Navigating and Connecting to NERSC

New User Training
February 15, 2024

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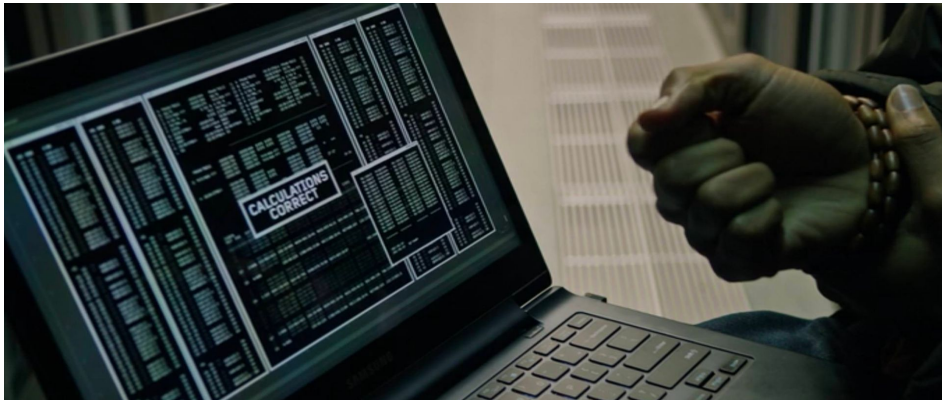
What NOT to do!

I love this movie, by the way. This is just NOT how to connect to an HPC resource!

some random cable from laptop to server rack?



Connecting to NERSC is EASY

What you DO need:

- An internet connection
- a laptop or computer with `terminal`
- Username, password and Multi-Factor Authentication method

Agenda

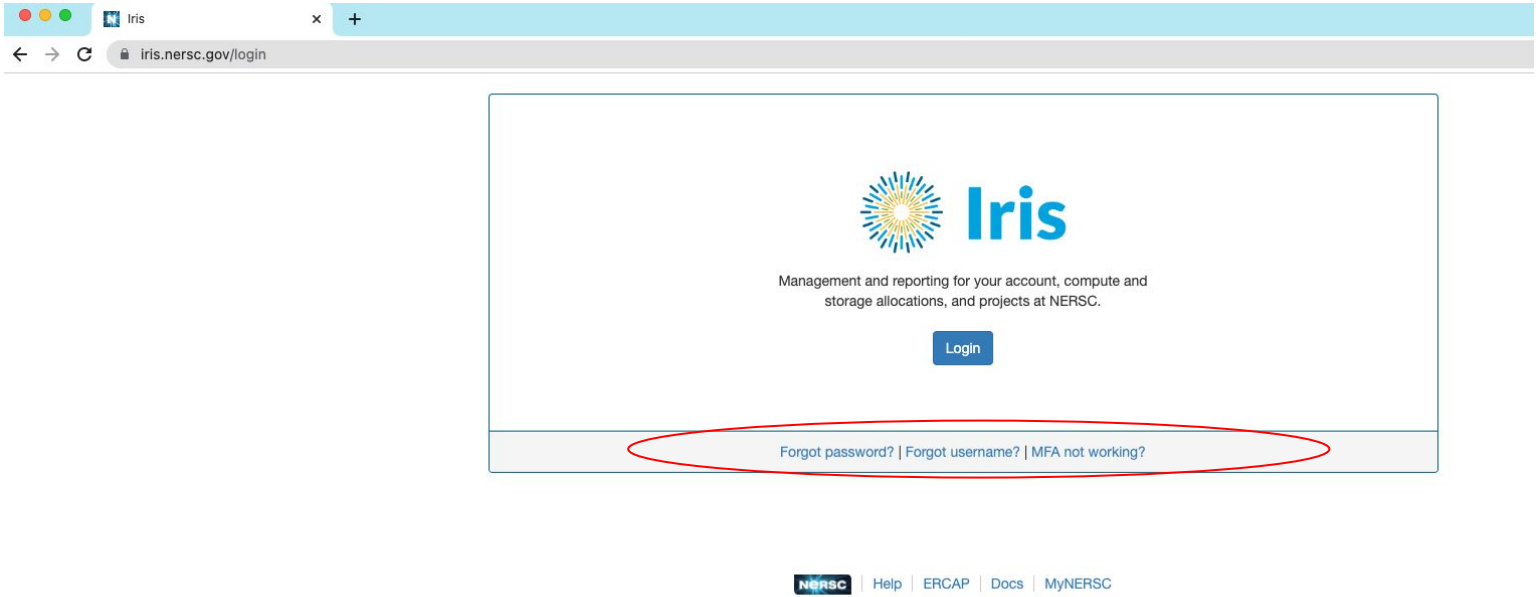
- Navigating Iris (https://iris.nersc.gov)
- Connecting to Perlmutter
  a. Connecting with SSH
  b. https://jupyter.nersc.gov notebooks and terminals in your browser
  c. NoMachine (https://docs.nersc.gov/connect/nx/) for GUI apps
- Submitting a User Ticket (https://help.nersc.gov)
- Navigating NERSC Documentation
- Navigating NERSC Home Page

Navigating Iris

What is Iris?

- Lab Notebook for NERSC resource tracking and management
  - Manage password and set up Multi-Factor Authentication
  - Keep track of compute hours, storage space, projects
  - Check compute job history and hours charged
  - and more!

Iris (https://iris.nersc.gov) for Your Account



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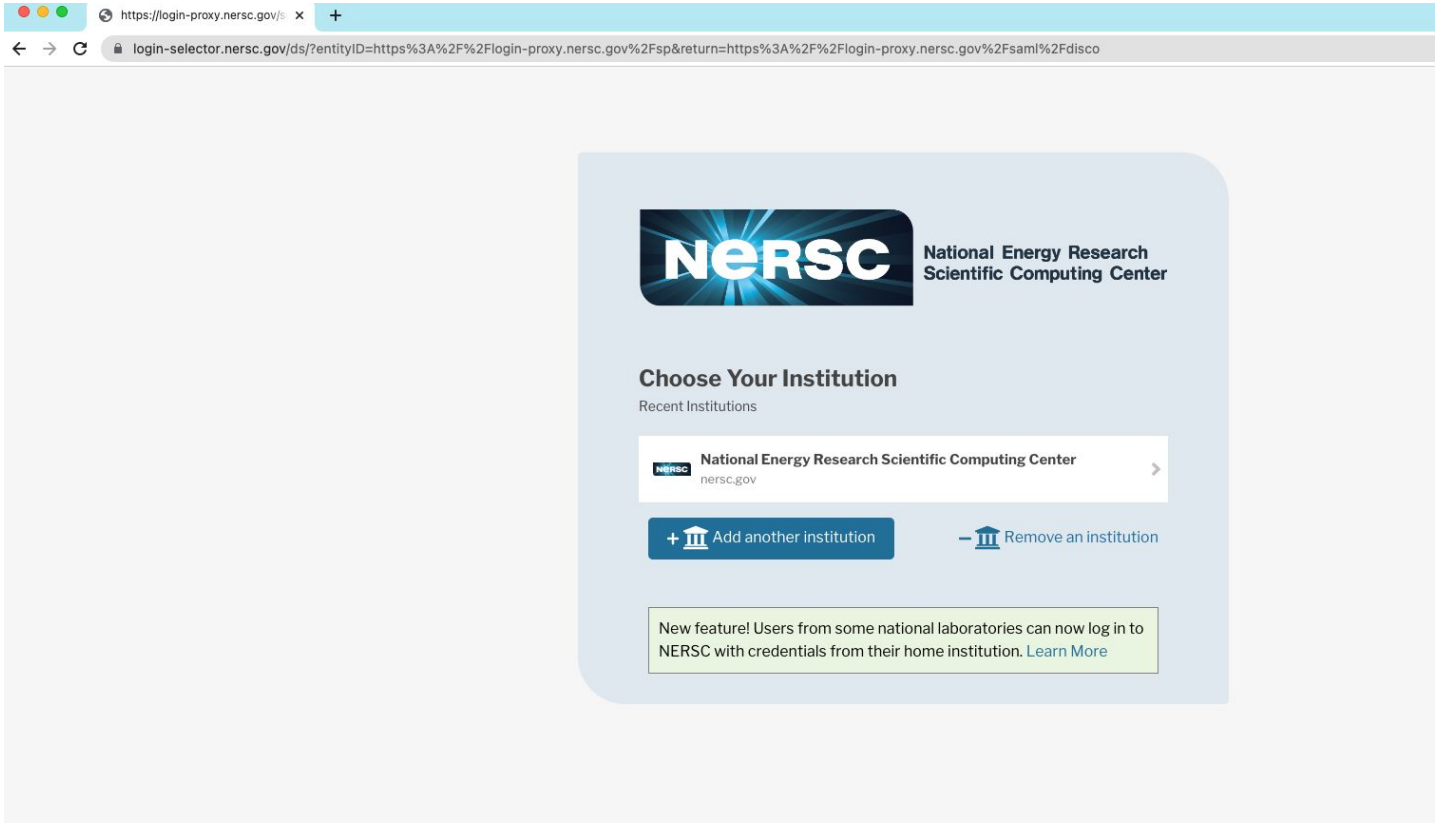

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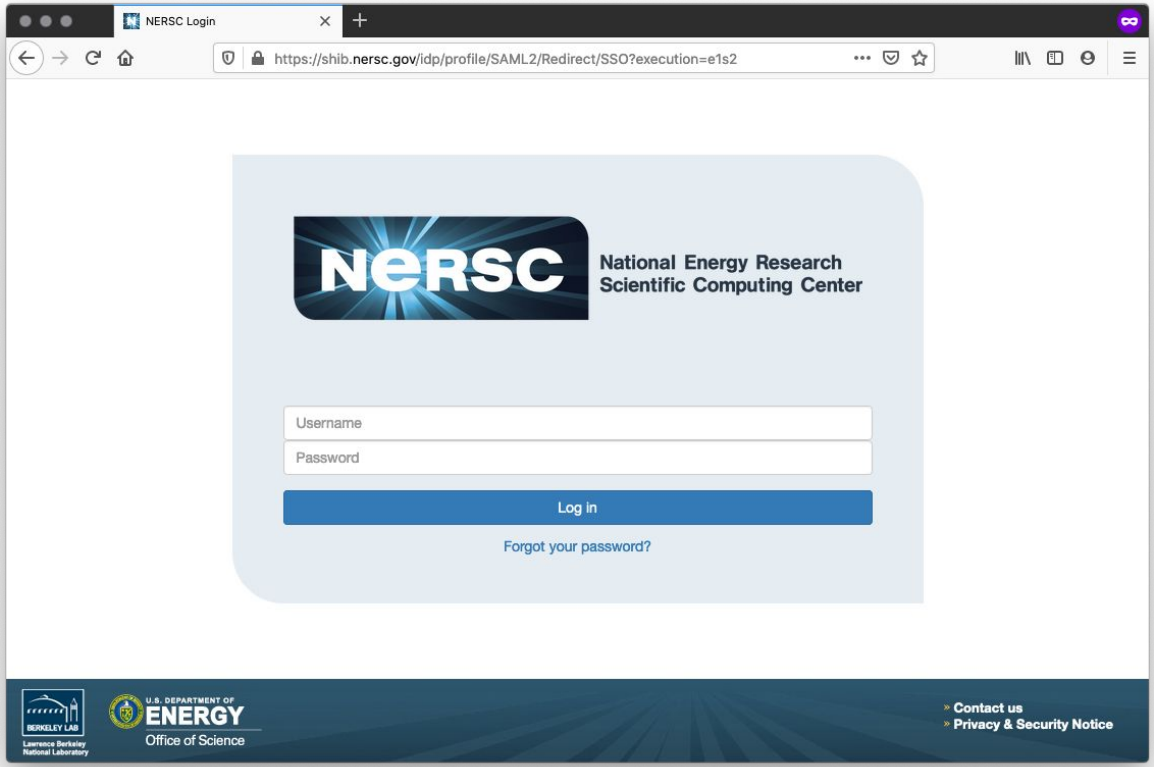
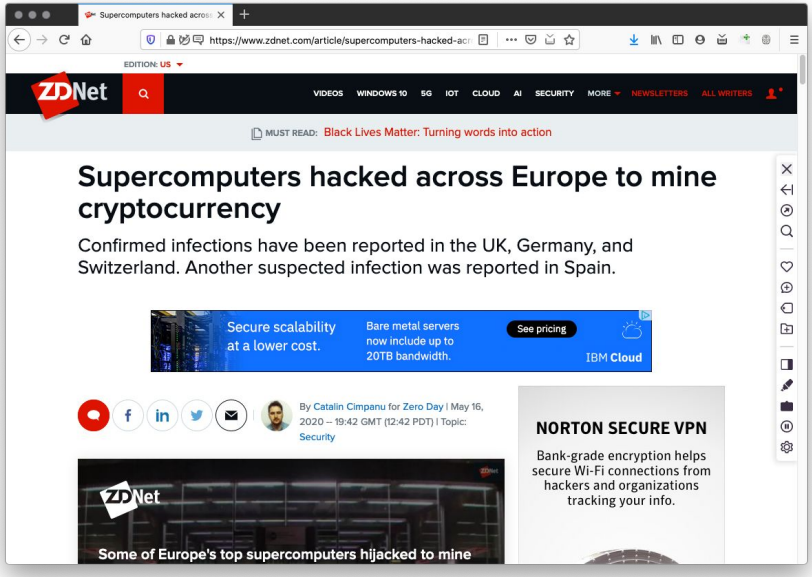


Multi-Factor Authentication (MFA)

Tip: you will use this a LOT

- Protects NERSC users from attacks like this →
- **Log into NERSC resources with your NERSC password plus a one-time code that is provided by an app**



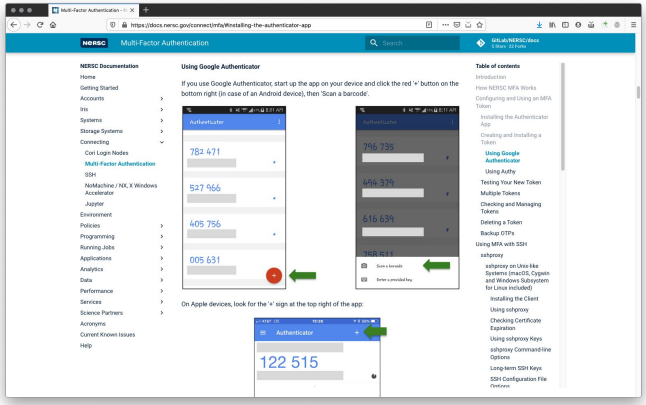
Setting Up MFA in Iris

- First install Google Authenticator on your smartphone (and/or Authy on your computer)

https://play.google.com/store/apps/details?id=com.google.android.apps.authenticator2&hl=en
https://itunes.apple.com/us/app/google-authenticator/id388497605?mt=8

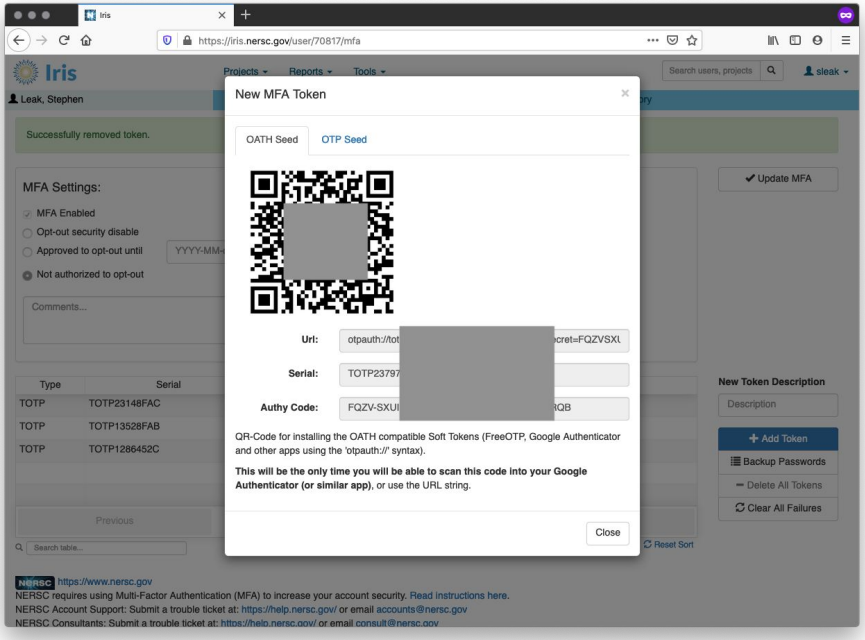
https://authy.com

Search "MFA" at
https://docs.nersc.gov



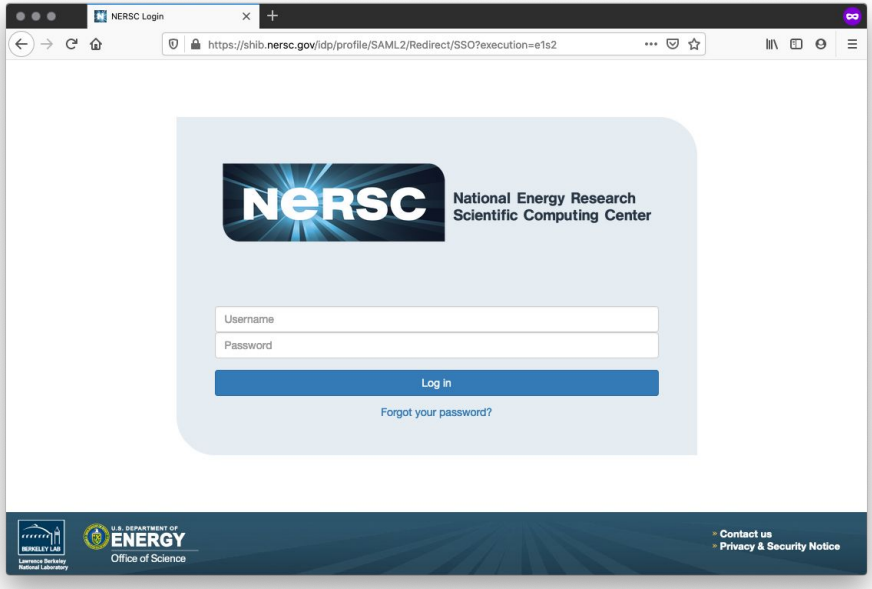
Setting Up MFA in Iris

- Click the "MFA" tab
- Click the "Add Token" button
- Scan the QR code with the Authenticator app (or, paste the Authy code into Authy)



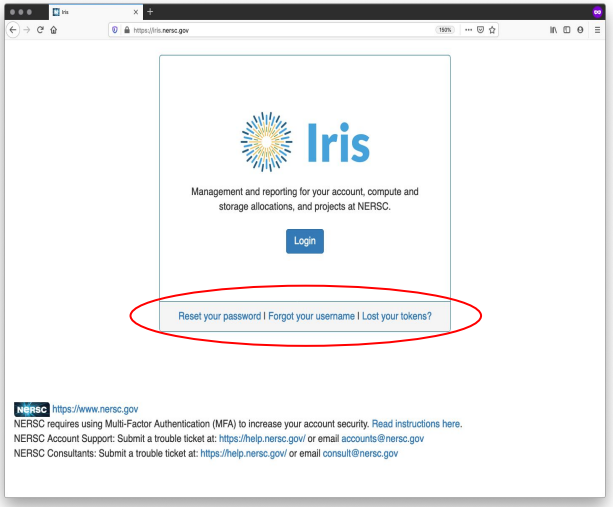
Logging in with MFA

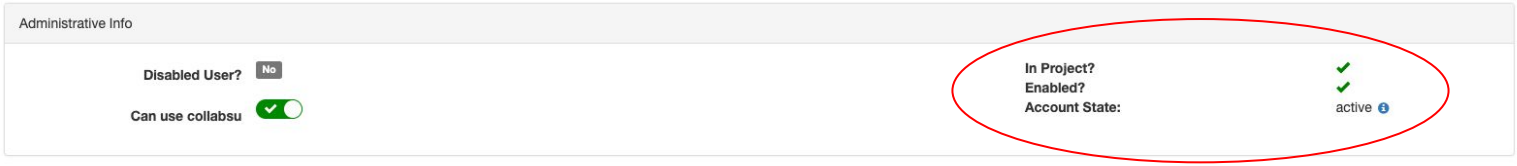
After single-sign-on page you'll be asked for your one-time password (6 digits from app)



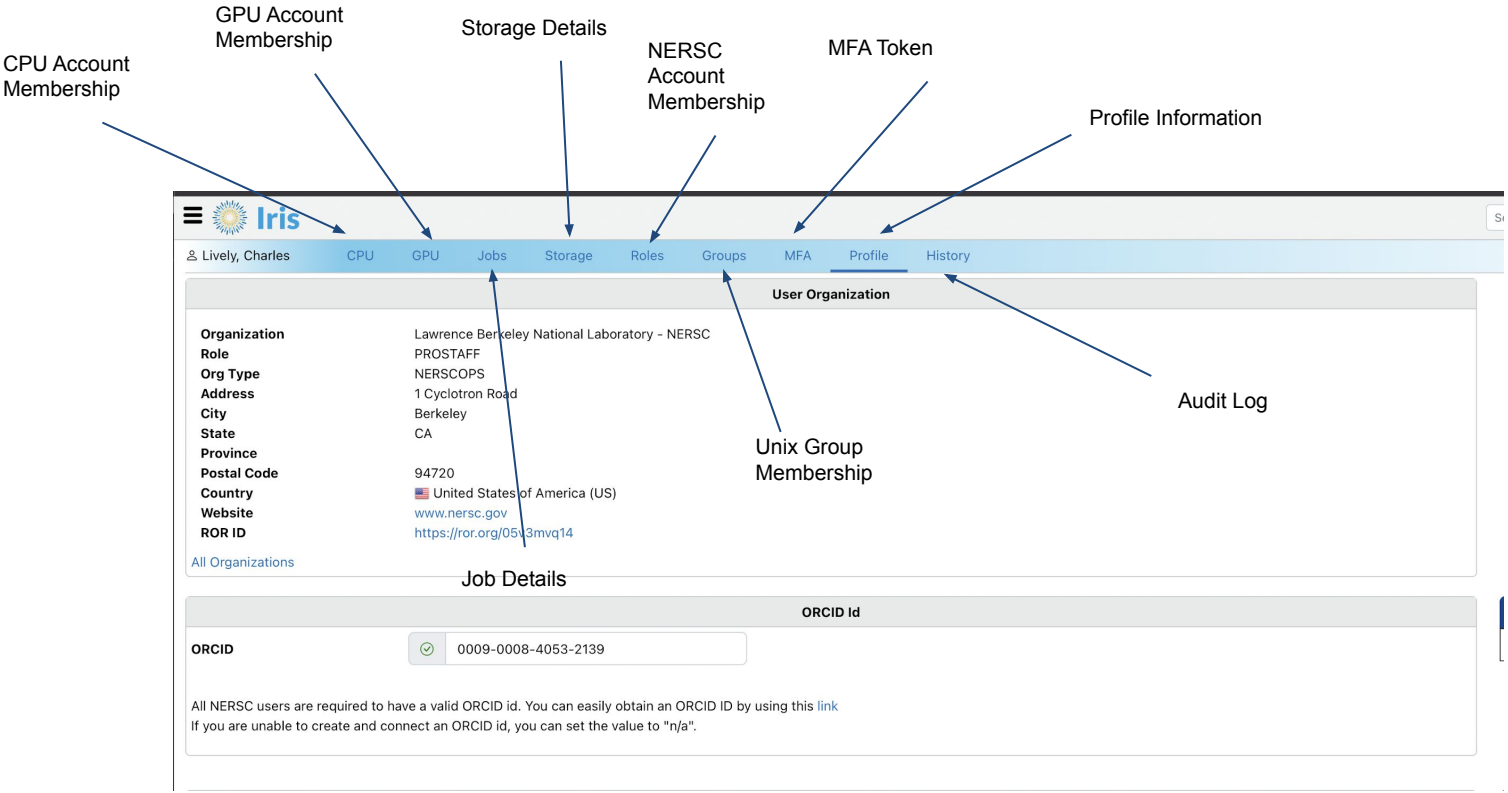
Troubleshooting Account Access

- I can't login to Iris
  - New account? It may not be approved yet (can take a few days)
  - Forgot password? Lost MFA tokens? Use the links on the Iris login page
- I can login to Iris, but not Cori or Perlmutter
  - Are you in a project? Check "Roles" tab

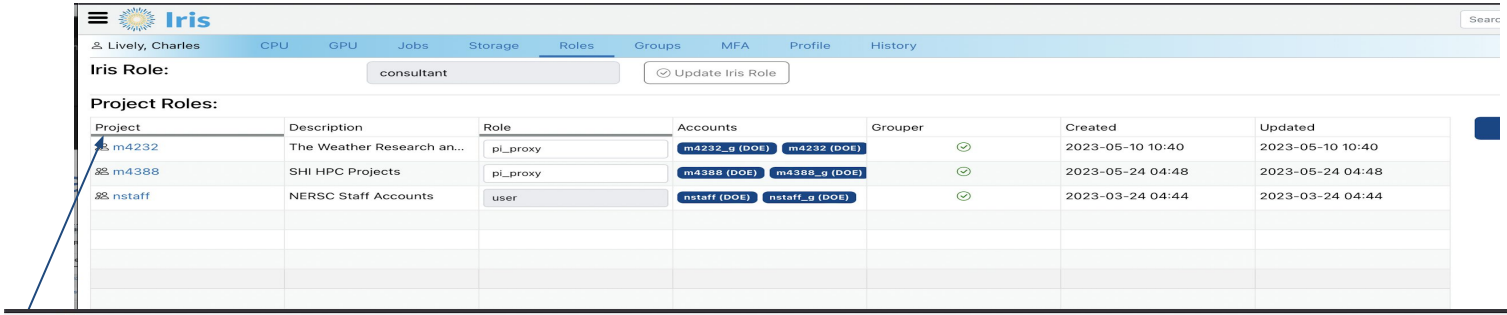


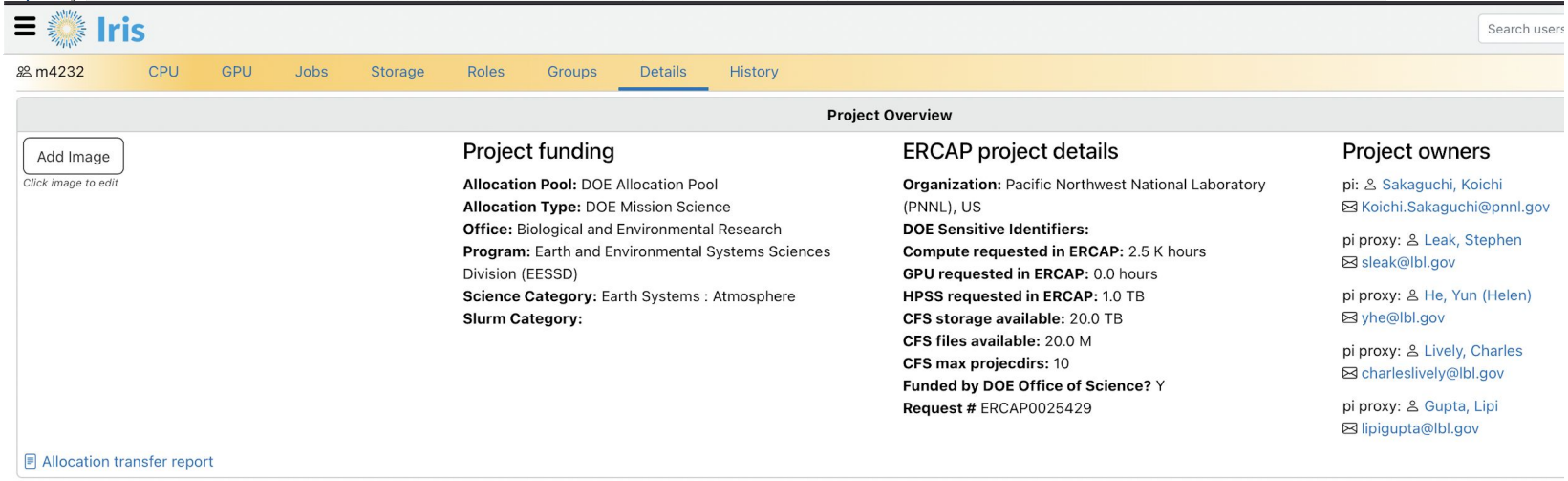


Navigating Iris - Menu Bar

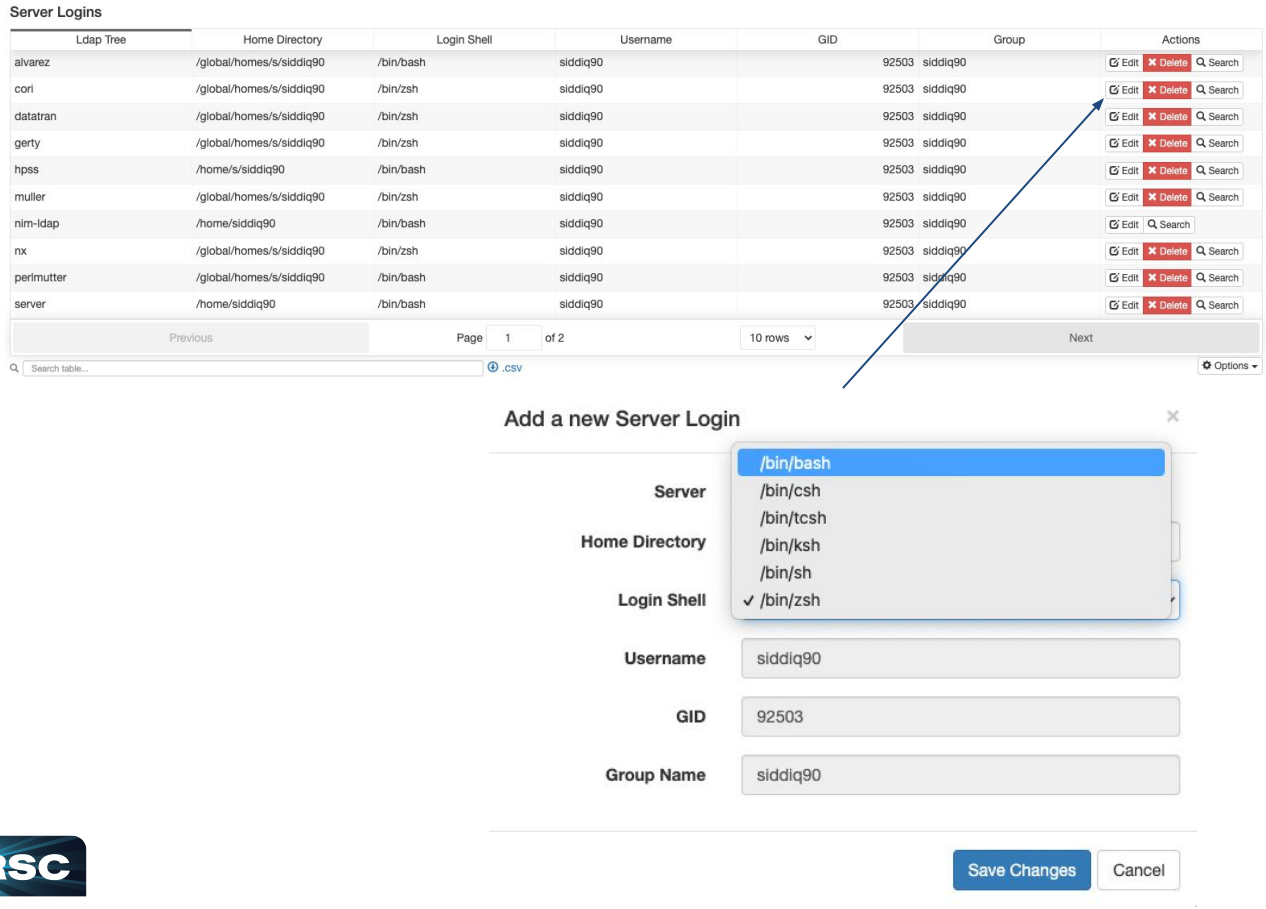


Navigating Iris - Finding Account Details



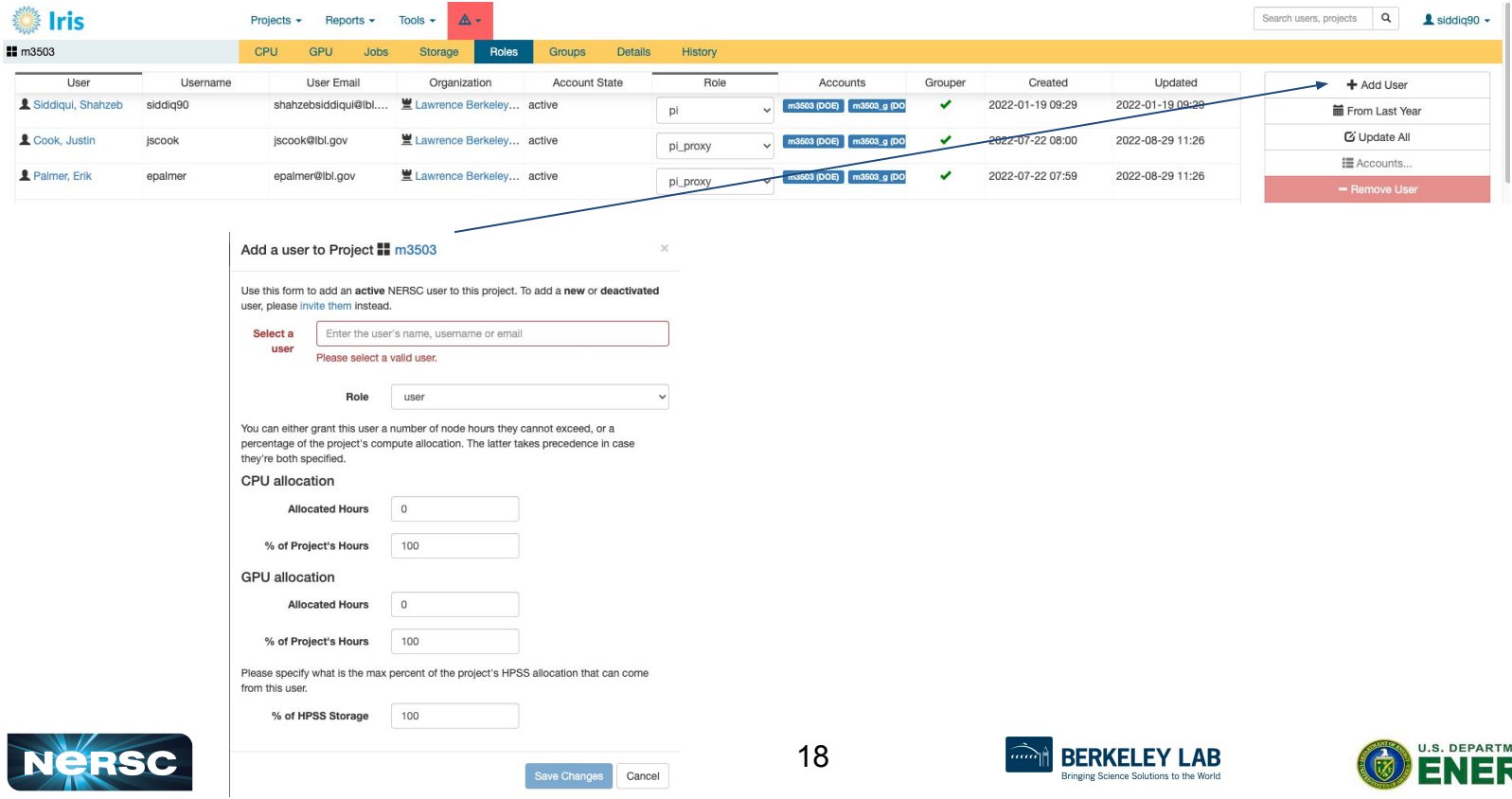


Navigating Iris - Changing User Shell



Navigating Iris - Adding User to Account

PI and PI Proxy only!



Connecting to NERSC Systems

Connecting with SSH

the internet!

You will need a `(text) terminal` program!

- Mac: terminal (built-in) or "iTerm2" (https://www.iterm2.com/)
- Windows: PuTTY (https://www.putty.org/), MobaXterm (https://mobaxterm.mobatek.net/) or XWin32 or Git BASH
- Linux: Your own favorite :)
- Chromebook: crosh (developer mode) or Crostini (Linux-in-a-container) or SSH App

Connecting to NERSC systems

Connect to NERSC Computational Systems

Please make sure you have configured Multi-Factor Authentication (MFA) prior to login.

To access Perlmutter via `ssh` you can do the following:

```
ssh <user>@perlmutter-p1.nersc.gov
```

or

```
ssh <user>@saul-p1.nersc.gov
```

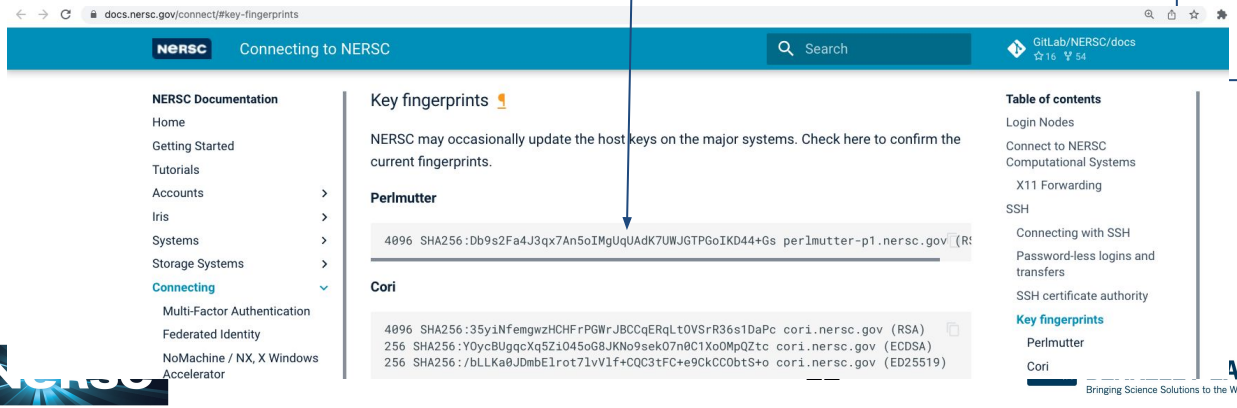
Similarly, you can access Cori with

```
ssh <user>@cori.nersc.gov
```

Connecting with SSH

```
ssh -l siddiq90 -Y perlmutter-p1.nersc.gov
78%  9/21, 11:41 AM
siddiq90 (ssh)
~/ ssh -l siddiq90 -Y perlmutter-p1.nersc.gov
The authenticity of host 'perlmutter-p1.nersc.gov (128.55.126.9)' can't be established.
RSA key fingerprint is SHA256:Db9s2Fa4J3qx7An5oIMgUqUAdK7UWJGTPGoIKD44+Gs.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
```

This means your laptop doesn't recognize the computer. The first time you log in, this is expected. But if your laptop **should** recognize Perlmutter, it's a red flag



Connecting with SSH

```
~/ ssh -l siddiq90 -Y perlmutter-p1.nersc.gov
Warning: Permanently added the RSA host key for IP address '128.55.126.12' to the list of known hosts.
********************************************************************************
                        NOTICE TO USERS

Lawrence Berkeley National Laboratory operates this computer system under
contract to the U.S. Department of Energy.  This computer system is the
property of the United States Government and is for authorized use only.
Users (authorized or unauthorized) have no explicit or implicit
expectation of privacy.

Any or all uses of this system and all files on this system may be
intercepted, monitored, recorded, copied, audited, inspected, and disclosed
to authorized site, Department of Energy, and law enforcement personnel,
as well as authorized officials of other agencies, both domestic and foreign.
By using this system, the user consents to such interception, monitoring,
recording, copying, auditing, inspection, and disclosure at the discretion
of authorized site or Department of Energy personnel.

Unauthorized or improper use of this system may result in administrative
disciplinary action and civil and criminal penalties. By continuing to use
this system you indicate your awareness of and consent to these terms and
conditions of use. LOG OFF IMMEDIATELY if you do not agree to the conditions
stated in this warning.

********************************************************************************

Login connection to host x3116c0s17b0n0:

Password + OTP:
```

When you ssh in, you'll see a prompt like:
Password + OTP:

Enter your (iris) password, then the 6 digits from Authenticator, with no spaces etc between
Example: **`Pa$$w0rd!123456`**

Nothing will appear at prompt as you type! (this is normal)
If you only get "Password: (no "+ OTP"), your account may not be ready yet

SSH Options

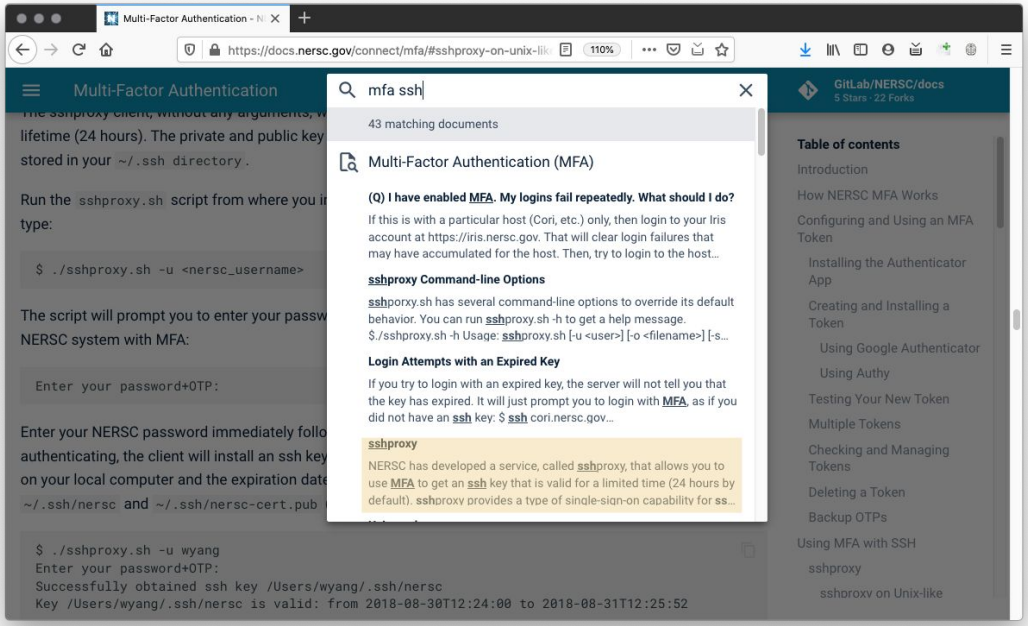
Wait, what was that "-Y" ?

"`ssh -Y`" (or "`ssh -X`")
allow X (ie, GUI) programs to display on your local monitor.

- You need an X-server (https://www.xquartz.org/ for Mac or http://x.cygwin.com/ for Windows)
- Can be very slow - alternatives coming up!

sshproxy

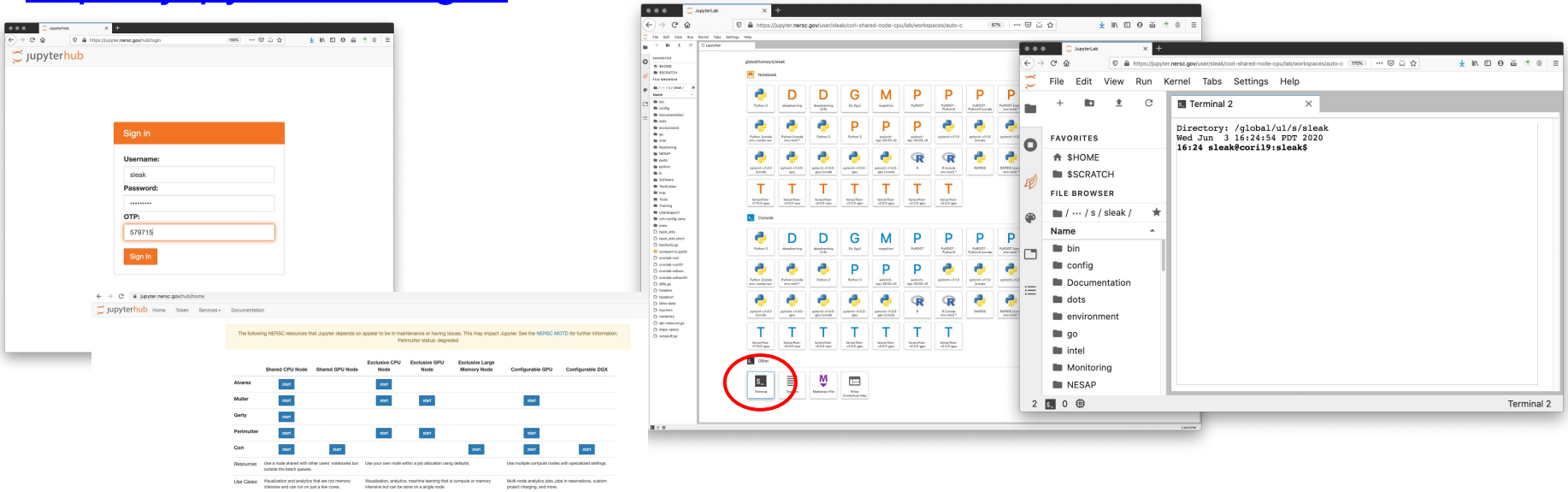
- Tired of repeatedly typing password + OTP?
  - **`sshproxy.sh`** creates a short-term (24 hours) certificate
  - Run **`sshproxy.sh`** once, then you can ssh to NERSC systems for the next 24 hours before being asked for password+OTP again



- Search "MFA SSH" at https://docs.nersc.gov

Jupyter

You can access NERSC systems from any web browser, via https://jupyter.nersc.gov

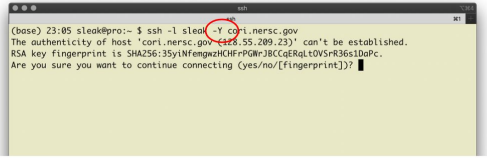


Running GUI Apps

GUI apps eg Matlab, DDT (debugging), Nsight (performance) can be painfully slow over a network

Why is this, and how can we fix it?

SSH Options



Wait, what was that "-Y" ?

"`ssh -Y`" (or "`ssh -X`")
allow X (ie, GUI) programs on Cori to display on your local monitor.

- You need an X-server (https://www.xquartz.org/ for Mac or http://x.cygwin.com/ for Windows)
- **Can be very slow** - alternatives coming up!

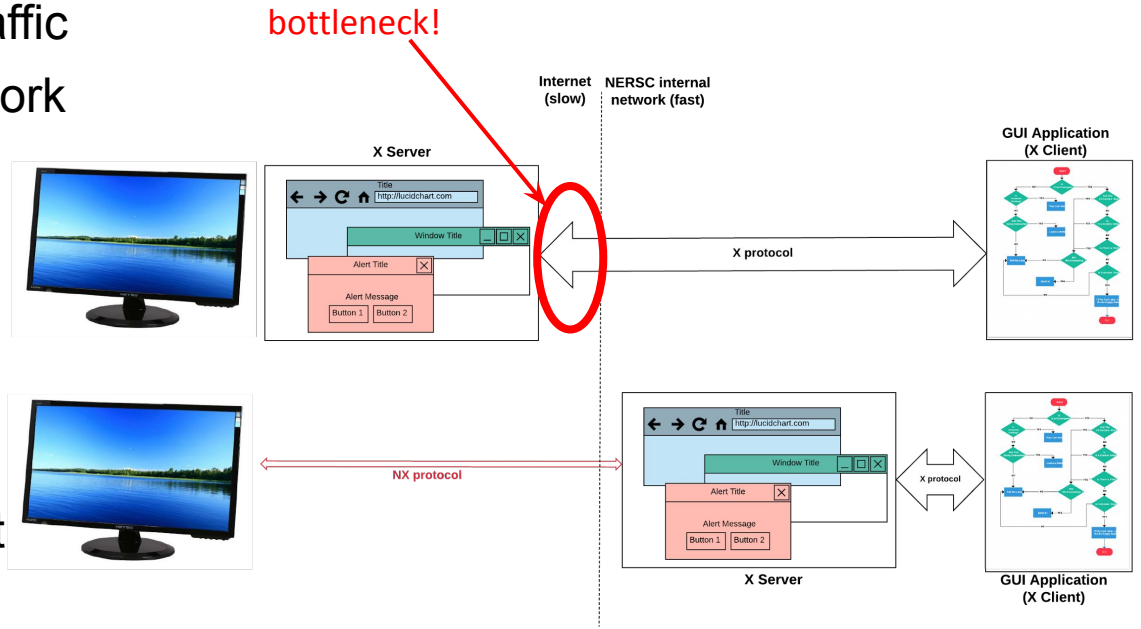
NoMachine

NoMachine: Accelerated X

X protocol makes a lot of traffic

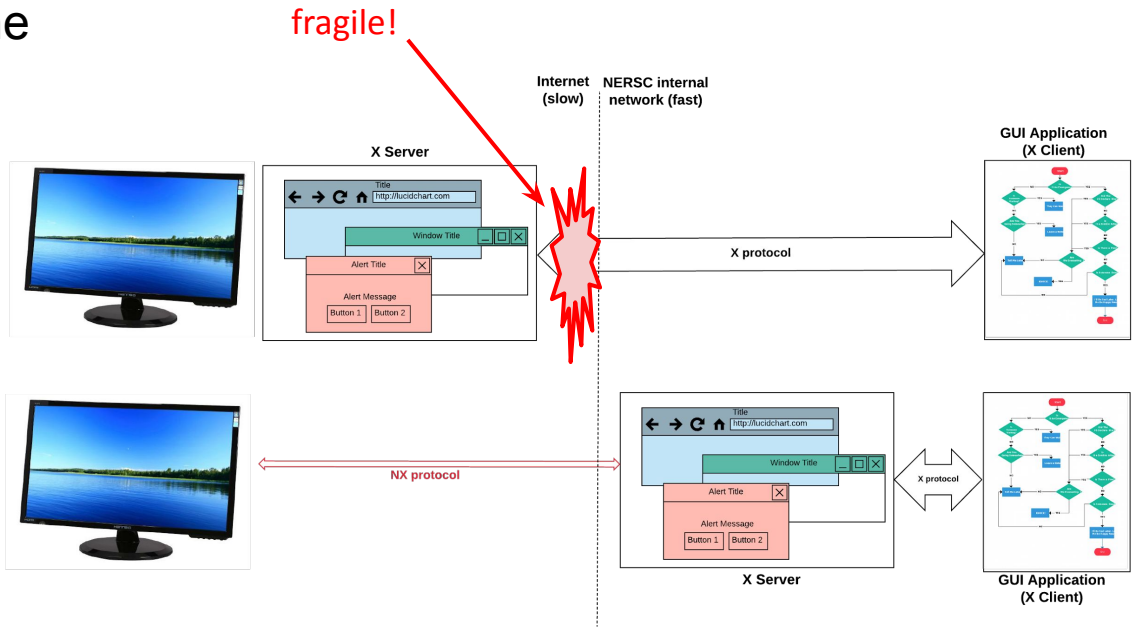
- OK over the (fast) network internal to NERSC
- Not OK over the (slow) internet

NoMachine runs **inside** NERSC, and sends less data over the (slow) internet



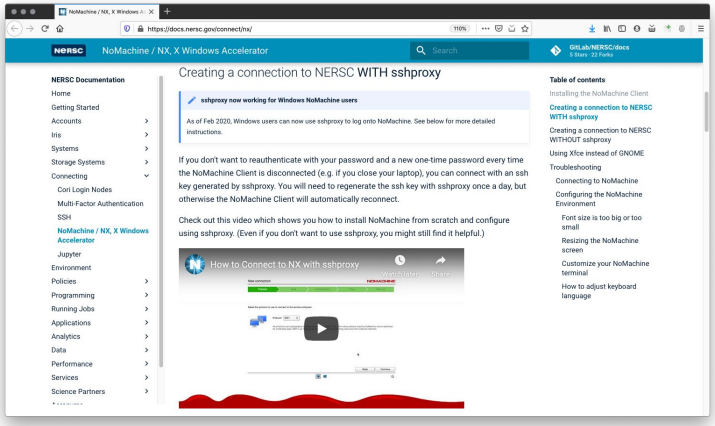
NoMachine: Accelerated X

NoMachine also removes the weakest link, so broken connections don't kill your application



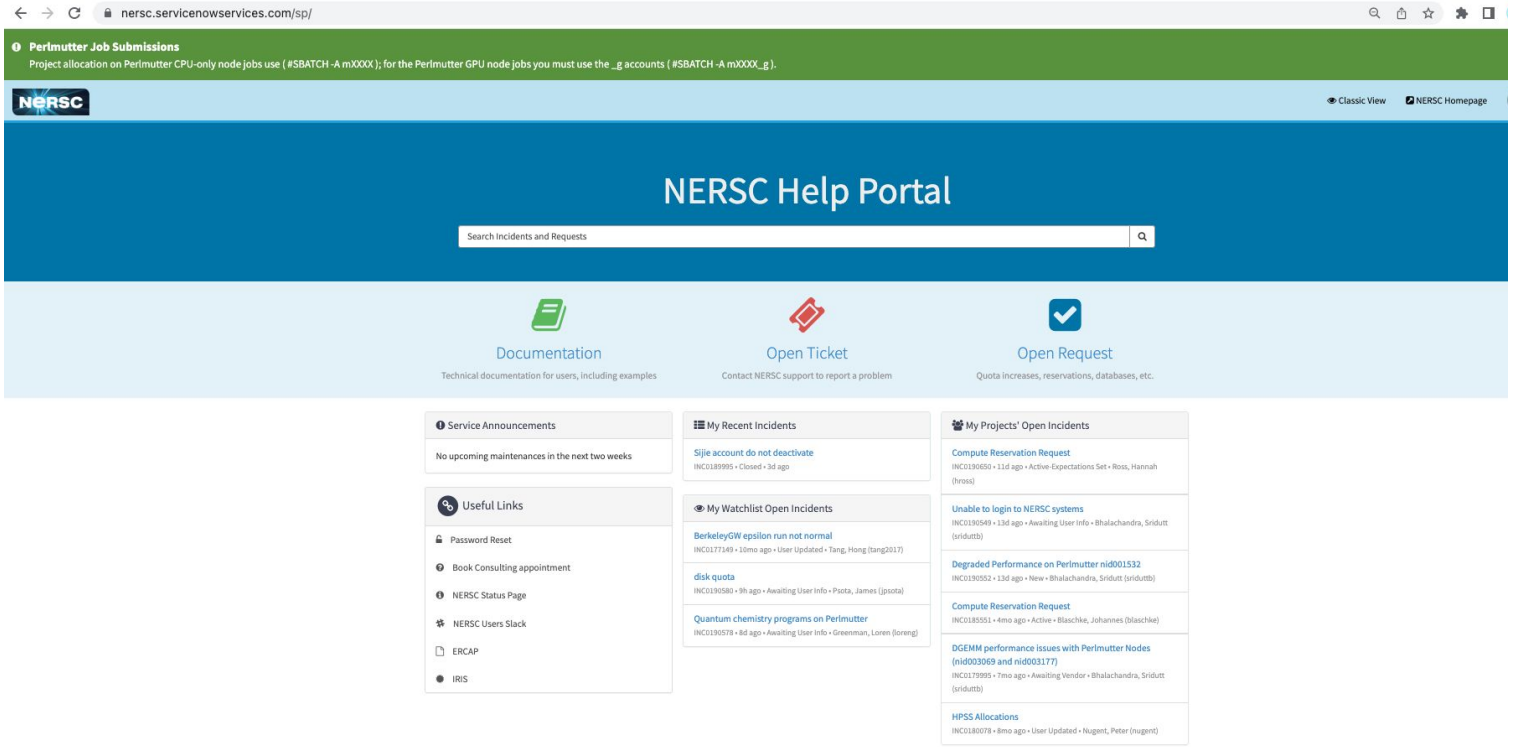
How to Set It Up

- https://docs.nersc.gov/connect/nx/ has detailed instructions
  - Download the client (https://www.nomachine.com/download-enterprise#NoMachine-Enterprise-Client) (Make sure to get the **client**, not the server or workstation)
  - Setup a connection (can optionally use the key you generated with `sshproxy.sh`)

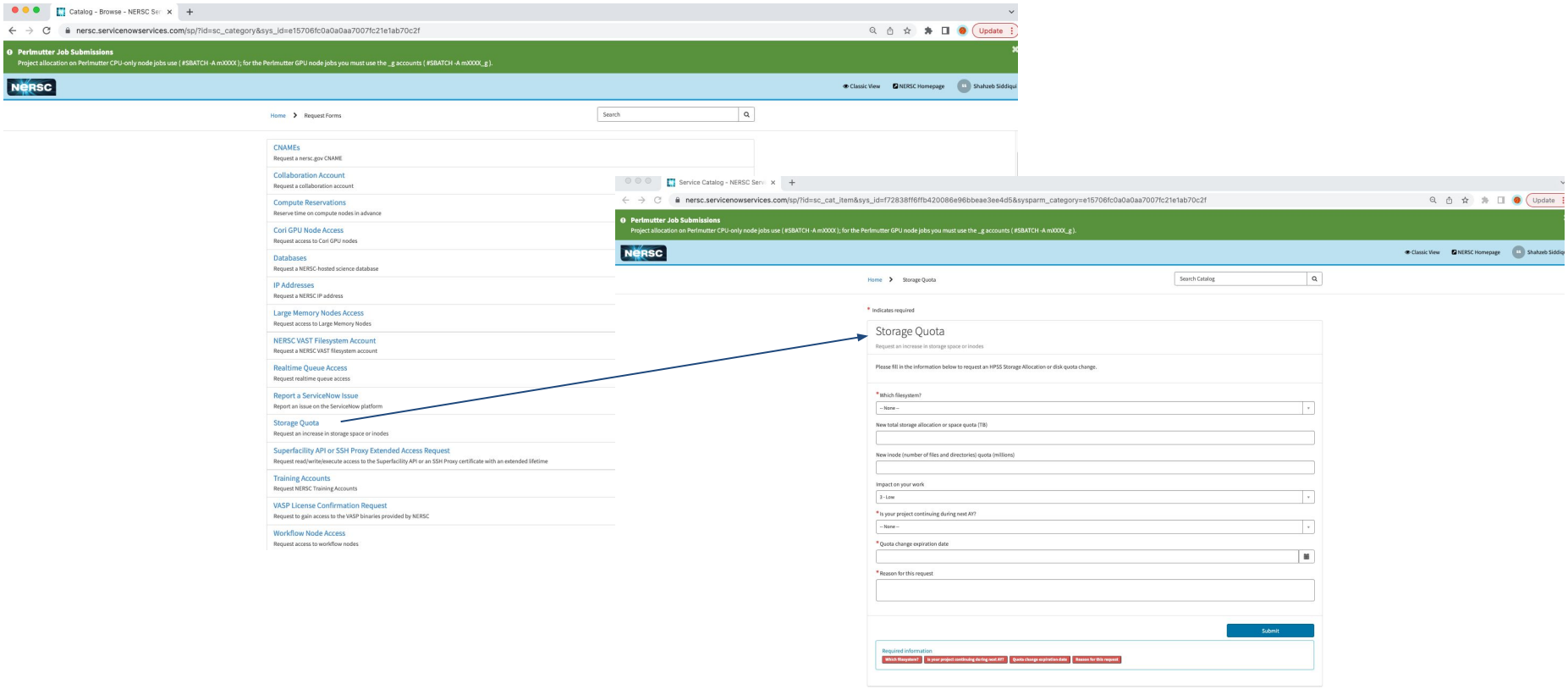


Getting Help! (Submitting a User Ticket)

NERSC Help Portal: https://help.nersc.gov/



Request Forms



How to file a Good Ticket

Do Include:

- error messages, JobID, location of relevant files on system, output of module list
- Steps to reproduce

Don't Include:

- Screenshots! (This seems helpful but usually cannot be read easily, and can't copy/paste text from an image!)

https://docs.nersc.gov/getting-started/#how-to-file-a-good-ticket

For Example!

Hard to troubleshoot

- ➔ My code is slow
- ➔ My job won't start
- ➔ Perlmutter is broken

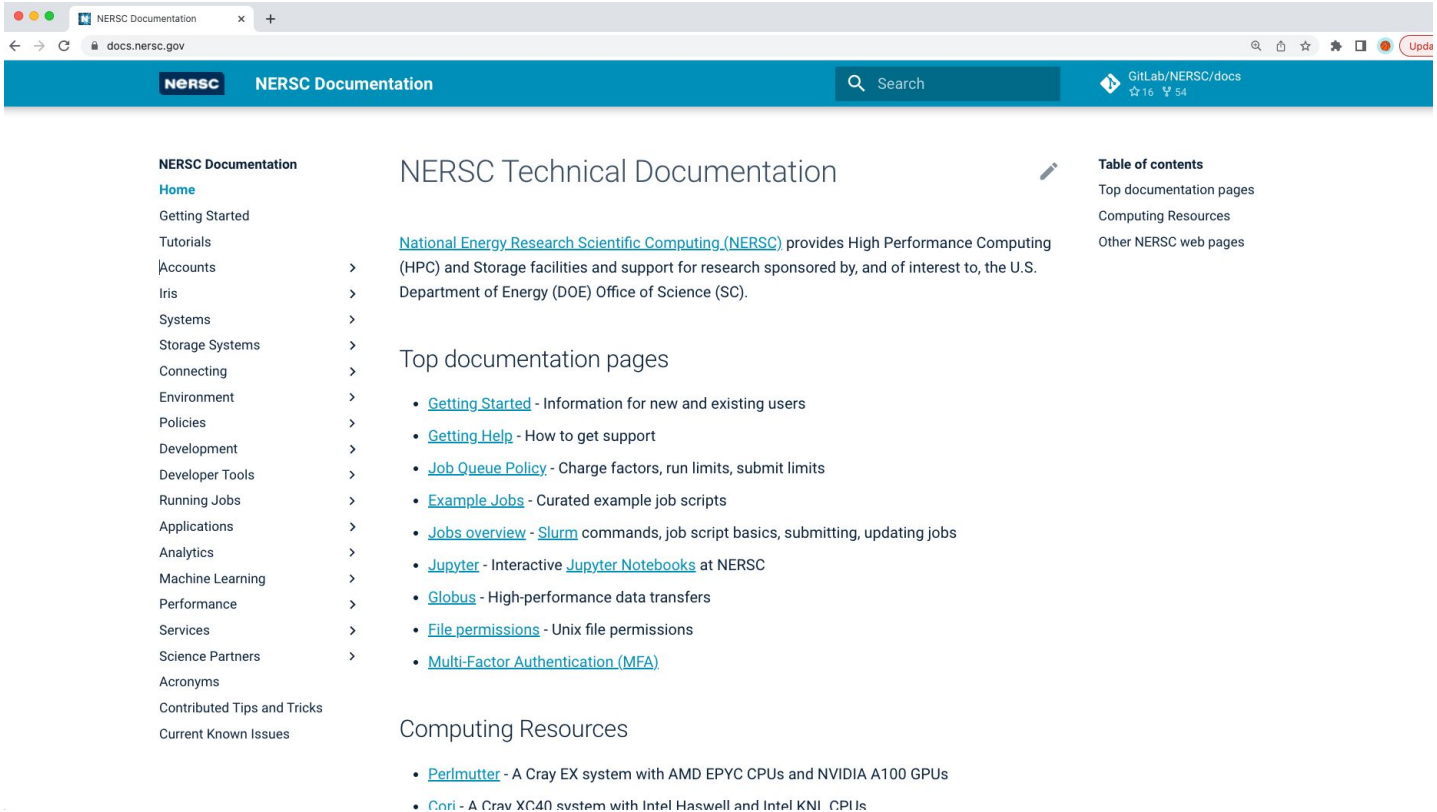
It's always helpful to include the actual error message, even if it's long!

Better to troubleshoot

- ➔ JobID 123456 was 3x slower than JobID 234566.
- ➔ The jobscript located at $HOME/submit_job.sh works on Cori but not on Perlmutter. This was the error message:...
- ➔ Running python $SCRATCH/test_cori.py crashes with this error message.

Navigating NERSC User Documentation

NERSC Documentation - Main Page



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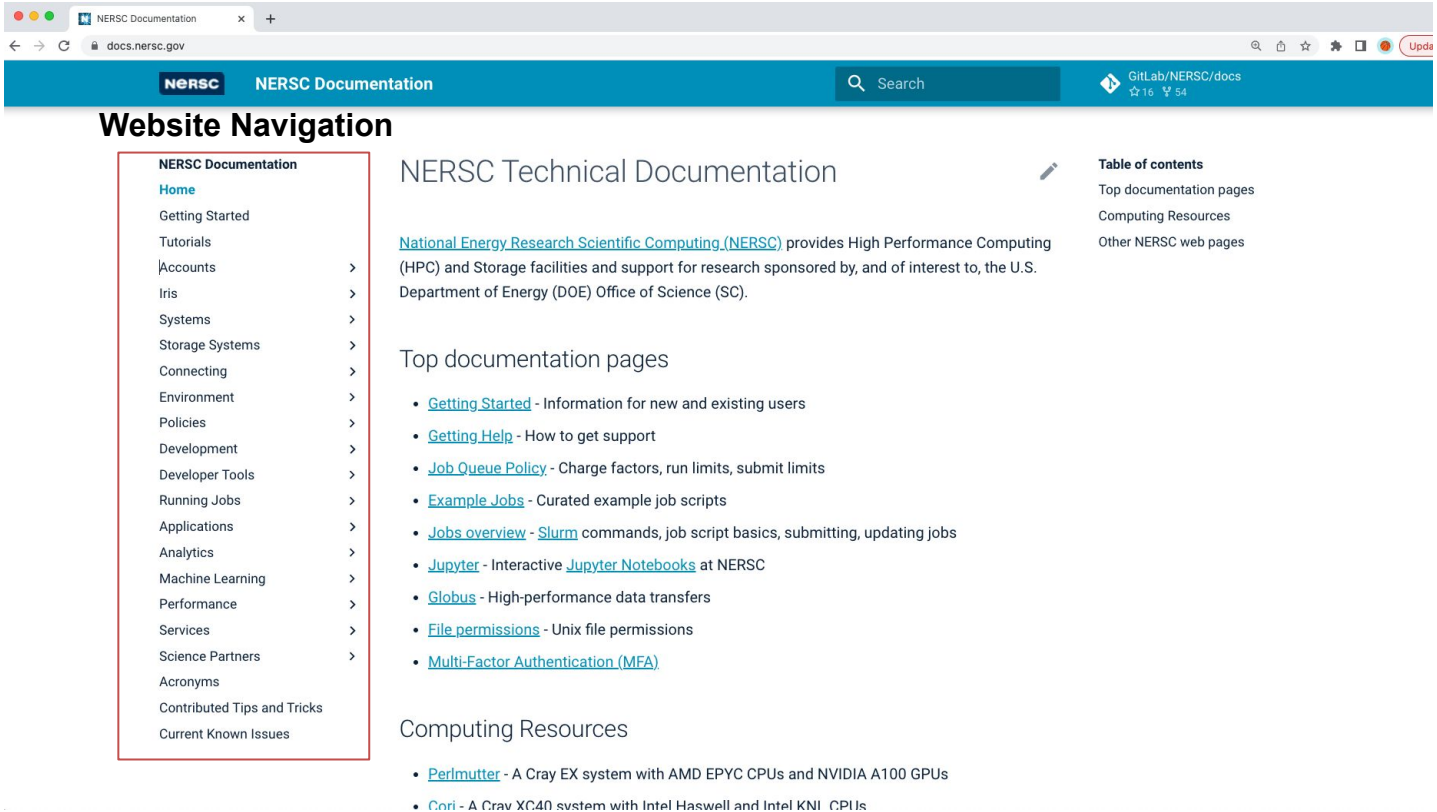

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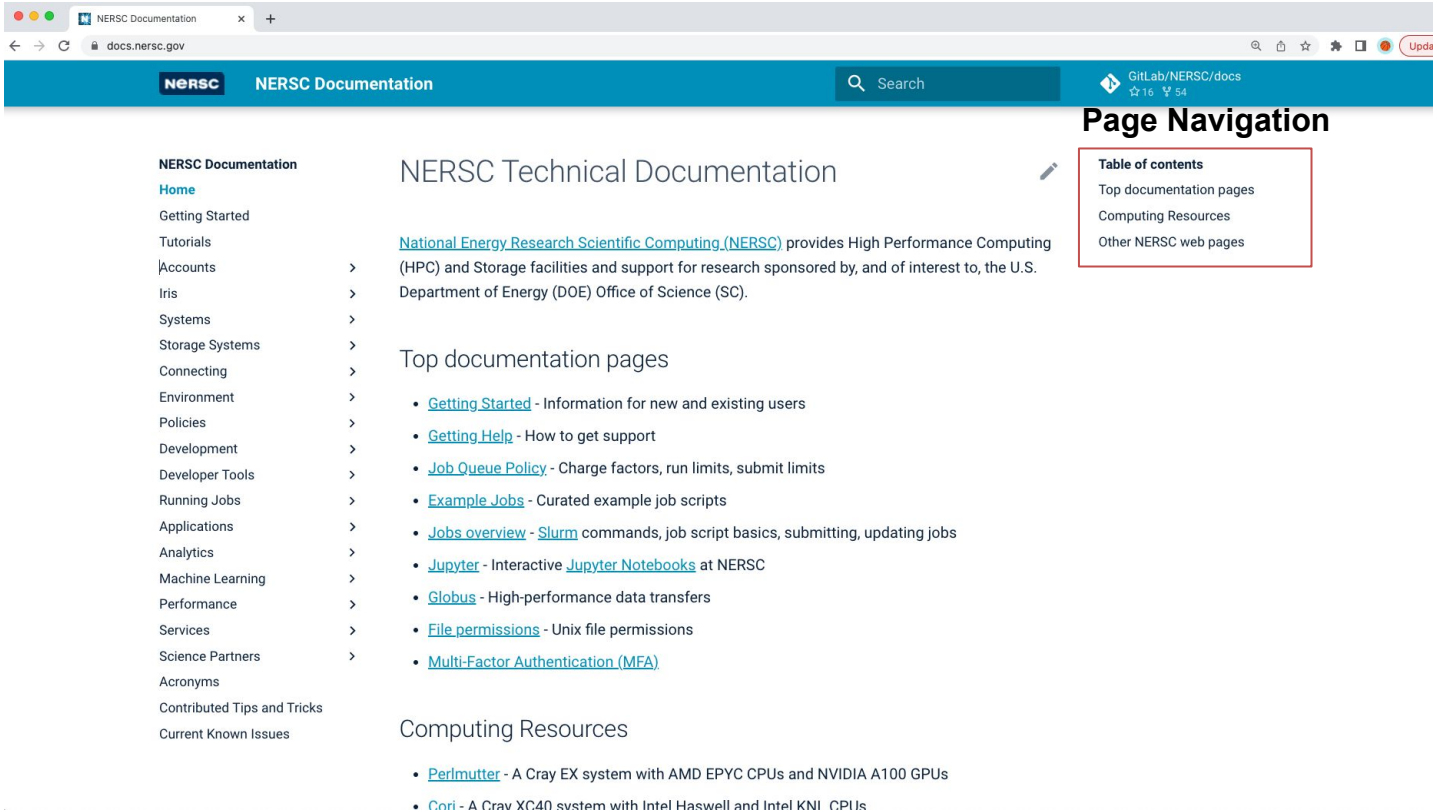

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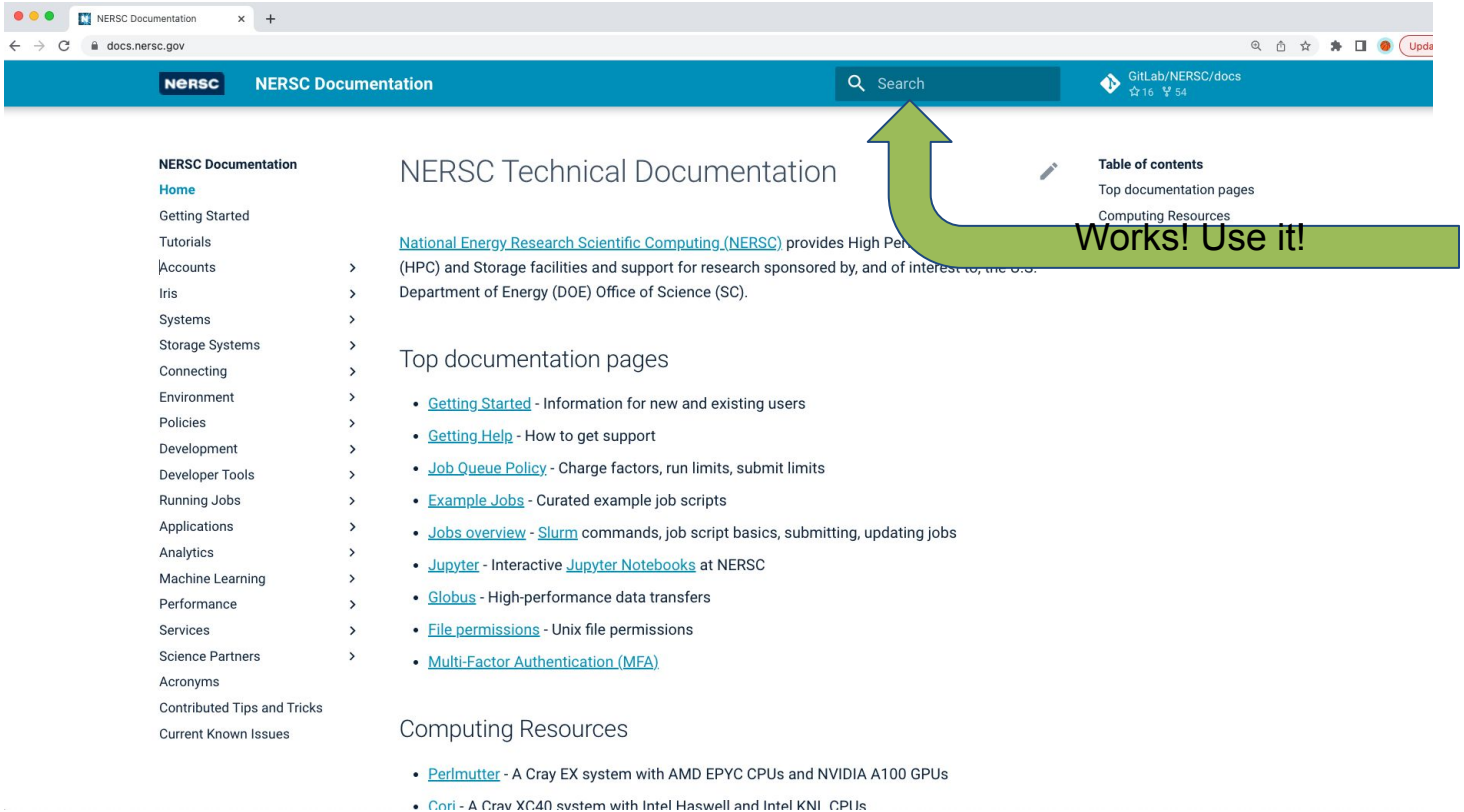
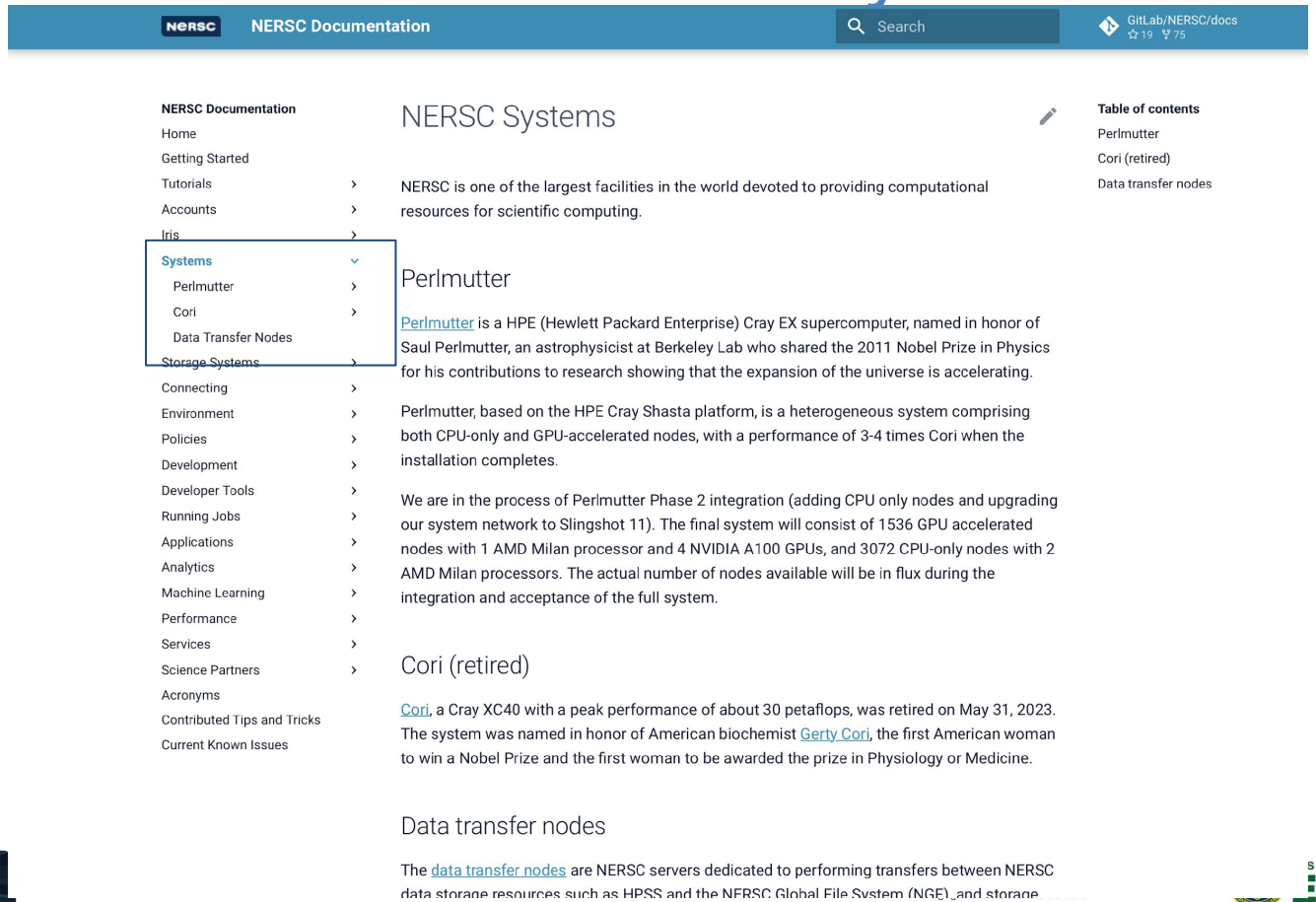
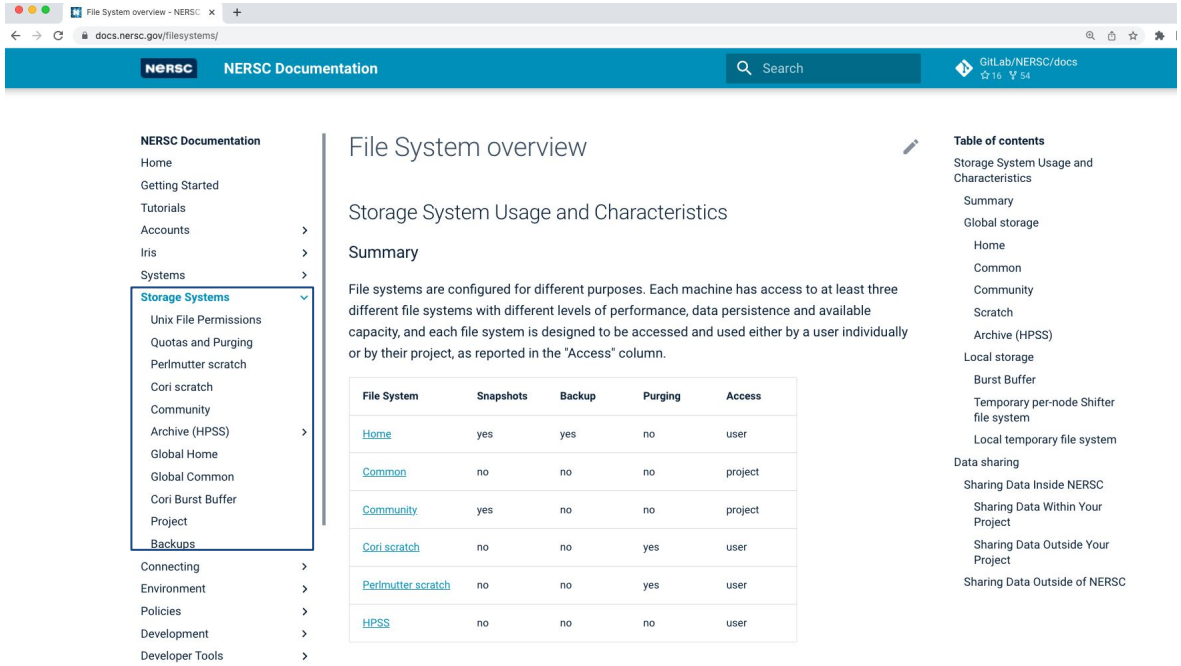


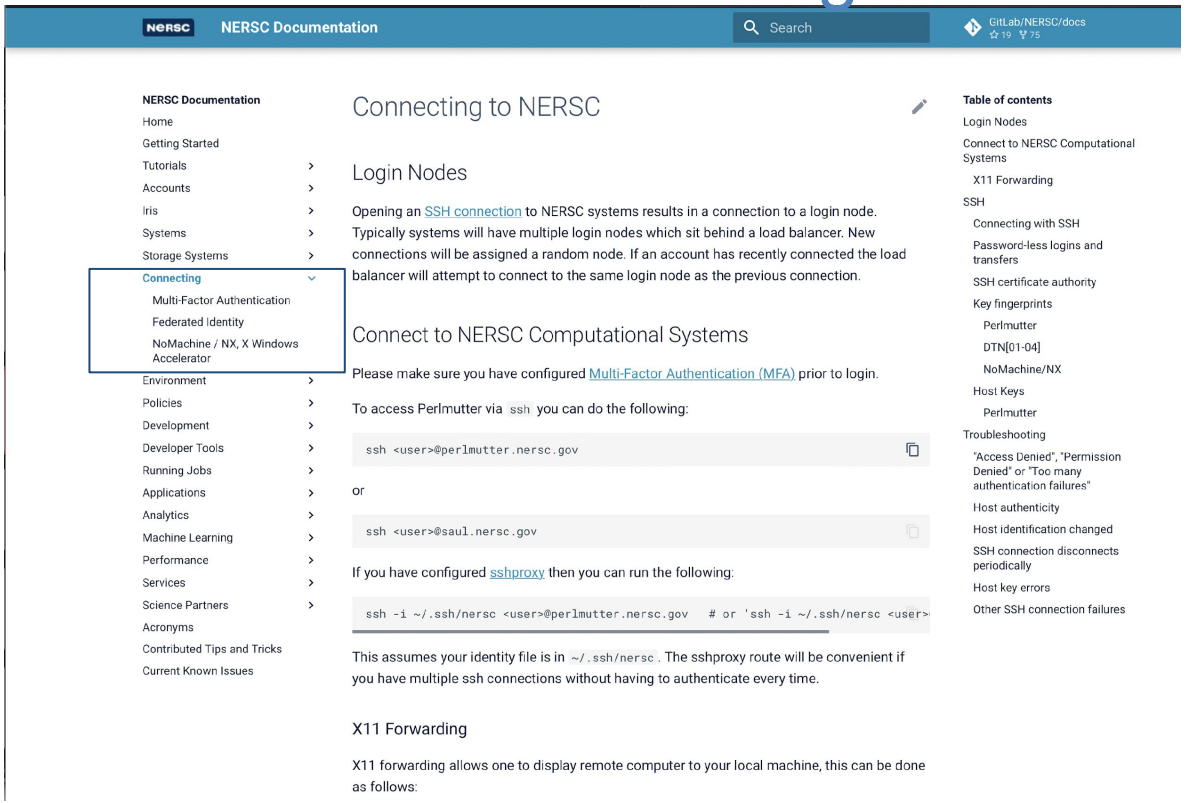
NERSC Documentation - System Overview



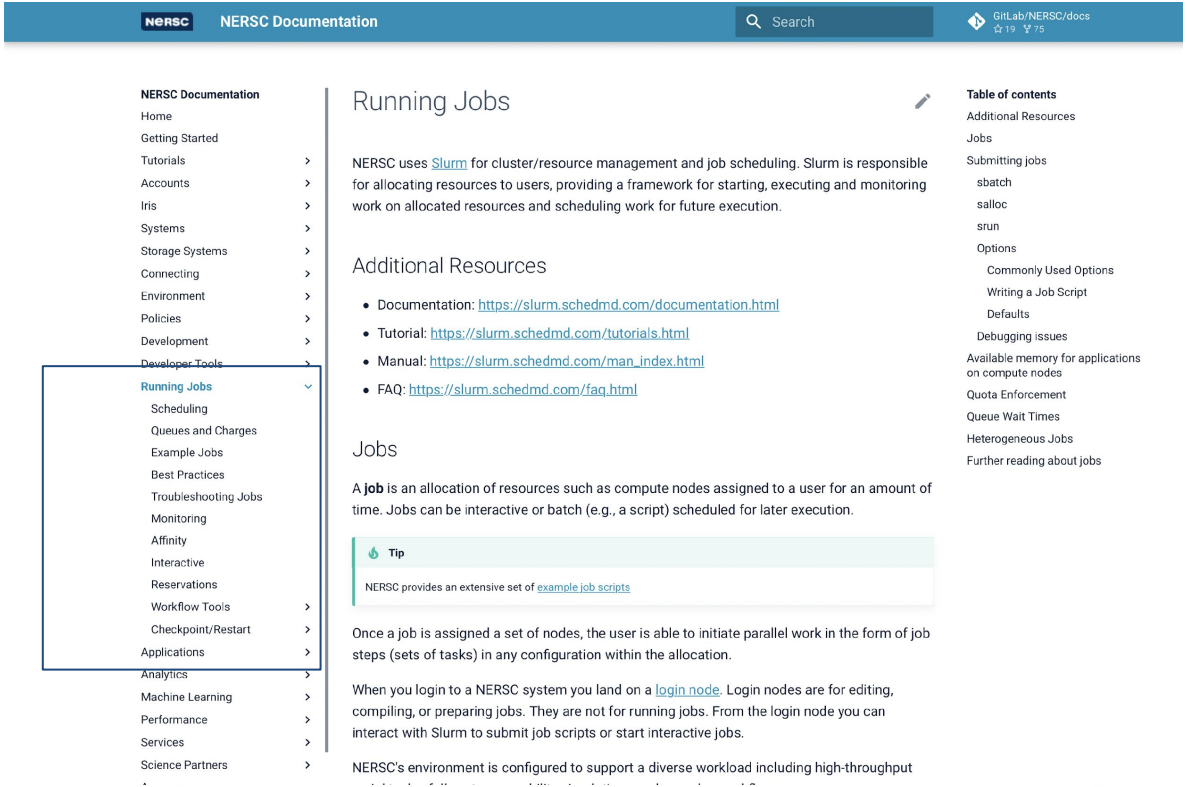
NERSC Documentation - Storage Overview



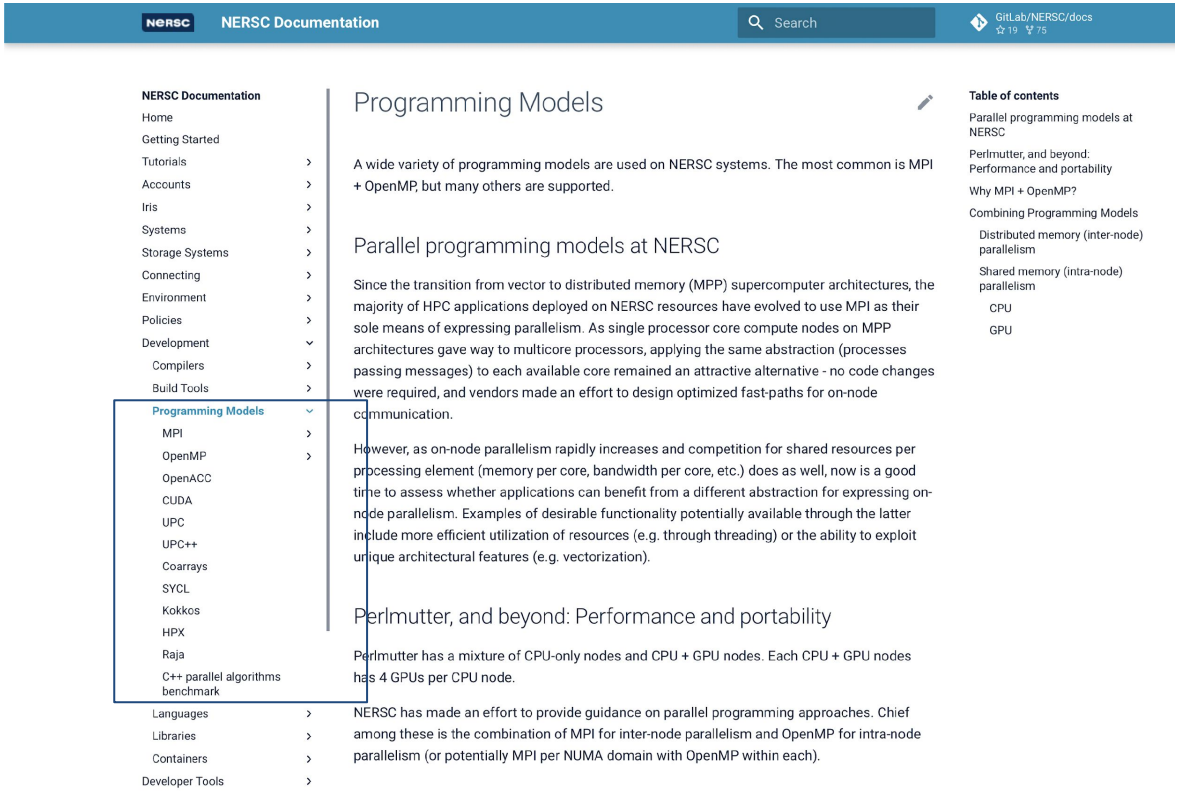
NERSC Documentation - Connecting to NERSC



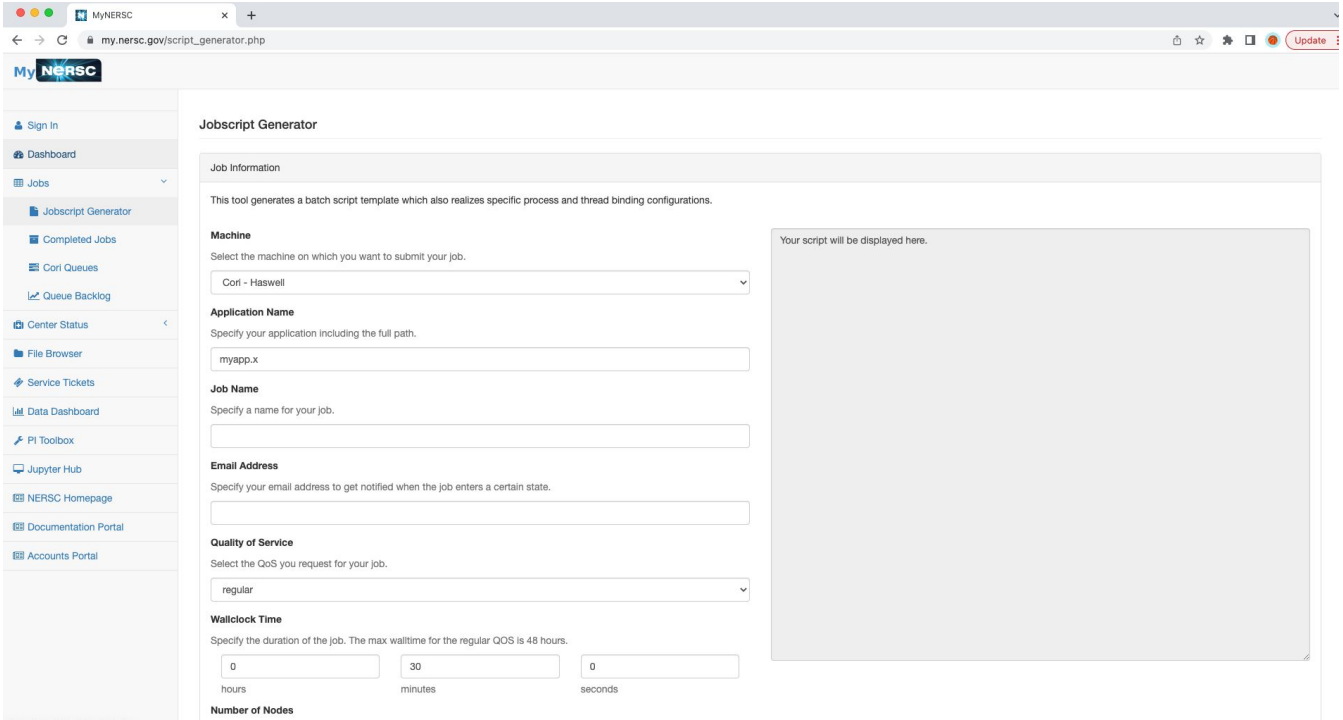
NERSC Documentation - Running Jobs



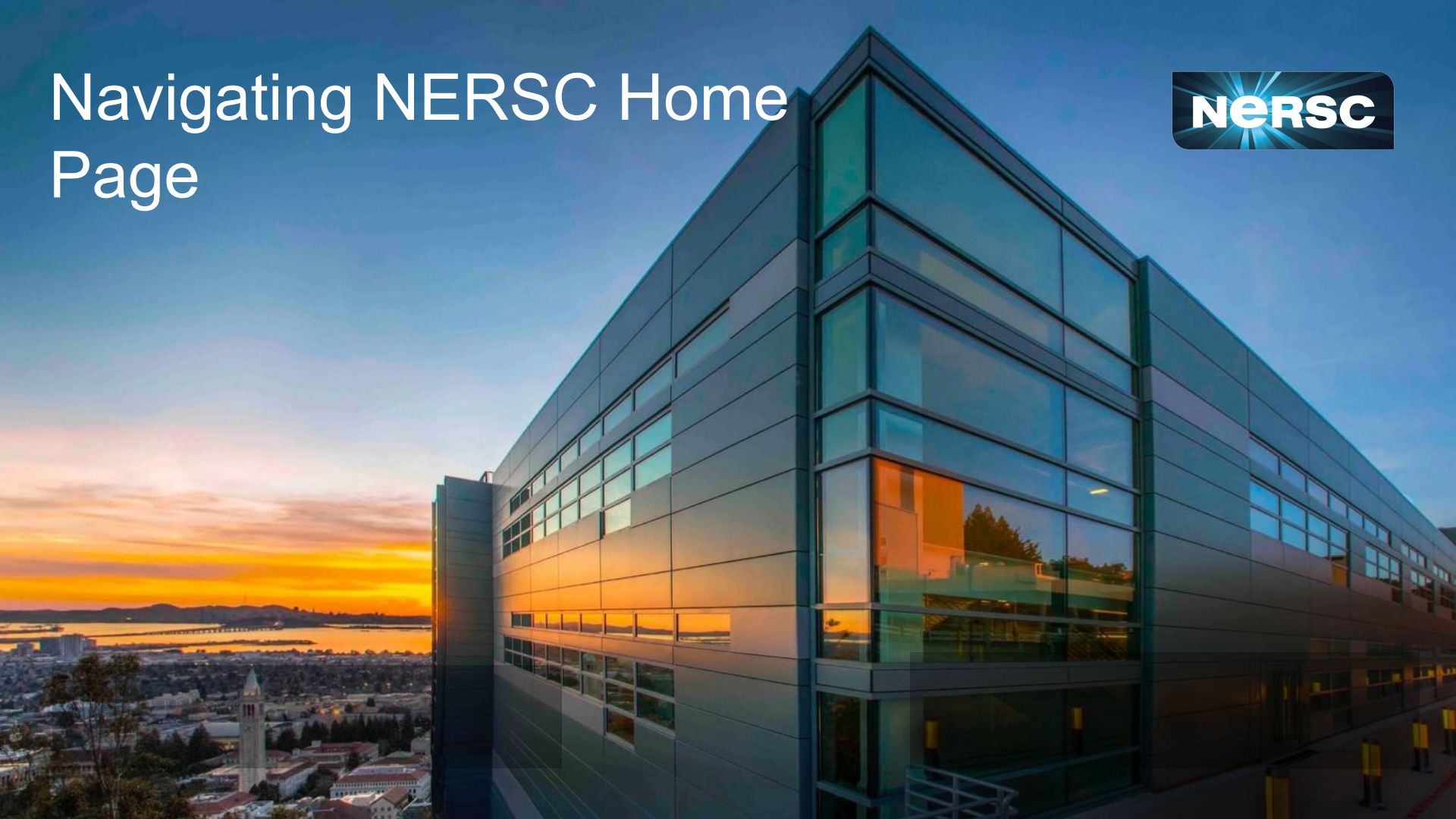
NERSC Documentation - Programming Models



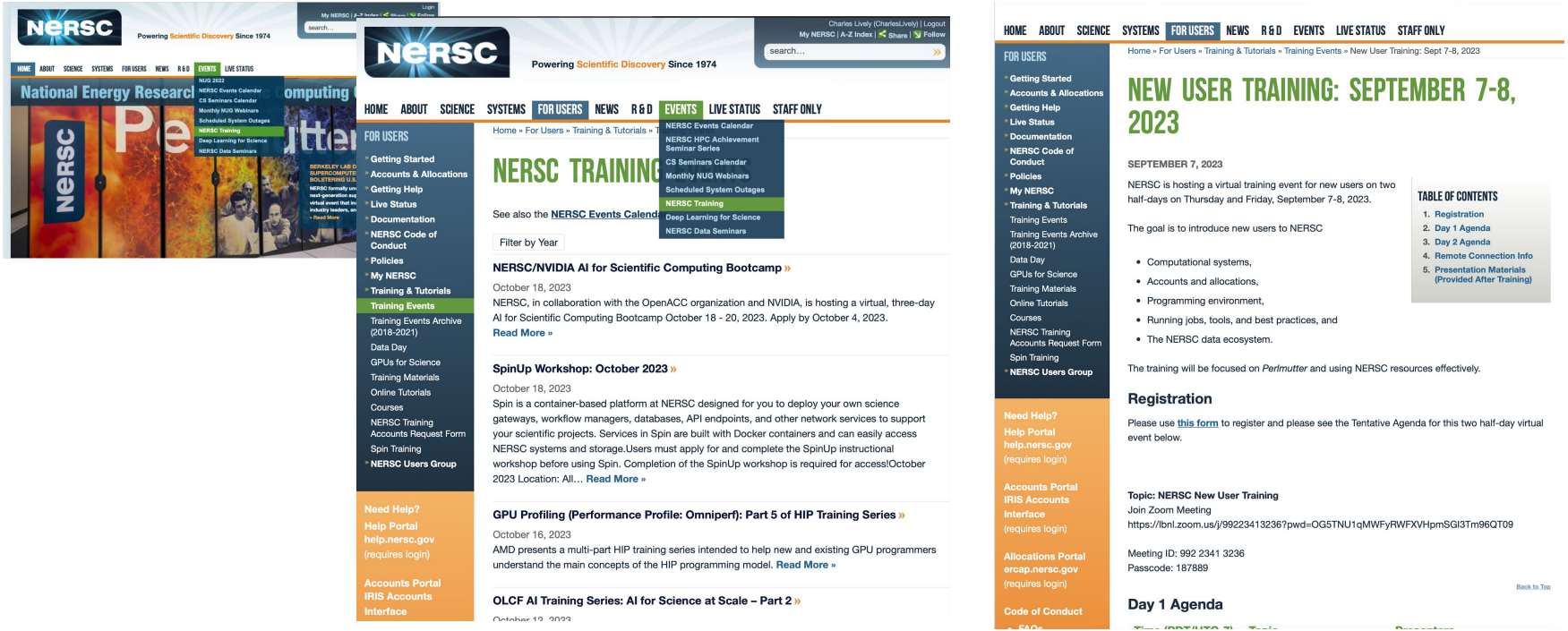
Jobscript Generator



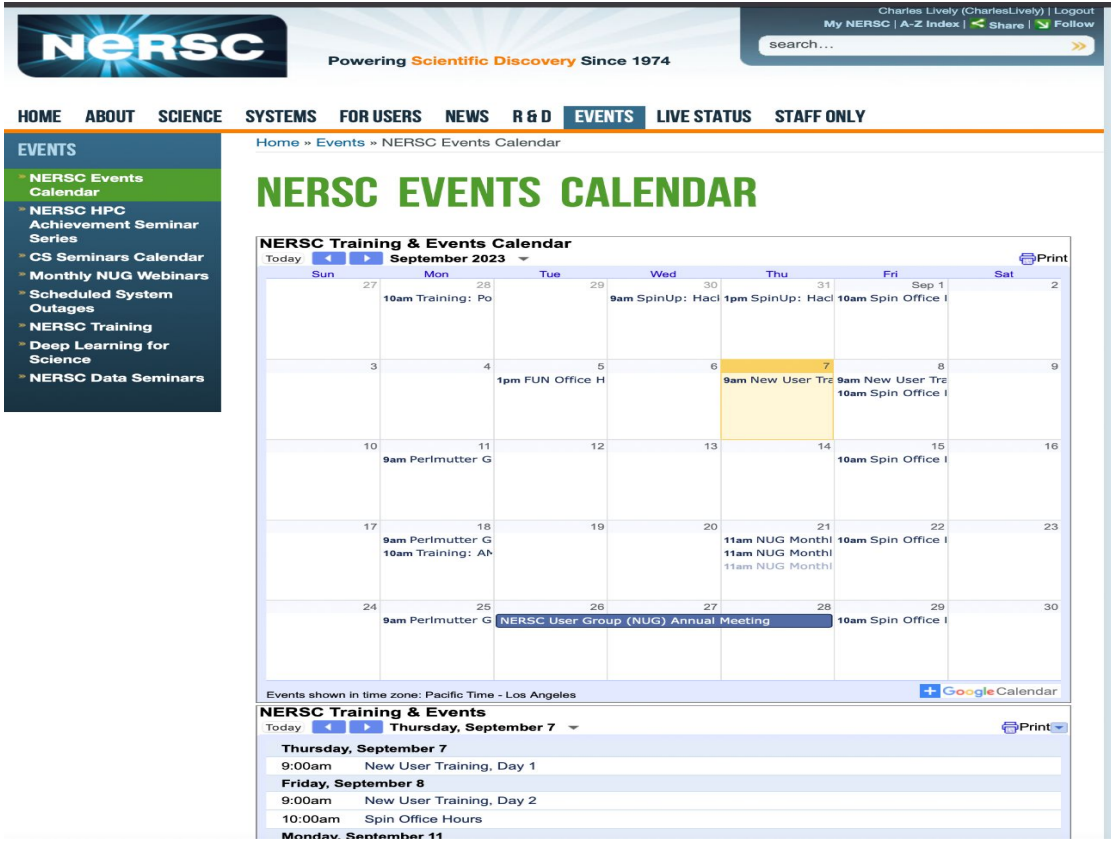
Navigating NERSC Home Page



Navigating www.nersc.gov (NERSC Training)



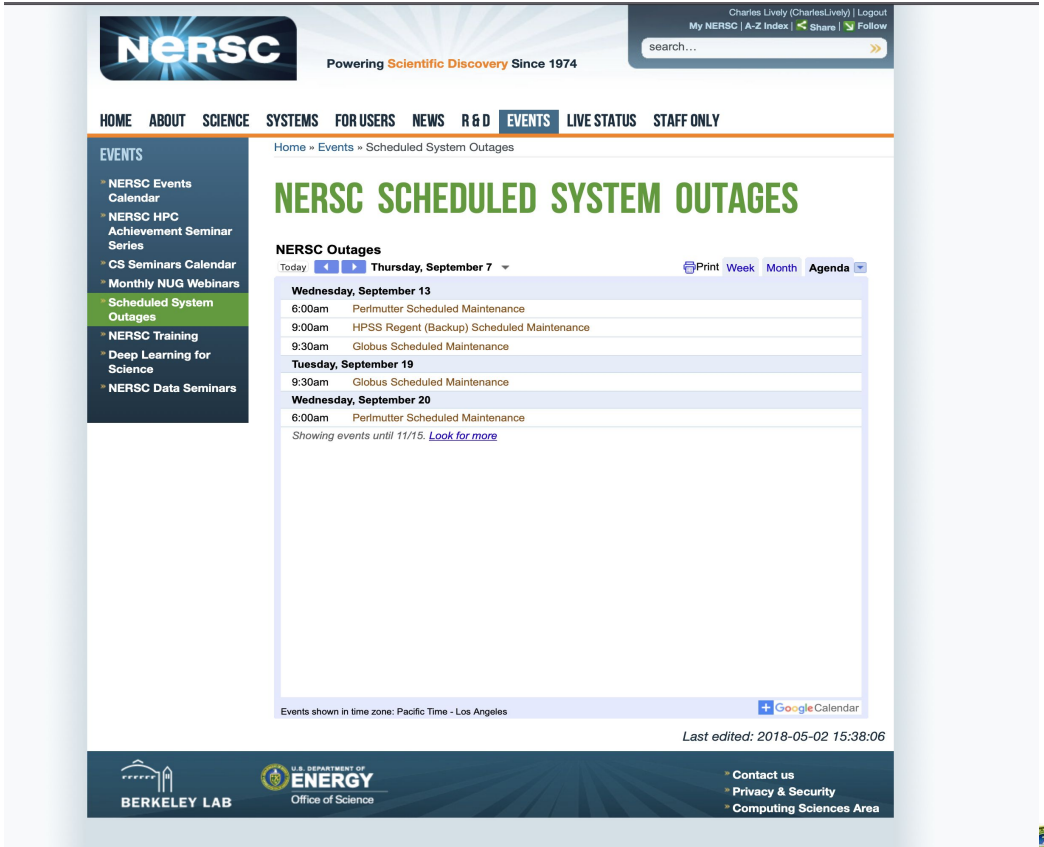
Navigating www.nersc.gov (NERSC Events)



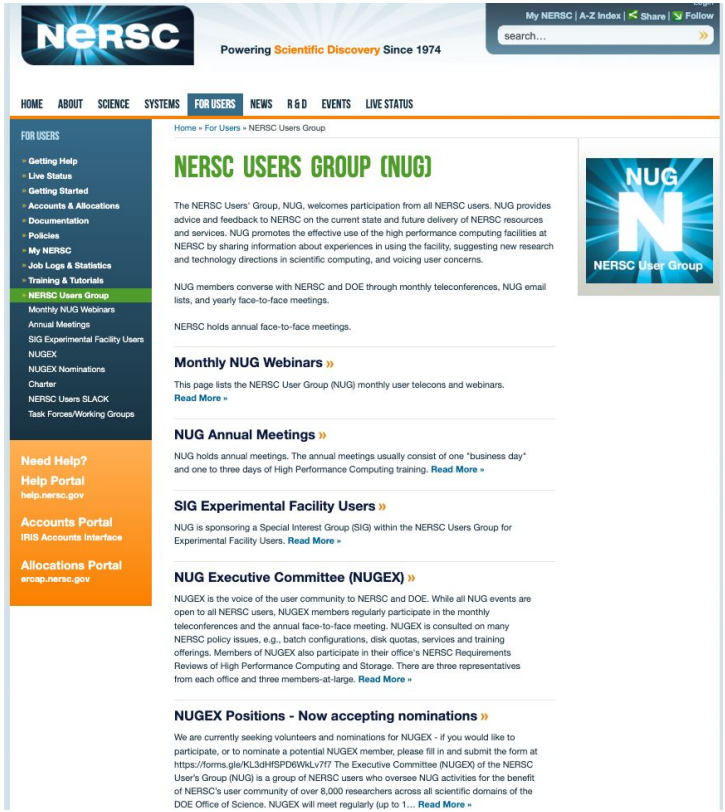
Live Status: (https://www.nersc.gov/live-status/motd/)

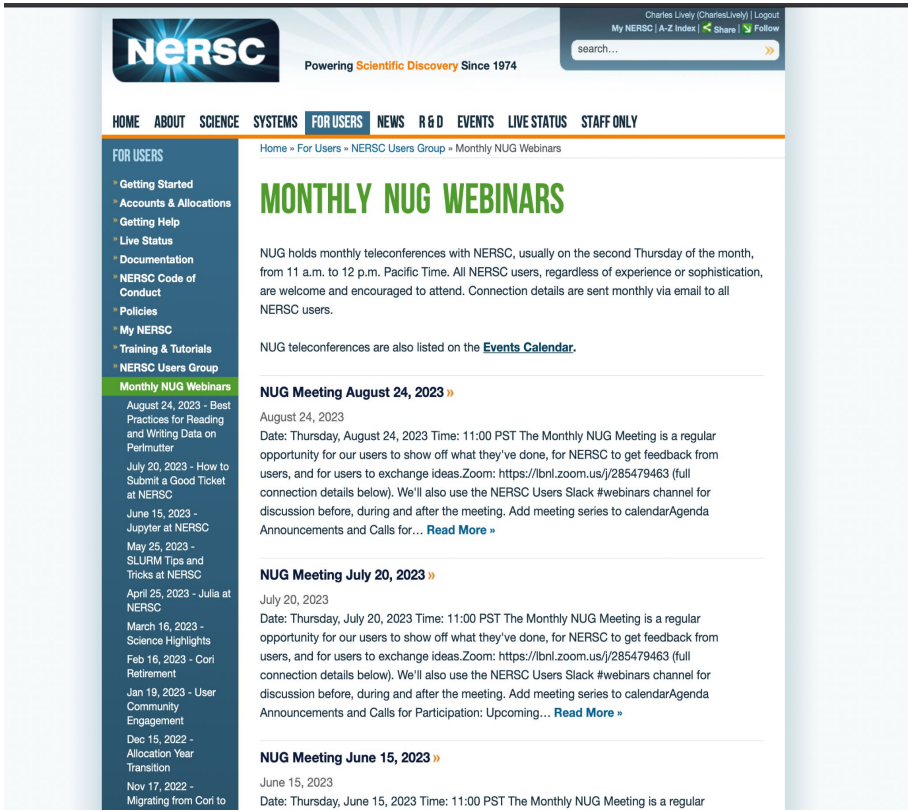
Lipi's Top Tip:
Add disruptive outages to your calendar so you can plan ahead!

Navigating www.nersc.gov (Scheduled System Outages)



Navigating www.nersc.gov (NERSC User Slack)






Thank You and
Welcome to
NERSC!
NERSC