HPRC Primers

Introduction to Linux

using the HPRC Portal

Please connect to the TAMU VPN

https://connect.tamu.edu/

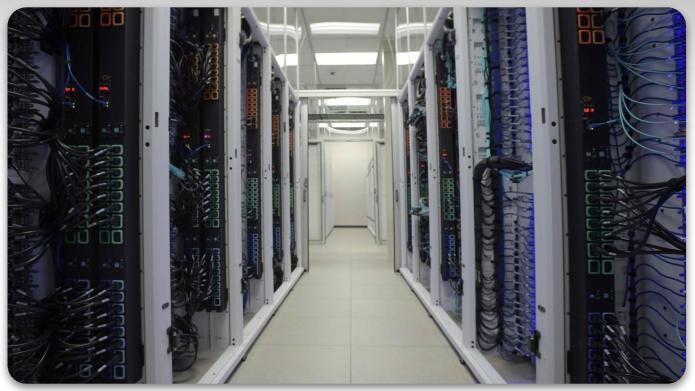
DIVISION OF RESEARCH
TEXAS A&M UNIVERSITY

Your Login Password

- Both State of Texas law and TAMU regulations prohibit the sharing and/or illegal use of computer passwords and accounts;
- Don’t write down passwords;
- Don’t choose easy to guess/crack passwords;
- Change passwords frequently

HPRC's Newest Cluster

Grace is a 925-node Intel cluster from Dell with an InfiniBand HDR-100 interconnect, A100 GPUs, RTX 6000 GPUs and T4 GPUs. There are 925 nodes based on the Intel Cascade Lake processor.



Grace Status: Testing and Early user onboarding

Grace
3TB Large Memory-80 cores/nodes
Other Login Nodes-48 cores/node

Login Nodes	5
384GB memory general compute nodes	800
GPU - A100 nodes with 384GB memory	100
GPU - RTX 6000 nodes with 384GB memory	9
GPU - T4 nodes with 384GB memory	8
3TB Large Memory	8

Available late Spring 2021

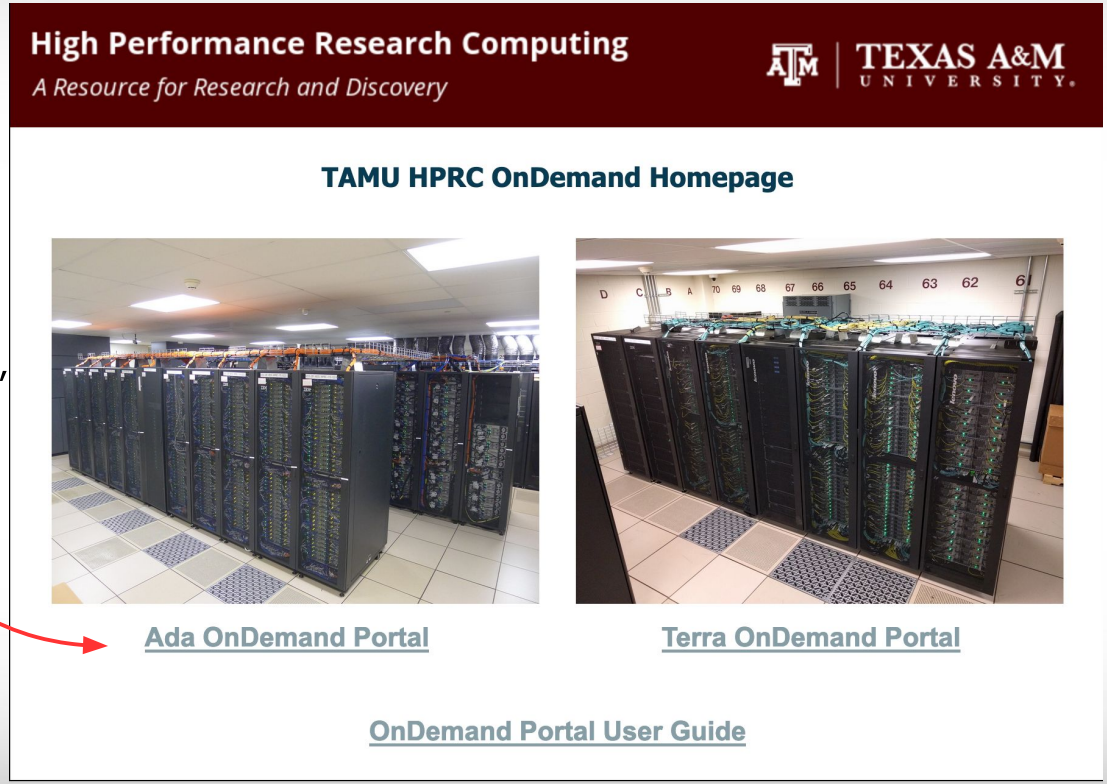
For more information:
https://hprc.tamu.edu/wiki/Grace:Intro

Accessing the system

- SSH (secure shell)
  - The only program allowed for remote access; encrypted communication; freely available for Linux/Unix and Mac OS X hosts;
- HPRC Portal:
  - https://portal.hprc.tamu.edu/
  - login with your HPRC account

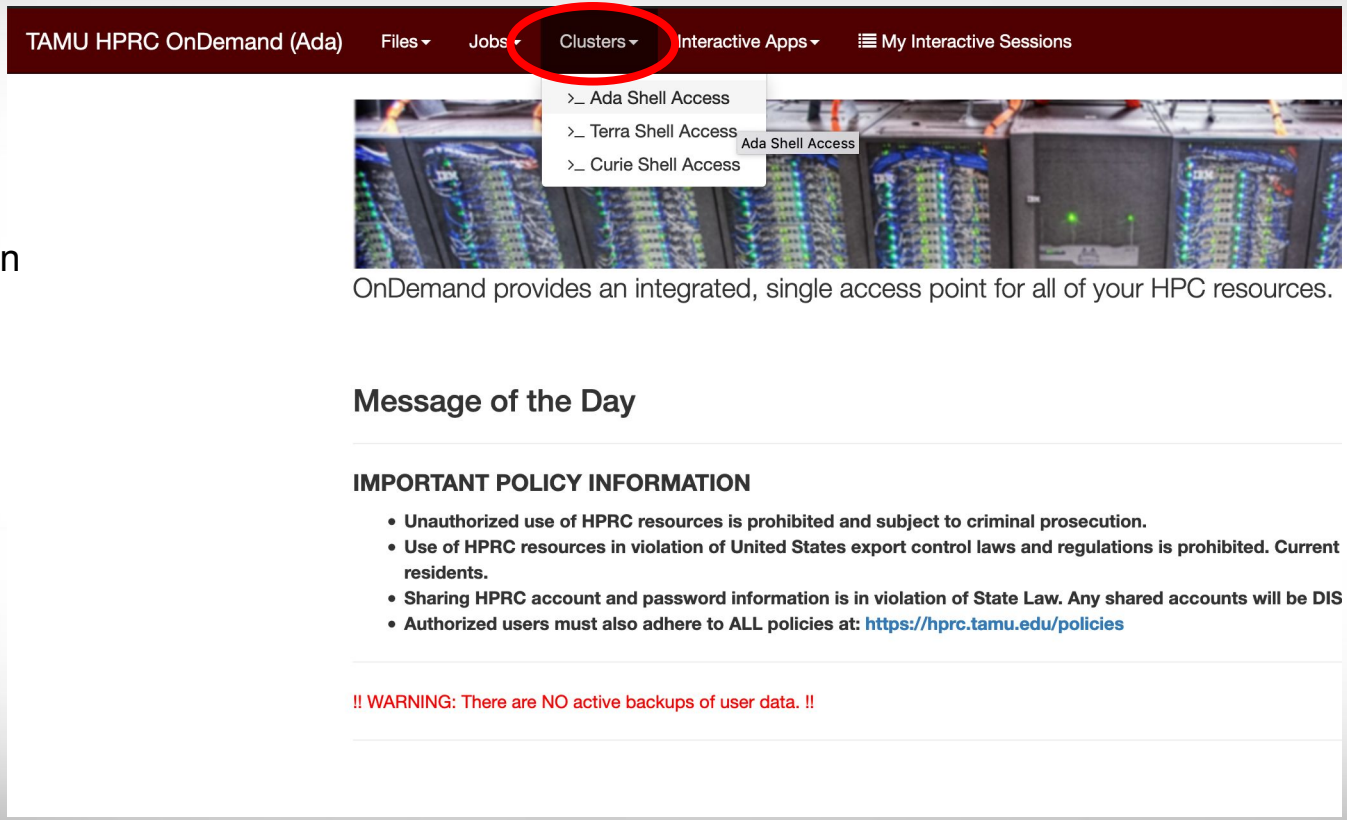
Using the Portal

Select "Ada OnDemand Portal"

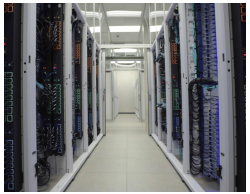


Using the Portal - Shell Access

Starts an in-browser SSH session



Pop Quiz



Which one of the following is not an HPRC cluster?

A. Ada
B. Bozo
C. Grace
D. Terra

Using SSH (on a Linux Client)

```
ssh -X NetID@ada.tamu.edu
```

You may see something like this the first time you connect to the remote machine from your local machine:

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

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

```
ssh -Y NetID@ada.tamu.edu
```

To use the HPRC clusters, you must apply for an HPRC account.

Where Am I?

`pwd` command (print working directory)

Linux commands in green for you to type

```
pwd
```

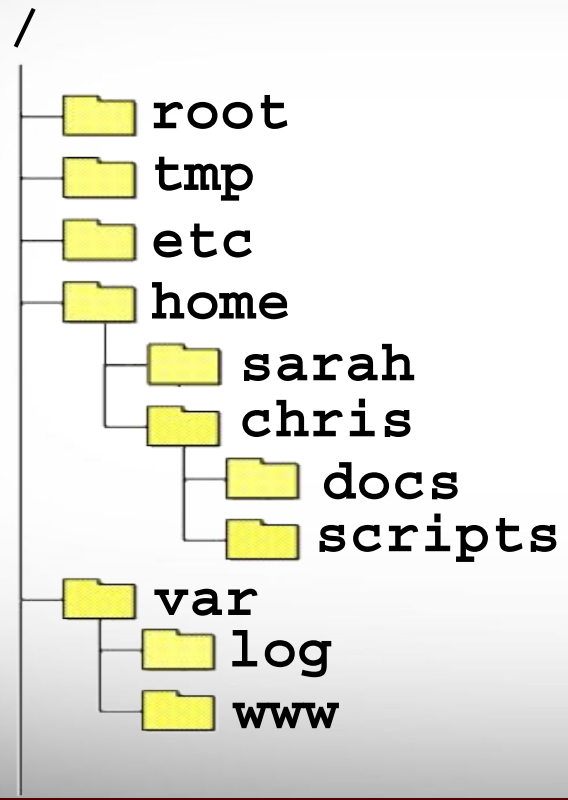
command output in blue

```
/home/user_NetID
```

list contents of your pwd

```
ls
```

Finding your way around the Linux directory structure




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

Linux Commands Have Options

Leave a space between the command and the options

double dash means there is a single option which is usually a descriptive word

```
ls --all
```

`--all` show all files including hidden files which begin with `.`

single dash means each character is an option

```
ls -a -l
```

`-a` show all files including hidden
`-l` show file details

most options can be combined behind one dash

```
ls -al
```

`-a` show all files including hidden
`-l` show file details

`.` current working directory
`..` parent directory

Search for Linux Commands Options

Search the manual page for the Linux command `ls`

```
man ls
```

Page up	Move up one page
Page down	Move down one page
Spacebar	Move down one page
Mouse scroll wheel	Move up and down

`/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

Common Directory Commands

`mkdir` command to make a new directory:

```
mkdir my_dir
```

`cd` to change to another directory:

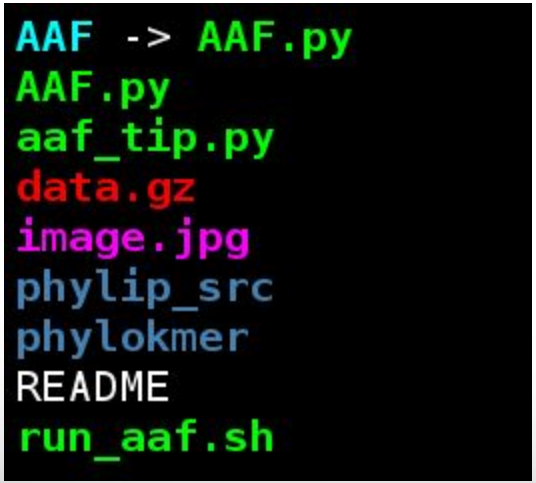
```
cd my_dir
```

`rmdir` to remove an empty directory:

```
rmdir my_dir
```

UNIX Terminal Attributes

File and directory names are colored
based on their attributes such as permissions and extension



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

Changing Directories: the `cd` cmd

- Return to your home directory

```
cd
cd ~
cd ~/
```

- To switch to the parent directory of the current directory:

```
cd ..
```

- Return to previous pwd

```
cd -
```

```
cd
mkdir temp
mkdir temp/hg19
cd temp
pwd
cd hg19
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
```

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 your previous commands
- Type **`history`** to see your previously entered commands

```
history
history | tail
```

See the last 10 commands

- Search your history commands using | and grep

```
history | grep wget
```

Redirection Operators

<	redirects input	`bsub < job_script.sh`
>	redirects output	`command > out.txt`
>>	appends output	`command >> out.txt`
<<	input from *here document* (search the web for examples)	

2>	redirects error	`command 2> error.txt`
&>	redirects output and error	`command &> out-error.txt`
>&	redirects output and error	`command >& out-error.txt`
2>&1	redirects error to where output is going	
1>&2	redirects output to where error is going	

Changing Attributes: The **chmod** cmd

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

```
cd ~/temp/hg19
```

```
chmod 755 chr_xy.txt    ( the permissions will be set to   -rwxr-xr-x )

chmod o-x chr_xy.txt    ( the permissions will change to -rwxr-xr-- )

chmod ug-x chr_xy.txt   ( the permissions will change to -rw-r--r-- )

chmod g+w chr_xy.txt    ( the permissions will change to -rw-rw-r-- )
```

```
u = user                    r = read
g = group                   w = write
o = other                   x = execute
-x = remove executable permissions
+x = enable executable permissions
```

The *Gedit* Text Editor**

From the Linux terminal command line enter this command to start gedit and edit a file called my_favorite_foods.txt

```
gedit my_favorite_foods.txt &
```

The '**&**' will detach gedit from the terminal so you can continue to use the terminal

Recommendations for naming files:

- Use all lowercase characters
- Separate words with an underscore
- Make the filename concise and very descriptive of the file contents even if the name seems long

**Gedit will not work through the HPRC portal

Shell Script Exercise

create a shell script

```
vim 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_name="Dylan"

echo "Howdy $my_name" > names.txt

mkdir script_output

mv names.txt script_output

cd script_output

cat names.txt
```

```
exit
```

exit the terminal session
can also use Ctrl+d to detach session

Continued Learning

Intro to HPRC Video Tutorial Series

HPRC's Wiki Page