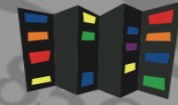


Hands-on introduction to Open OnDemand

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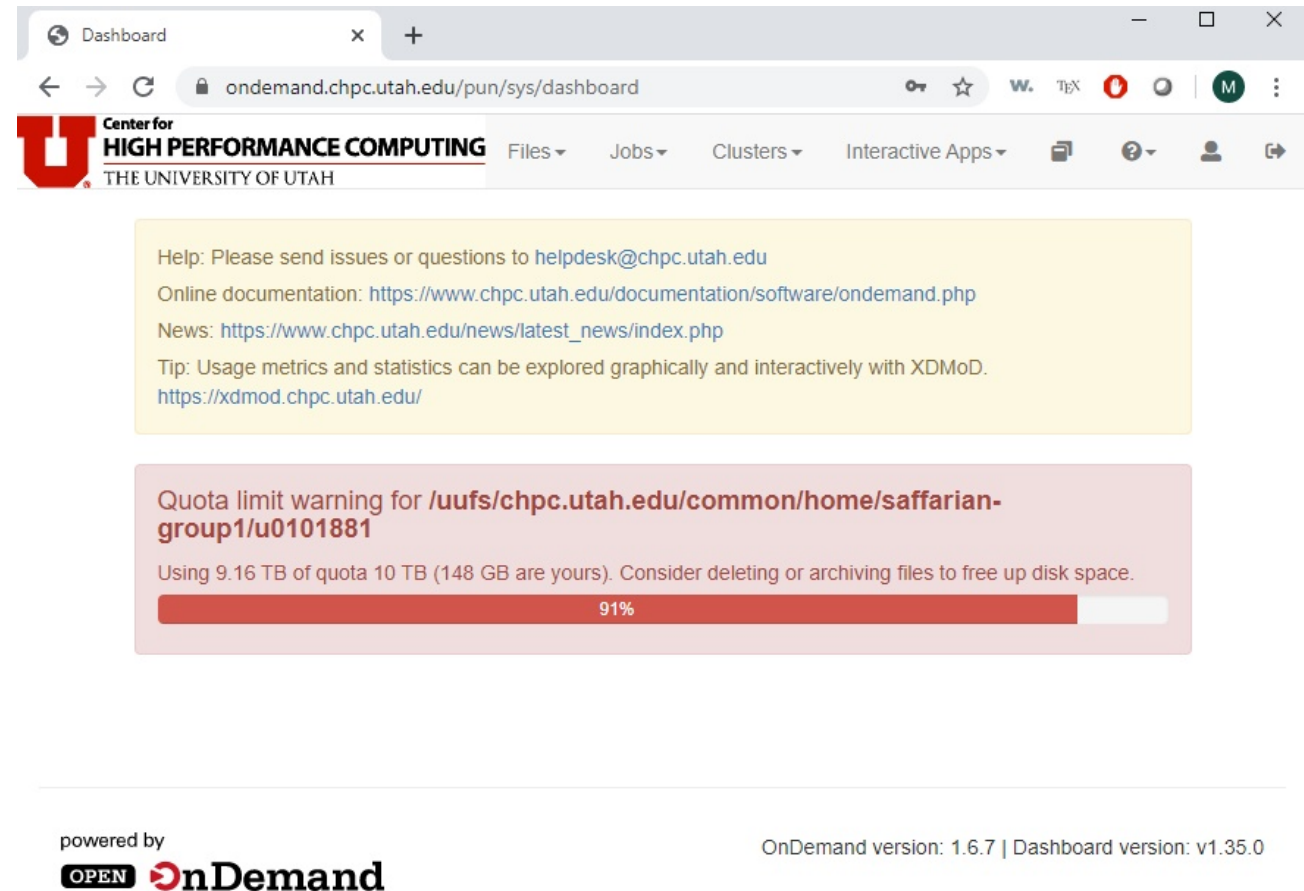
- What is Open OnDemand
- File operations
- Job management
- Interactive remote desktop
- Interactive applications
- Future outlook



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

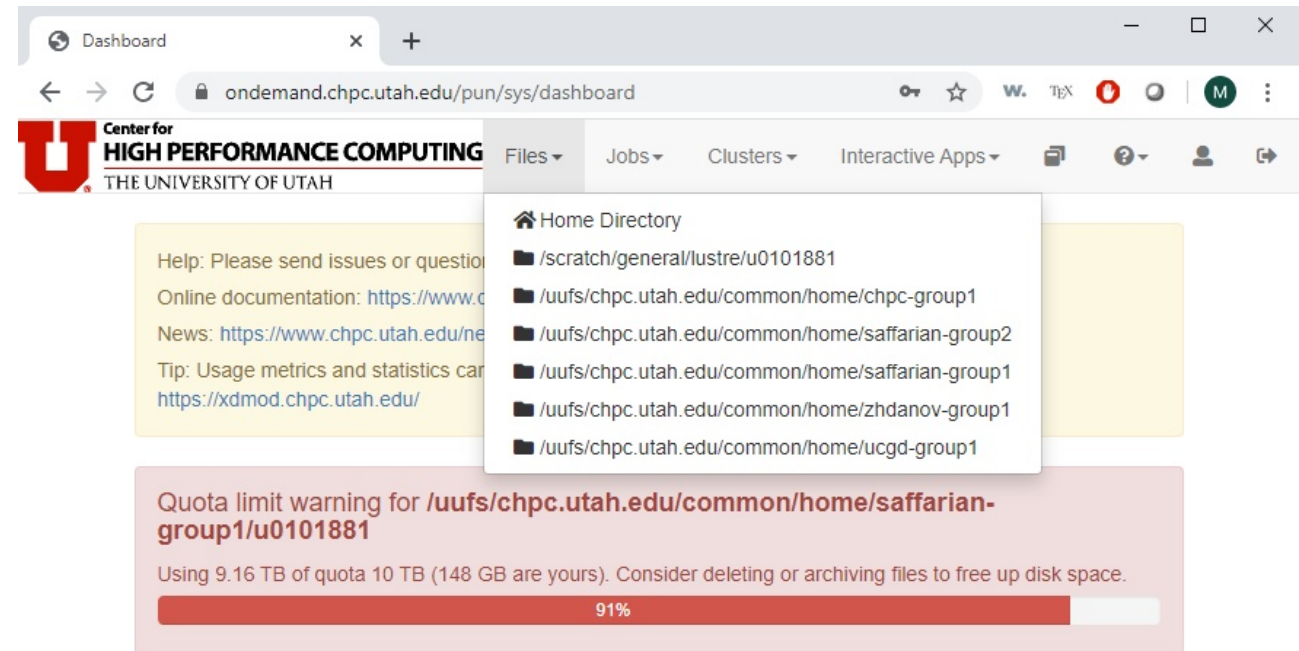
- Web portal to HPC resources - openondemand.org
- Easier, command line free, use of HPC resources
- File management module
- Job submission and monitoring module
- Interactive desktop and applications
 - e.g. MATLAB, ANSYS, Jupyter Notebook, R Studio Server
- Actively developed and supported by NSF

- ondemand.chpc.utah.edu
- Log in with your uNID and password
- Will display disk quota warnings if at $\geq 90\%$

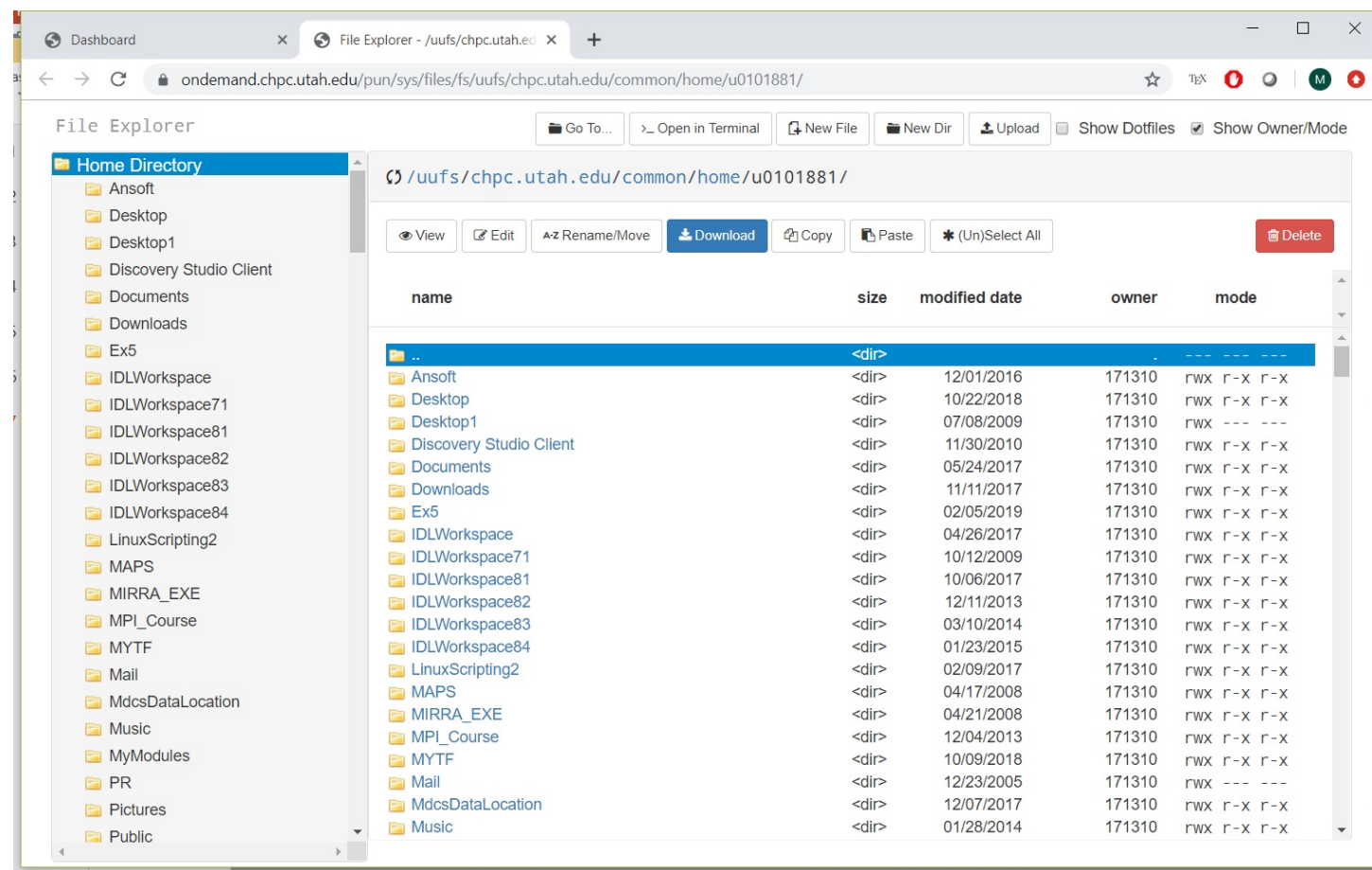


The screenshot shows a web browser window with the URL `ondemand.chpc.utah.edu/pun/sys/dashboard`. The page header includes the CHPC logo and navigation links: Files, Jobs, Clusters, and Interactive Apps. A yellow information box contains links for Help (`helpdesk@chpc.utah.edu`), Online documentation (`https://www.chpc.utah.edu/documentation/software/ondemand.php`), and News (`https://www.chpc.utah.edu/news/latest_news/index.php`). A red warning box indicates a quota limit warning for the user `/uufs/chpc.utah.edu/common/home/saffarian-group1/u0101881`, showing that 9.16 TB of a 10 TB quota is used (91%). The footer mentions the system is powered by OPEN OnDemand and provides version information: OnDemand version: 1.6.7 | Dashboard version: v1.35.0.

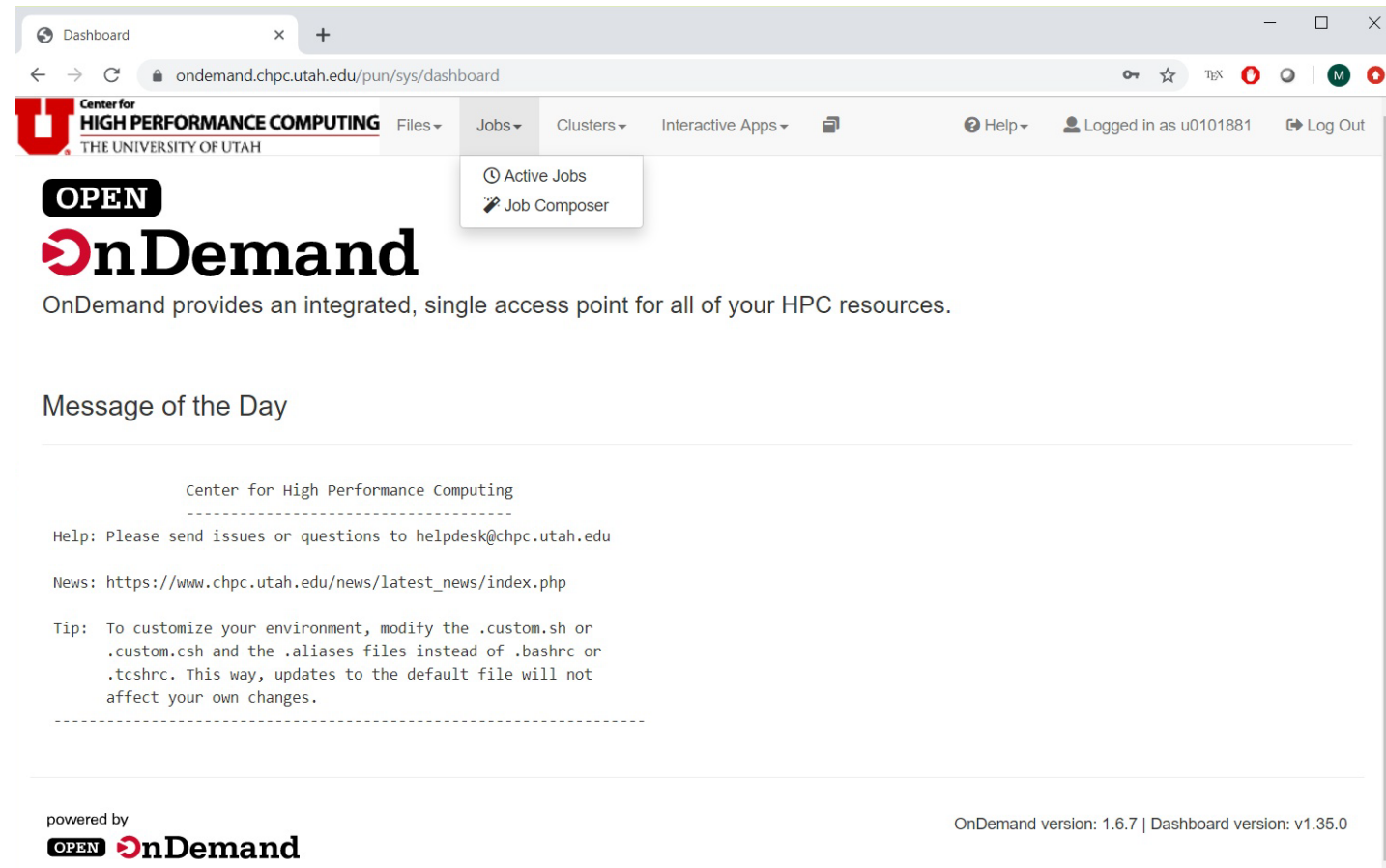
- Sees all file systems where user has access
- Allows various file operations, including editing



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



- Listing of active jobs
- Creating and submitting new jobs



The screenshot shows the OnDemand dashboard in a web browser. The browser address bar shows `ondemand.chpc.utah.edu/pun/sys/dashboard`. The dashboard header includes the University of Utah logo, the text "Center for HIGH PERFORMANCE COMPUTING", and navigation links for "Files", "Jobs", "Clusters", and "Interactive Apps". The "Jobs" menu is open, showing "Active Jobs" and "Job Composer". The main content area features the "OnDemand" logo with the word "OPEN" above it, followed by the text "OnDemand provides an integrated, single access point for all of your HPC resources." Below this is a "Message of the Day" section with contact information for the Center for High Performance Computing, including a helpdesk email and a news link. At the bottom, it states "powered by" with the "OnDemand" logo and version information: "OnDemand version: 1.6.7 | Dashboard version: v1.35.0".

- 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 x Active Jobs x +

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

Open OnDemand / Active Jobs

All Jobs ▾ All Clusters ▾

Active Jobs

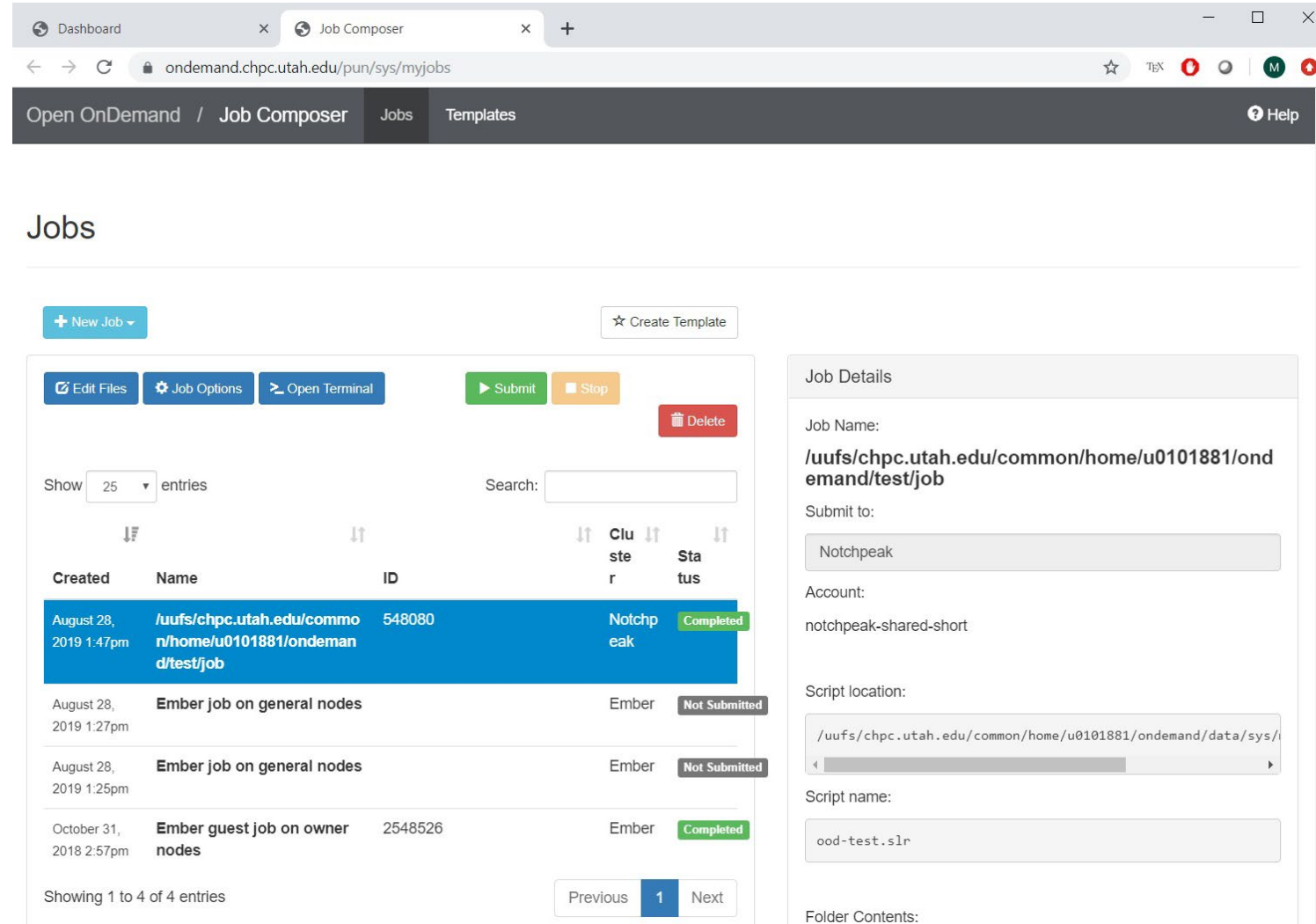
Show 50 ▾ entries

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. The top navigation bar includes links for Dashboard, Job Composer, Jobs, and Templates. The main content area is titled 'Jobs' and features a table of job entries. The table has columns for Created, Name, ID, Cluster, and Status. The first job is a Notchpeak job, which is completed. The second and third jobs are Ember jobs, which are not submitted. The fourth job is an Ember guest job, which is completed. The right sidebar shows the Job Details for the selected job, including the Job Name, Submit to, Account, Script location, Script name, and Folder Contents.

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

Showing 1 to 4 of 4 entries

Job Details:

Job Name: /uufs/chpc.utah.edu/common/home/u0101881/ondemand/test/job

Submit to: Notchpeak

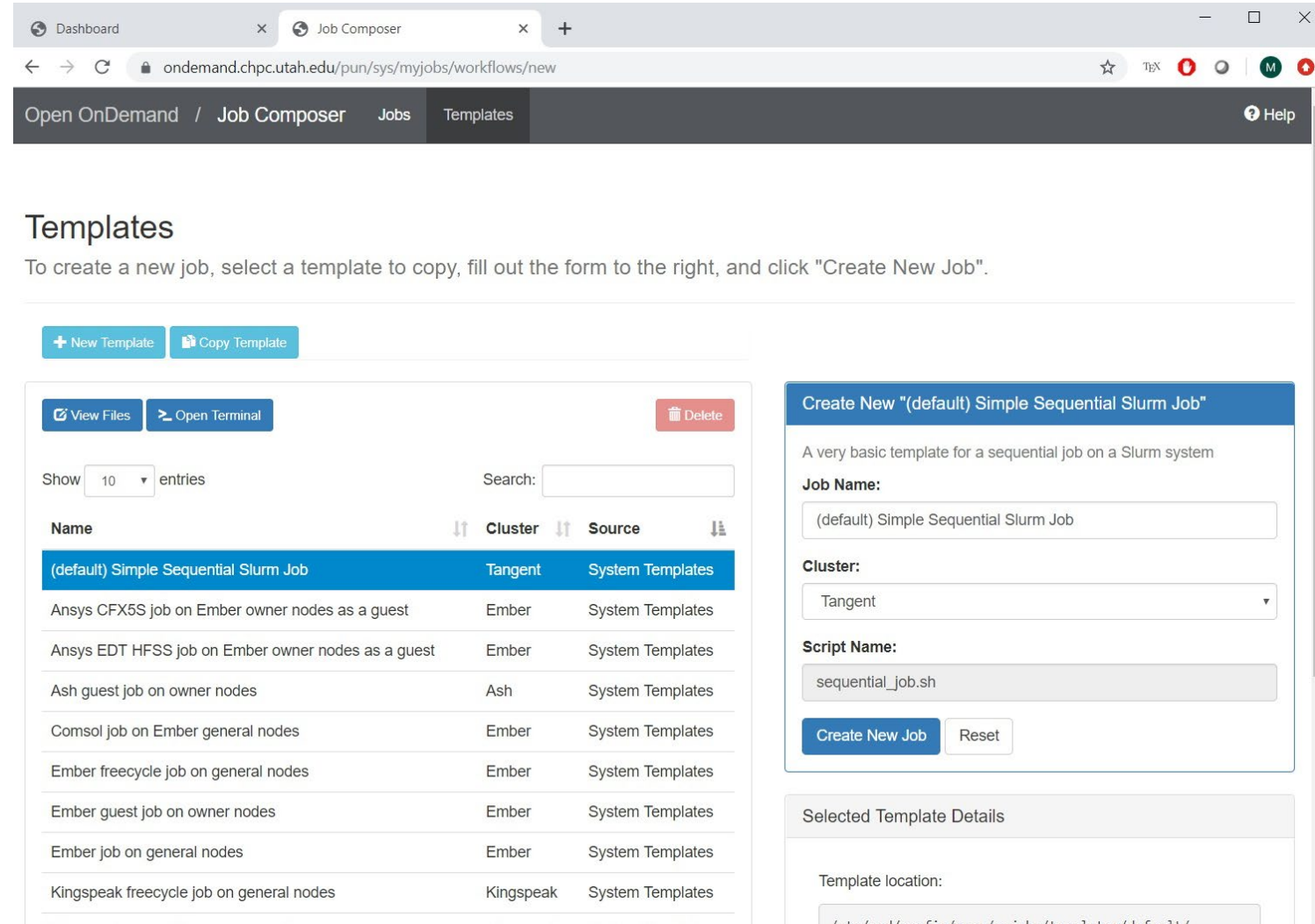
Account: notchpeak-shared-short

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>

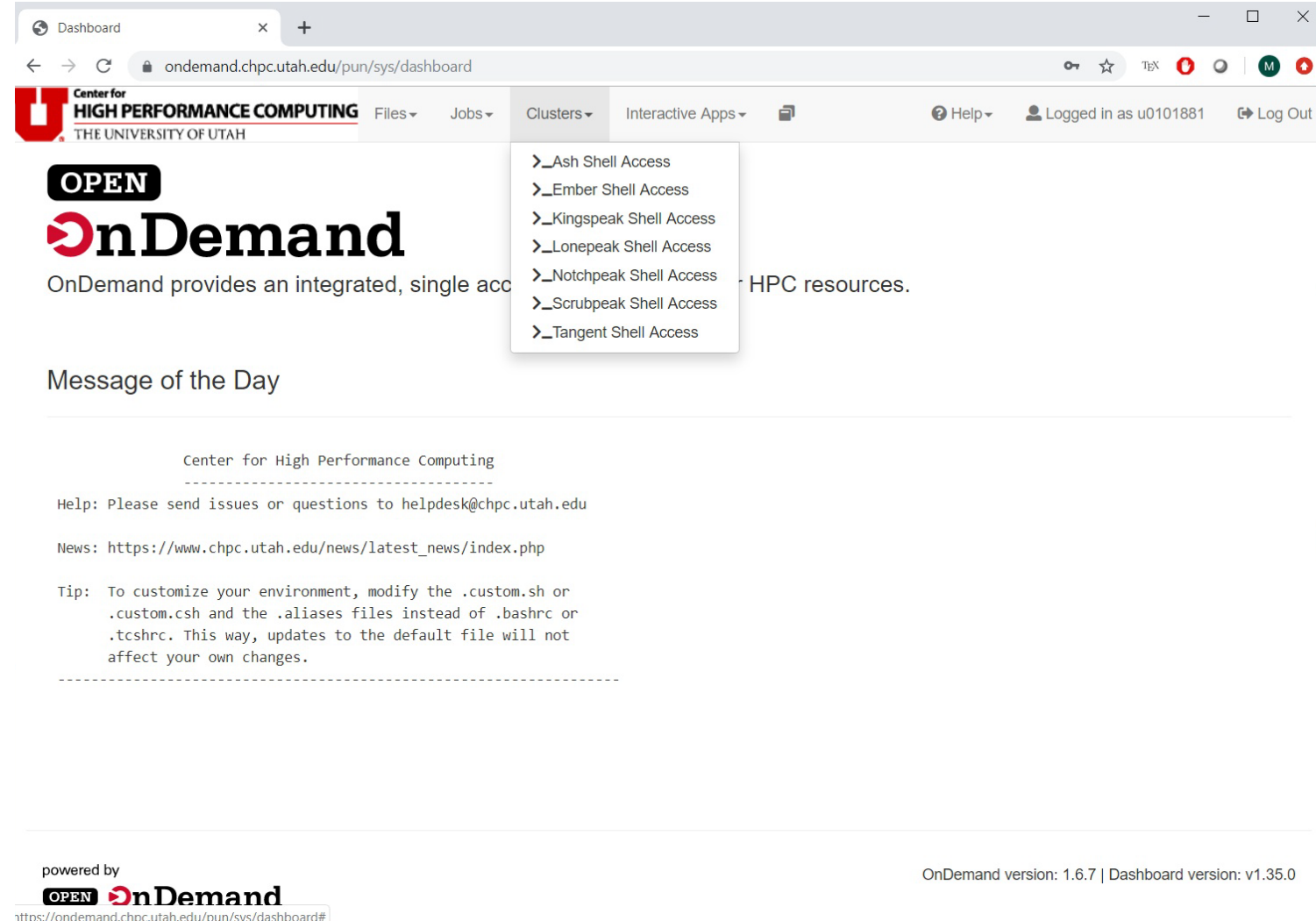


The screenshot shows the Job Composer web interface. The browser address bar displays `ondemand.chpc.utah.edu/pun/sys/myjobs/workflows/new`. The navigation bar includes links for Open OnDemand, Job Composer, Jobs, and Templates. The main heading is "Templates", with a subtext: "To create a new job, select a template to copy, fill out the form to the right, and click 'Create New Job'".

Below the heading, there are two buttons: "+ New Template" and "Copy Template". A table lists available templates, with columns for Name, Cluster, and Source. The first template, "(default) Simple Sequential Slurm Job", is highlighted. To the right of the table is a form titled "Create New '(default) Simple Sequential Slurm Job'". The form includes fields for Job Name (pre-filled with "(default) Simple Sequential Slurm Job"), Cluster (a dropdown menu currently showing "Tangent"), and Script Name (pre-filled with "sequential_job.sh"). At the bottom of the form are "Create New Job" and "Reset" buttons. Below the form, a section titled "Selected Template Details" shows the template location.

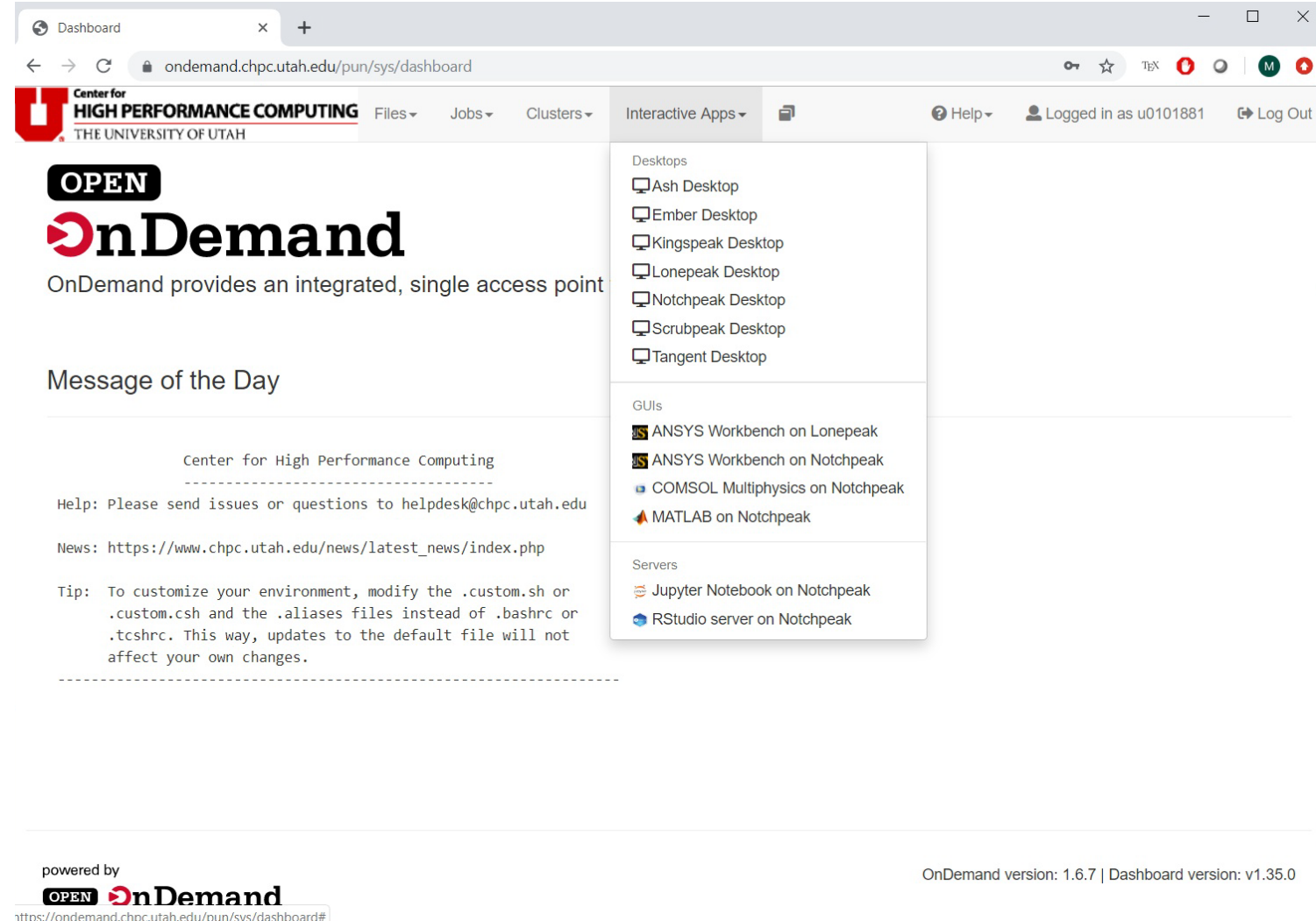
Name	Cluster	Source
(default) Simple Sequential Slurm Job	Tangent	System Templates
Ansys CFX5S job on Ember owner nodes as a guest	Ember	System Templates
Ansys EDT HFSS job on Ember owner nodes as a guest	Ember	System Templates
Ash guest job on owner nodes	Ash	System Templates
Comsol job on Ember general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

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



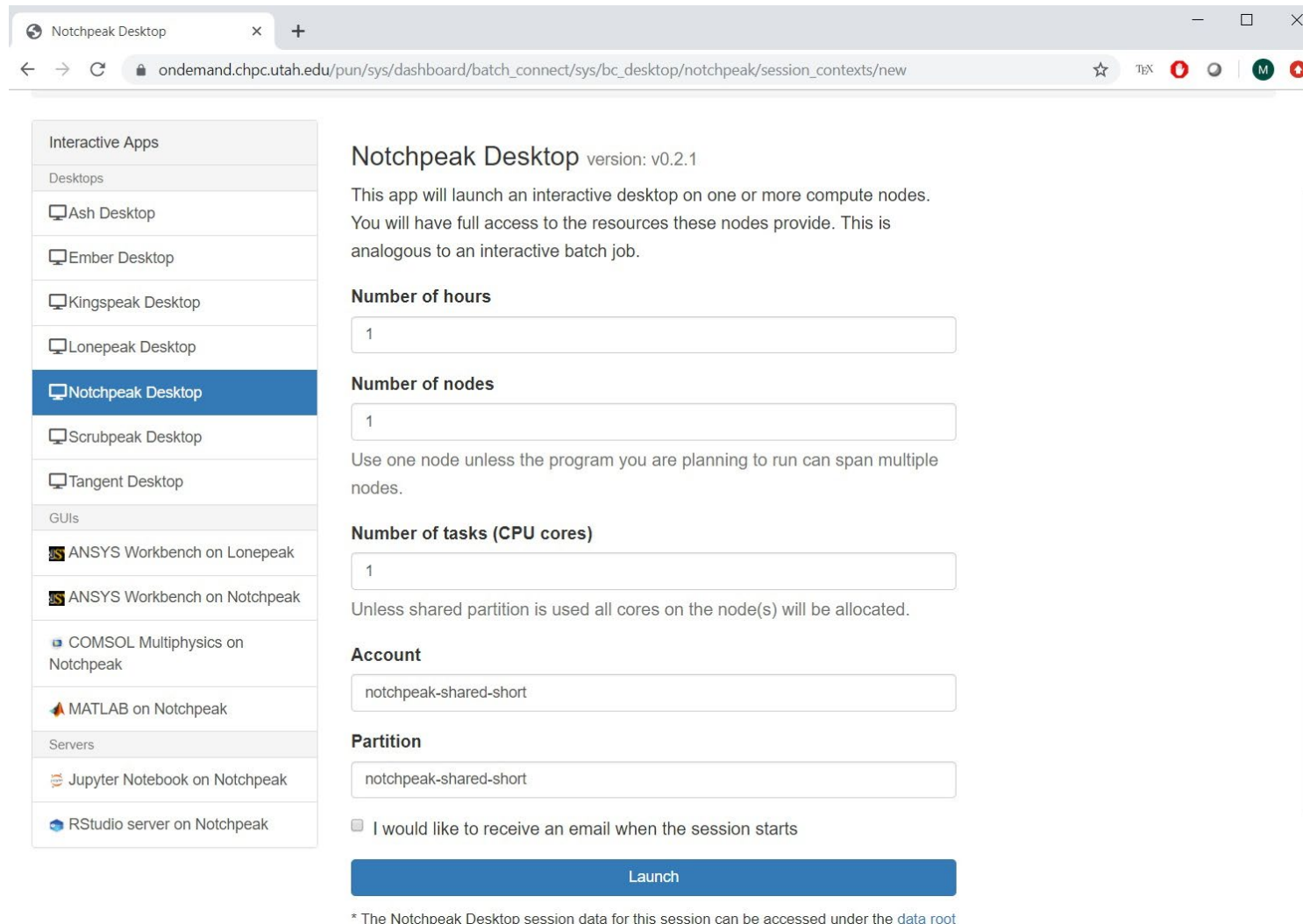
The screenshot shows the OnDemand dashboard in a web browser. The URL is `ondemand.chpc.utah.edu/pun/sys/dashboard`. The page features a navigation bar with links for Files, Jobs, Clusters, and Interactive Apps. A dropdown menu for Clusters is open, listing various shell access options: `>_Ash Shell Access`, `>_Ember Shell Access`, `>_Kingspeak Shell Access`, `>_Lonepeak Shell Access`, `>_Notchpeak Shell Access`, `>_Scrubpeak Shell Access`, and `>_Tangent Shell Access`. The main content area includes the OnDemand logo, a message of the day, and a tip about customizing the environment. The footer indicates the dashboard is powered by OnDemand and provides the version information: 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
- Either remote desktop or application



The screenshot shows the OnDemand dashboard in a web browser. The URL is ondemand.chpc.utah.edu/pun/sys/dashboard. The page features a navigation bar with links for Files, Jobs, Clusters, and Interactive Apps. The main content area displays the OnDemand logo and a message of the day. A dropdown menu for Interactive Apps is open, showing options for Desktops (Ash, Ember, Kingspeak, Lonepeak, Notchpeak, Scrubpeak, Tangent) and GUIs (ANSYS Workbench on Lonepeak, ANSYS Workbench on Notchpeak, COMSOL Multiphysics on Notchpeak, MATLAB on Notchpeak). Servers listed include Jupyter Notebook on Notchpeak and RStudio server on Notchpeak. The footer indicates the dashboard is powered by OnDemand and provides the version information: OnDemand version: 1.6.7 | Dashboard version: v1.35.0.

- Specific for each cluster
- To start the desktop job ASAP use notchpeak-shared-short
- Wait time may be longer on other clusters unless group has owner nodes



The screenshot shows a web browser window with the URL `ondemand.chpc.utah.edu/pun/sys/dashboard/batch_connect/sys/bc_desktop/notchpeak/session_contexts/new`. The page is titled "Notchpeak Desktop" and shows a sidebar with a list of interactive apps. "Notchpeak Desktop" is selected and highlighted in blue. The main content area displays the configuration for the Notchpeak Desktop session, including fields for "Number of hours", "Number of nodes", "Number of tasks (CPU cores)", "Account", and "Partition". A "Launch" button is at the bottom.

Notchpeak Desktop version: v0.2.1

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.

Number of hours

1

Number of nodes

1

Use one node unless the program you are planning to run can span multiple nodes.

Number of tasks (CPU cores)

1

Unless shared partition is used all cores on the node(s) will be allocated.

Account

notchpeak-shared-short

Partition

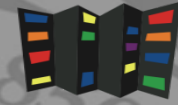
notchpeak-shared-short

☐ I would like to receive an email when the session starts

Launch

* The Notchpeak Desktop session data for this session can be accessed under the data root

- Account/partition devoted to interactive jobs
- Two 64 core, 256 GB AMD Zen CPU based nodes
- Max walltime 8 hours
- Max 32 tasks, 64 GB RAM per user
- Instant job allocation = interactivity of the job
- Good for OOD interactive apps, testing, debugging, etc
- `srun -n 1 -N 1 -A notchpeak-shared-short -p notchpeak-shared-short -t 8:00:00 --pty /bin/bash -l`



- First job is queued
- Once job starts, Launch button appears
- Can modify the viewing quality
- Also can share the link for others to view (but not do anything else)

Notchpeak Desktop (565316)

Queued

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

Time Requested: 1 hour

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

 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.

Notchpeak Desktop (565316)

1 node | 1 core | Running

Host: >_notch081.ipuib.int.chpc.utah.edu

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

Time Remaining: 59 minutes

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

 Delete

Compression



0 (low) to 9 (high)

Image Quality



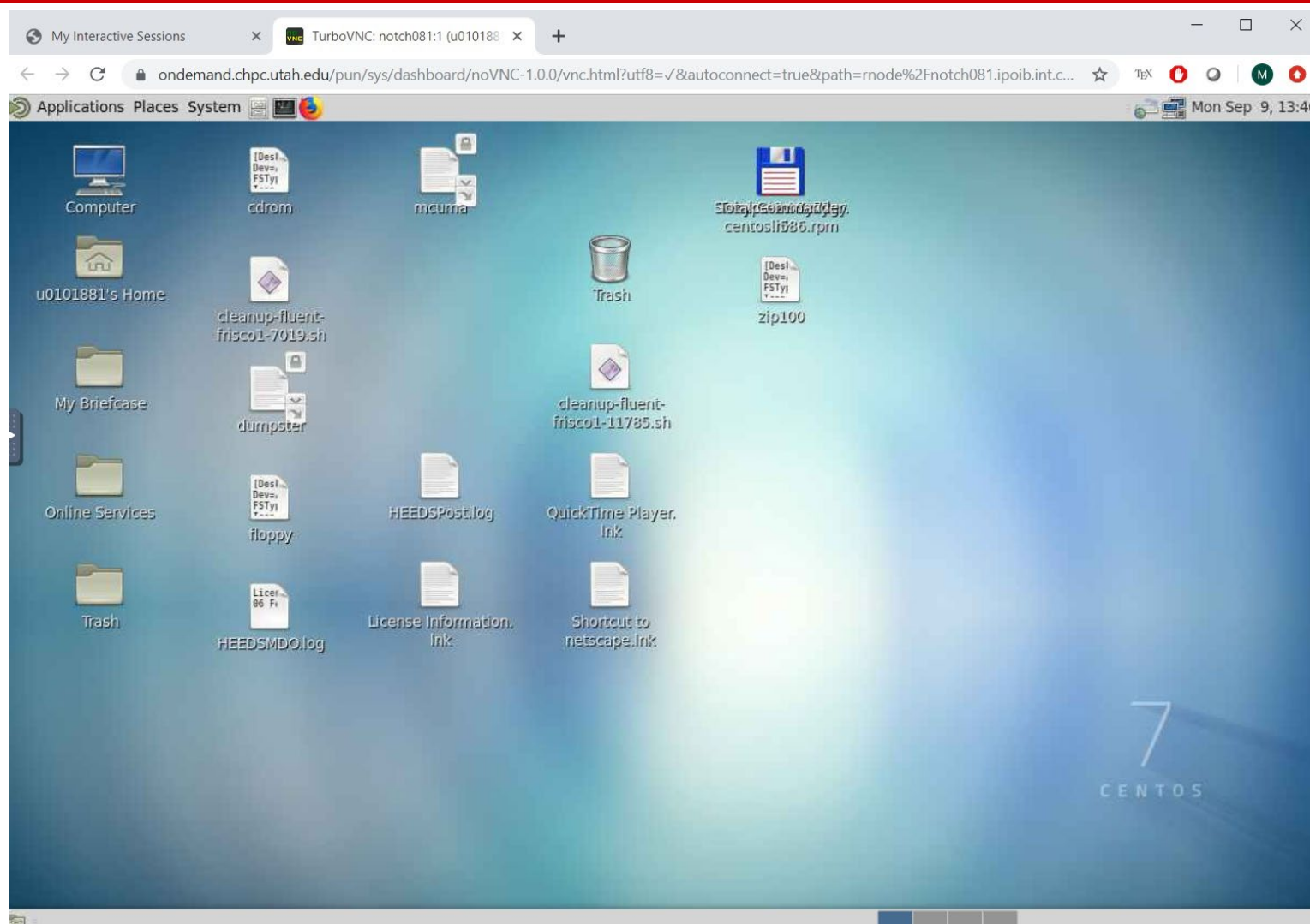
0 (low) to 9 (high)

Launch Notchpeak Desktop

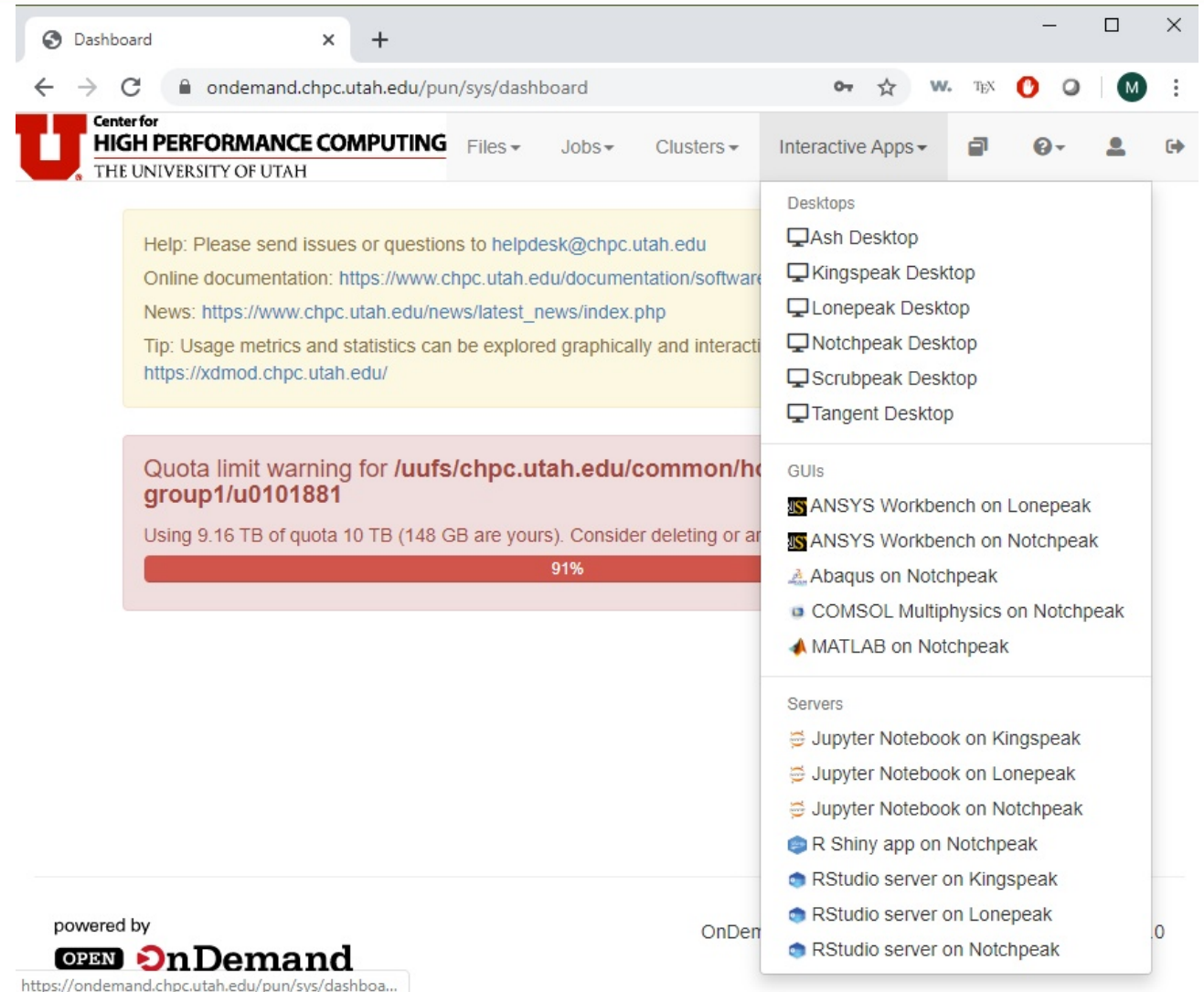
View Only (Share-able Link)



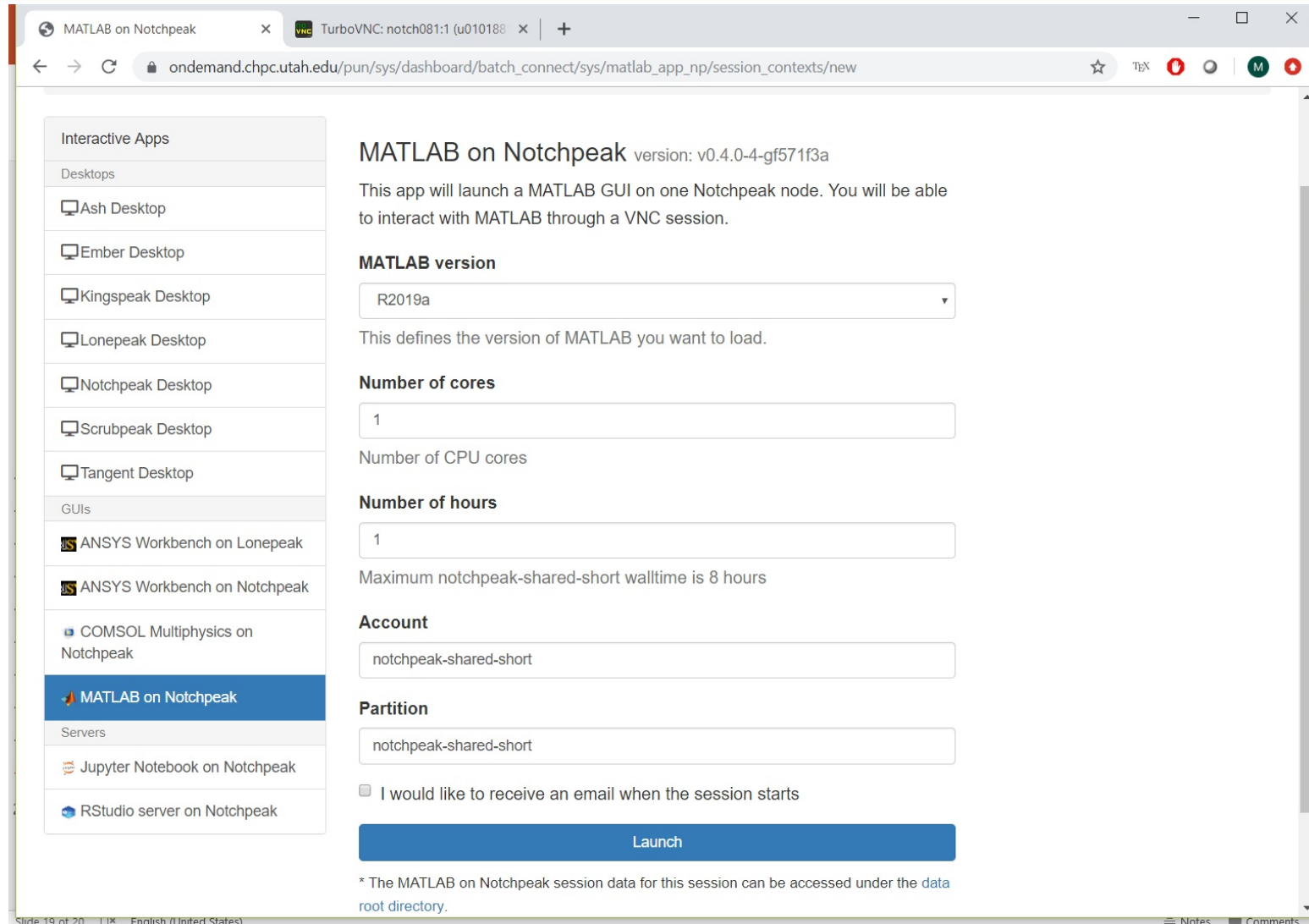
- Interactive job's remote desktop is launched in a separate browser tab
- Closing the tab does not delete the job (persistent connection)
- Must hit Delete to delete the job



- Direct launch of a given application
- Abaqus, ANSYS, COMSOL, MATLAB
- Jupyter Notebook
- RStudio server, R Shiny app
- Can set up others if needed



- Same start parameters as in Interactive Desktop
- Plus option to choose MATLAB version
- Only on Notchpeak at the moment

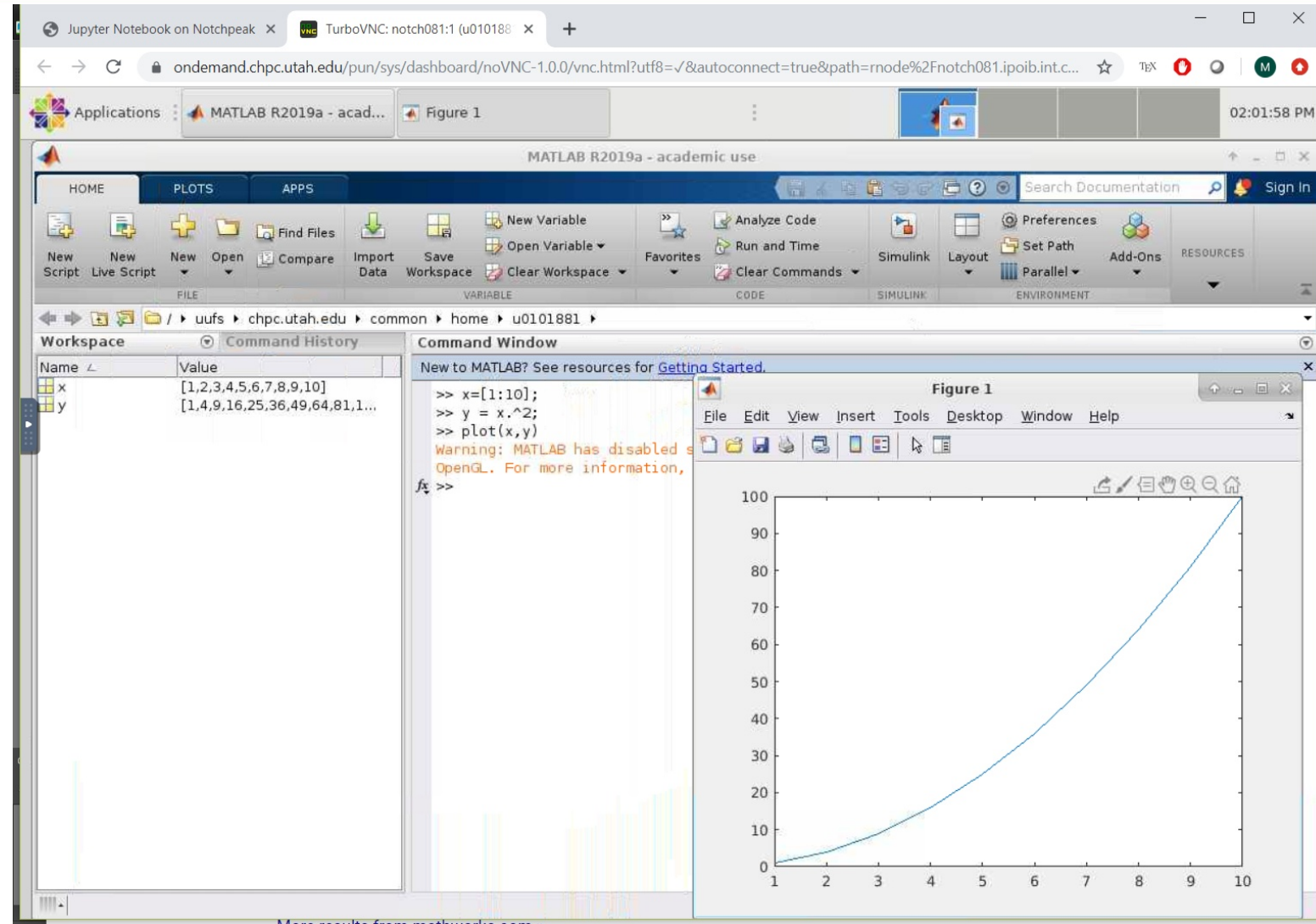


The screenshot shows a web browser window with the URL `ondemand.chpc.utah.edu/pun/sys/dashboard/batch_connect/sys/matlab_app_np/session_contexts/new`. The page is titled "MATLAB on Notchpeak" and displays a form for creating a new session. On the left, a sidebar lists various interactive apps and desktops, with "MATLAB on Notchpeak" selected. The main content area shows the following configuration options:

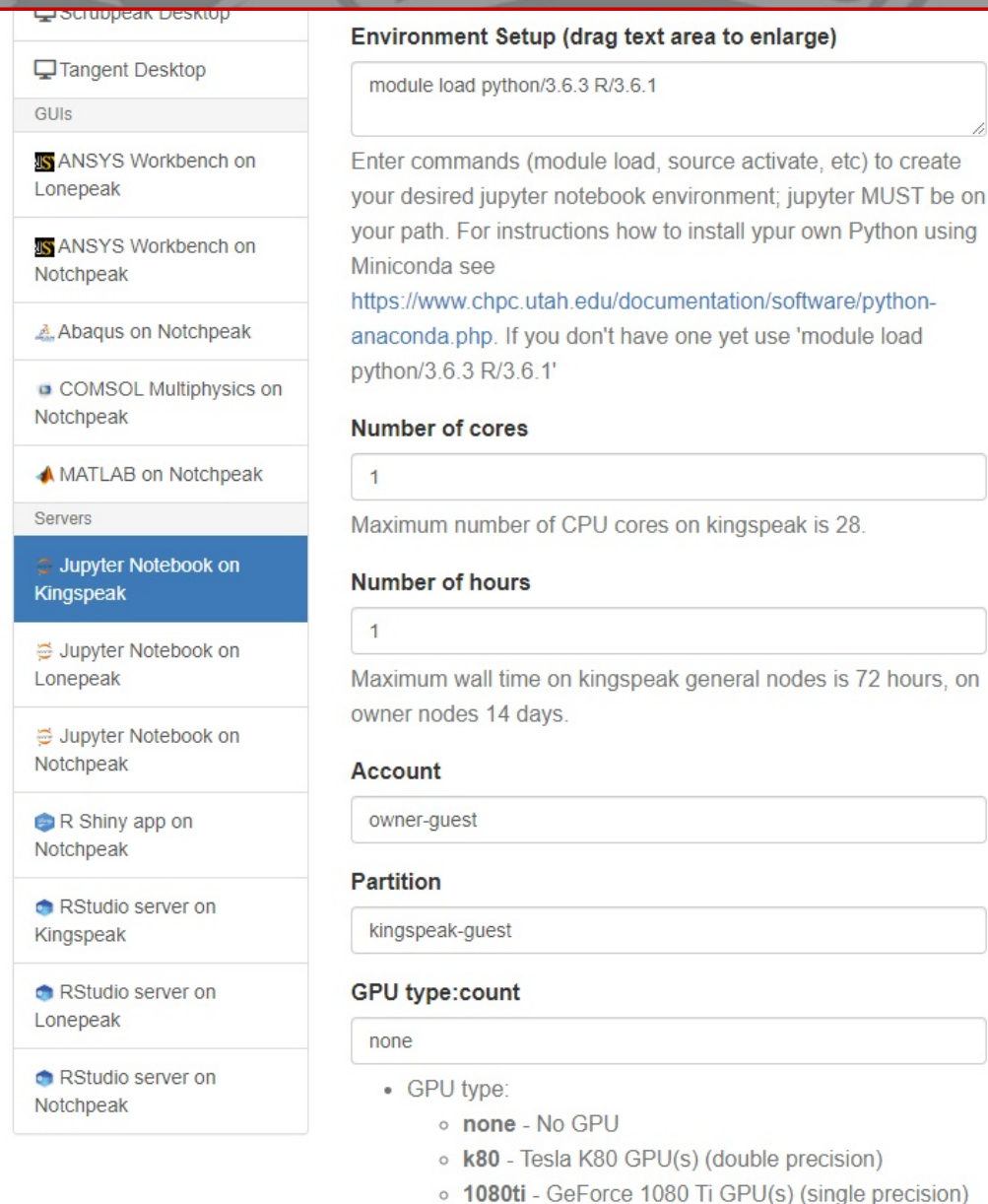
- MATLAB on Notchpeak** version: v0.4.0-4-gf571f3a
- Description: This app will launch a MATLAB GUI on one Notchpeak node. You will be able to interact with MATLAB through a VNC session.
- MATLAB version**: A dropdown menu set to "R2019a". Below it, a note states: "This defines the version of MATLAB you want to load."
- Number of cores**: A text input field set to "1". Below it, a label reads: "Number of CPU cores".
- Number of hours**: A text input field set to "1". Below it, a note states: "Maximum notchpeak-shared-short walltime is 8 hours".
- Account**: A text input field set to "notchpeak-shared-short".
- Partition**: A text input field set to "notchpeak-shared-short".
- A checkbox labeled "I would like to receive an email when the session starts" is currently unchecked.
- A large blue "Launch" button is at the bottom.
- A footnote at the bottom states: "* The MATLAB on Notchpeak session data for this session can be accessed under the [data root directory](#)."

At the bottom left of the browser window, it says "Slide 19 of 20 | English (United States)". At the bottom right, there are links for "Notes" and "Comments".

- MATLAB GUI window
- Additional MATLAB windows appear over the GUI



- Specify own or CHPC Python module
- Can also specify GPU - but make sure to list the right account/partition
- Available on Notchpeak, Kingspeak and Lonepeak



The screenshot shows a web interface for selecting and configuring a Jupyter Notebook environment. On the left, a sidebar lists various desktop and server environments. The 'Jupyter Notebook on Kingspeak' option is selected. On the right, the 'Environment Setup' section allows users to drag text into a box to specify modules, set the number of cores and hours, choose an account and partition, and select a GPU type.

Environment Setup (drag text area to enlarge)

module load python/3.6.3 R/3.6.1

Enter commands (module load, source activate, etc) to create your desired jupyter notebook environment; jupyter MUST be on your path. For instructions how to install your own Python using Miniconda see <https://www.chpc.utah.edu/documentation/software/python-anaconda.php>. If you don't have one yet use 'module load python/3.6.3 R/3.6.1'

Number of cores

1

Maximum number of CPU cores on kingspeak is 28.

Number of hours

1

Maximum wall time on kingspeak general nodes is 72 hours, on owner nodes 14 days.

Account

owner-guest

Partition

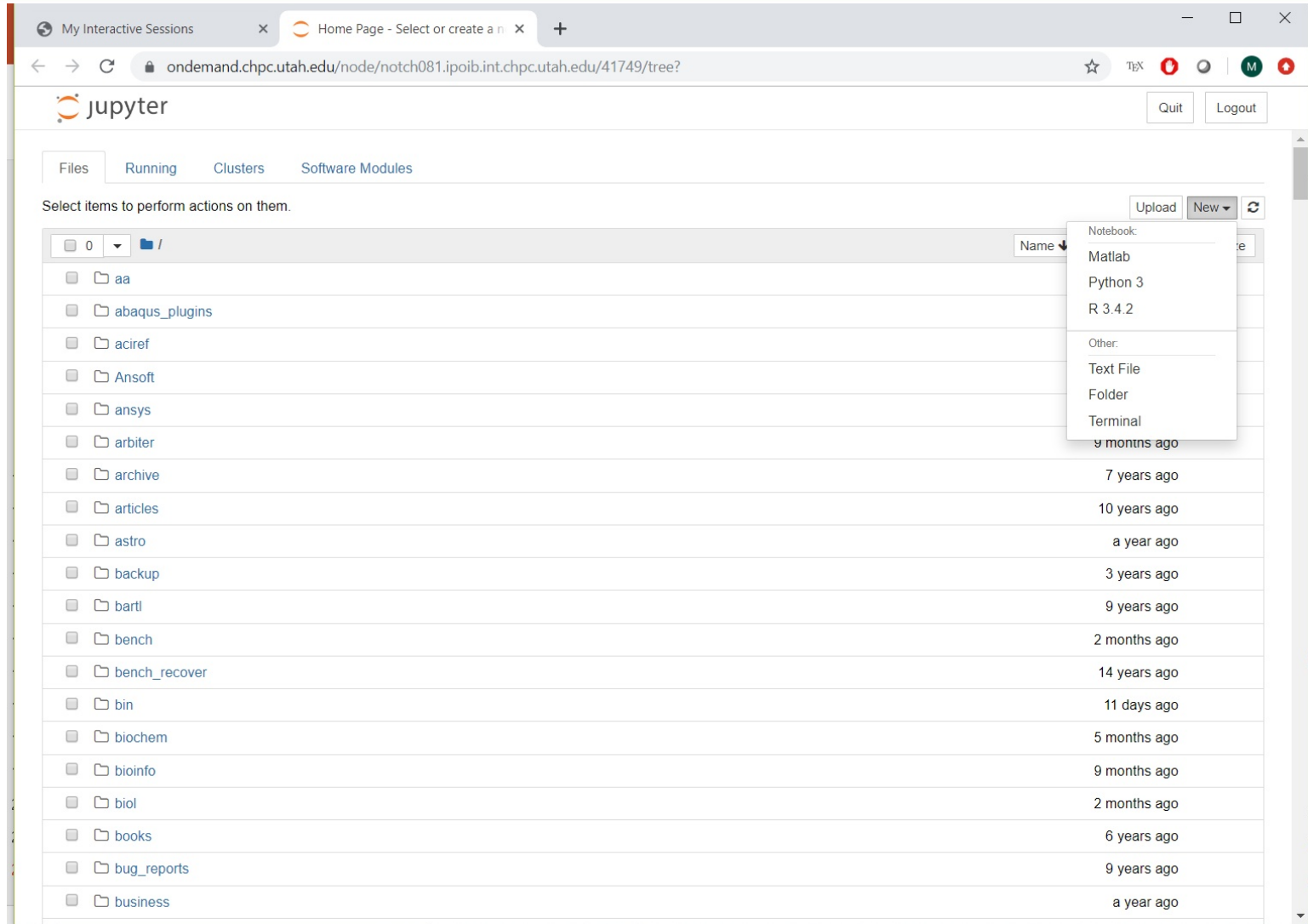
kingspeak-guest

GPU type:count

none

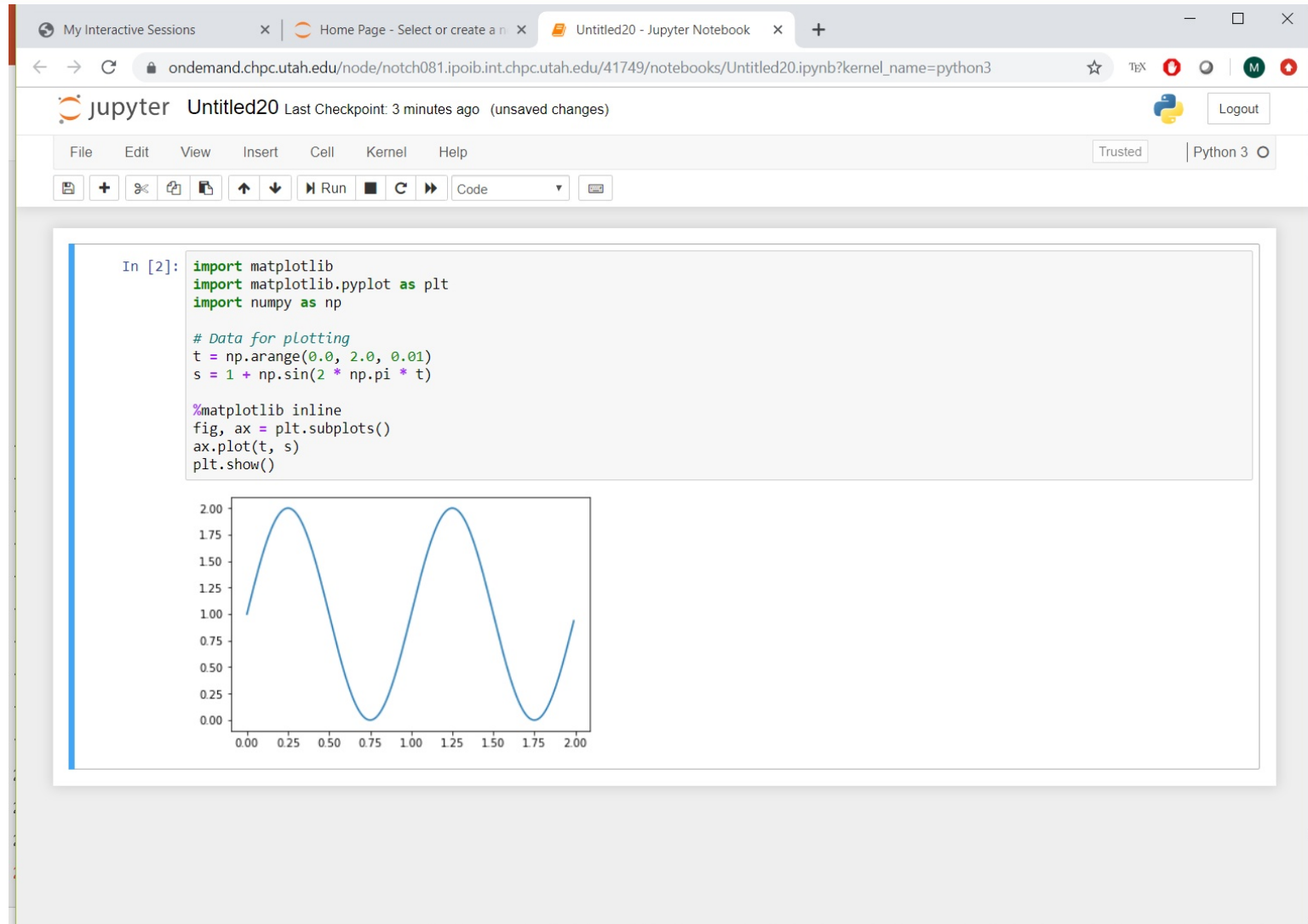
- GPU type:
 - none - No GPU
 - k80 - Tesla K80 GPU(s) (double precision)
 - 1080ti - GeForce 1080 Ti GPU(s) (single precision)

- 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 screenshot shows the Jupyter web interface in a browser. The address bar displays the URL: `ondemand.chpc.utah.edu/node/notch081.ipob.int.chpc.utah.edu/41749/tree?`. The interface includes tabs for "Files", "Running", "Clusters", and "Software Modules". A dropdown menu is open, showing options for "Notebook:" (Matlab, Python 3, R 3.4.2) and "Other:" (Text File, Folder, Terminal). The file list on the left includes folders like "aa", "abaqus_plugins", "aciref", "Ansoft", "ansys", "arbiter", "archive", "articles", "astro", "backup", "bartl", "bench", "bench_recover", "bin", "biochem", "bioinfo", "biol", "books", "bug_reports", and "business".

- The notebook is launched in another browser tab



- Interface improvements
 - e.g. job submission from the File Explorer
- Other interactive apps based on user demand
- More flexible interactive targets (e.g. frisco nodes)
- Job accounting and metrics from XDMod
- Integration with other gateways

- <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