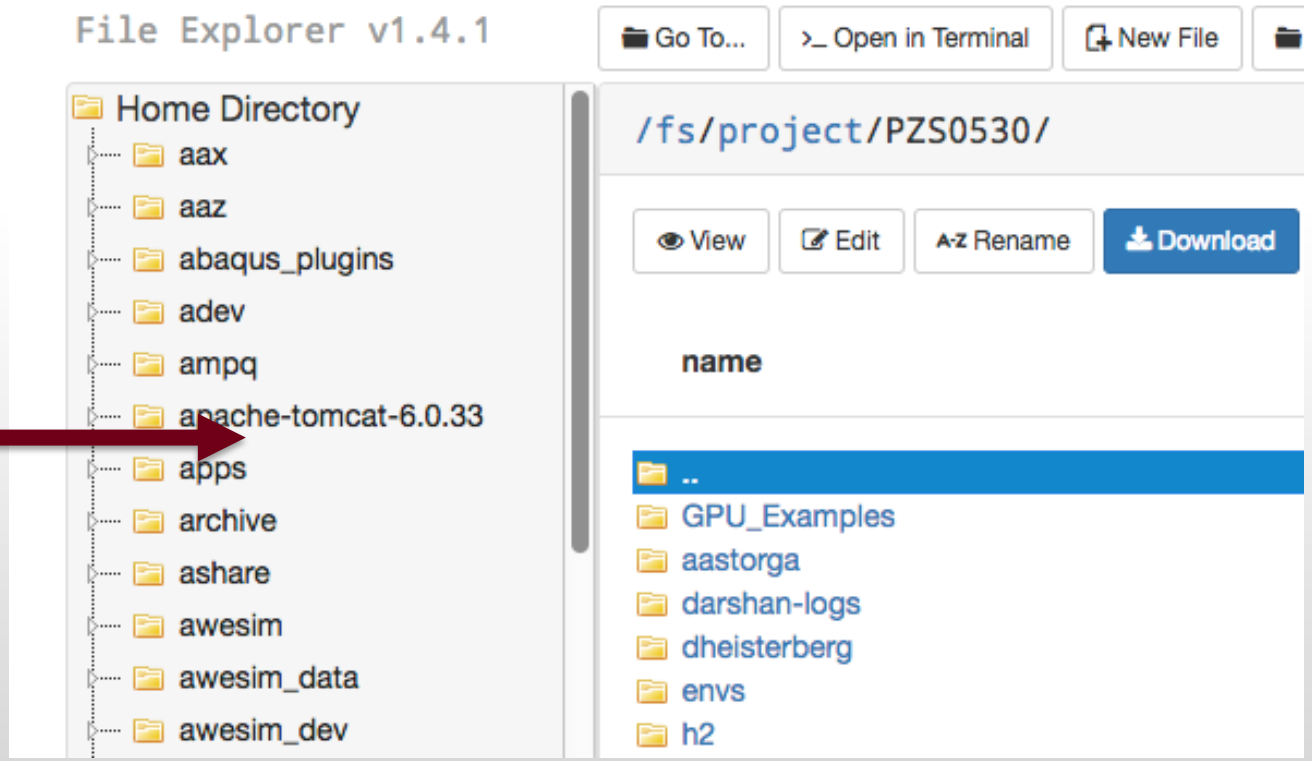
Customizing OnDemand: Branding

- Institution logo
- Navbar color
- Portal name
- Display MOTD
- Display announcements



Customizing OnDemand: Files Shortcuts





Add directory shortcuts to open Files app i.e.
home directory, scratch space, and project space

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OPEN OnDemand

Extending OnDemand

- Extended through adding new apps
  - We realized that *we* can't write every app
- Platform enables users to write apps
  - Inspired by HubZero and Galaxy projects
  - Users can develop and run apps in their home directory
- Admins can publish apps by copying them to the deployment directory

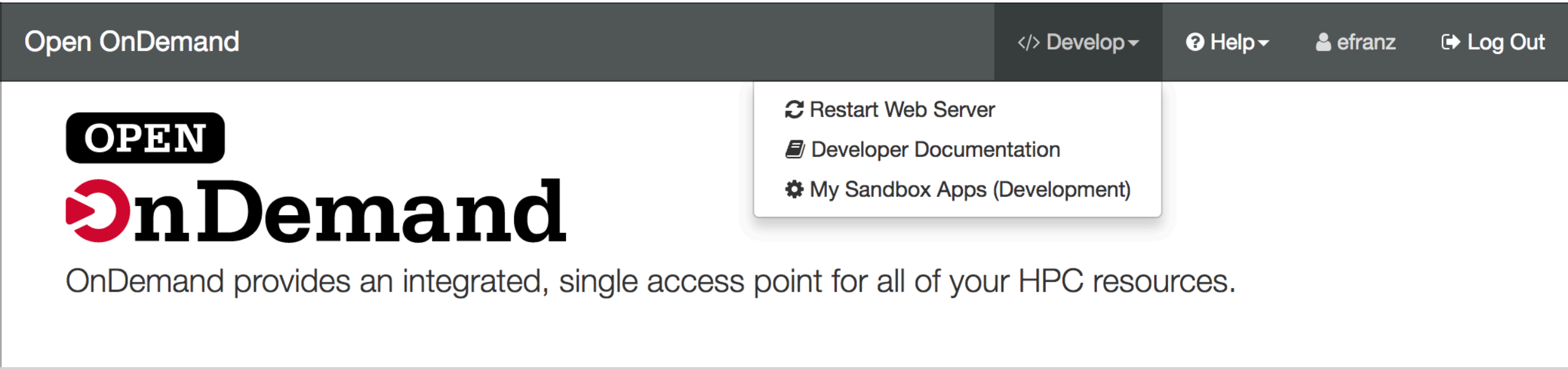
Extending OnDemand: Types of Apps

- Interactive app plugin
  - Consists of a job template and configuration files
  - Purpose is to connect to an existing GUI application
  - Example: Jupyter, MATLAB, Desktop
- Web apps
  - Consists of code written in Python, Ruby, or Node.js
  - Purpose is to provide custom workflow
  - Example: Shell, Files, Active Jobs, Job Composer

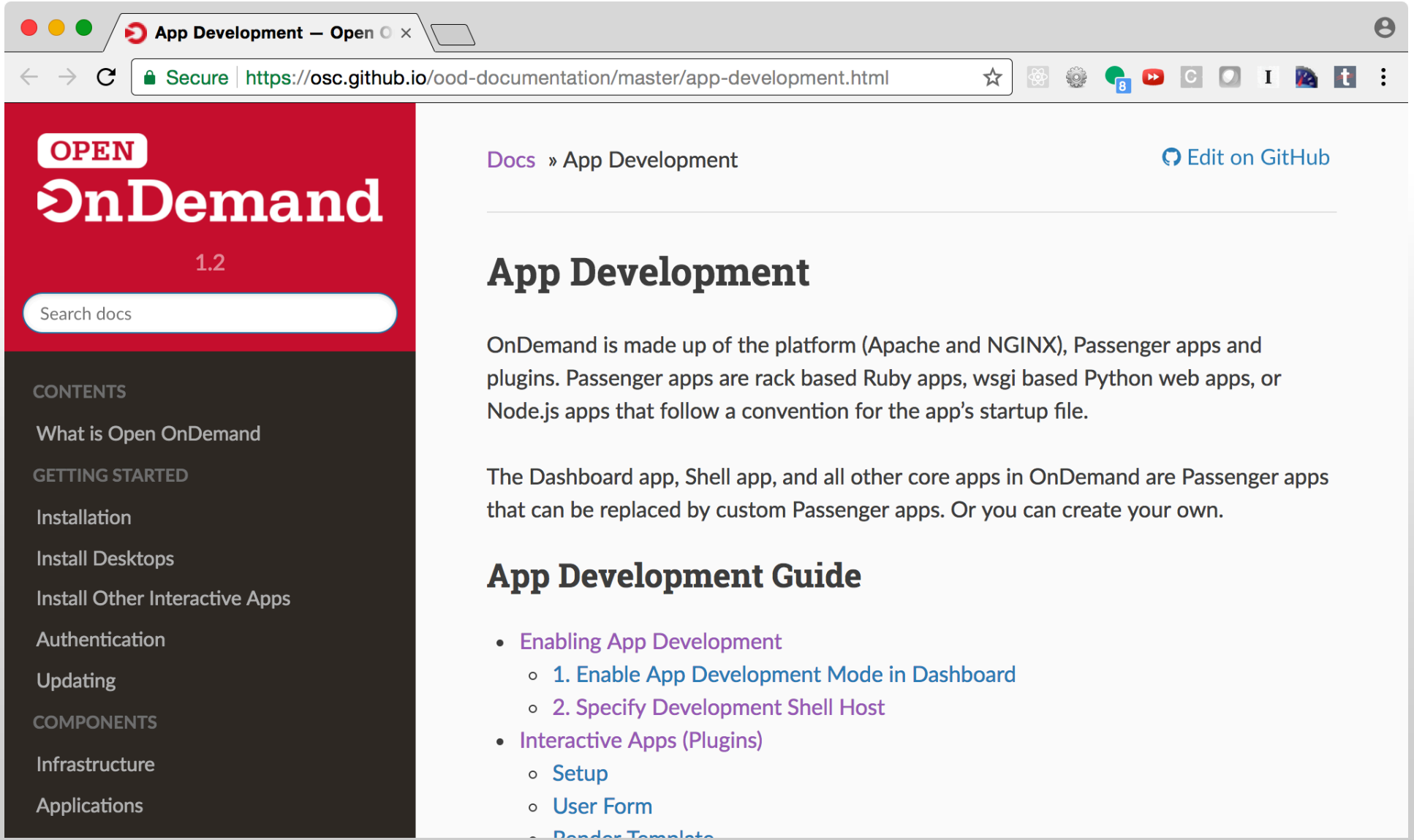
Extending OnDemand: Developer Interface

- Tools enabled via developer mode:
  - Developer Menu
  - Developer Documentation Link
  - My Sandbox Apps
  - App Editor
- See documentation for how to enable developer mode

Extending OnDemand: Developer Menu



Extending OnDemand: Developer Documentation



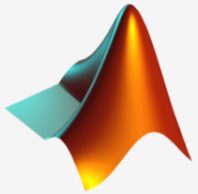
Extending OnDemand: My Sandbox Apps

Open OnDemand | Develop | Help | efranz | Log Out

Home / My Sandbox Apps (Development)

New App | Launch Shell | Launch Files | Open Trash 8

Show 50 entries | Search:

	Directory Name	App Details		Last Modified	
	matlab	MATLAB [master]	Launch MATLAB	01/22/18	Details / Shell / Files
	paraview	Paraview	Launch Paraview	01/22/18	Details / Shell / Files
	quota	Quota [quota2] Display quotas	Launch Quota	01/22/18	Details / Shell

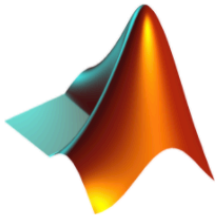
Extending OnDemand: App Editor

Open OnDemand | Develop | Help | efranz | Log Out

Home / My Sandbox Apps (Development) / MATLAB

matlab [master S:0 U:1 ?:0]

Details



Launch MATLAB

Edit Metadata

Shell

Files

Title: MATLAB

Active users: 0

Type: Batch Connect App

Directory: /users/PZS0562/efranz/ondemand/dev/matlab

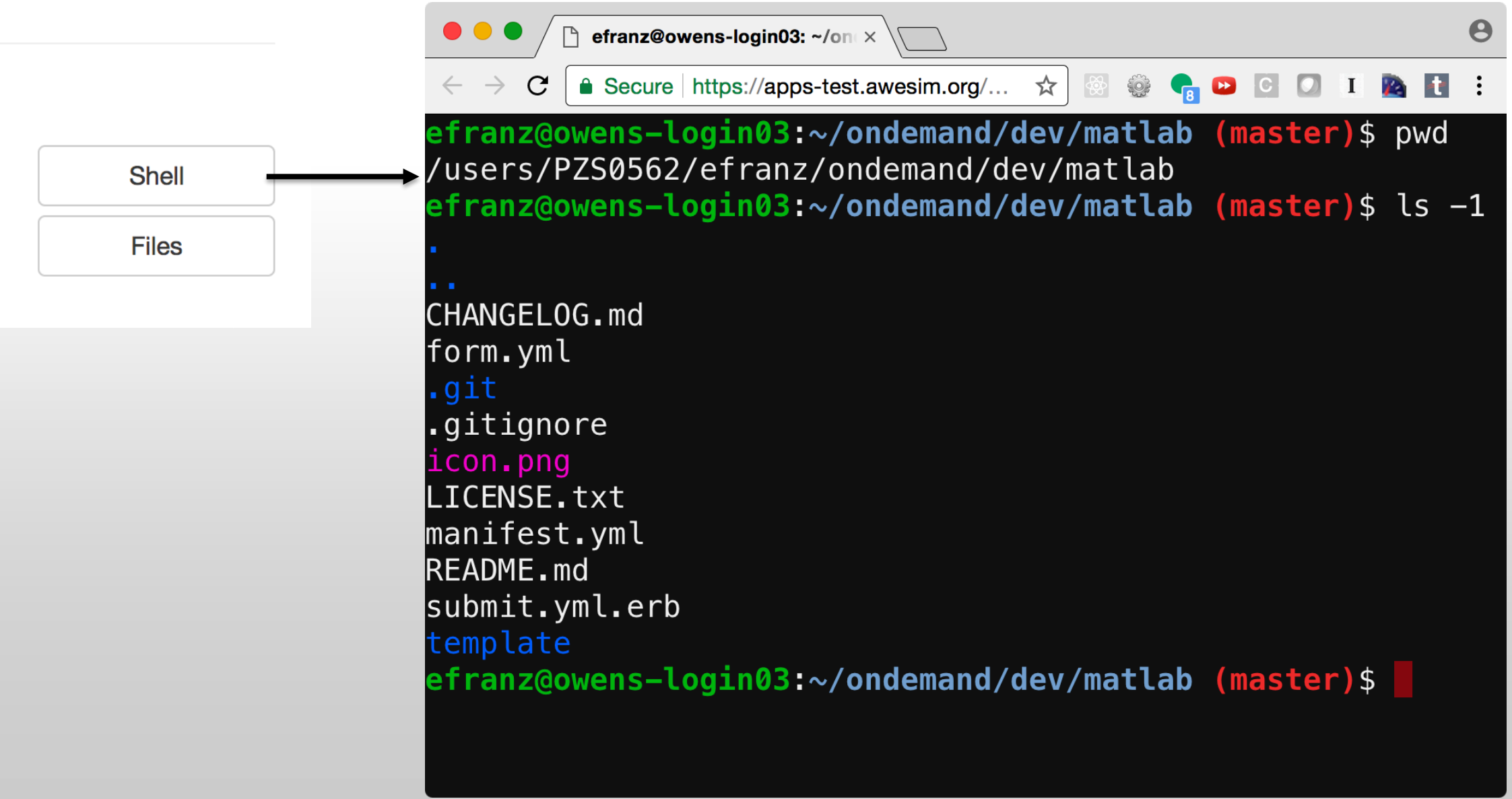
Git remote: git@github.com:OSC/bc_osc_matlab.git

Description:

Back

Delete App

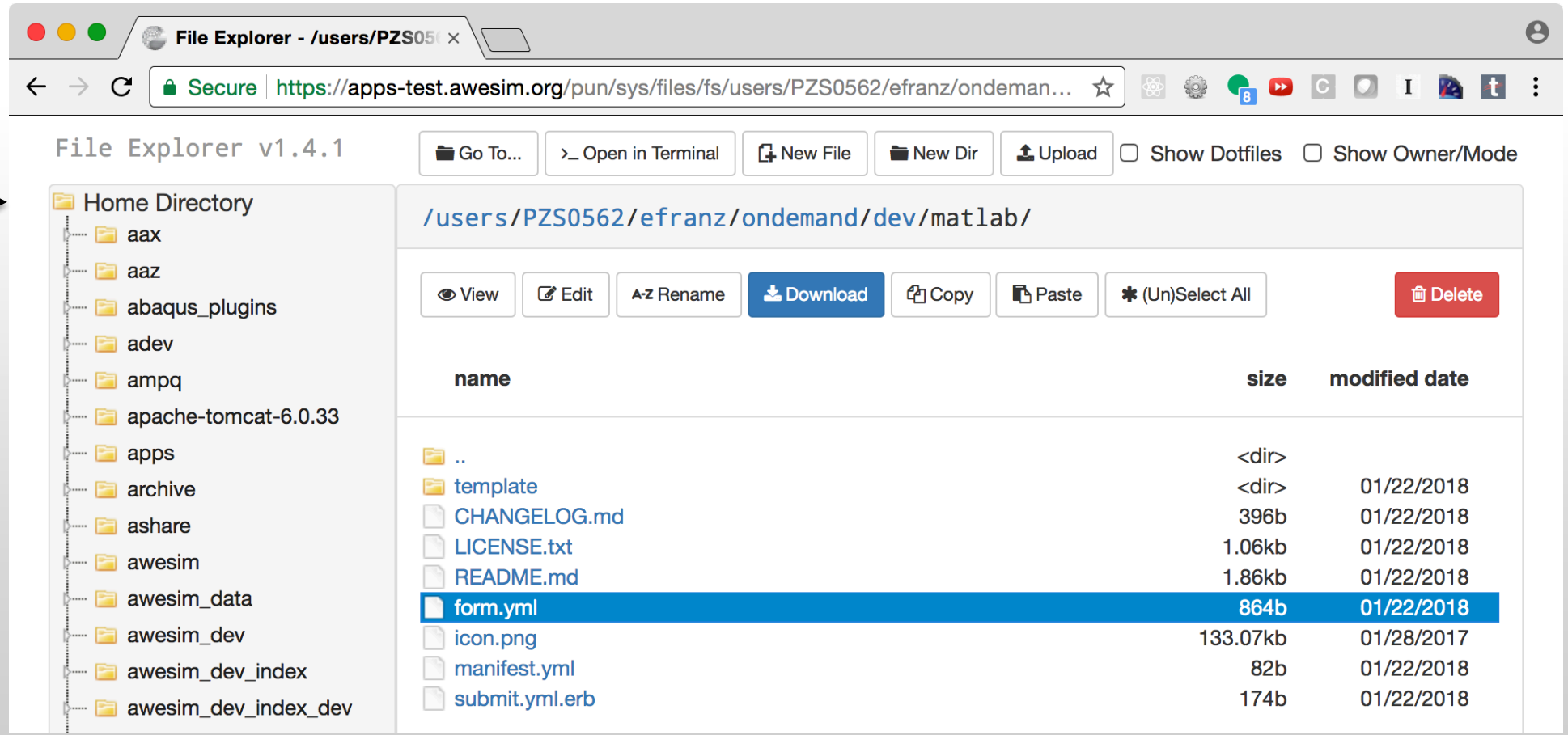
Extending OnDemand: App Editor – Shell Access



Extending OnDemand: App Editor – Files Access

Shell

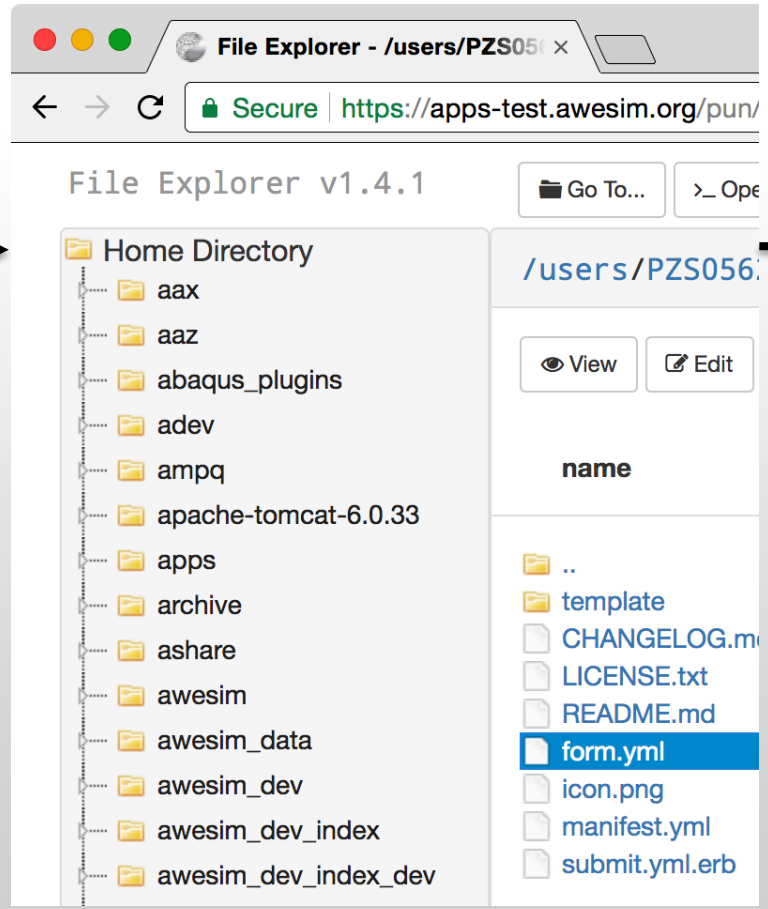
Files

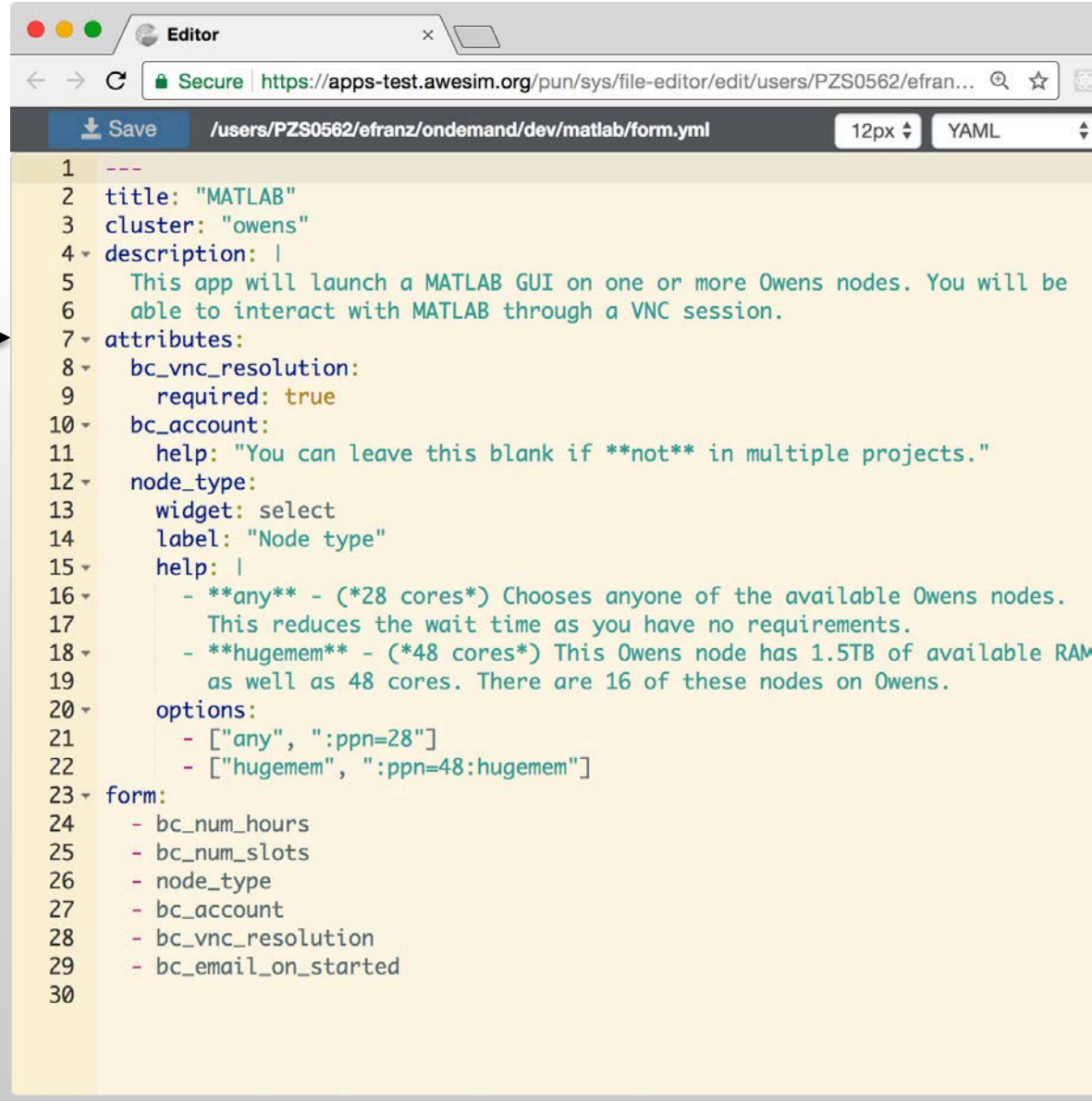


Extending OnDemand: App Editor – File Editor

Shell

Files





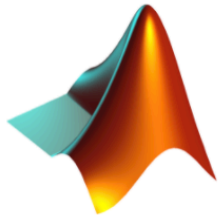
Extending OnDemand: App Editor – Launch App

Open OnDemand

Home / My Sandbox Apps (Development) / M

matlab [master S:0 U:1 ?:0]

Details



Launch MATLAB

Title: MATLAB

Active users: 0

Type: Batch Connect App

Directory: /users/PZS056

Git remote: git@github.co

Description:

Back

Home / Interactive Sessions / MATLAB

Interactive Apps

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

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

Servers
- Jupyter + Spark
- Jupyter Notebook
- RStudio Server

MATLAB

This app will launch a MATLAB GUI on one or more Owens nodes. You will be able to interact with MATLAB through a VNC session.

Number of hours

1

Number of nodes

1

Node type

any

- **any** - (*28 cores*) Chooses anyone of the available Owens nodes. This reduces the wait time as you have no requirements.
- **hugemem** - (*48 cores*) This Owens node has 1.5TB of available RAM as well as 48 cores. There are 16 of these nodes on Owens.

Account

PZS0562

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

Resolution

width 1152 px height 720 px

Reset Resolution

I would like to receive an email when the session starts

Launch

* All MATLAB session data is generated and stored under the user's home directory in the corresponding data root directory.

Extending OnDemand: Publishing Apps

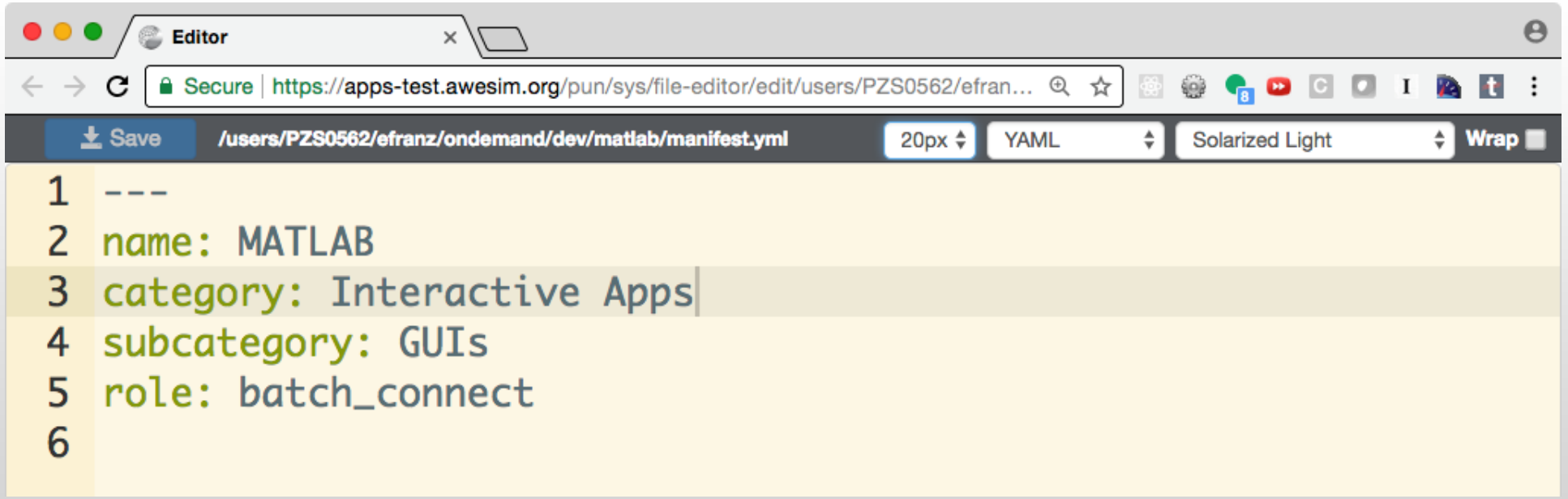
App Publishing: Deploy an app so every user can launch it

1. Developer specifies app category in a manifest file
   - Determines which dropdown menu the app will appear in

2. Admin copies the app code to deployment directory

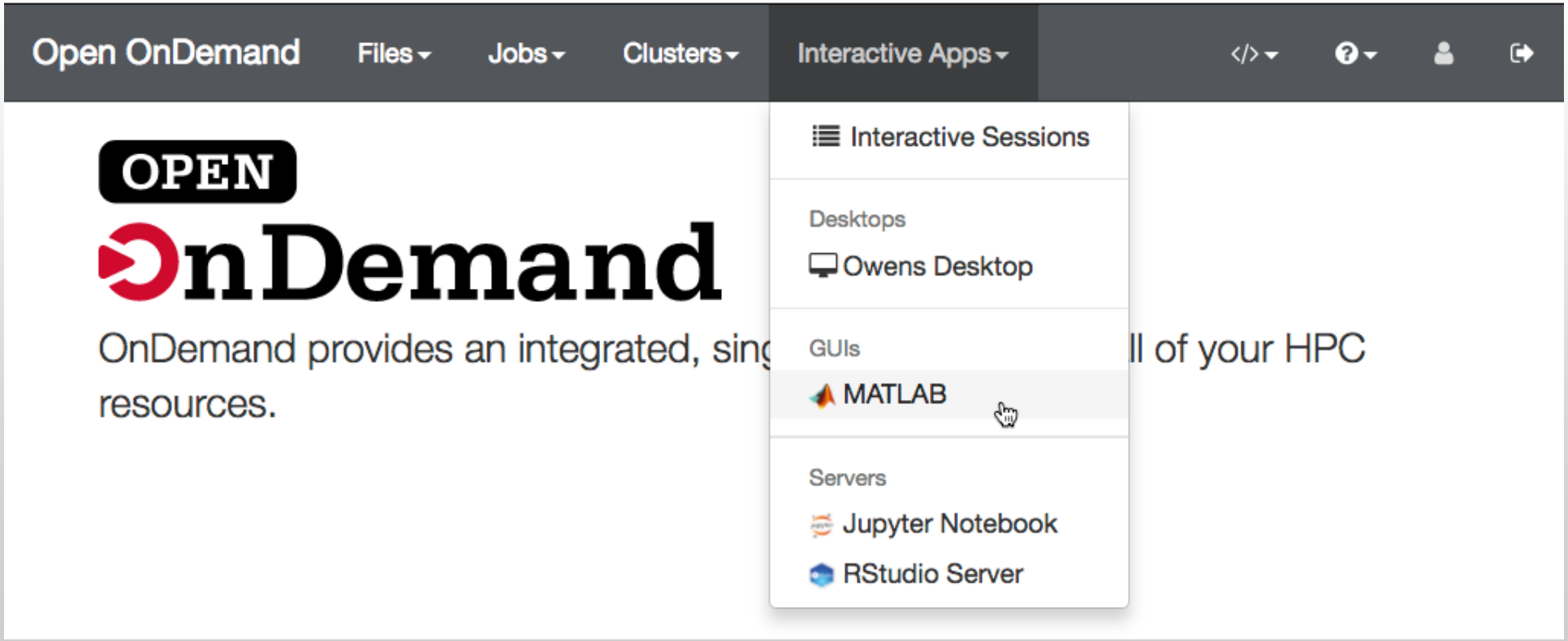
Extending OnDemand: Publishing Apps

Specify category in manifest.yml



Extending OnDemand: Publishing Apps – Copy and Launch

```
efranz@web05:~$ sudo rsync -rlptvu --delete /users/PZS0562/efranz/ondemand/dev/matlab/ \
> /var/www/ood/apps/sys/matlab
```



Interactive App Development and Publishing: Summary

- App developer interface enables users to copy modify and run apps in their home directory
- Apps deployed to the deployment directory can be launched by every user

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OPEN OnDemand

Demos

- PSC, Tufts, and OSC will demonstrate user facing installations of OnDemand that show off their customizations and extensions of OnDemand.

- Demos
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Thank you! Any questions?

Alan Chalker, Ph.D.
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Ohio Supercomputer Center
alanc@osc.edu

go.osu.edu/ood

Appendix Slides

The following slides show some screens related to the demos that PSC, Tufts, and OSC did at the end of the webinar. Please watch the webinar video to see the entire demo content.

PSC: Dashboard

Bridges OnDemand | Files | Jobs | Clusters | Interactive Apps | Help | efranz | Log Out

A PITTSBURGH SUPERCOMPUTING CENTER RESOURCE

Welcome to Bridges

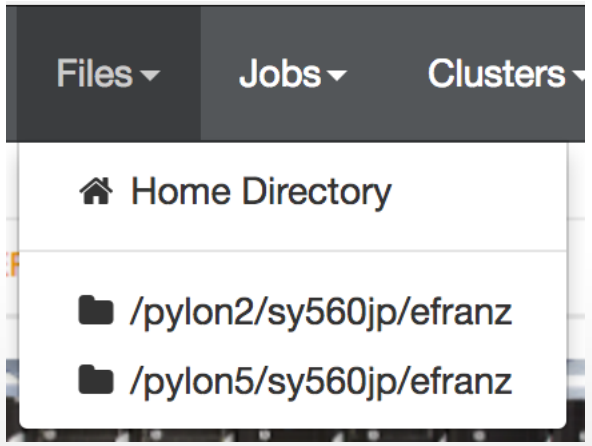
Bridges is a uniquely capable resource for empowering new research communities and bringing together HPC and Big Data.

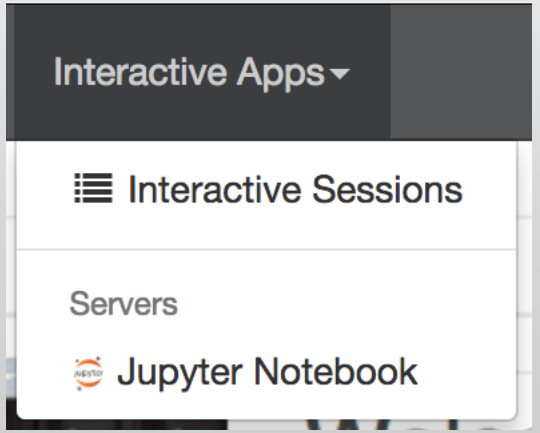
Open OnDemand provides a simple interface for file and job management on Bridges.

Message of the Day

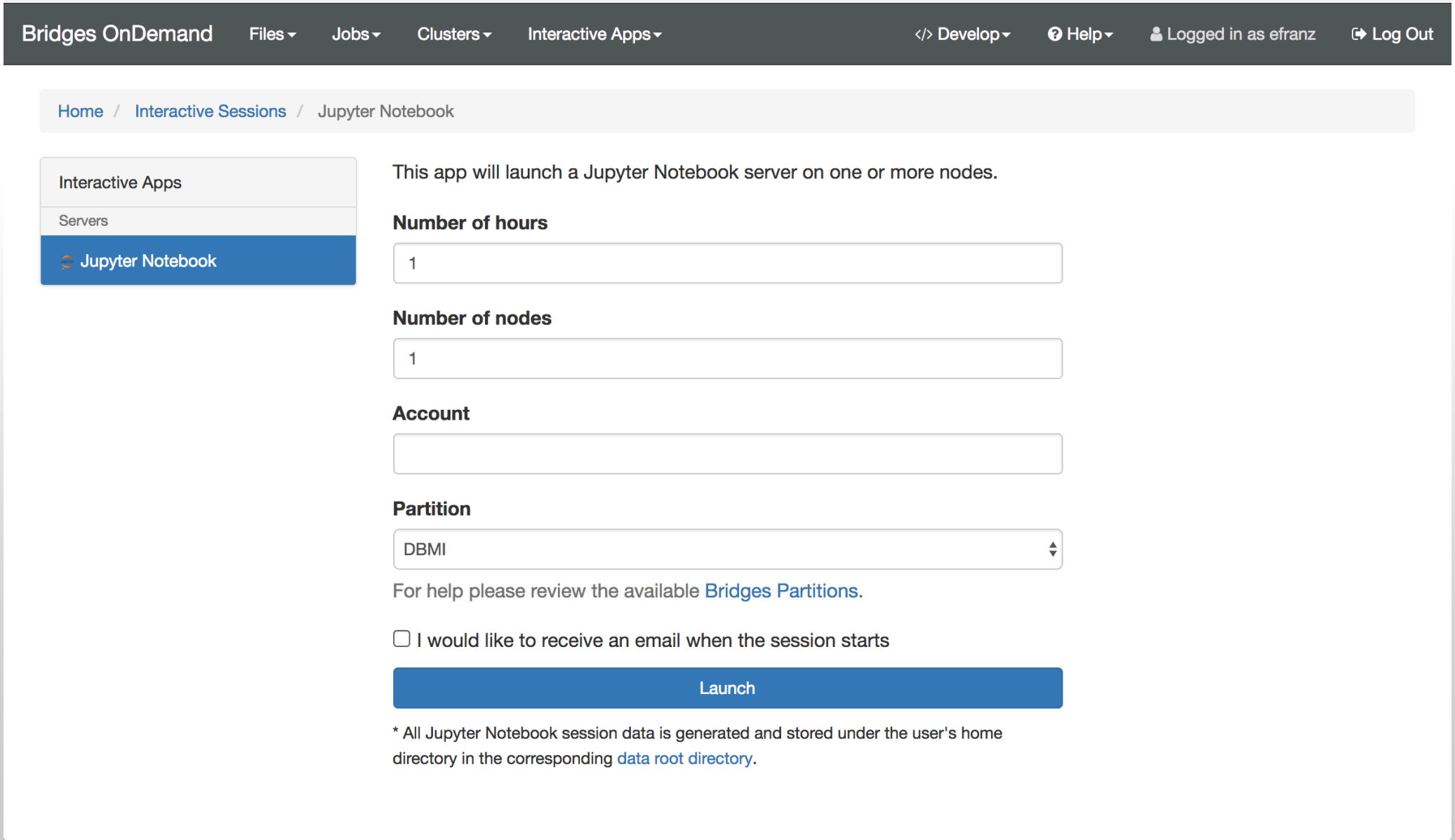
```
********************************** W A R N I N G **********************************
You have connected to vm028.bridges.psc.edu

This computing resource is the property of the Pittsburgh Supercomputing Center.
It is for authorized use only.  By using this system, all users acknowledge
notice of, and agree to comply with, PSC polices including the Resource Use
Policy, available at http://www.psc.edu/index.php/policies. Unauthorized or
improper use of this system may result in administrative disciplinary action,
civil charges/criminal penalties, and/or other sanctions as set forth in PSC
policies. By continuing to use this system you indicate your awareness of and
```

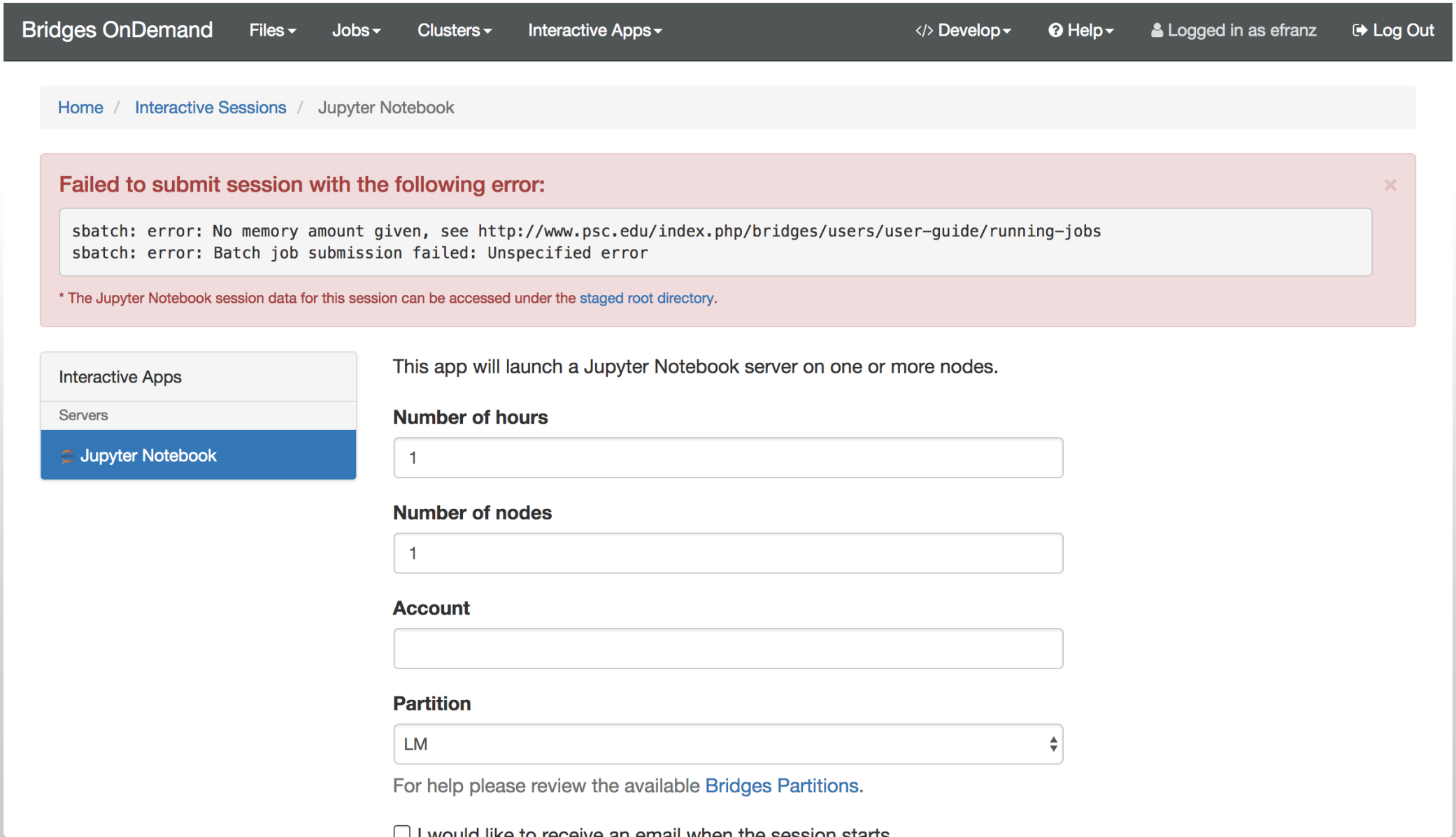




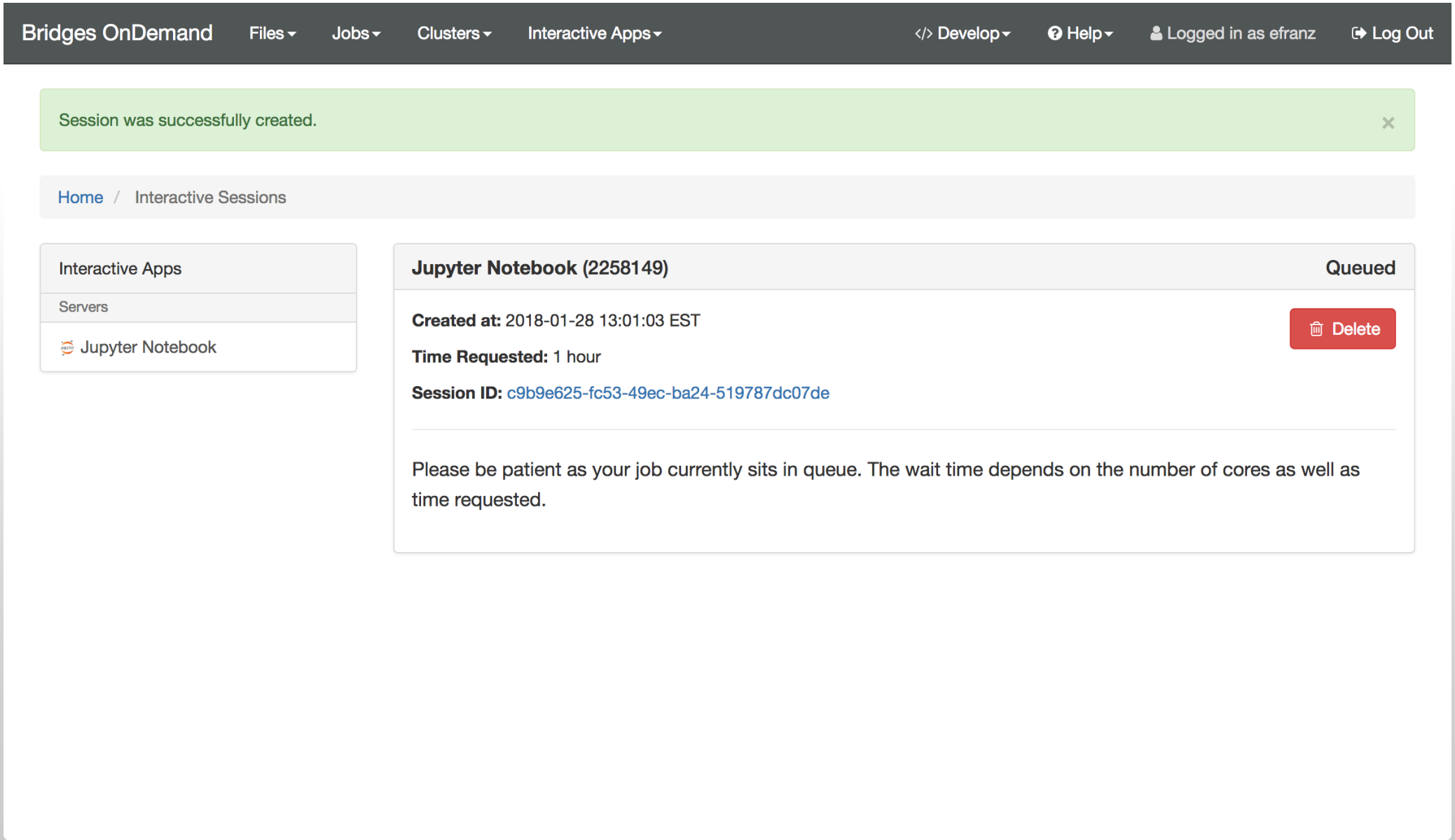
PSC: Jupyter


Bridges OnDemand
Files
Jobs
Clusters
Interactive Apps
Develop
Help
Logged in as efranz
Log Out
Home / Interactive Sessions / Jupyter Notebook
Interactive Apps
Servers
Jupyter Notebook
This app will launch a Jupyter Notebook server on one or more nodes.
Number of hours
1
Number of nodes
1
Account
Partition
DBMI
For help please review the available Bridges Partitions.
I would like to receive an email when the session starts
Launch
* All Jupyter Notebook session data is generated and stored under the user's home directory in the corresponding data root directory.

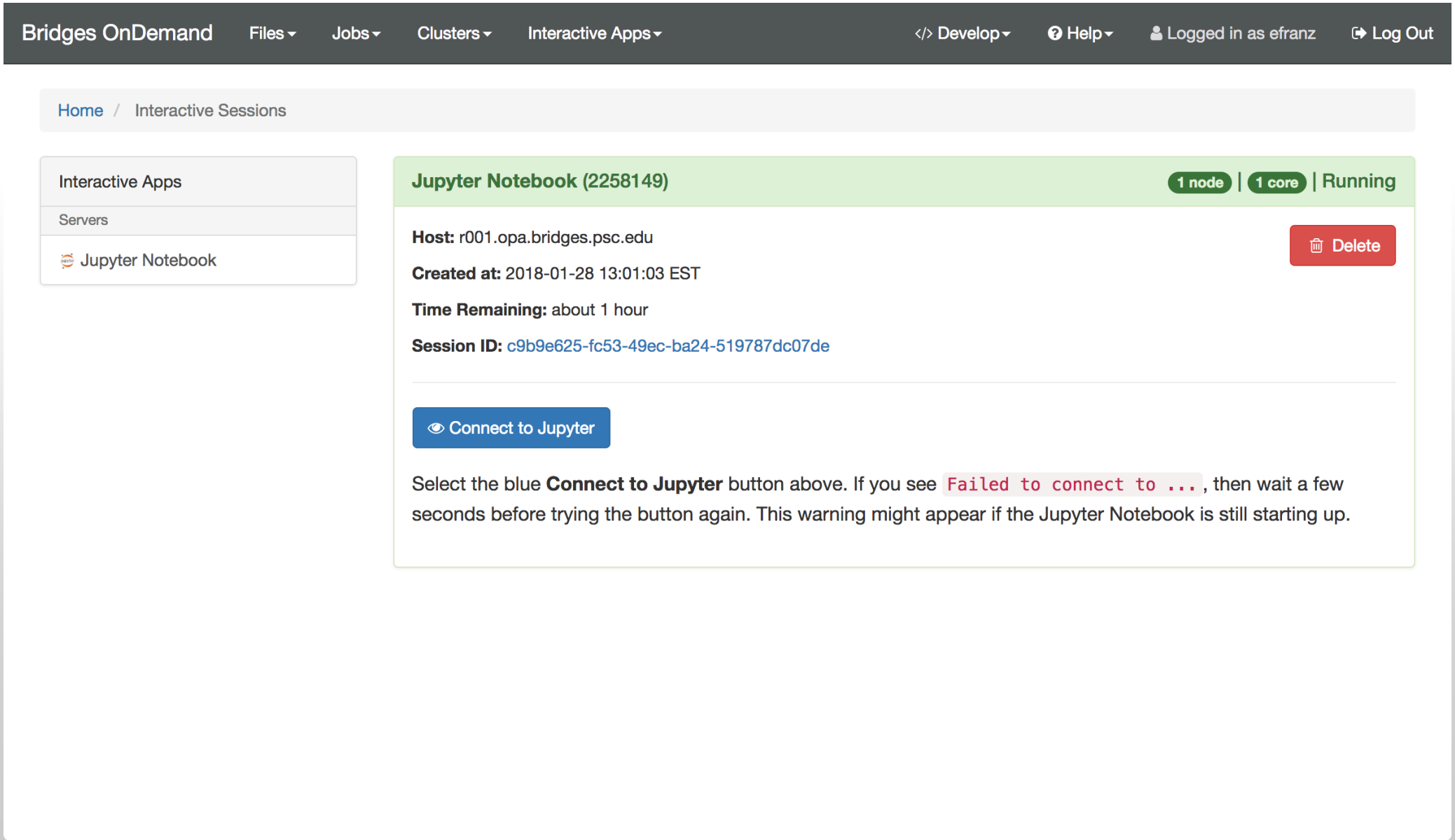
PSC: Jupyter - Trying to Submit to Restricted Partition



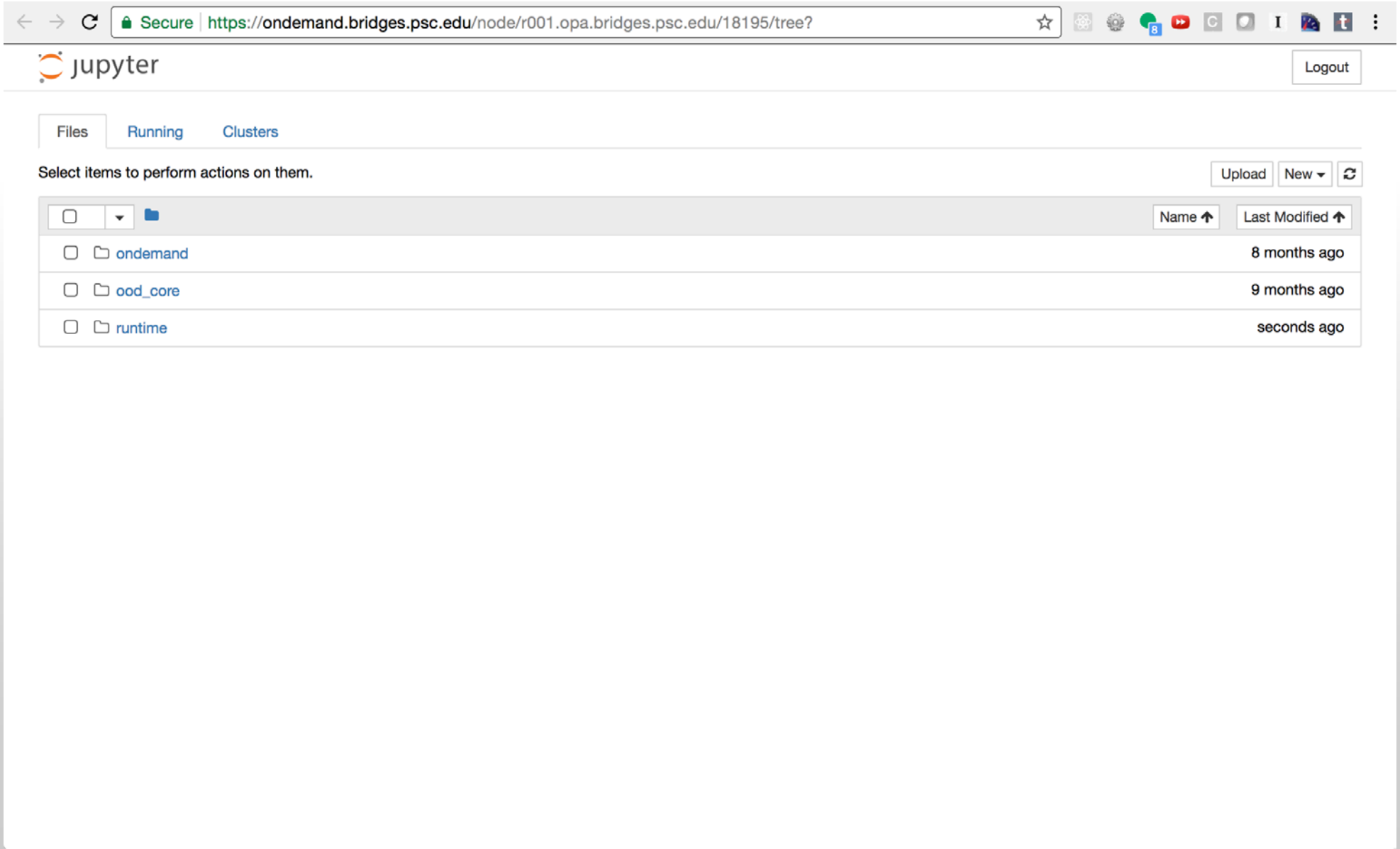
PSC: Jupyter


Bridges OnDemand
Files
Jobs
Clusters
Interactive Apps
Develop
Help
Logged in as efranz
Log Out
Session was successfully created.
Home / Interactive Sessions
Interactive Apps
Servers
Jupyter Notebook
Jupyter Notebook (2258149)
Queued
Created at: 2018-01-28 13:01:03 EST
Time Requested: 1 hour
Session ID: c9b9e625-fc53-49ec-ba24-519787dc07de
Delete
Please be patient as your job currently sits in queue. The wait time depends on the number of cores as well as time requested.

PSC: Jupyter


Bridges OnDemand
Files
Jobs
Clusters
Interactive Apps
Develop
Help
Logged in as efranz
Log Out
Home / Interactive Sessions
Interactive Apps
Servers
Jupyter Notebook
Jupyter Notebook (2258149)
1 node | 1 core | Running
Host: r001.opa.bridges.psc.edu
Created at: 2018-01-28 13:01:03 EST
Time Remaining: about 1 hour
Session ID: c9b9e625-fc53-49ec-ba24-519787dc07de
Delete
Connect to Jupyter
Select the blue Connect to Jupyter button above. If you see Failed to connect to ..., then wait a few seconds before trying the button again. This warning might appear if the Jupyter Notebook is still starting up.

PSC: Jupyter


Secure
https://ondemand.bridges.psc.edu/node/r001.opa.bridges.psc.edu/18195/tree?
jupyter
Logout
Files
Running
Clusters
Select items to perform actions on them.
Upload
New
Name
Last Modified
ondemand
8 months ago
ood_core
9 months ago
runtime
seconds ago

PSC: Active Jobs Shows Running Jobs

Bridges OnDemand / Active Jobs

All Jobs ▾ All Clusters ▾

Active Jobs

Show 50 entries Filter:

	ID	Name	User	Account	Time Used	Queue	Status	Cluster
❯	2258149	ondemand/sys/dashboard/sys/jupyter_app	efranz	sy560jp	00:01:16	RM-small	Running	Bridges
❯	2231921	run.sh	lms464	mc5611p	00:03:33	RM	Running	Bridges
❯	2231458	image_measurement_add_2.job	szhang5	ac4s8vp		RM-shared	Queued	Bridges
❯	2231459	image_measurement_add_1.job	szhang5	ac4s8vp		RM-shared	Queued	Bridges
❯	2225583	Trinity-pdb_nonorm_centos7.4.slurm	blood	pscstaff		LM	Queued	Bridges
❯	2249004	zwitterion_0.0750_0.1050_10.00.sh	madinya2	mr561dp		RM-shared	Queued	Bridges
❯	2249005	zwitterion_0.0750_0.1200_10.00.sh	madinya2	mr561dp		RM-shared	Queued	Bridges
❯	2249006	zwitterion_0.0750_0.1350_10.00.sh	madinya2	mr561dp		RM-shared	Queued	Bridges
❯	2249007	zwitterion_0.0750_0.1500_10.00.sh	madinya2	mr561dp		RM-shared	Queued	Bridges
❯	2249008	zwitterion_0.0750_0.1650_10.00.sh	madinya2	mr561dp		RM-shared	Queued	Bridges
❯	2249009	zwitterion_0.0750_0.1800_10.00.sh	madinya2	mr561dp		RM-shared	Queued	Bridges
❯	2249010	zwitterion_0.0750_0.1950_10.00.sh	madinya2	mr561dp		RM-shared	Queued	Bridges
❯	2249011	zwitterion_0.0750_0.2100_10.00.sh	madinya2	mr561dp		RM-shared	Queued	Bridges
❯	2249012	zwitterion_0.0750_0.2250_10.00.sh	madinya2	mr561dp		RM-shared	Queued	Bridges

PSC: Job Details Provides Buttons to Access Job Files

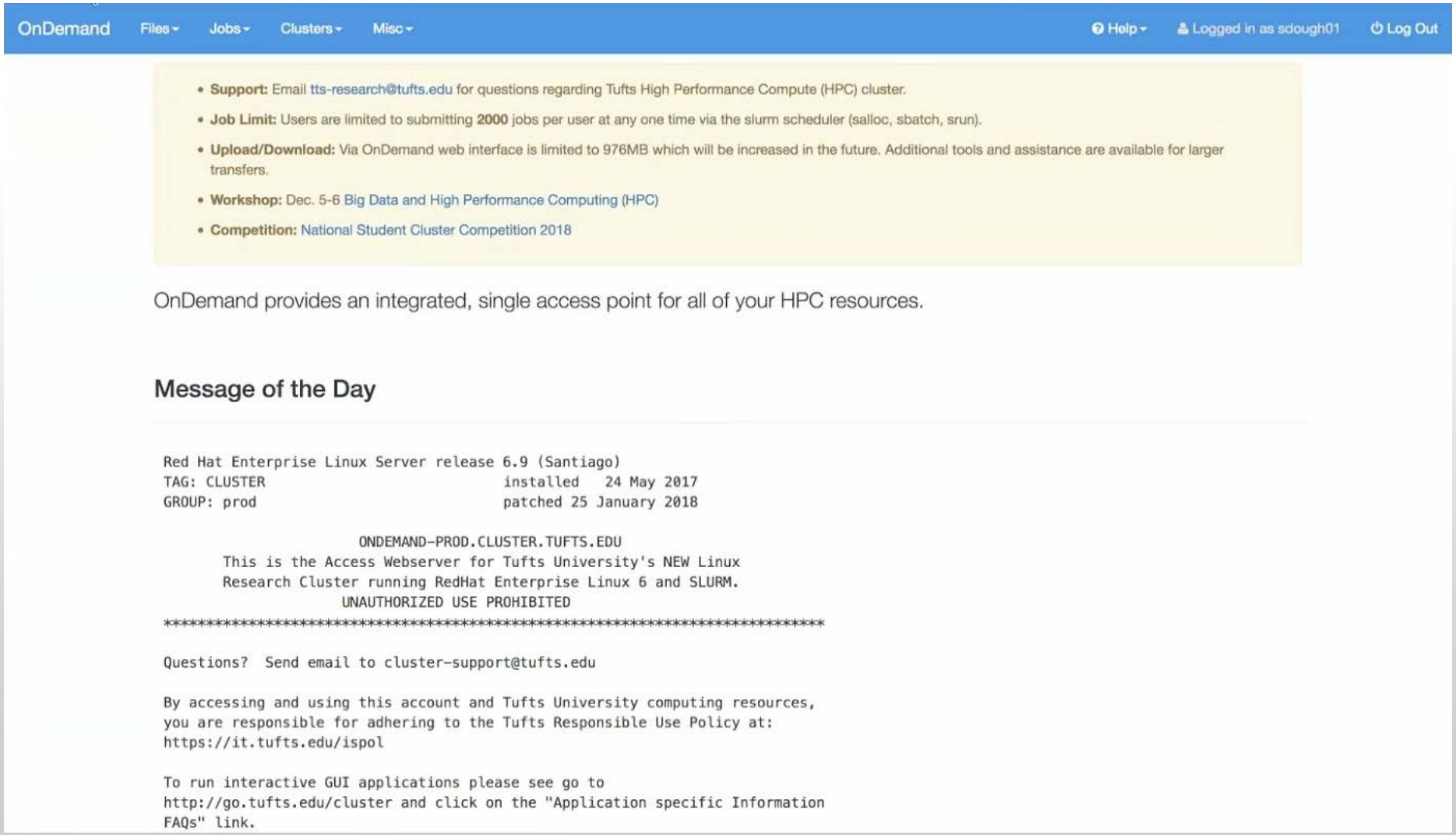
Running **ondemand/sys/dashboard/sys/jupyter_app**
2258149

Cluster	Bridges
Job Id	2258149
Job Name	ondemand/sys/dashboard/sys/jupyter_app
User	efranz
Account	sy560jp
Partition	RM-small
State	RUNNING
Reason	None
Total Nodes	1
Total CPUs	1
Time Limit	1:00:00
Time Used	1:56
Memory	4400M

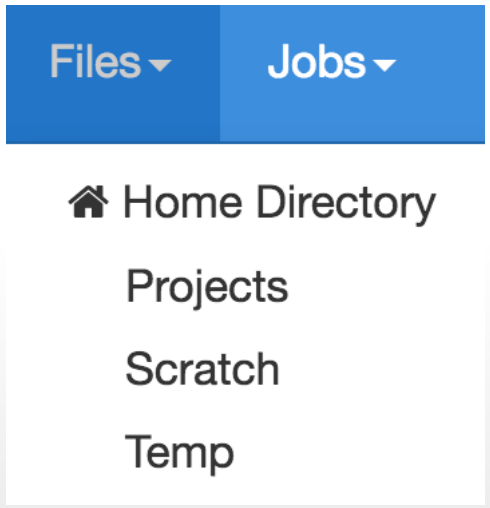
Output Location: `/home/efranz/ondemand/data/sys/dashboard/batch_connect/sys/jupyter_app/output/c9b9e625-fc53-49ec-ba24-519787dc07de`

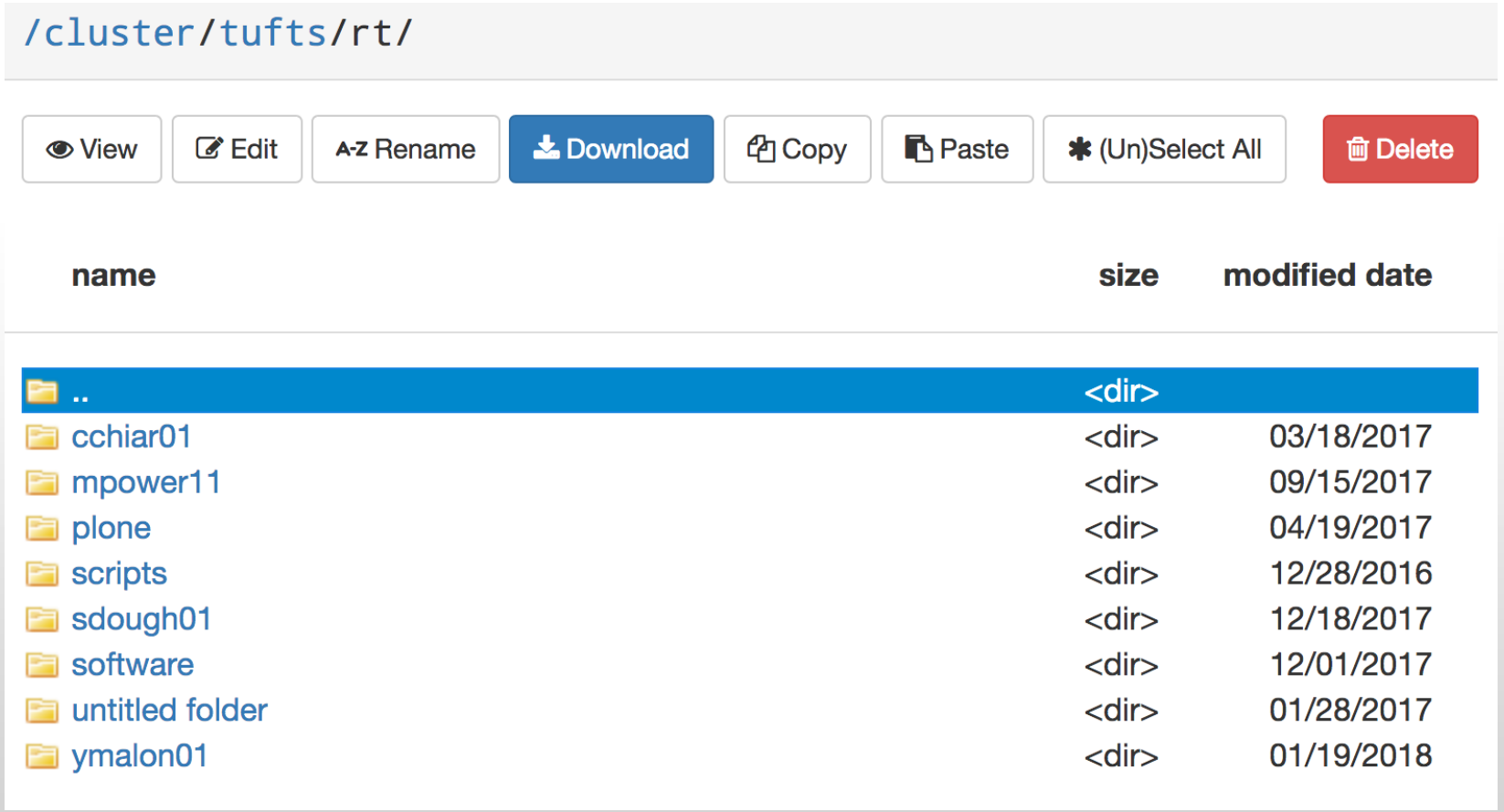
Open in File Manager | >_ Open in Terminal | Delete

Tufts: OnDemand Customization



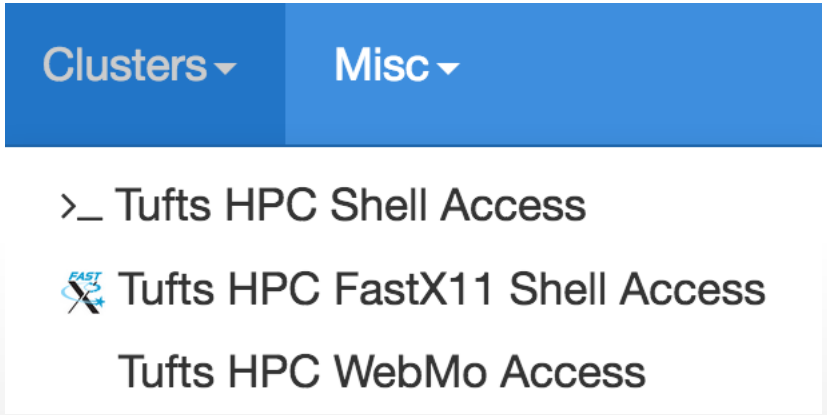
Tufts: Simple Custom App Redirect for Files Shortcut

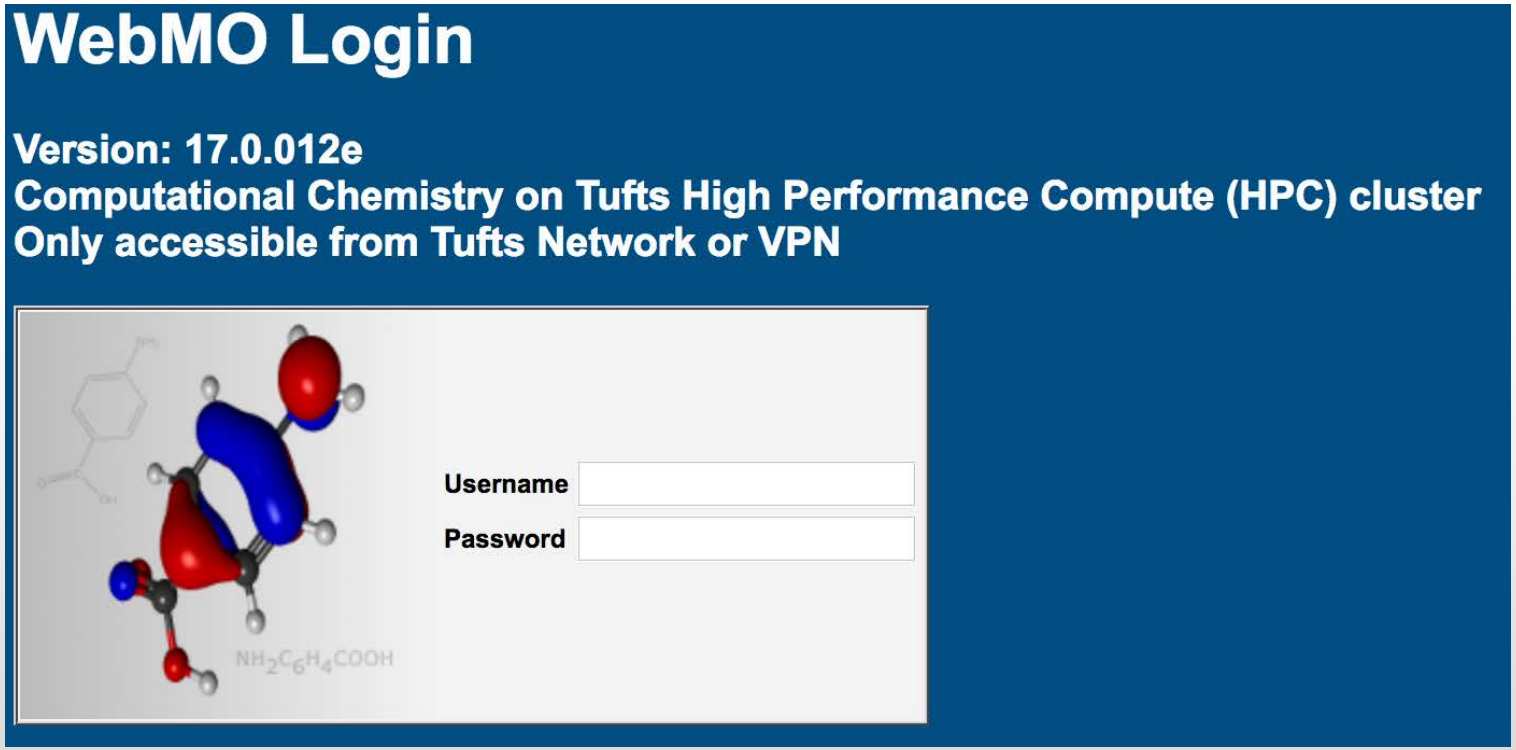





```
exec('/usr/local/bin/projects', function(error, stdout, stderr){
  response.writeHead(302, {'Location': 'http://ondemand.cluster.tufts.edu/pun/sys/files/fs/cluster/tufts/' + stdout});
```

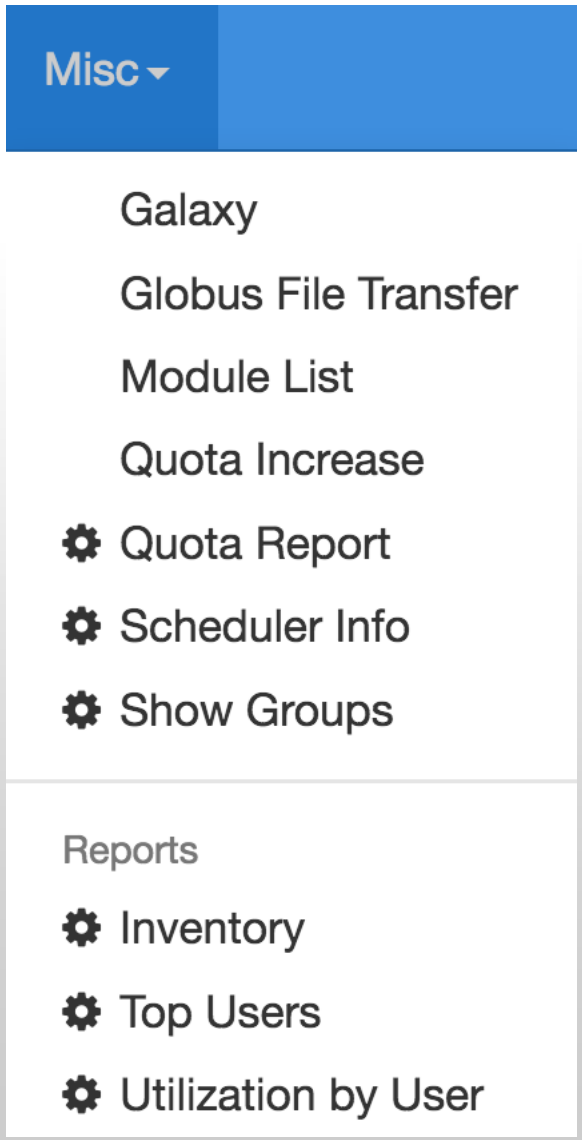
Tufts: Simple Custom App Redirect for WebMo



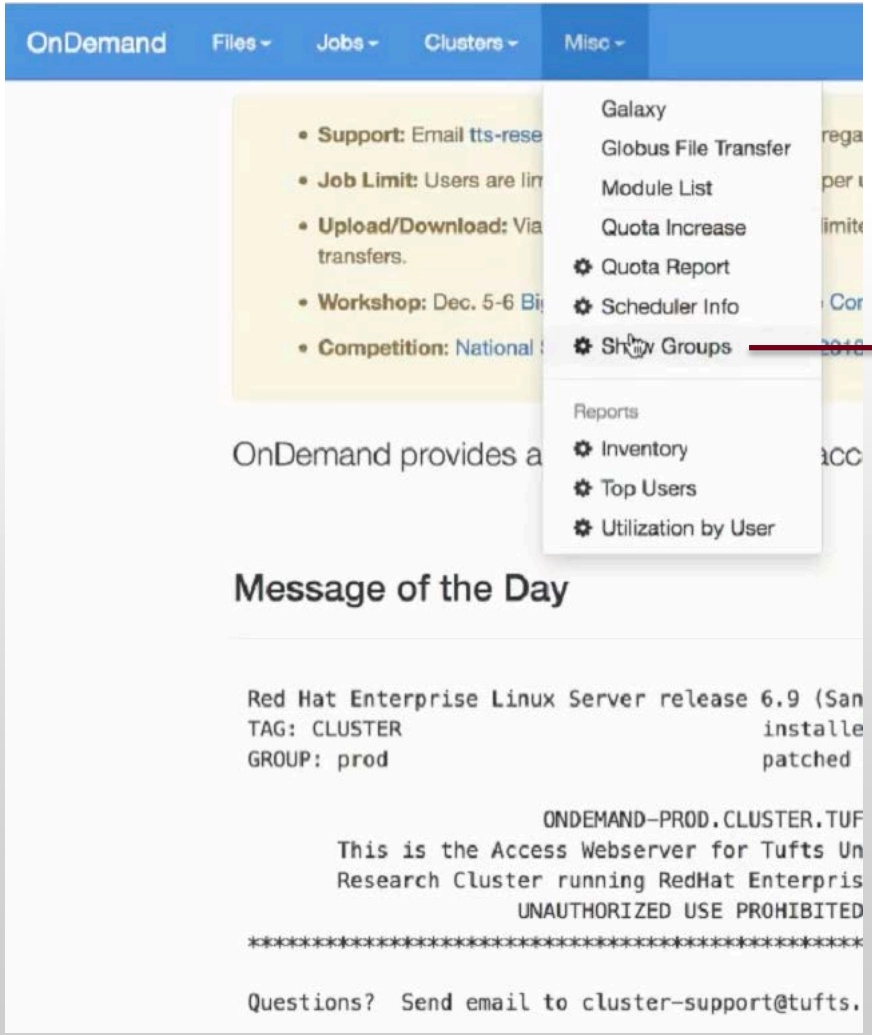
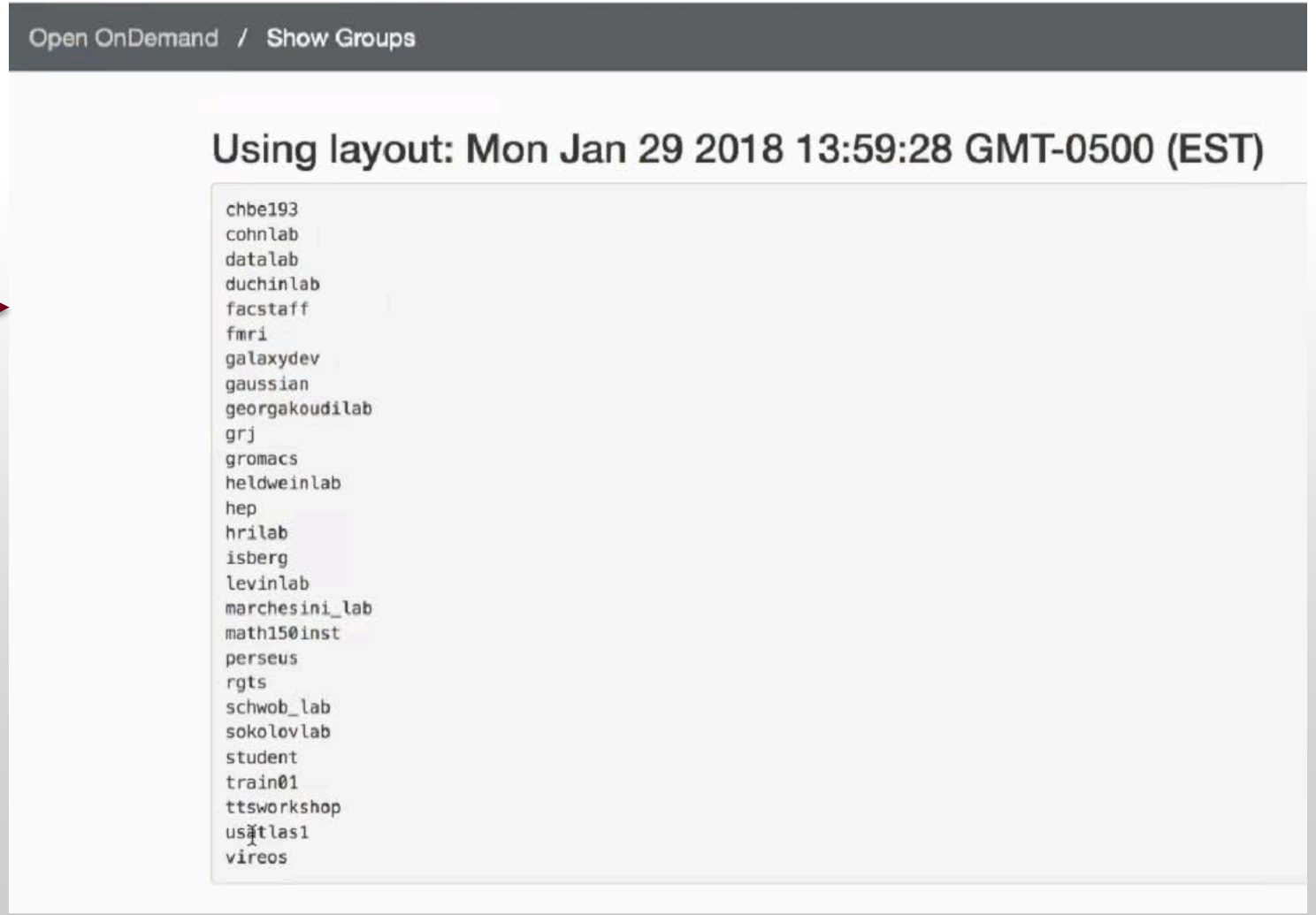



```
response.writeHead(302, {'Location': 'http://webmo-prod.cluster.tufts.edu/webmo'});
```

Tufts: Custom Apps Menu “Misc” with Custom Status Apps




```
exec('/usr/local/bin/inventory', function(error, stdout, stderr){

pmem01              72                  1033838
pmem02              72                  1033838
=========================================
Nodes               Cores               Memory(MB)
201                 6424                24727967
```

Tufts: Custom Show Groups App