

HIGH PERFORMANCE RESEARCH COMPUTING

HPRC Primer

Introduction to Linux

August 27, 2024

TAMU users: If you are outside campus, activate VPN by connect.tamu.edu



High Performance
Research Computing

DIVISION OF RESEARCH

Computing Resources

The HPRC group currently administers four HPC clusters:

- ACES
- FASTER
- Grace
- Launch



You will need one of two options to use them:

Credentials	Clusters	Who
HPRC Account	FASTER, Grace	Primarily Texas A&M students/staff
ACCESS ID	FASTER, Launch, and ACES	Researcher or educator at a U.S. academic, non-profit research, or educational institution

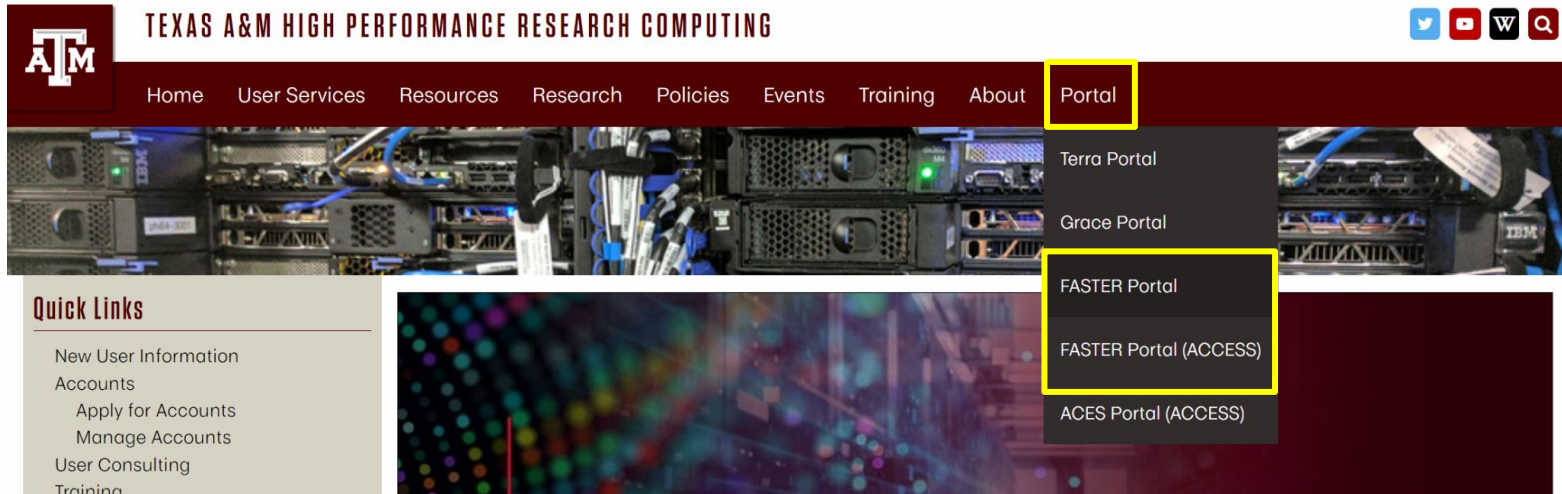
Link to our Knowledge Base: <https://hprc.tamu.edu/kb/>

Your Login Password

- Do NOT share your password
- Do NOT share your account
- Texas law and TAMU regulations prohibit the sharing and/or illegal use of computer passwords and accounts

HPRC Portal

- HPRC webpage: hprc.tamu.edu
 - TAMU: portal-faster.hprc.tamu.edu
 - ACCESS: portal-faster-access.hprc.tamu.edu



HPRC Portal (ACCESS)

If you chose the second option on the previous slide, you'll get the ACCESS CILogon OpenID Connect page.

Log-in using your ACCESS credentials. Create an account if you do not already have one.

ACCESS

Consent to Attribute Release

ACCESS Website 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

ACCESS CI (XSEDE)

☐ Remember this selection

LOG ON

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

Select the Identity Provider appropriate for your account

ACCESS

If you had an XSEDE account, please enter your XSEDE username and password for ACCESS login.

ACCESS ID

ACCESS Password

LOGIN

[Register for an ACCESS ID](#)

[Forgot your password?](#)

[Need Help?](#)

Linux Using the Portal - Shell Access

TAMU HPRC OnDemand (FASTER)

Files ▾

Jobs ▾

Clusters ▾

Interactive Apps ▾

Dashboard ▾



>_faster Shell Access

Starts an in-browser
Linux terminal on
FASTER

Convenient
shell access
anywhere
with a web
browser

OnDemand provides an integrated, single access point for all of your HPC resources.

Message of the Day

IMPORTANT POLICY INFORMATION

- Unauthorized use of HPRC resources is prohibited and subject to criminal prosecution.
- Use of HPRC resources in violation of United States export control laws and regulations is prohibited. Current HPRC staff members are US citizens and legal residents.
- Sharing HPRC account and password information is in violation of State Law. Any shared accounts will be DISABLED.
- Authorized users must also adhere to ALL policies at: <https://hprc.tamu.edu/policies>

The terminal will ask you
to log in again

Linux Using SSH

If you're using a terminal application on your own computer instead of the Portal, you can connect to HPRC clusters using the ssh command:

```
ssh -X NetID@faster.hprc.tamu.edu
```

Mac users may need to use ssh -Y to enable X11 so you can view images and use GUI software:

```
ssh -Y NetID@faster.hprc.tamu.edu
```

You may see something like this the first time you connect:

```
Host key not found from the list of known hosts.  
Are you sure you want to continue connecting (yes/no)?
```

Type **yes**, hit enter and you will then see the following:

```
Host faster.hprc.tamu.edu' added to the list of known hosts.  
NetID@faster.tamu.edu's password:
```

Where Am I?

pwd command (print working directory)

Linux commands in green for you to type

```
pwd
```

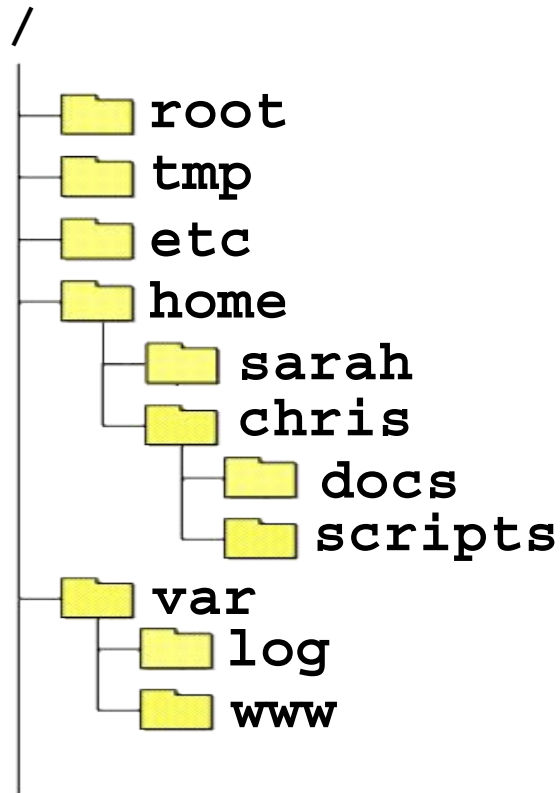
command output in blue

```
/home/username
```

list contents of your working directory

```
ls
```


Navigating the Linux Directory Structure



```
/
/root
/tmp
/etc
/home
/home/sarah
/home/chris
/home/chris/docs
/home/chris/scripts
/var
/var/log
/var/www
```

Common Directory Commands

```
mkdir my_dir
```

mkdir to make a new directory

```
cd my_dir
```

cd to change to another directory

```
cd ..
```

cd back out of the current directory

```
rmdir my_dir
```

rmdir to remove an empty directory

Changing Directories: cd

Return to your home directory:

```
cd  
cd ~  
cd ~/  
cd $HOME
```

Switch to the parent directory
of the current directory:

```
cd ..
```

Return to previous directory:

```
cd -
```

```
cd $HOME  
mkdir temp  
mkdir temp/dir1  
cd temp  
pwd  
cd dir1  
pwd  
cd ../..  
pwd  
cd -  
pwd  
cd ..  
pwd  
cd ~  
pwd
```

Absolute vs. Relative Path

```
/
/root
/tmp
/etc
/home
/home/sarah
/home/chris/project
/home/chris/docs/README
/var
/var/log
/var/www
```

If you are in the `project` directory

```
pwd
```

```
/home/chris/project
```

The relative path to the `README` file is `../docs/README`

```
ls ../docs/README
```

The absolute path to the `README` file `/home/chris/docs/README`

```
ls /home/chris/docs/README
```

Common Commands

Let's start working with content in our directories.

Start with these basic commands:

cat	Writes file content on the standard output*
echo	Display a text string on the standard output
touch	Creates a new empty file
nano	Creates a new file or edit an existing file (text editor)
rm	Remove a file

Let's print some output and make a new file:

```
echo "Hello World"  
touch new.txt  
nano new.txt  
cat new.txt
```

*Usually "standard output"
just means your screen, but
it can be moved

Using the Portal File Editor

TAMU HPRC OnDemand (FASTER)

Files ▾

Jobs ▾

Clusters ▾

Interactive Apps ▾

Dashboard ▾



In the “Files” tab
in the portal

Open in Terminal

+ New File

New Directory

Upload

Download

Copy/Move

Delete

Home Directory

/scratch/user/saluja.aditi5



/ scratch / user / saluja.aditi5 / DeepLearningExamples /

Change directory

Create a new
file and edit

Copy path

☐ Show Owner/Mode

☐ Show Dotfiles

Filter:

Showing 11 of 15 rows - 0 rows selected

	Type	Name		Size	Modified at
<input type="checkbox"/>	Folder	CUDA-Optimized	⋮	-	3/21/2022 11:28:24 AM
<input type="checkbox"/>	Folder	DGLPyTorch	⋮	-	3/21/2022 11:28:25 AM
<input type="checkbox"/>	Folder	FasterTransformer	⋮	-	3/21/2022 11:28:26 AM
<input type="checkbox"/>	Folder	Kaldi	⋮	-	3/21/2022 11:28:26 AM

History of Your Commands

Your commands are saved to a file in your home directory (`.bash_history`)

You can use the up/down arrows to scroll through previous commands

Type **history** to see your previously entered commands

```
history
```

History of your commands

```
history | tail
```

See the last 10 commands

Search your command history using `|` and `grep`

```
history | grep echo
```

Linux Commands Have Options

Leave a space between the command and the options

Spell out a full option with a double-dash:

```
ls --all
```

--all show all files, including
hidden files which begin with '.'

Single dash lets you abbreviate:

```
ls -a -l
```

-a (shorter version of --all)
-l show file details

You can also combine (short) options behind one single dash:

```
ls -al
```

-a (same function as above)
-l (same function as above)

Remember directory shortcuts:

- current working directory
- .. parent directory

Search for Linux Commands Options

Search the manual page for the Linux command `ls`

man ls

f

move down (forward) one page

b

move up (back) one page

(Sometimes mouse scroll wheel and arrow keys work, too)

/all

search the man page for the text 'all'

n

search forward for next found match

N

search backwards next found match

g

go to first line

G

go to last line

q

quit

Linux Terminal Attributes

Depending on your terminal, you've probably been seeing different colors as you navigate.

File and directory names are colored based on their attributes such as permissions and extension (file type).

```
AAF -> AAF.py
AAF.py
aaf_tip.py
data.gz
image.jpg
phylip_src
phylokmer
README
run_aaf.sh
```

TURQUOISE	Symbolic link
GREEN	Executable file
RED	Compressed files
PURPLE	Image files
BLUE	Directories
WHITE	Text files

Note: These colors are not Linux-universal and can depend on the different terminal emulator or shell.

Changing Attributes: chmod

Set limits on who can modify files and directories with 'chmod'

Follow the instructions at right to make some example files and check their details.

```
mkdir data
cd data
touch file1.txt
touch file2.txt
ls -l
```

You should see a bunch of dashes and letters to the left. Those are the permissions.

1. To change the user's permissions of file1.txt to read, write, execute:
(will be `-rwxrw-r--`)
2. To change the permissions of file2.txt to read and execute for all and write for the user:
(will be `-rwxr-xr-x`)
3. To remove the execute permissions of file2.txt for all "other" users:
(will be `-rwxr-xr--`)

```
chmod u+rwx file1.txt
```

```
chmod 755 file2.txt
```

↑ (see next slide for what this number means)

```
chmod o-x file2.txt
```

Changing Attributes: chmod

```
chmod [options] [permission mode] [target_file]
```

0 = No permission
1 = Execute permission
2 = Write permission
3 = Write and execute permissions
4 = Read permission
5 = Read and execute permissions
6 = Read and write permissions
7 = Read, write, and execute permissions

u = user
g = group
o = other

r = read
w = write
x = execute
-x = remove executable permissions
+x = enable executable permissions

Note the permissions display format is - uuugggooo

Shell Script Exercise

A *script* will let you perform multiple commands at once.

We've created an example script, which you can copy and run yourself.

Navigate to your home directory

```
cd $HOME
```

Copy the script to your home directory

```
cp /scratch/training/fall_2024_primers/my_script.sh .
```

Shell Script Exercise

View (or edit) the shell script

```
nano my_script.sh
```



make your shell script executable

```
chmod 755 my_script.sh
```

run your shell script

```
./my_script.sh
```

```
#!/bin/bash
# HPRC shell script exercise

my_var="People"

echo "Howdy $my_var" > output.txt

mkdir script_output

mv output.txt script_output

cd script_output

cat output.txt
```

Shell Script Explanation

The “shebang”; all bash scripts must have this at the very top so the computer knows how to run it.

make your shell script executable

```
chmod 755 my_script.sh
```

Pound signs start comments. They're for you to leave notes; the computer doesn't do anything with them. (The shebang is the exception!)

```
#!/bin/bash
# HPRC shell script exercise

my_var="People"

echo "Howdy $my_var" > output.txt

mkdir script_output

mv output.txt script_output

cd script_output

cat output.txt
```

Shell Script Explanation

A “variable.” Call later with
‘\$’ to reuse stored data.

The ‘>’ redirects the output
to the filename you provide.

(Commands we’ve seen previously)

```
#!/bin/bash
# HPRC shell script exercise

my_var="People"

echo "Howdy $my_var" > output.txt

mkdir script_output

mv output.txt script_output

cd script_output

cat output.txt
```


Shell Script Exercise

View (or edit) the shell script

```
nano my_script.sh
```



make your shell script executable

```
chmod 755 my_script.sh
```

run your shell script

```
./my_script.sh
```

```
#!/bin/bash
# HPRC shell script exercise

my_var="People"

echo "Howdy $my_var" > output.txt

mkdir script_output

mv output.txt script_output

cd script_output

cat output.txt
```

Exit your terminal



```
exit
```

exit the terminal session

To fully logout of the FASTER portal, you need to exit the browser.



**HIGH PERFORMANCE
RESEARCH COMPUTING**
TEXAS A&M UNIVERSITY

Thank you

Any questions?

Need Help?

First check the FAQ <https://hprc.tamu.edu/kb/FAQ/Accounts/>

- FASTER User Guide <https://hprc.tamu.edu/kb/User-Guides/FASTER/>
- Email your questions to help@hprc.tamu.edu

Help us help you -- provide the following info:

- Which cluster you're using
- Your username
- Job id(s) if any
- Location of your jobfile, input/output files
- Application used, if any
- Module(s) loaded, if any
- Error messages
- Steps you have taken, so we can reproduce the problem

Continued Learning

[Intro to HPRC Video Tutorial Series](#)

[HPRC's Knowledge Base](#)