

A scenic view of the University of Colorado Boulder campus. In the foreground, a large, historic red brick building with a prominent central tower and a flagpole flying the American flag is visible. The building is surrounded by lush green trees with some autumnal yellow and orange foliage. In the background, a large, rugged mountain with rocky peaks and dense evergreen forests rises under a clear blue sky with a few wispy clouds.

**Alpine in your Browser with Open  
OnDemand**

**Be Boulder.**



University of Colorado **Boulder**



# Alpine in your Browser with Open OnDemand

Instructors: Brandon Reyes

- Website: [www.rc.colorado.edu](http://www.rc.colorado.edu)
- Helpdesk: [rc-help@colorado.edu](mailto:rc-help@colorado.edu)
- Slides:  
[https://github.com/ResearchComputing/alpine\\_in\\_your\\_browser\\_with\\_ood\\_primer](https://github.com/ResearchComputing/alpine_in_your_browser_with_ood_primer)
- Survey: <http://tinyurl.com/curc-survey18>

# Agenda

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

# Open OnDemand



- Open OnDemand is an NSF-funded open-source HPC portal based on the 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
  - Remote desktop
  - Jupyter Notebooks
  - RStudio
  - MATLAB

# ACCESS-CI (RMACC Users Only)

- ACCESS-CI provides:
  - Allocations
  - Support
  - Operations
  - Metrics
- Supports CURC by 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!



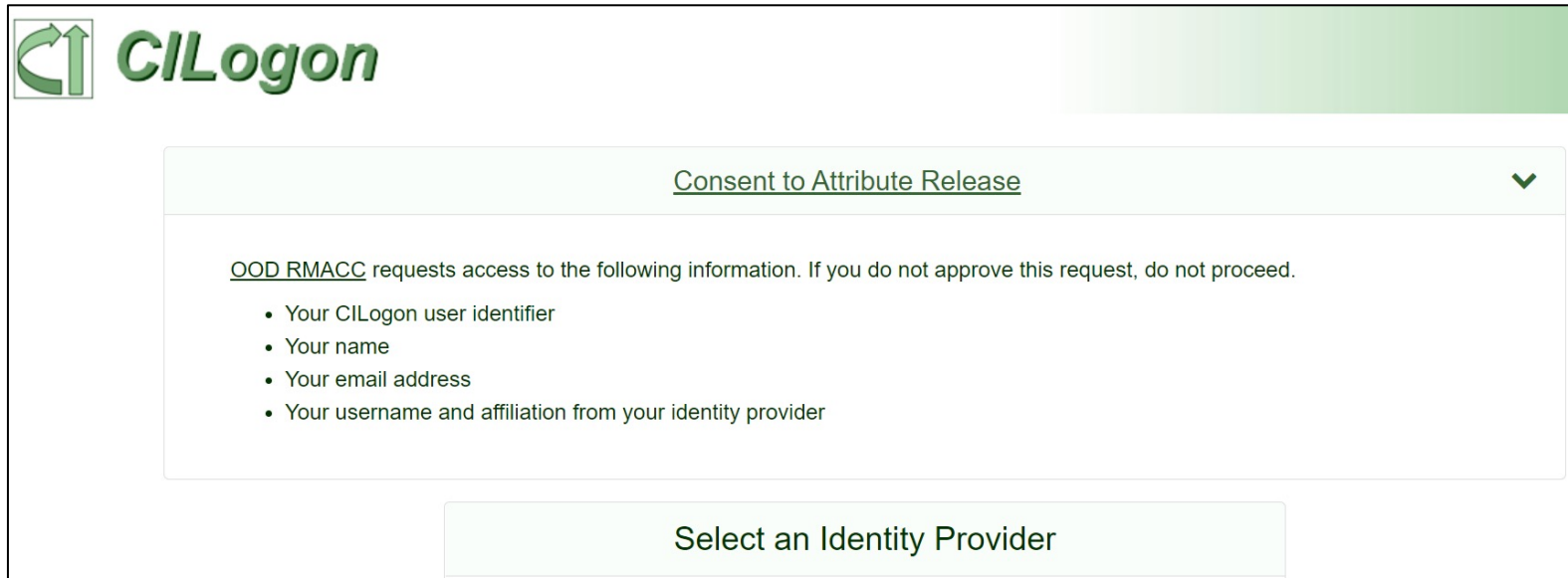
Advanced Cyberinfrastructure Coordination Ecosystem:  
Services & Support


# 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](#) ▼

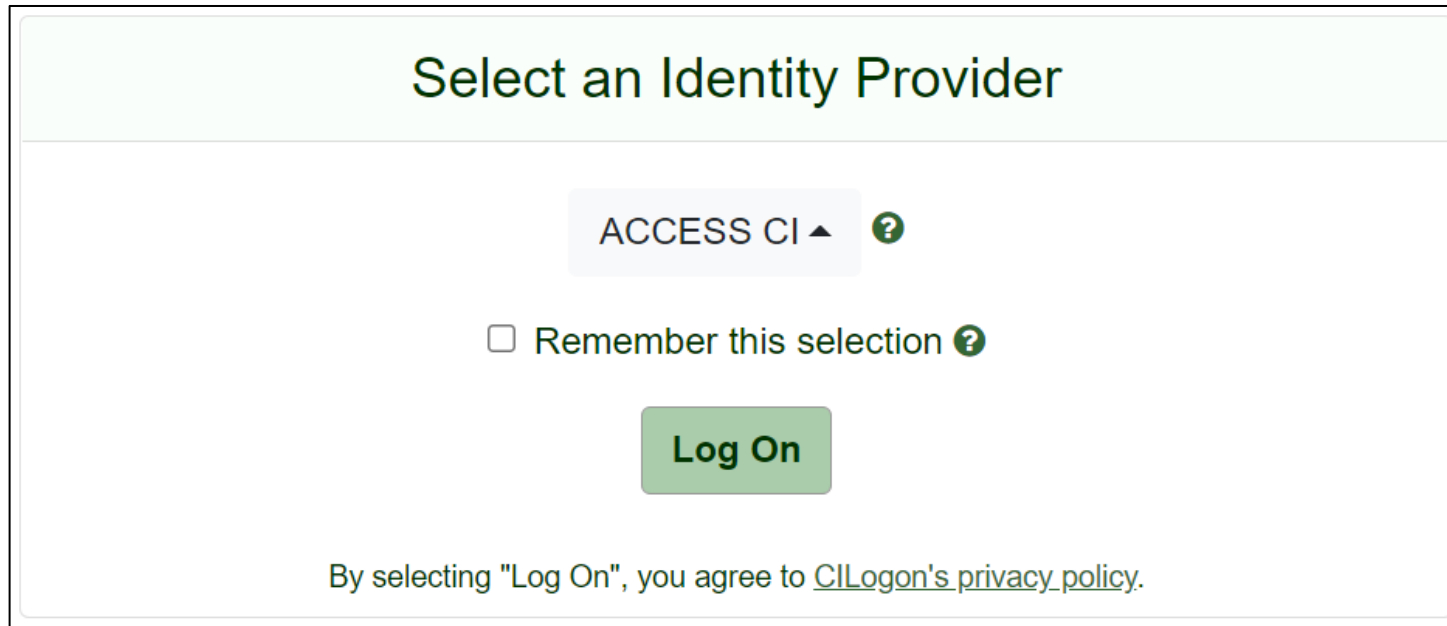
OOD RMACC requests access to the following information. If you do not approve this request, do not proceed.

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

Select an Identity Provider

# Logging In (RMACC 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)'

A screenshot of a web form titled "Select an Identity Provider". The form has a light green header bar with the title. Below the header, there is a dropdown menu currently showing "ACCESS CI" with a small upward arrow and 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. At the bottom of the form is a green "Log On" button. Below the button, there is a line of text: "By selecting 'Log On', you agree to [CILogon's privacy policy](#)." data-bbox="212 447 778 882"/>

Select an Identity Provider

ACCESS CI ▲ ?


☐ Remember this selection ?

Log On

By selecting "Log On", you agree to [CILogon's privacy policy](#).

# Logging In (cont.)

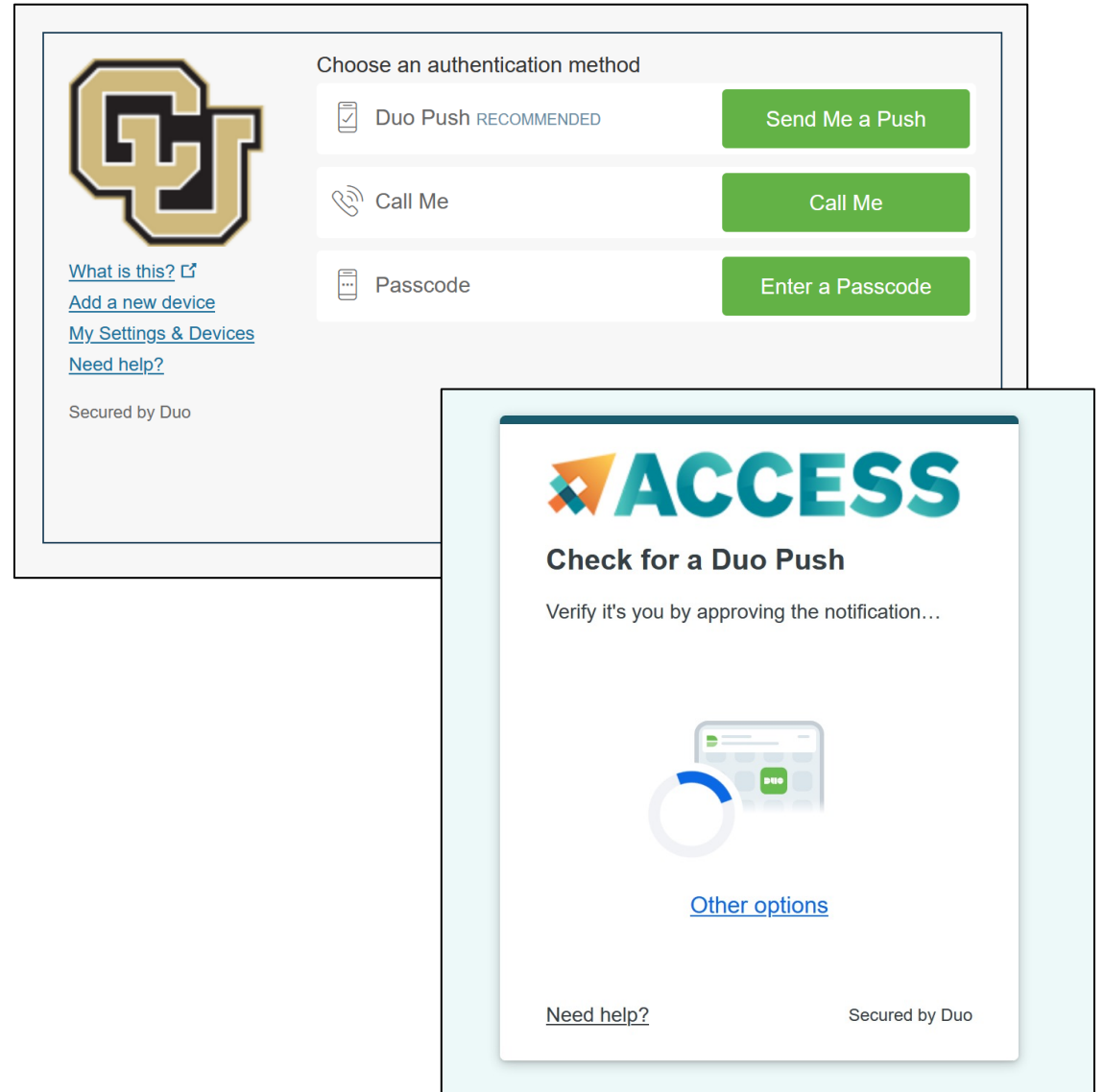
- CU Boulder: Authenticate with your Identikey and Password
- CSU: Authenticate with your EID and Password
- RMACC: You will be redirected to the ACCESS-CI login page
  - Use your ACCESS username and password



The screenshot shows the ACCESS-CI login interface. At the top left is the ACCESS logo, which consists of a stylized 'A' made of three colored triangles (orange, yellow, blue) followed by the word 'ACCESS' in blue. Below the logo is the text 'Login to CILogon'. There are two input fields: the first is labeled 'ACCESS Username' and the second is labeled 'ACCESS Password'. Below these fields is a blue button with the text 'Login'. At the bottom left is a green icon of a circular arrow pointing up and to the right, followed by the text 'CILogon' in a green, italicized font.

# 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 ▼

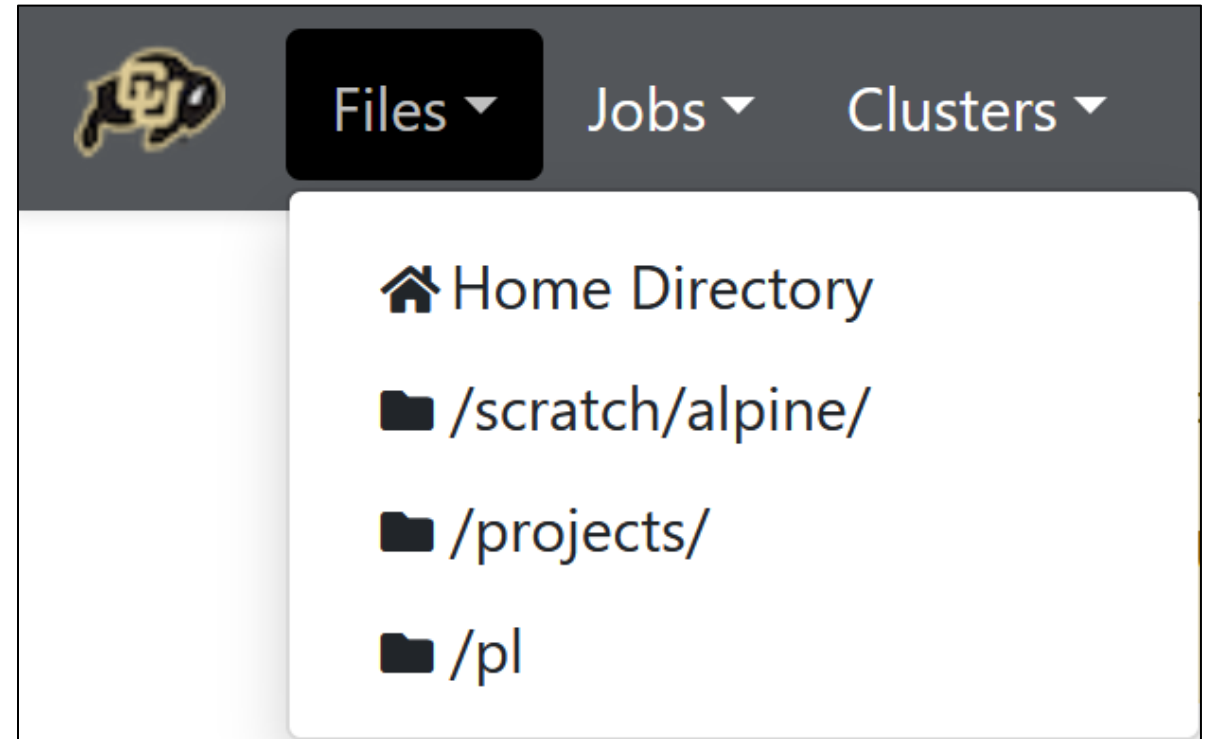
Interactive Apps ▼



My Interactive Sessions

# Files

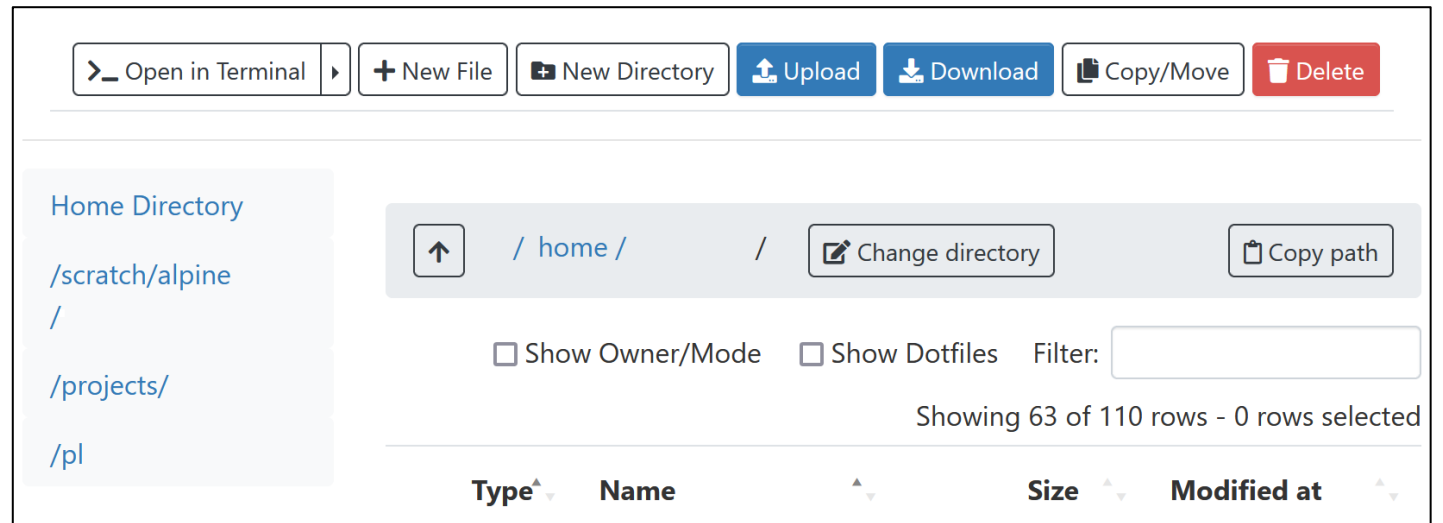
- Open OnDemand allows you to navigate and manipulate your files
- You can access your entire CURC filesystem using this tool:
  - /home
  - /projects
  - /scratch/alpine
  - /pl (if applicable)





# Files Management

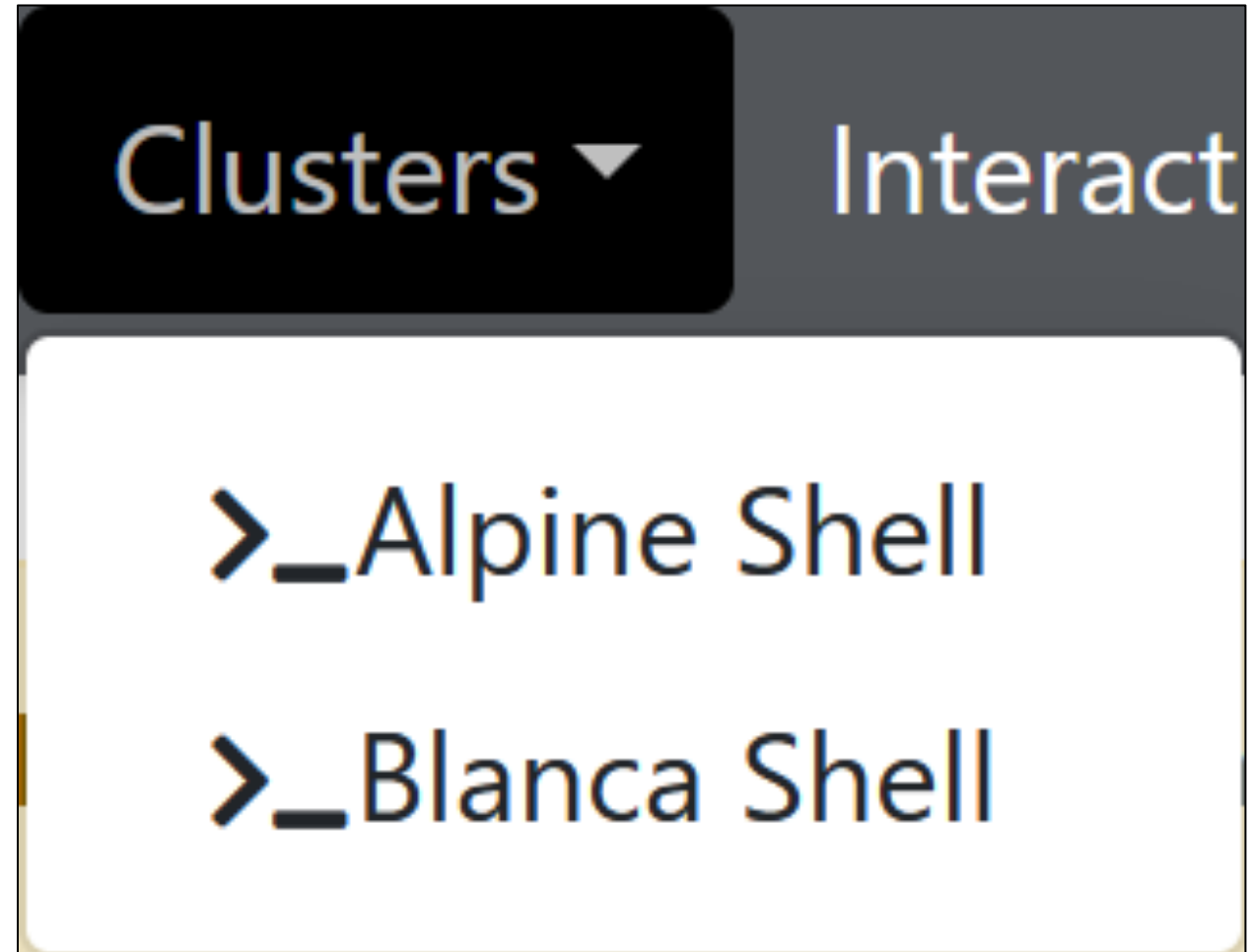
- On the files page you can:
  - Upload data
  - Download files
  - Create new files
  - Edit files
  - Copy/move data
  - Delete files
  - Create directories



# Demo: File Transfer

# 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

<https://curc.readthedocs.io/en/latest/gateways/OnDemand.html>

# 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
  - Remote desktop (Core Desktop)
  - RStudio
  - MATLAB
  - VS Code-Server
  - ...with more coming soon!

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)
	VS Code-Server (Custom)
	VS Code-Server (Presets)

# Interactive Apps (cont.)

- Each app comes with two spawning options:
  - ‘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’

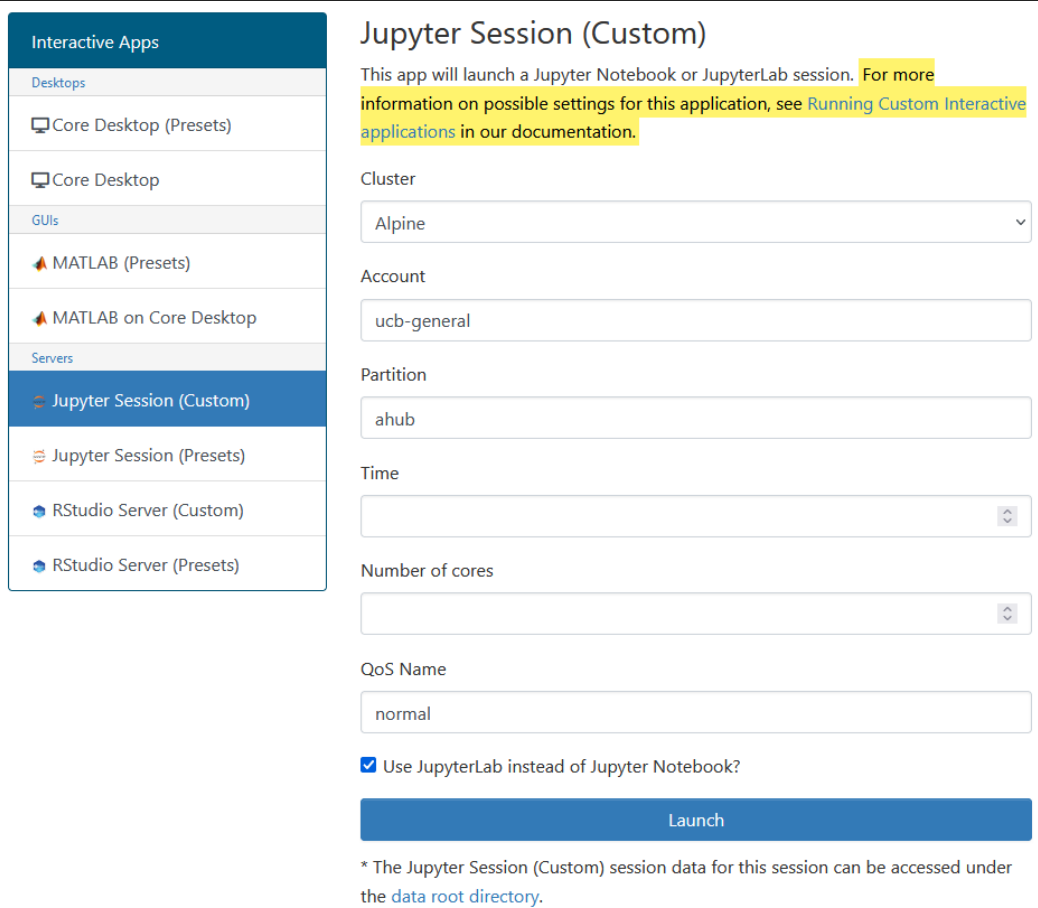
# Custom Application Inputs

Input	Description
Cluster	Possible options are Alpine and Blanca
Account	The account you would like to use: <ul style="list-style-type: none"><li>• Standard CU Boulder value → “ucb-general”</li><li>• Standard CSU value → “csu-general”</li><li>• Standard RMACC value → “rmacc-general”</li><li>• Standard AMC value → “amc-general”</li><li>• Can use project allocations e.g. “ucbXXX_asc1”</li></ul>
Partition	Specifies a particular node type to use e.g. “ahub”
Number of cores	The number of physical CPU cores for the job
Memory [GB]	The total amount of memory allocated for the Job
QoS Name	Quality of Service (QoS) constrains or modifies certain job characteristics
Time	The duration of the job, in hours



# Jupyter Sessions

- You can spawn a Jupyter Notebook using JupyterLab or Jupyter Notebook
- If you want to use a custom environment, you must create a Jupyter Kernel
  - <https://curc.readthedocs.io/en/latest/gateways/jupyterhub.html?#creating-your-own-custom-jupyter-kernel>
  - Easiest to do with a conda environment
- One can access a single Alpine GPU via the “Custom” application



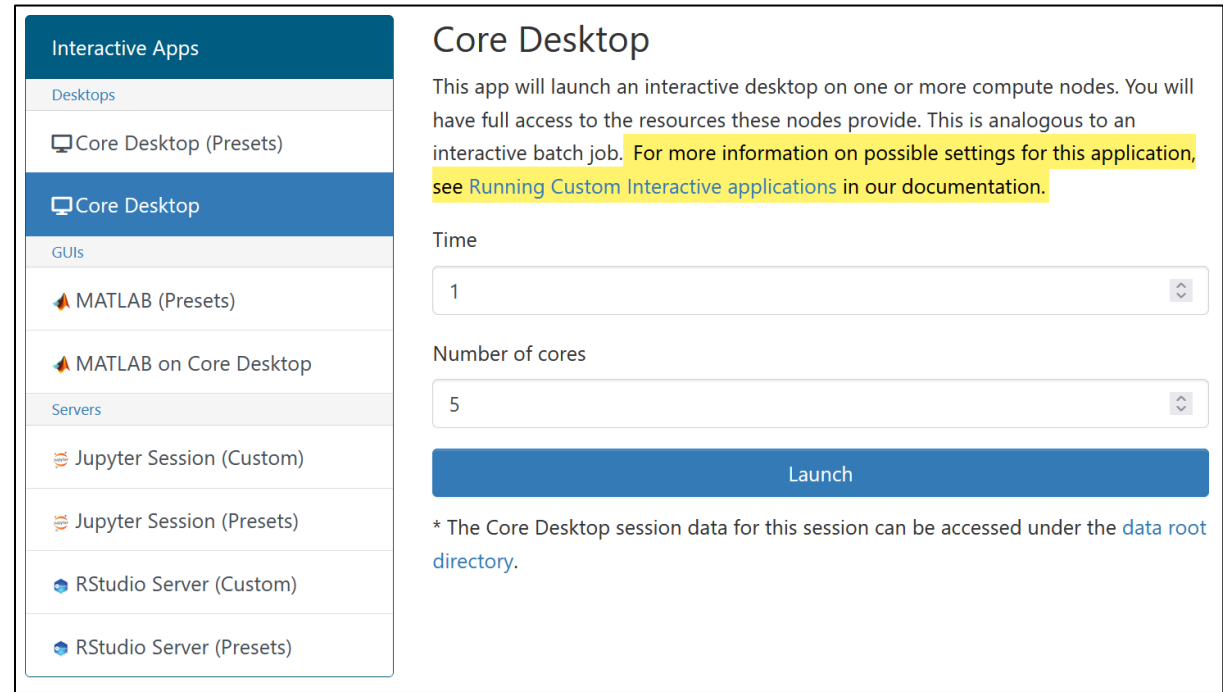
The screenshot shows the 'Interactive Apps' sidebar on the left with categories: Desktops, GUIs, and Servers. Under Servers, 'Jupyter Session (Custom)' is selected. The main panel is titled 'Jupyter Session (Custom)' and contains the following fields:

- 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.
- Cluster:** Alpine (dropdown menu)
- Account:** ucb-general (text input)
- Partition:** ahub (text input)
- Time:** (empty input with up/down arrows)
- Number of cores:** (empty input with up/down arrows)
- QoS Name:** normal (text input)
- Checkbox:** ☒ Use JupyterLab instead of Jupyter Notebook?
- Launch Button:** A blue button labeled 'Launch'.
- Footnote:** \* The Jupyter Session (Custom) session data for this session can be accessed under the [data root directory](#).

# Demo: Jupyter Session

# Core Desktop

- A remote desktop i.e. an interactive desktop
- Ran on their own compute nodes (not Alpine or Blanca)
- All jobs are launched on shared GPUs
  - Not meant for serious GPU workflows!
- **Very useful for running GUI based software**



**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

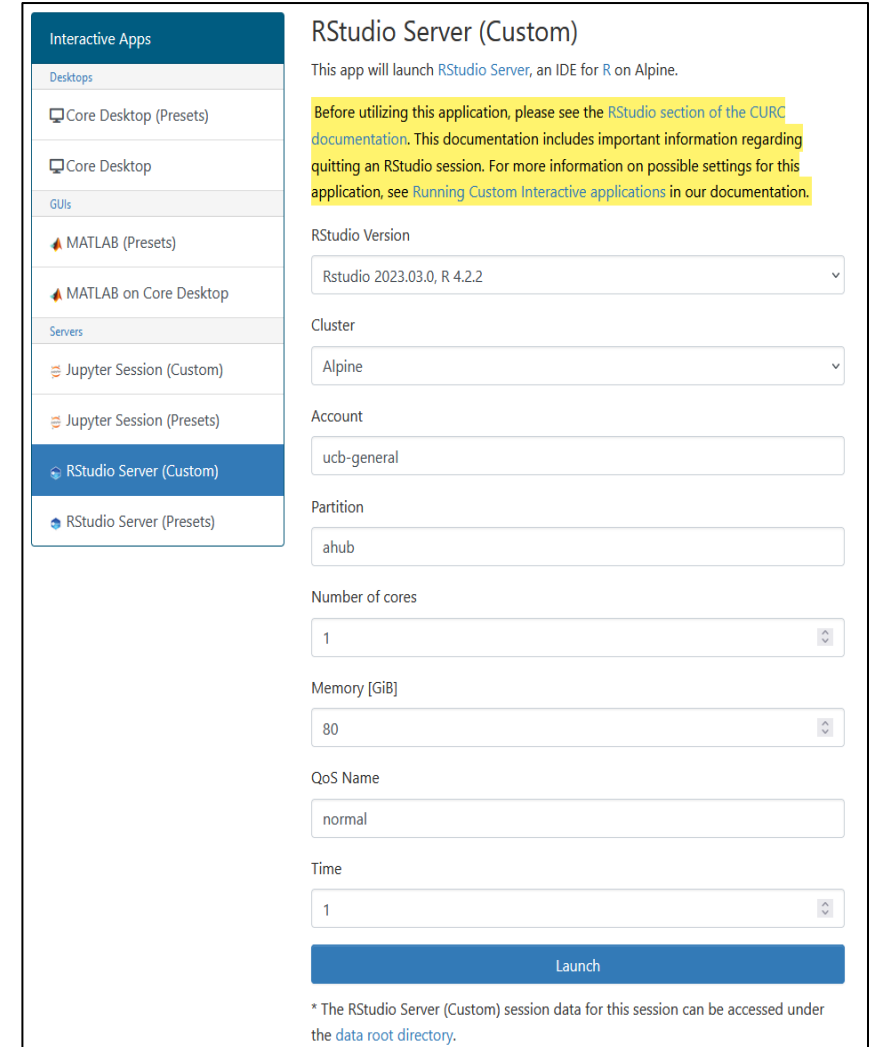
**Launch**

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

# Demo: Core Desktop

# RStudio Server

- Allows you to use RStudio, an Integrated Development Environment (IDE) for R
- Currently in a Beta phase
- Ran inside an Apptainer container
  - Most R libraries are easily installable, but some may fail due to dependency issues.
  - Documentation for installing dependencies can be found at <https://curc.readthedocs.io/en/latest/gateways/OnDemand.html#installing-dependencies-for-rstudio-currently-available-only-on-alpine>
  - **First launch** of application can take several minutes (use 4 cores), subsequent launches will be fast!



The screenshot shows the 'RStudio Server (Custom)' configuration page. On the left is a sidebar with a tree view under 'Interactive Apps' containing 'Desktops', 'GUIs', and 'Servers'. The 'Servers' section is expanded, showing 'Jupyter Session (Custom)', 'Jupyter Session (Presets)', 'RStudio Server (Custom)' (selected), and 'RStudio Server (Presets)'. The main panel on the right is titled 'RStudio Server (Custom)' and contains the following fields: a note about documentation, 'RStudio Version' (dropdown set to 'Rstudio 2023.03.0, R 4.2.2'), 'Cluster' (dropdown set to 'Alpine'), 'Account' (text input 'ucb-general'), 'Partition' (text input 'ahub'), 'Number of cores' (dropdown set to '1'), 'Memory [GiB]' (dropdown set to '80'), 'QoS Name' (text input 'normal'), and 'Time' (dropdown set to '1'). A blue 'Launch' button is at the bottom. A footnote states: '\* The RStudio Server (Custom) session data for this session can be accessed under the data root directory.'

# Demo: RStudio

# MATLAB

- Launches a MATLAB GUI using Core Desktop
  - Same setup as Core Desktop
- Not meant for serious workflows!
- Several MATLAB versions are available
  - Using the default R2021b can improve load times (locally installed)

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



# VS Code-Server

- Launches Visual Studio (VS) Code in your browser
  - Uses the software Code-Server
    - Contains a majority of standard VS Code functionality
- Downloading extensions may have to be done differently
  - <https://curc.readthedocs.io/en/latest/gateways/OnDemand.html#installing-vs-code-server-extensions>

## VS Code-Server (Custom)

This app will launch a VS Code server using Code-Server. For more information on possible settings for this application, see [Running Custom Interactive applications](#) in our documentation. Additionally, for more information on installing VS Code extensions, please see our [Installing VS Code-Server Extensions](#) section of the documentation.

Cluster

Alpine

Code-Server version

4.16.1

Account

ucb-general

Partition

ahub

QoS Name

interactive

Time

1

Number of cores

1

Launch

# Demo: VS Code-Server

# Survey and feedback

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