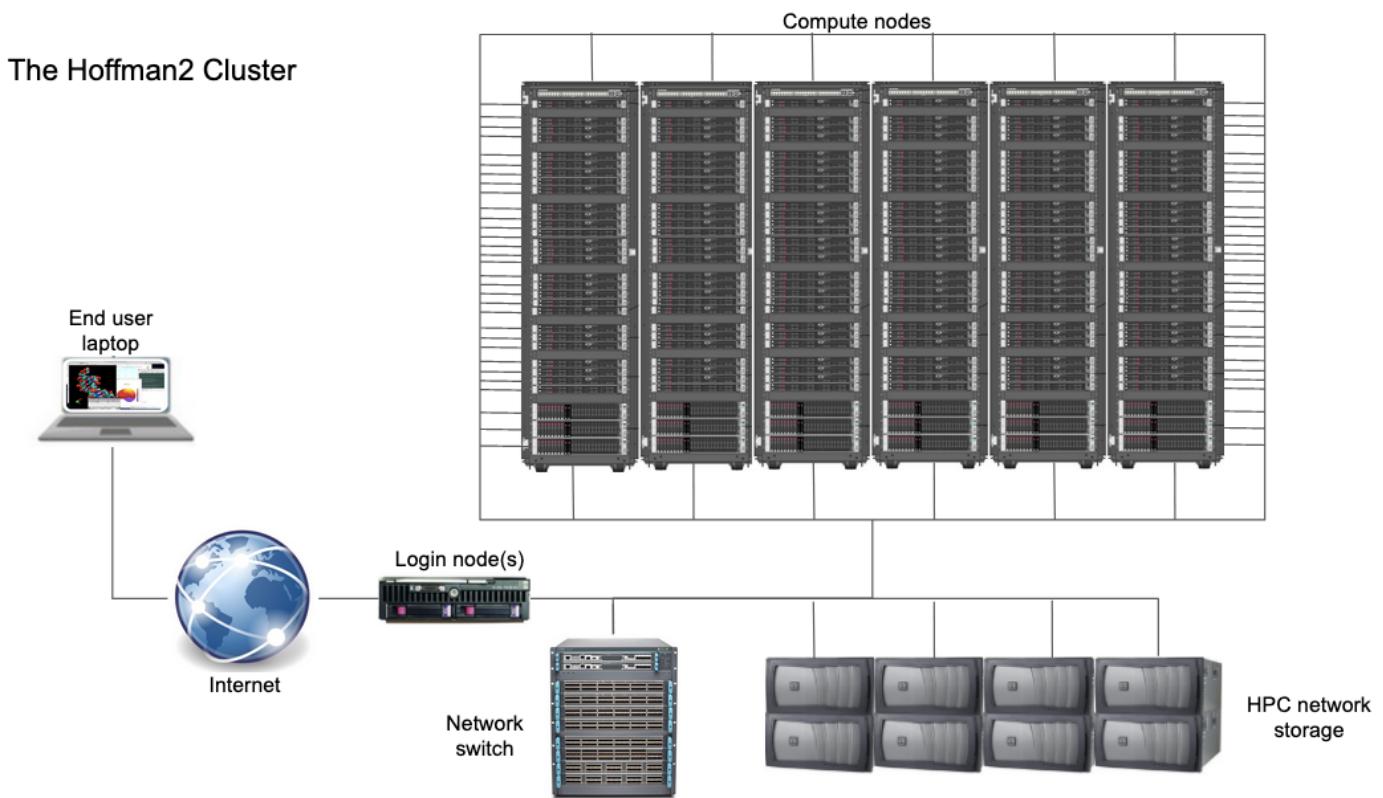


H2HH: Introduction to the Hoffman2 Cluster

Raffaella D'Auria, PhD

Learning Outcomes

- what is the Hoffman2 Cluster
- what can the Hoffman2 Cluster do for you
- navigating the documentation / policies
- getting an account on Hoffman2
- connecting to the Hoffman2 Cluster and opening a graphical application
- unix command line 101
- where to look for applications already available on Hoffman2



Nomenclature

Compute node:

- A compute node is a server (computer) with multiple computing cores that can execute as many simultaneous processes or threads as many cores it has

Computing core:

- A basic unit of computation within a CPU

Login node:

- A server designed to ensure connectivity between the "world" and the computing nodes on the cluster

Nomenclature (cont'd)

Computing Cluster:

- A computing cluster is made of individual nodes (computers) which are interconnected between themselves and which aggregate power can be harnessed to address problems which nature requires either distributed or capacity computing

What can the Hoffman2 Cluster do for you

High Performance Computing

- distributed computing (multiple computing cores across multiple compute nodes)
- shared-memory computing (multiple cores on the same compute node)
- data-intensive computing
- high-memory computing

Capacity Computing

- multiple computing cores available to carry out very many simulations
- execute concurrent (synchronous) or independent (asynchronous) simulations

What can the Hoffman2 Cluster do for you (cont'd)

Licensed software availability

- Abaqus
- Intel Parallel Cluster Studio
- Maple
- Mathematica
- MATLAB

Licensed software management

- bring your own licensed software (COMSOL, Ansys, FDTD, etc.)

User Support/Project Collaboration/Training

Navigating the documentation

The screenshot shows a web browser window with the URL <https://www.hoffman2.idre.ucla.edu/> in the address bar. The page content is the "Hoffman2 Cluster documentation page". On the left, there is a sidebar with a dark background containing a navigation menu:

- Hoffman2 Documentation**
- Search docs
- ABOUT:**
 - Mission and governance
 - System overview
 - Scheduler utilization graph
 - Purchasing additional resources
 - Frequently asked questions
 - Acknowledging Hoffman2
- ACCOUNTS:**
 - Requesting an account
 - Users - managing your account
 - Sponsors - managing your group
- USING THE HOFFMAN2 CLUSTER:**
 - Connecting/Logging in
 - Unix command line
 - Computing
 - Software
 - Data transfer
 - Storage
- EDUCATION AND USER SUPPORT:**
 - Education and training
 - Technical support
 - Research facilitation
 - Research proposal partnership
- POLICIES:**
 - User account policy
 - Backup policy
 - Job scheduling policy
 - Role of the login nodes
 - Role of GPU nodes

The main content area has a light gray background. At the top right are links for "View page source" and "Next". Below that is the title **Hoffman2 Cluster documentation page**. A section titled "How to use this documentation" provides instructions on navigating the site. Another section, "About the Hoffman2 Cluster", describes the project's history and management. There are also sections for "Recent announcements", "IDRE Advanced Computing Classes", and "See how the Hoffman2 Cluster is contributing to the research mission of UCLA". At the bottom, there is a "Last updated on Jan 12, 2022." message, a link to "Please report problems with this page", and a copyright notice: "© 2019 UC Regents Terms of Use & Privacy Policy".

The Hoffman2 Cluster - About

<https://www.hoffman2.idre.ucla.edu/About/System-overview.html>

The Hoffman2 Cluster is open, free of charge, to the entire UCLA campus with a base amount of computational and storage resources. Researchers can purchase additional computational and storage resources to increase their computational capacity. Computational resources owned by research groups can be accessed in preferential mode (in which each group only accesses their resources with higher priority and for extended run times) or in a shared/condominium mode (in which unused resources from a group are accessed by any other group who has purchased computational resources into the cluster). The advantage of the shared model is that researchers can access a much wider set of resources than what they have contributed. Additional resources for researchers include complete system administration for contributed cores, cluster access through dual, redundant 100GB network interconnects to the campus backbone, the capability to run large parallel jobs that can take advantage of the cluster's InfiniBand interconnect, and access to a multi-node NetApp storage system. Current HPC storage capacity is 2.5 petabytes, augmented by 250TB of flash-based storage for home and scratch directories and over 2PB of backup storage.

The cluster is also an end point on the [Globus](#) Online service using the 100GB network interconnect backbone, thus providing researchers a facility for fast and reliable data movement between Hoffman2 and most leadership class facilities across the USA.

Getting an account on Hoffman2

<https://www.hoffman2.idre.ucla.edu/Accounts/Requesting-an-account.html>

ACCOUNTS:

- System Identity Manager (SIM)

Requesting an account

- Overview
- Applying for a user account
- Register as a Sponsor

USING THE HOFFMAN2 CLUSTER:

- Users - managing your account
- Sponsors - managing your group

EDUCATION AND USER SUPPORT:

- Education and training
- Technical support
- Research facilitation
- Research proposal partnership

POLICIES:

- User account policy
- Backup policy
- Job scheduling policy
- Role of the login nodes
- Role of GPU nodes

Requesting an account

Note

If you are using a computer on Mednet in the David Geffen School of Medicine (DGSOM) you may need to first connect to the [campus VPN](#) in order to reach SIM. If you still have an issue, please submit a ticket to our [helpdesk](#).

Overview

In order to use the Hoffman2 Cluster, you will need to apply for a user account. All user accounts need to be sponsored by a UCLA faculty or researcher that qualifies under [UCLA Policy 900](#) as a principal investigator.

We use a web-based account management application, the [System Identity Manager \(SIM\)](#), for sponsor registration, user account requests, and to manage your Hoffman2 Cluster account. Please note, the [SIM](#) uses the UCLA Federated Authentication Service to authenticate access, therefore you need to have a [UCLA Logon ID](#) in order to access [SIM](#). [UCLA Logon ID](#) is not a service of the OARC HPC Systems Research Technology Group, if you have difficulty with it consider contacting the [UCLA IT Support Center](#).

Warning

All operations relative to cluster accounts and managing resources for your group (such as approving new users, renew expired accounts etc.) are performed on [System Identity Manager](#), [SIM](#), Hoffman2 faculty sponsors will **NOT** be notified by email messages when a new user is requesting their sponsorship or access to their resources. Faculty sponsors will therefore need to periodically visit their account on [SIM](#) to approve pending applications. Likewise users with pending applications will need to visit [SIM](#) to check the status of their application.

Requesting a user account

ACCOUNTS:
System Identity Manager (SIM)

Requesting an account

- Overview
- Applying for a user account**
- Who is eligible to become a Hoffman2 Cluster user

Register as a Sponsor

Users - managing your account

Sponsors - managing your group

USING THE HOFFMAN2 CLUSTER:

- Connecting/Logging in
- Unix command line
- Computing
- Software
- Data transfer
- Storage

EDUCATION AND USER SUPPORT:

- Education and training
- Technical support
- Research facilitation
- Research proposal partnership

POLICIES:

- User account policy

Requesting an account — Hoffman2

https://www.hoffman2.idre.ucla.edu/Accounts/Requesting-an-account.html#applying-for-a-user-account

Applying for a user account

After acquiring a **UCLA Logon ID** you are ready to register with **SIM** and apply for a user account on the Hoffman2 Cluster provided that your academic adviser is already registered as a **Hoffman2 Cluster Sponsor**. Please note, each person is allowed only one Hoffman2 Cluster user account. If you require access to multiple research groups, please submit a request to add/join a secondary group via our [online helpdesk](#).

Important

New users: [Register here!](#)

Should your academic adviser not be listed in the sponsor / principal investigator drop-down list on the **Request a cluster account** web form, your adviser will need to [register with SIM and request to become a sponsor](#). If you are a UCLA faculty or researcher that qualifies under **UCLA Policy 900** as a principal investigator, please register as a **Hoffman2 Cluster sponsor** first, before applying for a user account.

Who is eligible to become a Hoffman2 Cluster user

- UCLA Faculty
- UCLA Student
- UCLA Staff

Note

Cluster access can be authorized for people not affiliated with UCLA from Hoffman2 Cluster sponsors who have [purchased nodes](#) on the Hoffman2 Cluster by written request to the [IDRE Accounts Administrator](#).

Questions or comments? Visit our support online help desk at: <https://support.idre.ucla.edu>.

Requesting a sponsor account

<https://www.hoffman2.idre.ucla.edu/Accounts/Requesting-an-account.html#register-as-a-sponsor>

Requesting an account — Hoffm X

ACCOUNTS:

System Identity Manager (SIM)

Requesting an account

- Overview
- Applying for a user account
- Register as a Sponsor**
- Who is eligible to become a Hoffman2 Cluster Sponsor

Users - managing your account

Sponsors - managing your group

USING THE HOFFMAN2 CLUSTER:

- Connecting/Logging in
- Unix command line
- Computing
- Software
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- Storage

EDUCATION AND USER SUPPORT:

- Education and training
- Technical support
- Research facilitation
- Research proposal partnership

POLICIES:

- User account policy
- Backup policy
- Job scheduling policy

https://www.hoffman2.idre.ucla.edu/Accounts/Requesting-an-account.html#register-as-a-sponsor

Register as a Sponsor

There is no charge for being a sponsor or for sponsoring user accounts. Please register with **SIM** and check the box to become a sponsor.

Important

New Sponsors: [Register here!](#)

First name * Middle name (optional)

Last name * Title (optional)

Department or Institution *

Email *

Become a Sponsor? ←

Please check here if you hold a Faculty or professional research series appointment at UCLA that qualifies you as a principal investigator and you intend to sponsor students and researchers on the cluster. See: [UCLA Policy 900 : Principal Investigator Eligibility](#) [i]

REGISTER

After becoming a Hoffman2 Cluster sponsor, please visit the [Sponsor responsibilities](#) page to learn more about your responsibility as a Hoffman2 Cluster sponsor.

Sponsor responsibilities

<https://www.hoffman2.idre.ucla.edu/Accounts/Sponsors-managing-your-group.html#sponsor-responsibilities>

The screenshot shows a web browser window with the URL <https://www.hoffman2.idre.ucla.edu/Accounts/Sponsors-managing-your-group.html#sponsor-responsibilities>. The page content is as follows:

ACCOUNTS:

- System Identity Manager (SIM)
- Requesting an account
- Users - managing your account

Sponsors - managing your group

- Sponsor responsibilities**
- Managing your users

USING THE HOFFMAN2 CLUSTER:

- Connecting/Logging in
- Unix command line
- Computing
- Software
- Data transfer
- Storage

EDUCATION AND USER SUPPORT:

- Education and training
- Technical support
- Research facilitation
- Research proposal partnership

POLICIES:

- User account policy
- Backup policy
- Job scheduling policy
- Role of the login nodes
- Role of GPU nodes
- Security

Sponsor responsibilities

As a Hoffman2 Cluster sponsor you are expected to manage the authorization to use the cluster of the various user accounts you have sponsored (and which constitute your Hoffman2 group).

A Hoffman2 Cluster sponsor is required to:

- Approve or deny new user requests on SIM
- Approve or deny user renewals on SIM
- Supervise your sponsored users use of Hoffman2 Cluster computational resources
- Keep your email address current on your SIM account profile
- Respond promptly to messages from the Hoffman2 Cluster administrators (e.g., in case of suspected unauthorized access)
- Communicate to the Hoffman2 Cluster administrators if you no longer wish or qualify to be a sponsor
- Manage your group and your resources on SIM (you have the option of assign a delegate to carry on account related functions)
- Update the sponsorship SIM page if you no longer wish to sponsor a particular person's account
- Update us if a sponsored user is no longer eligible (e.g., if a student graduates and leaves UCLA)

Tip

If you have any account related problems or questions, contact us at: accounts@idre.ucla.edu (please set your email client to accept or whitelist email from accounts@idre.ucla.edu).

Questions or comments? Visit our support online help desk at: <https://support.idre.ucla.edu>.

Managing your users

Warning

You will NOT be notified by email messages when a user is requesting your sponsorship or access to your resources, you will therefore need to periodically visit your account on SIM.

Managing your account

<https://www.hoffman2.idre.ucla.edu/Accounts/Users-managing-your-account.html#password-processes>

ACCOUNTS:

- System Identity Manager (SIM)
- Requesting an account

Users - managing your account

- User responsibilities
- Account expiration
- Data retention

>Password Processes

- Retrieve your cluster username
- Request a new sponsor
- Change your email address
- Request membership to a secondary Unix group

Sponsors - managing your group

USING THE HOFFMAN2 CLUSTER:

- Connecting/Logging in
- Unix command line
- Computing
- Software
- Data transfer
- Storage

EDUCATION AND USER SUPPORT:

- Education and training
- Technical support
- Research facilitation
- Research proposal partnership

Users - managing your account

User responsibilities

When you are granted access to the Hoffman2 Cluster, you accept:

1. Each person is allowed only one Hoffman2 Cluster user account. If you require access to multiple research groups, please submit a request to add/join a secondary group via our [online helpdesk](#).
2. Hoffman2 Cluster user accounts are single user IDs and are not to be shared. If sharing is detected, your account will be disabled.
3. All accounts on the Hoffman2 Cluster are governed by a set of [Security Policies](#), which include [UCLA Policy 401: Minimum Security Standards for Network Devices](#) and [UCLA Policy 404: Protection of Electronically Stored Personal Information](#). Please read and familiarize yourself with these UCLA and Hoffman2 Cluster policies.
4. Personal information and other sensitive data, including statutory, regulatory, and contractually protected data - for example, human subjects research, restricted research, student and educational data, and personal health information (PHI) - are prohibited on the Hoffman2 Cluster.
5. You are expected to keep your contact information current for cluster-wide communication. To do so, please login into your [My Profile](#) page of the [System Identity Manager](#) at: <https://sim.idre.ucla.edu/sim/profile> and update your Hoffman2 Cluster identity profile.

If you have any questions, please open a new support ticket via our [helpdesk](#)

Account expiration

Hoffman2 Cluster user accounts must be renewed annually by your sponsor, typically on the anniversary of the account's creation date. Expired user accounts that are not renewed will be scheduled for deletion from the system, including any permanent data in their home and scratch directories. For more information, please see below [Data retention](#).

Questions or comments? Visit our support online help desk at: <https://support.idre.ucla.edu>.

Password Processes

<https://www.hoffman2.idre.ucla.edu/Accounts/Users-managing-your-account.html#password-processes>

ACCOUNTS:

- System Identity Manager (SIM)
- Requesting an account

Users - managing your account

- User responsibilities
- Account expiration
- Data retention

Password Processes

- Create a password
- Forgotten passwords
- Change your password

- Retrieve your cluster username
- Request a new sponsor
- Change your email address
- Request membership to a secondary Unix group

Sponsors - managing your group

USING THE HOFFMAN2 CLUSTER:

- Connecting/Logging in
- Unix command line
- Computing
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- Storage

EDUCATION AND USER SUPPORT:

- Education and training
- Technical support

Please adhere to the following rules when creating your password:

- You cannot use your username or a significant portion of it in your password.
- You need to have a minimum of 8 characters.
- You need to have at least 5 unique (different) characters.
- You need to have at least one character from 3 different character classes.
- The character classes are: UPPERCASE CHARACTERS, lowercase characters, digits (0-9), and punctuation (!#%&)(+*-./;=?>@[]_^`{ }|~)).
- You do not have to additionally change your password on the compute nodes. It usually takes 10-20 minutes for your new password to propagate to all the cluster nodes.

Tip

You can refer to the web-page [Choose a secure password](#) to learn more about how to choose a good password.

Questions or comments? Visit our support online help desk at: <https://support.idre.ucla.edu>.

Create a password

After your user account is created you can set your password on [SIM](#) (the link below will take you to the page where your password can be set):

[Create your password here!](#)

Forgotten passwords

You can reset your cluster password on [SIM](#) (the link below will take you to the page where your password can be reset):

[Reset your password here!](#)

For sponsor: managing users in your group

<https://www.hoffman2.idre.ucla.edu/Accounts/Sponsors-managing-your-group.html#managing-your-users>

ACCOUNTS:

- System Identity Manager (SIM)
- Requesting an account
- Users - managing your account

Sponsors - managing your group

- Sponsor responsibilities
- Managing your users

USING THE HOFFMAN2 CLUSTER:

- Connecting/Logging in
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- Storage

EDUCATION AND USER SUPPORT:

- Education and training
- Technical support
- Research facilitation
- Research proposal partnership

POLICIES:

- User account policy
- Backup policy
- Job scheduling policy
- Role of the login nodes
- Role of GPU nodes

Managing your users

Warning

You will NOT be notified by email messages when a user is requesting your sponsorship or access to your resources, you will therefore need to periodically visit your account on SIM.

Appointing a delegate

You can Appoint a delegate to approve and renew cluster accounts on your behalf by navigating to the Resources page of SIM

New user

You and any appointed delegate can approve or deny new account requests by using SIM. SIM does not send notifications, accordingly you may want to check SIM for new account requests.

User renewal

Each year on, or near the date of the original account application, user accounts need to be renewed to ensure continuation of services. You and any delegate can check on SIM the status of user renewals.

Expired user

If an account is not renewed, it expires. When an account has expired, the Accounts Administrator may contact you about the disposition of the account and its files. If you agree, the account will be disabled and the user will no longer be able to login or use Hoffman2 Cluster services.

Note

Respond to inquiries regarding expired accounts to prevent user termination and/or manage user data.

Connecting to the Hoffman2 Cluster

<https://www.hoffman2.idre.ucla.edu/Using-H2/Connecting/Connecting.html>

USING THE HOFFMAN2 CLUSTER:

Connecting/Logging in

- Connecting via terminal and SSH
- Connecting via remote desktop
- Connecting via Jupyter Notebook/Lab
- Remote direct rendering

Unix command line

Computing

Software

Data transfer

Storage

EDUCATION AND USER SUPPORT:

- Education and training
- Technical support
- Research facilitation

Connecting/Logging in

View page source

Previous Next

Connecting/Logging in

All the connections to the Hoffman2 Cluster are based on a secure protocol that requires authentication. Currently we support the following ways to connect to the cluster:

- via terminal emulator and SSH client on your local machine
- via remote desktop
- via jupyter notebook/lab

it is also possible to perform remote direct rendering on GPU nodes.

As all connections are based on a secure protocol, when logging in for the first time, for security reasons, you will be asked to confirm the authenticity of the host you are connecting to by double checking the hostkey fingerprint.

Connecting via a terminal and an SSH client

- ☐ Connecting via terminal and SSH
 - Opening GUI applications
 - ☒ Setting up SSH clients for Windows
- ☒ Connecting via remote desktop
- ☒ Connecting via Jupyter Notebook/Lab
- Remote direct rendering
- Unix command line
- Computing
- Software
- Data transfer
- Storage

EDUCATION AND USER SUPPORT:

- Education and training

Connecting via terminal and SSH

One of the most powerful ways to use the cluster is via a Unix shell, such as Bash, tcsh, or others. Unix shells are programs that provide an interface between the user and the operating system via the command-line **shell prompt** onto which the user types commands. A Unix shell is executed by a terminal program. Depending on the operating system of your computer, you have several choices for which terminal to use when connecting with the cluster.

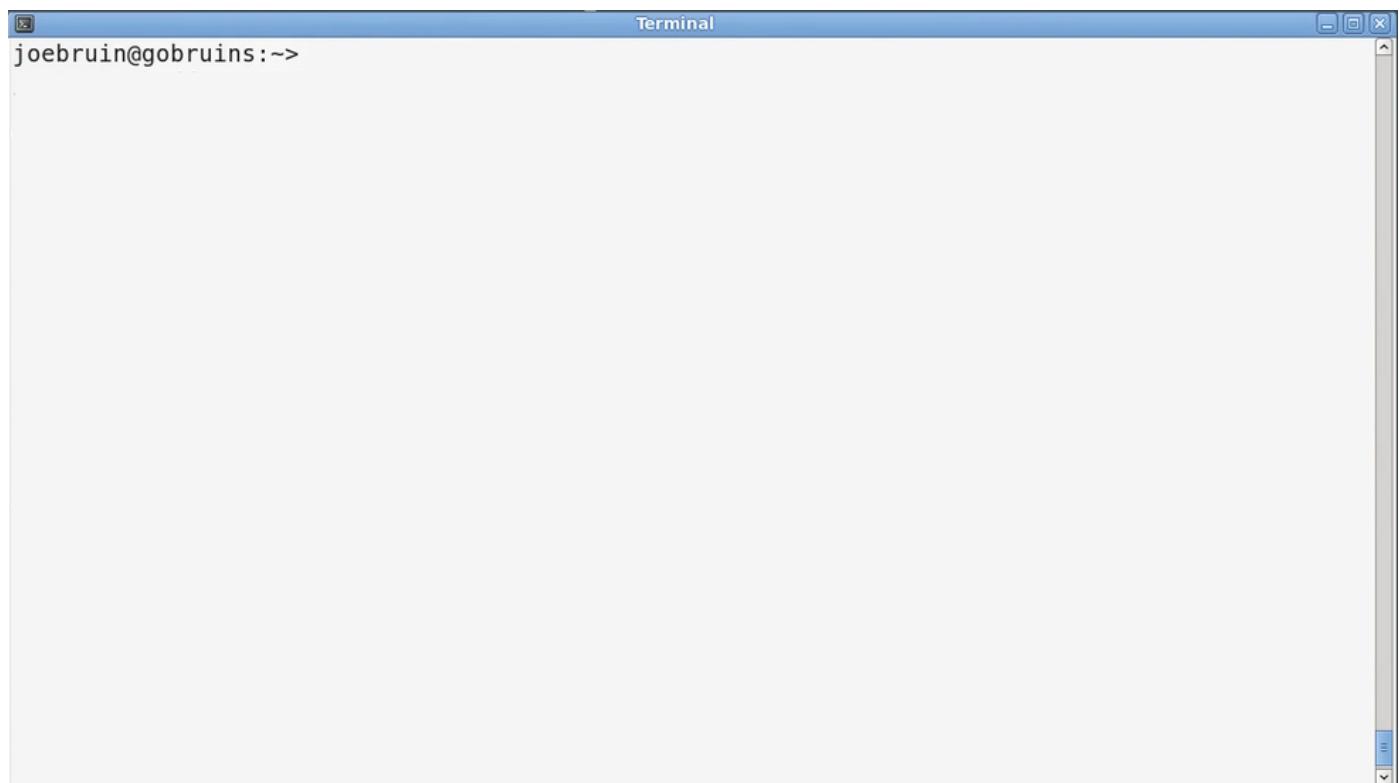
Linux Mac Windows

On any Linux distribution, you can use the standard SSH-client generally installed with the OS and available via any terminal application. Open a terminal window and type:

```
$ ssh login_id@hoffman2.idre.ucla.edu
```

where `login_id` is replaced by your cluster user name.

Terminal and SSH client (Linux and MacOS)



Terminal and SSH client (Linux and MacOS) (cont'd)

```
Terminal  
joebruin@gobruins:~> ssh joebruin@hoffman2.idre.ucla.edu  
joebruin@hoffman2.idre.ucla.edu's password:
```

Terminal and SSH client (Linux and MacOS) (cont'd)

```
Terminal  
joebruin@gobruins:~> ssh joebruin@hoffman2.idre.ucla.edu  
joebruin@hoffman2.idre.ucla.edu's password:  
Last login: Fri Aug 28 16:34:52 2020 from vpn-206.oit.ucla.edu  
Welcome to the Hoffman2 Cluster!  
  
Hoffman2 Home Page:      http://www.hoffman2.idre.ucla.edu  
Consulting:               https://support.idre.ucla.edu/helpdesk  
  
All login nodes should be accessed via "hoffman2.idre.ucla.edu".  
  
Please do NOT compute on the login nodes.  
  
Processes running on the login nodes which seriously degrade others'  
use of the system may be terminated without warning. Use qrsh to obtain  
an interactive shell on a compute node for CPU or I/O intensive tasks.  
  
The following news items are currently posted:  
  
Mathematica version 12.1  
MATLAB version 9.8 (R2020a) Total Academic Headcount  
Q Chem version 5.3.0  
IDRE Workshops and Training Sessions  
News Archive On Web Site  
  
Enter shownews to read the full text of a news item.  
[joebruin@login3 ~]$ █
```

Connecting via a terminal and SSH for the first time

```
joebruin@gobruins:~> ssh joebruin@hoffman2.idre.ucla.edu
The authenticity of host 'hoffman2.idre.ucla.edu (192.154.2.204)' can't be established.
ED25519 key fingerprint is SHA256:1Zdo2eN0mwgro0yCOXXFFdQjfQQA1vMpBxgwhGwirwY.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? [
```

Connecting for the first time

<https://www.hoffman2.idre.ucla.edu/About/FAQ/FAQ.html#connecting-for-the-first-time>

ABOUT:

- Mission and governance
- System overview
- Scheduler utilization graph
- Purchasing additional resources

Frequently asked questions

- Getting help
 - Accounts
 - Acknowledging the Hoffman2 Cluster
 - Applications, compilers and libraries
- Connecting, Authentication, SSH public-keys
 - Connecting for the first time
 - Public hosts hostkey fingerprints
 - Set-up SSH public-key authentication
- Data transfers
- Job Errors/ Job Scheduler
- Storage and File systems
- Other

Acknowledging Hoffman2

ACCOUNTS:

Connecting for the first time

As all connections are based on a secure protocol, the first time you connect from a local computer to the Hoffman2 Cluster you will be prompted with a message similar to:

```
The authenticity of host 'HOSTNAME (HOST IP)' can't be established.
ED25519 key fingerprint is SHA256:1Zdo2eN0mwgro0yCOXXFFdQjfQQA1vMpBxgwhGwirwY.
Are you sure you want to continue connecting (yes/no)?
```

Where **HOSTNAME** and **HOST IP** are the hostname and IP address of the various classes of public hosts.

Warning

Only proceed to connect if the ED25519 key fingerprint displayed in the prompted message corresponds to one of the [ED25519 fingerprints](#) listed in the Hoffman2 Cluster [Public hosts hostkey fingerprints](#) section.

If the ED25519 fingerprint displayed by your SSH client does not match one of the [ED25519 fingerprints](#) above for the Hoffman2 Cluster public hosts, when attempting to connect you will get a message similar to:

```
@@ WARNING: REMOTE HOST IDENTIFICATION HAS CHANGED! @@
IT IS POSSIBLE THAT SOMEONE IS DOING SOMETHING NASTY!
Someone could be eavesdropping on you right now (man-in-the-middle attack)!
It is also possible that the ED25519 host key has just been changed.
```

in this case, do not continue authentication; instead, contact us [here](#) or by email at: support@idre.ucla.edu.

Problems with this answer? Please send comments [here](#).

Hoffman2 Cluster public hostkey fingerprints

<https://www.hoffman2.idre.ucla.edu/About/FAQ/FAQ.html#table-h2-public-host-classes>

The Hoffman2 Cluster has the following classes of public, or external facing, hosts that are used to connect or to transfer data to and from the cluster:

| Class | Hostname |
|---------------------|---|
| Login nodes | hoffman2.idre.ucla.edu |
| Data transfer nodes | dtn.hoffman2.idre.ucla.edu |
| NX nodes | nx.hoffman2.idre.ucla.edu |
| x2go nodes | x2go.hoffman2.idre.ucla.edu |

All public facing hosts have the following hostkey fingerprint:

```

ED25519 MD5-hex: a4:eb:80:cd:84:8d:e3:69:62:a2:4a:3c:7b:f6:6d:f7
ED25519 SHA1-hex: /vL4oZulkQWULnA1hd0EZXx@GcI
ED25519 SHA256-hex: Lzdo2eh0mwgr0oyC0XXFd0f0Qa1vMpBxgwhGwirwY
ED25519 MD5-base64: a4e080cd848d36962a24a3c7bf66d7
ED25519 SHA1-base64: fe2f8a19ba590e32e2e703585dd04199c7419c2
ED25519 SHA256-base64: 959768d9e34e9b082ba0ec823975c515d4237d8400d6f329071830846c22af06

RSA MD5-hex: 3c:9c:67:d8:c5:a4:ae:77:07:5f:10:2f:20:4a:75:0f
RSA SHA1-hex: t+AS3JPKPxJvc5D7e3Vekcam8
RSA SHA256-hex: kah9BjW5zrUfnTp9Tg+E121dcCN7jN5+lR2RyIdvwM
RSA MD5-base64: 3c9c67d8c5a4ae77075f102f204a750f
RSA SHA1-base64: b7e012dc93e43f126f72cfbcfadd57a471a9ad
RSA SHA256-base64: 91a87d049c12ceb94595d5a7d4e0f8497621d70237b268379f94af647221dbf03

```

Even though all of our public, external-facing hosts use the same ED25519 (or RSA) public hostkey, depending on the software package you use to connect to the cluster, that public key can be represented with any one of the different fingerprint hashes given in the table [Hoffman2 public hostkey fingerprints](#).

Connecting from Windows with terminal and SSH

<https://www.hoffman2.idre.ucla.edu/Using-H2/Connecting/Connecting.html#connecting-via-terminal-and-ssh>

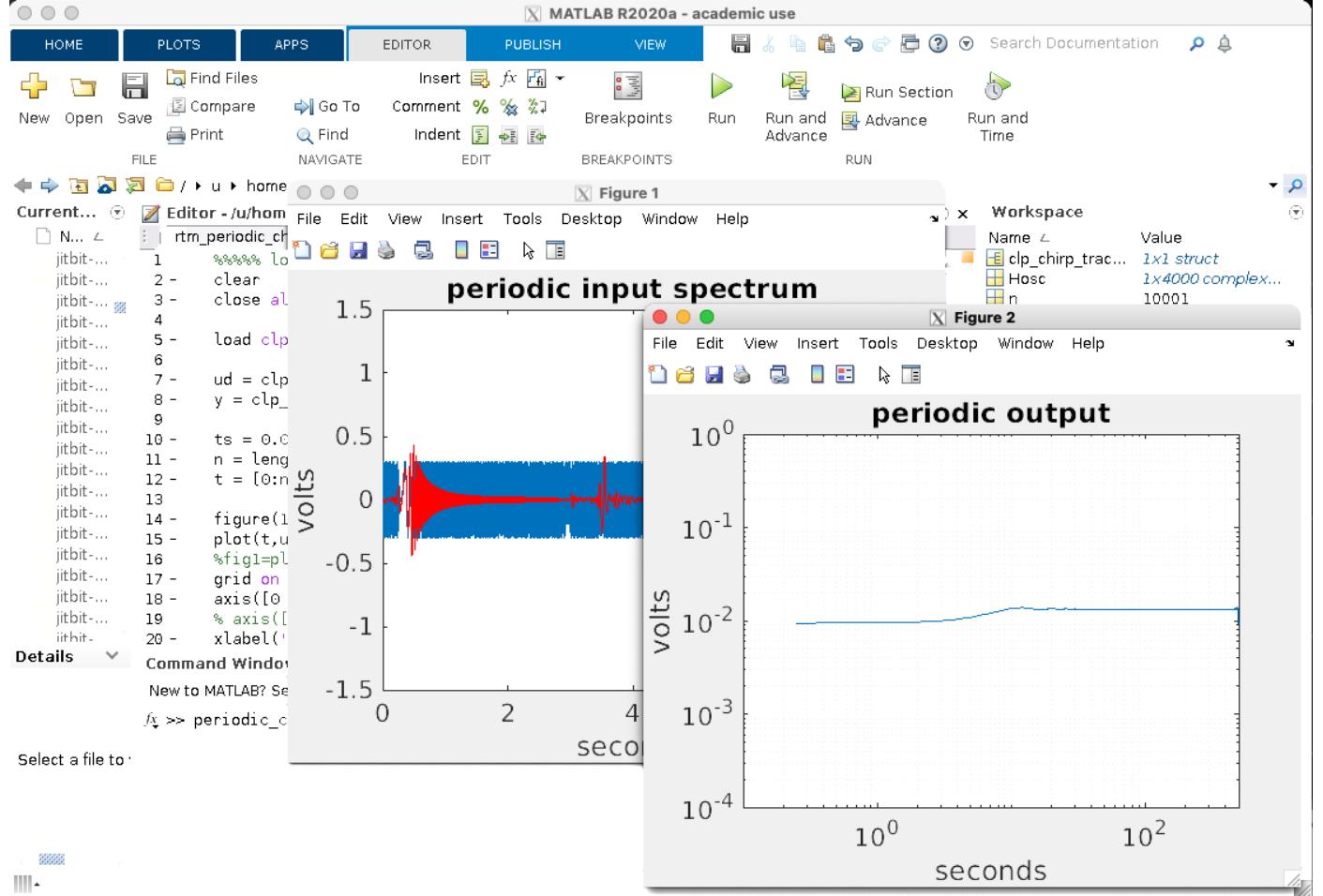
On Windows one of the following applications should be installed:

- [MobaXterm](#) terminal for Windows with [X11 server](#), SSH client & network tools
- [GitBash](#) terminal with SSH client
- [Windows Subsystem](#) A Windows native compatibility layer for running Linux binaries on Windows (available from Windows 10)
- [PuTTY](#) terminal with SSH client
- [Cygwin](#) a large collection of GNU and Open Source tools which provide functionality similar to a Linux distribution on Windows

X Window Systems/X11

The software that allow displaying of graphical applications on a unix-like system and that is designed to work on a server-client mode (you can connect to it and forward graphical applications to your local computer)

- For example: forward the MATLAB desktop GUI from Hoffman2 to your local computer



Opening graphical applications on Linux (Hands-on)

- [X11 server](#) is natively available
- forwarding of graphical applications for remote display is enabled via:
`ssh -X joebruin@hoffman2.idre.ucla.edu`
 substitute joebruin with your Hoffman2 username

Opening graphical applications on MacOS (Hands-on)

first time only:

- install [Xquartz](#) (the X11 server for MacOS)
- open the terminal app and **before connecting to Hoffman2** issue:

```
defaults write org.macosforge.xquartz.X11 enable_iglx -bool true
```

- reboot your local computer

connect with:

- forwarding of graphical applications for remote display is enabled via:
`ssh -Y joebruin@hoffman2.idre.ucla.edu`

Opening graphical applications on Windows

no need to install other software then any of the following:

- [MobaXterm](#)
- [Windows Subsystem for Linux](#)
- [Cygwin](#)

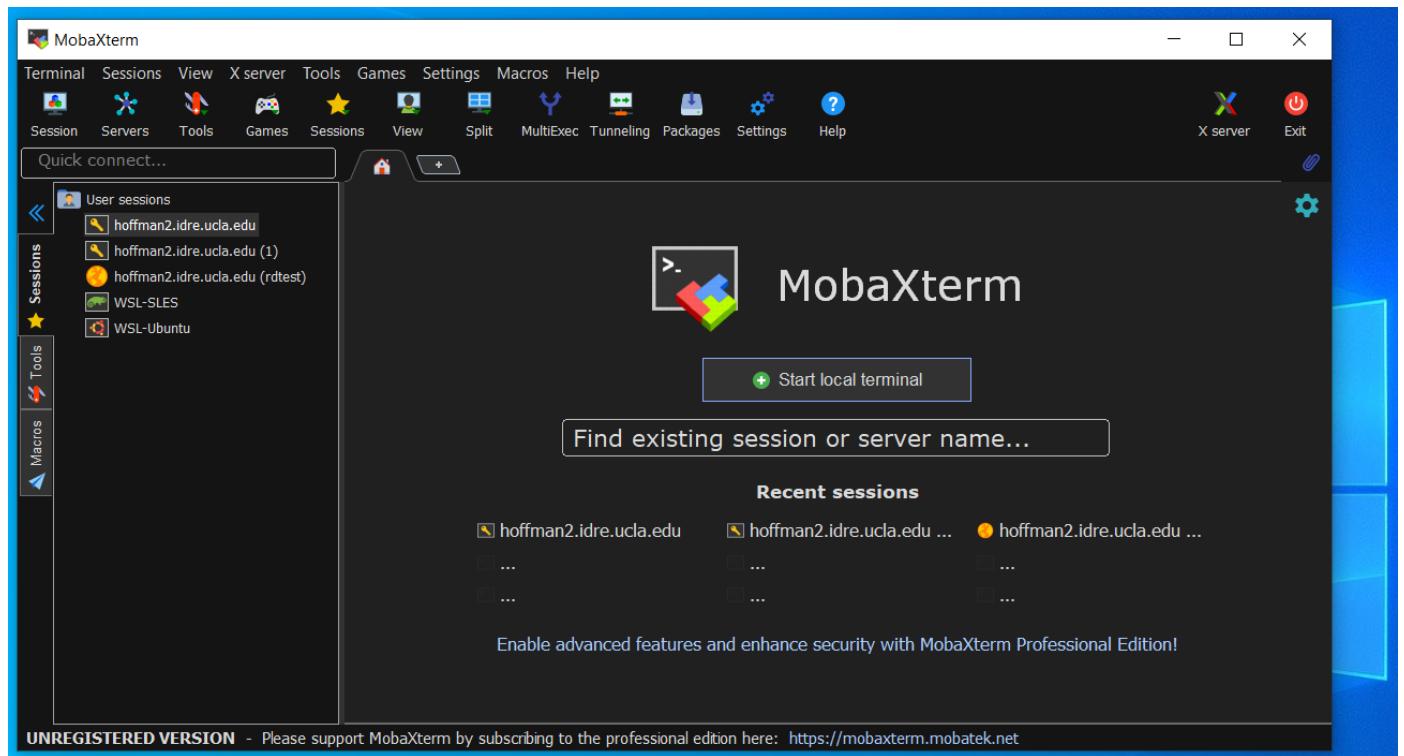
need to install an X11 window server if using either of:

- [GitBash](#)
- [PuTTY](#)

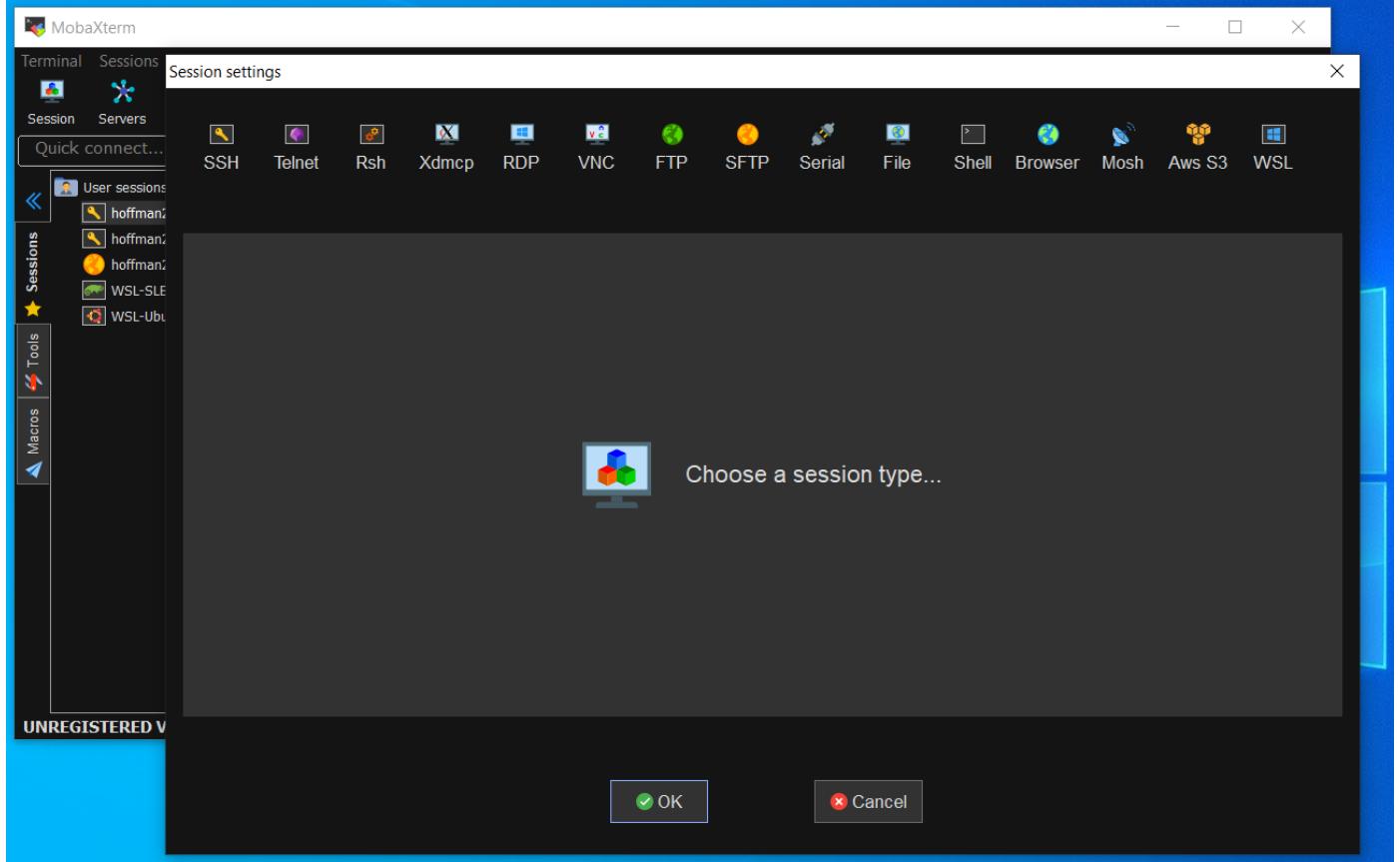
a possible X11 Window server:

- [Xming](#)

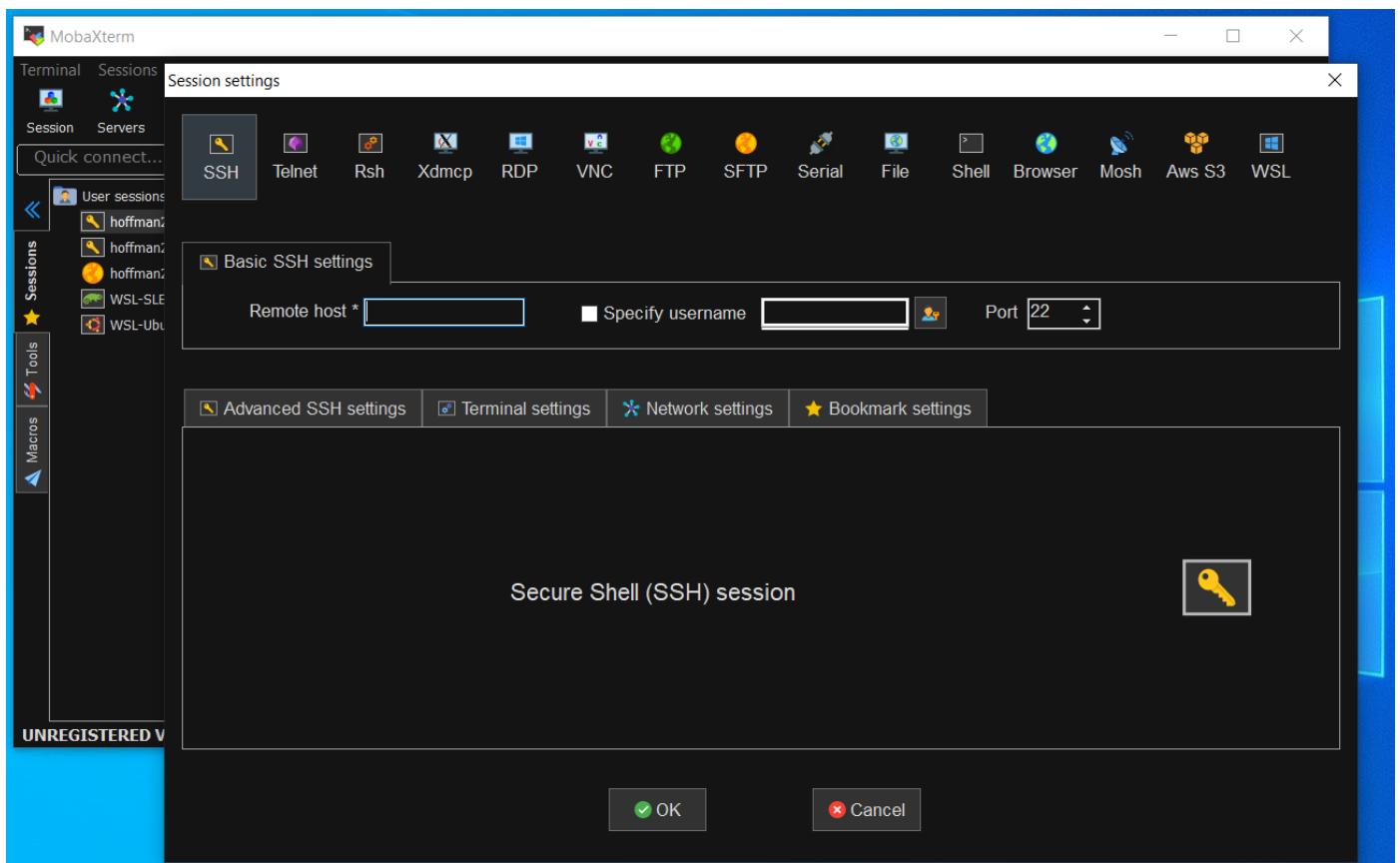
Opening graphical applications on Windows using MobaXterm (Hands-on)



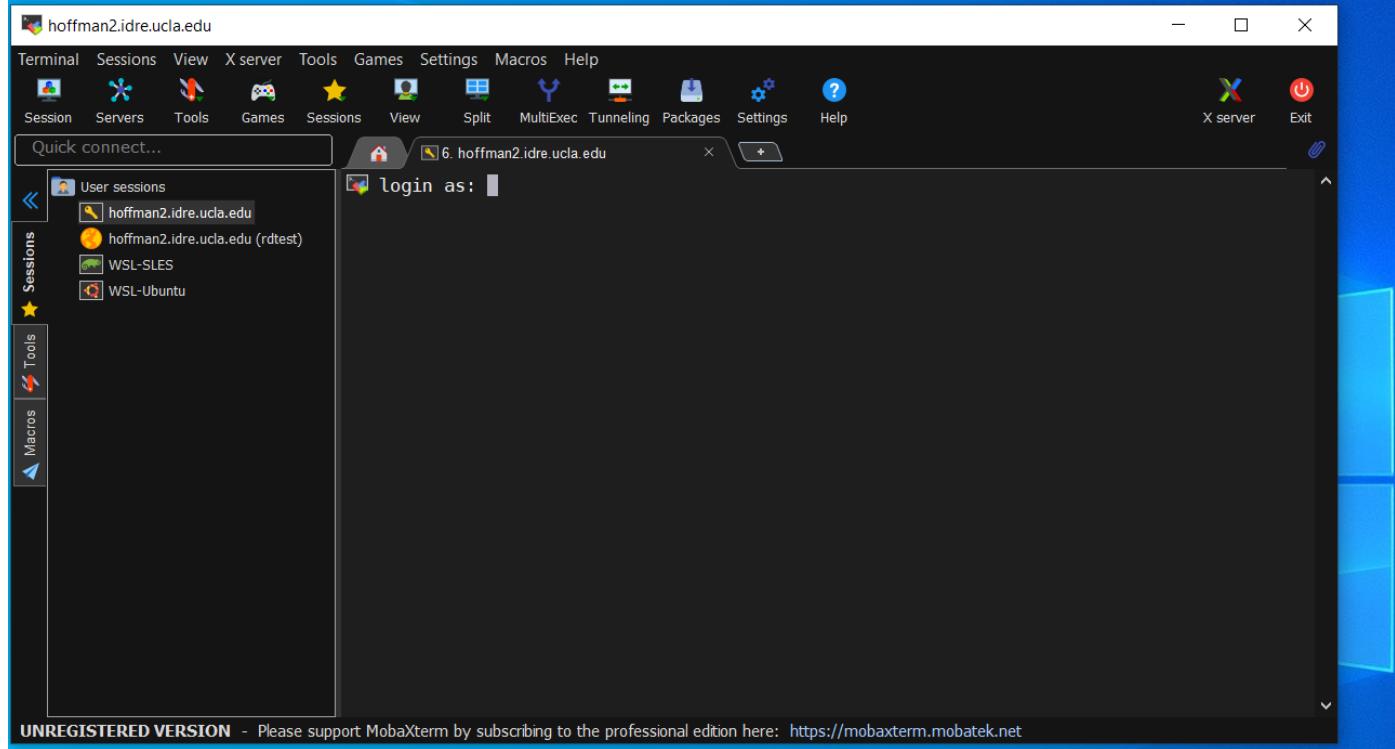
Opening graphical applications on Windows using MobaXterm (cont'd)



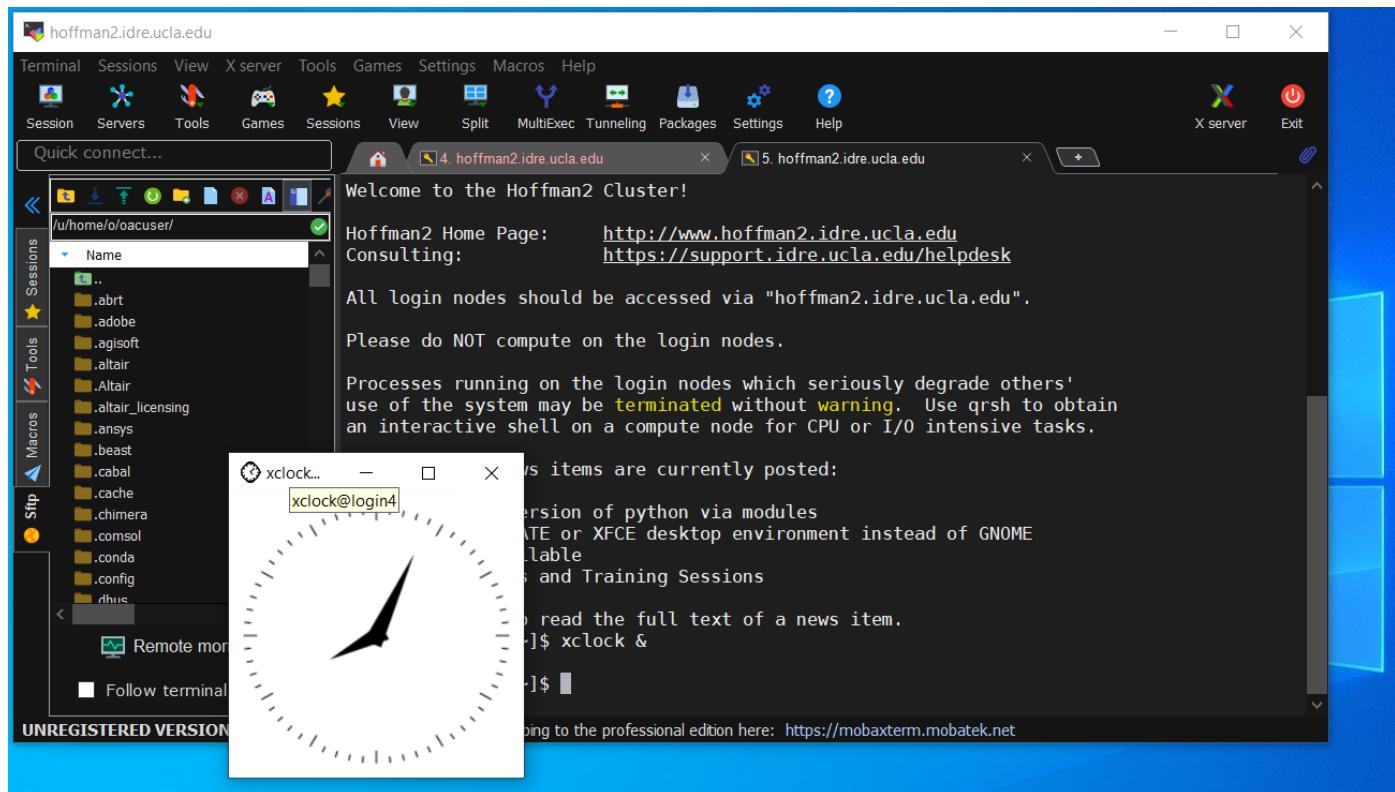
Opening graphical applications on Windows using MobaXterm (cont'd)



Opening graphical applications on Windows using MobaXterm (cont'd)



Opening graphical applications on Windows using MobaXterm



Unix command line 101

<https://www.hoffman2.idre.ucla.edu/Using-H2/Command-line/Unix-command-line.html>

UCLA Unix command line — Hoffman2

https://www.hoffman2.idre.ucla.edu/Using-H2/Command-line/Unix-command-line.html

Terminal

```
joebruin@gobruins:~> ssh joebruin@hoffman2.idre.ucla.edu
joebruin@hoffman2.idre.ucla.edu's password:
Last login: Fri Aug 28 16:34:52 2020 from vpn-206.oit.ucla.edu
Welcome to the Hoffman2 Cluster!

Hoffman2 Home Page:      http://www.hoffman2.idre.ucla.edu
Consulting:              https://support.idre.ucla.edu/helpdesk

All login nodes should be accessed via "hoffman2.idre.ucla.edu".

Please do NOT compute on the login nodes.

Processes running on the login nodes which seriously degrade others' use of the system may be terminated without warning. Use qrsh to obtain an interactive shell on a compute node for CPU or I/O intensive tasks.

The following news items are currently posted:

Mathematica version 12.1
MATLAB version 9.8 (R2020a) Total Academic Headcount
Q Chem version 5.3.0
IDRE Workshops and Training Sessions
News Archive On Web Site

Enter shownews to read the full text of a news item.
[joebruin@login3 ~]$
```

Unix command line 101: Navigation (Hands-on)

<https://www.hoffman2.idre.ucla.edu/Using-H2/Command-line/Unix-command-line.html#navigation>

- Try these commands:

```
ls
ls -a
ls -l
ls -lat
ls -latr
pwd
cd $SCRATCH
pwd
timestamp=`date "+%F_%H-%M"`;
mkdir $HOME/H2HH_$timestamp;
cd $HOME/H2HH_$timestamp
pwd
rmdir $HOME/H2HH_$timestamp
ls $HOME/H2HH_$timestamp
```

Move to Hands-on notebook

Unix command line 101: Environmental Variables (Hands-on)

<https://www.hoffman2.idre.ucla.edu/Using-H2/Command-line/Unix-command-line.html#unix-environment-environmental-variables>

- Some important environmental variables:

```
$PATH
$LD_LIBRARY_PATH
$HOME
$SCRATCH # Hoffman2-specific
$SHELL
```

- to check the content of an environmental variable issue:

```
echo $HOME
```

Move to Hands-on notebook

Unix command line 101: Working with files (Hands-on)

<https://www.hoffman2.idre.ucla.edu/Using-H2/Command-line/Unix-command-line.html#working-with-files>

- Try these commands:

```
cat $HOME/.bashrc  
less $HOME/.bashrc # type q to interrupt  
more $HOME/.bashrc # type q to interrupt
```

- Check the first few lines of a file:

```
head $HOME/.bashrc  
head -n 2 $HOME/.bashrc
```

- Check the last few lines of a file:

```
tail $HOME/.bashrc  
tail -n 2 $HOME/.bashrc
```

- Check the last lines of a file as it is being written:

```
tail -f $SGE_ROOT/$SGE_CELL/common/accounting # Control-C to interrupt
```

Move to Hands-on notebook

Unix command line 101: Editing files (Hands-on)

<https://www.hoffman2.idre.ucla.edu/Using-H2/Command-line/Unix-command-line.html#editing-files>

- Non graphical editors:

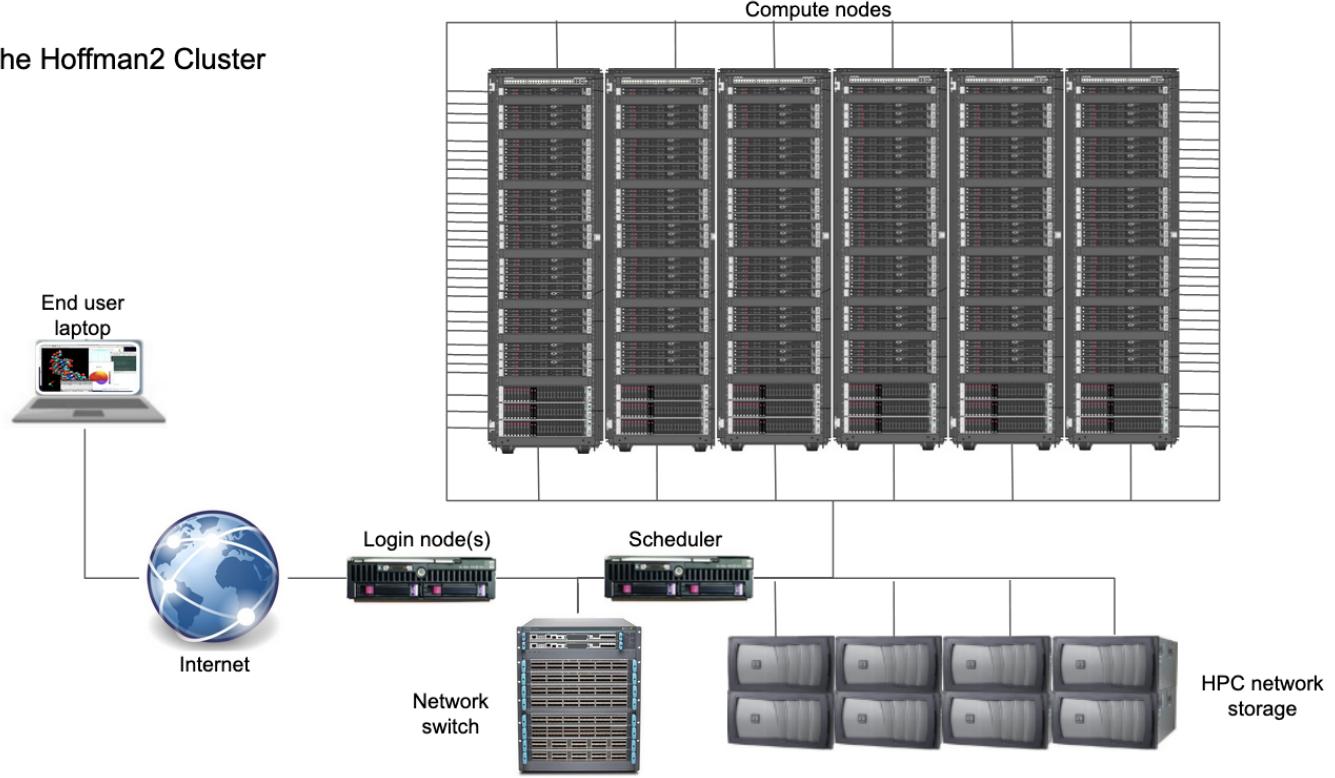
```
nano  
emacs  
vi
```

- Graphical editors:

```
gedit &  
emacs &  
gvim &
```

Getting work done on the cluster

The Hoffman2 Cluster



On which resources will your job run?

<https://www.hoffman2.idre.ucla.edu/Using-H2/Computing/Computing.html#computational-resources-on-the-hoffman2-cluster>

Highp vs shared vs campus resources:

<https://www.hoffman2.idre.ucla.edu/Using-H2/Computing/Computing.html#highp-vs-shared-vs-campus-jobs>

- **highp** refers to the use of group owned compute nodes
 - users can run jobs for up to 14 days
 - only for users in group who own resources
- **shared** refers to the use of temporarily unused group owned compute nodes
 - users can run jobs for up to 24 hours
 - only for users in group who own resources
- **campus** refers to compute nodes owned by IDRE and made available to the UCLA community
 - users can run jobs for up to 24 hours

On which resources will your job run? (cont'd)

<https://www.hoffman2.idre.ucla.edu/Using-H2/Computing/Computing.html#jobs-and-resources>

Working interactively on the cluster

Where to look for applications already available

on Hoffman2

Running non interactive workflow (batch jobs)