



HPRC Primers

Introduction to Linux

With Demonstrations through the HPRC Web Portal

Please connect to the TAMU VPN

<https://connect.tamu.edu/>



DIVISION OF RESEARCH
TEXAS A & M UNIVERSITY

High Performance Research Computing Resources

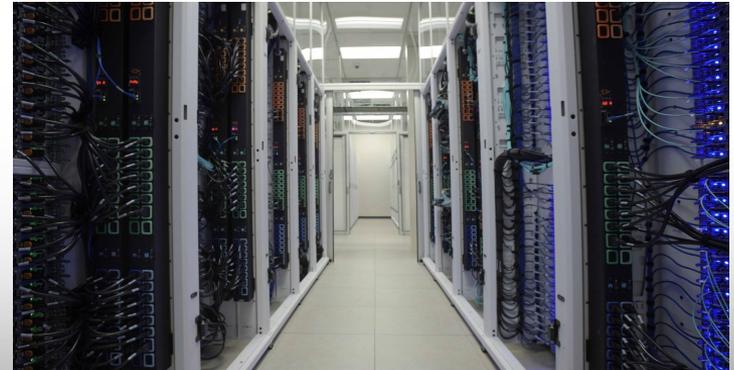
Terra

320-node hybrid Intel cluster from Lenovo with an Omni-Path Architecture (OPA) interconnect and 48 NVIDIA K80 dual-GPU accelerators. 304 nodes based on the Intel Broadwell processor & 16 nodes based on the Intel Knights Landing processor. 4 nodes with Skylake processors, 192 GB of memory, and dual V100 GPUs.



Grace

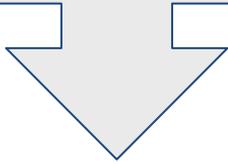
925-node Intel cluster from Dell with an InfiniBand HDR-100 interconnect, A100 GPUs, RTX 6000 GPUs and T4 GPUs. All nodes are based on the Intel Cascade Lake processor.



High Performance Research Computing Resources

FASTER

184-node Intel cluster from Dell with an InfiniBand HDR-100 interconnect. A100 GPUs, A10 GPUs, A30 GPUs, A40 GPUs and T4 GPUs are distributed and composable via Liquid PCIe fabrics. All nodes are based on the Intel Ice Lake processor.



ViDaL

24-node Dell cluster with Intel Skylake processors and a 40Gb Ethernet interconnect. ViDaL provides secure and compliant computing facilities to conduct research projects involving analysis of sensitive or proprietary data. ViDaL also offers support for both Windows and Linux operating systems.

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

Accessing a Remote Linux 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

High Performance Research Computing
A Resource for Research and Discovery



TAMU HPRC OnDemand Homepage



Select
"Terra OnDemand Portal"



[Terra OnDemand Portal](#)

[Grace OnDemand Portal](#)

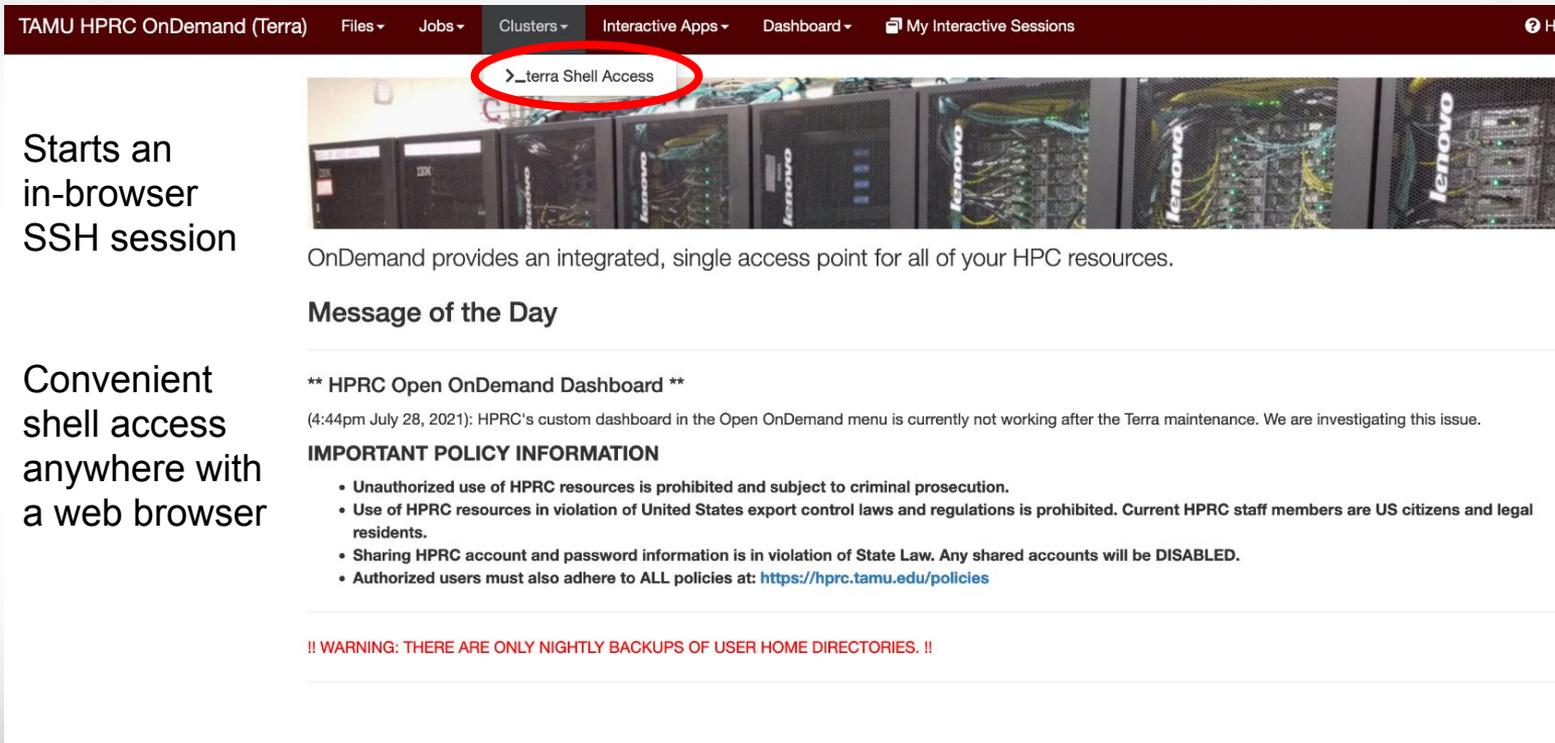
Must be connected to
TAMU WIFI or VPN

[OnDemand Portal User Guide](#)

<https://portal.hprc.tamu.edu>



Using the Portal - Shell Access



TAMU HPRC OnDemand (Terra) Files Jobs Clusters Interactive Apps Dashboard My Interactive Sessions

>_terra Shell Access

Starts an in-browser SSH session

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

Message of the Day

**** HPRC Open OnDemand Dashboard ****

(4:44pm July 28, 2021): HPRC's custom dashboard in the Open OnDemand menu is currently not working after the Terra maintenance. We are investigating this issue.

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>

!! WARNING: THERE ARE ONLY NIGHTLY BACKUPS OF USER HOME DIRECTORIES. !!

This starts a Linux terminal on Terra

Using SSH (on a Linux Client)

```
ssh -X NetID@terra.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 terra.tamu.edu' added to the list of known hosts.  
NetID@terra.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@terra.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
```

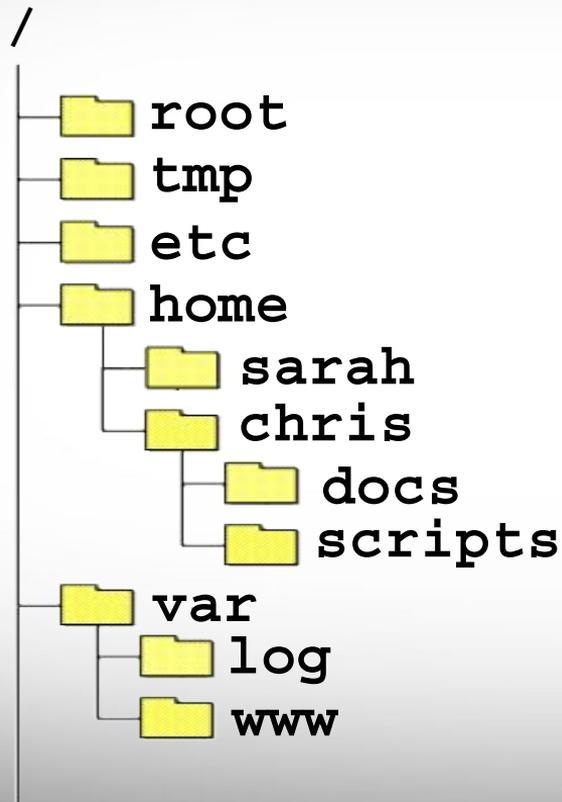
command output in blue

```
/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

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

TURQUOISE

GREEN

RED

PURPLE

BLUE

WHITE

Symbolic link

Executable file

Compressed files

Image files

Directories

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

2>	redirects error	<code>command 2> error.txt</code>
&>	redirects output and error	<code>command &> out-error.txt</code>
>&	redirects output and error	<code>command >& out-error.txt</code>
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](#)