

Connecting to NERSC



New User Training
June 16, 2020

Steve Leak
NERSC User Engagement Group

This Session

- Connecting to NERSC Services
 - a. <https://iris.nersc.gov> for managing your account and project
 - b. <https://help.nersc.gov/> to contact NERSC support
 - c. <https://my.nersc.gov> for center status and a portal to everything
- Connecting to Cori
 - a. `ssh -l my_nersc_name cori.nersc.gov` for power users
 - b. <https://jupyter.nersc.gov> notebooks and terminals in your browser
 - c. NoMachine (<https://docs.nersc.gov/connect/nx/>) for GUI apps

Now

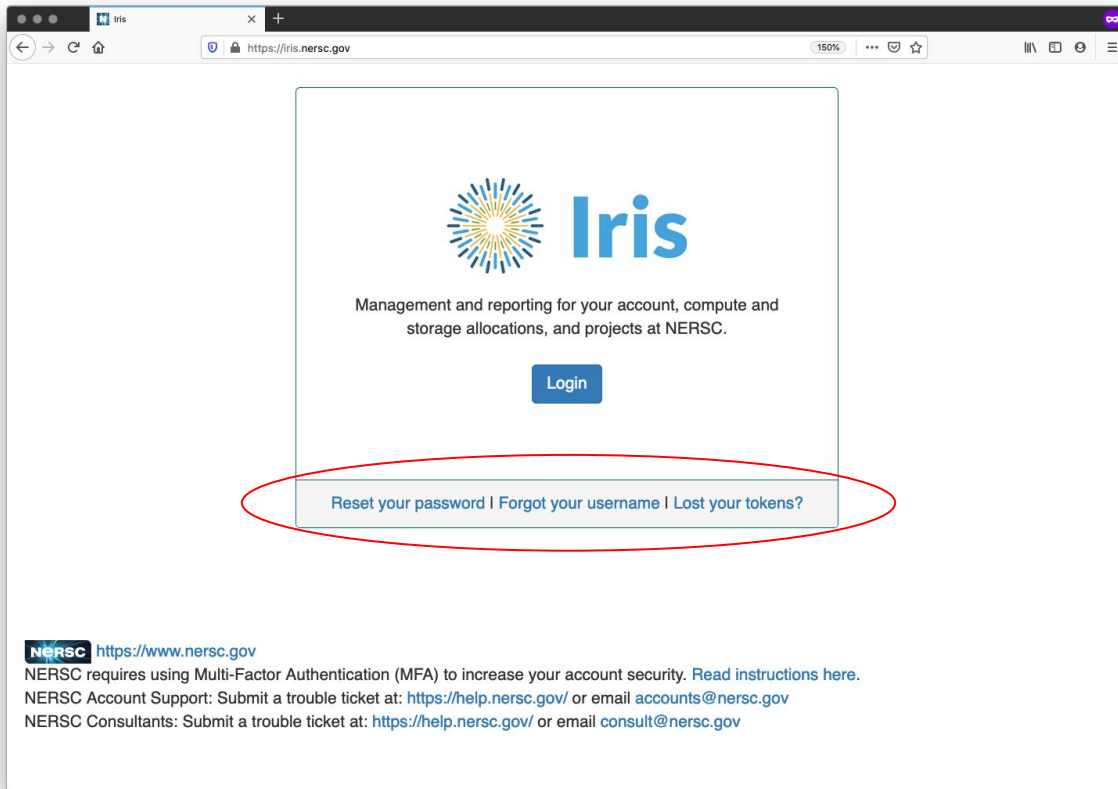
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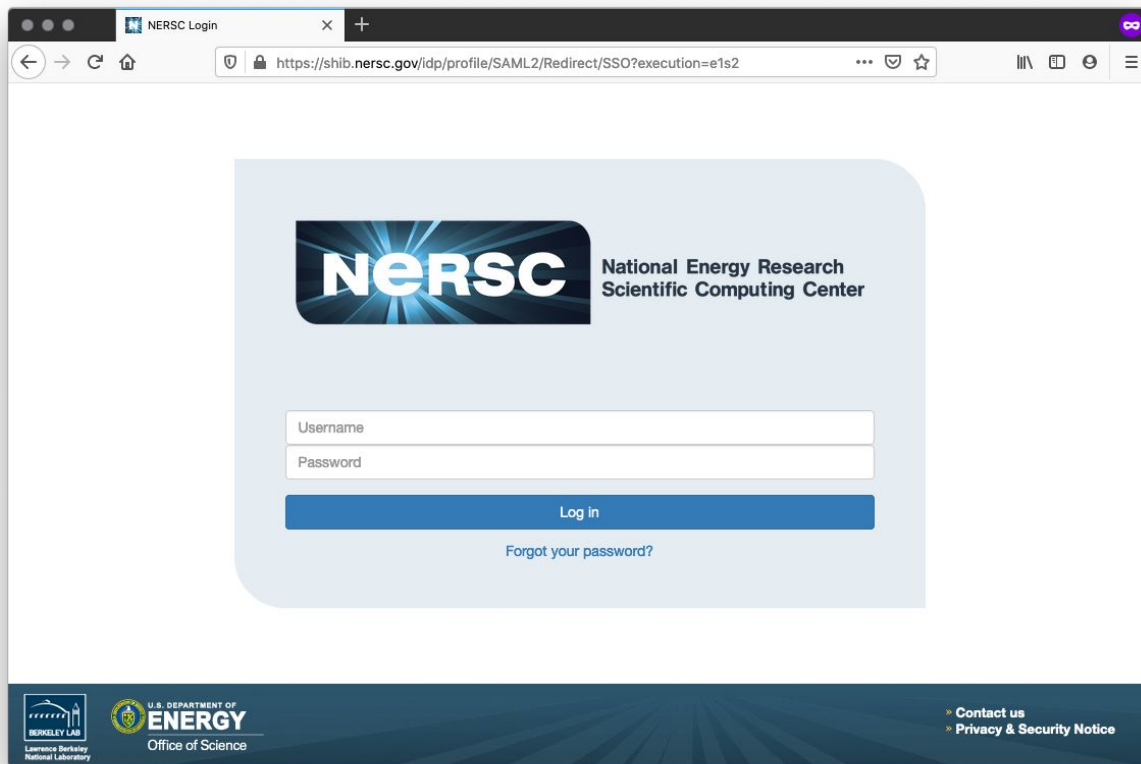
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Iris (<https://iris.nersc.gov>) for Your Account



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



A screenshot of a web browser displaying the NERSC Login page. The browser's address bar shows the URL <https://shib.nersc.gov/idp/profile/SAML2/Redirect/SSO?execution=e1s2>. The page features the NERSC logo (National Energy Research Scientific Computing Center) and a login form with fields for Username and Password, a Log in button, and a link for 'Forgot your password?'. The footer includes logos for Berkeley Lab, the U.S. Department of Energy Office of Science, and links for 'Contact us' and 'Privacy & Security Notice'.

NERSC Login

<https://shib.nersc.gov/idp/profile/SAML2/Redirect/SSO?execution=e1s2>


NERSC National Energy Research Scientific Computing Center


Username

Password

Log in

[Forgot your password?](#)

 **BERKELEY LAB**
Lawrence Berkeley National Laboratory

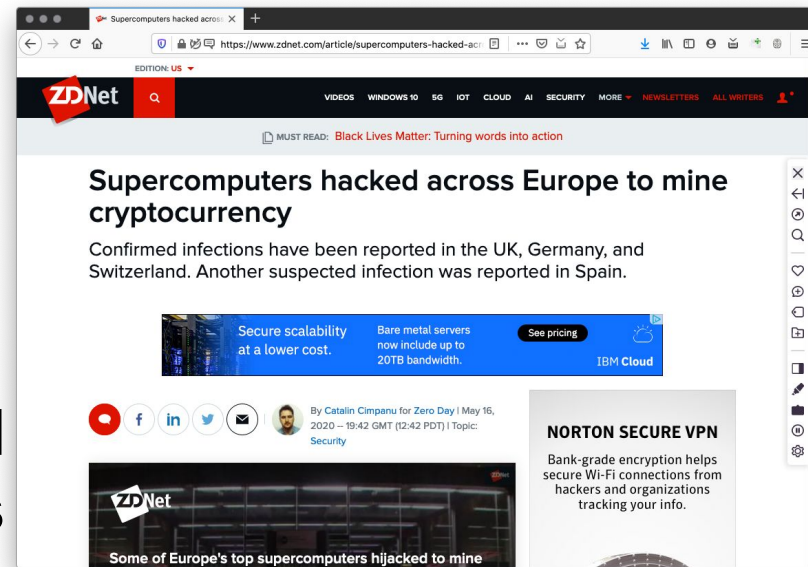
 **U.S. DEPARTMENT OF ENERGY**
Office of Science

[Contact us](#)
[Privacy & Security Notice](#)

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**



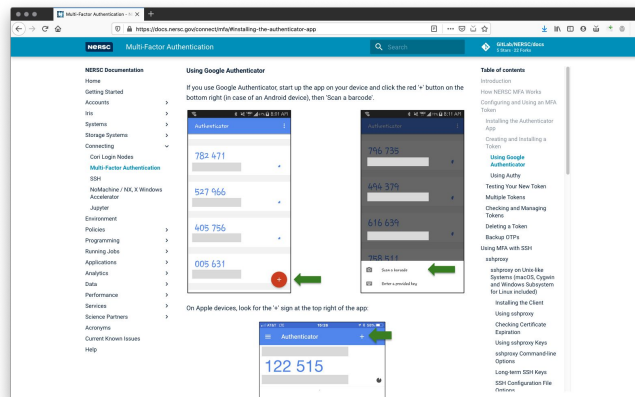
Setting Up MFA in Iris

- 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>

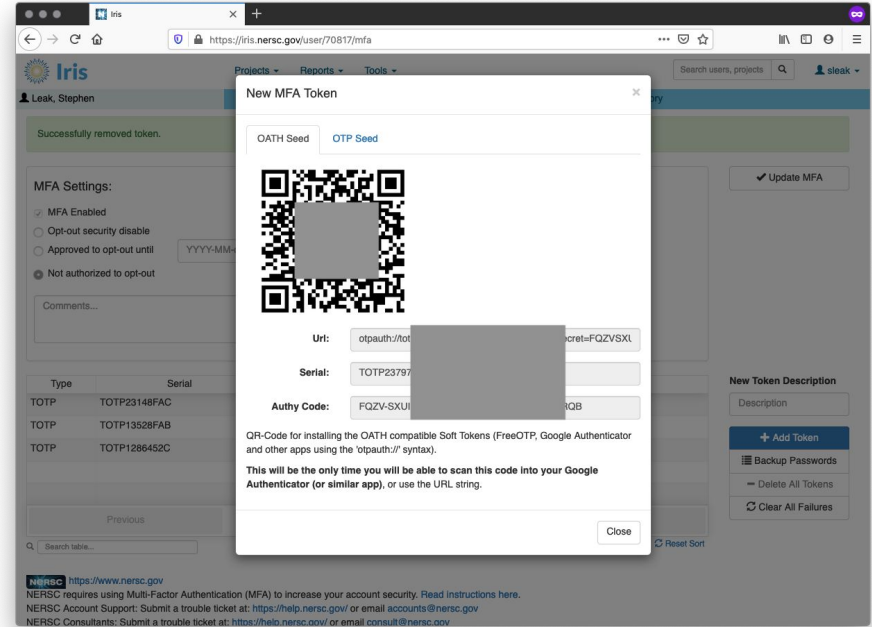
<https://authy.com>

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



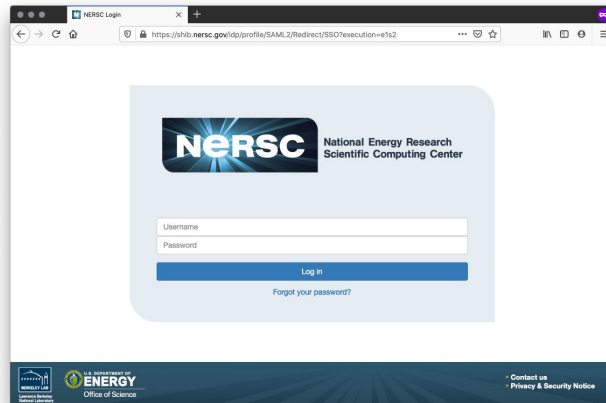
Setting Up MFA in Iris

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



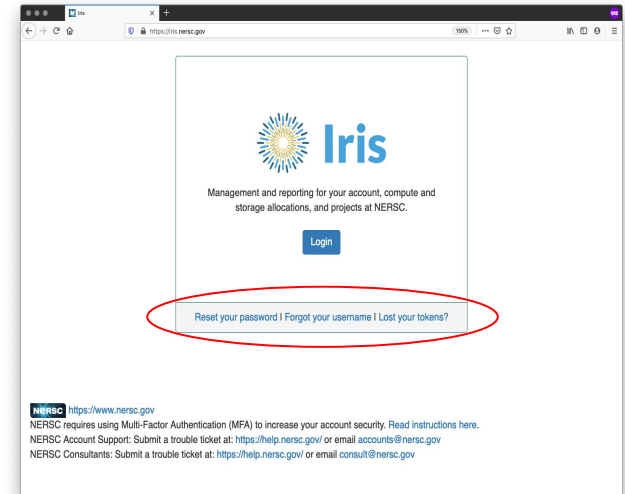
Logging in with MFA

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



Troubleshooting

- 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
 - Are you in a project? Check "Roles" tab



Now

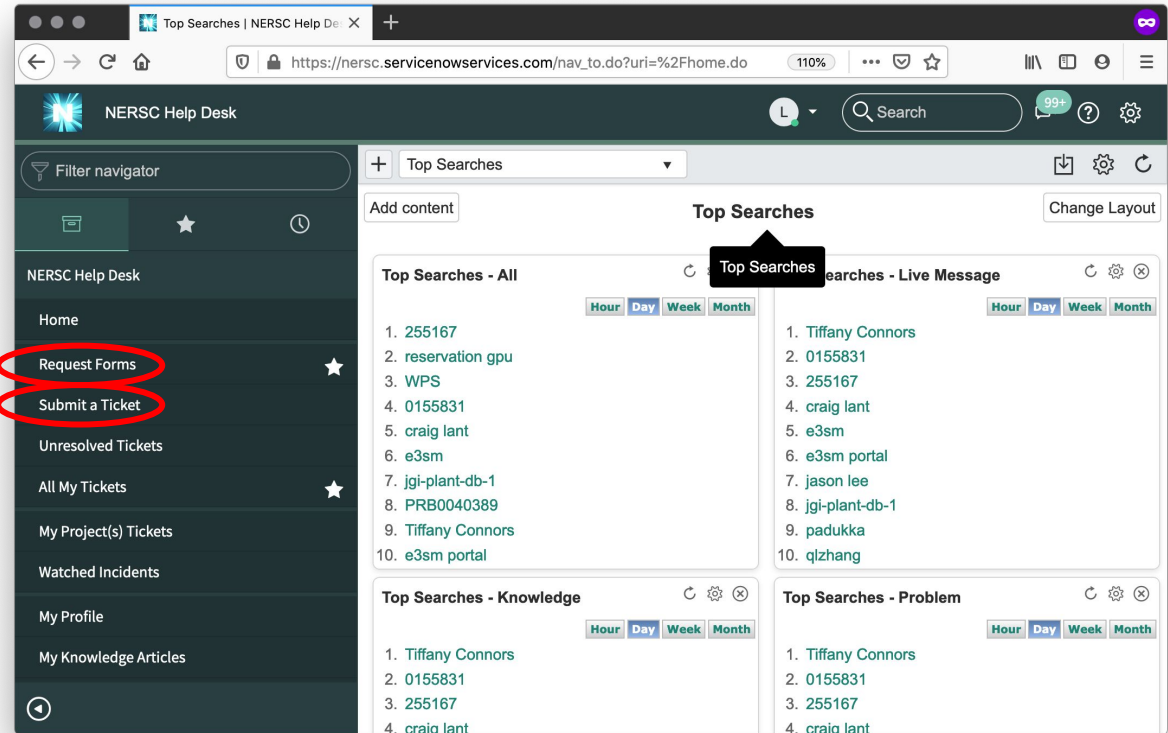
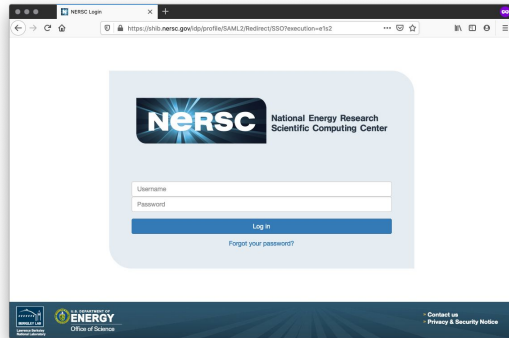
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Help: <https://help.nersc.gov/>



Now

- Connecting to NERSC Services

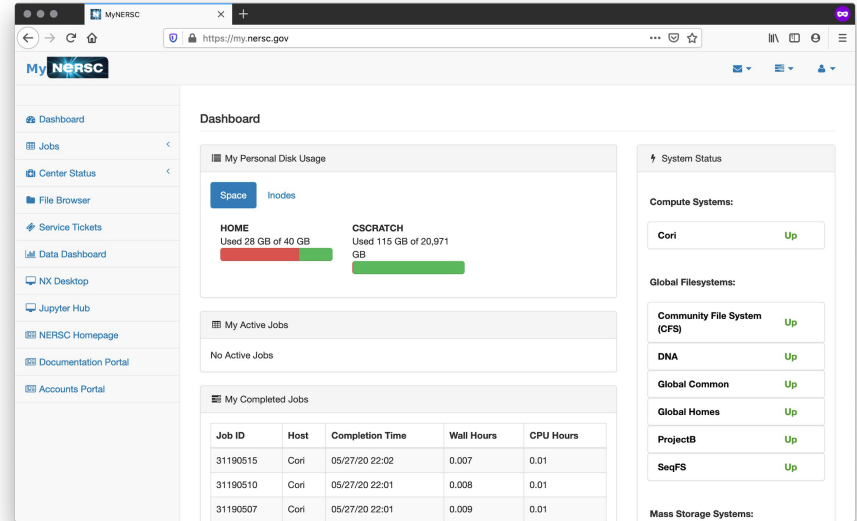
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<https://my.nersc.gov>

If you only remember **one**
URL, <https://my.nersc.gov>
will get you everywhere
NERSC



<https://my.nersc.gov>

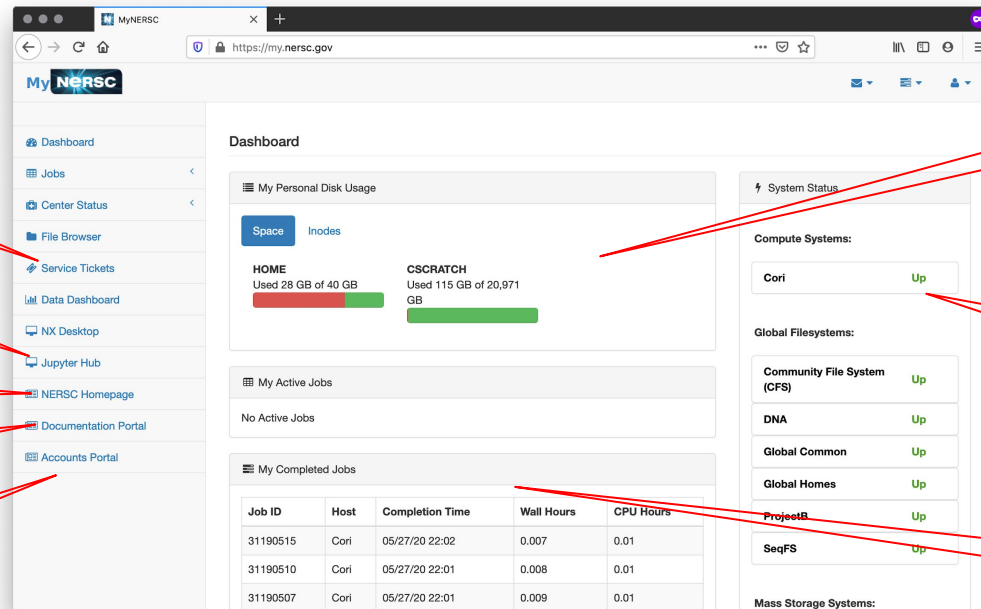
help.nersc.gov

jupyter.nersc.gov

www.nersc.gov

docs.nersc.gov

iris.nersc.gov



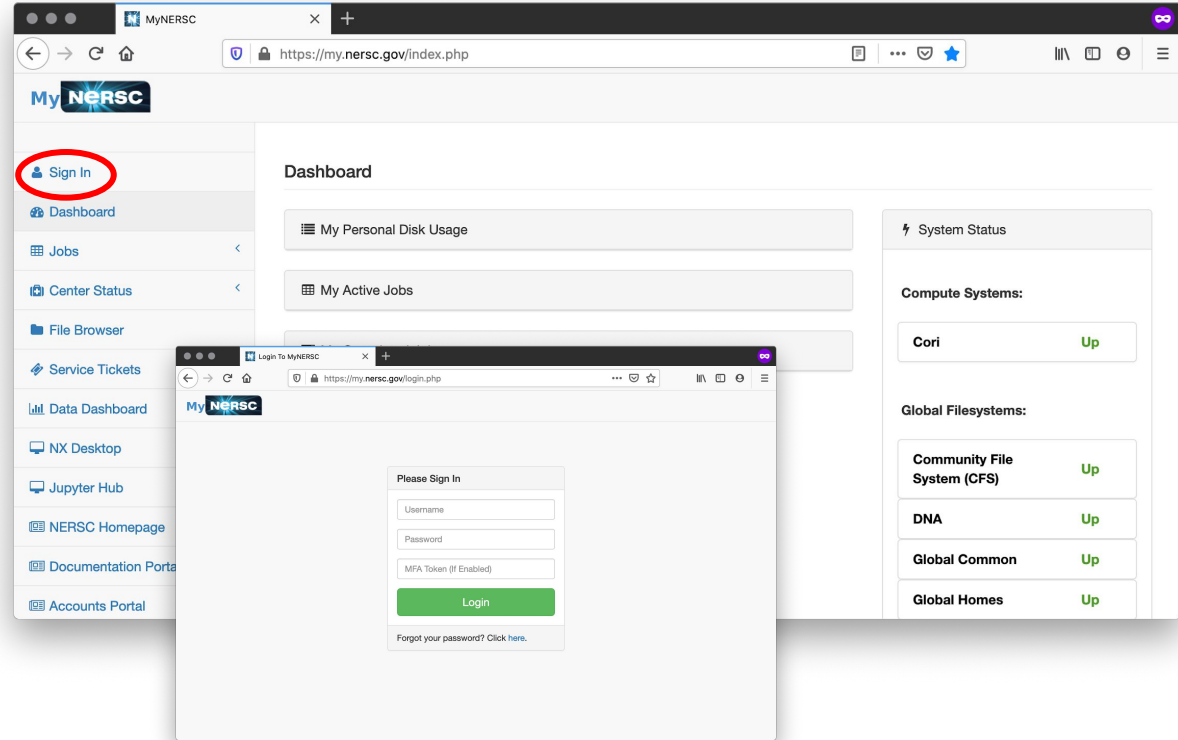
my disk quota

is cori up?

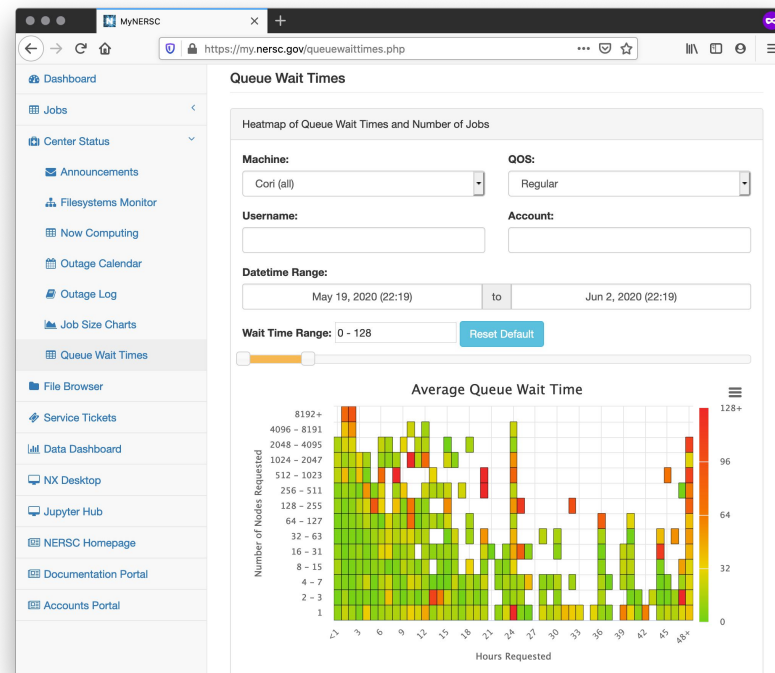
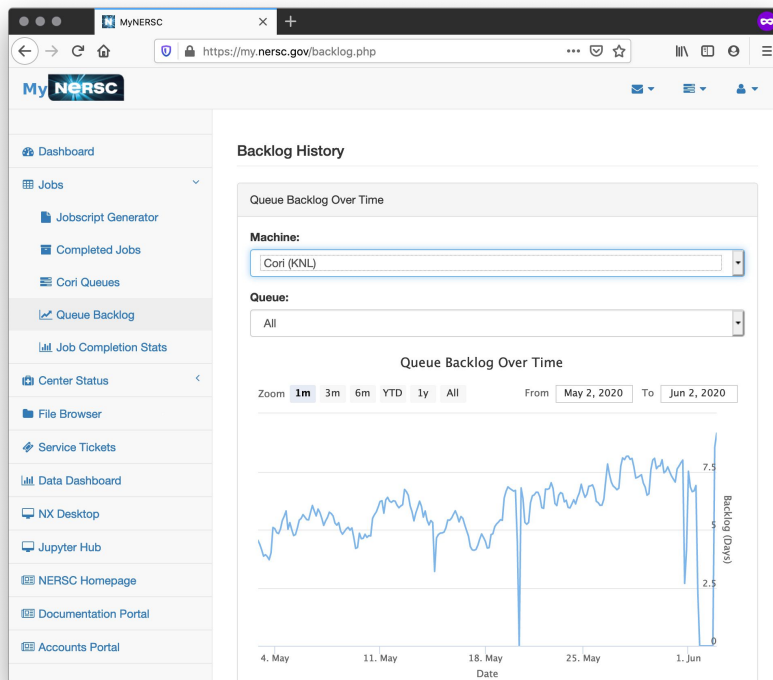
my jobs

<https://my.nersc.gov>

Most things require
login (also MFA)



<https://my.nersc.gov>



Recap: 3 Ways to Access NERSC Services

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Next

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Connecting with SSH

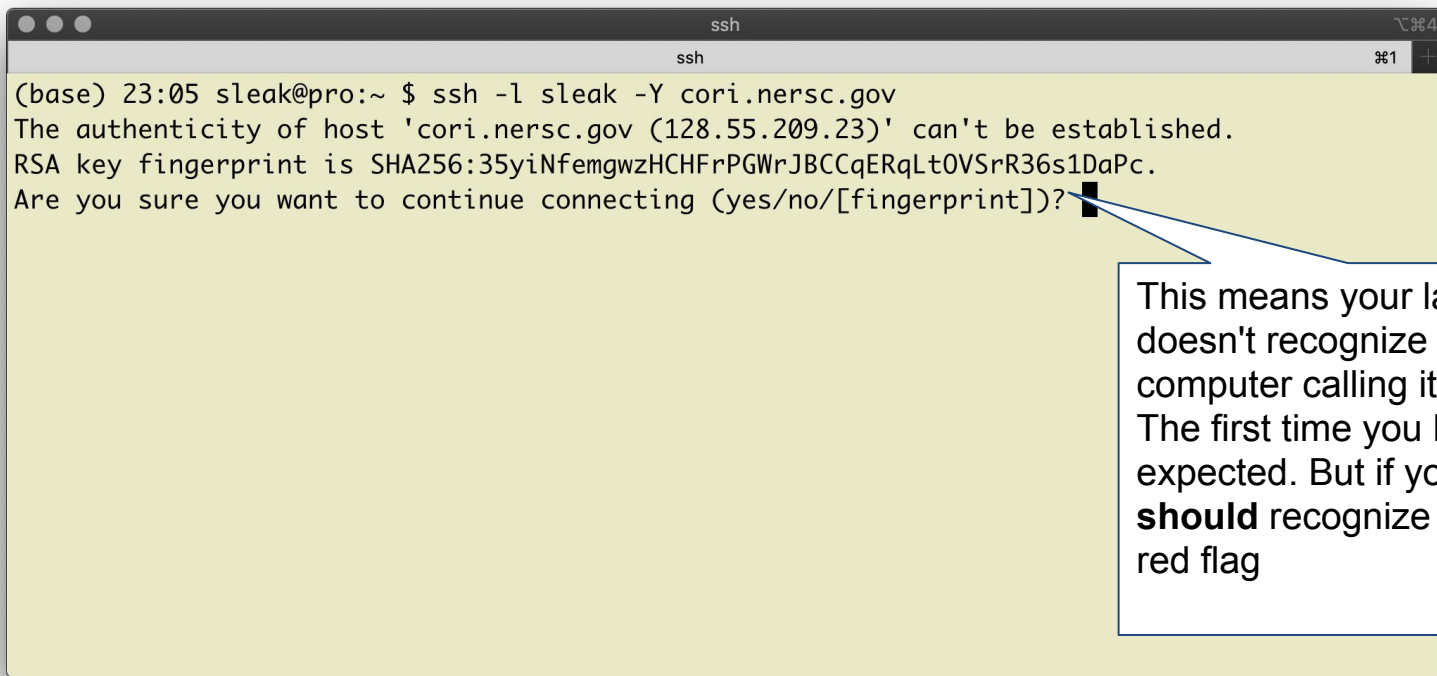
"The traditional method"

- For those comfortable working in a terminal, ssh from your local terminal to cori is the most flexible and powerful working environment

You will need a terminal program!

- Mac: terminal (built-in) or "iTerm2" (<https://www.iterm2.com/>)
- Windows: PuTTY (or XWin32 or Git BASH)
(<https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>)
- Linux: Your own favorite :)
- Chromebook: crosh (developer mode) or Crostini (Linux-in-a-container) or SSH App

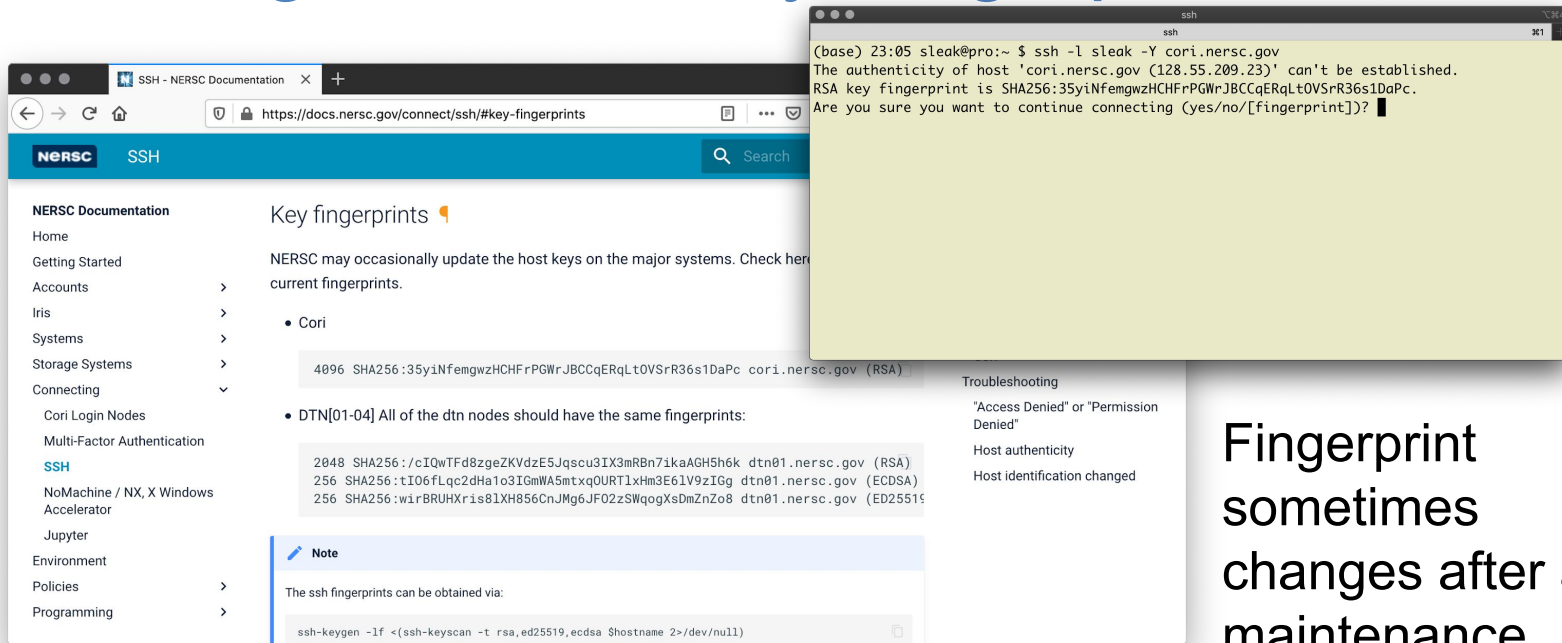
Connecting with SSH



```
(base) 23:05 sleak@pro:~ $ ssh -l sleak -Y cori.nersc.gov
The authenticity of host 'cori.nersc.gov (128.55.209.23)' can't be established.
RSA key fingerprint is SHA256:35yiNfemgwzHCHFrPGWrJBCCqERqLt0VSrR36s1DaPc.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
```

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

Checking the SSH Key Fingerprint



The image shows a web browser window displaying the NERSC SSH key fingerprints page. The page title is "Key fingerprints" and it explains that NERSC may occasionally update host keys. It lists two categories of fingerprints: "Cori" and "DTN[01-04]". The "Cori" section shows a list of fingerprints for the host cori.nersc.gov (RSA). The "DTN[01-04]" section states that all DTN nodes should have the same fingerprints and lists fingerprints for dtn01.nersc.gov (RSA), dtn01.nersc.gov (ECDSA), and dtn01.nersc.gov (ED25519). A "Note" section explains that the ssh fingerprints can be obtained via the command: `ssh-keygen -lf <(ssh-keyscan -t rsa,ed25519,ecdsa $hostname 2>/dev/null)`. A terminal window is overlaid on the right side of the browser window, showing an SSH connection attempt to cori.nersc.gov. The terminal output indicates that the authenticity of the host cannot be established because the RSA key fingerprint is SHA256:35yiNfemgwzHCHFrPGWwJBCCqERqLt0VSR36s1DaPc. The terminal prompts the user to confirm if they want to continue connecting (yes/no/[fingerprint]).

NERSC SSH

Key fingerprints

NERSC may occasionally update the host keys on the major systems. Check here for current fingerprints.

- Cori
- DTN[01-04] All of the dtn nodes should have the same fingerprints:

4096 SHA256:35yiNfemgwzHCHFrPGWwJBCCqERqLt0VSR36s1DaPc cori.nersc.gov (RSA)

2048 SHA256:/cIQwTFd8zgeZKVdzE5Jqscu3IX3mRbN7ikaAGH5h6k dtn01.nersc.gov (RSA)
256 SHA256:tIO6fLqc2dHa1o3IGmWA5mtxqOURTlxHm3E61V9zIGg dtn01.nersc.gov (ECDSA)
256 SHA256:wirBRUHXris81XH856CnJMg6JF02zSWqogXsDmZnZo8 dtn01.nersc.gov (ED25519)

Note

The ssh fingerprints can be obtained via:

```
ssh-keygen -lf <(ssh-keyscan -t rsa,ed25519,ecdsa $hostname 2>/dev/null)
```

Terminal output:

```
(base) 23:05 sleak@pro:~ $ ssh -l sleak -Y cori.nersc.gov
The authenticity of host 'cori.nersc.gov (128.55.209.23)' can't be established.
RSA key fingerprint is SHA256:35yiNfemgwzHCHFrPGWwJBCCqERqLt0VSR36s1DaPc.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
```

Fingerprint
sometimes
changes after a
maintenance

You can check the fingerprint at
<https://docs.nersc.gov/connect/ssh/#key-fingerprints>

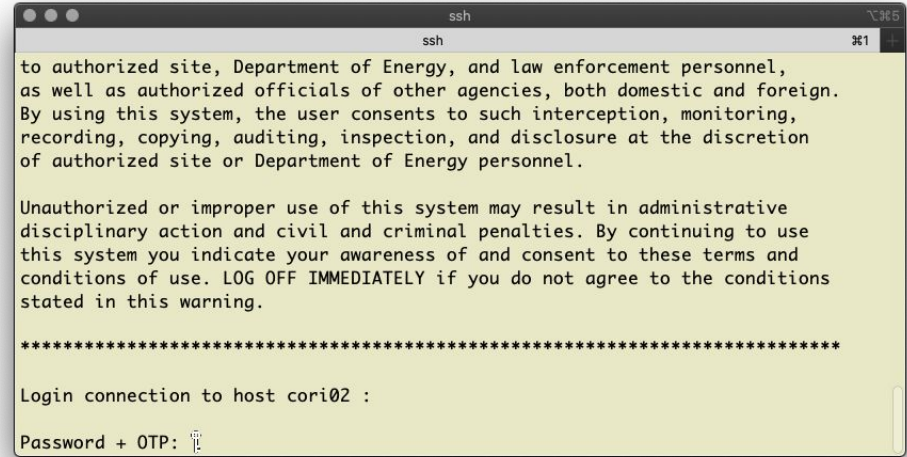
Connecting with SSH

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 eg **qwerty687921**

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
ssh
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.

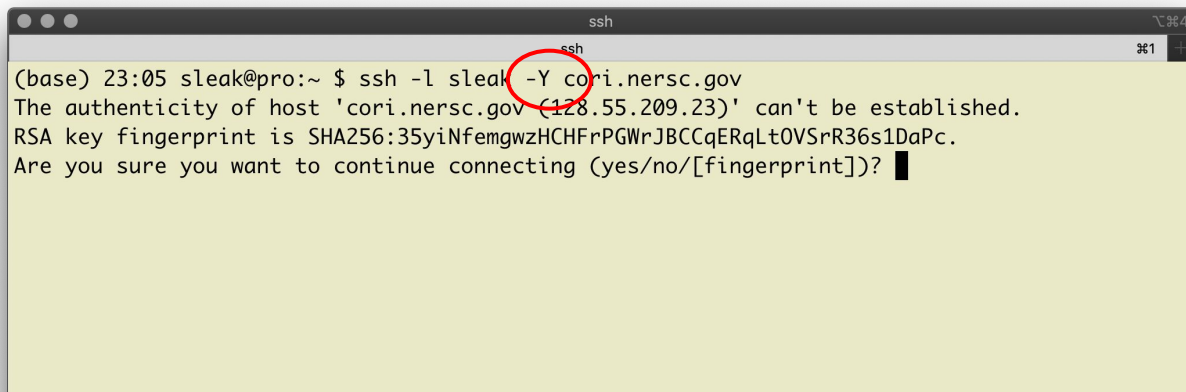
*****

Login connection to host cori02 :

Password + OTP: 
```

SSH Options

Wait, what was that "-Y" ?

A terminal window titled 'ssh' showing a command prompt. The user has entered 'ssh -l sleak -Y cori.nersc.gov'. The option '-Y' is circled in red. The terminal output shows a warning about the host's authenticity and asks for confirmation to continue connecting.

```
(base) 23:05 sleak@pro:~ $ ssh -l sleak -Y cori.nersc.gov
The authenticity of host 'cori.nersc.gov (128.55.209.23)' can't be established.
RSA key fingerprint is SHA256:35yiNfemgwzHCHFrPGWrJBCCqERqLt0VSrR36s1DaPc.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
```

"ssh -Y" (or "ssh -X")

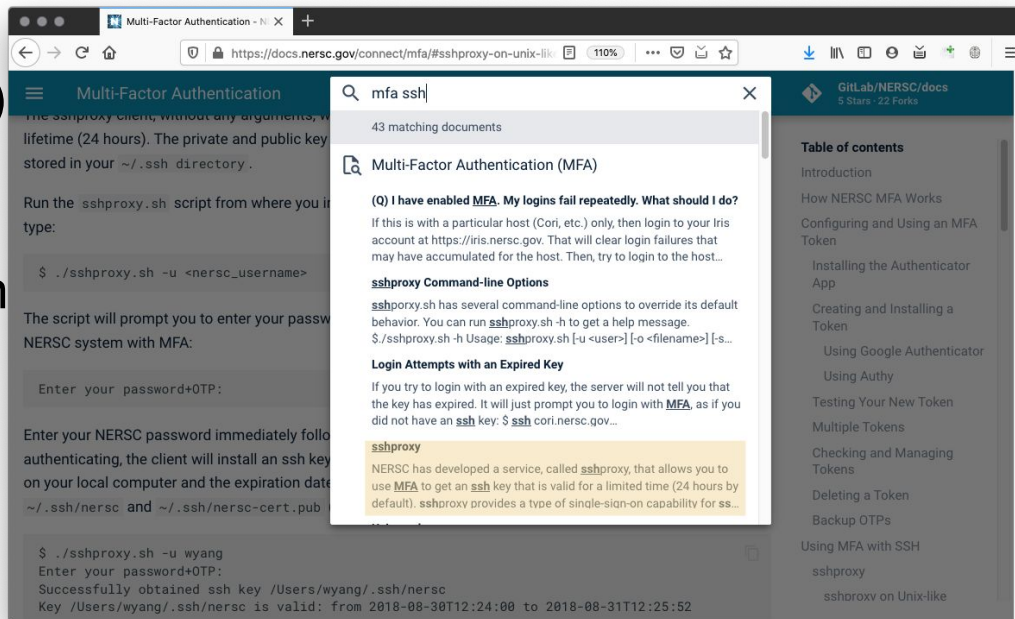
allow X (ie, GUI) programs on Cori to display on your local monitor.

- 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!

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>

sshproxy

Mac/Linux (**sshproxy.sh**)

```
sshproxy.sh -u elvis
```

Then login using the key:

```
sshproxy.sh -i /path/to/key cori.nersc.gov
```

Or: add it to your keychain

```
sshproxy.sh -a -u elvis
```

```
ssh -l elvis cori.nersc.gov
```

```
ssh
(base) 13:21 sleak@pro:~ $ sshproxy.sh -u sleak
Enter the password+OTP for sleak:
Successfully obtained ssh key /Users/sleak/.ssh/nersc
Key /Users/sleak/.ssh/nersc is valid: from 2020-06-03T13:21:00 to 2020-06-04T13:22:20
(base) 13:22 sleak@pro:~ $ ssh -i /Users/sleak/.ssh/nersc cori.nersc.gov
*****
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
```

```
ssh
(base) 13:24 sleak@pro:~ $ sshproxy -a -u sleak
Enter the password+OTP for sleak:
Identity added: /Users/sleak/.ssh/nersc (/Users/sleak/.ssh/nersc)
Lifetime set to 86399 seconds
Certificate added: /Users/sleak/.ssh/nersc-cert.pub (user_sleak)
Lifetime set to 86399 seconds
Successfully obtained ssh key /Users/sleak/.ssh/nersc
Key /Users/sleak/.ssh/nersc is valid: from 2020-06-03T13:24:00 to 2020-06-04T13:25:06
(base) 13:25 sleak@pro:~ $ ssh -l sleak cori.nersc.gov
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```

sshproxy

Windows (**sshproxy.exe**)

- Start a Command prompt ("CMD" in search box)

```
sshproxy.exe -u elvis
```

```
pageant nersckey.ppk
```

```
putty -agent elvis@cori.nersc.gov
```

Search "windows sshproxy" at <https://docs.nersc.gov>

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Jupyter

You can access Cori from any web browser, via <https://jupyter.nersc.gov>

The image displays four overlapping screenshots of the JupyterLab interface:

- Top-left:** The JupyterHub login page. It includes a "Sign in" button, a "Username:" field with the value "sleak", a "Password:" field, and an "OTP:" field with the value "579715".
- Bottom-left:** The "Shared CPU Node" selection screen. It lists various nodes, with "Cori" circled in red. Other nodes include "Gerly", "Spin", and "Resources".
- Middle-right:** The JupyterLab workspace. It shows a grid of kernels with various configurations (e.g., Python 3, JupyterLab, etc.). The "Cori" kernel is circled in red at the bottom.
- Rightmost:** A terminal window showing the command prompt "sleak@cori19:sleak\$".

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Running GUI Apps on Cori

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

Why is this, and how can we fix it?

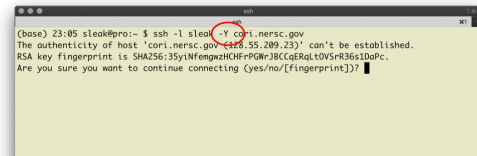
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24

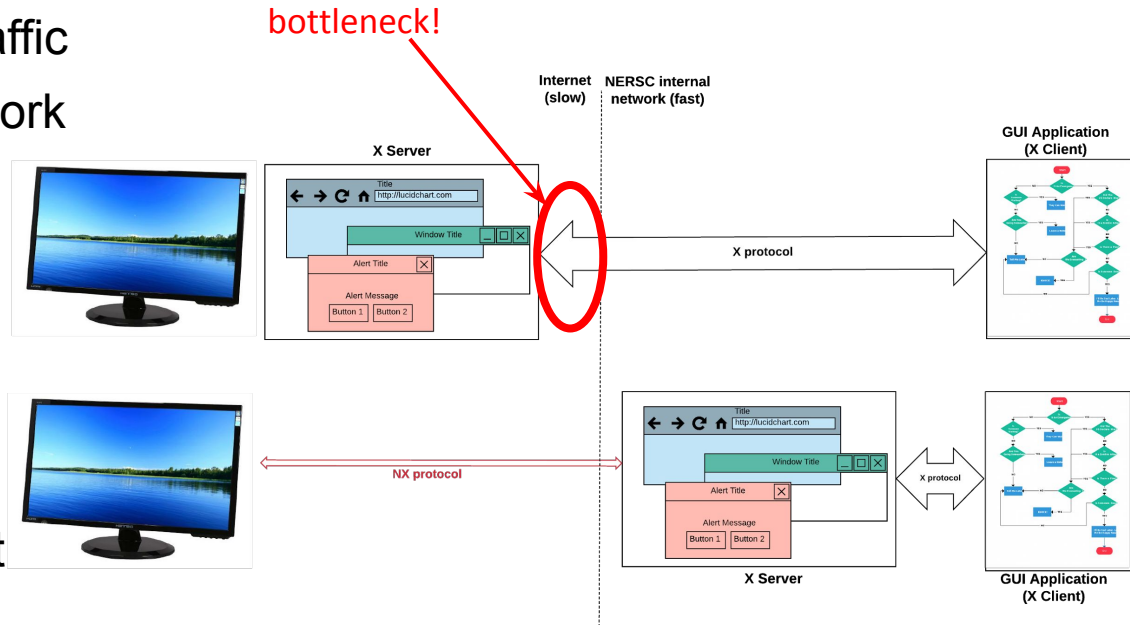


NoMachine: Accelerated X

X protocol makes a lot of traffic

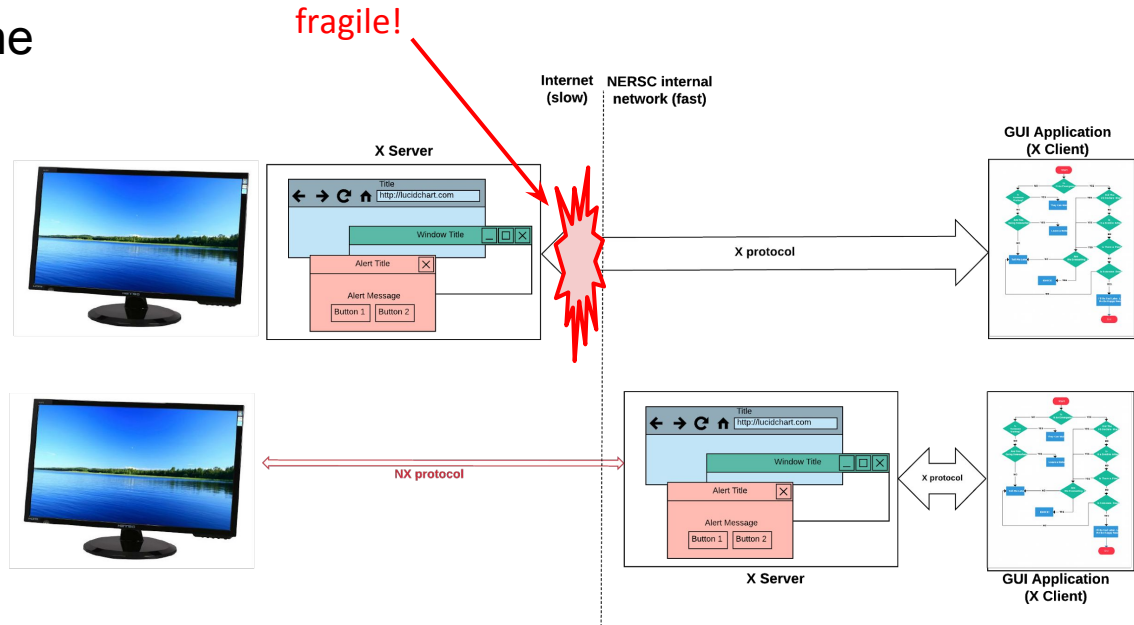
- OK over the (fast) network internal to NERSC
- Not OK over the (slow) internet

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



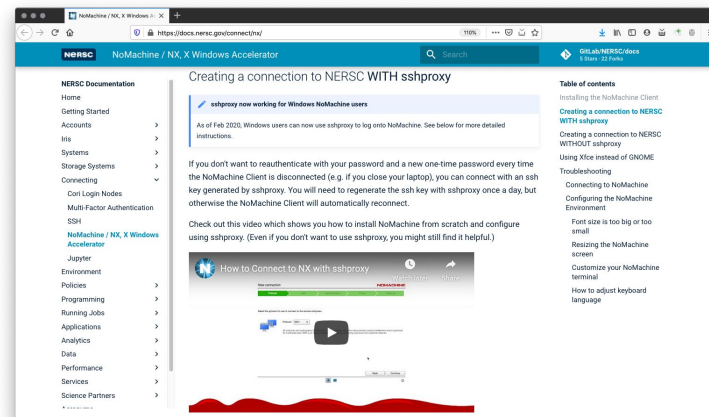
NoMachine: Accelerated X

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`)



NoMachine without sshproxy

The image shows a desktop window titled "NoMachine - NERSC" displaying a login form. The form includes fields for "Username" (containing "sleak") and "Password" (containing "hunter2687071"). A red circle highlights the password field. A red arrow points from the "Authy" app on the left, which displays the MFA code "687 071", to the password field. Another red arrow points to the "Save this password in the connection file" checkbox, which is unchecked. The text "MFA OTP immediately after password (no spaces)" is written in red above the password field. The text "don't save the password (it changes every login!)" is written in red below the checkbox. The login form also includes a "Back" button and an "OK" button. The background of the NoMachine window shows a desktop environment with a red wavy bar at the bottom.

Authy

NERSC

687 071

Changes in 9 Seconds

Tokens Requests Settings

NoMachine - NERSC

NERSC

NO MACHINE

Please type your username and password to login.

Username: sneak

Password: hunter2687071

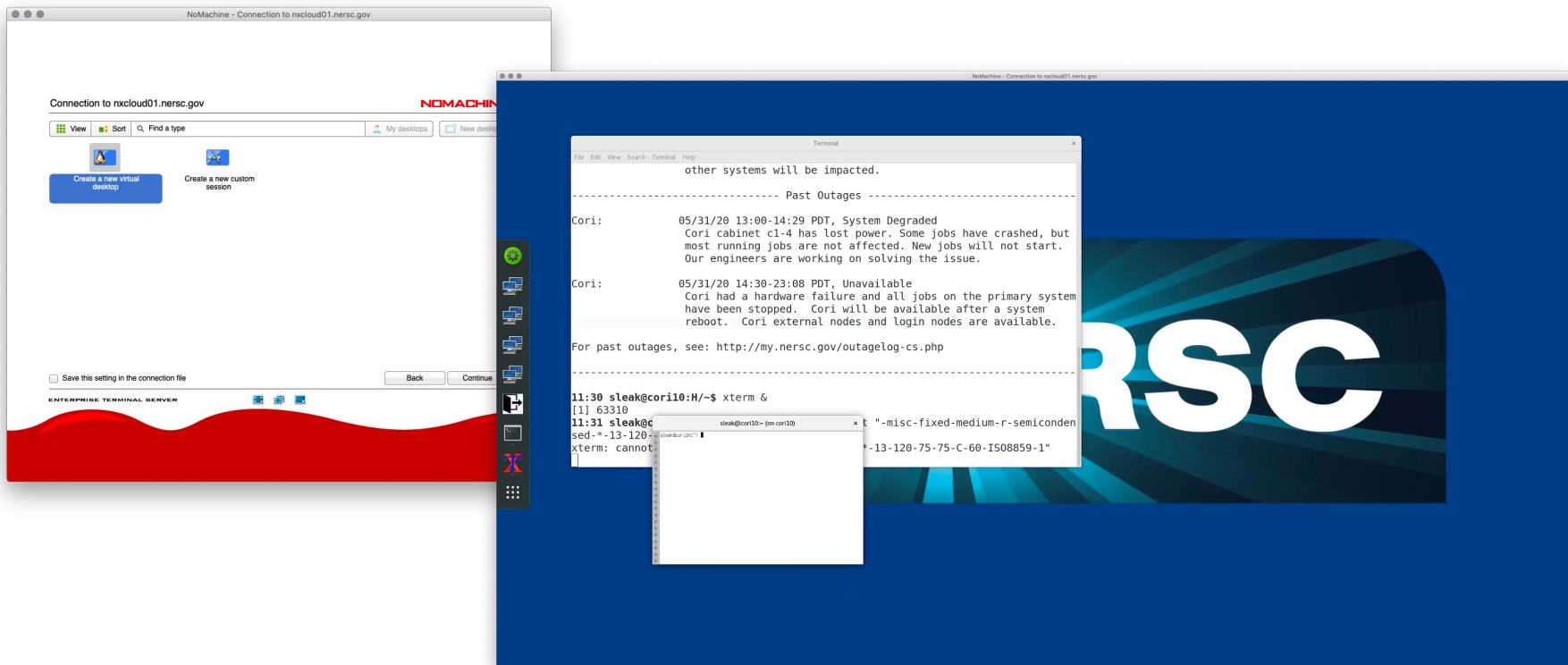
☐ Save this password in the connection file

Back OK

MFA OTP immediately after password (no spaces)

don't save the password (it changes every login!)

NoMachine



What We've Covered

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Thank You and
Welcome to
NERSC!

