



Intro to HPC and SSH

Haniye Kashgarani



Topics

- What is HPC and why is it important?
- Cluster and Nodes
- University of Wyoming cluster – ARCC
- Secure Shell (SSH)
- Two-way authentication
- How to connect to cluster using SSH?
- Commands cheatsheet
- Copy files from and to cluster

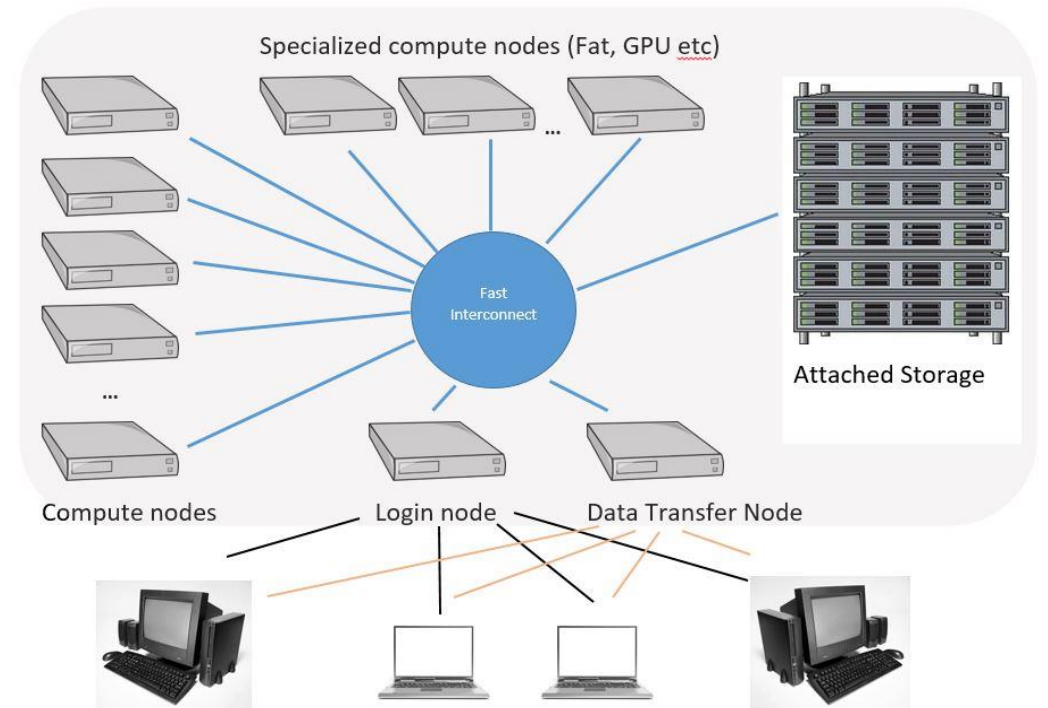


What is HPC and why is it important?

- High performance computing (HPC) is the ability to process data and perform complex calculations at high speeds.
- Advanced and powerful computer hardware
- High performance computing is an aggregation of computing power to solve problems which are either too complex for standard computers or they would take too long to finish.

Cluster and Nodes

- A group of computers connected to each other using high speed networks -- "cluster"
- Each computer in cluster is called a "node"
- You have access to multiple computer nodes instead of one



<https://www.hpc.iastate.edu/guides/introduction-to-hpc-clusters/what-is-an-hpc-cluster>

University of Wyoming cluster – ARCC

- ARCC - Advanced Research Computing Center
- <https://arccwiki.atlassian.net/wiki/spaces/DOCUMENTATION/overview?homepageId=65539>
- Different types of partitions and nodes
- Each partition has its own specific hardware features:
 - Teton partition:
 - 180 computer nodes
 - Intel Broadwell CPUs with 32 cores
 - 128GBs of RAM
- <https://arccwiki.atlassian.net/wiki/spaces/DOCUMENTATION/pages/82247690/Hardware+-+Teton>



Secure Shell (SSH)

- A common way of remotely logging in to computers running the Linux operating system.
- SSH client program
- MacOS, Linux, and Windows 10 come with a pre-installed command-line SSH client
- Older Windows versions: graphical SSH clients including MobaXTerm.
- <https://mobaxterm.mobatek.net/>
- <https://arccwiki.atlassian.net/wiki/spaces/DOCUMENTAT/pages/1075970176/Windows+-+MobaXterm+Login>



Two-way authentication

- Where you are connecting from:
 - on campus;
 - off campus after establishing a VPN connection;
 - off campus without a VPN connection.
- Off campus:
 - Install Duo Mobile application in your smart phone
 - Apple: <https://apps.apple.com/us/app/duo-mobile/id422663827>
 - Android: https://play.google.com/store/apps/details?id=com.duosecurity.duomobile&hl=en_US&gl=US
 - Activate Two-way Authentication using the steps in this powerpoint:
 - <https://uwyo.teamdynamix.com/TDClient/1940/Portal/Shared/FileOpen?AttachmentID=e9fd640c-98be-4d1b-9503-fab20b7c2a64&ItemID=11313&ItemComponent=26&IsInline=0>
 - <https://arccwiki.atlassian.net/wiki/spaces/DOCUMENTAT/pages/1065156694/Using+Two-Factor+Authentication>

How to connect to cluster using SSH?

- ssh username@teton.arcc.uwyo.edu
- Enter password
- Verify the connection on Duo Mobile



Commands Cheatsheet

- arccquota
- scp | scp -r: using ssh protocol to copy files from and to local PC
- cd: change directory
- ls: list all files and directories
- mkdir: command to create a directory
- pwd: the full path of your working directory
- cp | cp -r: copy files and folders
- rm | rm -r: command removes a chosen file or directory
- cat: command to display the content of a file
- mv: move the file or folder
- clear: clears the terminal screen
- Exit: closes the connection

Copy files from and to cluster

Copy files from local PC to cluster:

```
scp /path/on/local/PC.txt username@teton.arcc.uwyo.edu:/destination/path/on/host/
```

Copy directory from cluster to local PC:

```
scp -r  
username@teton.arcc.uwyo.edu:/directory/path/on/host /destination/path/on/local/pc
```

Additional References

- <https://Openvim.com>
- <https://codecademy.com/learn/learn-the-command-line>
- <https://epcced.github.io/hpc-intro/>
- <https://searchsecurity.techtarget.com/definition/Secure-Shell>