

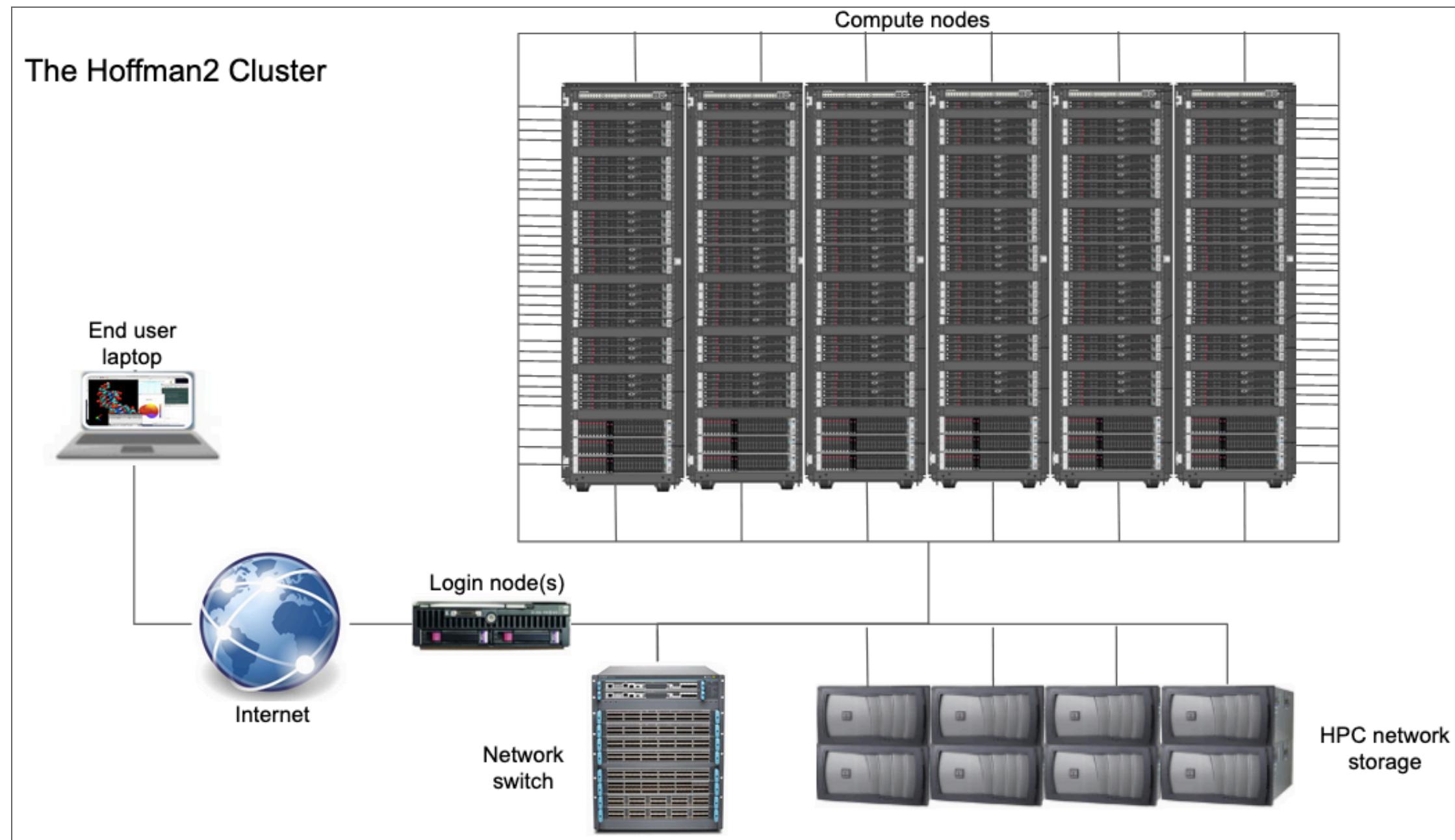
HPC@UCLA: Introduction to the Hoffman2 Cluster

Raffaella D'Auria, PhD

Learning Outcomes

- 1) what is the Hoffman2 Cluster**
- 2) what can the Hoffman2 Cluster do for you**
- 3) navigating the documentation**
- 4) getting an account on the Hoffman2 Cluster**
- 5) connecting to the Hoffman2 Cluster via terminal and SSH**
- 6) opening graphical applications on the Hoffman2 Cluster**
- 7) unix command line 101**
- 8) Getting work done on the Hoffman2 Cluster**

What is the Hoffman2 Cluster



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

Learning Outcomes 2

- 1) what is the Hoffman2 Cluster**
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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

Learning Outcomes 3

- 1) what is the Hoffman2 Cluster**
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Navigating the documentation

<https://www.hoffman2.idre.ucla.edu/>

The screenshot shows a web browser window displaying the "Hoffman2 Cluster documentation page". The URL in the address bar is <https://www.hoffman2.idre.ucla.edu/>. The page content is as follows:

Hoffman2 Documentation

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

Hoffman2 Cluster documentation page

How to use this documentation Please use the table of contents contained in the menu to navigate to the needed page, or use the search box, also in the page menu, to look up a topic in the documentation by keywords. Use the Find feature (Ctrl-F for Windows computers or ⌘ F for Mac computers) to locate the search term on the selected search page.

About the Hoffman2 Cluster The Hoffman2 Cluster is a project of the Institute for Digital Research and Education (IDRE). It opened to users on January 28, 2008. The Hoffman2 Cluster is managed and operated by the IDRE Research Technology Group under the direction of Lisa Snyder.

Recent announcements

- Campus VPN required to reach Grid Identity Manager
- GPU nodes available

IDRE Advanced Computing Classes

A number of advanced computing classes are scheduled every academic term. For more information or to sign up, please see: [IDRE's list of upcoming event](#). To visit UCLA's one-stop portal for training classes and workshops offered around campus, please visit: [Workshops @ UCLA](#). For more information also see: [Education-and-training](#).

See how the Hoffman2 Cluster is contributing to the research mission of UCLA

- [Research highlights](#)
- [Publications acknowledging the Hoffman2 Cluster](#)
- [Acknowledging the Hoffman2 Cluster](#)

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Learning Outcomes 4

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Getting an account on the Hoffman2 Cluster

- Any perspective Hoffman2 Cluster user needs to be approved by a Hoffman2 Cluster Faculty Sponsor
- UCLA faculty or researchers that qualifies under **UCLA Policy 900** as principal investigators can apply to become Hoffman2 Cluster Faculty Sponsors
- Hoffman2 Cluster Faculty Sponsors can sponsor themselves and their collaborators to become Hoffman2 Cluster users
- All accounts matters are handled through the **System Identity Manager (SIM)**
- Access to SIM is via your **UCLA Logon ID**

More information are available at: [**https://www.hoffman2.idre.ucla.edu/Accounts/Accounts.html#**](https://www.hoffman2.idre.ucla.edu/Accounts/Accounts.html#)

In what follow a demonstration of a registration as a H2C Faculty Sponsor and a H2C user will be show.

Connecting to SIM for the first time

- Access to the **System Identity Manager (SIM)** requires authentication via your **UCLA Logon ID**
- the first time you connect you should see:

The screenshot shows a web page titled "Hoffman2 Cluster" under "System Identity Manager". In the top right corner, there is a "Logout Demo" link. The main question on the page is "Do you have a Hoffman2 Cluster account ?" with two buttons below it: "YES" and "NO / I DO NOT KNOW". At the bottom left is the "UCLA" logo, and at the bottom center is the copyright notice "© 2018 UC REGENTS TERMS OF USE & PRIVACY POLICY" followed by a small link icon.

- select **NO** if you do not have an account already

Registering with SIM as a Hoffman2 Faculty Sponsor

UCLA faculty or researchers that qualifies under UCLA Policy 900 as principal investigators can apply to become Hoffman2 Cluster Faculty Sponsors

Below is a screenshot with the information provided to the SIM registration page by the hypothetical PI, Éuro Bruin, who is applying to become a Hoffman2 Cluster Faculty Sponsor:

The screenshot shows a registration form with the following fields filled in:

- First name ***: Euro
- Middle name (optional)**: (empty)
- Last name ***: Bruin
- Title (optional)**: (empty)
- Department or Institution ***: Luskin Center for Innovation
- Email ***: eurobruin@ucla.edu
- 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](#) [link icon]
- REGISTER** button

Registering with SIM as a Hoffman2 Faculty Sponsor (cont'd)

Sponsors registration requires the creation of a **unix group**, all perspective users applying under a PI sponsorship will be part of this unix group.

Request a Primary Group

Naming requirements.

- The length must be between 3 and 8 characters.
- The first letter must be a - z.
- Lowercase letters only.

Primary Group (UNIX) *

REQUEST GROUP

Registering with SIM as a Hoffman2 Faculty Sponsor - Approval Step

All Sponsors applications have to be verified and approved, this process generally take about a working day. After selecting the unix group name SIM will display:

Home

Status

Awaiting approval from Lisa Snyder for ebruin H2 since 2024-04-02 19:59:14

Information

Hello Éuro Bruin,

Debut 2024-04-02 19:59:01

Requesting a user account (for Sponsors or Sponsorees)

**SIM currently does not send email notification, Sponsors need to log back into SIM to check the status of their application
Sponsors can sponsor themselves for a user account**

After approval Sponsors can create an account for themselves and approve/deny new users requesting their sponsorship:

The screenshot shows the Hoffman2 Cluster System Identity Manager interface. At the top, there is a header with the cluster name "Hoffman2 Cluster" and "System Identity Manager" on the left, and "Logout Demo", "Home", and "My Profile" on the right. Below the header, the word "Home" is displayed. The main content area is divided into two sections: "Information" and "Actions". The "Information" section contains the text "Hello Demo Bruin," and "Debut 2024-04-02 19:57:29". The "Actions" section contains the text "Create an account for yourself."

Hoffman2 Cluster
System Identity Manager

Logout Demo
Home My Profile

Home

Information

Hello Demo Bruin,
Debut 2024-04-02 19:57:29

Actions

Create an account for yourself.

Requesting a user account (for Sponsors or Sponsorees) -cont'd

All perspective users, after registration with SIM can request a user account, the first step is to select a Hoffman2 Faculty Sponsor:

Request a Cluster Account

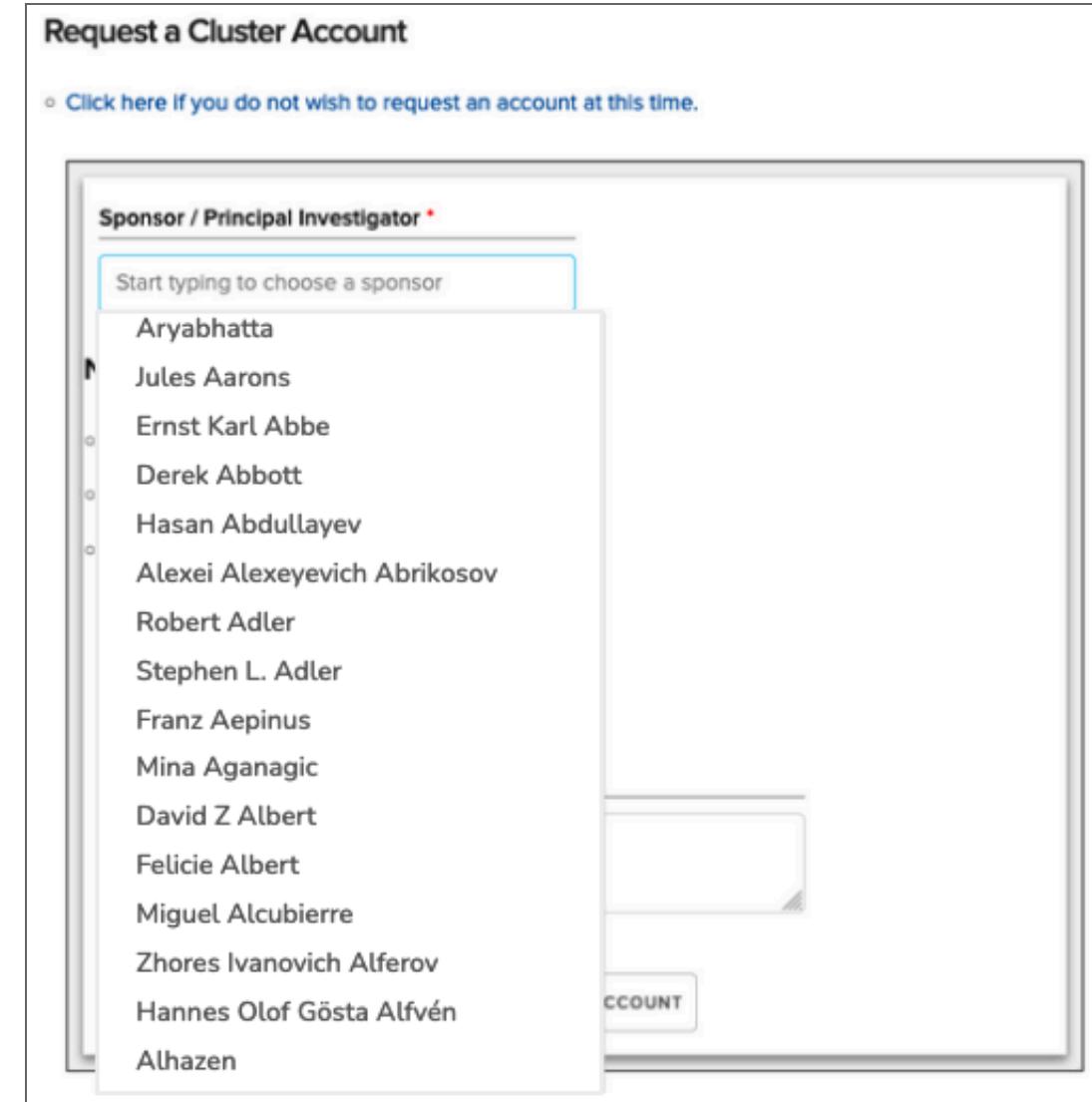
Click here if you do not wish to request an account at this time.

Sponsor / Principal Investigator *

Start typing to choose a sponsor

- Aryabhatta
- Jules Aarons
- Ernst Karl Abbe
- Derek Abbott
- Hasan Abdullayev
- Alexei Alexeyevich Abrikosov
- Robert Adler
- Stephen L. Adler
- Franz Aepinus
- Mina Aganagic
- David Z Albert
- Felicie Albert
- Miguel Alcubierre
- Zhores Ivanovich Alferov
- Hannes Olof Gösta Alfvén
- Alhazen

ACCOUNT



Completing the user cluster account request

The screenshot shows a web-based form for requesting a user cluster account. The form is contained within a light gray border and includes the following fields:

- Sponsor / Principal Investigator ***: A text input field containing "Euro Bruin".
- Naming requirements.**: A list of three items:
 - The length must be between 3 and 8 characters.
 - The first letter must be a - z.
 - Lowercase letters only.
- Username ***: A text input field containing "dbruin".
- Project Description**: A text area containing the placeholder text "My awesome research will make the world a better place!".

At the bottom center of the form is a blue rectangular button labeled "REQUEST ACCOUNT".

Sponsors account approval or denial

After requesting an account perspective users should remind their selected sponsors to log into SIM and approve or deny their application.

SIM does not send email messages, if the sponsor does not log into SIM accounts requests will not be approved

This is what a PI who has pending account requests would see upon logging onto SIM:

Approve New Account Request

The following people have requested that you authorize their use of the Hoffman2 cluster, presumably they are members of your lab, or collaborators.

Contact Information	Department Information
Demo Bruin demobruin@ucla.edu	1000 Physics & Astronomy Letters and Science

Project Description

My awesome research will make the world a better place!

AUTHORIZE ACCOUNT **REJECT REQUEST**

Setting the password for your account

Upon being approved, users will need to log back into SIM (**you will not be notified by SIM that your account has been approved, it is your responsibility to periodically check**).

An approved user will see the following menu requesting to set a password for their newly created accounts:

Reset Hoffman2 cluster password for username: dbruin.

Help
Set initial UNIX account password.

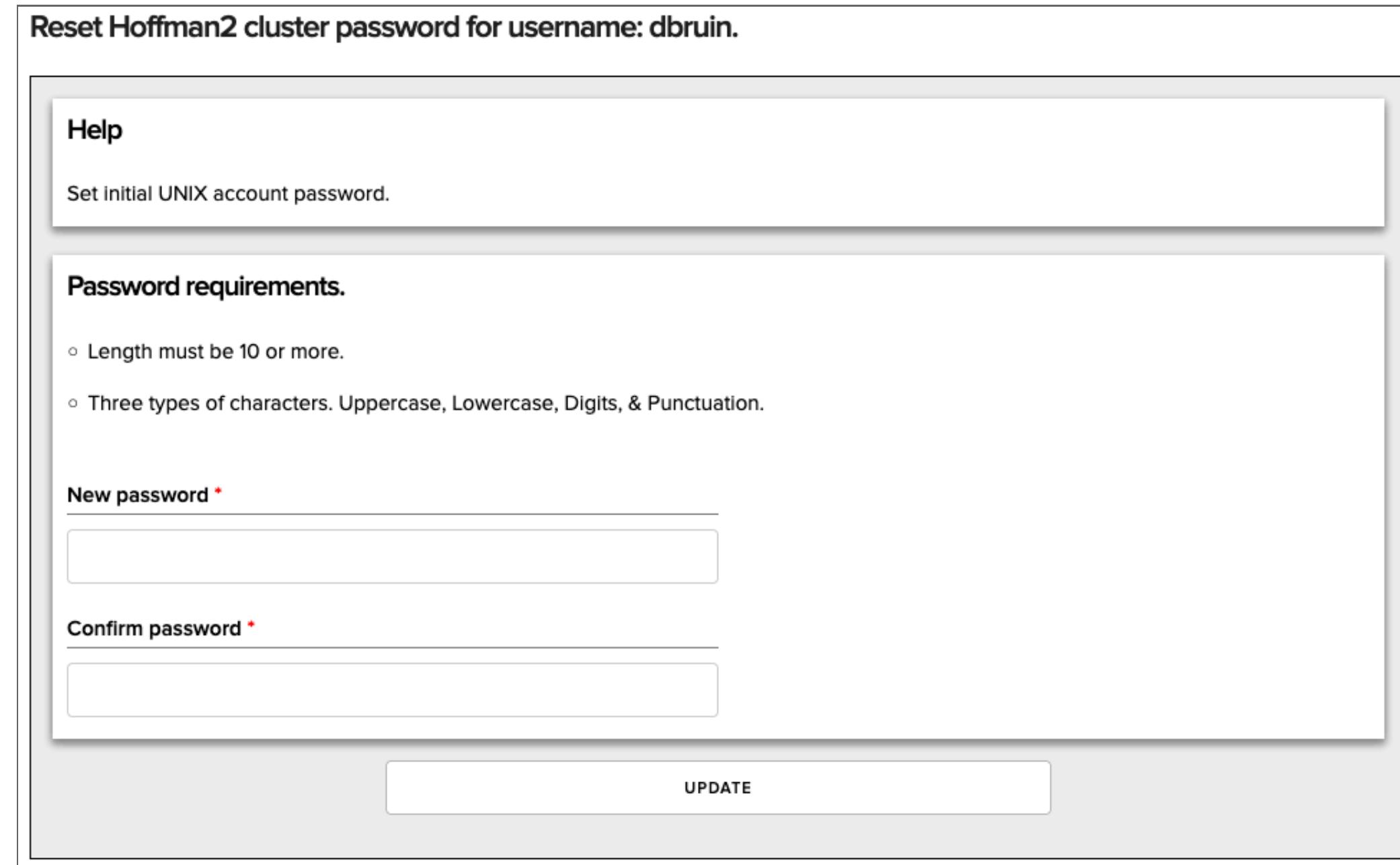
Password requirements.

- Length must be 10 or more.
- Three types of characters. Uppercase, Lowercase, Digits, & Punctuation.

New password *

Confirm password *

UPDATE



Password resetting

Use the link: <https://sim.idre.ucla.edu/sim/account/view> and click on the link: Change the password for <YOURHOFFMAN2USERNAME> on the H2 cluster shown below for user dbruin.

Your Account

dbruin

cluster
H2

sponsor
Éuro Bruin

sponsorship status
Active

username
dbruin (uid:21207)

primary group
ebruin (gid:21206)

last used
Never

[Change the password for dbruin on the H2 cluster.](#)

[Request resource for your dbruin account. *](#)

Start typing to choose a resou

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

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>.

Sponsor responsibilities

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

ACCOUNTS:

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

Sponsors - managing your group

- Sponsor responsibilities** (selected)
- Managing your users

USING THE HOFFMAN2 CLUSTER:

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

EDUCATION AND USER SUPPORT:

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- 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.

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
- Unix command line
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EDUCATION AND USER SUPPORT:

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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 vising [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 inquires regarding expired accounts to prevent user termination and/or manage user data.

Learning Outcomes 5

- 1) what is the Hoffman2 Cluster**
- 2) what can the Hoffman2 Cluster do for you**
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- 5) **connecting to the Hoffman2 Cluster via terminal and SSH****
- 6) opening graphical applications on the Hoffman2 Cluster**
- 7) unix command line 101**
- 8) Getting work done on the Hoffman2 Cluster**

Connecting to the Hoffman2 Cluster via terminal and SSH

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

The screenshot shows a web browser window with the URL <https://www.hoffman2.idre.ucla.edu/Using-H2/Connecting/Connecting.html>. The page title is "Connecting/Logging in". The left sidebar has a dark background with white text under "USING THE HOFFMAN2 CLUSTER:" and "EDUCATION AND USER SUPPORT:". The "USING THE HOFFMAN2 CLUSTER:" section includes links for "Connecting/Logging in" (selected), "Connecting via terminal and SSH", "Connecting via remote desktop", "Connecting via Jupyter Notebook/Lab", "Remote direct rendering", "Unix command line", "Computing", "Software", "Data transfer", and "Storage". The "EDUCATION AND USER SUPPORT:" section includes links for "Education and training", "Technical support", and "Research facilitation". The main content area has a light gray background with a header "» Connecting/Logging in" and "View page source". It features a "Previous" button and a "Next" button. The main heading is "Connecting/Logging in". Below it, a paragraph states: "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:" followed by a bulleted list: "• via terminal emulator and SSH client on your local machine", "• via remote desktop", and "• via jupyter notebook/lab". A note below says: "it is also possible to perform remote direct rendering on GPU nodes." At the bottom, a note reads: "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 (from Linux)

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

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.

Important

Once you have identified your terminal application open it and issue:

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

substitute **login_id** with your Hoffman2 Cluster user name.

Connecting via a terminal and an SSH client (from Mac)

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

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 macOS (the operating system running on Mac computers) an SSH-client is available and can be used via the **Terminal application** (although other terminal programs are also available for macOS). The Terminal application can be located via **Spotlight Search** or **Finder**.

Important

Once you have identified your terminal application open it and issue:

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

substitute **login_id** with your Hoffman2 Cluster user name.

Connecting via a terminal and an SSH client (from Windows)

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

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 Windows, install **any one** of the following free ssh client programs, which offer a terminal emulator for connecting to remote computers. The order in which options are ordered from our most to least recommended applications (users may still opt for different solutions):

- [MobaXterm](#) an SSH client that includes an X11 server (for running GUI applications).
- [Git Bash](#) an emulation shell provided by [Git for Windows](#)
- [PowerShell 5.1 or later](#)
- [Windows Subsystem for Linux](#): A Windows native compatibility layer for running Linux binaries on Windows (available from Windows 10).
- [Putty](#) an open source SSH and telnet client.
- [Cygwin](#) a collection of tools that provide Linux functionalities in Windows systems.

See: [Setting up SSH clients for Windows](#) to learn how to install and customize some of the terminal clients mentioned here.

Connecting via terminal and SSH - Linux, Mac & Windows

on a Windows PowerShell make sure that the version is 5.1 or later with the command:

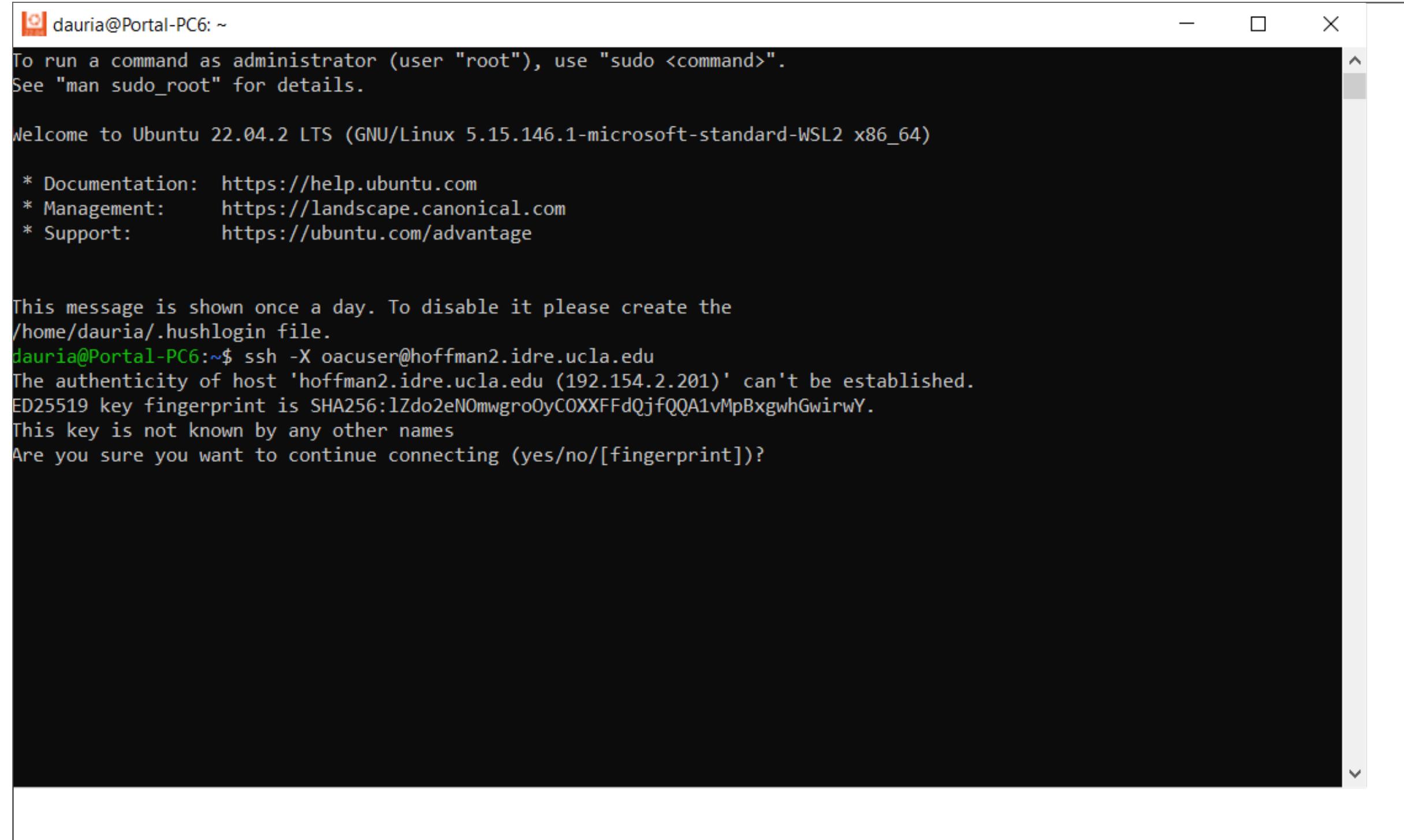
```
$PSVersionTable.PSVersion
```

on any terminal applications you may run (aside from Putty and Cygwin excluded in this presentation), type

```
ssh <YOURHOFFMAN2CLUSTERUSERNAME>@hoffman2.idre.ucla.edu
```

Connecting via a terminal and SSH for the first time

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



The screenshot shows a terminal window titled "dauria@Portal-PC6: ~". The window contains the following text:

```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

Welcome to Ubuntu 22.04.2 LTS (GNU/Linux 5.15.146.1-microsoft-standard-WSL2 x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

This message is shown once a day. To disable it please create the
/home/dauria/.hushlogin file.
dauria@Portal-PC6:~$ ssh -X oacuser@hoffman2.idre.ucla.edu
The authenticity of host 'hoffman2.idre.ucla.edu (192.154.2.201)' can't be established.
ED25519 key fingerprint is SHA256:1Zdo2eN0mwgroOyCOXXFFdQjfQQA1vMpBxgwhGwirwY.
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 hostkey fingerprints

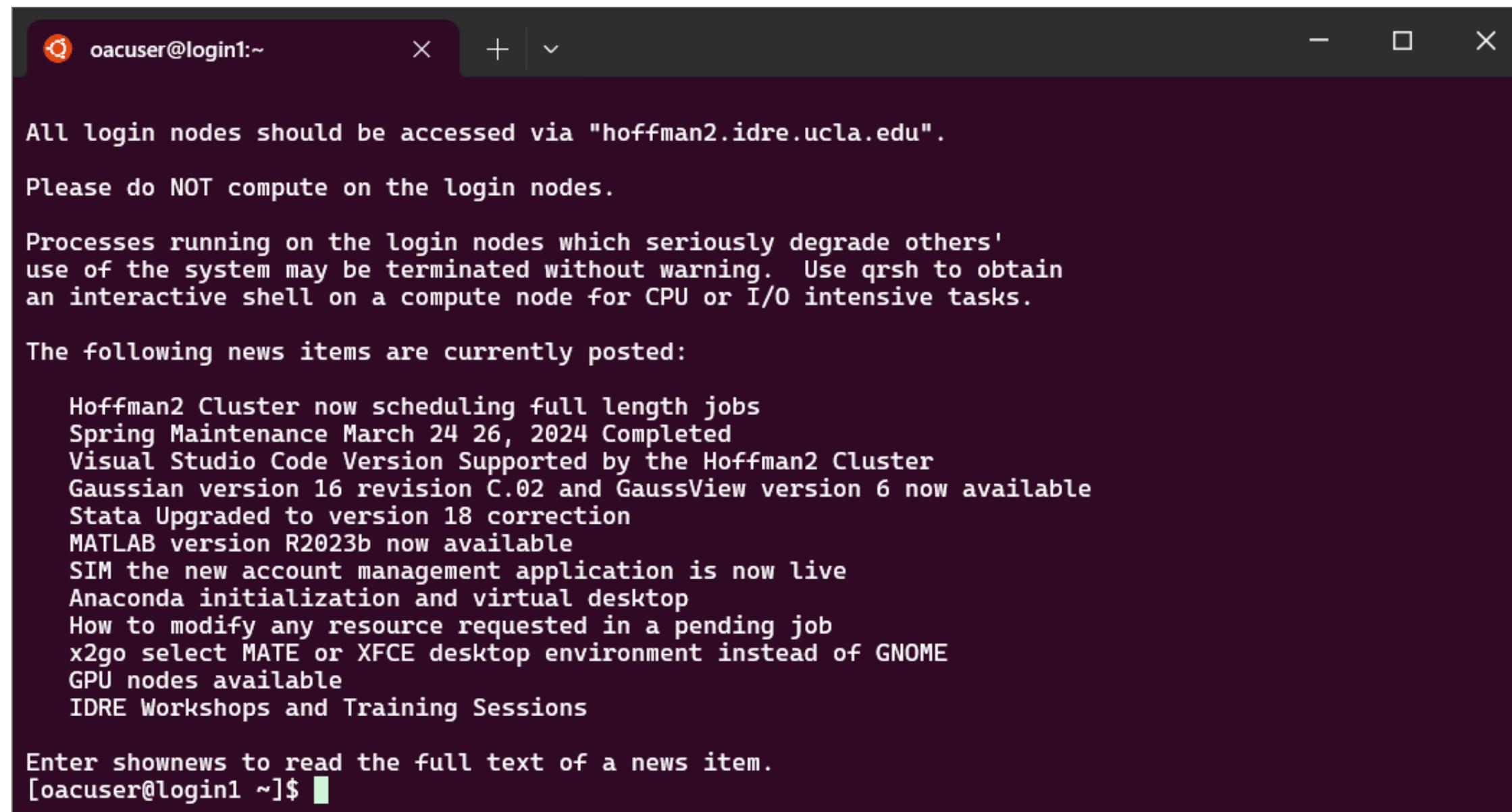
<https://www.hoffman2.idre.ucla.edu/About/FAQ/FAQ.html#table-h2-public-host-classes>

The screenshot shows a web browser window with the URL <https://www.hoffman2.idre.ucla.edu/About/FAQ/FAQ.html#table-h2-public-host-classes>. The left sidebar contains a navigation menu with sections like 'Public hosts hostkey fingerprints', 'Accounts', 'Using the Hoffman2 Cluster', and 'Education and User Support'. The main content area displays a table of public hostkey fingerprints for various node classes: Login nodes, Data transfer nodes, NX nodes, and x2go nodes. A terminal window titled 'dauria@Portal-PC6: ~' is overlaid on the browser, showing the command `ssh oacuser@hoffman2.idre.ucla.edu` and its output, which includes a hostkey fingerprint warning and a password prompt.

Class	Hostkey Fingerprint
Login nodes	ED25519 SHA256-base64: a4eb80cd848de36962a24a3c7bf66df7
Data transfer nodes	ED25519 SHA256-base64: fef2f8a19ba590e32e2e703585dd04199c7419c2
NX nodes	ED25519 SHA256-base64: 959768d9e34e9b082ba0ec823975c515d4237d0400d6f329071830846c22af06
x2go nodes	ED25519 MD5-base64: 3c9c678c5a4ae77075f102f204a750f

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](#)

Connecting via terminal and SSH (cont'd)



A screenshot of a terminal window titled "oacuser@login1:~". The window contains a message about login nodes and a list of news items.

```
oacuser@login1:~
```

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:
Hoffman2 Cluster now scheduling full length jobs
Spring Maintenance March 24 26, 2024 Completed
Visual Studio Code Version Supported by the Hoffman2 Cluster
Gaussian version 16 revision C.02 and GaussView version 6 now available
Stata Upgraded to version 18 correction
MATLAB version R2023b now available
SIM the new account management application is now live
Anaconda initialization and virtual desktop
How to modify any resource requested in a pending job
x2go select MATE or XFCE desktop environment instead of GNOME
GPU nodes available
IDRE Workshops and Training Sessions
Enter shownews to read the full text of a news item.
[oacuser@login1 ~]\$

Set up SSH keys to connect to the Hoffman2 Cluster

SSH keys are authentication credentials that can be set up for passwordless authentication (**use of a passphrase is strongly recommended**).

On a terminal on your local computer generate SSH-key:

```
ssh-keygen -f $HOME/.ssh/hoffman2.idre.ucla.edu
```

On a terminal on your local computer create a `$HOME/.ssh/config` using, for example, the [nano](#) editor:

```
nano $HOME/.ssh/config
```

- **NOTE:** on a PowerShell terminal use instead:

```
bash -c 'nano $HOME/.ssh/config'
```

On a terminal on your local computer add these lines to your `$HOME/.ssh/config`:

```
Host hoffman2
  hostname hoffman2.idre.ucla.edu
  ServerAliveInterval 30
  ServerAliveCountMax 5
  IPQoS throughput
  IdentityFile=~/ssh/hoffman2.idre.ucla.edu
```

Set up SSH keys to connect to the Hoffman2 Cluster (cont'd)

copy the key to the Hoffman2 Cluster

```
$ ssh-copy-id -i ~/.ssh/hoffman2.idre.ucla.edu <YOURH2CUSERNAME>@hoffman2.idre.ucla.edu
```

connect to the Hoffman2 Cluster

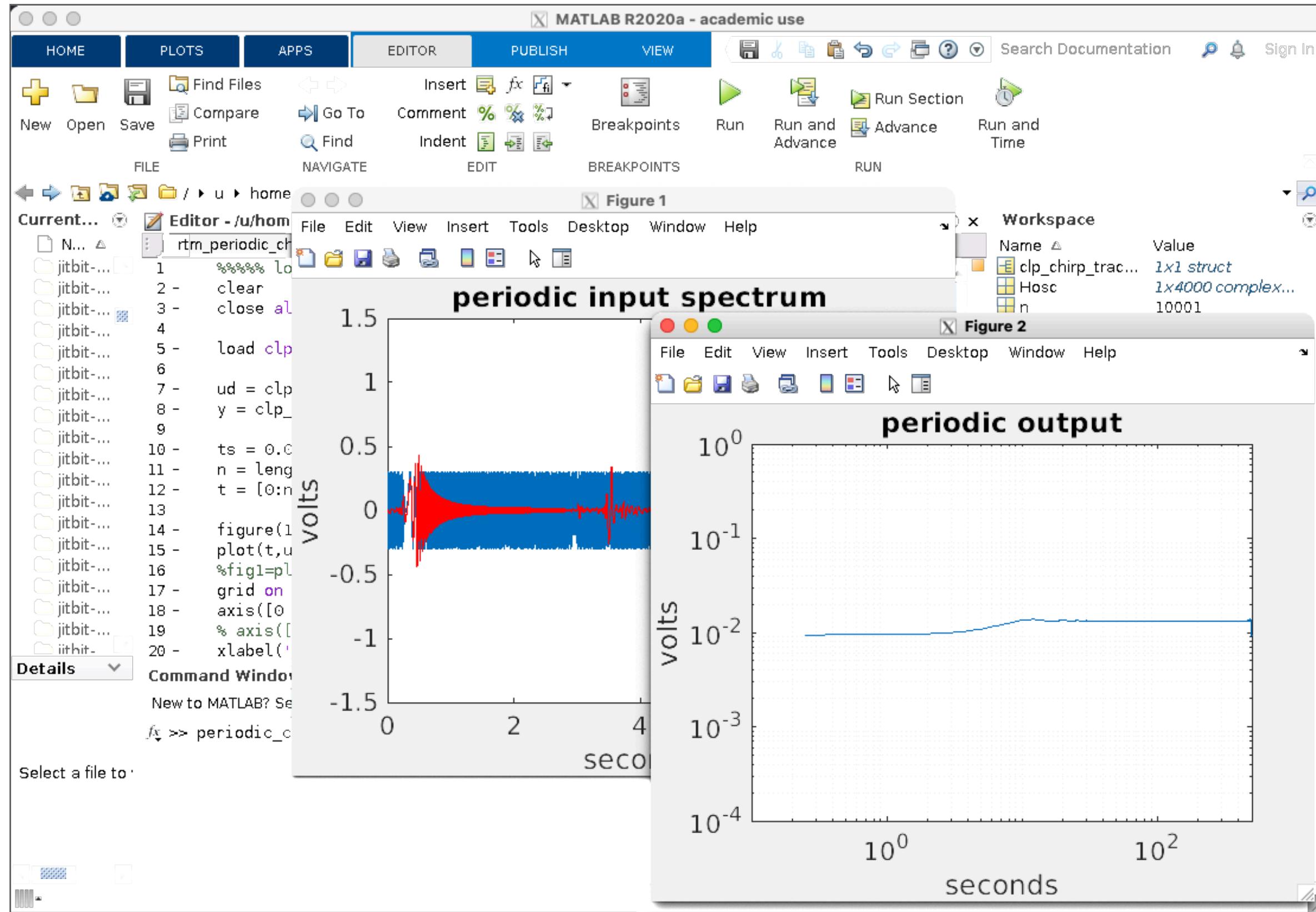
```
$ ssh <YOURHOFFMAN2CLUSTERUSERNAME>@hoffman2
```

Learning Outcomes 6

- 1) what is the Hoffman2 Cluster**
- 2) what can the Hoffman2 Cluster do for you**
- 3) navigating the documentation**
- 4) getting an account on the Hoffman2 Cluster**
- 5) connecting to the Hoffman2 Cluster via terminal and SSH**
- 6) **opening graphical applications on the Hoffman2 Cluster****
- 7) unix command line 101**
- 8) Getting work done on the Hoffman2 Cluster**

Opening graphical applications on the Hoffman2 Cluster

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)
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
```

substitute `joebruin` with your Hoffman2 username

Opening graphical applications on Windows

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

- MobaXterm
- Windows Subsystem for Linux
- Cygwin - NOT RECOMMENDED UNLESS YOU ARE AN EXPERT

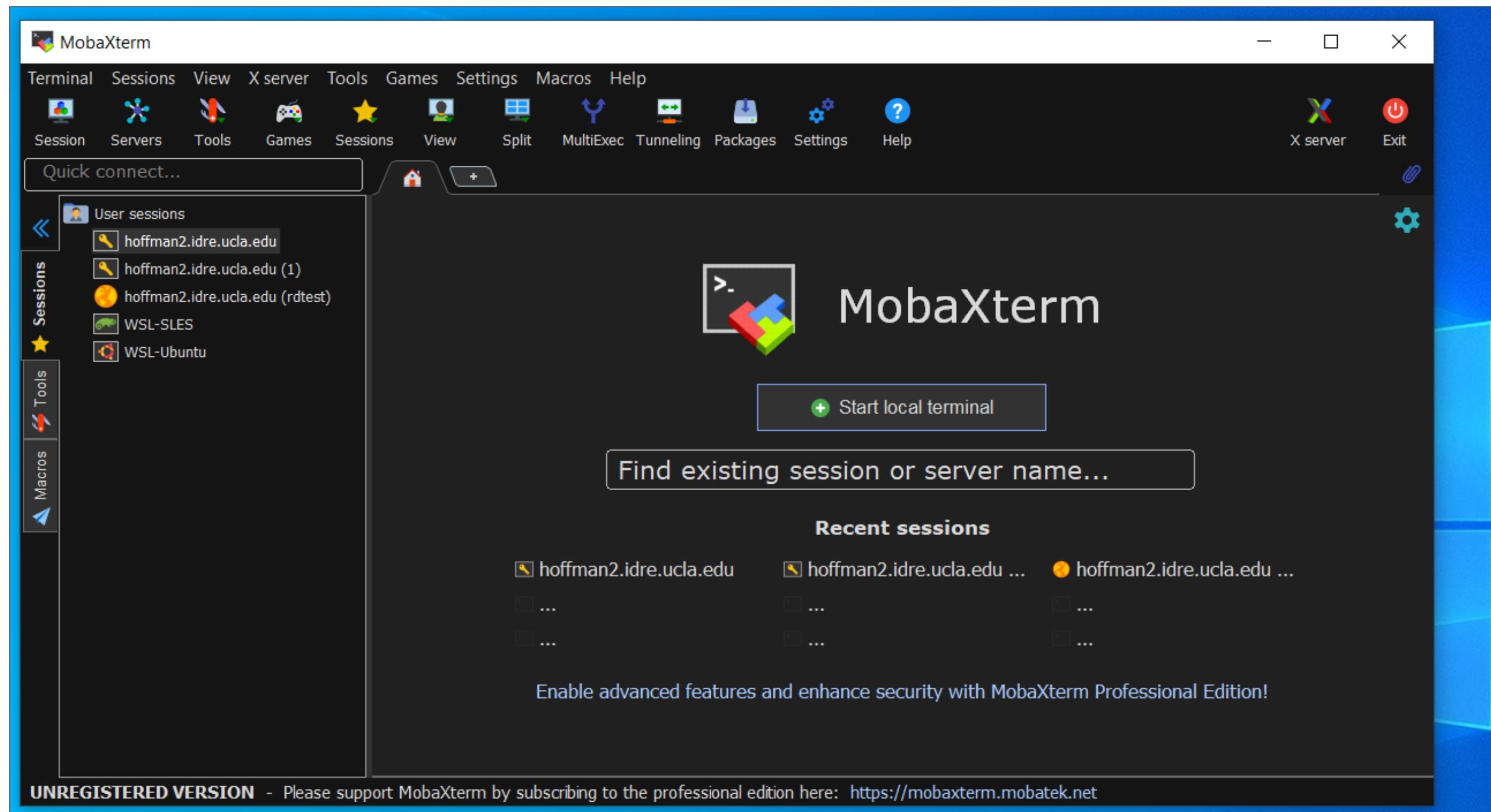
need to install an X11 window server if using either of:

- GitBash
- PuTTY
- PowerShell

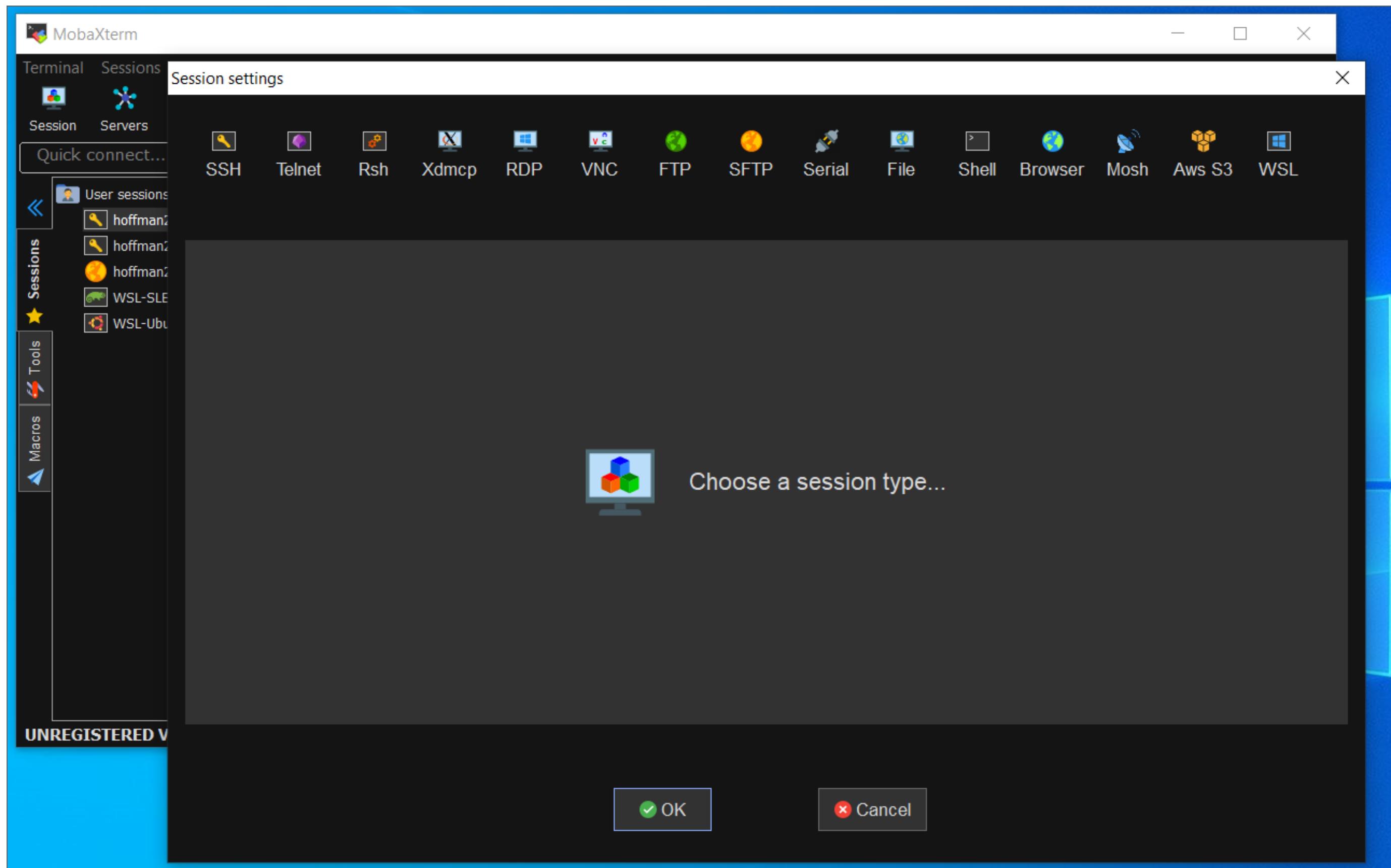
A POSSIBLE X11 WINDOW SERVER:

- Xming

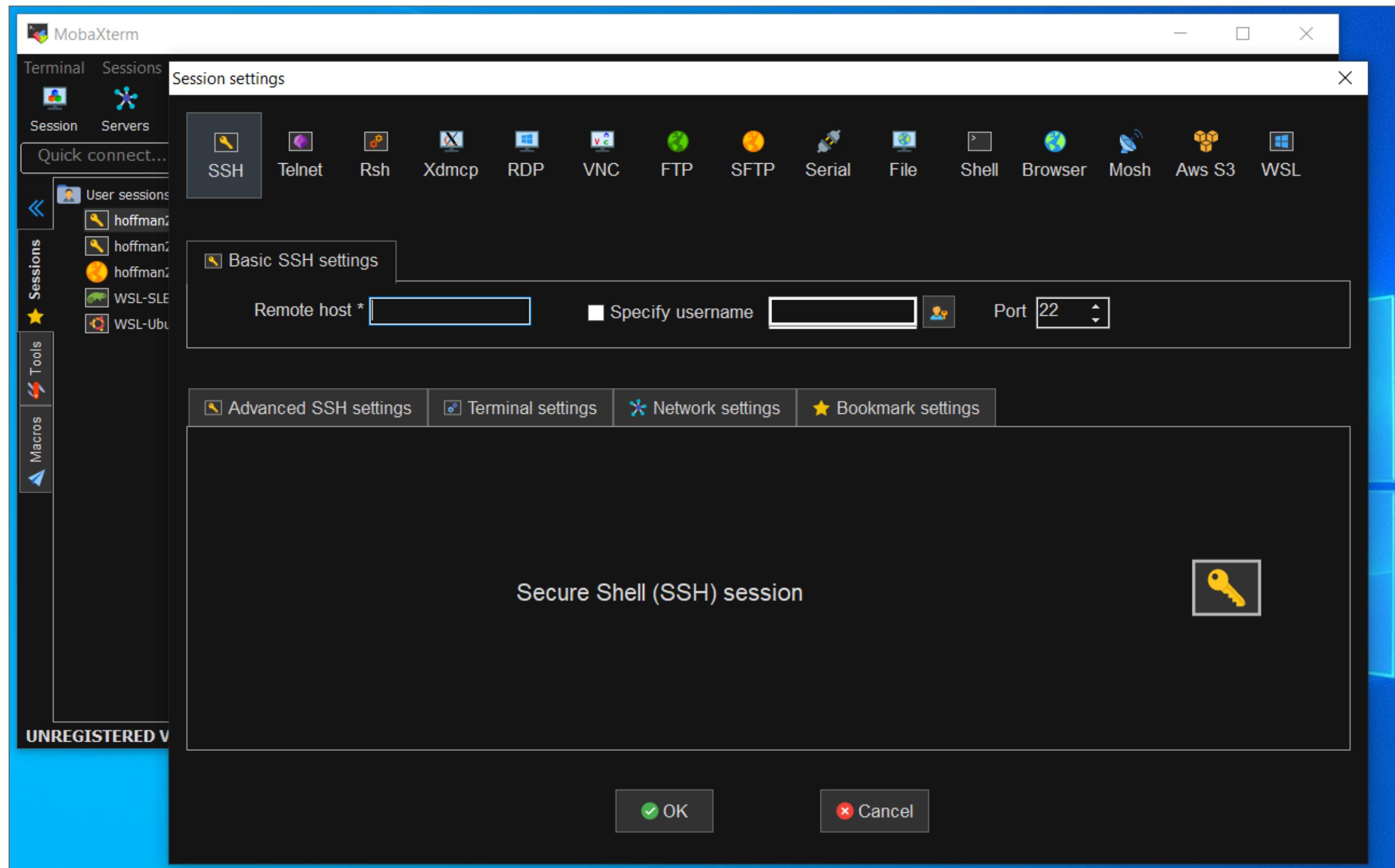
Opening graphical applications on Windows using MobaXterm (Hands-on)



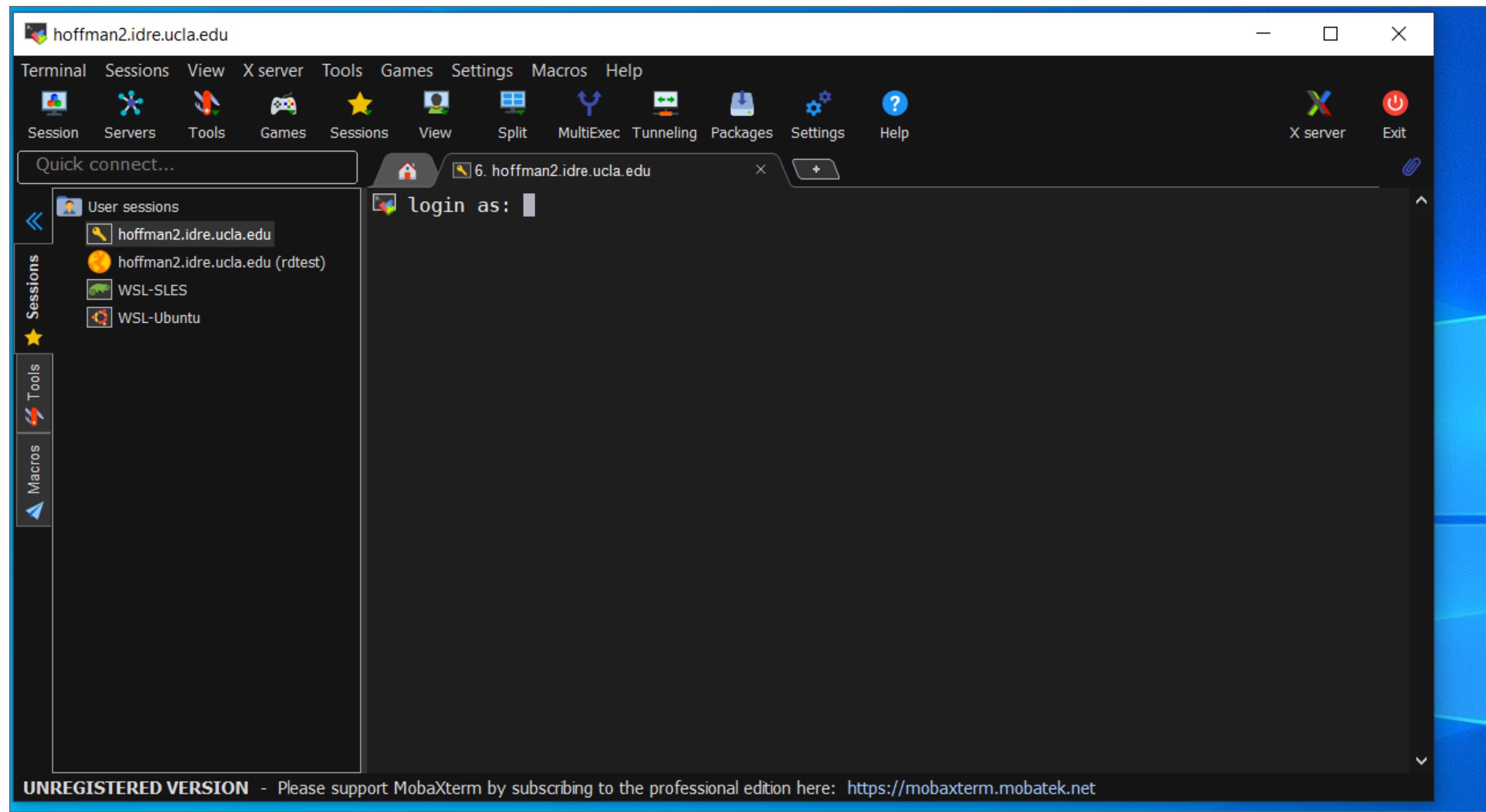
Opening graphical applications on Windows using MobaXterm (cont'd)



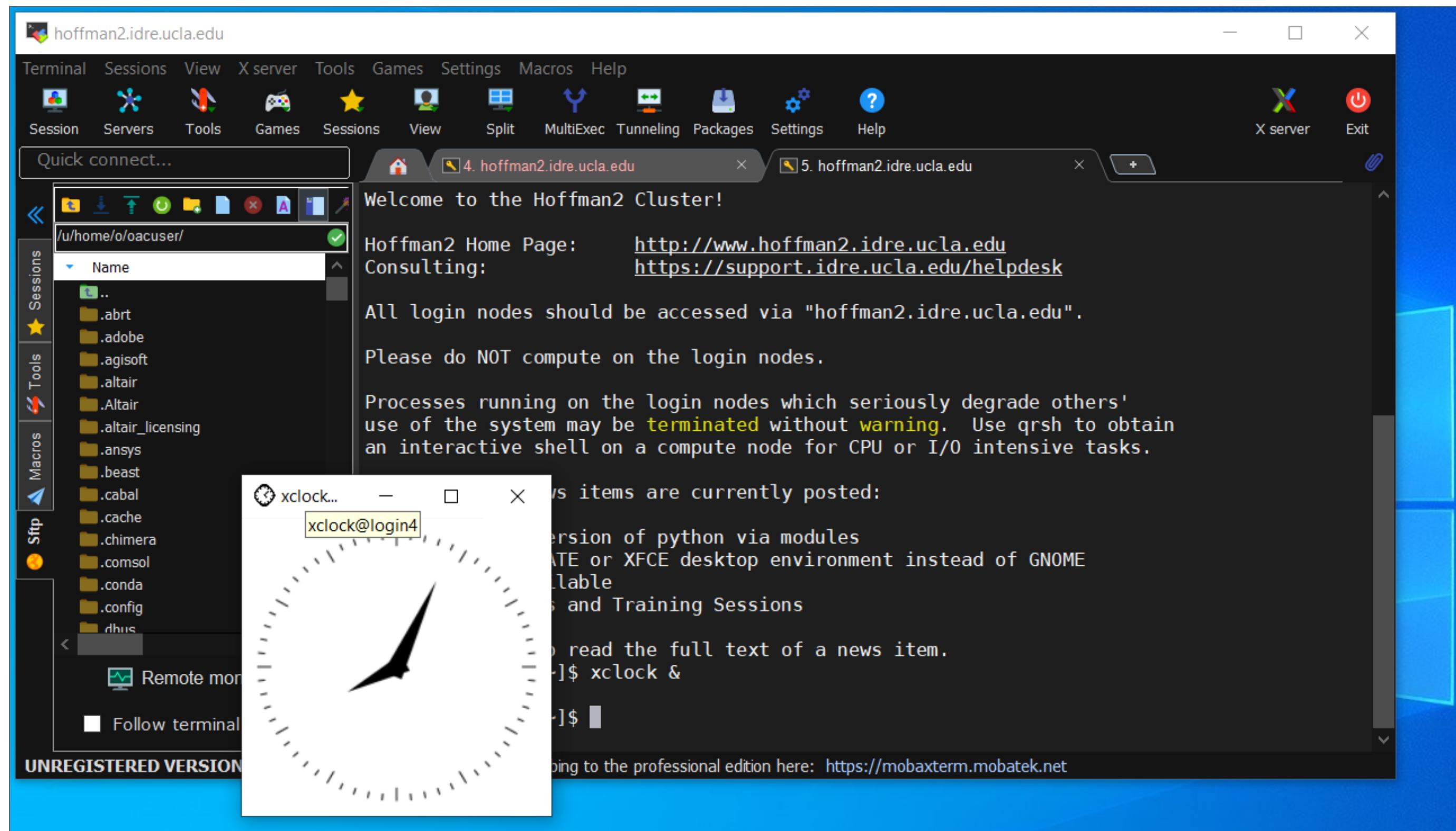
Opening graphical applications on Windows using MobaXterm (cont'd)



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



Opening graphical applications on Windows using MobaXterm



Learning Outcomes 7

- 1) what is the Hoffman2 Cluster**
- 2) what can the Hoffman2 Cluster do for you**
- 3) navigating the documentation**
- 4) getting an account on the Hoffman2 Cluster**
- 5) connecting to the Hoffman2 Cluster via terminal and SSH**
- 6) opening graphical applications on the Hoffman2 Cluster**
- 7) **unix command line 101****
- 8) Getting work done on the Hoffman2 Cluster**

Unix command line 101

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

The screenshot shows a web browser window with a dark theme. The title bar reads "UCLA Unix command line — Hoffman2 X". The address bar shows the URL "https://www.hoffman2.idre.ucla.edu/Using-H2/Command-line/Unix-command-line.html". The page content is a terminal window titled "Terminal". The terminal output is as follows:

```
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
cd
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-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**](https://www.hoffman2.idre.ucla.edu/Using-H2/Command-line/Unix-command-line.html#editing-files)

- Non graphical editors:

nano
emacs
vi

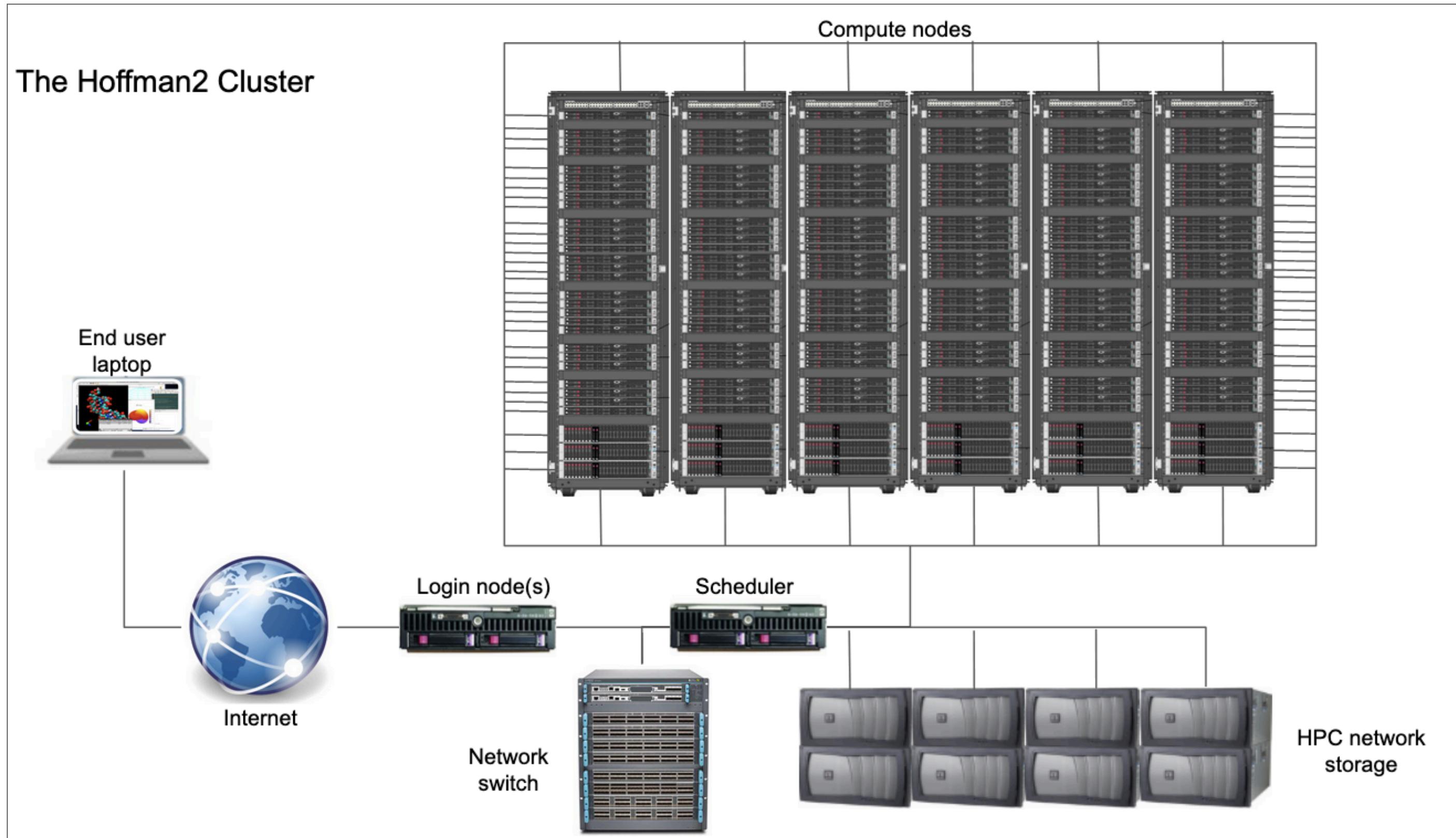
- Graphical editors:

gedit &
emacs &
gvim &

Learning Outcomes 8

- 1) what is the Hoffman2 Cluster**
- 2) what can the Hoffman2 Cluster do for you**
- 3) navigating the documentation**
- 4) getting an account on the Hoffman2 Cluster**
- 5) connecting to the Hoffman2 Cluster via terminal and SSH**
- 6) opening graphical applications on the Hoffman2 Cluster**
- 7) unix command line 101**
- 8) **Getting work done on the Hoffman2 Cluster****

Getting work done on the 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

Do I have access to high resources?

To find out paste in a terminal connected to the cluster the command (omitting the \$ character indicative of the unix prompt):

\$ myresources

what do you see?

What computational resources do I have access to?

Open a terminal on the Hoffman2 Cluster and issue:

```
$ myresources
```

if the first line of your ouput contains:

```
User joebruin is in the following resource group(s): campus
```

you do NOT have access to group-owned compute nodes and can only run for up to 24 hours on nodes owned by OARC/IDRE

if the first line of your output contains:

```
User joebruin is in the following resource group(s): gobruins evebruin
```

you have access to the nodes purchased by groups: gobruins and evebruin and you can run for up to 24 hours on shared queues and for up to 14 days when requesting to run on owned resources (highp mode)

Working interactively on the Hoffman2 Cluster

More on this on future presentations

Any work that will use substantial computational resources should be run on **compute nodes** and not on the **login nodes**.

To get an *interactive session* on one core of a compute node, from a terminal issue the following command(omitting the \$ character indicative of the unix prompt):

```
$ qrsh
```

What happens?

(To terminate your interactive session, after the prompt returns, type: Control + d or logout)

What applications/software is already available on Hoffman2?

Refer to: <https://www.hoffman2.idre.ucla.edu/Using-H2/Software/Software.html>

» Software

» Previous Next

Software

Most software on Hoffman2 is available via [environmental modules](#). A list of applications available via modules can be generated entering at the [terminal prompt](#) via the command:

```
$ all_apps_via_modules
```

Some applications are available via python or Anaconda and will not be visible until a python or anaconda modules are loaded. To request or suggest software installation or updates, please submit via our [helpdesk](#). Only software/applications that is [required by multiple groups](#) may be centrally installed or you and your group will receive given guidance on how to perform software installation in your [\\$HOME](#) or, if applicable, in your group [project directory](#).

Software/Applications categories

Productivity	Development	Discipline
Hoffman2 Cluster tools	Compilers	Bioinformatics and biostatistics
Environmental modules	Debuggers	Chemistry and chemical engineering
Containers	Build tools	Engineering and mathematics
Editors	Programming languages	Physics
Integrated development environments	Programming libraries	Statistics
Miscellaneous		Visualization and rendering

Apps available via modules

To see what applications are available in the current hierarchy, at a terminal connected to Hoffman2 issue the command:

```
$ module av # press enter to scroll down and exit the view
```

To look for a specific software, for example R, issue the command:

```
$ modules_lookup -m R
```

Worked out example of python environment creation

- log onto the Hoffman2 Cluster via termina and SSH, at the cluster command prompt issue:

```
qrsh  
module av python  
module av anaconda  
module av mamba
```

- in this example we will use the default python version 3.9.6:

```
module load python/3.9.6  
mkdir -p $HOME/.venv/3.9.6  
python -m venv $HOME/.venv/3.9.6/NEWENV  
source $HOME/.venv/3.9.6/NEWENV/bin/activate  
# now install any needed python package, for example:  
pip install numpy  
# for example, update pip:  
python -m pip install --upgrade pip
```