Alpine in your Browser with Open OnDemand

Research Computing
UNIVERSITY OF COLORADO **BOULDER**

Be Boulder.

Alpine in your Browser with Open OnDemand

Instructor: Brandon Reyes

- Website: www.rc.colorado.edu
- Documentation: https://curc.readthedocs.io
- Helpdesk: rc-help@colorado.edu

- Slides: https://github.com/ResearchComputing/rmacc_2024
  - In the directory “alpine_in_your_browser_with_ood”

Agenda

- Who is CURC?
- 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!

Who is CURC?

CU Research Computing (CURC) is a group at CU Boulder that hosts a variety of resources. One of these resources is the Alpine High Performance Computing (HPC) system. All individuals within the RMACC community can request an account with CURC, which will allow them to freely run on Alpine. Access to Alpine for the RMACC community is facilitated through Open OnDemand.

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 (Jupyter notebooks, MATLAB, RStudio)

Open OnDemand (at CURC)

- Open OnDemand provides a browser-based interface to interact with Alpine!
- All RMACC users with a CURC account can access Open OnDemand via
  - CU Users: https://ondemand.rc.colorado.edu/
  - CSU, AMC, RMACC users: https://ondemand-rmacc.rc.colorado.edu

ACCESS-CI (AMC and 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

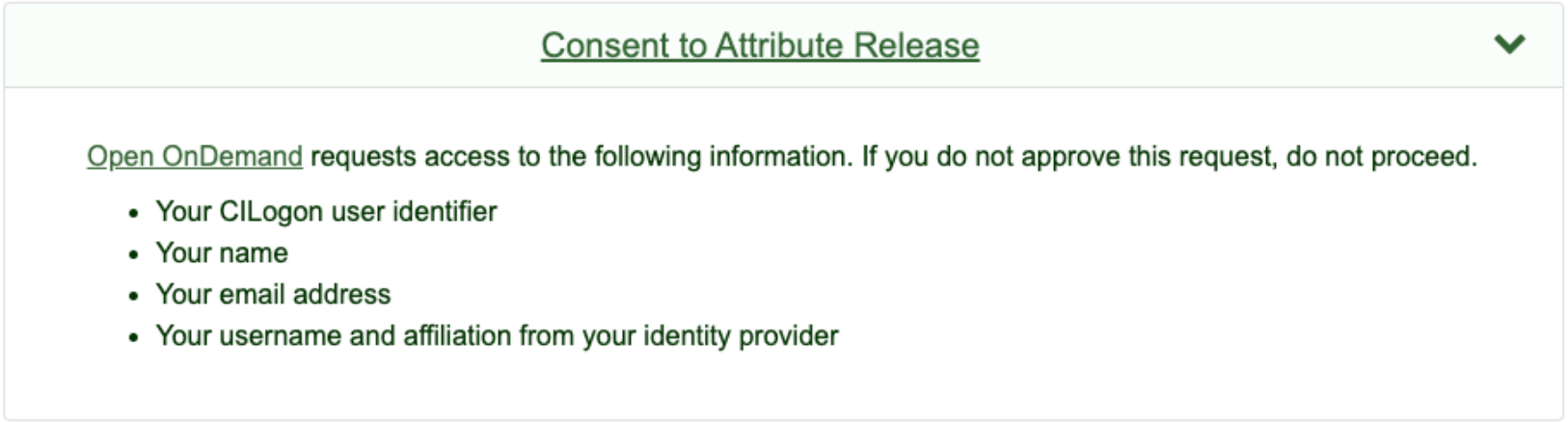
ACCESS-CI (RMACC Users Only)

- Once you have an ACCESS-CI Account, email us at rc-help@colorado.edu 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!

Logging in to Open OnDemand

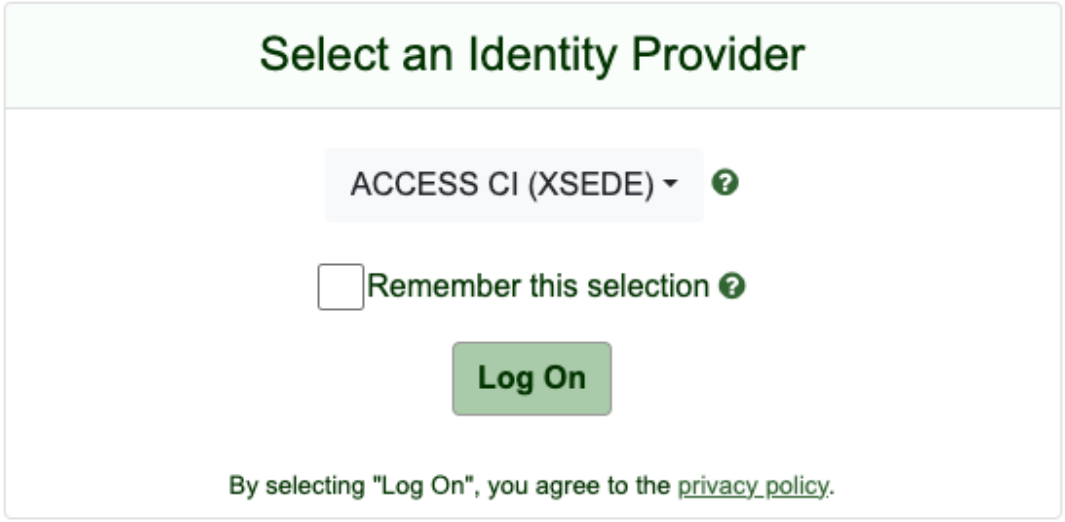
Logging In

- Visit https://ondemand-rmacc.rc.colorado.edu
  - You will be re-directed to the CILogon sign-in page:



Logging In

- Select your identity provider
  - AMC or RMACC: select ‘ACCESS CI (XSEDE)’
  - CSU: select ‘Colorado State University’

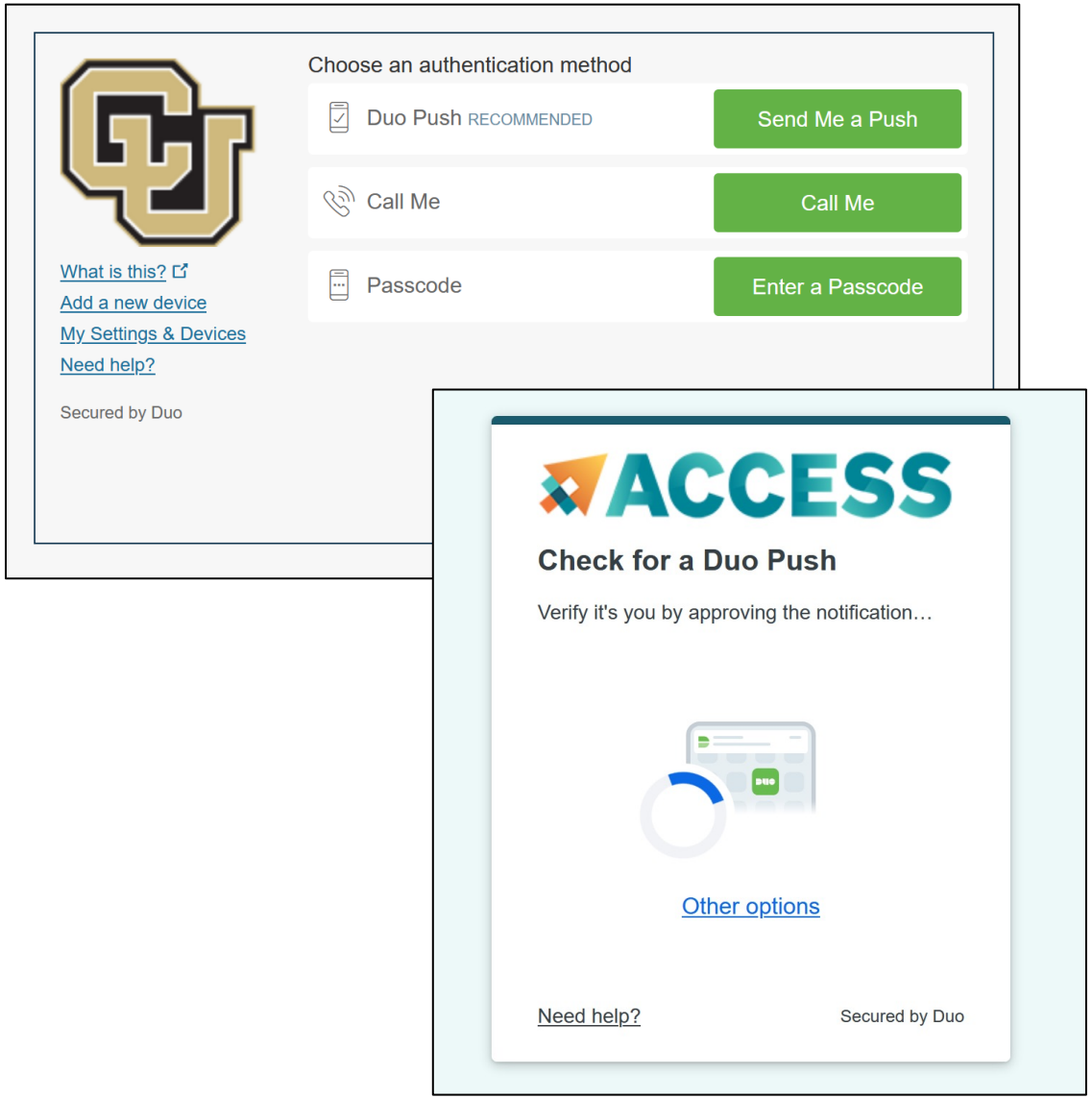


Logging In (cont.)

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

Logging In

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



Demo: Logging in to Open OnDemand

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

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

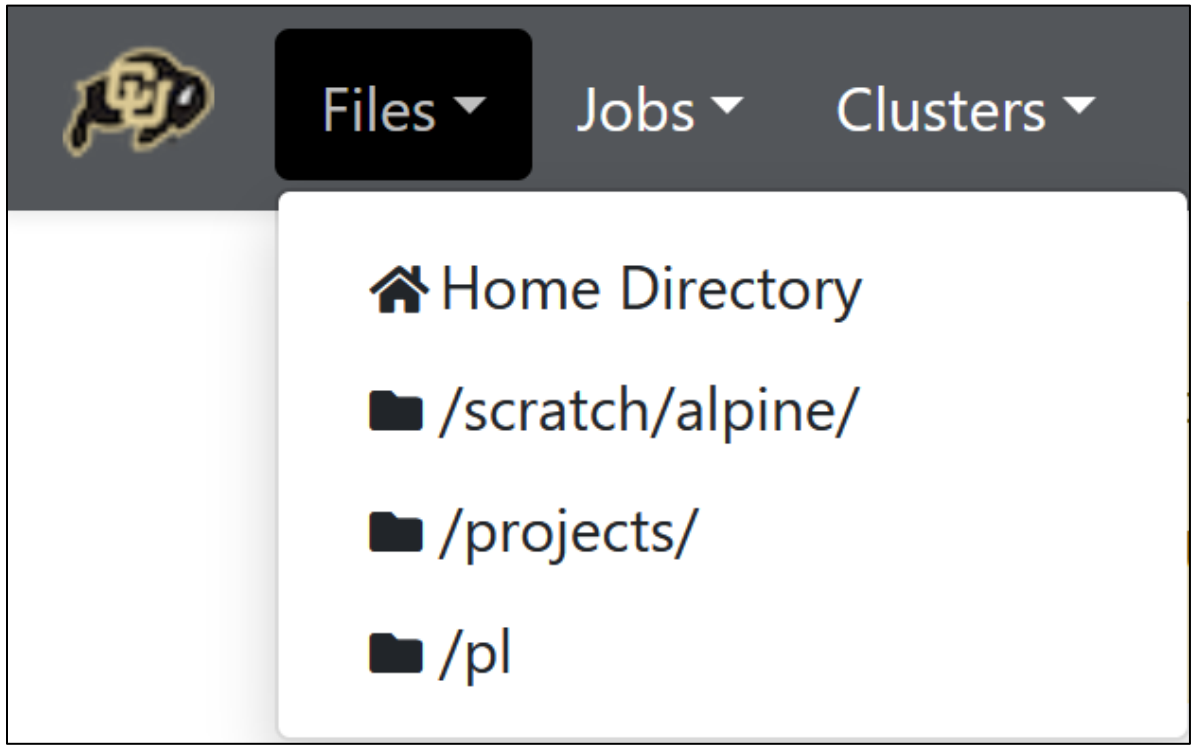
Features of Open OnDemand

OnDemand Home Page

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

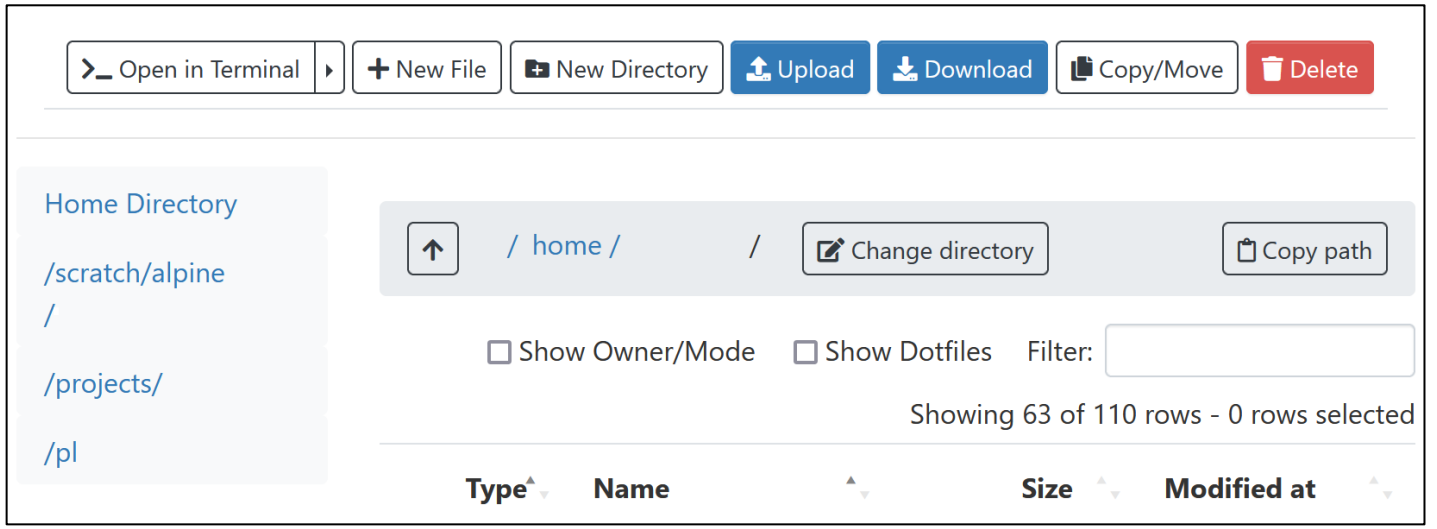
Files

- 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

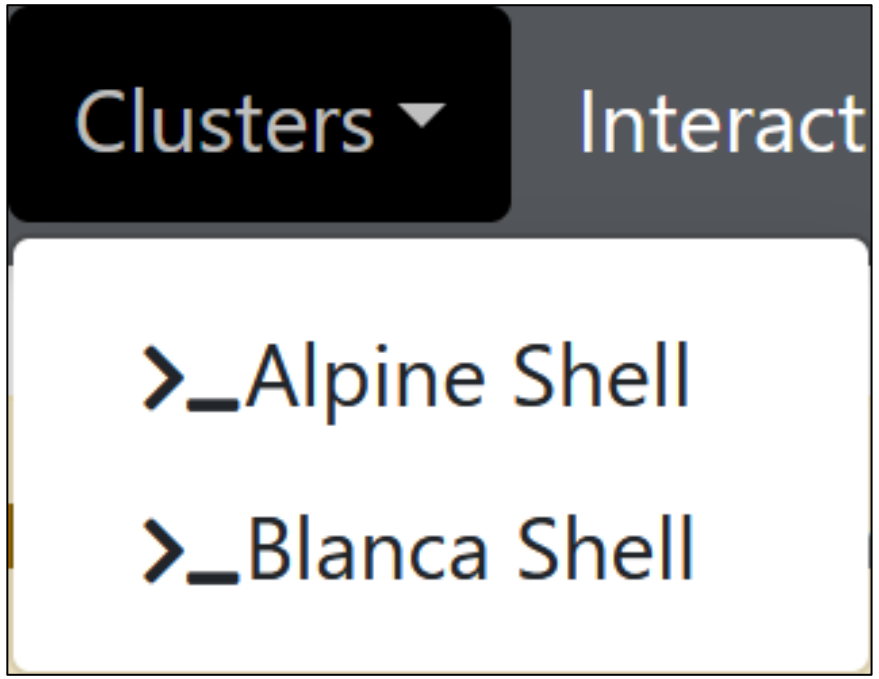


Please only download and upload files that are 10 GB or less

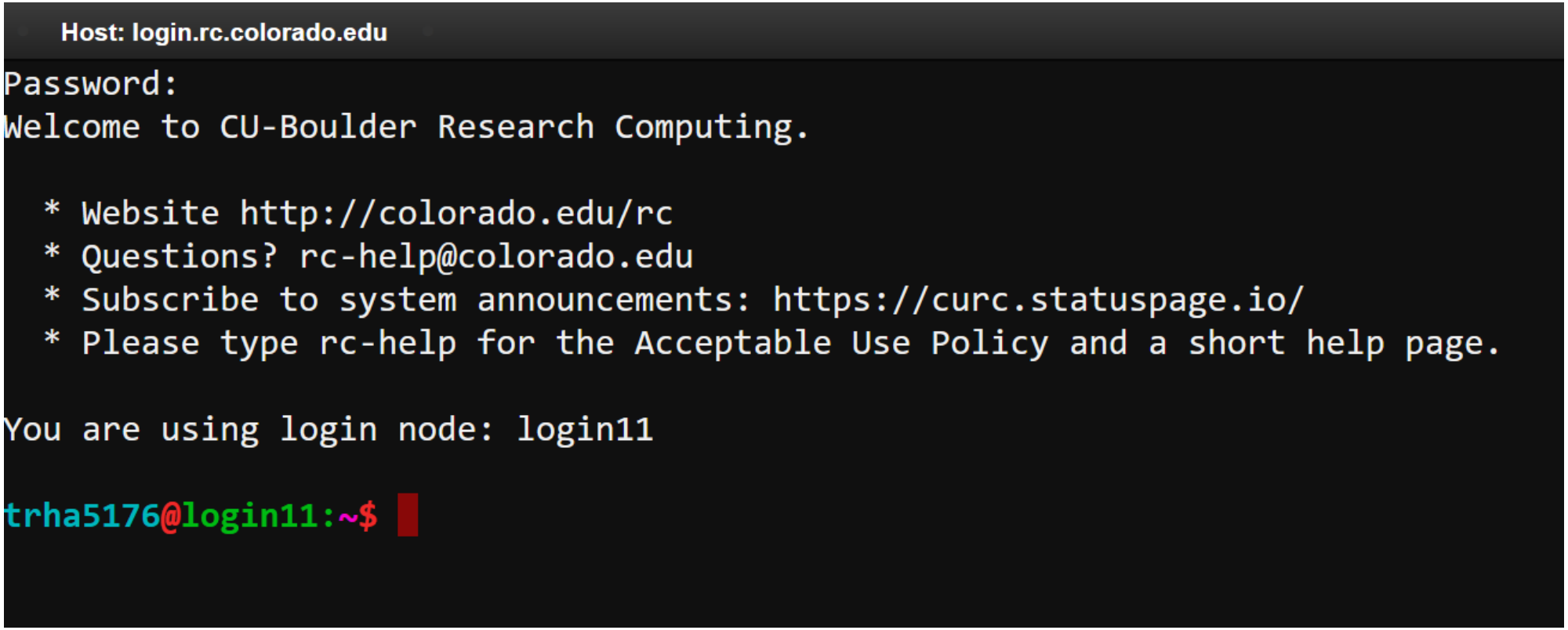
Demo: File Transfer

Clusters

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



Terminal

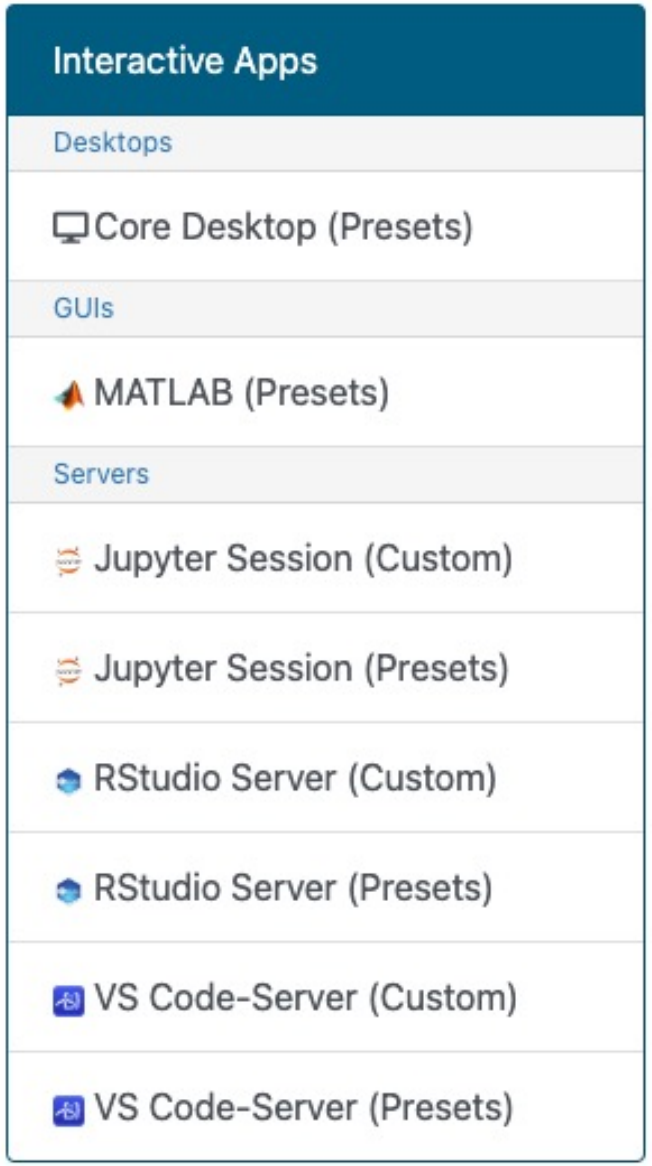

Host: login.rc.colorado.edu
Password:
Welcome to CU-Boulder Research Computing.
* Website http://colorado.edu/rc
* Questions? rc-help@colorado.edu
* Subscribe to system announcements: https://curc.statuspage.io/
* Please type rc-help for the Acceptable Use Policy and a short help page.
You are using 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 (cont.)

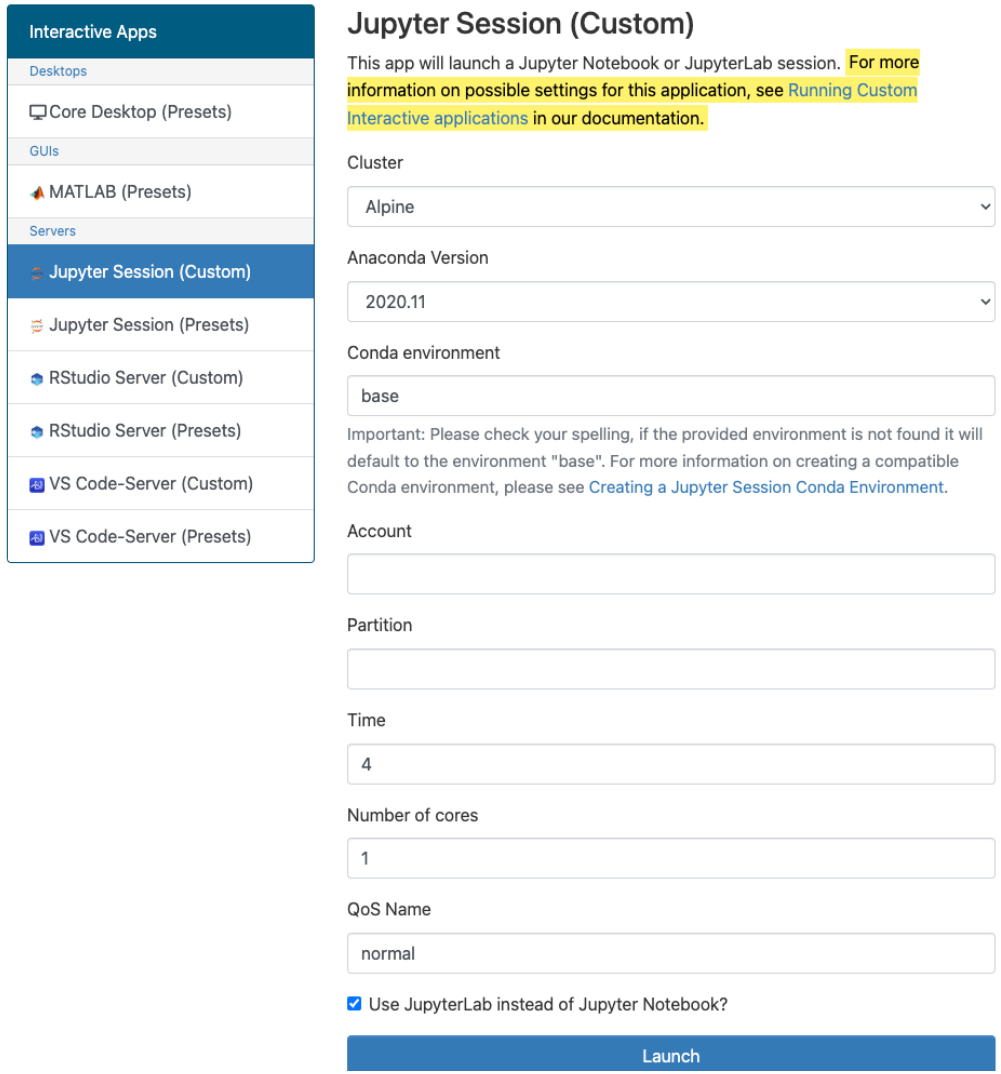
- Most applications come with two spawning options:
  - ‘Custom’ allows you to spawn a session with customizable configurations
    - If your configurations are incompatible, your job will not run!
  - ‘Presets’ allows you to spawn a session with common, functional configurations
    - Works ‘out of the box’

Custom Application Inputs

Input	Description
Cluster	The HPC system (Alpine)
Account	The account you would like to use: • Standard CU Boulder value → “ucb-general” • Standard CSU value → “csu-general” • Standard RMACC value → “rmacc-general” • Standard AMC value → “amc-general” • Can use project allocations e.g. “rmaccXXX_asc1”
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

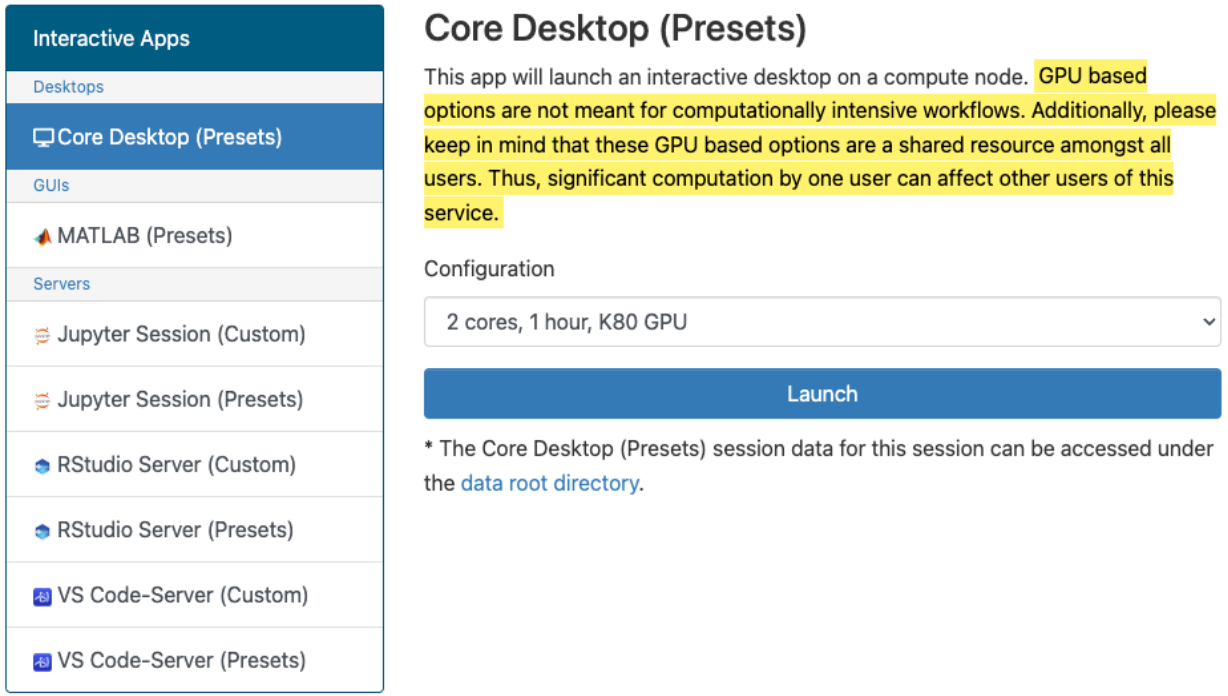
- You can spawn a Jupyter Notebook using JupyterLab or Jupyter Notebook
- If you want to use a custom environment, you must create a Jupyter Kernel
  - https://curc.readthedocs.io/en/latest/gateways/jupyterhub.html?#creating-your-own-custom-jupyter-kernel
  - Easiest to do with a conda environment
-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



Demo: Jupyter Session

Core Desktop

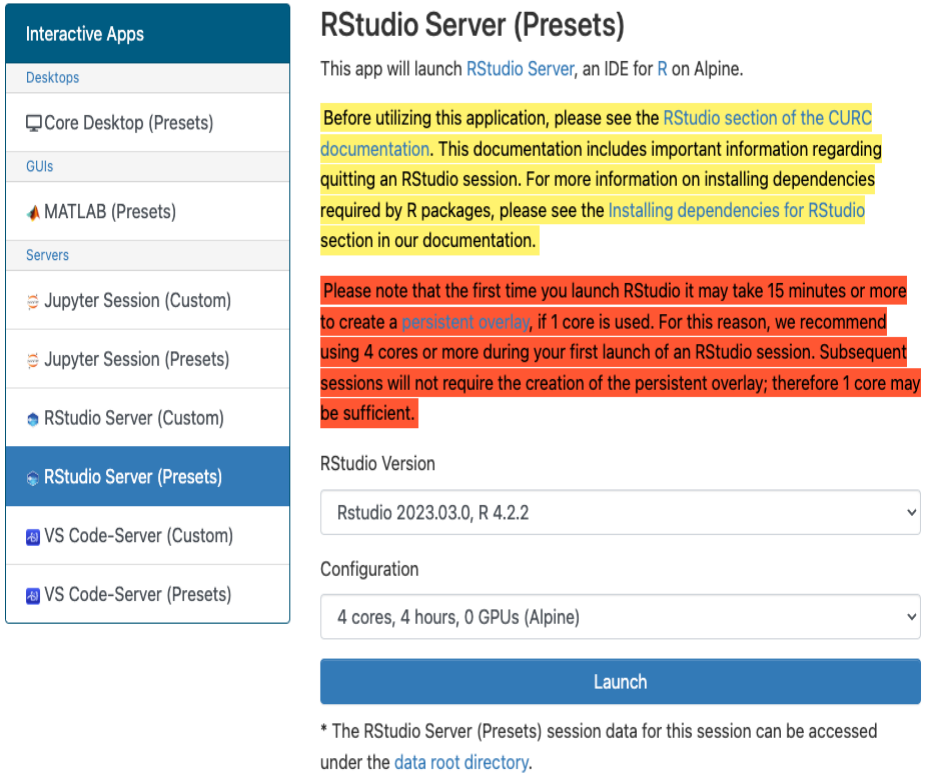
- A remote desktop i.e. an interactive desktop
- Ran on their own compute nodes (not Alpine)
- All jobs are launched on shared GPUs
  - Not meant for serious GPU workflows!
- **Very useful for running GUI based software**



Demo: Core Desktop

RStudio Server

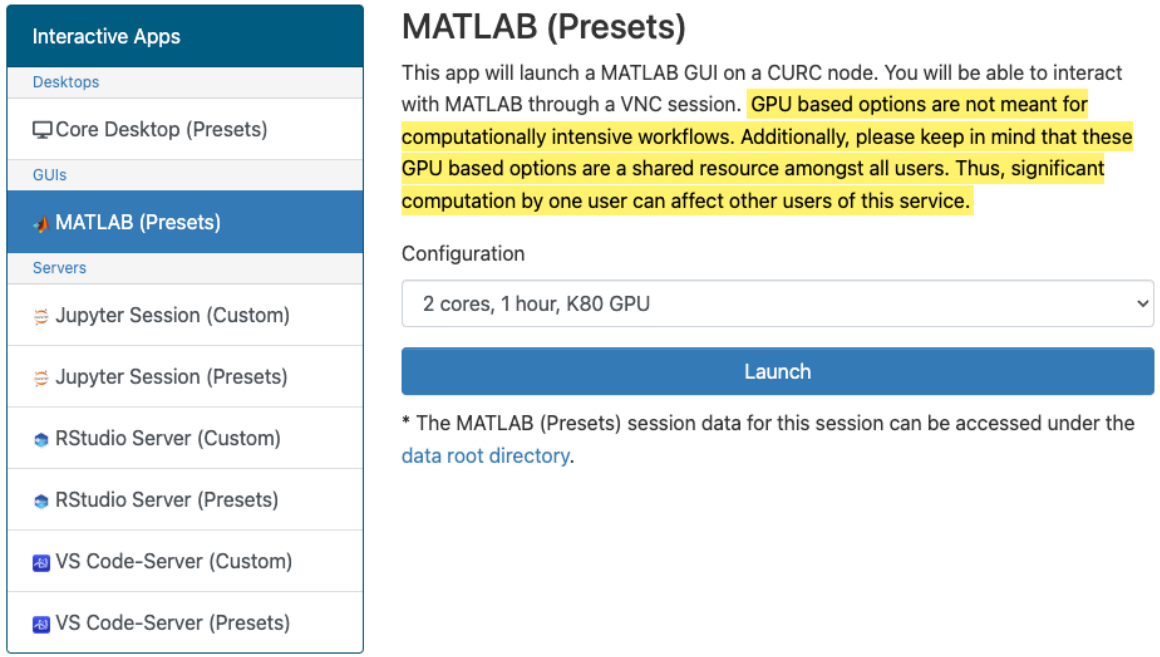
- Allows you to use RStudio, an Integrated Development Environment (IDE) for R
- Ran inside an Apptainer container
  - Most R libraries are easily installable, but some may fail due to dependency issues.
  - Documentation for installing dependencies can be found at https://curc.readthedocs.io/en/latest/gateways/OnDemand.html#installing-dependencies-for-rstudio-c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



Demo: RStudio

MATLAB

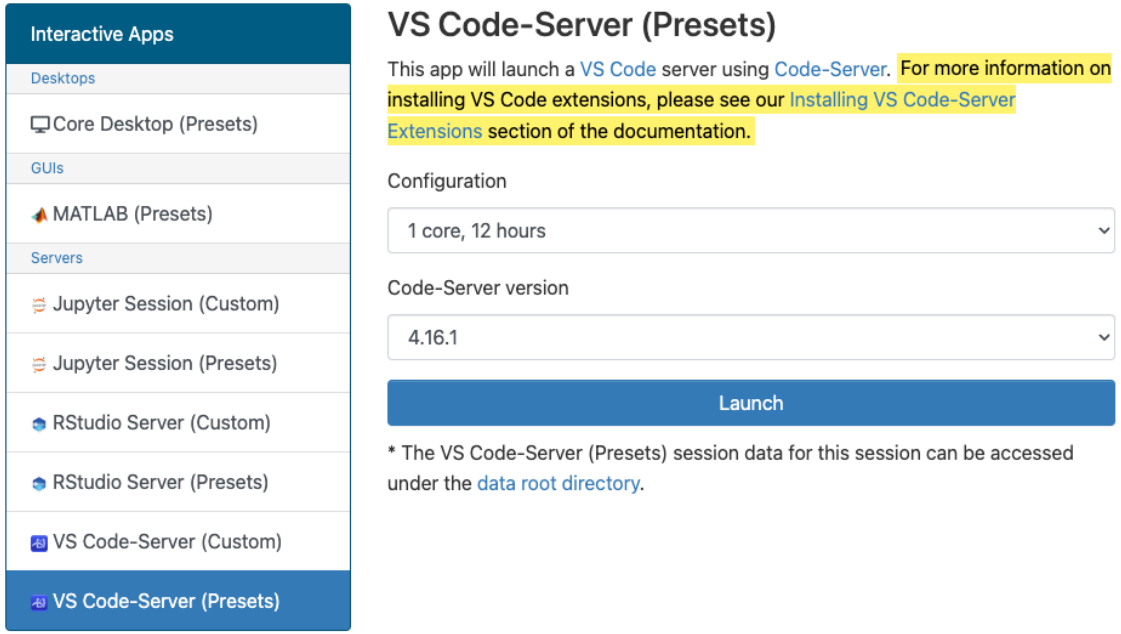
- Launches a MATLAB GUI using Core Desktop
  - Same setup as Core Desktop
- Not meant for serious workflows!
- Has only one version of MATLAB
  - Currently this is MATLAB version R2021b
  - Other versions can be used from the Alpine command line



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



Demo: VS Code-Server

Presentation is available on GitHub!

GitHub link: https://github.com/ResearchComputing/rmacc_2024

- In the directory “alpine_in_your_browser_with_ood”