



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

ACCESS-CI

- 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

- 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:

Consent to Attribute Release ✓

Open OnDemand 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

Logging In

- Select your identity provider
 - 'ACCESS CI (XSEDE)'

Select an Identity Provider

ACCESS CI (XSEDE) ?

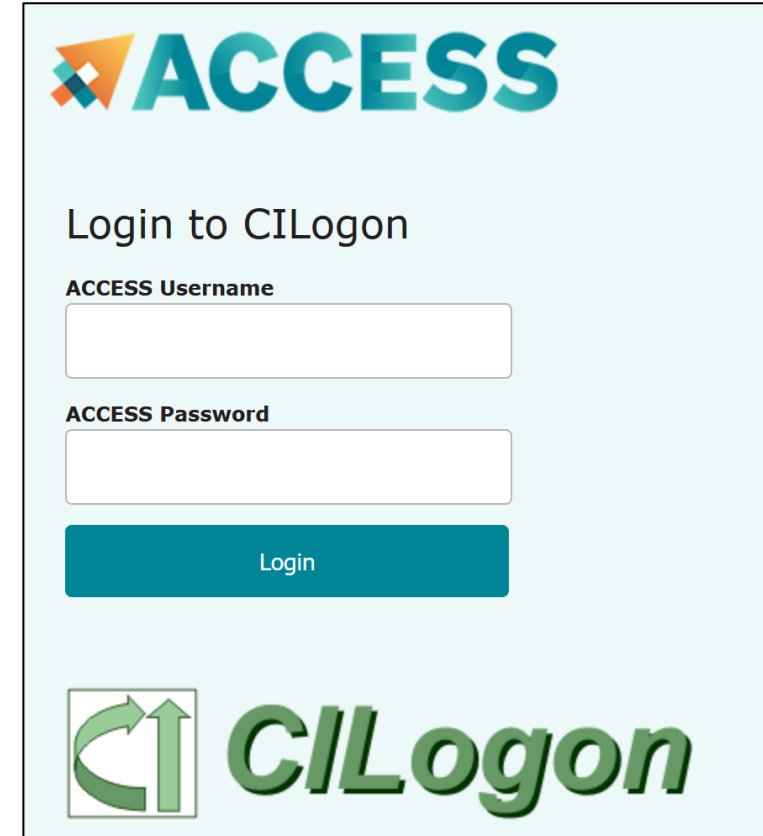
☐ Remember this selection ?

Log On

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

Logging In (cont.)

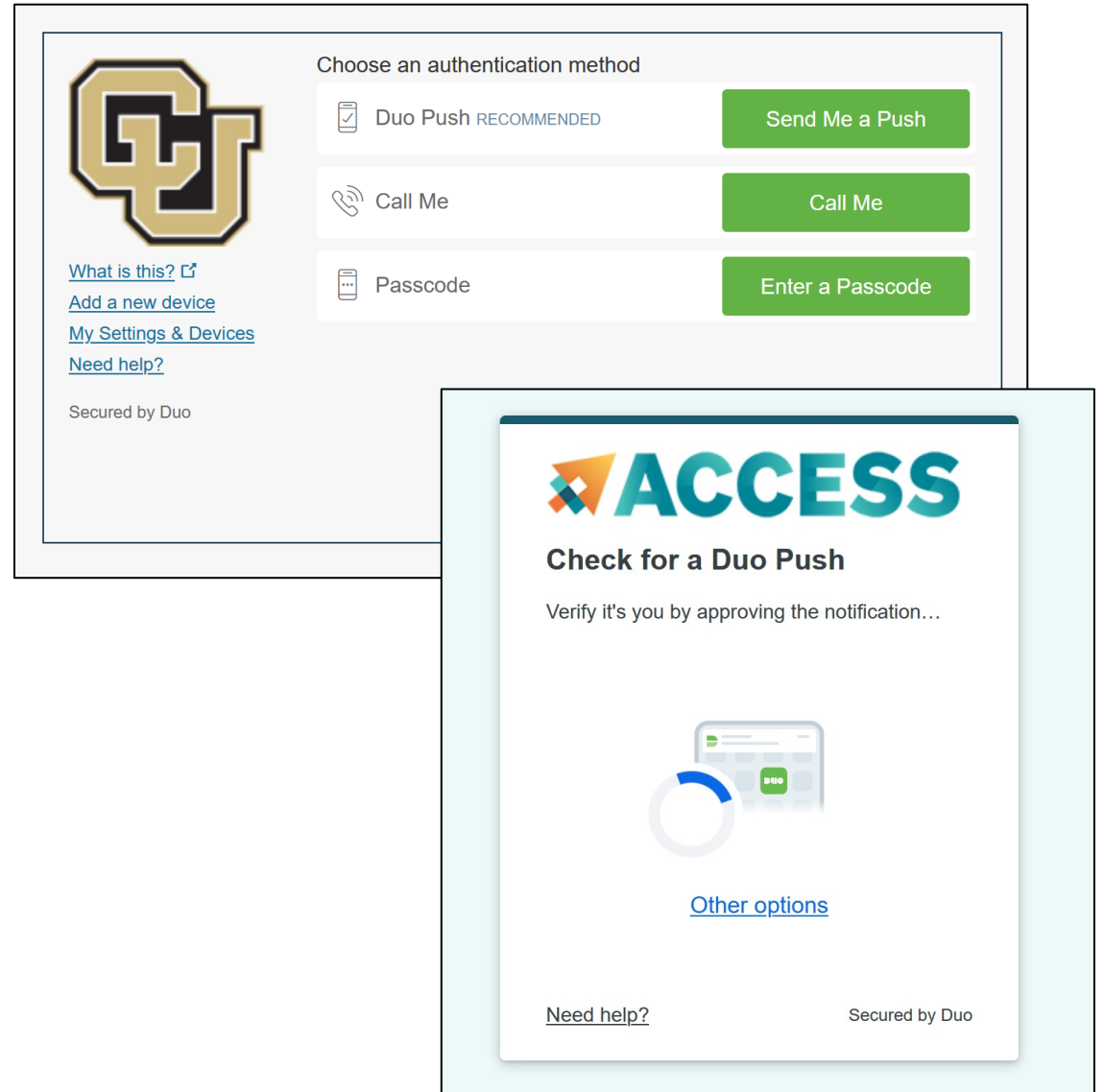
- You will be redirected to the ACCESS-CI login page
 - Use your ACCESS username and password



The screenshot shows the ACCESS-CI login interface. At the top left is the ACCESS logo, which consists of a stylized orange and blue icon followed by the word "ACCESS" in blue. Below the logo is the text "Login to CILogon". Underneath this are two input fields: the first is labeled "ACCESS Username" and the second is labeled "ACCESS Password". Below the password field is a blue button with the text "Login". 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.
- You will be prompted to set up Duo 2FA upon logging in for the first time



Demo: Logging in to Open OnDemand

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

Features of Open OnDemand

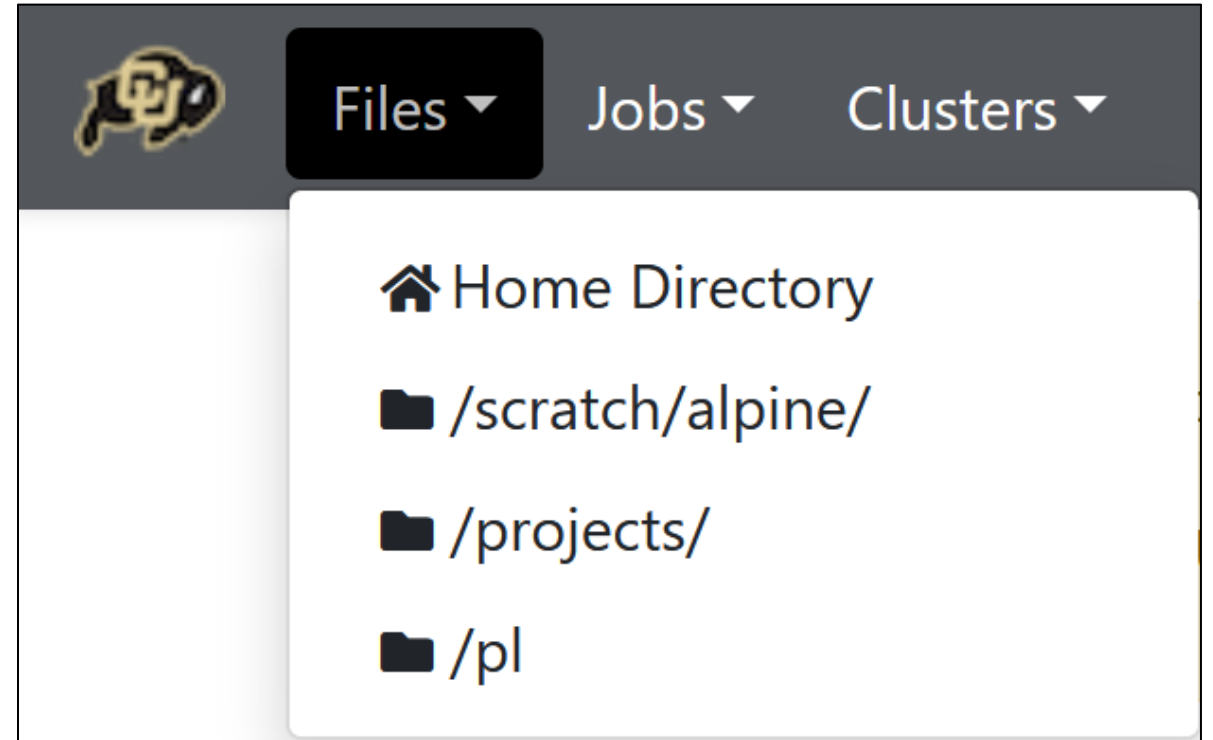
OnDemand Home Page

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



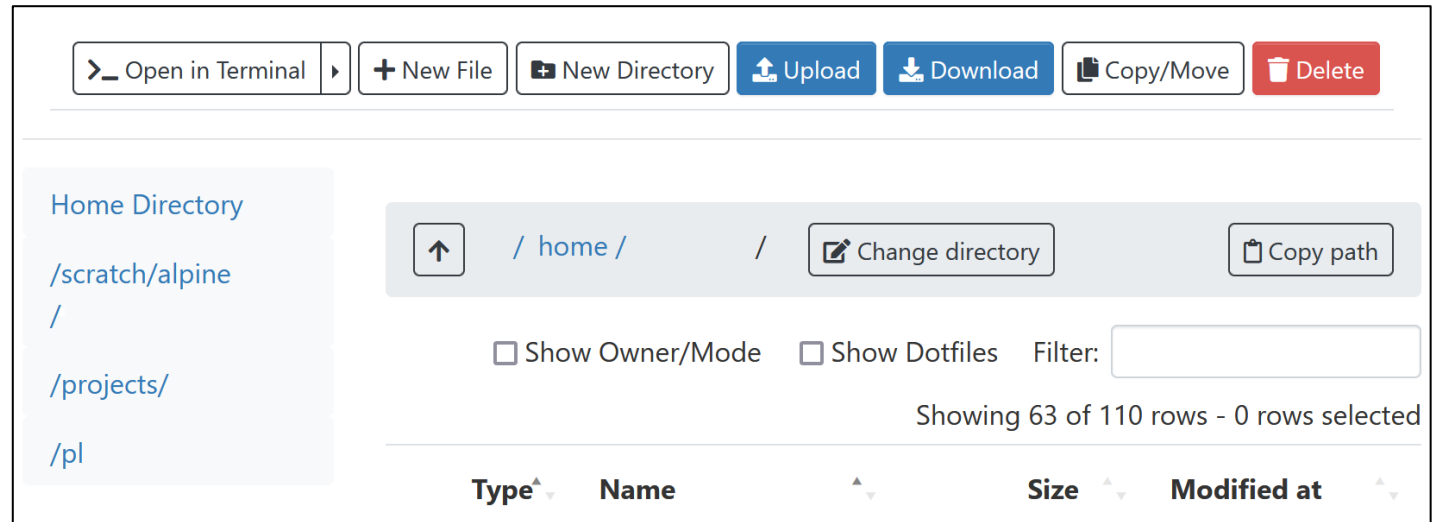
Files

- 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)
GUIs	
	MATLAB (Presets)
Servers	
	Jupyter Session (Custom)
	Jupyter Session (Presets)
	RStudio Server (Custom)
	RStudio Server (Presets)
	VS Code-Server (Custom)
	VS Code-Server (Presets)

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: <ul style="list-style-type: none">• Standard RMACC value → “rmacc-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

Interactive Apps

Desktops

Core Desktop (Presets)

GUIs

MATLAB (Presets)

Servers

Jupyter Session (Custom)

Jupyter Session (Presets)

RStudio Server (Custom)

RStudio Server (Presets)

VS Code-Server (Custom)

VS Code-Server (Presets)

Jupyter Session (Custom)

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

Anaconda Version

2020.11

Conda environment

base

Important: Please check your spelling, if the provided environment is not found it will default to the environment "base". For more information on creating a compatible Conda environment, please see [Creating a Jupyter Session Conda Environment](#).

Account

Partition

Time

4

Number of cores

1

QoS Name

normal

☒ Use JupyterLab instead of Jupyter Notebook?

Launch

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**

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

Core Desktop (Presets)

This app will launch an interactive desktop on a compute node. GPU based options are not meant for computationally intensive workflows. Additionally, please keep in mind that these GPU based options are a shared resource amongst all users. Thus, significant computation by one user can affect other users of this service.

Configuration

2 cores, 1 hour, K80 GPU

Launch

* The Core Desktop (Presets) 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
- 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!

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VS Code-Server (Presets)

RStudio Server (Presets)

This app will launch [RStudio Server](#), an IDE for R on Alpine.

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 installing dependencies required by R packages, please see the [Installing dependencies for RStudio](#) section in our documentation.

Please note that the first time you launch RStudio it may take 15 minutes or more to create a [persistent overlay](#), if 1 core is used. For this reason, we recommend using 4 cores or more during your first launch of an RStudio session. Subsequent sessions will not require the creation of the persistent overlay; therefore 1 core may be sufficient.

RStudio Version

Rstudio 2023.03.0, R 4.2.2

Configuration

4 cores, 4 hours, 0 GPUs (Alpine)

Launch

* The RStudio Server (Presets) 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!
- Has only one version of MATLAB
 - Currently this is MATLAB version R2021b
 - Other versions can be used from the Alpine command line

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VS Code-Server (Presets)

MATLAB (Presets)

This app will launch a MATLAB GUI on a CURC node. You will be able to interact with MATLAB through a VNC session. GPU based options are not meant for computationally intensive workflows. Additionally, please keep in mind that these GPU based options are a shared resource amongst all users. Thus, significant computation by one user can affect other users of this service.

Configuration

2 cores, 1 hour, K80 GPU

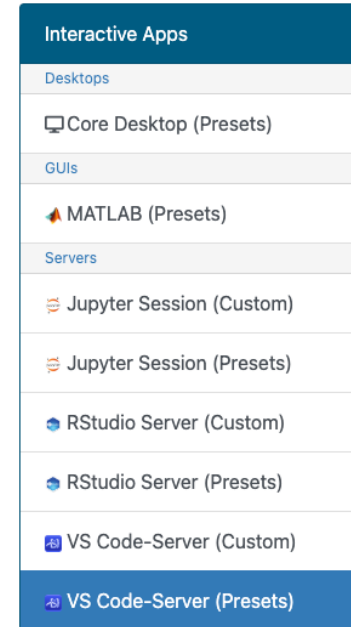
Launch

* The MATLAB (Presets) 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 (Presets)

This app will launch a VS Code server using Code-Server. For more information on installing VS Code extensions, please see our [Installing VS Code-Server Extensions](#) section of the documentation.

Configuration

1 core, 12 hours

Code-Server version

4.16.1

Launch

* The VS Code-Server (Presets) session data for this session can be accessed under the [data root directory](#).

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”

