Hands-on introduction to Open OnDemand

Martin Čuma
Center for High Performance Computing
University of Utah
m.cuma@utah.edu

Overview

- What is Open OnDemand
- Interactive applications
- File operations
- Job management
- Job statistics
- Class use
- Future outlook

Hands on requirements

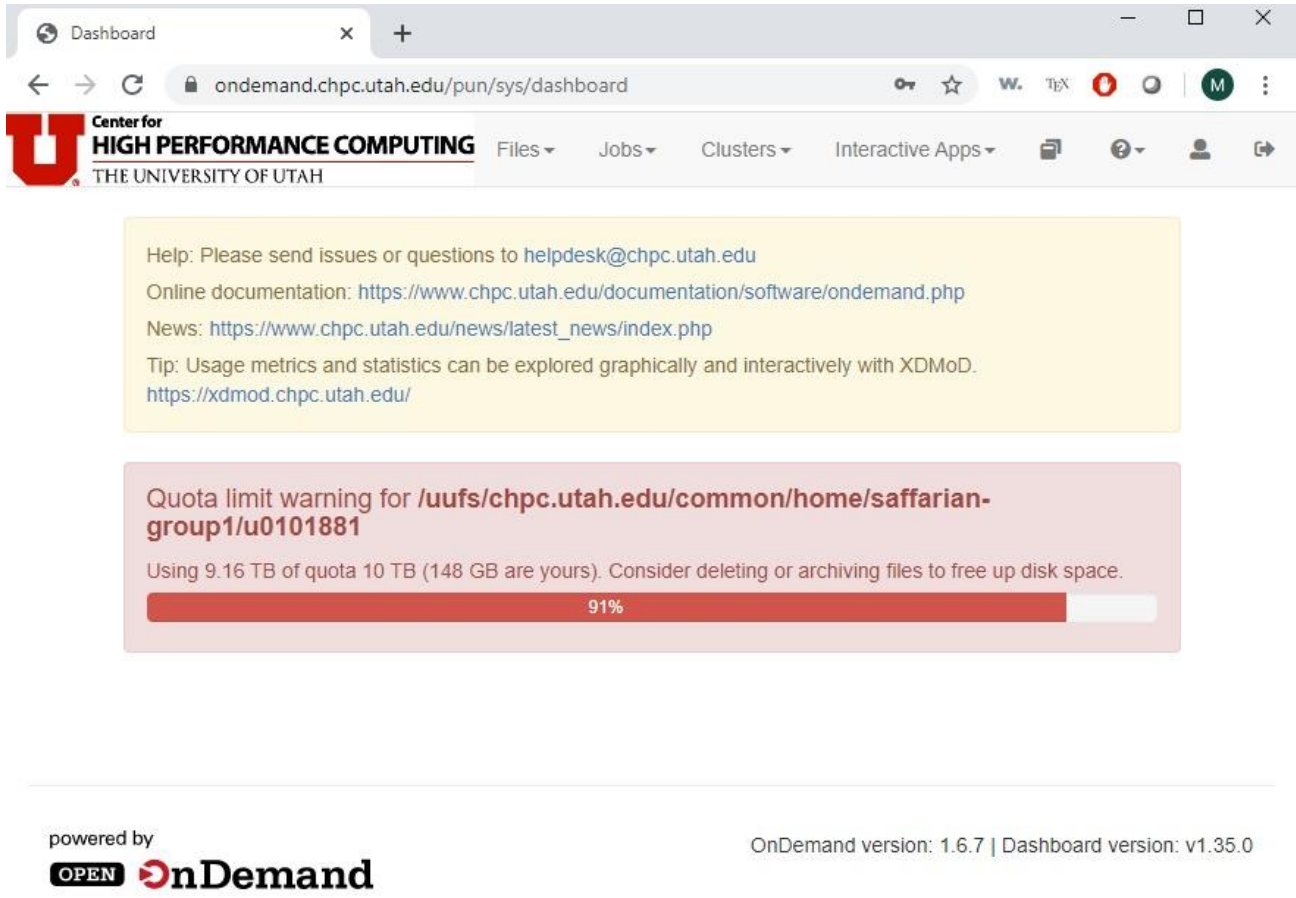
1. Internet access
2. Web browser
3. CHPC account

What is Open OnDemand

- Web portal to HPC resources - openondemand.org
- Easier, command line free, use of HPC resources
- Interactive desktop and applications
  - e.g. MATLAB, ANSYS, Jupyter Notebook, R Studio Server, …
- Class specific applications
- File management module
- Job submission and monitoring module
- Actively developed and supported by NSF

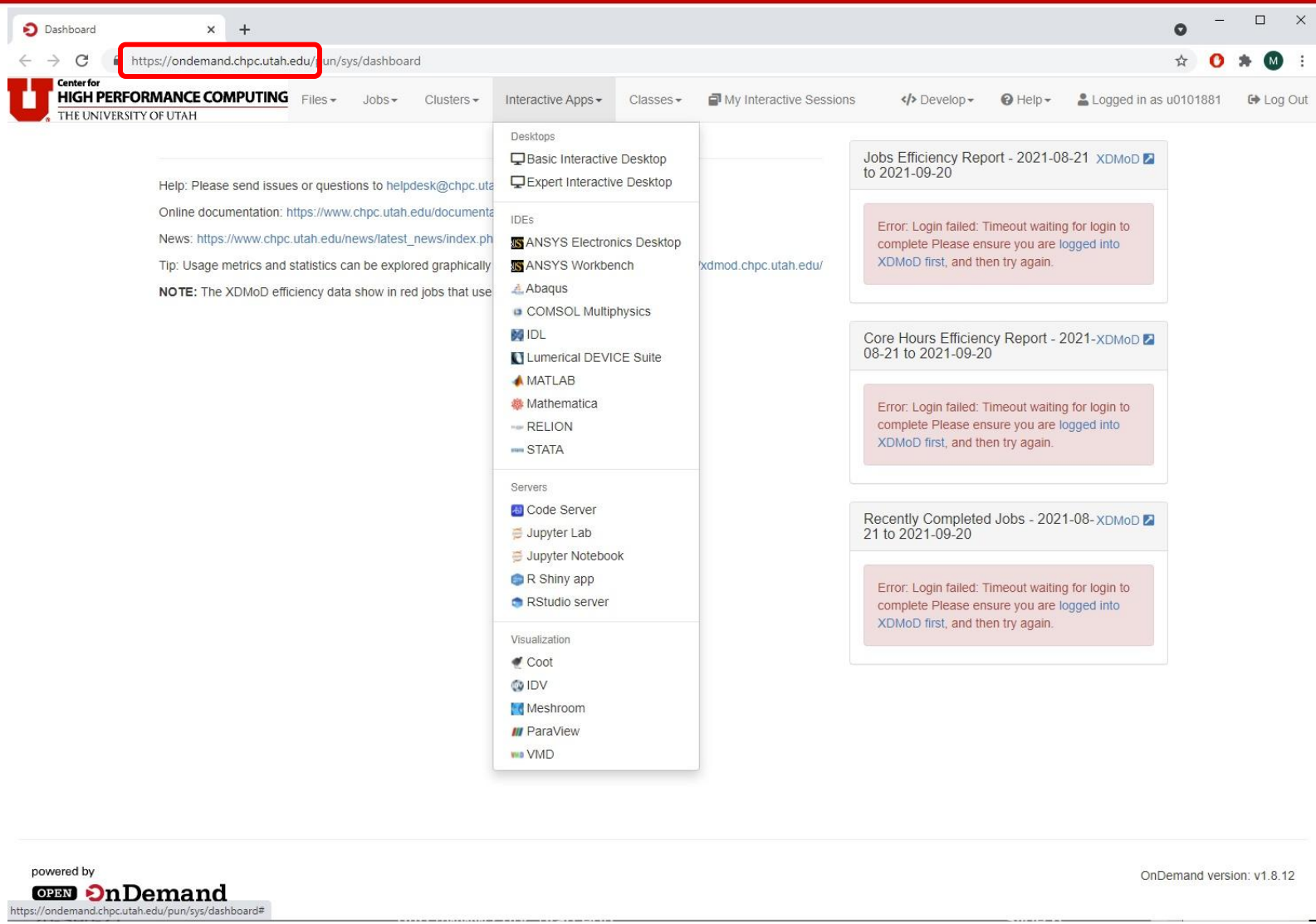
CHPC's Open OnDemand

- ondemand.chpc.utah.edu
  ondemand-class.chpc.utah.edu
  pe-ondemand.chpc.utah.edu
- Log in with your uNID and password
- Will display disk quota warnings if at >= 90%



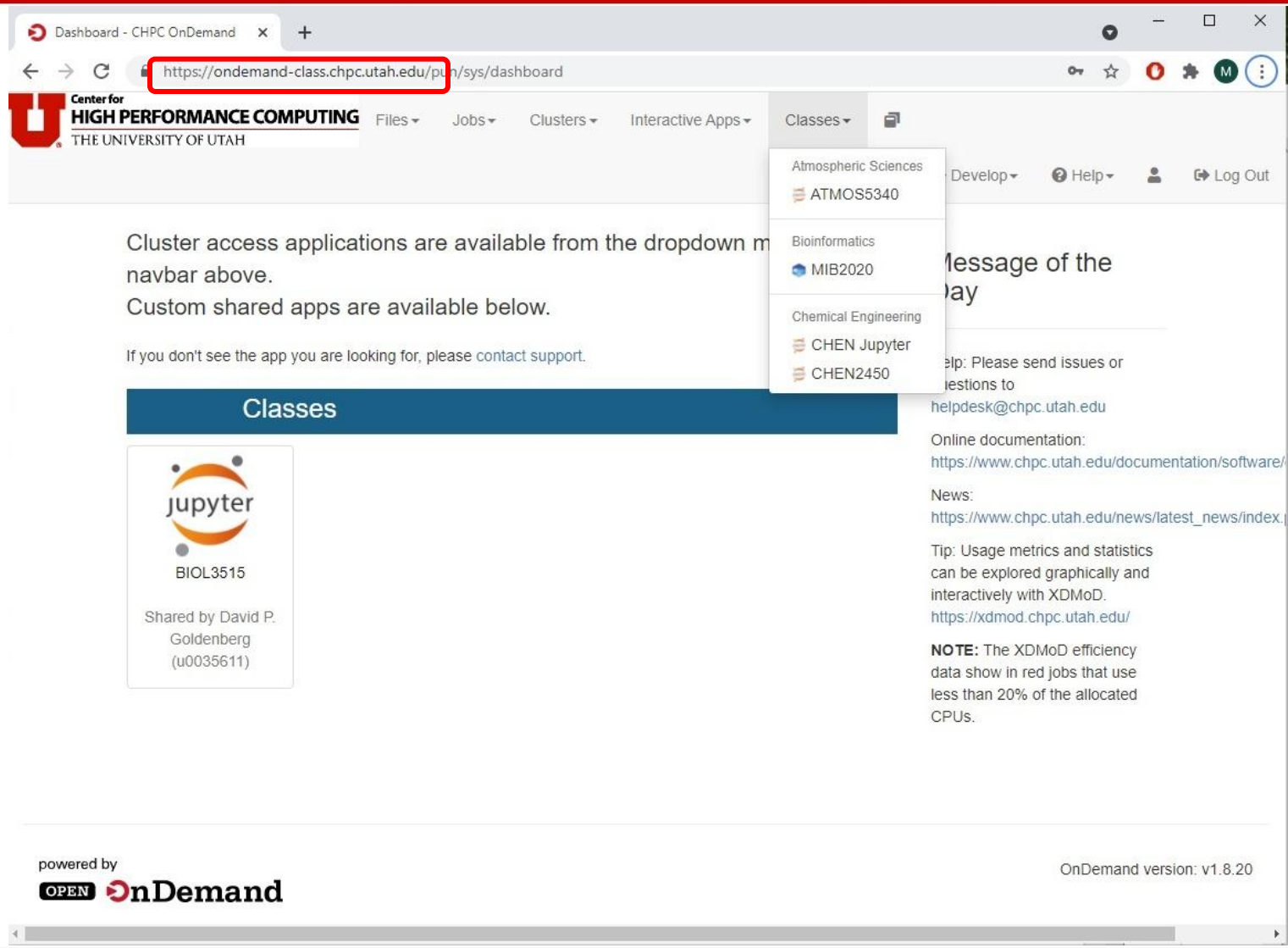
Interactive apps

- Interactive jobs
- The most unique feature of OOD
- Session on a compute node inside interactive SLURM job, or Frisco node
- Either remote desktop or application



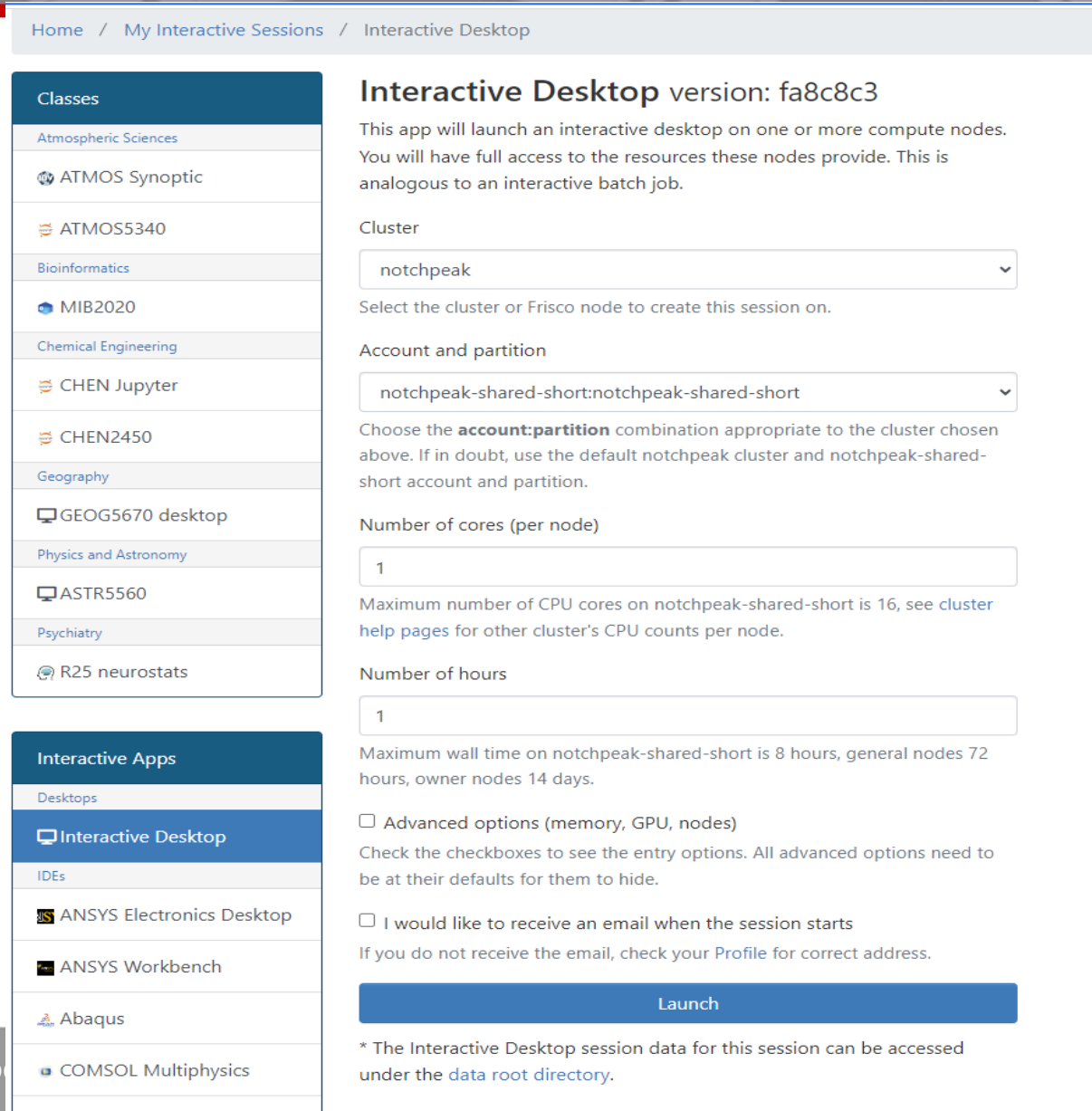
Interactive apps – contd.

- Class specific apps in a separate menu
- General environment and class have the same interactive apps
- PE has a specific subset of apps



Interactive apps - desktop

- Cluster or Frisco node specified on the top
- To start the desktop job ASAP use notchpeak-shared-short
- Wait time may be longer on other clusters unless group has owner nodes
- Advanced options via check box



notchpeak-shared-short

- Account/partition devoted to interactive jobs
- Two 64 core, 256 GB AMD Zen 1 CPU based nodes, two Intel Cascade Lake 52 core nodes, 4 GeForce 1080Ti, 4 Tesla T4 GPUs
- Max walltime 8 hours
- Max 16 tasks, 128 GB RAM, 2 jobs per user
- Instant job allocation = interactivity of the job
- Good for OOD interactive apps, testing, debugging, etc
- `salloc -n 1 -N 1 -A notchpeak-shared-short -p notchpeak-shared-short –gres=gpu:t4:1 -t 8:00:00`

redwood-shared-short

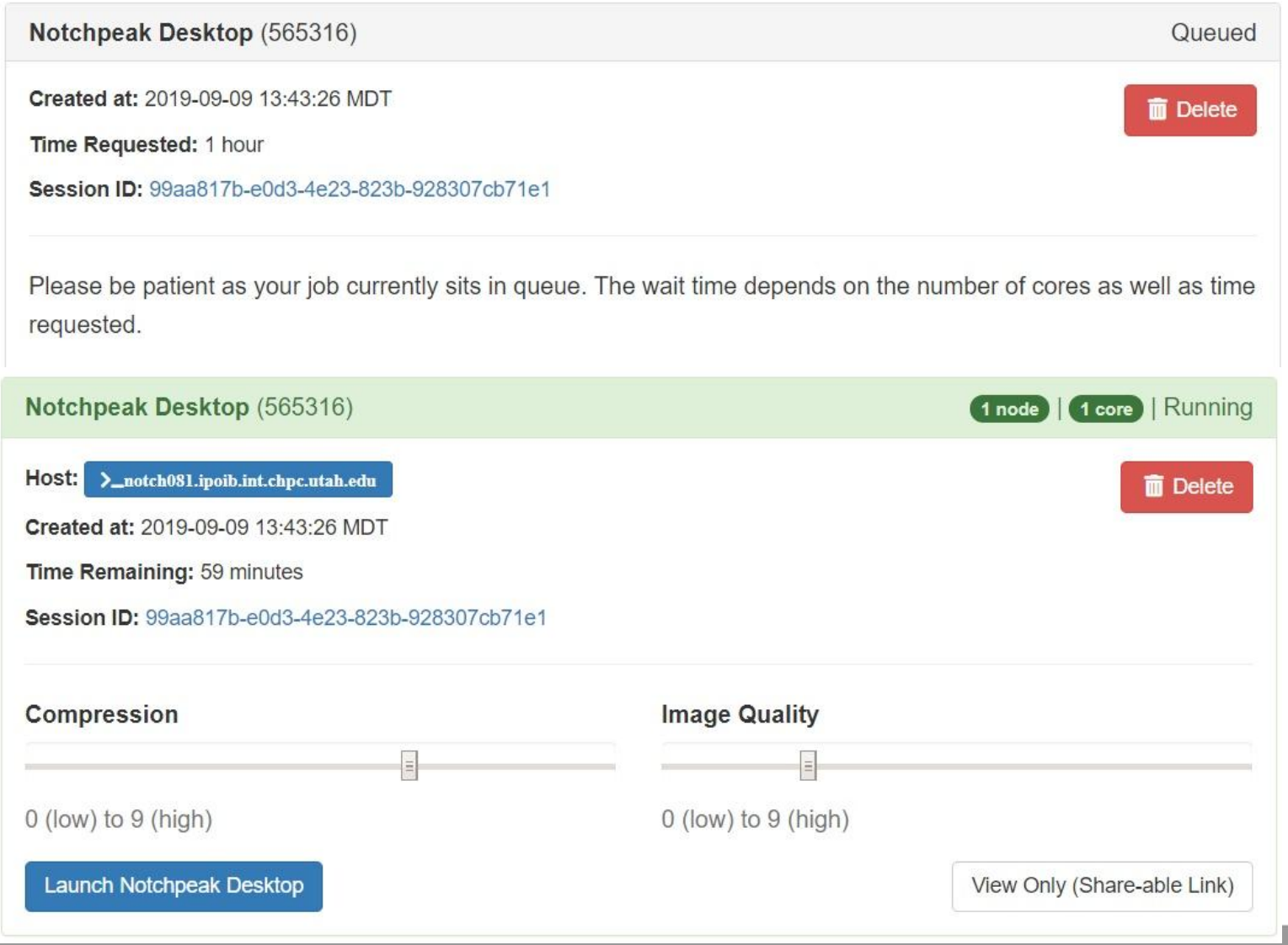
- Account/partition devoted to interactive jobs
- Two 28 core, 128 GB Intel Broadwell CPU based nodes
- Max walltime 8 hours
- Max 8 tasks, 16 GB RAM per user
- Instant job allocation = interactivity of the job
- Good for OOD interactive apps, testing, debugging, etc
- `salloc -n 1 -N 1 -A redwood-shared-short -p redwood-shared-short -t 8:00:00`

Frisco nodes

- Another option to launch interactive apps
- Run X server – the only choice for most Visualization apps
- 8 servers in the GE with various hardware specs, https://www.chpc.utah.edu/documentation/guides/frisco-nodes.php
- 2 servers in the PE, called bristlecone[1,2]
- Subject to the same Arbiter limits as if using FastX

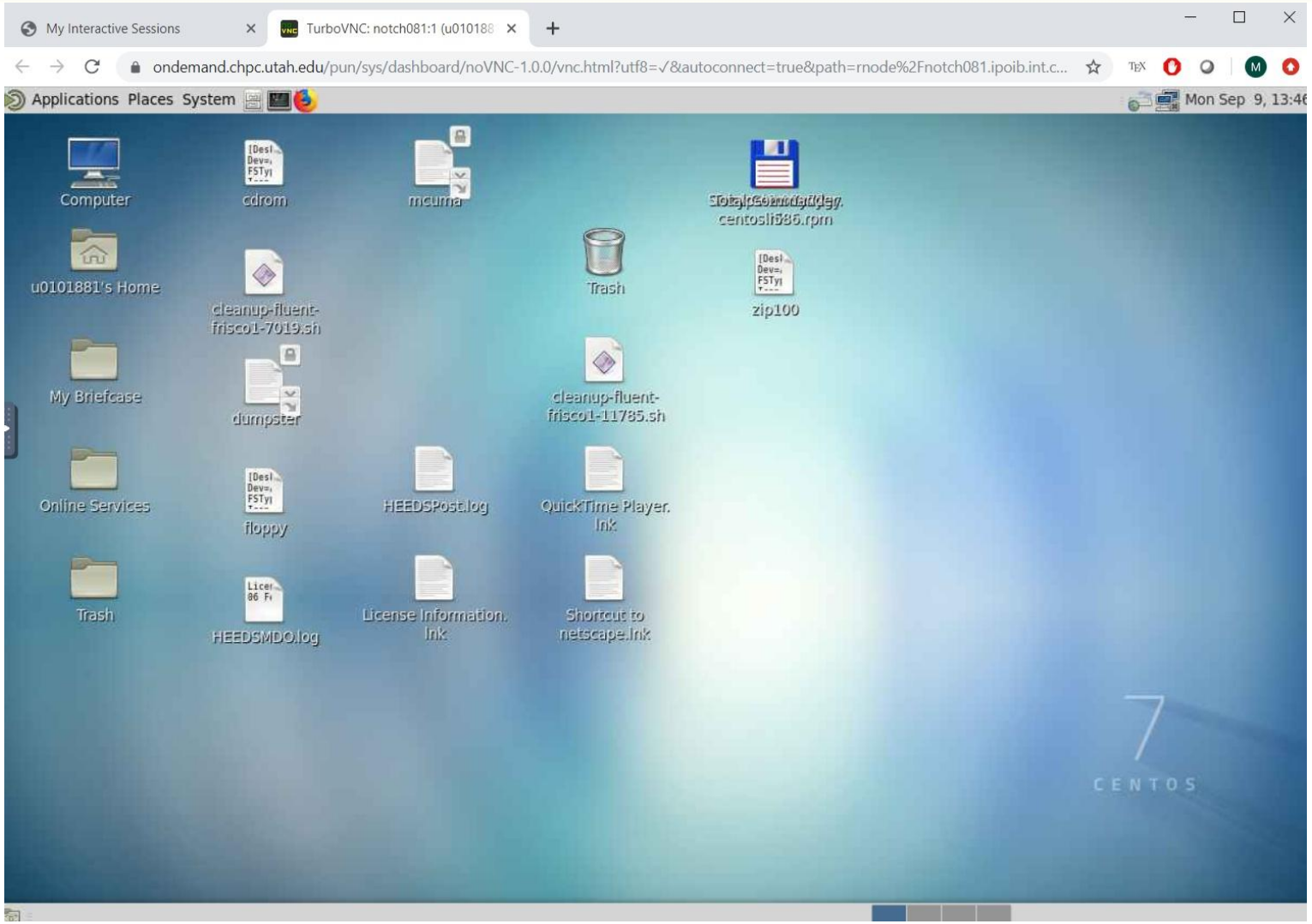
Interactive desktop launch

- First job is queued
- Once job starts, Launch button appears
- Can modify the viewing quality (set low compression high image quality on a fast network)
- Also can share the link for others to view



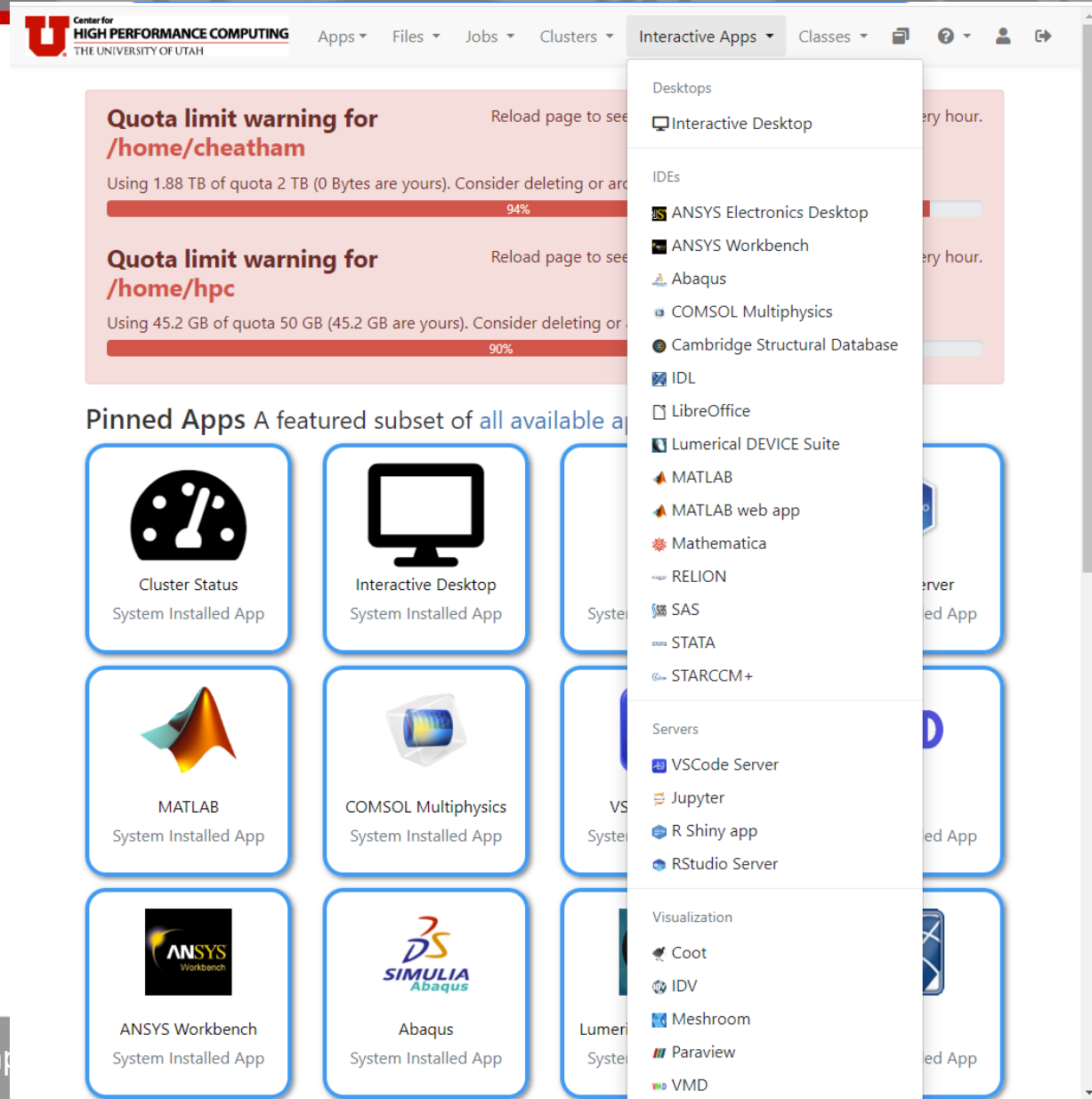
Interactive desktop launch

- Interactive job's remote desktop is launched in a separate browser tab
- Closing the tab does not delete the job (persistent connection)
- Must hit Delete to delete the job



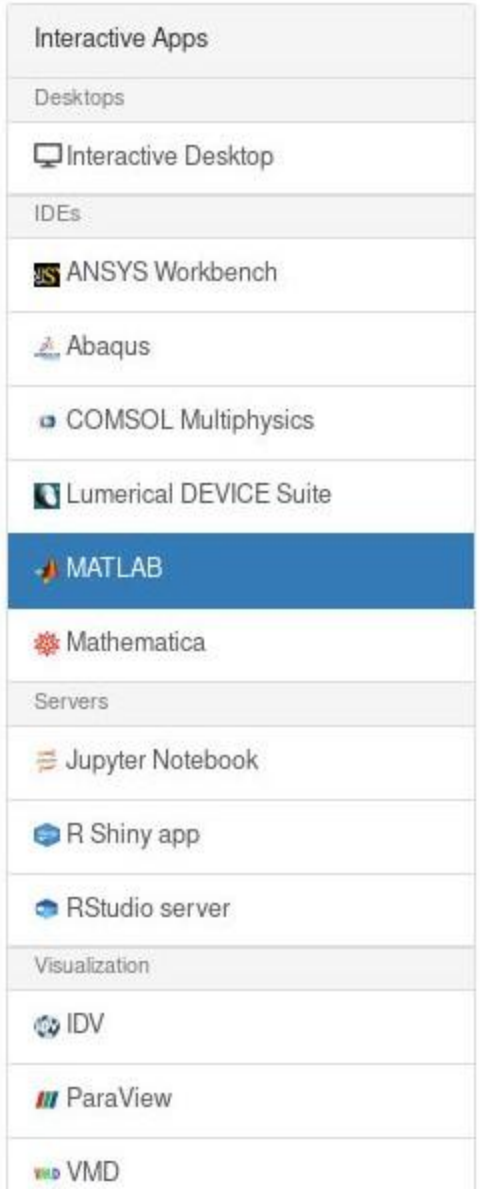
Interactive apps - GUIs and servers

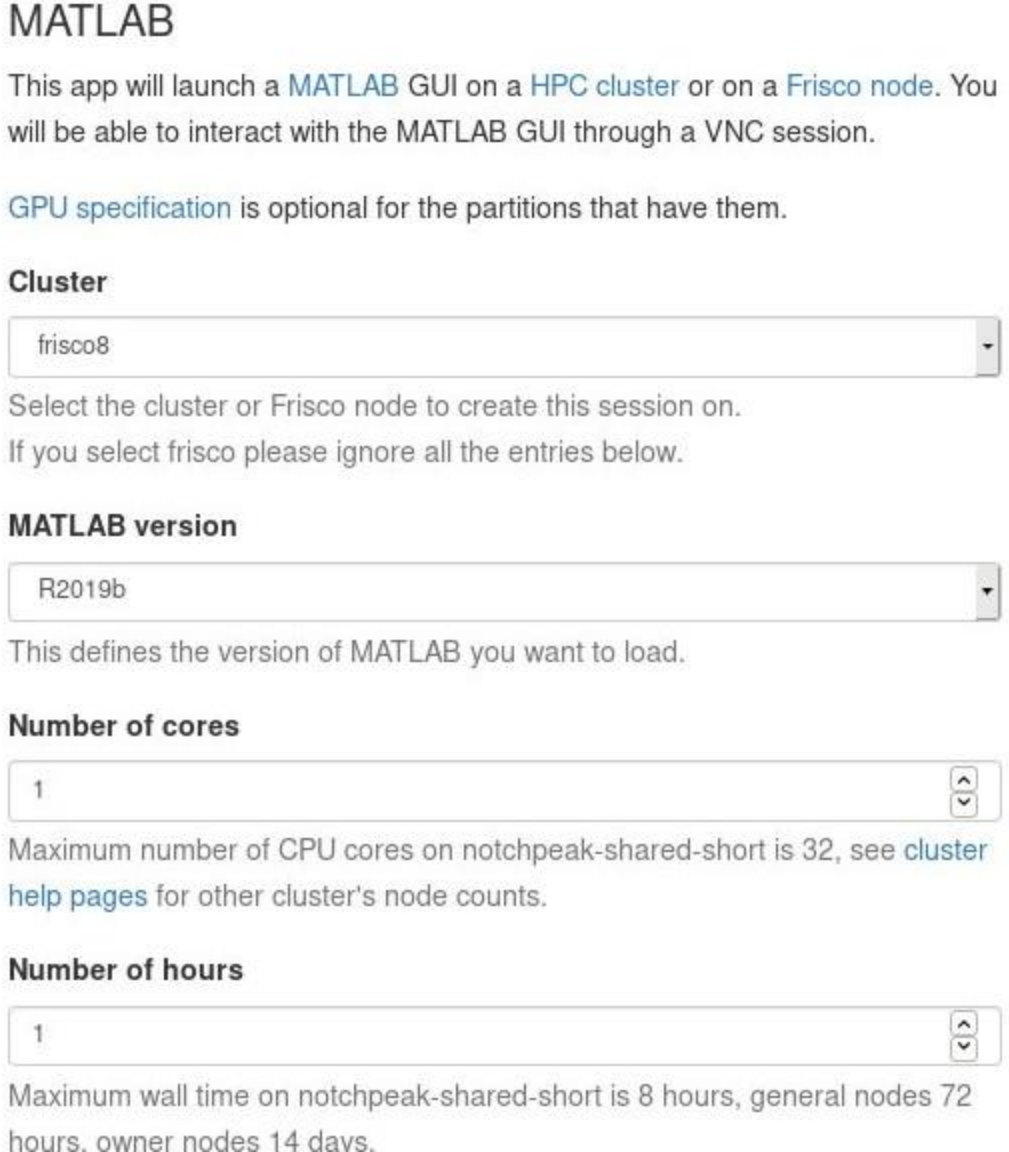
- Direct launch of a given application
- Abaqus, ANSYS, COMSOL, Lumerical, MATLAB, SAS, Mathematica, RELION, Stata
- Jupyter Notebook, Lab
- RStudio server, R Shiny app
- Paraview, Coot and VMD only on Friscos
- Can set up others if needed



Interactive apps - MATLAB

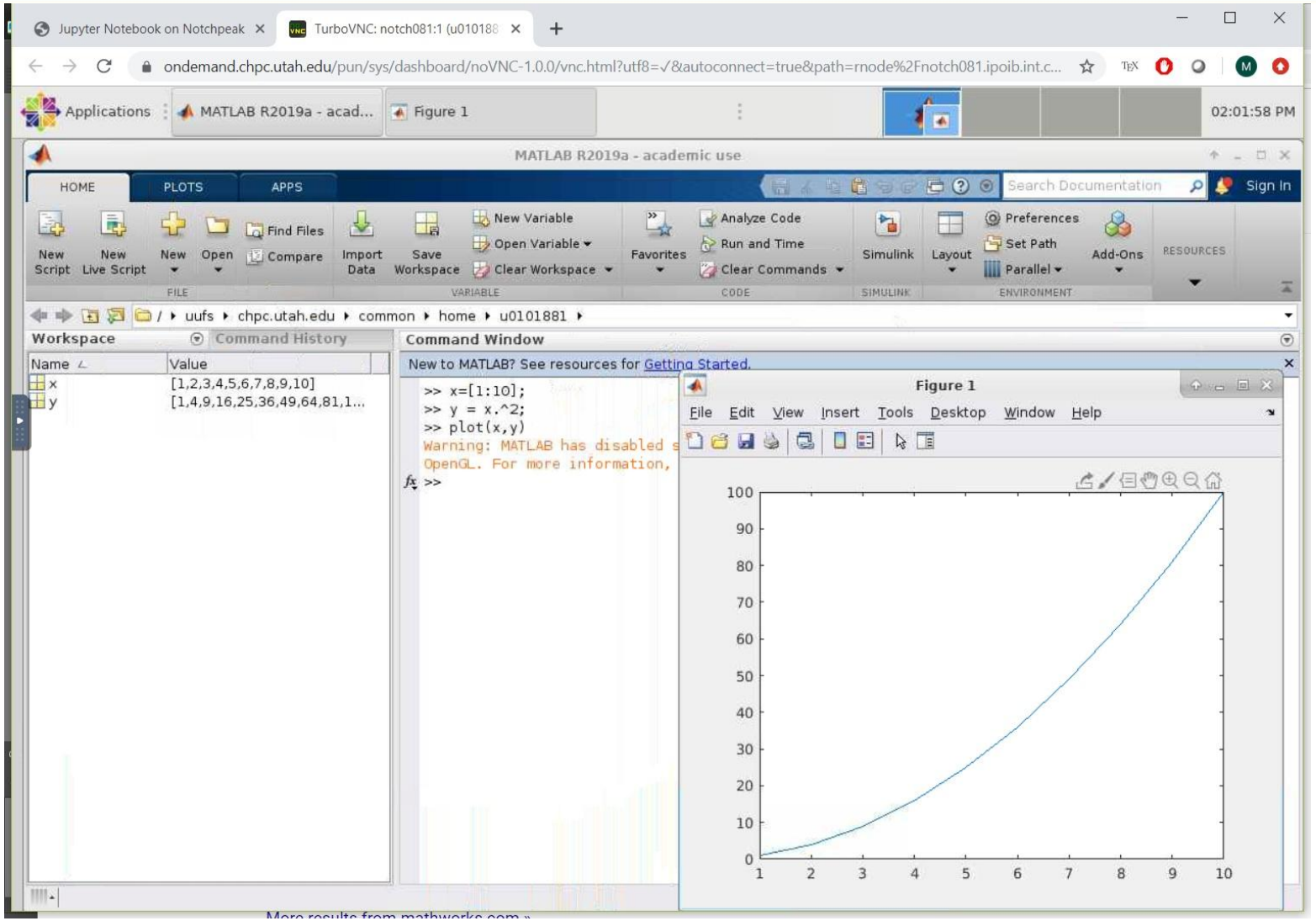
- Same start parameters as in Interactive Desktop
- Plus option to choose MATLAB version
- Works on clusters and Friscos





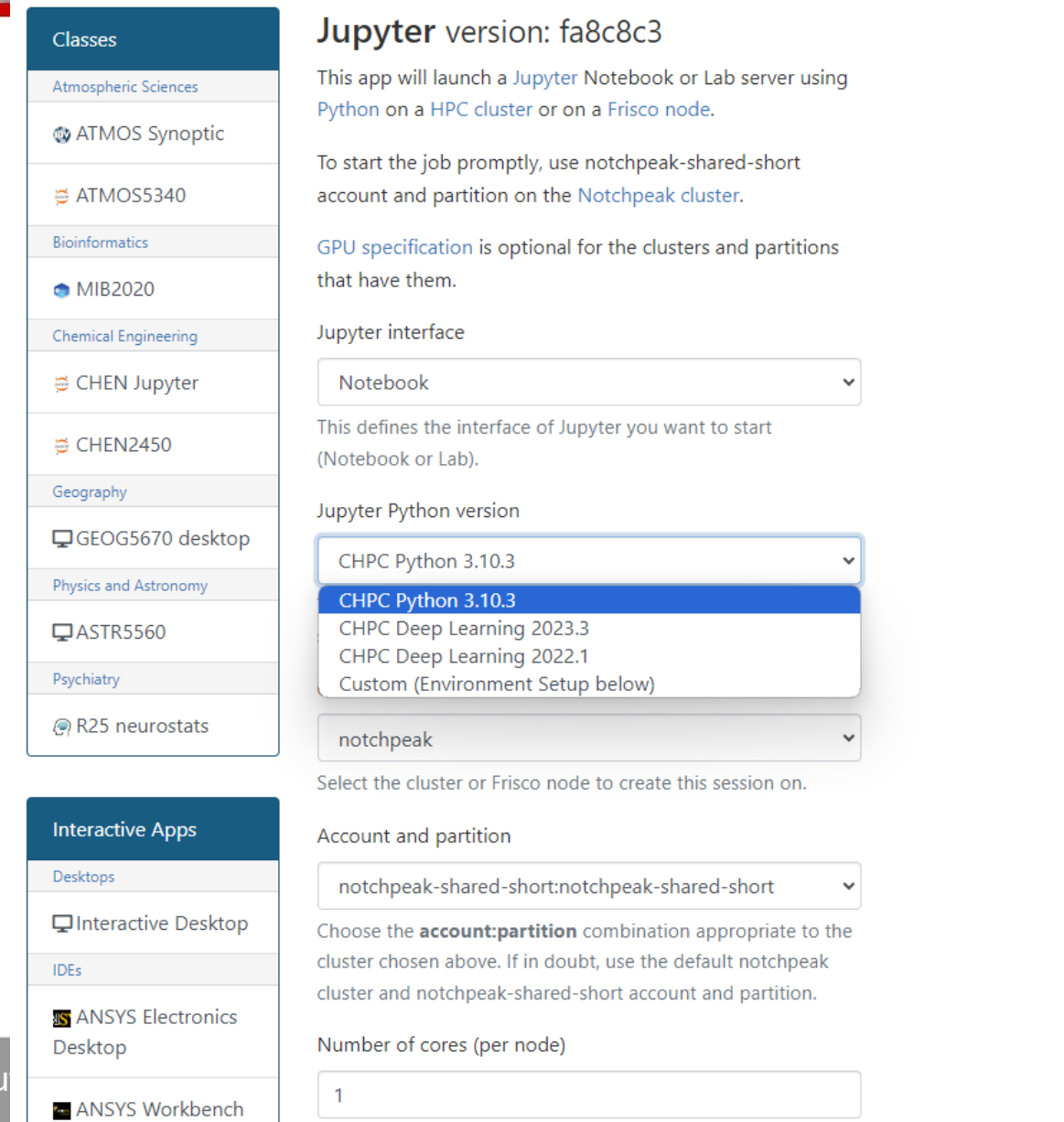
Interactive apps - MATLAB

- MATLAB GUI window
- Additional MATLAB windows appear over the GUI
- MATLAB Web App is an alternative that behaves like a web server



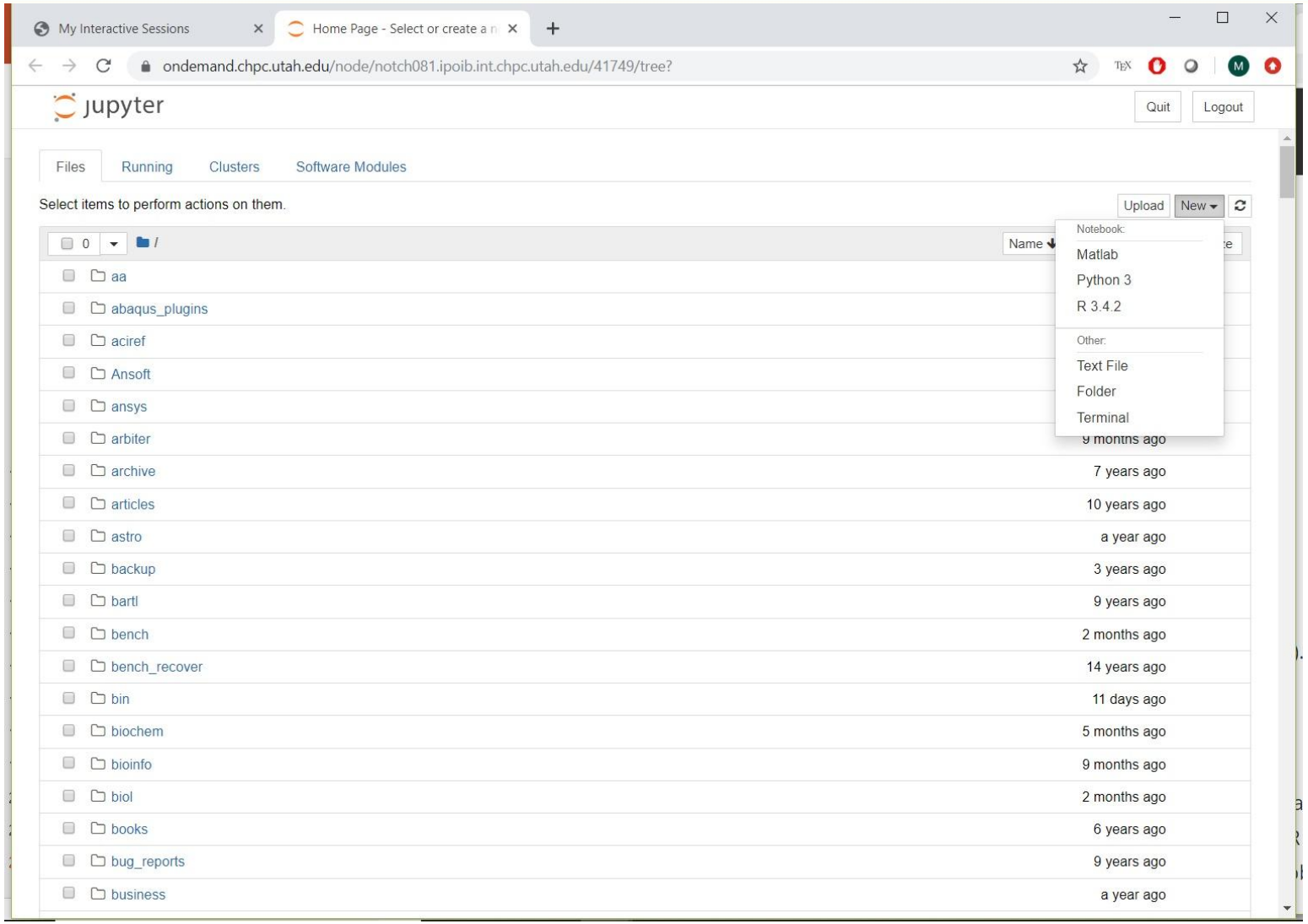
Interactive apps - Jupyter notebook

- Specify own or CHPC Python module
- Can also specify GPU - but make sure to list the right account/partition
- Works on clusters and Friscos



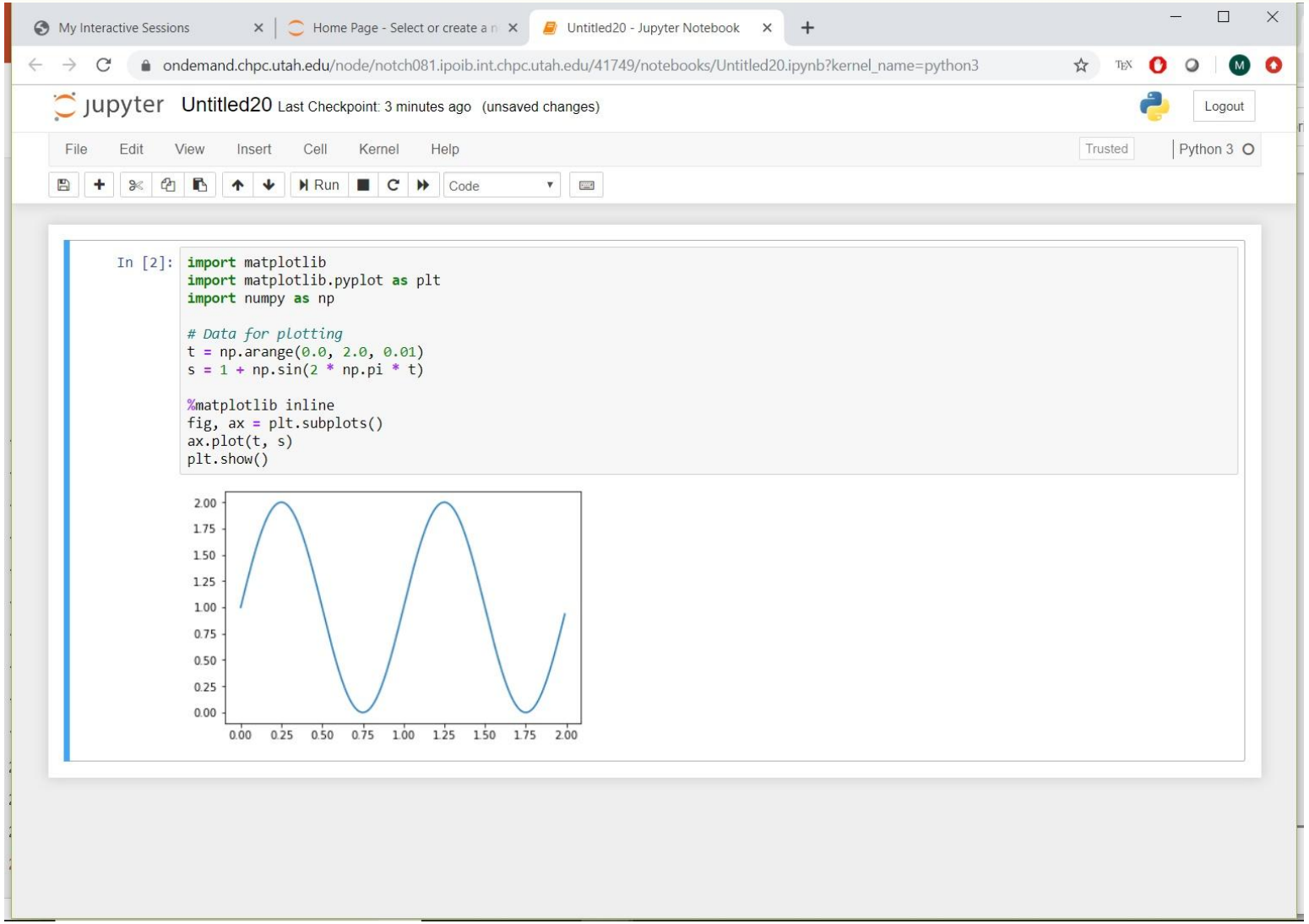
Interactive apps - Jupyter notebook

- Own Python needs to be installed via Anaconda, see CHPC webpage for instructions
- CHPC Python also has MATLAB and R notebooks
- Other languages can be installed if needed



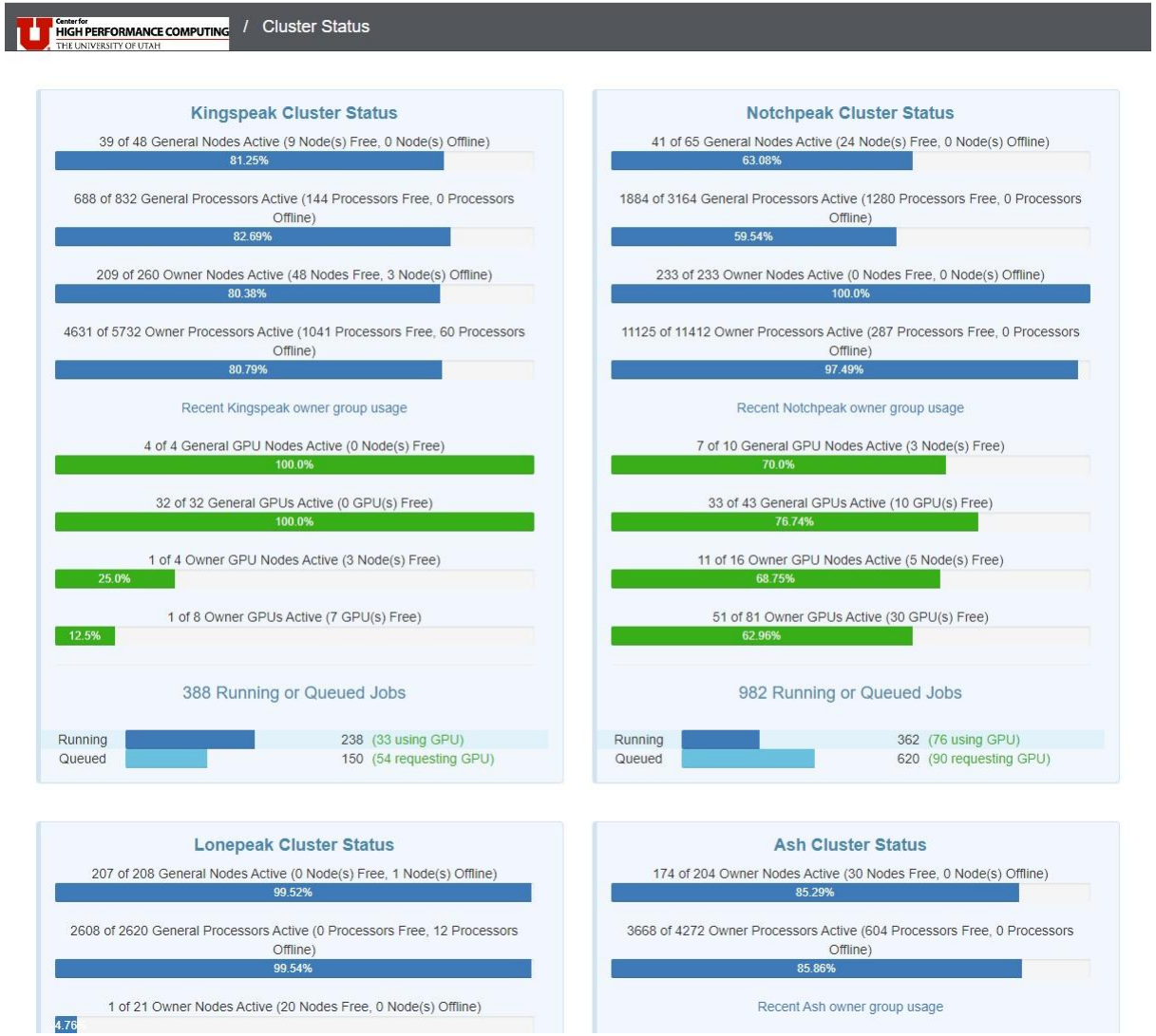
Interactive apps - Jupyter notebook

- The notebook is launched in another browser tab



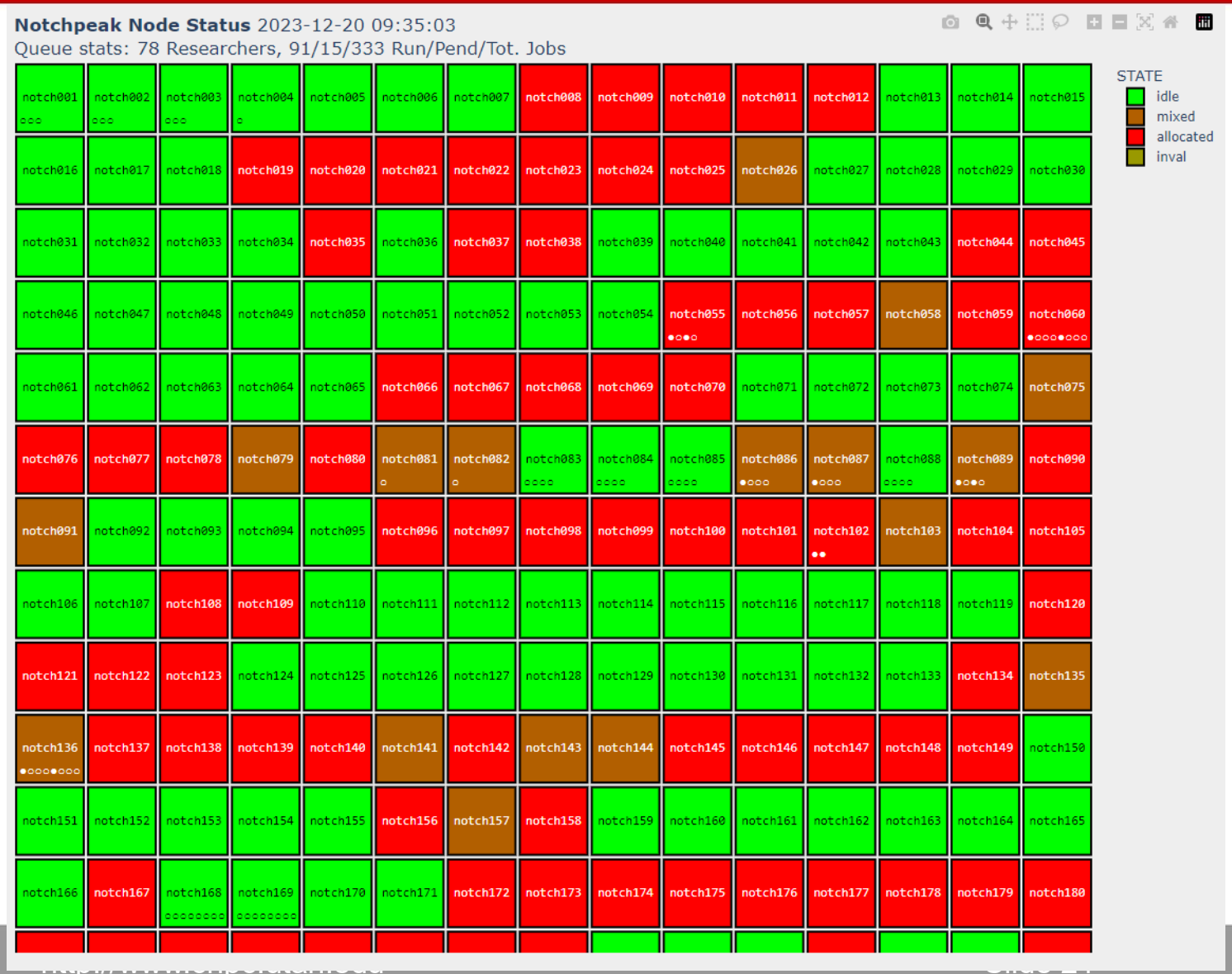
Clusters status app

- Menu Clusters-Cluster Status
- Alternative to System Status on CHPC webpage
- Shows how busy clusters are
- General, owner nodes, GPU nodes and GPUs
- Running and queued jobs



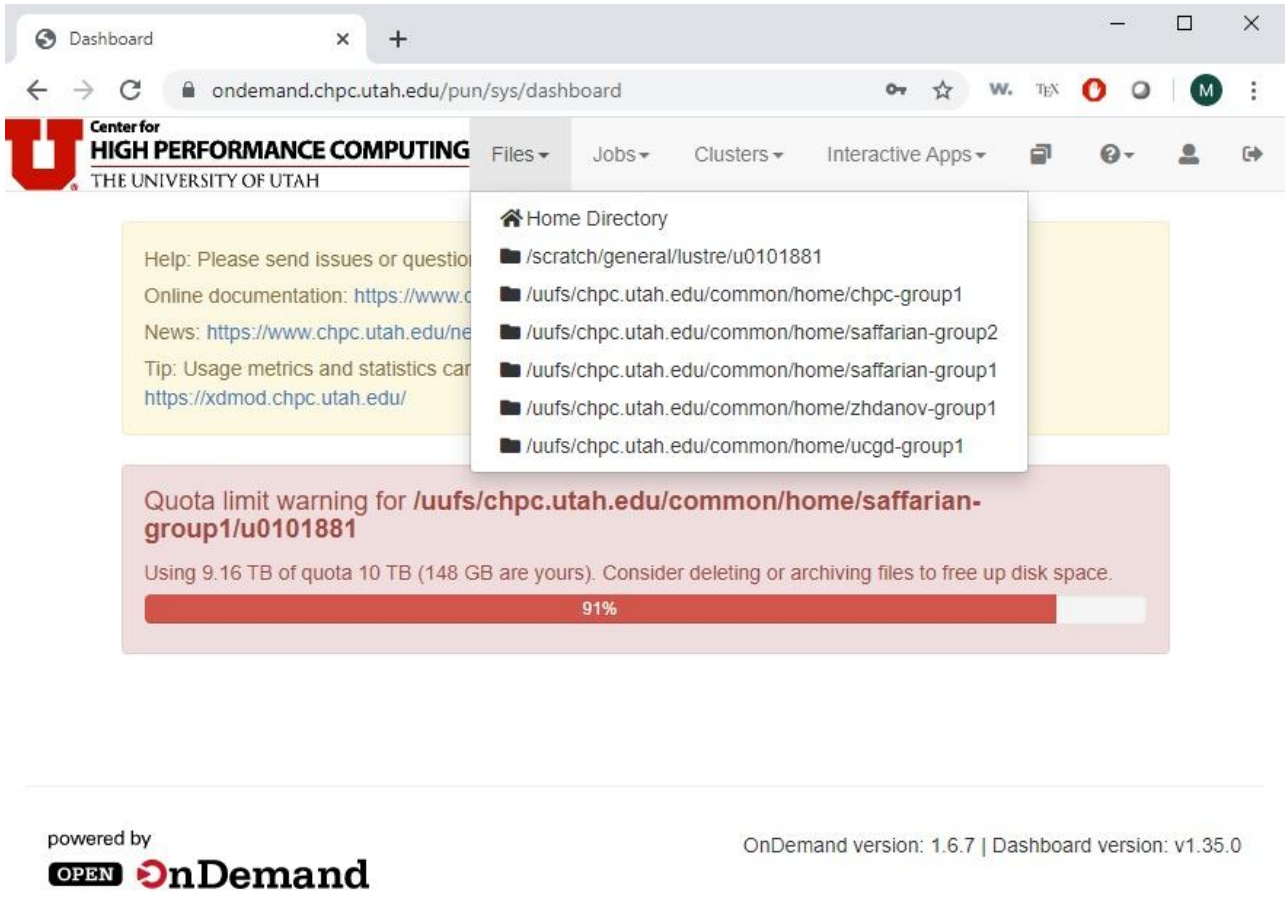
Node status app

- Menu Clusters-X Node Status
- Color coded node status
- Hovering over node shows extra information
- GPU status in small circles at the bottom of node tile



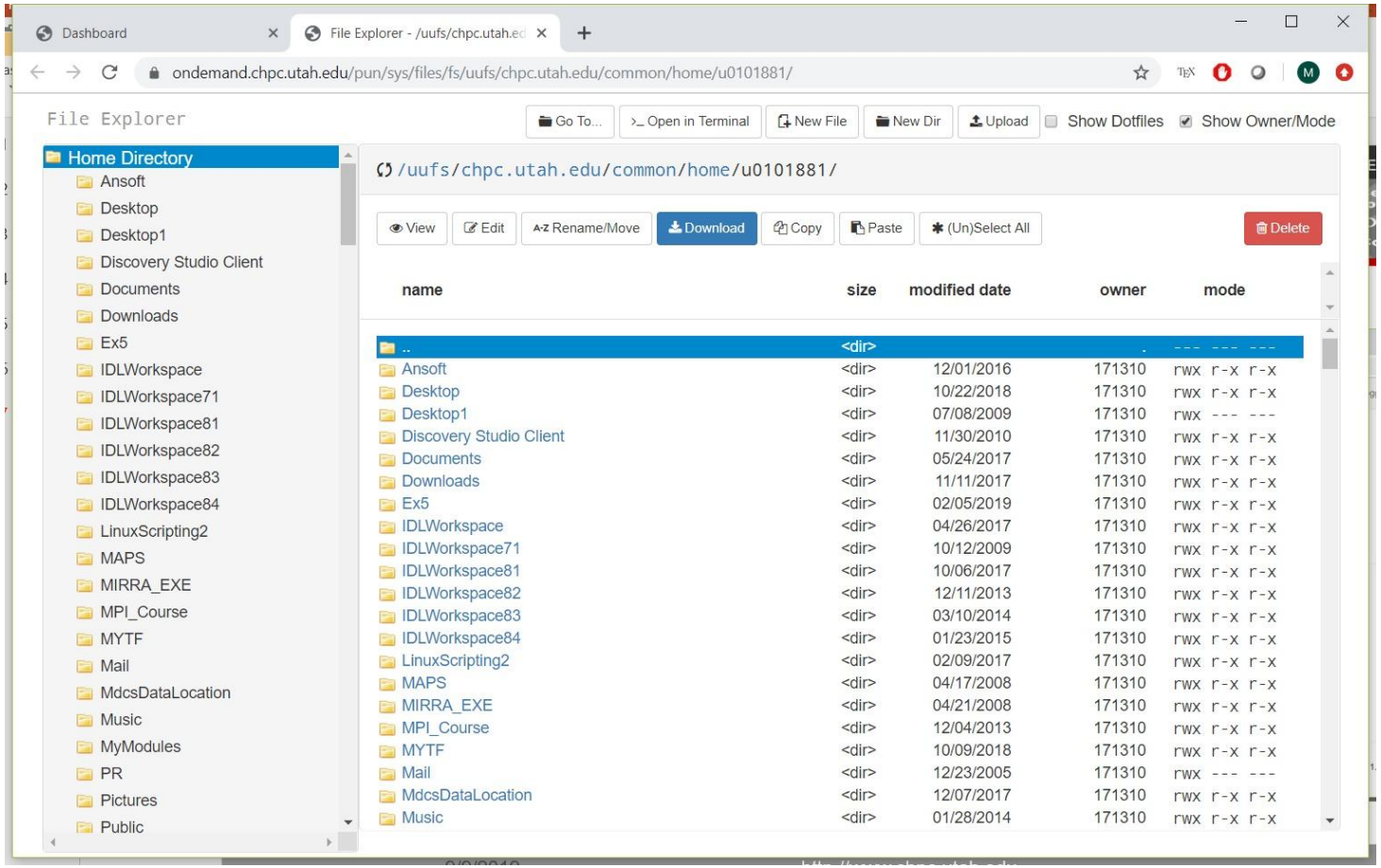
File explorer

- Sees all file systems where user has access
- Allows various file operations, including editing



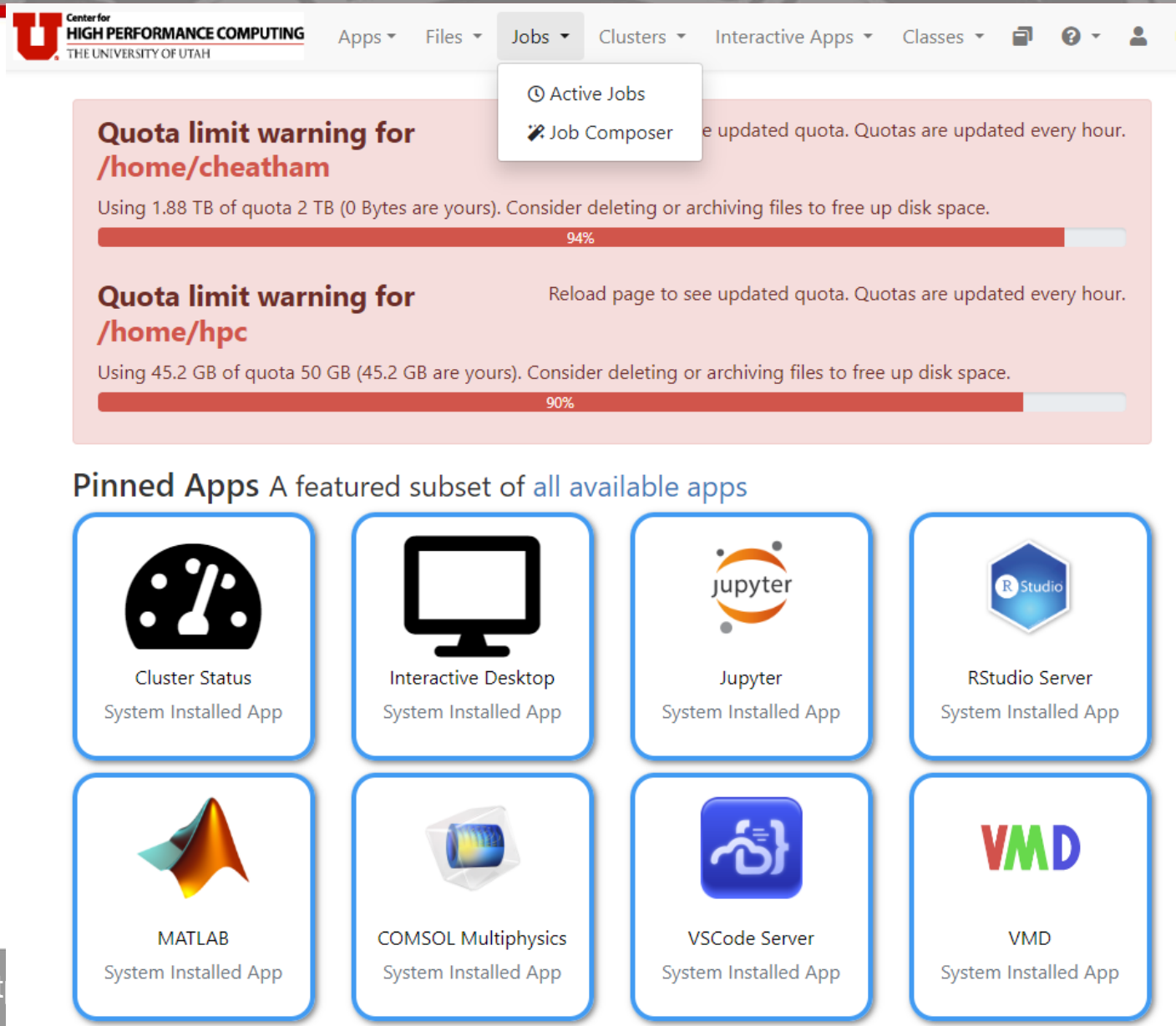
File explorer

- Drag and drop copying, renaming
- File viewing and editing
- Open in terminal
- Upload and Download



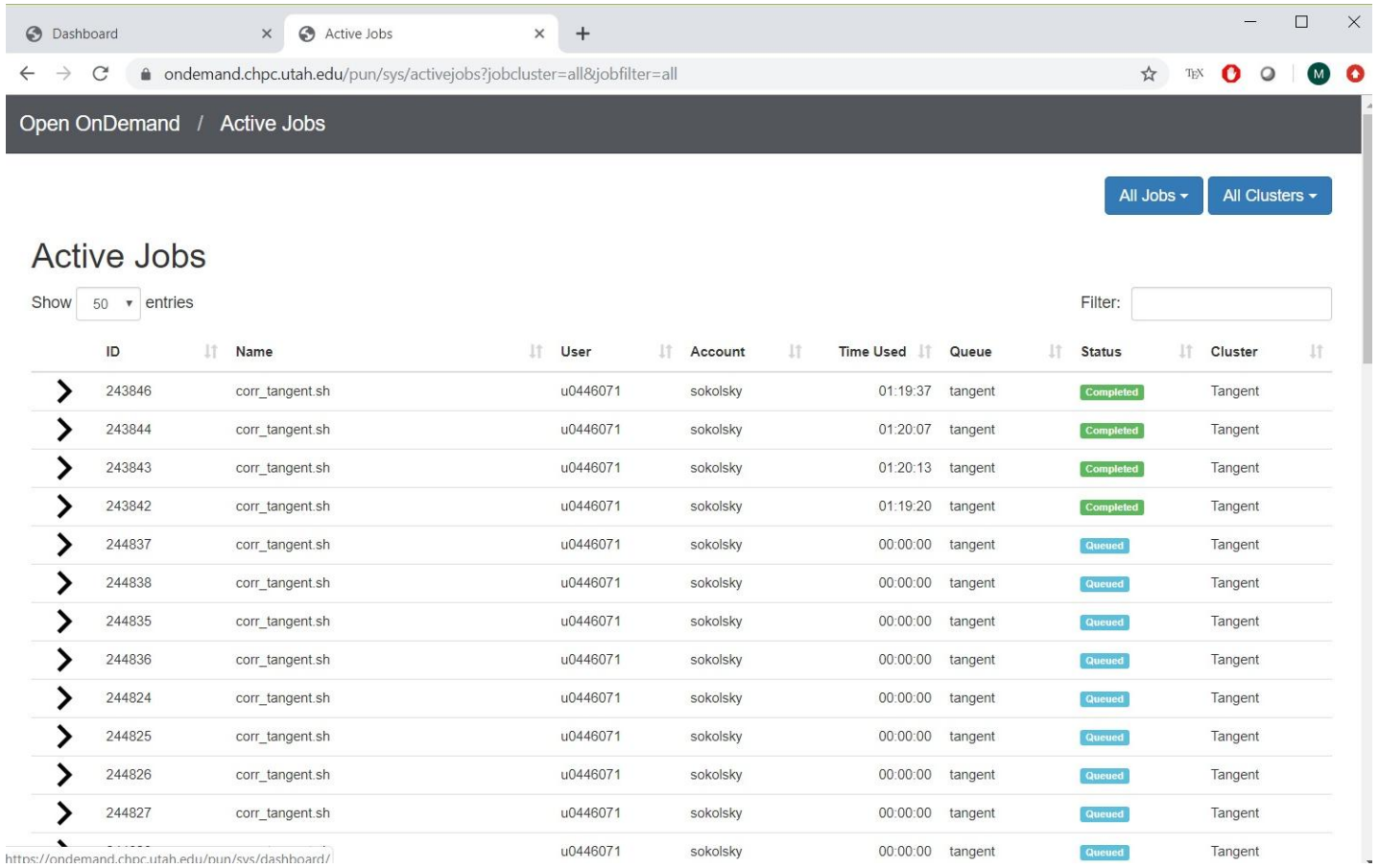
Jobs

- Listing of active jobs
- Creating and submitting new jobs



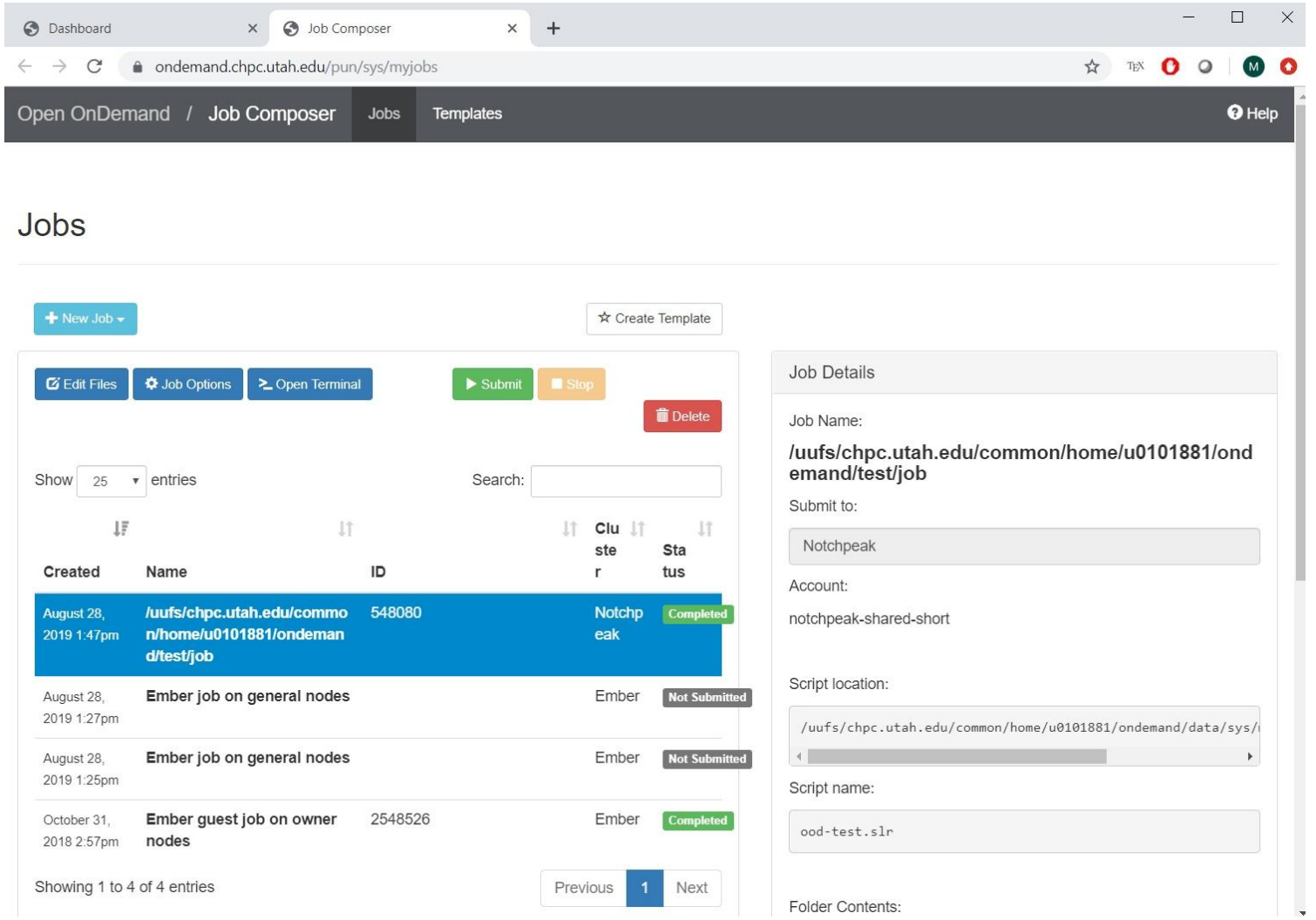
Active jobs

- Filter by all or user only jobs
- Filter by all clusters or specific cluster
- Expanding shows job details
- Use filter to search for jobs



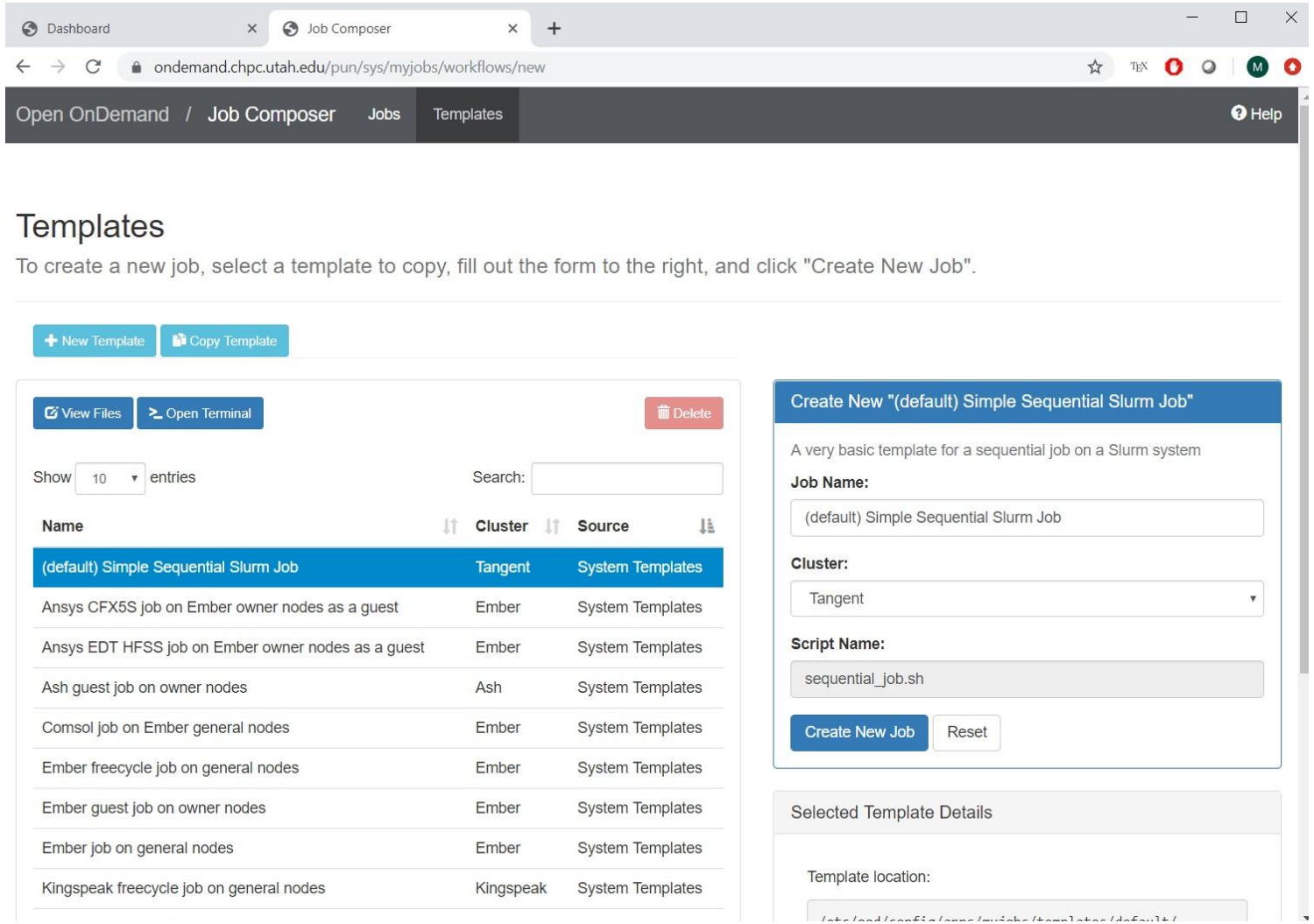
Job composer - jobs

- Create and edit job scripts
- Edit job input files (in File Explorer)
- Submit/cancel jobs
- See job status
- Caveat - OOD copies all job files to ~/ondemand/data/sys/myjobs/projects/default



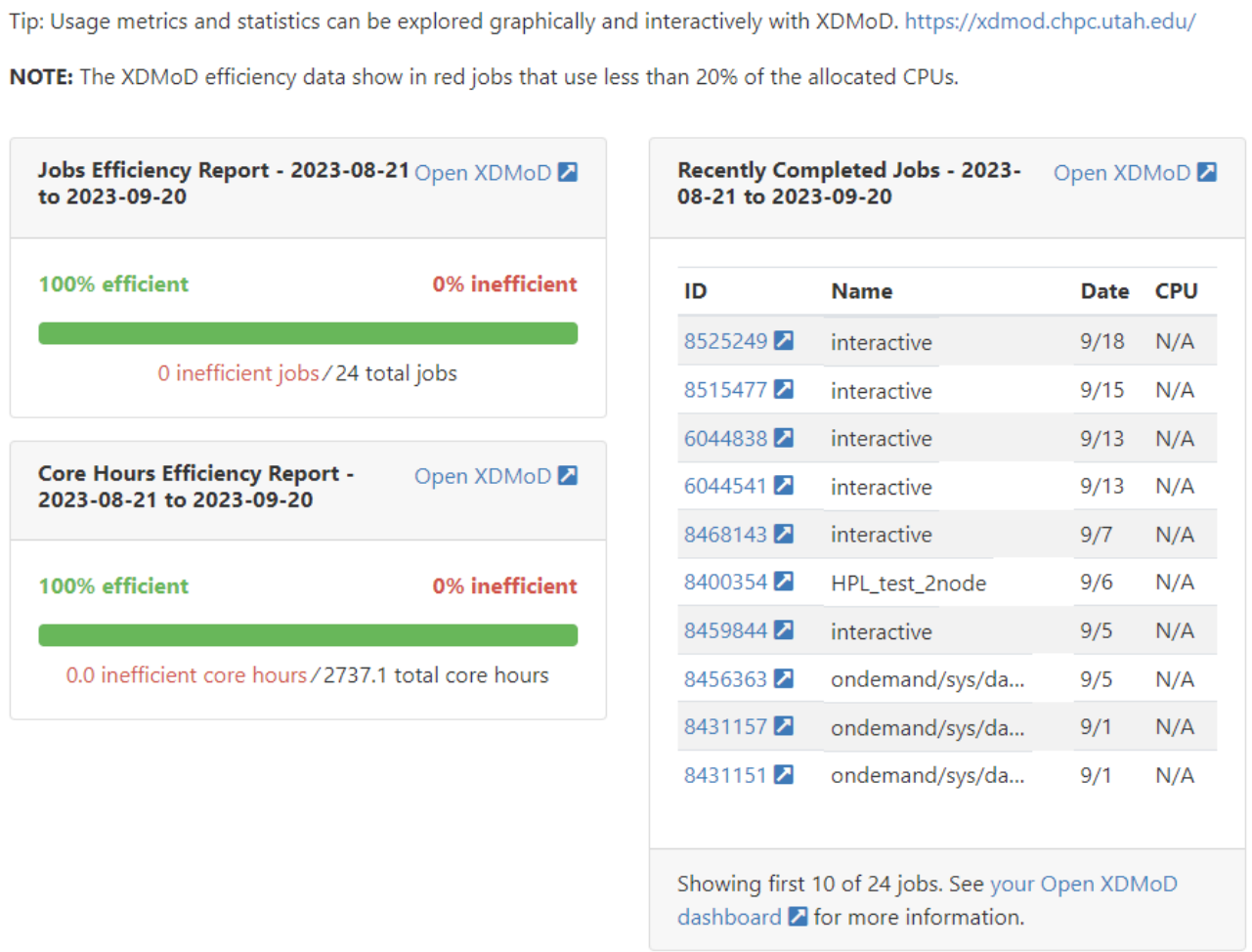
Job composer - templates

- SLURM job script templates
- Create new jobs based on these templates
- Modify these jobs based on specific needs
- https://github.com/CHPC-UofU/chpc-myjobs-templates



XDMoD integration

- XDMoD provides job efficiency reporting
- OnDemand displays select data from xdmod.chpc.utah.edu
- Job efficiency display shows up
- Can click to each job number to go to XDMoD display page



Tip: Usage metrics and statistics can be explored graphically and interactively with XDMoD. https://xdmod.chpc.utah.edu/

NOTE: The XDMoD efficiency data show in red jobs that use less than 20% of the allocated CPUs.

Jobs Efficiency Report - 2023-08-21 to 2023-09-20 Open XDMoD

100% efficient 0% inefficient

0 inefficient jobs / 24 total jobs

Core Hours Efficiency Report - 2023-08-21 to 2023-09-20 Open XDMoD

100% efficient 0% inefficient

0.0 inefficient core hours / 2737.1 total core hours

Recently Completed Jobs - 2023-08-21 to 2023-09-20 Open XDMoD

ID	Name	Date	CPU
8525249	interactive	9/18	N/A
8515477	interactive	9/15	N/A
6044838	interactive	9/13	N/A
6044541	interactive	9/13	N/A
8468143	interactive	9/7	N/A
8400354	HPL_test_2node	9/6	N/A
8459844	interactive	9/5	N/A
8456363	ondemand/sys/da...	9/5	N/A
8431157	ondemand/sys/da...	9/1	N/A
8431151	ondemand/sys/da...	9/1	N/A

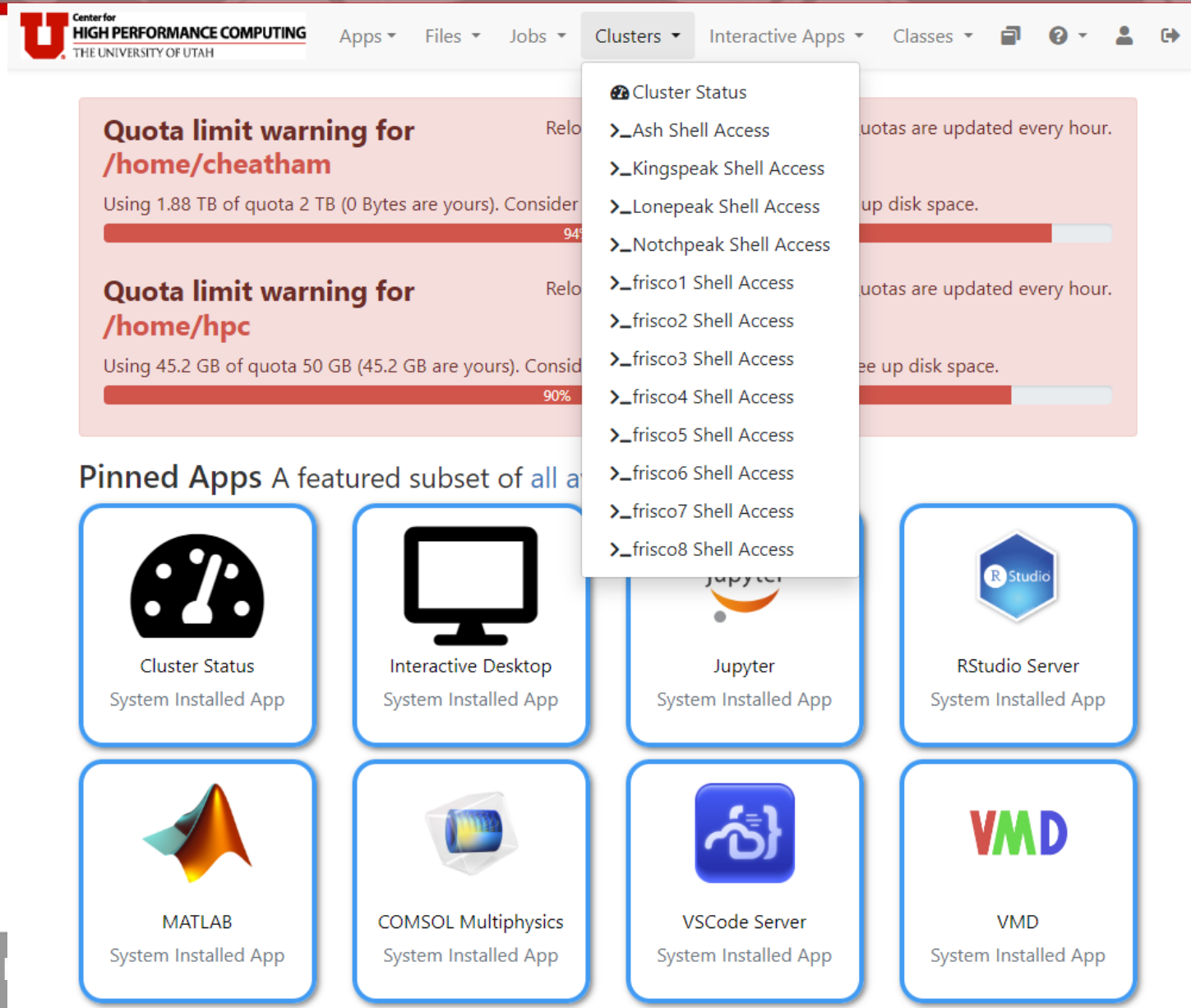
Showing first 10 of 24 jobs. See your Open XDMoD dashboard for more information.

powered by OPEN OnDemand

OnDemand version: 3.0.1

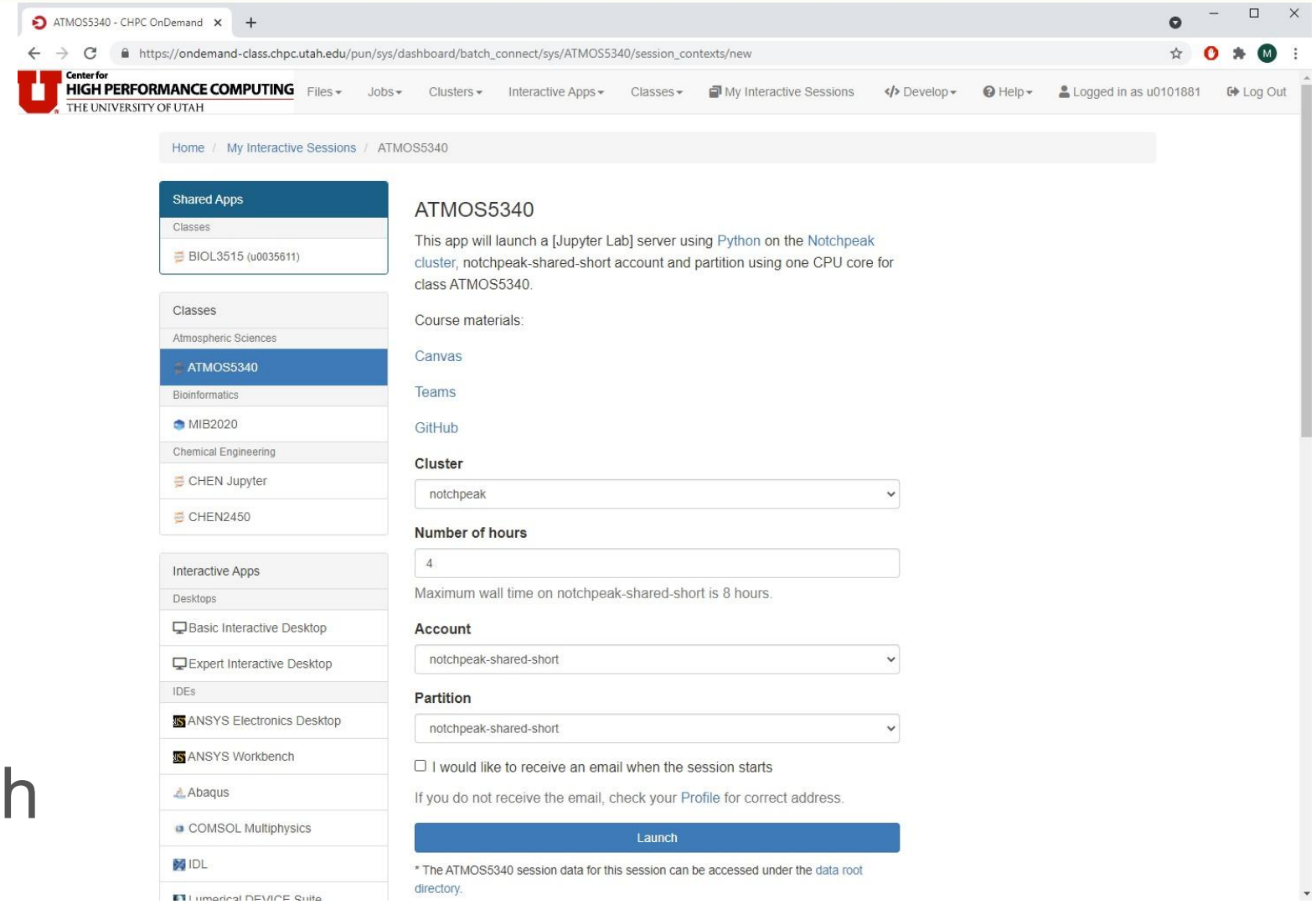
Clusters terminal access

- Shell terminal access to each cluster
- Opens a new browser tab with terminal



Class use

- ondemand-class.chpc.utah.edu
- Classes can use pre-defined interactive apps
- It's easier for students to have class specific app
- Instructor can work with us to create the app



Future outlook

- Interface improvements
  - New job composer
  - OOD development tracked at GitHub, https://github.com/OSC/ondemand
- Other interactive apps based on user demand
- More integrated accounting and metrics from XDMod
- Integration with other gateways, cloud providers

Further resources

- http://ondemand.chpc.utah.edu
- https://www.chpc.utah.edu/documentation/software/ondemand.php
- http://openondemand.org/
- https://www.osc.edu/resources/online_portals/ondemand

- Helpdesk: helpdesk@chpc.utah.edu