

A scenic view of the University of Colorado Boulder campus. In the foreground, a large, historic red brick building with a prominent tower and an American flag on top is visible. The building is surrounded by lush green trees with some autumn-colored foliage. In the background, a large, rugged mountain with rocky peaks and green slopes rises under a blue sky with light clouds.

**Alpine in your Browser: The Open
OnDemand Gateway**

Be Boulder.



University of Colorado **Boulder**

Alpine in your Browser! The Open OnDemand Gateway

Instructors: Trevor Hall, Brandon Reyes

- Website: www.rc.colorado.edu
- Helpdesk: rc-help@colorado.edu
- Slides: <https://github.com/ResearchComputing/OpenOnDemand>
- Survey: <http://tinyurl.com/curc-survey18>

RMACC Cyber Infrastructure



- <https://ask.cyberinfrastructure.org/c/rmacc/65>
- This forum provides opportunity for RMACC members to converse amongst themselves and with the larger, global research computing community.
- The “go to” general Q&A platform for the global research computing community - researchers, facilitators, research software engineers, CI engineers, sys admins and others.

Agenda

- About Open OnDemand
 - What is ACCESS-CI?
- How to log in to CURC resources
- Features of Open OnDemand
 - Using the Shell
 - File Transfer
 - Job Monitoring and Composer
- Interactive Applications
 - Demos!

Open OnDemand



- Open OnDemand is an NSF-funded open-source HPC portal based on Ohio Supercomputing Center's original OnDemand portal
- Enables web access to HPC resources, including:
 - Easy file management
 - Command-line shell access
 - Job management and monitoring across different batch servers and resource managers
 - Graphical desktop environments and desktop applications

Open OnDemand (at CURC)



- Open OnDemand provides a browser-based interface to interact with Alpine and Blanca!
- All CURC users can access Open OnDemand
 - CU Users: <https://ondemand.rc.colorado.edu/>
 - CSU, AMC, RMACC users: <https://ondemand-rmacc.rc.colorado.edu>
- Notable Features:
 - SSH-free terminal access
 - Jupyter Notebooks
 - RStudio
 - MATLAB

ACCESS-CI (RMACC Users Only)

- ACCESS-CI provides:
 - Allocations
 - Support
 - Operations
 - Metrics
- Supports CURC with managing RMACC users
- Get an ACCESS-CI Account:
<https://identity.access-ci.org/new-user.html>



Advanced Cyberinfrastructure Coordination Ecosystem:
Services & Support

ACCESS-CI (RMACC Users Only)

- Once you have an ACCESS-CI Account, reach out to us with the following information:
 - Your ACCESS-CI username
 - Your institutional affiliation
 - Your role
 - Your department
 - Your first and last name
 - Your preferred email address
- We will provision you an account!

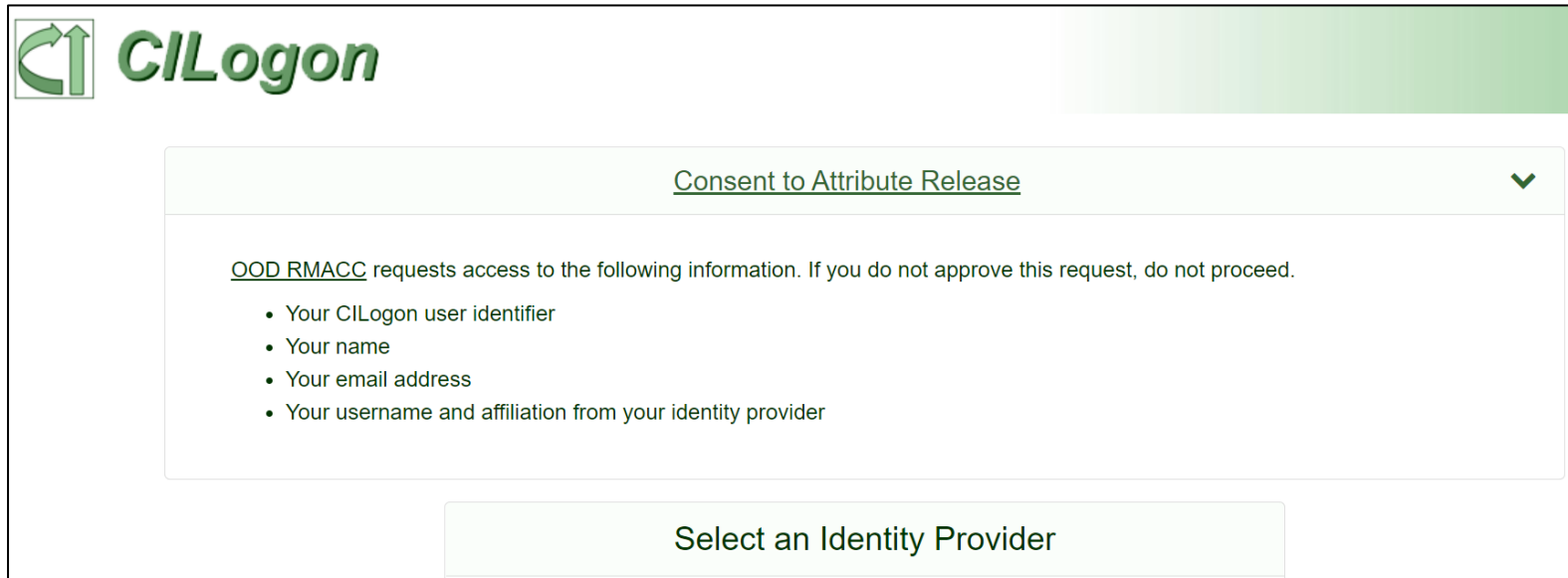



Advanced Cyberinfrastructure Coordination Ecosystem:
Services & Support

Logging in to Open OnDemand

Logging In

- CU Boulder: <https://ondemand.rc.colorado.edu/>
- RMACC: <https://ondemand-rmacc.rc.colorado.edu>
 - You will be re-directed to the CILogon sign-in page:



 **CILogon**

[Consent to Attribute Release](#) ▼

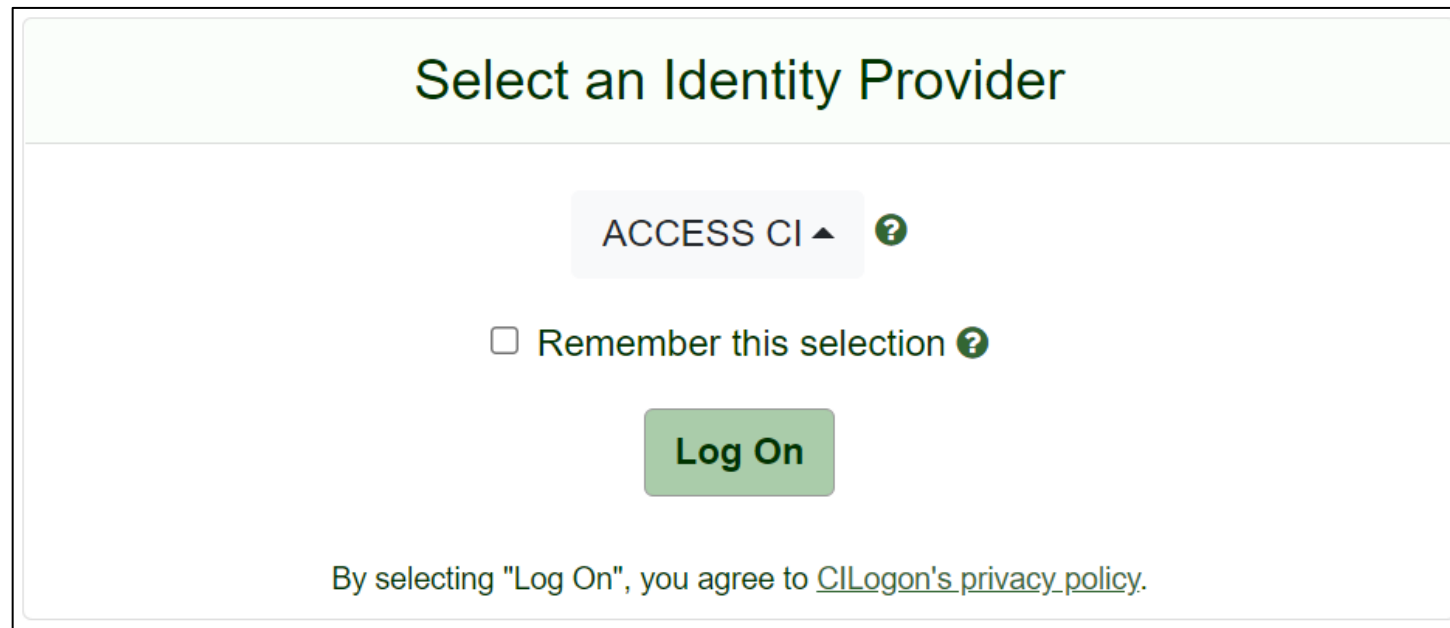
OOD RMACC requests access to the following information. If you do not approve this request, do not proceed.

- Your CILogon user identifier
- Your name
- Your email address
- Your username and affiliation from your identity provider

Select an Identity Provider

Logging In (RMAACC Users Only)

- Select your identity provider.
 - If you are a CSU user, select 'Colorado State University'
 - If you are from **any** other institution, select 'ACCESS CI (XSEDE)'



The screenshot shows a web form titled "Select an Identity Provider". It features a dropdown menu currently set to "ACCESS CI" with a green question mark icon to its right. Below the dropdown is a checkbox labeled "Remember this selection" followed by a green question mark icon. A green "Log On" button is positioned below the checkbox. At the bottom of the form, a line of text states: "By selecting 'Log On', you agree to [CILogon's privacy policy](#)."

Logging In (Cont.)

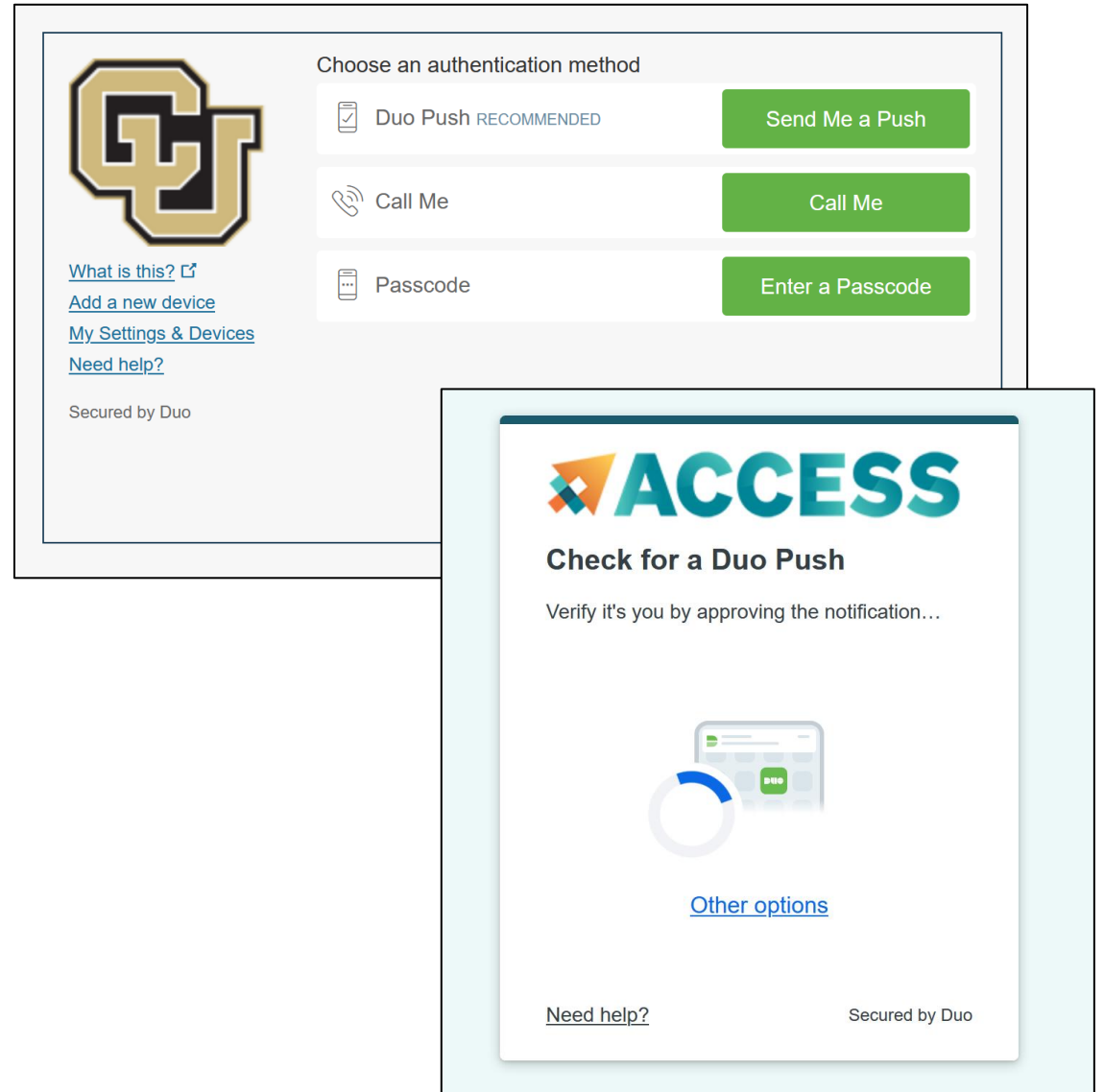
- CU Boulder: Authenticate with your Identikey and Password
- CSU: Authenticate with your EID and Password
- RMACC: You will be redirected to the ACCESS-CI login page
 - Use your ACCESS username and password



The screenshot shows the ACCESS-CI login interface. At the top is the ACCESS logo, which consists of a stylized orange and blue icon followed by the word "ACCESS" in blue. Below the logo is the text "Login to CILogon". There are two input fields: "ACCESS Username" and "ACCESS Password", both with white text on a light blue background. Below the password field is a blue "Login" button. At the bottom of the page is the CILogon logo, which features a green circular arrow icon and the text "CILogon" in green.

Logging In

- Duo 2-Factor Authentication is a requirement for the security of our systems.
- CU Boulder and CSU users must have this configured prior to logging in
- RMACC users will be prompted to set up Duo 2FA upon logging in for the first time



Demo: Logging in to Open OnDemand

<https://ondemand.rc.colorado.edu/>

<https://ondemand-rmacc.rc.colorado.edu>

Features of Open OnDemand

OnDemand Home Page

- From the home page, you can access the following Open OnDemand Features:
 - Files
 - Jobs
 - Clusters
 - Interactive Apps
 - My Interactive Sessions



Files ▼

Jobs ▼

Clusters ▼

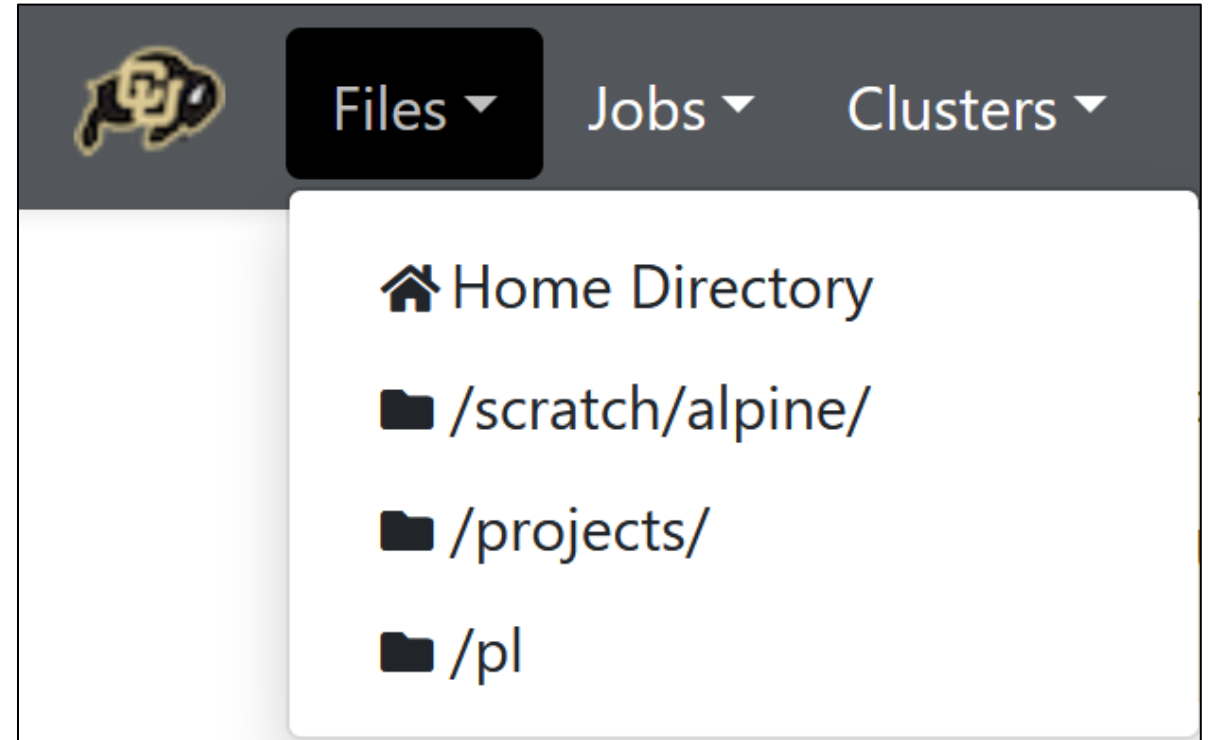
Interactive Apps ▼



My Interactive Sessions

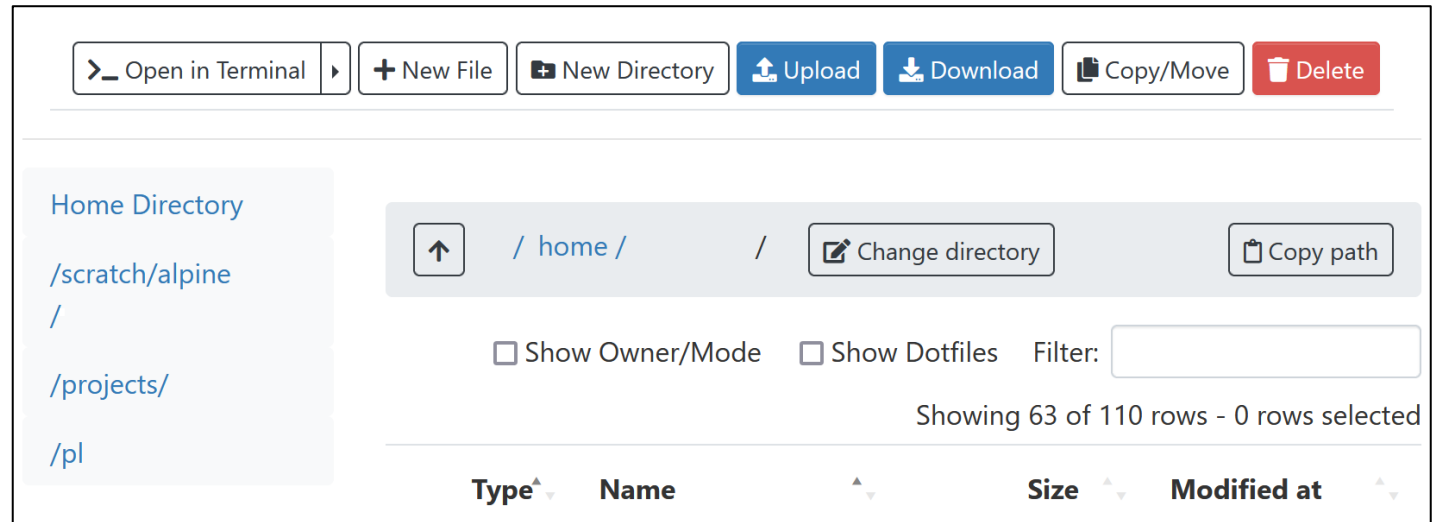
Files

- Open OnDemand allows you to navigate and manipulate your files
- You can access your entire CURC filesystem using this tool:
 - /home
 - /projects
 - /scratch/alpine
 - /pl (if applicable)



Files Management

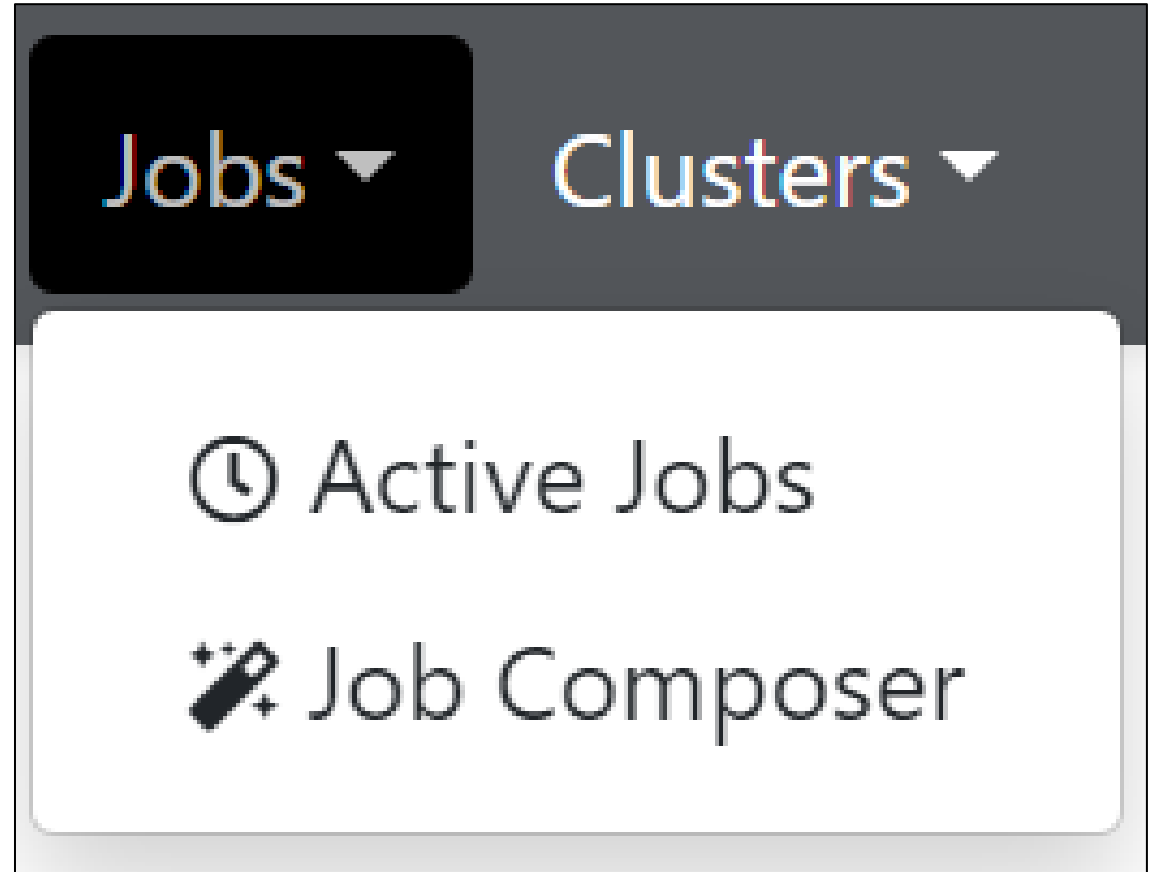
- On the files page you can:
 - Upload data
 - Download files
 - Create new files
 - Edit files
 - Copy/move data
 - Delete files
 - Create directories



Demo: File Transfer

Jobs

- Open OnDemand allows you to monitor jobs running on the system
 - You can monitor your own jobs, but you can also monitor **all** queued and running jobs
- You can also create and submit jobs using the **Job Composer** tool



Active Jobs

Active Jobs

Show 50 entries

All Jobs All Clusters

Filter:

ID	Name	User	Account	Time Used	Queue	Status	Cluster	Actions
>	17096	sys/dashboard/sys/cu-desktop-presets	rmacc-general	00:33:24	core-gpu	Running	Core	
>	17102	sys/dashboard/sys/cu-desktop-presets	ucb-general	00:08:31	core-gpu	Running	Core	
>	17103	sys/dashboard/sys/bc_desktop/core	ucb-general	00:08:19	viz	Completed	Core	
>	17095	sys/dashboard/sys/bc_desktop/core	ucb-general	01:19:59	viz	Running	Core	
>	17100	sys/dashboard/sys/bc_desktop/core	ucb-general	00:10:58	viz	Running	Core	
>	17068	sys/dashboard/sys/bc_desktop/core	ucb-general	17:51:09	viz	Running	Core	

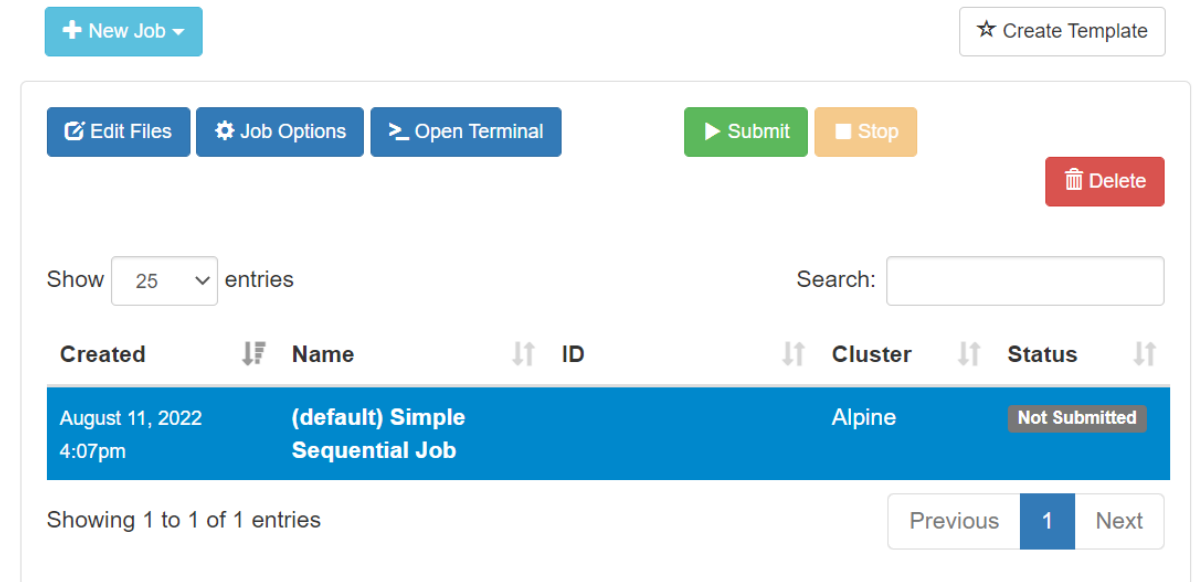
Active Jobs (con't)

- Here you'll see a list of jobs on the selected cluster(s)
- If you select one of them, you can see details about the job

Queued AlphaPulldownEx1 2471710	
Cluster	Alpine
Job Id	2471710
Job Name	AlphaPulldownEx1
User	
Account	ucb-general
Partition	aa100
State	PENDING
Reason	PartitionTimeLimit
Total Nodes	1
Total CPUs	8
Time Limit	2-00:00:00
Time Used	0:00
Memory	64000M

Job Composer

- With the Job Composer, you can create a script and submit to the scheduler
- Default templates are available, but you can use your own templates or edit using the built-in editor



The screenshot displays the Job Composer web interface. At the top, there is a '+ New Job' button and a 'Create Template' link. Below these are buttons for 'Edit Files', 'Job Options', 'Open Terminal', 'Submit', 'Stop', and 'Delete'. A search bar and a 'Show 25 entries' dropdown are also present. The main section is a table with columns: Created, Name, ID, Cluster, Status, and a 'Not Submitted' badge. The table contains one entry: 'August 11, 2022 4:07pm', '(default) Simple Sequential Job', 'Alpine', and 'Not Submitted'. At the bottom, it says 'Showing 1 to 1 of 1 entries' and has 'Previous', '1', and 'Next' navigation buttons.

Created	Name	ID	Cluster	Status
August 11, 2022 4:07pm	(default) Simple Sequential Job		Alpine	Not Submitted

Job Composer Options

Name

(default) Simple Sequential Job

Cluster

Alpine

Specify job script

main_job.sh

Files larger than 65KB are omitted for the job script field

Account

Account is an optional field. If not set, the account may be auto-set by the submit filter.

Job array specification

1-10

Job arrays are optional. e.g. 1-10

☐ Copy environment

Save

Reset

Back

Job Composer Script


Submit Script


main_job.sh


Script contents:

```
#!/bin/bash
# JOB HEADERS HERE

echo "Hello World"
```

 Open Editor

 Open Terminal

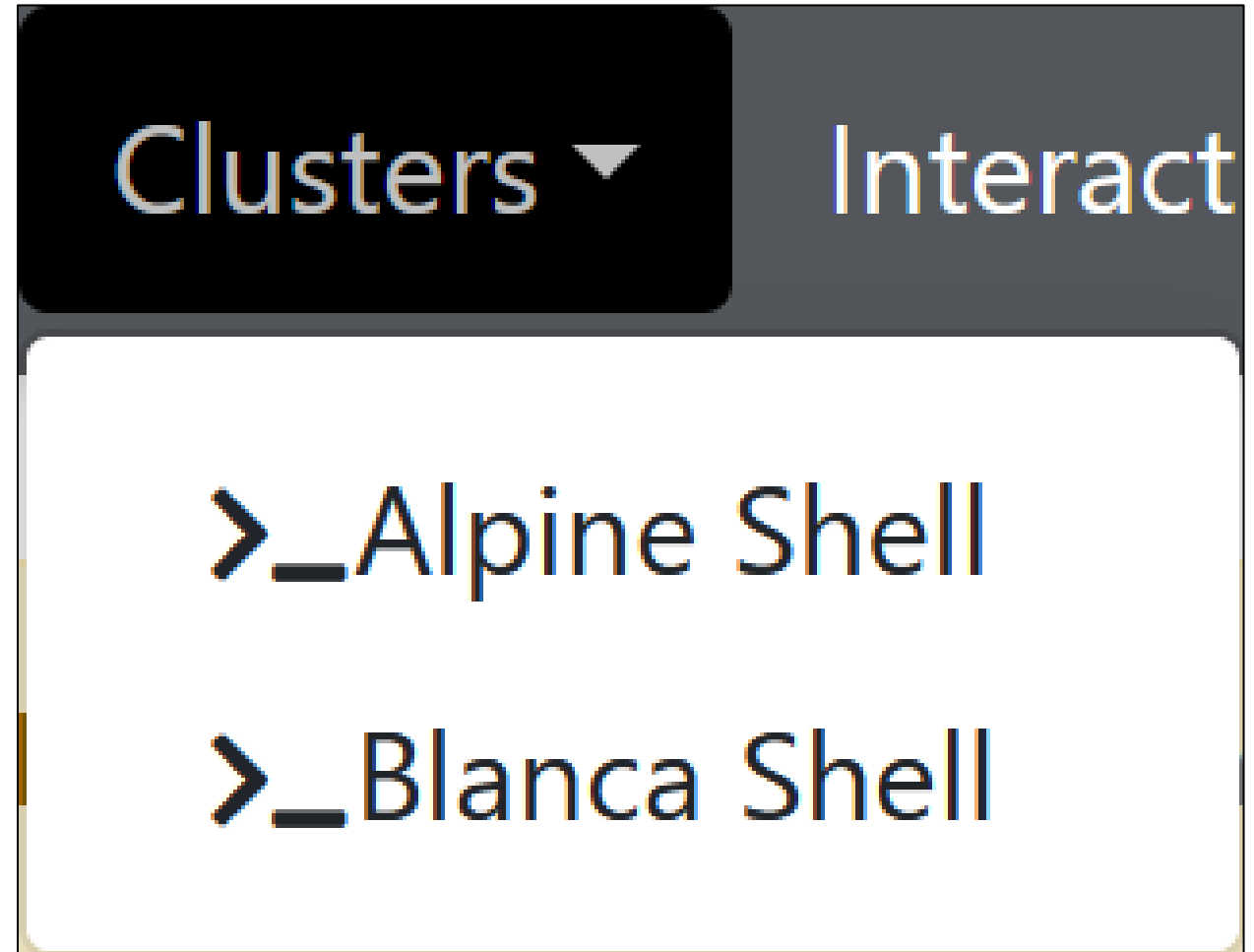
 Open Dir

- Once you've added all of the options for your job, you can view the script template
- You can edit this file using OnDemand's built-in text editor

Demo: Using the Job Composer

Clusters

- Open OnDemand allows you to open a terminal in your browser, no SSH required



Terminal

```
Host: login.rc.colorado.edu
Password:
Welcome to CU-Boulder Research Computing.

* Website http://colorado.edu/rc
* Questions? rc-help@colorado.edu
* Subscribe to system announcements: https://curc.statuspage.io/
* Please type rc-help for the Acceptable Use Policy and a short help page.

You are using login node: login11

trha5176@login11:~$
```

Interactive Applications

Interactive Apps


- Interactive apps are comprised of built-in Graphical User Interfaces (GUIs) for many of the most popular research applications
- Current Offerings Include:
 - Jupyter Notebooks
 - The Core Desktop
 - RStudio
 - MATLAB
 - ...with more coming soon!


Desktops

 Core Desktop (Presets)


 Core Desktop


GUIs

 MATLAB (Presets)

 MATLAB on Core Desktop

Servers

 Jupyter Session (Custom)

 Jupyter Session (Presets)

 RStudio Server (Custom)

 RStudio Server (Presets)

Interactive Apps (cont.)


- Each app comes with two spawning options: 'Custom' and 'Presets'
 - 'Custom' allows you to spawn a session with customizable configurations
 - If your configurations are incompatible, your job will not run
 - 'Presets' allows you to spawn a session with common, functional configurations
 - Works 'out of the box'


Desktops

 Core Desktop (Presets)


 Core Desktop


GUIs


 MATLAB (Presets)

 MATLAB on Core Desktop

Servers

 Jupyter Session (Custom)

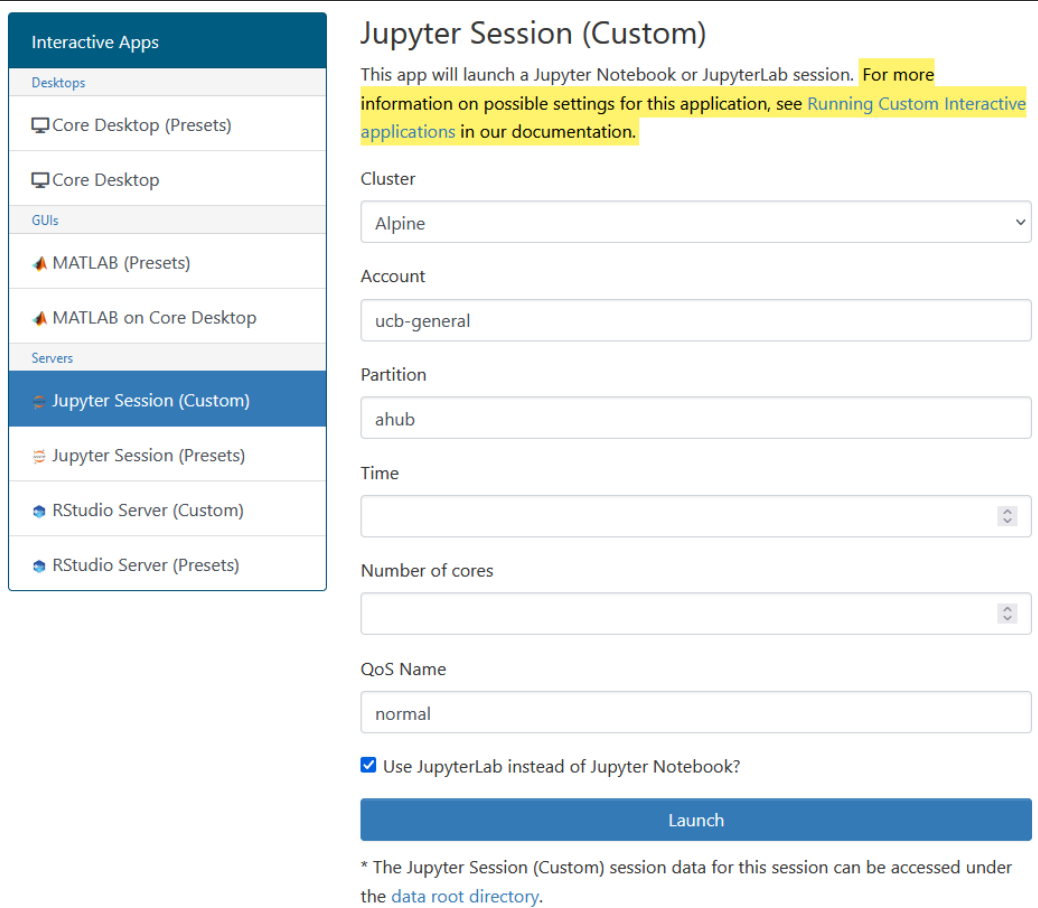
 Jupyter Session (Presets)

 RStudio Server (Custom)

 RStudio Server (Presets)

Jupyter Notebooks

- We can spawn a Jupyter Notebook using Research Computing Resources
- Configuration options include:
 - Slurm Account
 - Partition
 - Requested time
 - Number of cores

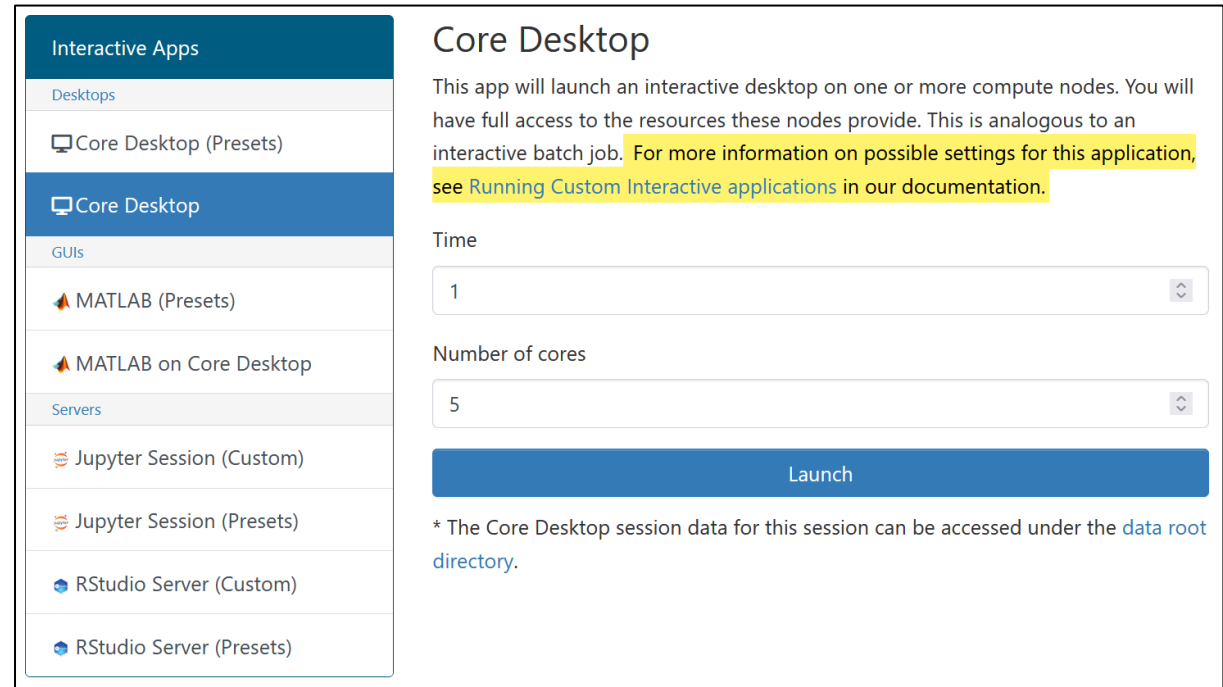


The screenshot shows a web interface for configuring a Jupyter session. On the left is a sidebar menu with categories: Interactive Apps, Desktops, GUIs, and Servers. Under Desktops are 'Core Desktop (Presets)' and 'Core Desktop'. Under GUIs are 'MATLAB (Presets)' and 'MATLAB on Core Desktop'. Under Servers are 'Jupyter Session (Custom)' (highlighted), 'Jupyter Session (Presets)', 'RStudio Server (Custom)', and 'RStudio Server (Presets)'. The main panel is titled 'Jupyter Session (Custom)' and contains a description: 'This app will launch a Jupyter Notebook or JupyterLab session. For more information on possible settings for this application, see [Running Custom Interactive applications](#) in our documentation.' Below this are several configuration fields: 'Cluster' (dropdown menu with 'Alpine' selected), 'Account' (text input with 'ucb-general'), 'Partition' (text input with 'ahub'), 'Time' (text input with a clear button), 'Number of cores' (text input with a clear button), and 'QoS Name' (text input with 'normal'). There is a checkbox labeled 'Use JupyterLab instead of Jupyter Notebook?' which is checked. At the bottom is a blue 'Launch' button. A footnote at the very bottom states: '* The Jupyter Session (Custom) session data for this session can be accessed under the [data root directory](#).'

Demo: Jupyter Notebooks

The Core Desktop

- To interact with a compute node in a graphical desktop environment, use the Core Desktop
- Configuration options include:
 - Requested Time
 - Number of Cores
- **If you are wanting to use a separate graphical application, you can run it on a Core Desktop**



The screenshot shows the 'Interactive Apps' configuration page. On the left is a sidebar with categories: Desktops, GUIs, and Servers. Under 'Desktops', 'Core Desktop (Presets)' is selected. Under 'GUIs', 'MATLAB (Presets)' and 'MATLAB on Core Desktop' are listed. Under 'Servers', 'Jupyter Session (Custom)', 'Jupyter Session (Presets)', 'RStudio Server (Custom)', and 'RStudio Server (Presets)' are listed. The main panel is titled 'Core Desktop' and contains a description: '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. For more information on possible settings for this application, see [Running Custom Interactive applications](#) in our documentation.' Below the description are two input fields: 'Time' with a value of '1' and 'Number of cores' with a value of '5'. A blue 'Launch' button is at the bottom. A footnote states: '* The Core Desktop session data for this session can be accessed under the [data root directory](#).'

Interactive Apps	
Desktops	
Core Desktop (Presets)	
Core Desktop	
GUIs	
MATLAB (Presets)	
MATLAB on Core Desktop	
Servers	
Jupyter Session (Custom)	
Jupyter Session (Presets)	
RStudio Server (Custom)	
RStudio Server (Presets)	

Core 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. For more information on possible settings for this application, see [Running Custom Interactive applications](#) in our documentation.

Time: 1

Number of cores: 5

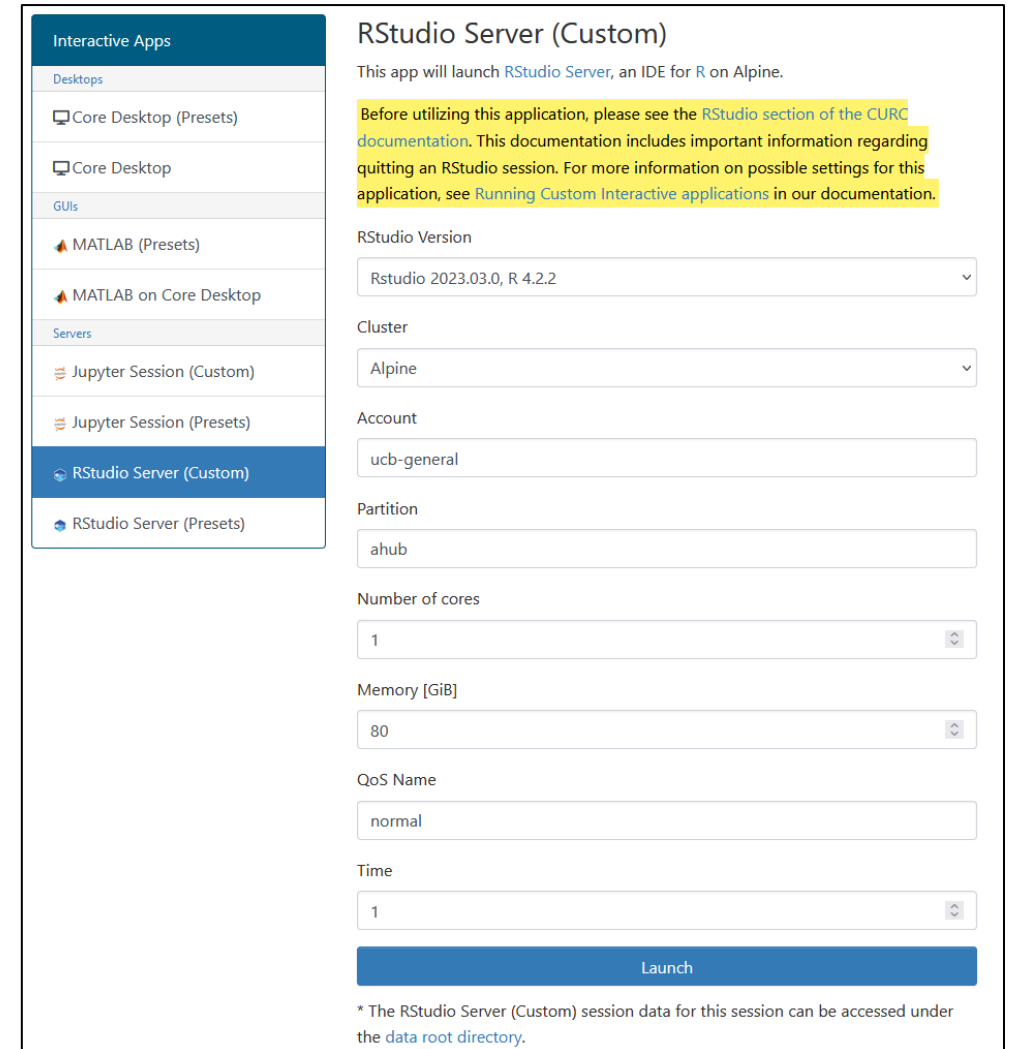
[Launch](#)

* The Core Desktop session data for this session can be accessed under the [data root directory](#).

Demo: The Core Desktop

RStudio

- We can test and run R programs in RStudio!
- Configuration options include:
 - Preferred R Version (4.2.2 exclusive, currently)
 - Cluster
 - Slurm Account
 - Partition
 - Number of Cores
 - RAM
 - QoS
 - Requested Time



The screenshot shows the 'Interactive Apps' sidebar on the left with 'RStudio Server (Custom)' selected. The main panel is titled 'RStudio Server (Custom)' and contains the following configuration options:

- Desktops:** Core Desktop (Presets), Core Desktop
- GUIs:** MATLAB (Presets), MATLAB on Core Desktop
- Servers:** Jupyter Session (Custom), Jupyter Session (Presets), **RStudio Server (Custom)**, RStudio Server (Presets)

RStudio Server (Custom) Configuration:

- Description:** This app will launch [RStudio Server](#), an IDE for R on Alpine.
- Warning:** Before utilizing this application, please see the [RStudio section of the CURC documentation](#). This documentation includes important information regarding quitting an RStudio session. For more information on possible settings for this application, see [Running Custom Interactive applications](#) in our documentation.
- RStudio Version:** Rstudio 2023.03.0, R 4.2.2
- Cluster:** Alpine
- Account:** ucb-general
- Partition:** ahub
- Number of cores:** 1
- Memory [GiB]:** 80
- QoS Name:** normal
- Time:** 1

Launch

* The RStudio Server (Custom) session data for this session can be accessed under the [data root directory](#).

Demo: RStudio

MATLAB

- We can run a MATLAB GUI on the Core Desktop!
- Configuration options include:
 - Preferred MATLAB version (R2016b – R2021b)
 - Number of Cores
 - Time requested
 - RAM
 - Slurm Account
 - Partition

Interactive Apps

Desktops

Core Desktop (Presets)

Core Desktop

GUIs

MATLAB (Presets)

MATLAB on Core Desktop

Servers

Jupyter Session (Custom)

Jupyter Session (Presets)

RStudio Server (Custom)

RStudio Server (Presets)

MATLAB on Core Desktop

This app will launch a MATLAB GUI on one Core CURC node. You will be able to interact with MATLAB through a VNC session. [For more information on possible settings for this application, see *Running Custom Interactive applications* in our documentation.](#)

MATLAB version

R2021b

Number of cores

1

Time

1

Memory [GB]

default

Specifying **default** will assign 4 GB per task.

Account

ucb-general

Partition

viz

Launch

* The MATLAB on Core Desktop session data for this session can be accessed under the [data root directory](#).

Demo: MATLAB

Review: Learning Goals

- ~~About Open OnDemand~~
 - ~~What is ACCESS-CI?~~
- ~~How to log in to CURC resources~~
- ~~Features of Open OnDemand~~
 - ~~Using the Shell~~
 - ~~File Transfer~~
 - ~~Job Monitoring and Composer~~
- ~~Interactive Applications~~
 - ~~Demos!~~

Questions?

CURC User Policies: <https://curc.readthedocs.io/en/latest/additional-resources/policies.html?highlight=policies#curc-user-policies>

Survey and feedback

<http://tinyurl.com/curc-survey18>