

Hands-on introduction to Open OnDemand

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

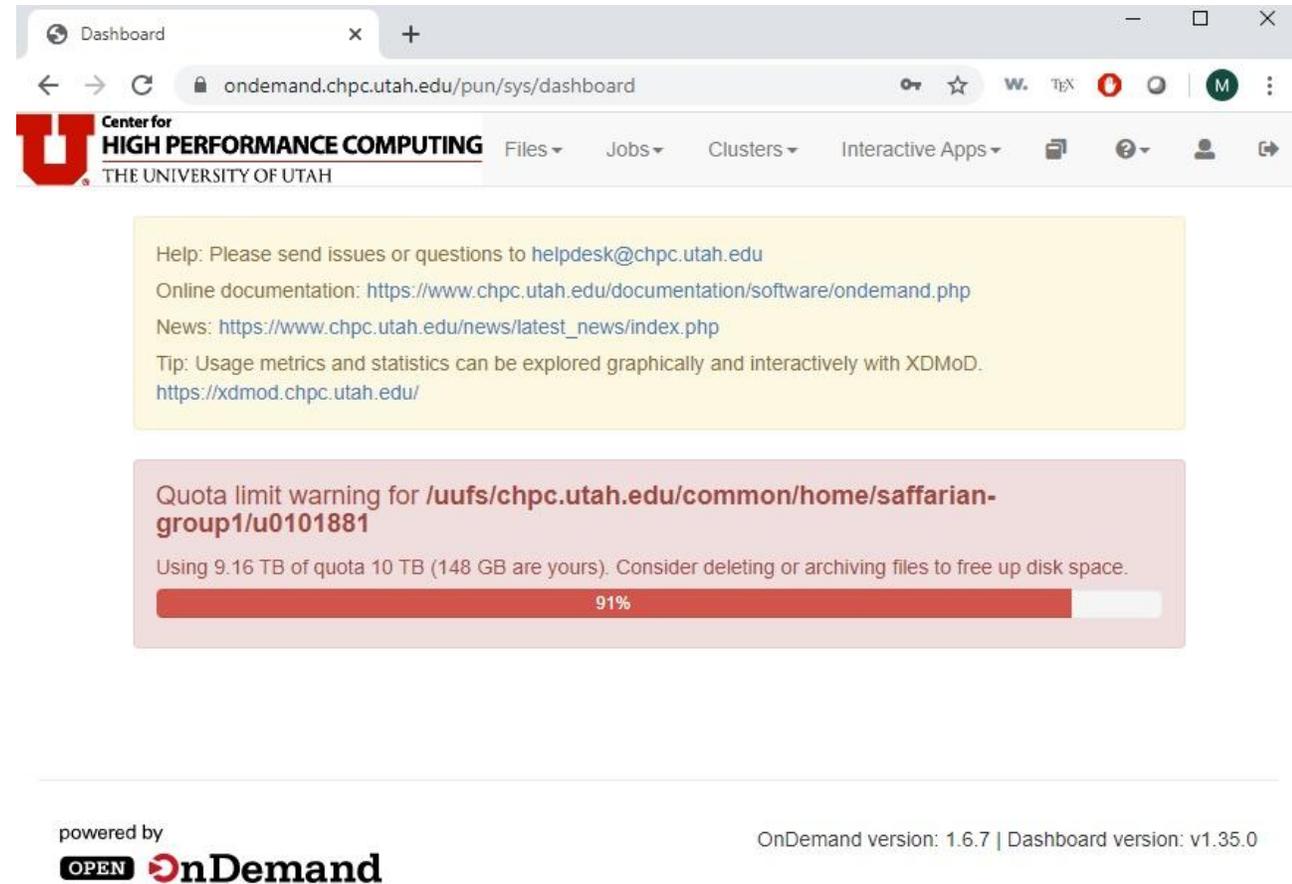


1. Internet access
2. Web browser
3. CHPC account



- 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

- 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 $\geq 90\%$



Dashboard

ondemand.chpc.utah.edu/pun/sys/dashboard

Center for HIGH PERFORMANCE COMPUTING THE UNIVERSITY OF UTAH

Files Jobs Clusters Interactive Apps

Help: Please send issues or questions to helpdesk@chpc.utah.edu
Online documentation: <https://www.chpc.utah.edu/documentation/software/ondemand.php>
News: https://www.chpc.utah.edu/news/latest_news/index.php
Tip: Usage metrics and statistics can be explored graphically and interactively with XDMoD. <https://xdmod.chpc.utah.edu/>

Quota limit warning for **/uufs/chpc.utah.edu/common/home/saffarian-group1/u0101881**
Using 9.16 TB of quota 10 TB (148 GB are yours). Consider deleting or archiving files to free up disk space.

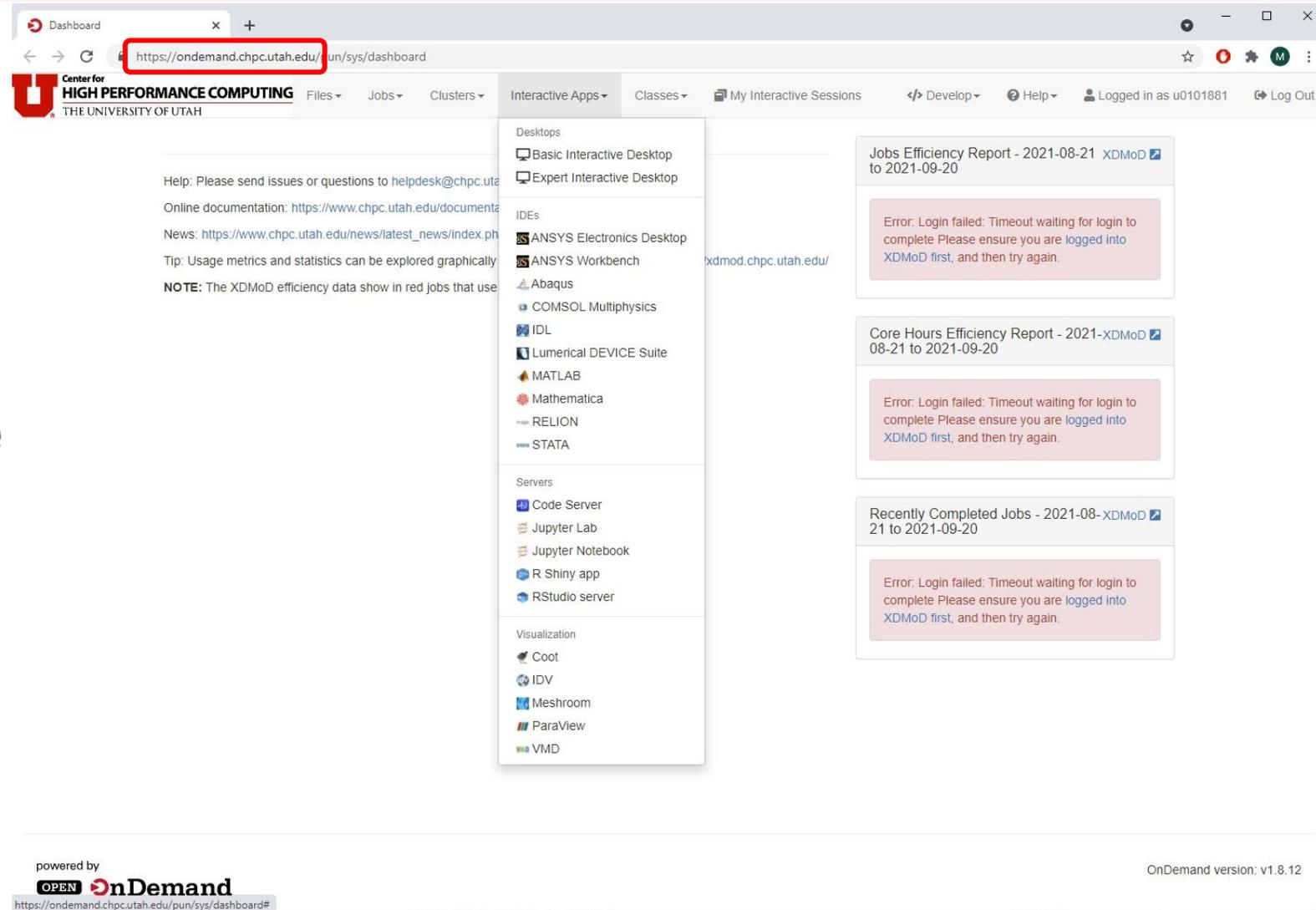
91%

powered by OPEN OnDemand

OnDemand version: 1.6.7 | Dashboard version: v1.35.0

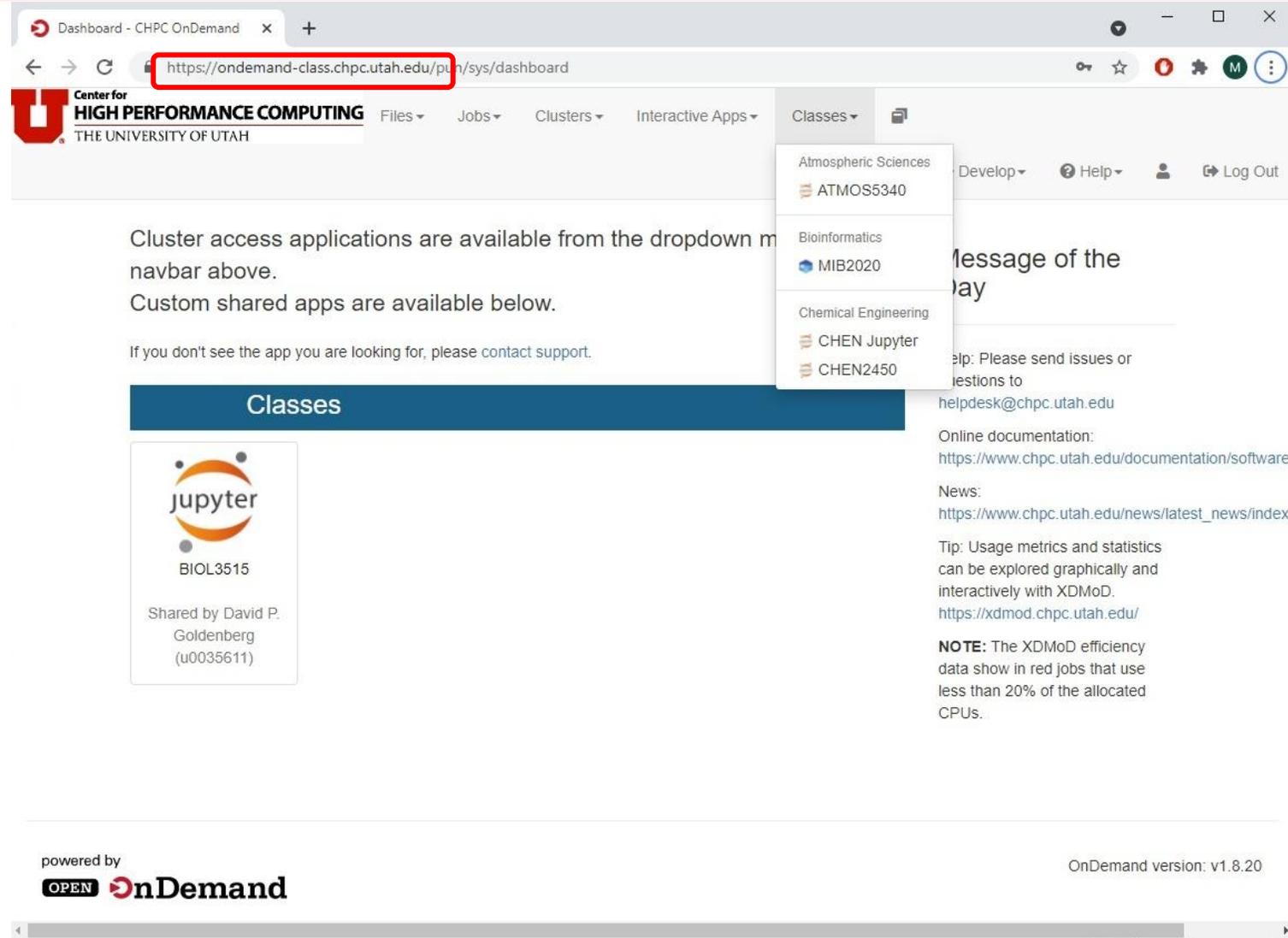


- Interactive jobs
- The most unique feature of OOD
- Session on a compute node inside interactive SLURM job, or Frisco node
- Either remote desktop or application



The screenshot shows the OnDemand interactive apps dashboard. The URL bar is highlighted with a red box, showing <https://ondemand.chpc.utah.edu/pun/sys/dashboard>. The dashboard includes a navigation menu with options like Files, Jobs, Clusters, Interactive Apps, Classes, My Interactive Sessions, Develop, and Help. A dropdown menu for Interactive Apps is open, listing various desktops, IDEs, servers, and visualization tools. The main content area displays several reports, including 'Jobs Efficiency Report - 2021-08-21 to 2021-09-20', 'Core Hours Efficiency Report - 2021-08-21 to 2021-09-20', and 'Recently Completed Jobs - 2021-08-21 to 2021-09-20'. Each report contains an error message: 'Error: Login failed: Timeout waiting for login to complete Please ensure you are logged into XDMoD first, and then try again.' The footer indicates the dashboard is powered by OPEN OnDemand and provides the URL <https://ondemand.chpc.utah.edu/pun/sys/dashboard#>. The OnDemand version is v1.8.12.

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



Dashboard - CHPC OnDemand

https://ondemand-class.chpc.utah.edu/pun/sys/dashboard

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Files Jobs Clusters Interactive Apps Classes

Atmospheric Sciences
ATMOS5340

Bioinformatics
MIB2020

Chemical Engineering
CHEN Jupyter
CHEN2450

Cluster access applications are available from the dropdown menu in the navbar above.
Custom shared apps are available below.
If you don't see the app you are looking for, please contact support.

Classes

 jupyter
BIOL3515
Shared by David P. Goldenberg (u0035611)

powered by OPEN OnDemand

OnDemand version: v1.8.20

- 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

Home / My Interactive Sessions / Interactive Desktop

Classes

- Atmospheric Sciences
 - ATMOS Synoptic
 - ATMOS5340
- Bioinformatics
 - MIB2020
- Chemical Engineering
 - CHEN Jupyter
 - CHEN2450
- Geography
 - GEOG5670 desktop
- Physics and Astronomy
 - ASTR5560
- Psychiatry
 - R25 neurostats

Interactive Apps

- Desktops
 - Interactive Desktop**
- IDEs
 - ANSYS Electronics Desktop
 - ANSYS Workbench
 - Abaqus
 - COMSOL Multiphysics

Interactive Desktop version: fa8c8c3

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.

Cluster

notchpeak

Select the cluster or Frisco node to create this session on.

Account and partition

notchpeak-shared-short:notchpeak-shared-short

Choose the **account:partition** combination appropriate to the cluster chosen above. If in doubt, use the default notchpeak cluster and notchpeak-shared-short account and partition.

Number of cores (per node)

1

Maximum number of CPU cores on notchpeak-shared-short is 16, see [cluster help pages](#) for other cluster's CPU counts per node.

Number of hours

1

Maximum wall time on notchpeak-shared-short is 8 hours, general nodes 72 hours, owner nodes 14 days.

Advanced options (memory, GPU, nodes)

Check the checkboxes to see the entry options. All advanced options need to be at their defaults for them to hide.

I would like to receive an email when the session starts

If you do not receive the email, check your [Profile](#) for correct address.

Launch

* The Interactive Desktop session data for this session can be accessed under the data root directory.



- 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`



- 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`



- 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



- 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

Notchpeak Desktop (565316) Queued

Created at: 2019-09-09 13:43:26 MDT

Time Requested: 1 hour

Session ID: 99aa817b-e0d3-4e23-823b-928307cb71e1

Please be patient as your job currently sits in queue. The wait time depends on the number of cores as well as time requested.

Notchpeak Desktop (565316) 1 node | 1 core | Running

Host: [>_notch081.ipuib.int.chpc.utah.edu](#) Delete

Created at: 2019-09-09 13:43:26 MDT

Time Remaining: 59 minutes

Session ID: 99aa817b-e0d3-4e23-823b-928307cb71e1

Compression

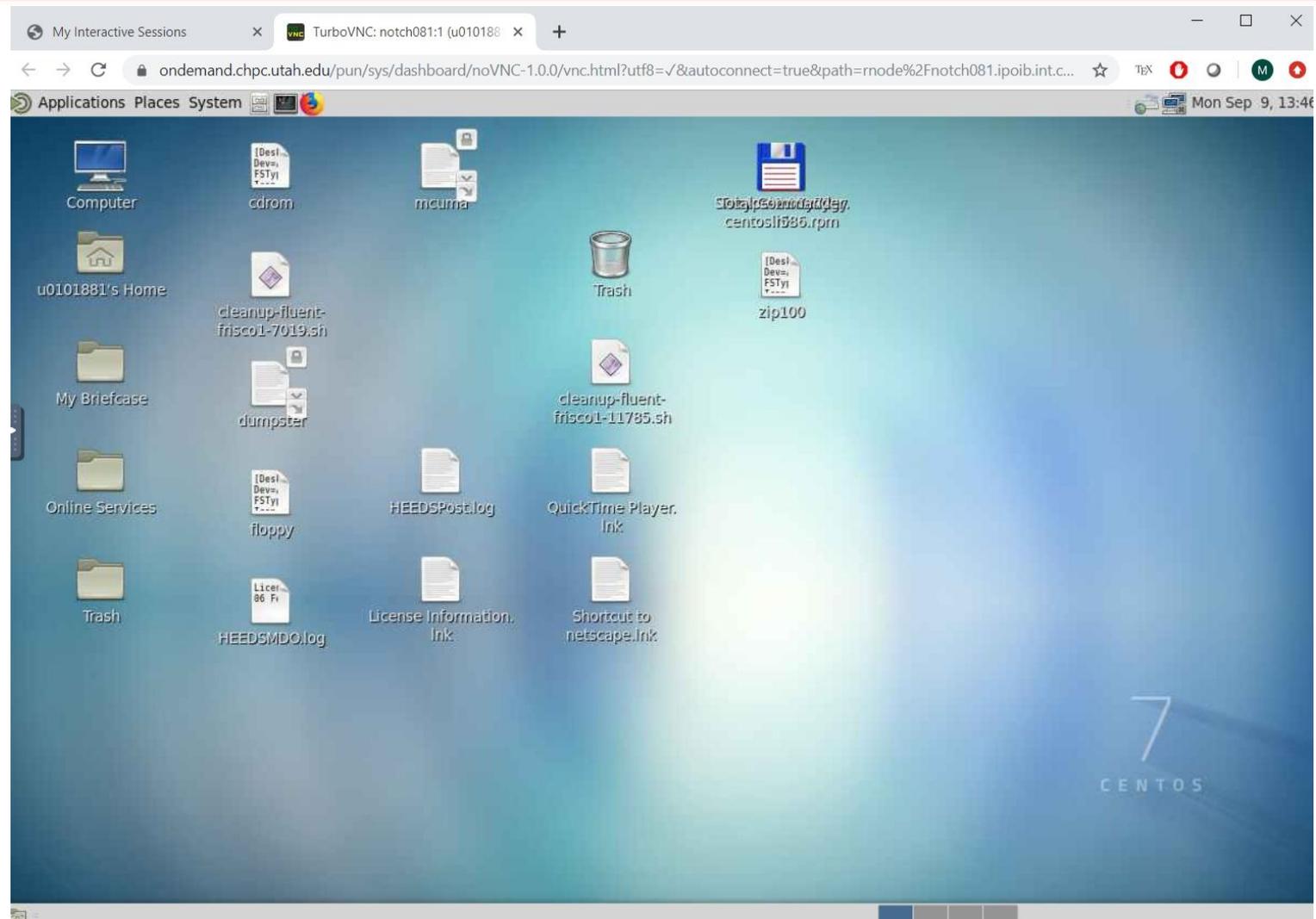
0 (low) to 9 (high)

Image Quality

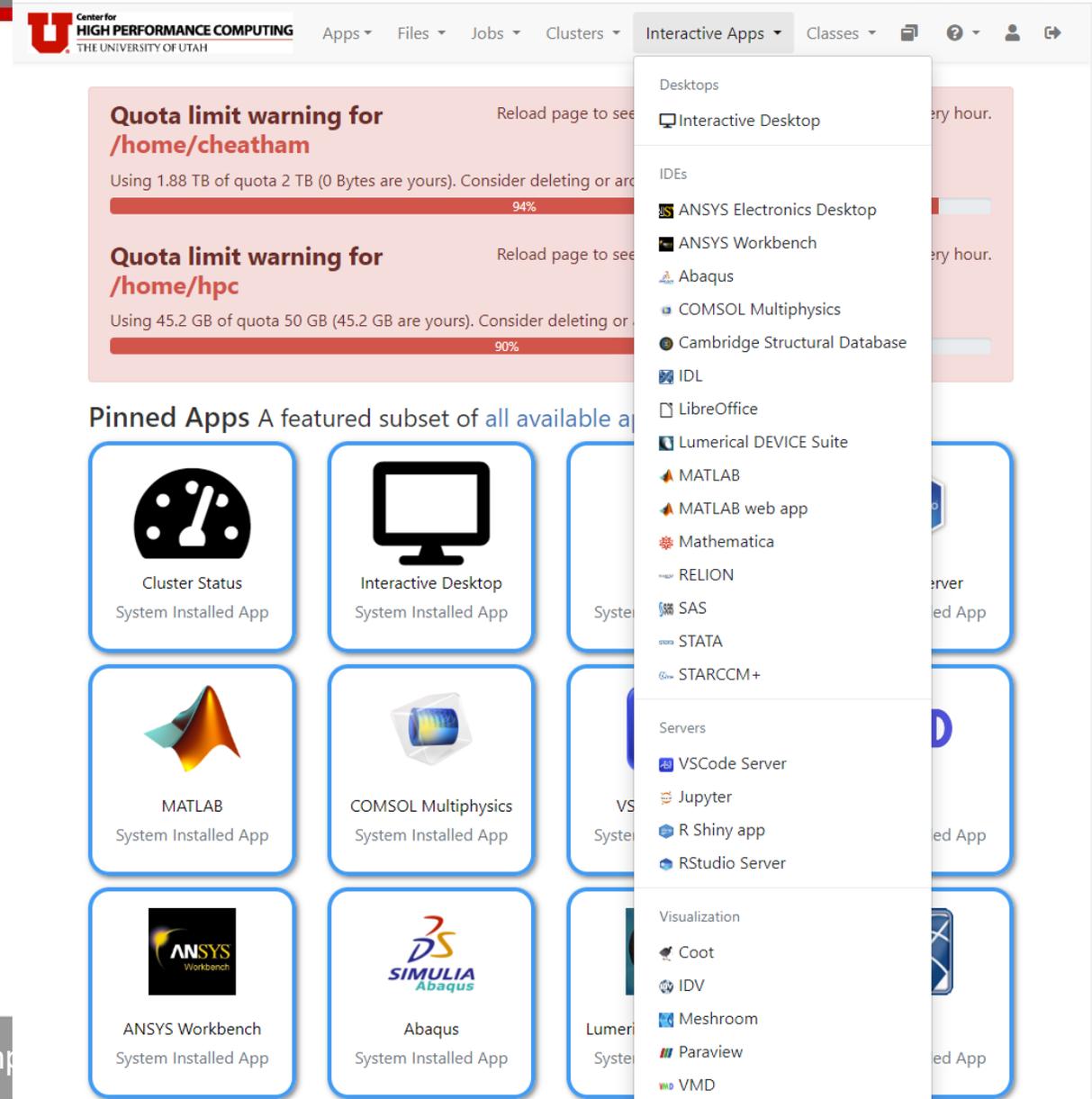
0 (low) to 9 (high)

[Launch Notchpeak Desktop](#) [View Only \(Share-able Link\)](#)

- 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



- 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



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Apps ▾ Files ▾ Jobs ▾ Clusters ▾ Interactive Apps ▾ Classes ▾

Quota limit warning for /home/cheatham
Using 1.88 TB of quota 2 TB (0 Bytes are yours). Consider deleting or archiving unnecessary files. 94%

Quota limit warning for /home/hpc
Using 45.2 GB of quota 50 GB (45.2 GB are yours). Consider deleting or archiving unnecessary files. 90%

Pinned Apps A featured subset of all available applications

- Cluster Status System Installed App
- Interactive Desktop System Installed App
- MATLAB System Installed App
- COMSOL Multiphysics System Installed App
- ANSYS Workbench System Installed App
- Abaqus System Installed App

Desktops

- Interactive Desktop

IDEs

- ANSYS Electronics Desktop
- ANSYS Workbench
- Abaqus
- COMSOL Multiphysics
- Cambridge Structural Database
- IDL
- LibreOffice
- Lumerical DEVICE Suite
- MATLAB
- MATLAB web app
- Mathematica
- RELION
- SAS
- STATA
- STARCCM+

Servers

- VSCoServer
- Jupyter
- R Shiny app
- RStudio Server

Visualization

- Coot
- IDV
- Meshroom
- Paraview
- VMD



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



Interactive Apps

Desktops

- Interactive Desktop

IDEs

- ANSYS Workbench
- Abaqus
- COMSOL Multiphysics
- Lumerical DEVICE Suite
- MATLAB**
- Mathematica

Servers

- Jupyter Notebook
- R Shiny app
- RStudio server

Visualization

- IDV
- ParaView
- VMD

MATLAB

This app will launch a [MATLAB GUI](#) on a [HPC cluster](#) or on a [Frisco node](#). You will be able to interact with the MATLAB GUI through a VNC session.

[GPU specification](#) is optional for the partitions that have them.

Cluster

Select the cluster or Frisco node to create this session on.

If you select frisco please ignore all the entries below.

MATLAB version

This defines the version of MATLAB you want to load.

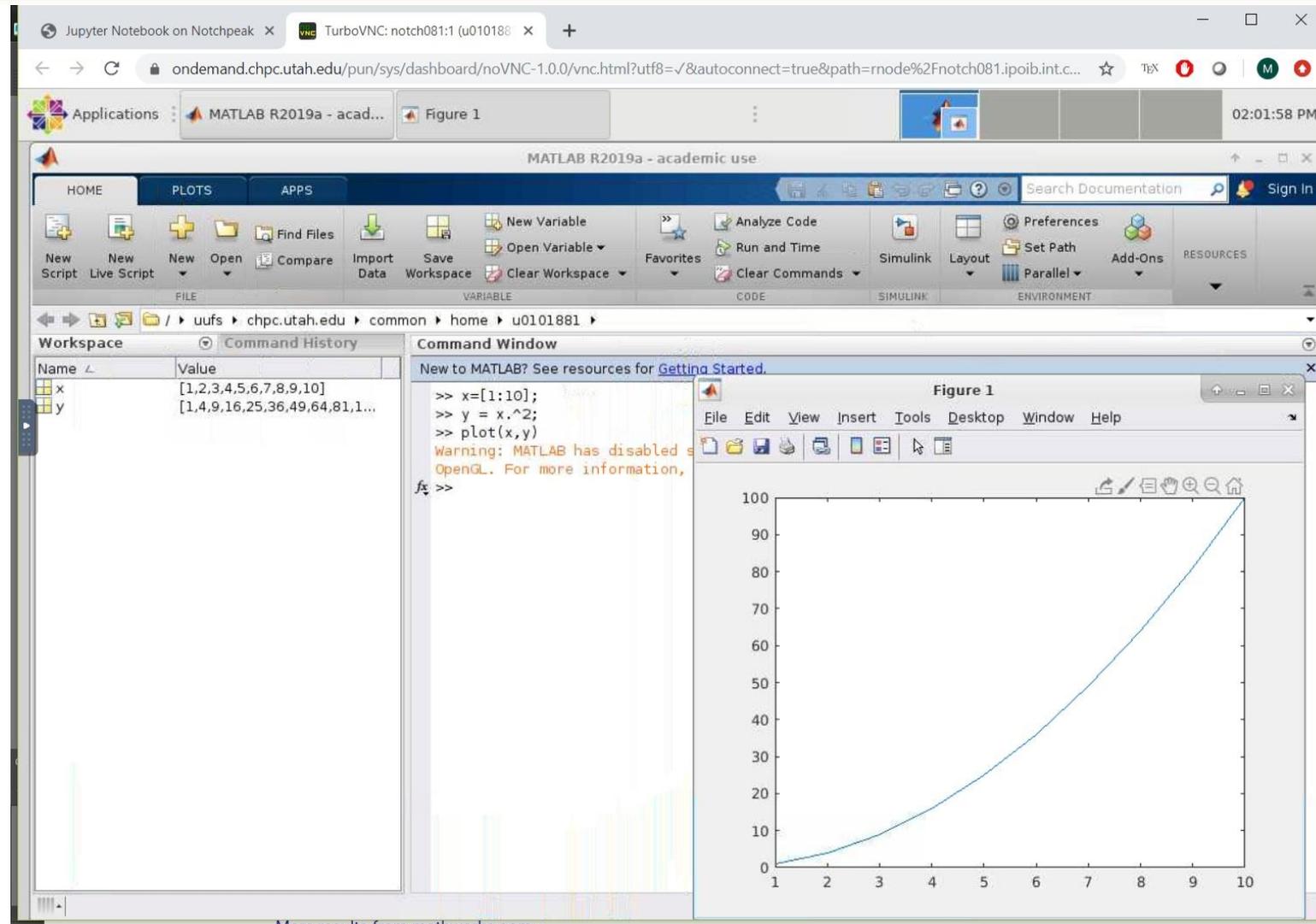
Number of cores

Maximum number of CPU cores on notchpeak-shared-short is 32, see [cluster help pages](#) for other cluster's node counts.

Number of hours

Maximum wall time on notchpeak-shared-short is 8 hours, general nodes 72 hours, owner nodes 14 days.

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



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

Classes

- Atmospheric Sciences
 - ATMOS Synoptic
 - ATMOS5340
- Bioinformatics
 - MIB2020
- Chemical Engineering
 - CHEN Jupyter
 - CHEN2450
- Geography
 - GEOG5670 desktop
- Physics and Astronomy
 - ASTR5560
- Psychiatry
 - R25 neurostats

Jupyter version: fa8c8c3

This app will launch a [Jupyter Notebook](#) or Lab server using [Python](#) on a [HPC cluster](#) or on a [Frisco node](#).

To start the job promptly, use notchpeak-shared-short account and partition on the [Notchpeak cluster](#).

GPU specification is optional for the clusters and partitions that have them.

Jupyter interface

This defines the interface of Jupyter you want to start (Notebook or Lab).

Jupyter Python version

- CHPC Python 3.10.3
- CHPC Deep Learning 2023.3
- CHPC Deep Learning 2022.1
- Custom (Environment Setup below)

Select the cluster or Frisco node to create this session on.

Account and partition

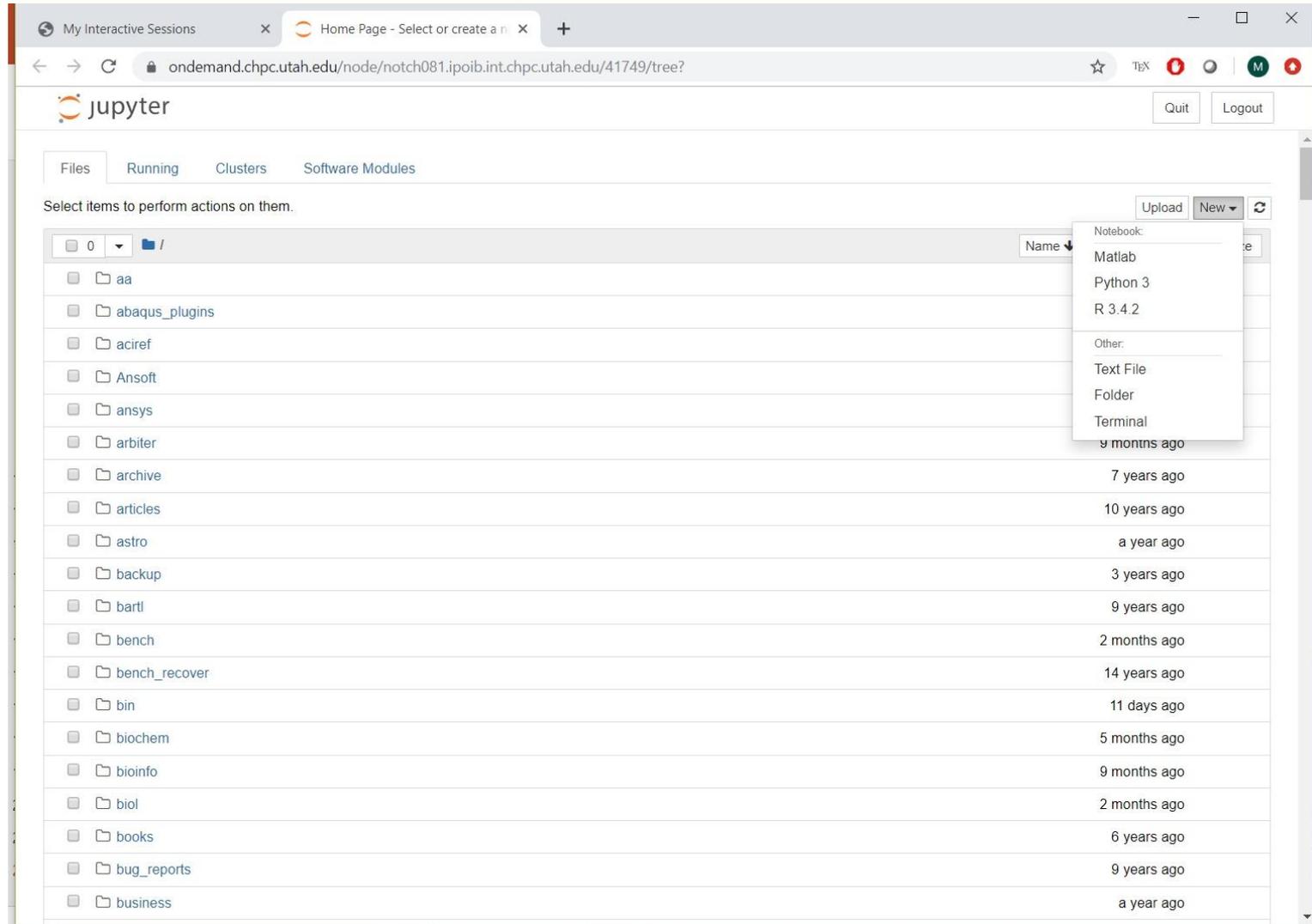
Choose the **account:partition** combination appropriate to the cluster chosen above. If in doubt, use the default notchpeak cluster and notchpeak-shared-short account and partition.

Number of cores (per node)

Interactive Apps

- Desktops
 - Interactive Desktop
- IDEs
 - ANSYS Electronics Desktop
 - ANSYS Workbench

- 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



- The notebook is launched in another browser tab

The screenshot shows a web browser with a Jupyter Notebook open. The browser's address bar shows the URL: `ondemand.chpc.utah.edu/node/notch081.ipob.int.chpc.utah.edu/41749/notebooks/Untitled20.ipynb?kernel_name=python3`. The Jupyter interface includes a menu bar (File, Edit, View, Insert, Cell, Kernel, Help) and a toolbar with icons for file operations and execution. The notebook content is as follows:

```
In [2]: import matplotlib
import matplotlib.pyplot as plt
import numpy as np

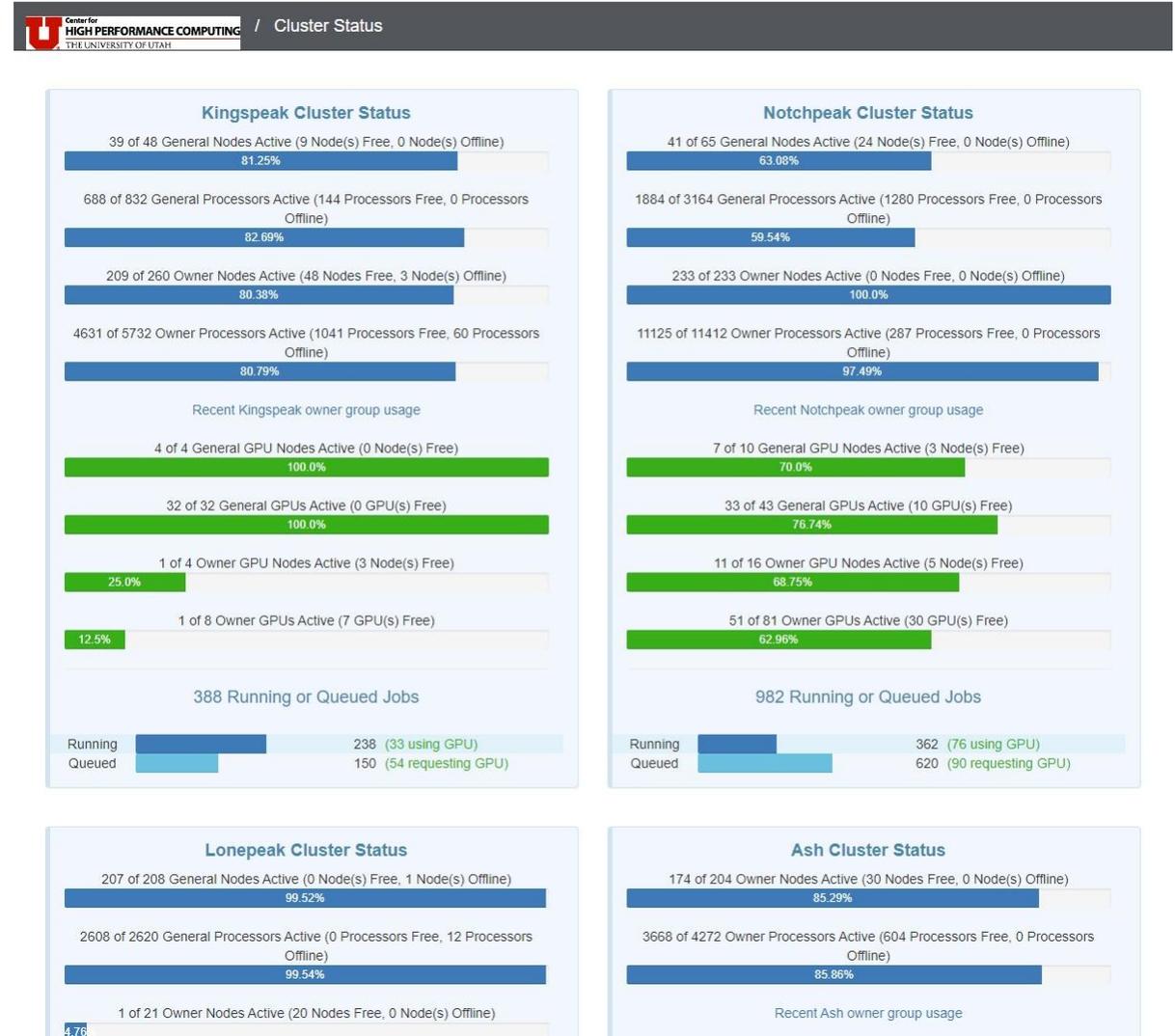
# Data for plotting
t = np.arange(0.0, 2.0, 0.01)
s = 1 + np.sin(2 * np.pi * t)

%matplotlib inline
fig, ax = plt.subplots()
ax.plot(t, s)
plt.show()
```

Below the code, a plot is displayed showing a blue sine wave. The x-axis ranges from 0.00 to 2.00 with major ticks every 0.25. The y-axis ranges from 0.00 to 2.00 with major ticks every 0.25. The sine wave starts at (0, 1), reaches a peak of 2 at x ≈ 0.25, crosses the x-axis at x ≈ 0.5, reaches a trough of 0 at x ≈ 0.75, crosses the x-axis again at x ≈ 1.0, reaches another peak of 2 at x ≈ 1.25, crosses the x-axis at x ≈ 1.5, reaches another trough of 0 at x ≈ 1.75, and ends at (2.0, 1).

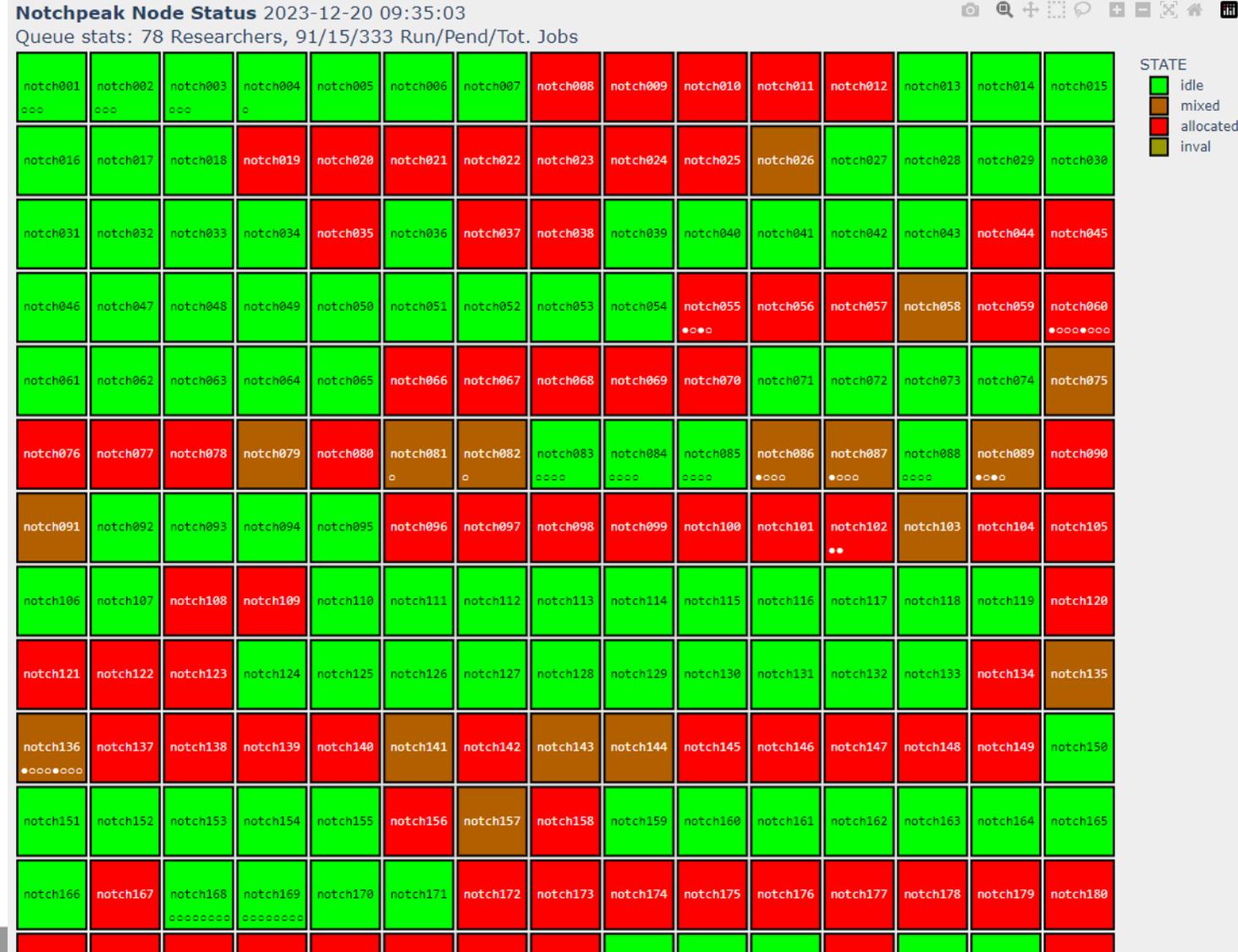


- Menu Clusters-Cluster Status
- Alternative to System Status on CHPC webpage
- Shows how busy clusters are
- General, owner nodes, GPU nodes and GPUs
- Running and queued jobs



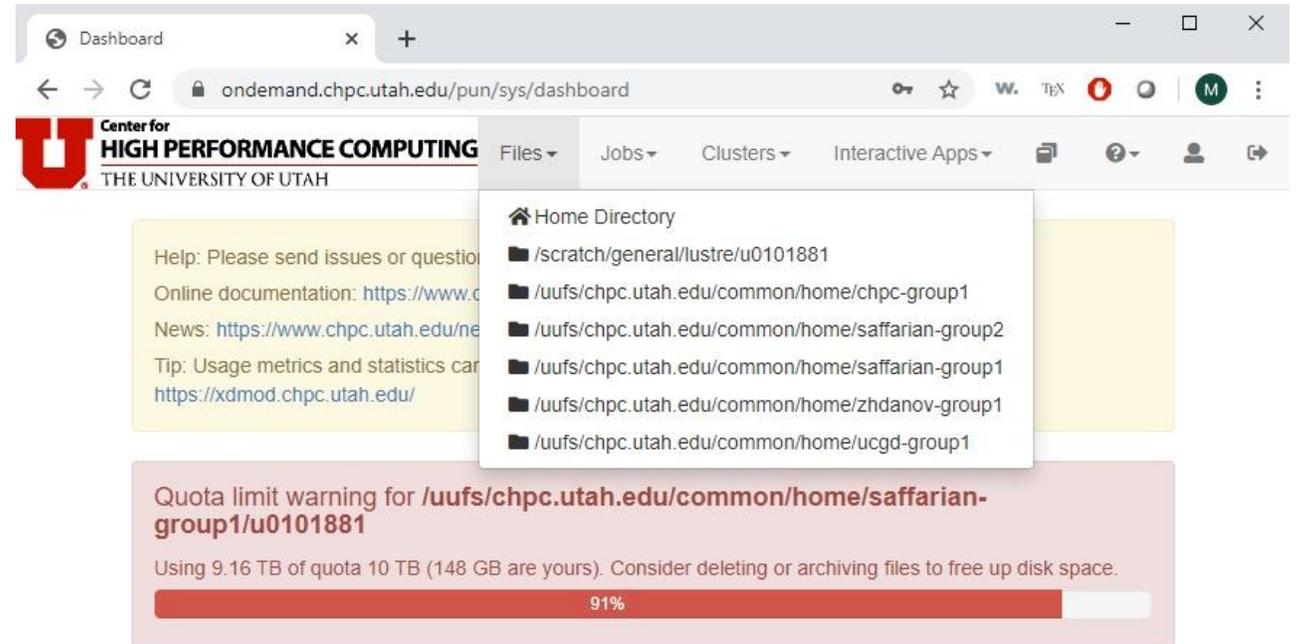


- Menu Clusters-X Node Status
- Color coded node status
- Hovering over node shows extra information
- GPU status in small circles at the bottom of node tile



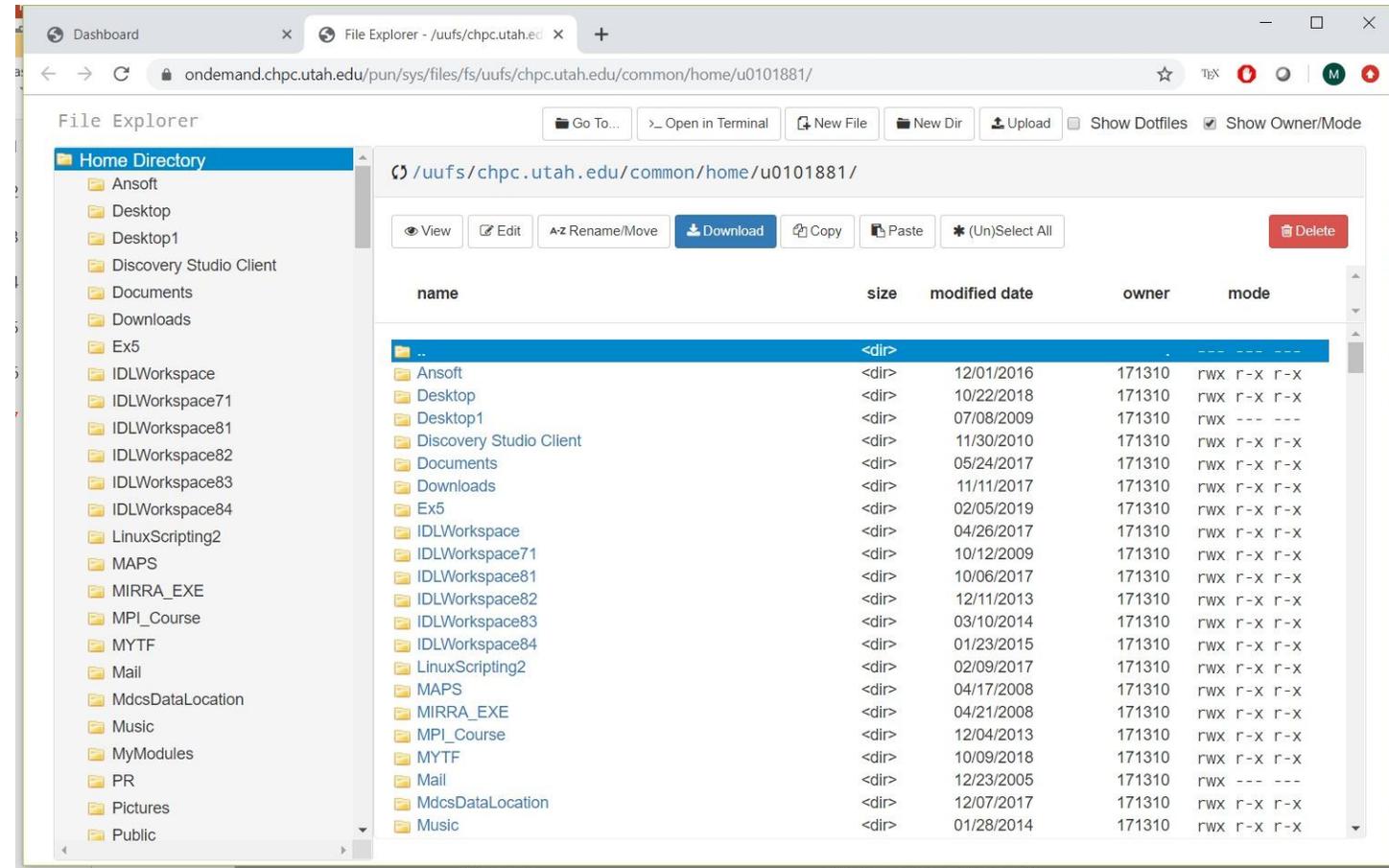


- Sees all file systems where user has access
- Allows various file operations, including editing





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





- Active Jobs
- Job Composer

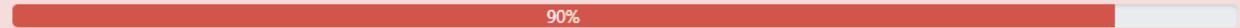
Quota limit warning for /home/cheatham

Using 1.88 TB of quota 2 TB (0 Bytes are yours). Consider deleting or archiving files to free up disk space.



Quota limit warning for /home/hpc

Using 45.2 GB of quota 50 GB (45.2 GB are yours). Consider deleting or archiving files to free up disk space.



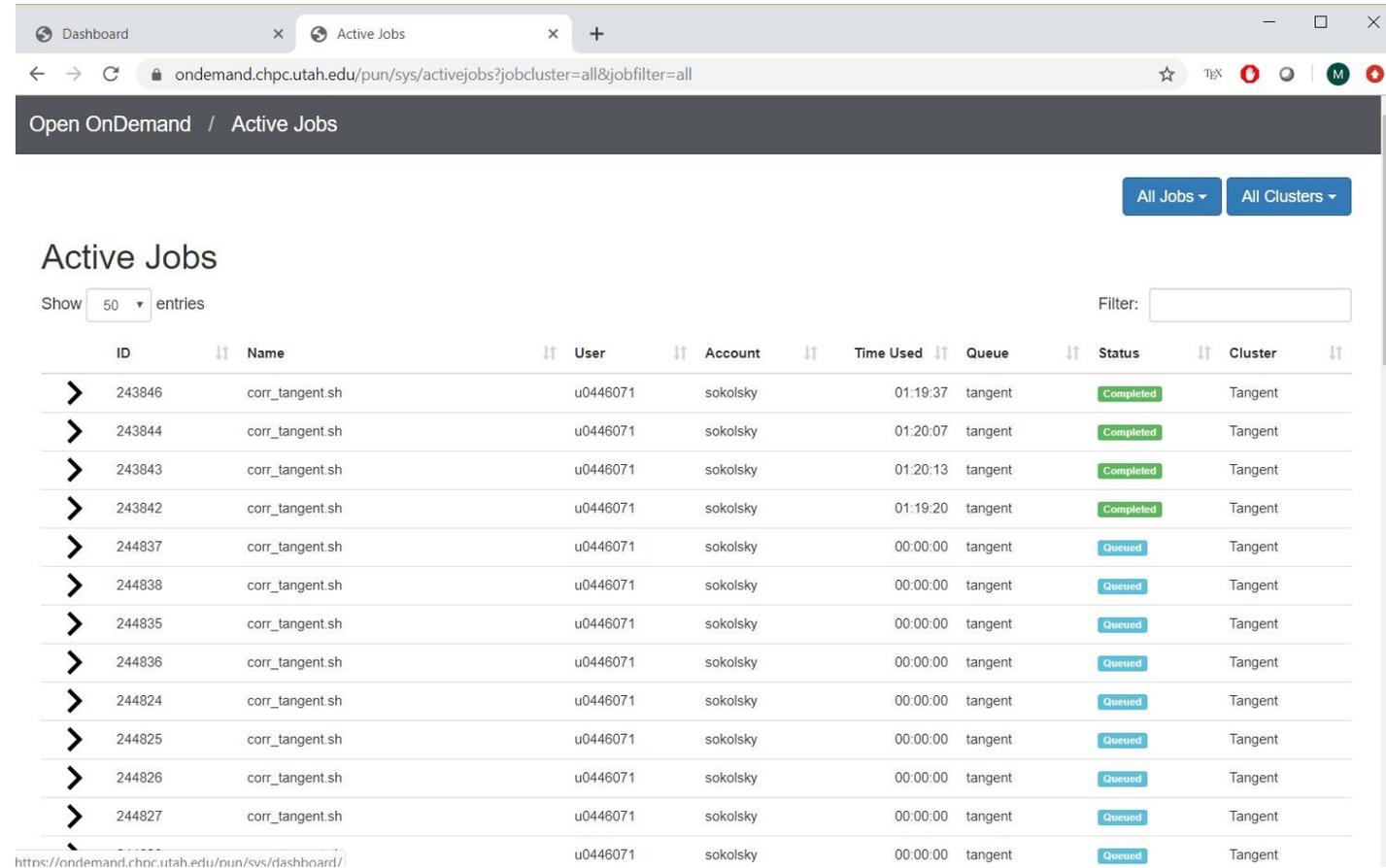
Pinned Apps A featured subset of all available apps

 Cluster Status System Installed App	 Interactive Desktop System Installed App	 Jupyter System Installed App	 RStudio Server System Installed App
 MATLAB System Installed App	 COMSOL Multiphysics System Installed App	 VSCode Server System Installed App	 VMD System Installed App

- Listing of active jobs
- Creating and submitting new 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



Dashboard | Active Jobs

ondemand.chpc.utah.edu/pun/sys/activejobs?jobcluster=all&jobfilter=all

Open OnDemand / Active Jobs

All Jobs | All Clusters

Active Jobs

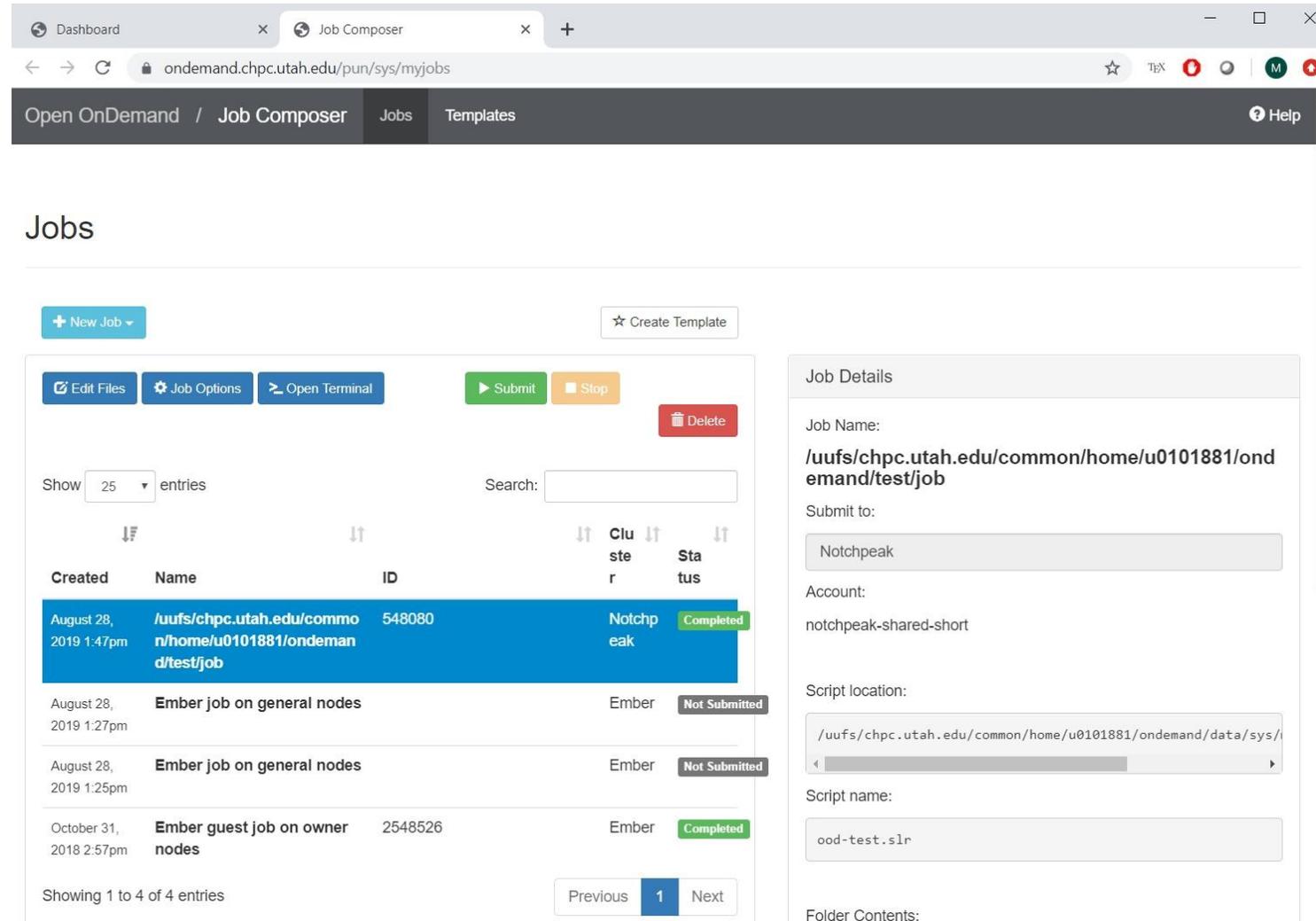
Show 50 entries

Filter:

ID	Name	User	Account	Time Used	Queue	Status	Cluster
> 243846	corr_tangent.sh	u0446071	sokolsky	01:19:37	tangent	Completed	Tangent
> 243844	corr_tangent.sh	u0446071	sokolsky	01:20:07	tangent	Completed	Tangent
> 243843	corr_tangent.sh	u0446071	sokolsky	01:20:13	tangent	Completed	Tangent
> 243842	corr_tangent.sh	u0446071	sokolsky	01:19:20	tangent	Completed	Tangent
> 244837	corr_tangent.sh	u0446071	sokolsky	00:00:00	tangent	Queued	Tangent
> 244838	corr_tangent.sh	u0446071	sokolsky	00:00:00	tangent	Queued	Tangent
> 244835	corr_tangent.sh	u0446071	sokolsky	00:00:00	tangent	Queued	Tangent
> 244836	corr_tangent.sh	u0446071	sokolsky	00:00:00	tangent	Queued	Tangent
> 244824	corr_tangent.sh	u0446071	sokolsky	00:00:00	tangent	Queued	Tangent
> 244825	corr_tangent.sh	u0446071	sokolsky	00:00:00	tangent	Queued	Tangent
> 244826	corr_tangent.sh	u0446071	sokolsky	00:00:00	tangent	Queued	Tangent
> 244827	corr_tangent.sh	u0446071	sokolsky	00:00:00	tangent	Queued	Tangent
> 244828	corr_tangent.sh	u0446071	sokolsky	00:00:00	tangent	Queued	Tangent

https://ondemand.chpc.utah.edu/pun/svs/dashboard/

- 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`

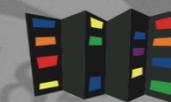


The screenshot shows the Job Composer web interface. At the top, there are navigation tabs for "Open OnDemand", "Job Composer", "Jobs", and "Templates". The "Jobs" tab is active, displaying a list of jobs. The interface includes buttons for "New Job", "Edit Files", "Job Options", "Open Terminal", "Submit", "Stop", and "Delete". A search bar and a "Show 25 entries" dropdown are also present. The job list table has columns for "Created", "Name", "ID", "Cluster", and "Status".

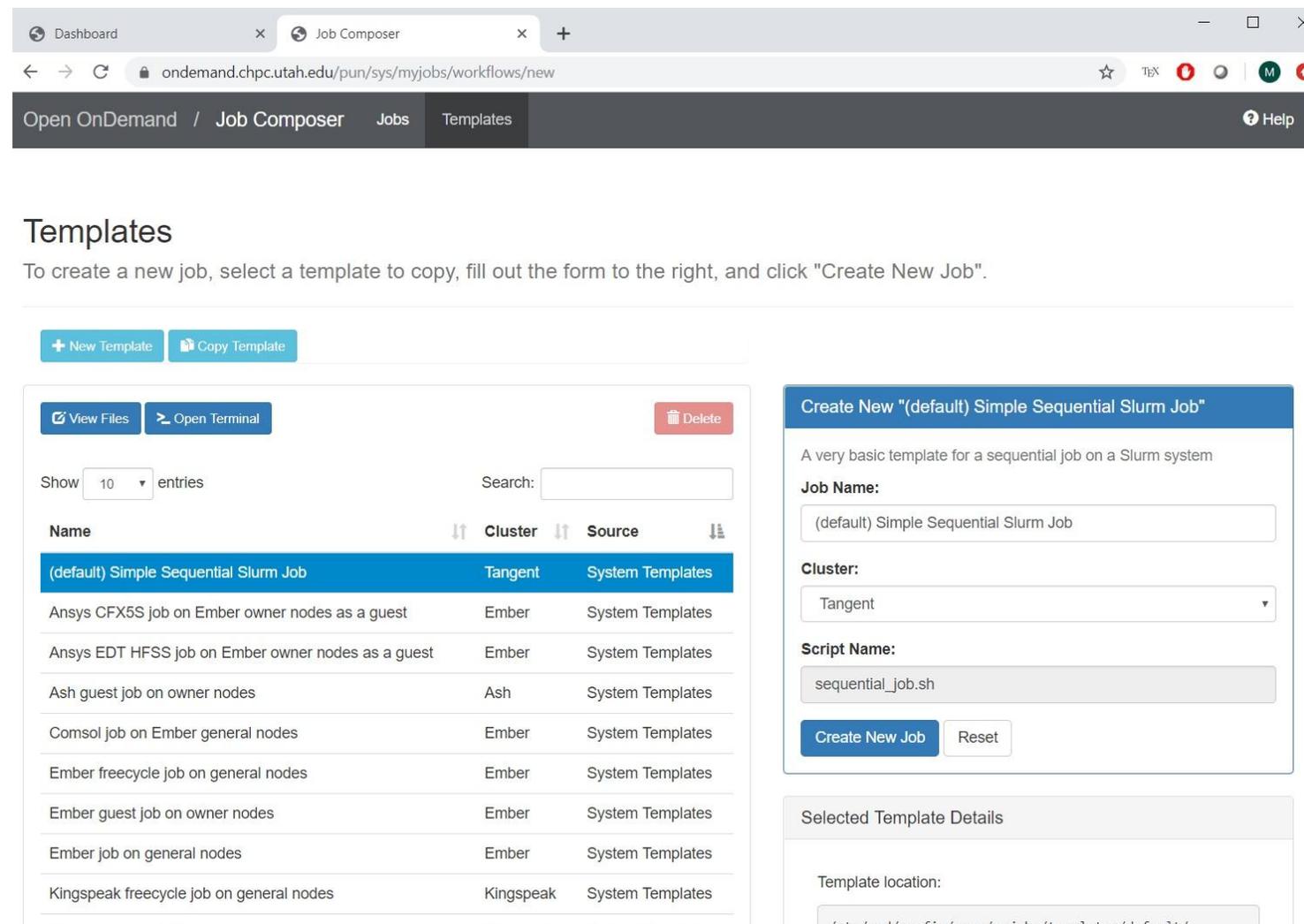
Created	Name	ID	Cluster	Status
August 28, 2019 1:47pm	/uufs/chpc.utah.edu/common/home/u0101881/ondemand/test/job	548080	Notchpeak	Completed
August 28, 2019 1:27pm	Ember job on general nodes		Ember	Not Submitted
August 28, 2019 1:25pm	Ember job on general nodes		Ember	Not Submitted
October 31, 2018 2:57pm	Ember guest job on owner nodes	2548526	Ember	Completed

Job Details panel on the right shows:

- Job Name: /uufs/chpc.utah.edu/common/home/u0101881/ondemand/test/job
- Submit to: Notchpeak
- Account: notchpeak-shared-short
- Script location: /uufs/chpc.utah.edu/common/home/u0101881/ondemand/data/sys/
- Script name: ood-test.slr
- Folder Contents:



- 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>



Dashboard x Job Composer x +

ondemand.chpc.utah.edu/pun/sys/myjobs/workflows/new

Open OnDemand / Job Composer Jobs Templates Help

Templates

To create a new job, select a template to copy, fill out the form to the right, and click "Create New Job".

+ New Template Copy Template

View Files Open Terminal Delete

Show 10 entries Search:

Name	Cluster	Source
(default) Simple Sequential Slurm Job	Tangent	System Templates
Ansys CFX5S job on Ember owner nodes as a guest	Ember	System Templates
Ansys EDT HFSS job on Ember owner nodes as a guest	Ember	System Templates
Ash guest job on owner nodes	Ash	System Templates
Comsol job on Ember general nodes	Ember	System Templates
Ember freecycle job on general nodes	Ember	System Templates
Ember guest job on owner nodes	Ember	System Templates
Ember job on general nodes	Ember	System Templates
Kingspeak freecycle job on general nodes	Kingspeak	System Templates

Create New "(default) Simple Sequential Slurm Job"

A very basic template for a sequential job on a Slurm system

Job Name:

Cluster:

Script Name:

Selected Template Details

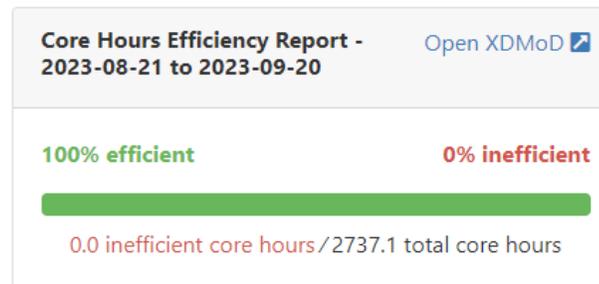
Template location:



- 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.



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.

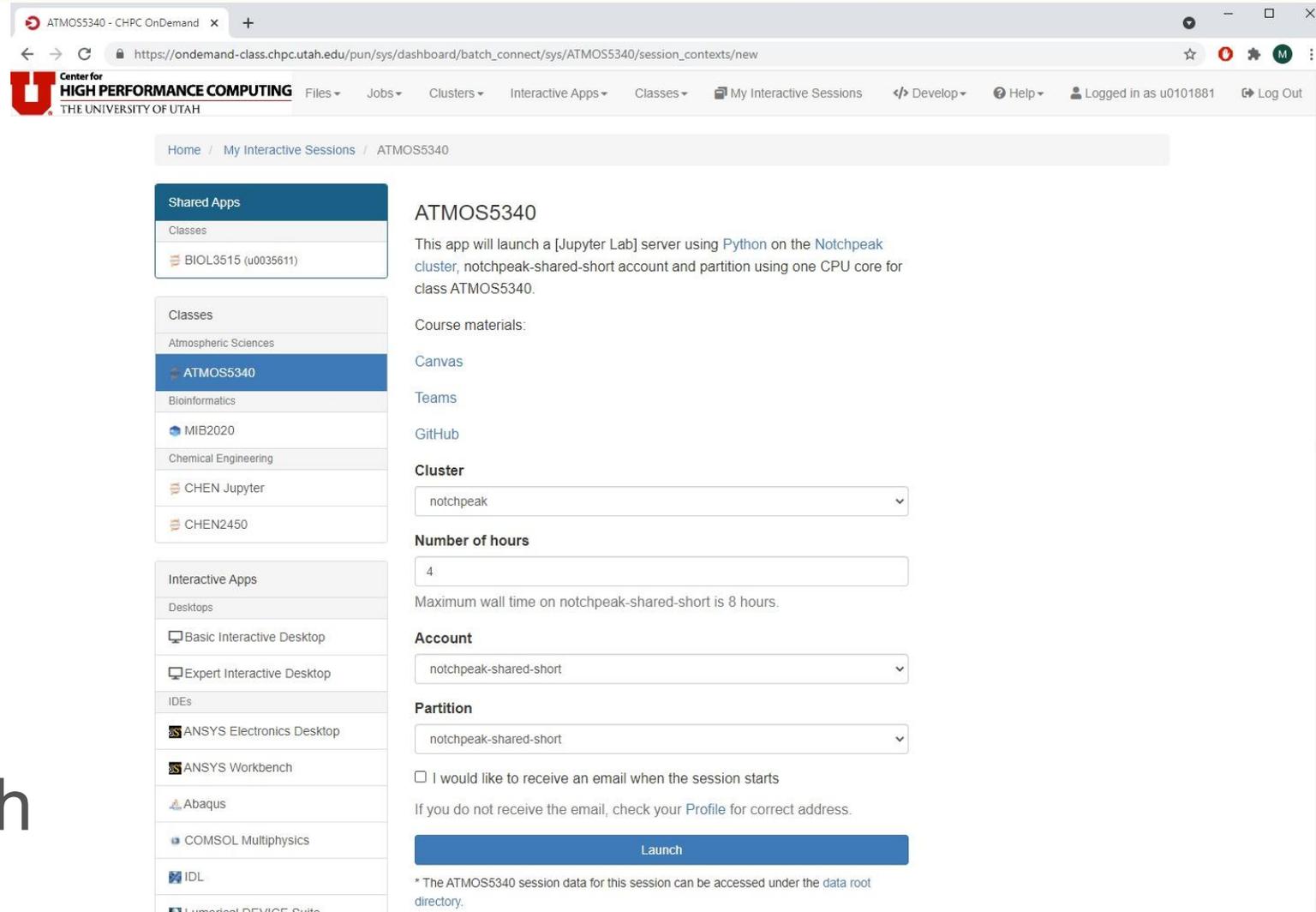


- Shell terminal access to each cluster
- Opens a new browser tab with terminal

The screenshot shows the Center for High-Performance Computing portal. At the top, there is a navigation bar with 'Apps', 'Files', 'Jobs', 'Clusters', 'Interactive Apps', and 'Classes'. The 'Clusters' dropdown menu is open, showing a list of shell access options: Cluster Status, >_Ash Shell Access, >_Kingspeak Shell Access, >_Lonepeak Shell Access, >_Notchpeak Shell Access, >_frisco1 Shell Access, >_frisco2 Shell Access, >_frisco3 Shell Access, >_frisco4 Shell Access, >_frisco5 Shell Access, >_frisco6 Shell Access, >_frisco7 Shell Access, and >_frisco8 Shell Access. Below the navigation bar, there are two red warning boxes for quota limits. The first warning is for /home/cheatham, showing 1.88 TB of quota used out of 2 TB. The second warning is for /home/hpc, showing 45.2 GB of quota used out of 50 GB. Below the warnings, there is a 'Pinned Apps' section with a grid of application tiles. The tiles include Cluster Status, Interactive Desktop, Jupyter, RStudio Server, MATLAB, COMSOL Multiphysics, VSCode Server, and VMD. Each tile has an icon and the text 'System Installed App'.



- 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



The screenshot shows a web browser window with the URL https://ondemand-class.chpc.utah.edu/pun/sys/dashboard/batch_connect/sys/ATMOS5340/session_contexts/new. The page is titled "ATMOS5340 - CHPC OnDemand" and features a navigation menu with options like "Files", "Jobs", "Clusters", "Interactive Apps", "Classes", "My Interactive Sessions", "Develop", "Help", and "Log Out". The main content area is divided into two columns. The left column contains a sidebar with "Shared Apps" (listing "BIOL3515 (u0035611)"), "Classes" (listing "Atmospheric Sciences", "ATMOS5340", "Bioinformatics", "MIB2020", "Chemical Engineering", "CHEN Jupyter", "CHEN2450"), "Interactive Apps" (listing "Desktops", "Basic Interactive Desktop", "Expert Interactive Desktop", "IDEs", "ANSYS Electronics Desktop", "ANSYS Workbench", "Abaqus", "COMSOL Multiphysics", "IDL", "Numerical DEVICE Suite"), and "Desktops". The right column displays the configuration for the "ATMOS5340" app, including a description: "This app will launch a [Jupyter Lab] server using Python on the Notchpeak cluster, notchpeak-shared-short account and partition using one CPU core for class ATMOS5340." Below this, there are sections for "Course materials" (listing "Canvas", "Teams", "GitHub"), "Cluster" (set to "notchpeak"), "Number of hours" (set to "4"), "Account" (set to "notchpeak-shared-short"), and "Partition" (set to "notchpeak-shared-short"). There is also a checkbox for "I would like to receive an email when the session starts" and a "Launch" button. A note at the bottom states: "* The ATMOS5340 session data for this session can be accessed under the data root directory."



- 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



- <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