




# Command Line Data Transfer on CURC Resources

# Command Line Data Transfer on CURC Resources

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## Instructor: Brandon Reyes

- Research Computing
  - Website: [www.rc.colorado.edu](http://www.rc.colorado.edu)
  - Helpdesk: [rc-help@colorado.edu](mailto:rc-help@colorado.edu)
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- Slides:  
[https://github.com/ResearchComputing/command\\_line\\_data\\_transfer\\_primer](https://github.com/ResearchComputing/command_line_data_transfer_primer)
  - Survey: <http://tinyurl.com/curc-survey18>

# Learning Objectives and Outline

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- Ways to access your data
- Data transfer using the command line
- Data transfer using Open OnDemand
- Data transfer using Globus
- Sharing Data

# Accessing Data on RC Resources

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- When you use RC resources the data is not on your local machine
- Ways to access the data from your local machine
  - Command line (a variety of tools)
  - Open OnDemand (straightforward GUI)
  - Globus (GUI with some set up required)



# Access through the Command Line

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- If you don't need a *fancy* GUI
- Provides a larger variety of tools
  - SCP
  - SFTP
  - RSYNC
  - RCLONE
  - SSHFS
  - SMB
- The tools provided can improve your data workflow (more on this later)

# General Filesystem Structure

## /home (2GB)

- Small important data
- Backed up frequently
- Not for sharing files or job output

## /projects (250GB)

- Medium sized important data
- Software
- Can be shared with others
- Backed up, but less frequently
- Not for job output

## /scratch/alpine (10TB)

- Large data
- Can be shared with others
- Fast Data transfer to compute nodes
- Not backed up!
- Purged after 90 days!

Filesystem documentation: <https://curc.readthedocs.io/en/latest/compute/filesystems.html>

# Unix Groups

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- Unix Groups
  - 3 Levels of permissions:
    - User
    - Group
    - Other
  - All users have a group associated with their username
  - Permissions can be set for an individual file with the `chmod` command

```
chmod g+rx file.exe
```

Documentation: <https://curc.readthedocs.io/en/latest/compute/filesystems.html#file-permissions-ownership-and-group-membership>

# Who can use the command line?

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- On our system every CU Boulder and CSU user can utilize SSH
  - Necessary for data transfers to your local machine
- AMC users can request SSH access:
  - <https://curc.readthedocs.io/en/latest/access/amc-access.html>
- ACCESS users (individuals from the RMACC community) cannot SSH into our resources right now
  - We are working on this, but it is difficult!
  - Unfortunately, this means the tutorial will not work with CURC resources

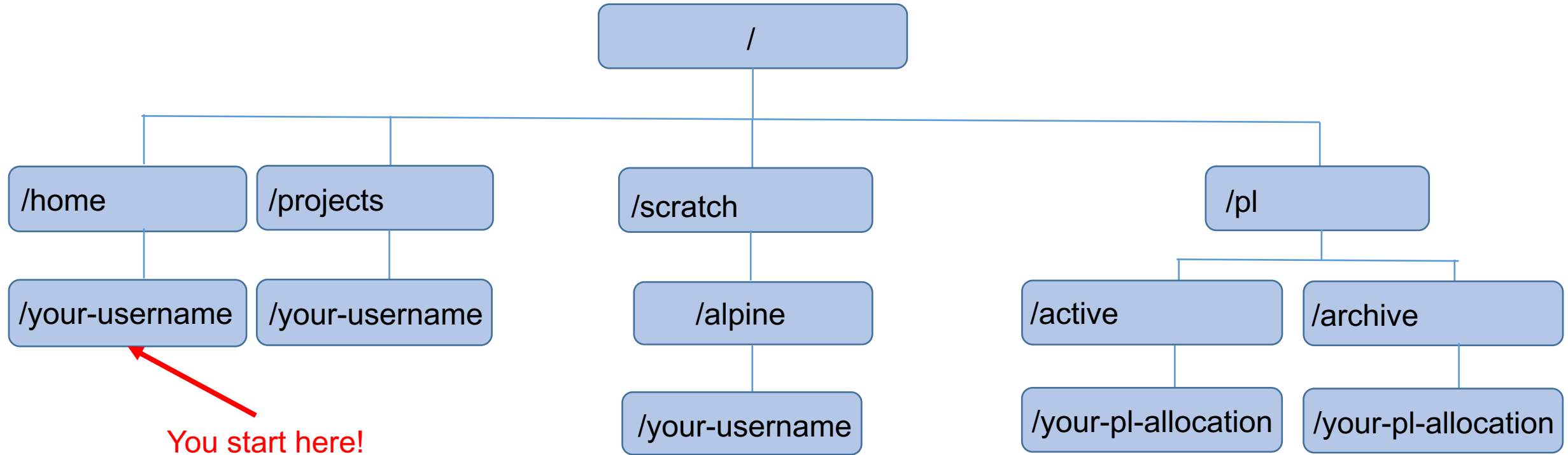


# Let's get on a login node!

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```
ssh <your-username>@login.rc.colorado.edu
```

# RC Filesystem Map



# Basic Navigation Commands

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- Change directories

```
cd <relative-or-full-path>
```

- List contents of a directory

```
ls <optional-path>
```

- Print current working directory

```
pwd
```

# RC endpoints

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Endpoint – one of the two file transfer locations i.e., it is either the source or the destination we want to copy data from or to.

- For data on RC resources, we have two endpoints
  - The **login\*** nodes
    - Only use for small (less than 5GB) transfers!!

```
<your-username>@login.rc.colorado.edu
```

- Data transfer nodes (DTNs)

```
<your-username>@dtn23.rc.colorado.edu
```

# RC Data transfer nodes (DTNs)

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- Command line use of DTNs is only available if you are on an approved VPN or campus network
- Dedicated nodes for transferring data
  - Faster transfers
  - More stable transfers
- Suitable for
  - Large and frequent transfers
  - Automated (passwordless) transfers for AMC and UCB
- User who can SSH will be able to SSH into the DTNs
  - This functionality is currently in development

# Which endpoint should I use?

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- If your workflow allows for it, always use the DTNs!
  - If what you are wanting to do is not available, please let us know



# Command line option - SCP

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SCP (Secure Copy Protocol) is a command line tool to transfer files/directories to, from, or between remote locations.

- Simple, but useful!
- Copying a local file to RC resources using a login node:

```
scp file1 <username>@login.rc.colorado.edu:<remote-path>
```

- Copying a directory from RC resources to local path via a DTN:

```
scp -r <username>@dtn23.rc.colorado.edu:<path-to-directory> <local-path>
```

# Command line option - SFTP

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SFTP (Secure File Transfer Protocol) a command line tool that is similar to SCP, but provides an SFTP session where both the local and remote filesystems are available

- Slightly more advanced than SCP
- Useful for multiple file/directory transfers
- Starting a SFTP session on a local machine

```
sftp <username>@dtn23.rc.colorado.edu
```

- Regular commands often refer to the remote host and prefixing an “l” refers to the local host
  - “put” -- Copy a file from the local computer to the remote host
  - “get” -- Copy a file from the remote host to the local computer

# Command line option - Rsync

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Rsync (remote sync) a command line tool that offers remote and local file synchronization.

- Only copies the portion of the files that have changed!
- Already installed on most Linux distributions and macOS
  - Needs to be installed on Windows
- Sync RC resources to local computer

```
rsync -av <username>@dtn23.rc.colorado.edu:<remote-path> <local-path>
```

- Flags:

- v     # verbose mode
  - a     # archive mode

# Command line option - Rclone

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Rclone is a command line tool used to manage files on cloud storage.

- It is compatible with all major cloud storage solutions
  - Supported by over 40 cloud storage products!
- Created as a cloud equivalent to the UNIX commands:
  - rsync, cp, mv, mount, ls, ncdu, tree, rm, and cat
- Needs to be downloaded on your local machine
- Requires a more involved setup process but works great!
  - <https://curc.readthedocs.io/en/latest/compute/data-transfer.html#rclone>

```
rclone copy rclonetest.csv aws_s3:testbucket/
```

# The PetaLibrary

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The PetaLibrary is a CU Boulder Research Computing service

- Expands the amount of storage space available to you
  - Confidential data should not be stored on PetaLibrary!!
- Aims to work seamlessly with all RC resources
- Supports the storage, archival, and sharing of data
- Available at a subsidized cost for researchers affiliated with University of Colorado
- New customer's initial upper limit:
  - 200 TB for Active storage (available to compute resources)
  - 100 TB for Archive storage (**not** available to compute resources)

# Command line option - mounting

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Mounting is the process of attaching a file system to a directory on another system.

- SSHFS (secure shell filesystem)
  - Needs to be installed on Mac and Windows (available on most Linux distributions)
  - You need to be on the campus network or VPN!

```
sshfs <username>@dtn23.rc.colorado.edu:<path> <local-mountpoint>
```

- To unmount (often necessary when disconnected)

```
umount -f <local-mountpoint>
```

- SMB (**Only available for PetaLibrary allocations**)
  - Built into all major operating systems
  - You need to be on the campus network or VPN!
  - Contact us if you want to use this



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# GUI based options

# GUI option - Open OnDemand

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- No command line required!
  - <http://ondemand.rc.colorado.edu/>
  - <http://ondemand-rmacc.rc.colorado.edu/>
- File management
  - Create, Delete, Move, and Rename
- File transfers
  - Upload and Download



# GUI option - Globus

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Globus is a service that allows for users to reliably move, share, and discover data

- Command line version is also available
- Our recommended way to transfer data
  - Stable and fast data transfers
  - Transfers continue if a user disconnects
  - Web GUI or Globus Connect Personal GUI
- Supported on all major operating systems
  - Works well with cloud storage providers
- Documentation: <https://curc.readthedocs.io/en/latest/compute/data-transfer.html?highlight=Globus#globus-transfers>



# Sharing Data

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- RC Users on RC resources
  - Send a request and a list of the users to [rc-help@colorado.edu](mailto:rc-help@colorado.edu)
    - RC will place the chosen users in your Linux group
      - Allows them to see your scratch and project directories
      - You can set permissions in the space, so items are hidden
  - On-premise collaborators can also access Petalibrary files with Globus Shared Endpoints
- Off-premise collaborators
  - Data sharing is only available if you have a PetaLibrary allocation
    - Data transfer is done through Globus Shared Endpoints

# Globus Shared Endpoints

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- Globus offers ‘shared endpoints’ which don’t require a user to have an account with RC.
- RC provides this capability for easy access of Data.
- PetaLibrary exclusive!
- Generates a shared collection that can be accessed with a link.
  - See <https://scholar.colorado.edu/concern/datasets/9593tw13k>
  - Can assign various permissions to specific users or all users withing Globus
  - More information on here: <https://docs.globus.org/how-to/share-files/>

# Survey and feedback

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



Slides: [https://github.com/ResearchComputing/command\\_line\\_data\\_transfer\\_primer](https://github.com/ResearchComputing/command_line_data_transfer_primer)