Introduction to Linux

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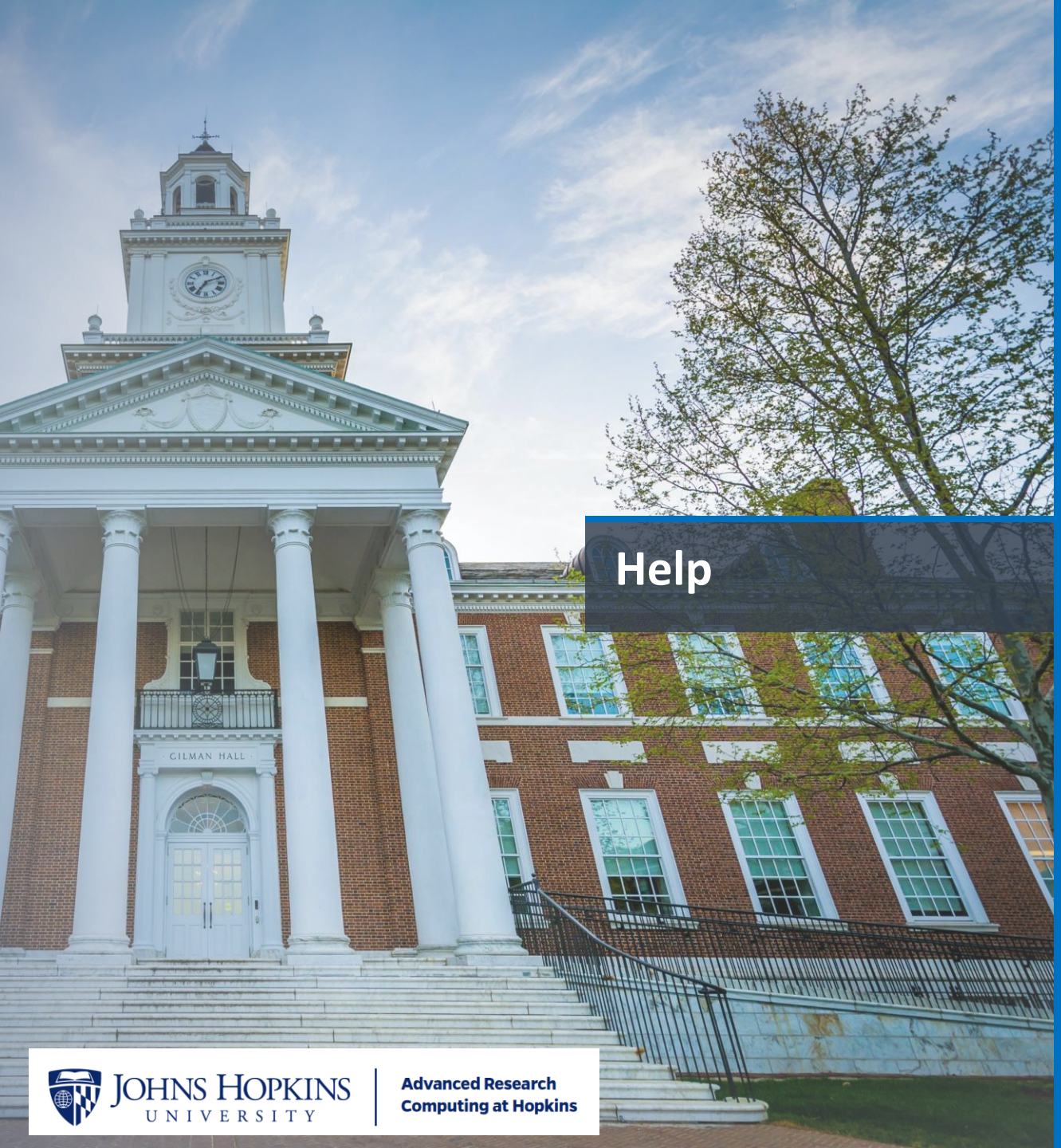
Command Line Interface (CLI)



Help

- User Guide

  arch.jhu.edu/guide

  arch.jhu.edu/support/faq/

  arch.jhu.edu/support/

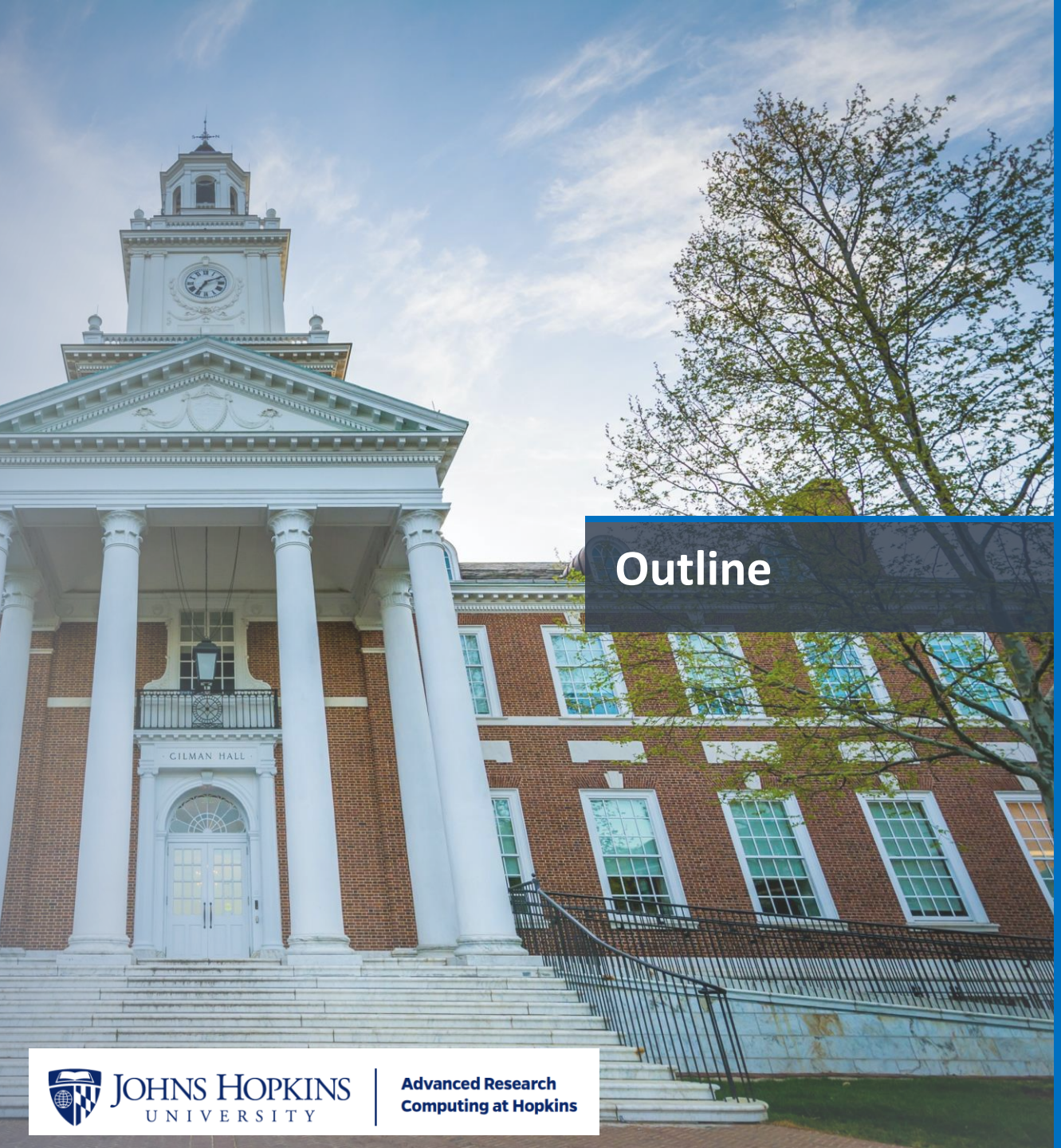
- Ticket

  help@rockfish.jhu.edu

  - User ID at Rockfish.
  - Detailed explanation of the problem/issue.
  - Add snapshots if possible.
  - Path to the working directory, scripts and (slurm) output files.

- Training workshop - interactive
- Google

  https://info-ee.surrey.ac.uk/Teaching/Unix/

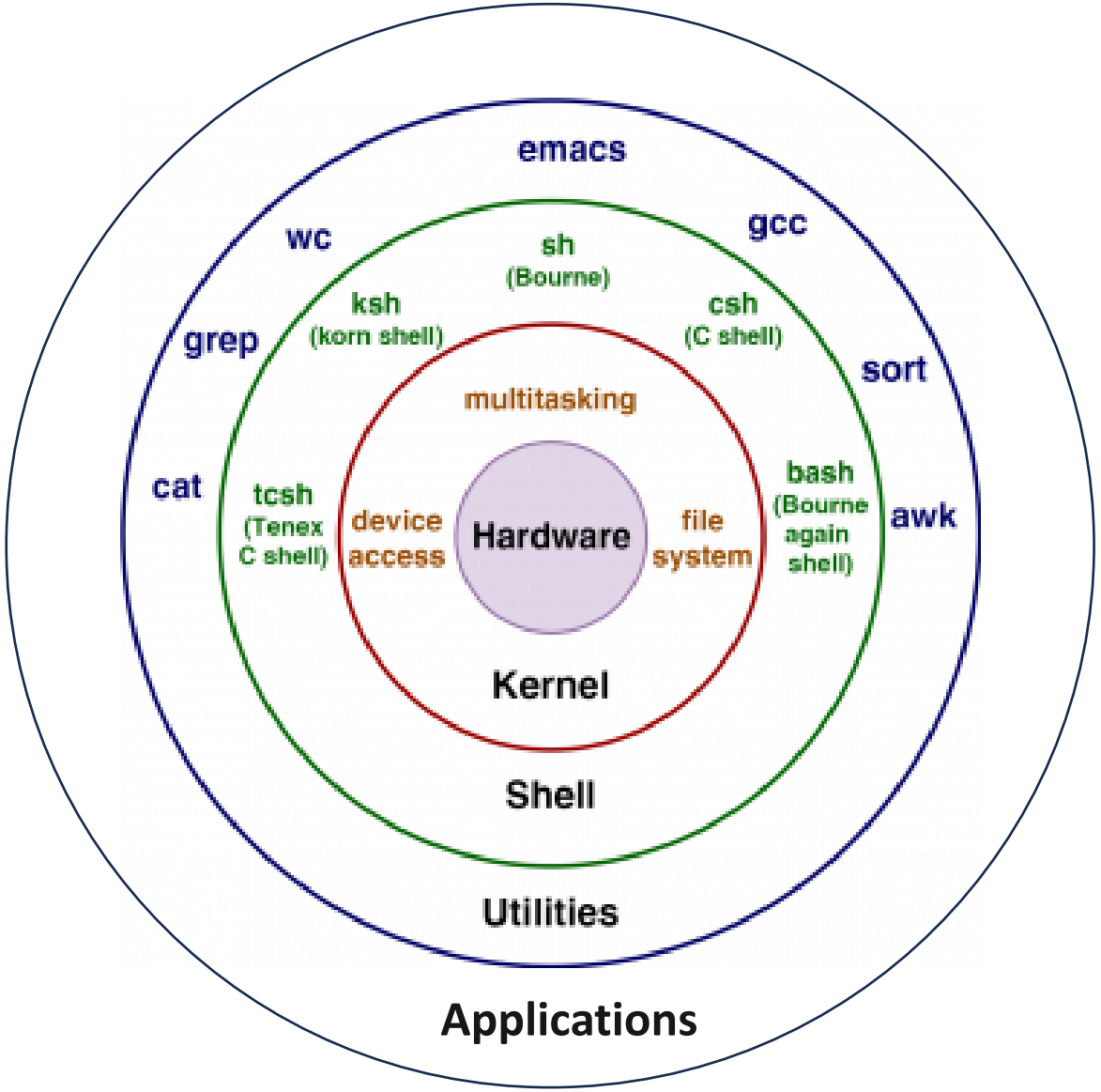


Outline

- Linux Architecture
- Connection and File Transfer
- Login Page
- Environment variables + Hidden Files
- Basic Commands
- Command Redirections
- File Permissions
- Text Editor
- Bash Script

Linux Architecture

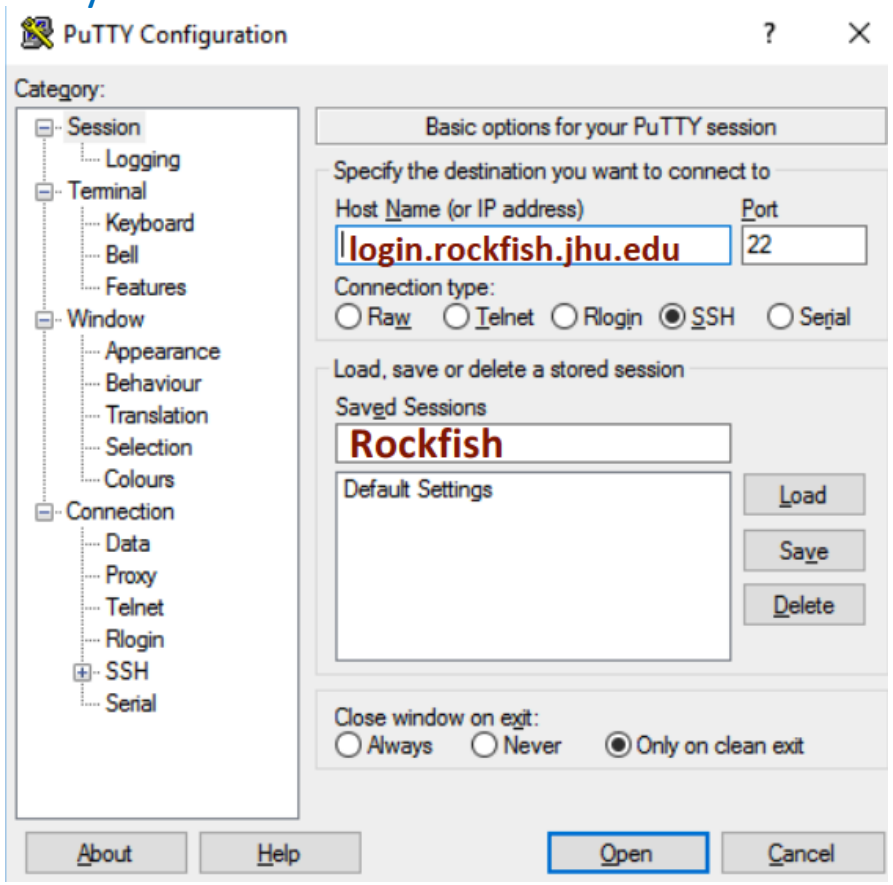
- Hardware: CPU, RAM, IO, GPU
- Kernel: core of OS
- Shell: bash
- Utilities:
  - basic commands
  - text editor - vi, emacs, **nano**
  - compilers - gcc, intel, aocc, nvcc



https://puneetpanwar.com/introduction-to-linux-command-line/

Connection

Putty interface



cli

windows

- Putty
- MobaXterm
- SecureCRT
- PowerShell
- Windows Sub-Linux System

web

- Open OnDemand (OOD)

  (requires JHU VPN)

  portal.rockfish.jhu.edu

Mac

cli

- Putty
- MobaXterm
- SecureCRT
- Terminal

[6 simple ways to open Terminal on Mac]

Connection with CLI

Secure Shell

$ ssh –ℓ userid login.rockfish.jhu.edu

$ ssh userid@login.rockfish.jhu.edu

$ ssh –XY userid@login.rockfish.jhu.edu

For Graphical Applications, but X11 forwarding is painfully slow!!
Use OOD instead.

File Transfer with CLI

environment variables

$HOME = ~ =/home/$USER

Secure Copy **For small data**

transfer from local machine to Rockfish

$ scp local_file userid@login.rockfish.jhu.edu: ~

$ scp –r local_dir userid@login.rockfish.jhu.edu: $HOME

transfer from Rockfish to local machine

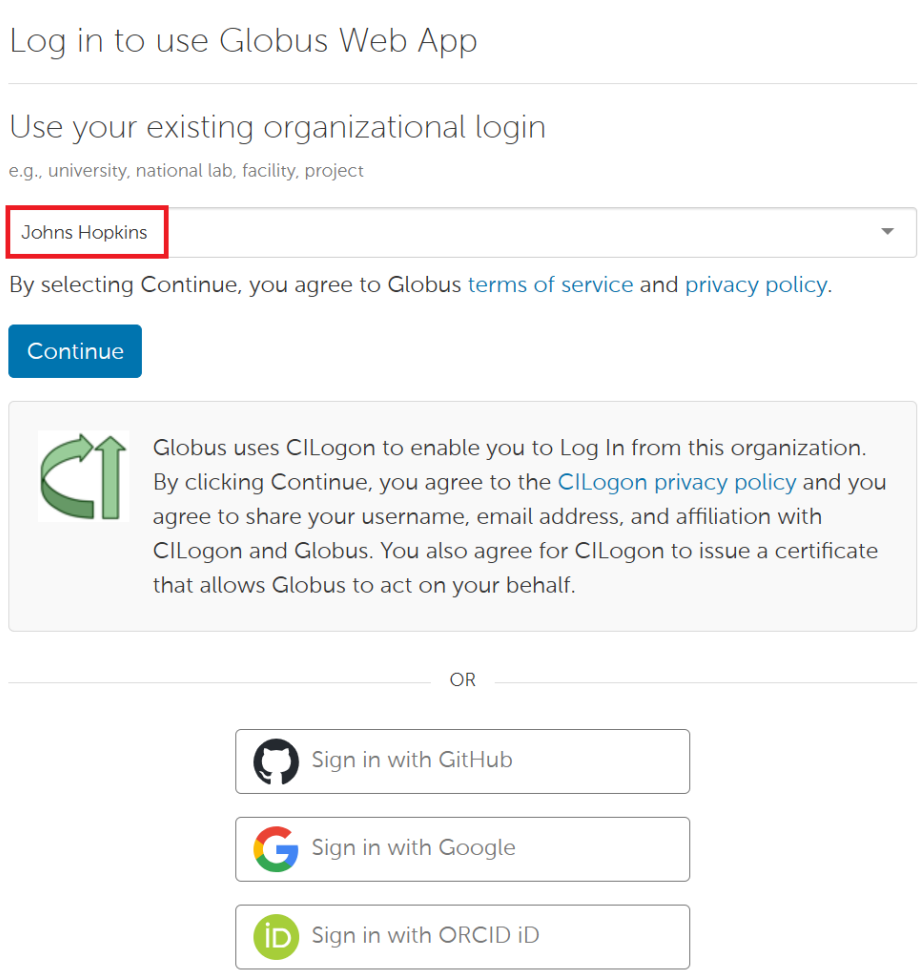
$ scp userid@login.rockfish.jhu.edu:/path/to/file .

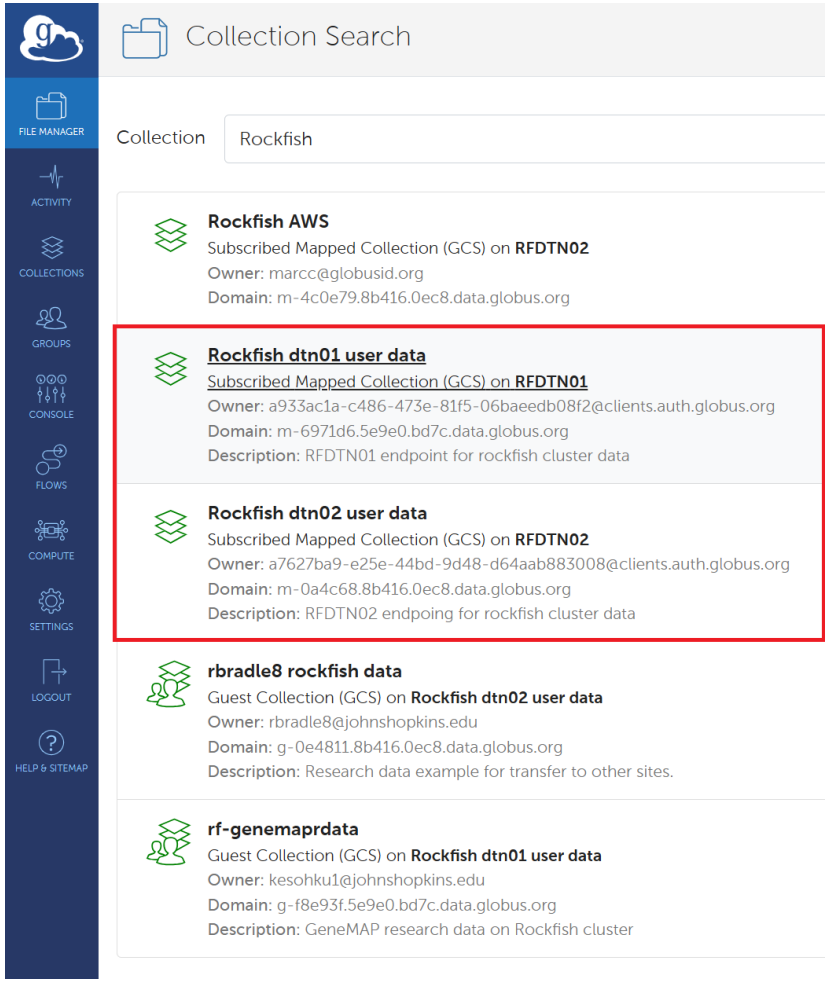
Type these scp commands in your Local Terminal

Globus **For Large data set**

File Transfer with globus.org

use JHED to create an account on coldfront.rockfish.jhu.edu





Exercises

1. Connect to Rockfish with the method you like
2. $ hostname
3. Downloading files from internet into your $HOME
   - $ wget https://tinyurl.com/training-url-txt
   - $ curl -O https://tinyurl.com/training-url-txt

Exercises

4. Secure copy folders from RF $HOME to your laptop
   - $ cat training-url-txt
   - $ git clone https://github.com/tsaiweiwu/arch

5. Secure copy folders from your RF $HOME to your laptop
   - $ scp –r user_id@login.rockfish.jhu.edu:$HOME/arch .

   Type the scp commands in your Local Terminal

Login Page

```
[twu73@login02 ~]$
```

- Print working directory

$ pwd

$ echo $PWD

- Change to your $HOME

$ cd

$ cd $HOME

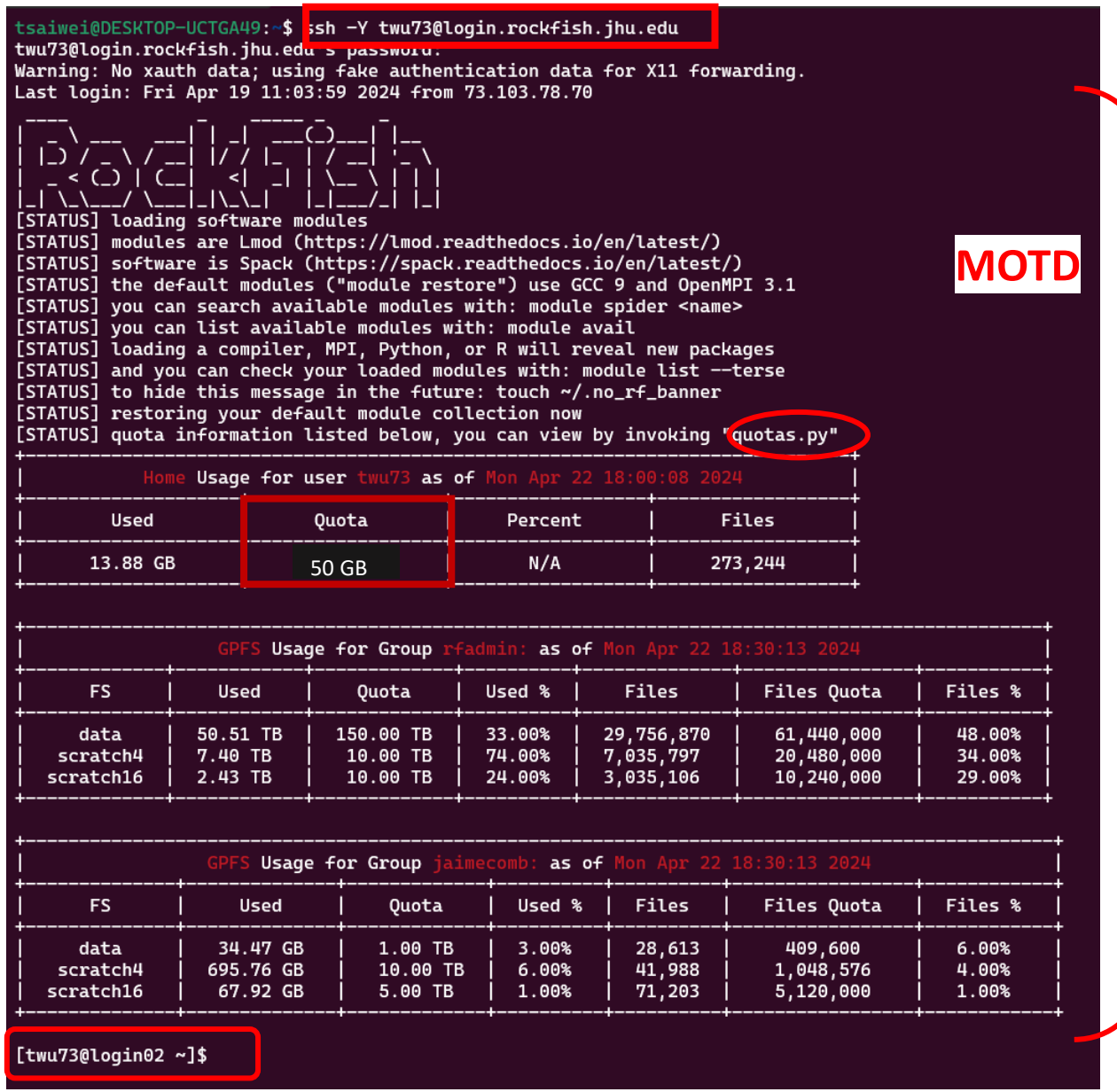
$ cd ~

- Change to parent directory

$ cd .. (one folder up)

$ cd ../.. (two folders up)

Note: Linux is case sensitive. cd ≠ Cd



Environment Variables

- Print environment variables

```
$ printenv
$ printenv | grep HOME
$ echo $PATH
```

Hidden Files

- Hidden files names start with with a period

~/.bashrc
~/.bash_profile
~/.bash_history
~/.bash_logout

https://www.howtogeek.com/435903/what-are-stdin-stdout-and-stderr-on-linux/

Basic commands

ls	shows files
mv	move or rename files/dir
mkdir	create a folder
cp [-r]	copy files or folder
rm [-r]	remove files or folder

hostname	shows the name of the node
who	list users on the node
top –u $USER	displays a user's processes
htop	
history	shows the history of your commands
cat	
more / less	view files
head / tail	
touch	create a file

Basic commands – Con’td

list files

$ ls -l	long format	$ ls -r	reverse order
$ ls -a	hidden files	$ ls -t	modification time
$ ls -h	human-readble		
$ ls -d	folders	$ ls -alrt	combination

Type $ man ls to see all the flags it can take

Command Redirect Exercises

- stdin, stdout, stderr
- >, >>, |, &
- tee (output to screen and also to a file)
- command 2>&1 | tee command.log
- ls > File11 ; cat File11
- list all files in Training and 'pipe' them into file File11
- ls -l >> File11 ; more File11
- List (long format) all files in Training and append the output (stdout) into File11
- ls -lR 2>&1 | tee Capture ; more Capture
- list all directories (recursively) and display stdout to the screen and into a file

File Permissions

```
$ ls -l
                  # of hard links                file size in bytes
                        ↓                              ↓
drwxr-xr-x.  4 root root     68 Jun 13 20:25 tuned
-rw-r--r--.  1 root root   4017 Feb 24  2022 vimrc
```

file permissions

d is a directory

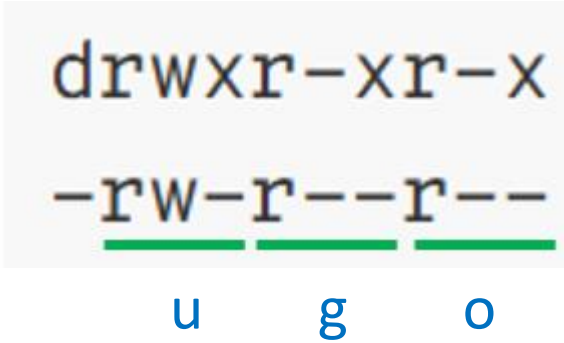
– is a file

ℓ is a soft link

owner group

Time of the last modification

File Permissions



Permission	Meaning for files	Meaning for directories
read (r)	Contents of the file can be displayed	Contents of directory can be listed
write (w)	File can be modified or deleted	Files can be created in or deleted from directory
execute (x)	File can be run like a program	Directory can be entered (i.e., the cd command works)

- u=user, g=group, o=others
- r=read=4, w=write=2, x=execute=1
- $ chmod g+r <file>
- $ chmod -w <file>
- $ chmod 755 <file>

- rwx = 7
- rw- = 6
- r-- = 4

Exercises

1. Check the hostname Type “hostname”
2. Type “pwd”
3. Go back to $HOME dir
4. List (long format) all files and directories in your HOME dir.
5. Redirect the output to a file
6. Check if the remove command is set to ask for removal
7. Type “man rm”

1. Create a directory called “Junk2021”
2. List permissions for Junk2021
3. Change permissions to User RWX only
4. Change directory to Junk2021

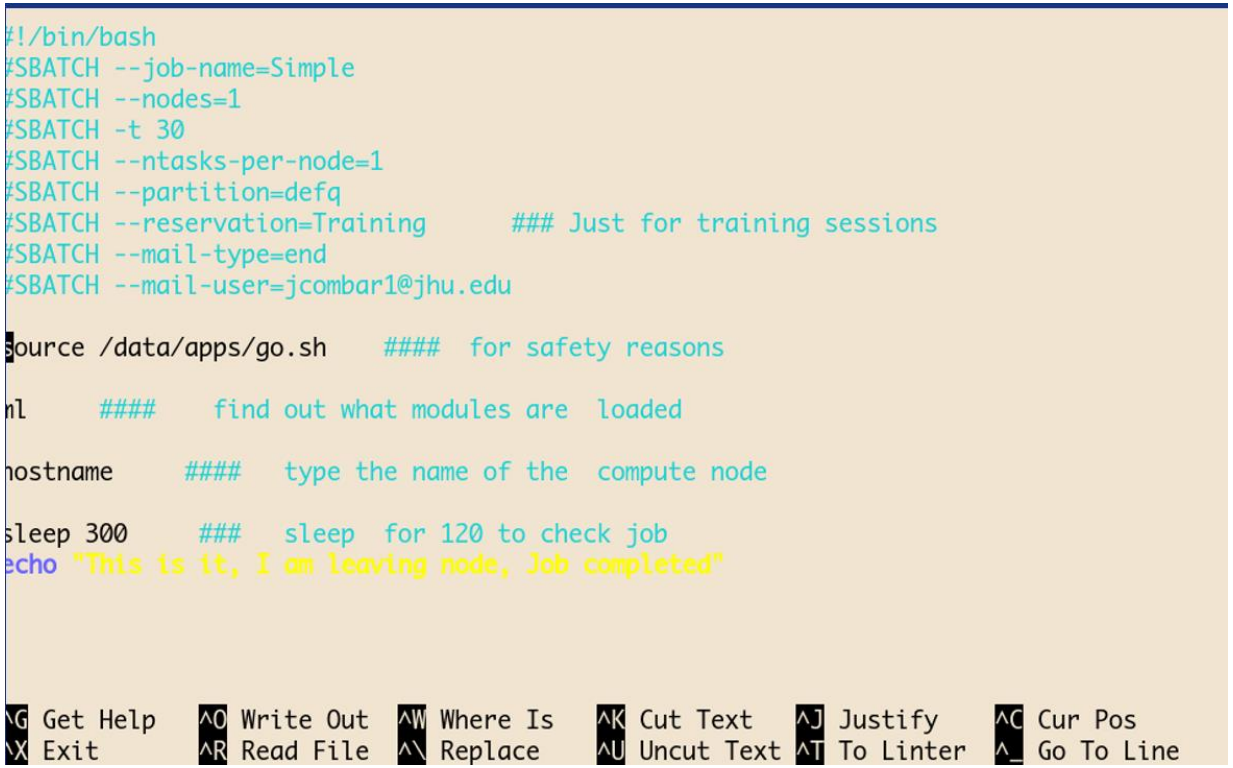
Text Editor - Nano

$ nano

$ nano filename.txt

nano's shortcuts

Ctrl+S	Save current file
Ctrl+O	Offer to write file ("Save as")
Ctrl+X	Close buffer, exit from nano



Bash Scripts

- Anything you can run normally on the command line can be put into a script and it will do exactly the same thing.
- Create a simple bash script

myscript.sh

```
1. #!/bin/bash
2. # A sample Bash script, by Ryan
3.
4. echo Hello World!
```

- How do you run a bash script, e.g. myscript.sh?

  $ ./myscript.sh -> NOT WORKING, Why?

  $ bash myscript.sh

Exercises

1. Create a folder Junk2024 and cd into the folder
2. Create a file called “exercise1.txt”
3. Find permissions for “exercise1.txt”
4. Add group read and group execute permissions to the file
5. Edit exercise1.txt (use nano or vi)
6. Add; echo “This is my first script”
7. Execute the script “./exercise1.txt
8. Remove dir Junk2021

Questions?

THANK YOU.

help@rockfish.jhu.edu