

Using remote desktops on Casper with VNC

Most programs on Casper and Cheyenne are designed to run in the terminal, but a few either require the use of a graphical interface or work best in one. While using the default method – X-forwarding – is sufficient for simple programs like text editors, it can be prohibitively slow for more complex programs like MATLAB, IDL, VAPOR, and RStudio.

When you log on to your workstation, you typically interact with programs using a graphical desktop shell. With virtual network computing (VNC), you can use a graphical desktop shell to work remotely on the Casper data analysis and visualization cluster.

The remote desktop runs on Casper in a VNC session that is managed by the *VNC server*. You access it with a *VNC client*, which runs on your local workstation.

To get started

Download and install a VNC client on your local machine. CISL recommends the [TigerVNC](#) client and provides this video to help Mac users install it: [In stalling TigerVNC on a Mac laptop](#). (Installing on Windows machines is less complex.)

[TurboVNC](#) also works, but systems using Java versions >8 do not include the necessary runtime libraries to enable TurboVNC's VNC viewer. Some other VNC clients – RealVNC, for example – do not work well with the VNC software installed on Casper.

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Connecting to a VNC session

To begin using a remote desktop with VNC, you will need to start a VNC session. Your session will run within a Casper job and can persist for up to 24 hours.

These basic steps for starting a session are described in detail below:

- Run the **vncmgr** script, which enables you to configure your VNC desktop session and start both a Casper batch job and the VNC server.
- Connect to the Casper batch node with your VNC client, using a port that VNC specifies.
- Enter a one-time password to access your VNC session.

If you are connected to the NCAR Internal Network or using the [NCAR VPN](#), you will be able to connect directly to your session on the Casper batch node using the VNC client.

If you are not on the NCAR network or VPN, you will need to create an SSH tunnel to connect your local machine and remote desktop. How to create the SSH tunnel is described below.

Overview of the vncmgr script

CISL provides the **vncmgr** script for initiating and managing VNC sessions on Casper. How to run it is described in detail in the following section. It can be used in interactive mode or command-line mode.

Interactive mode: If you run the script without any command-line arguments, it will launch in the interactive mode. In this mode, you can start a new session, list existing sessions, query a session to retrieve connection instructions and obtain a new one-time-password, and kill a running session. The script enables you to name your session, state how long you want the server to run, and select which desktop shell to use (GNOME2, GNOME3, or KDE). It also allows for custom requests to both the job scheduler and the VNC server program.

Command-line mode: In command-line mode, you specify a subcommand and provide any desired options as command line arguments. Here are the available commands:

- `vncmgr list`
- `vncmgr create [SESSION] --account PROJECT [--time WALLTIME ...]`
- `vncmgr query [SESSION]`
- `vncmgr kill [SESSION]`

Choosing a name (SESSION) is optional. If you do not provide a name, the name “default” will be assigned and referenced in each subcommand.

Customizing the Casper job and VNC server

The **vncmgr** script allows you to customize both the Casper session in which the server will run and the server itself. This customization can be done in both interactive and command-line modes. The most common uses involve increasing the resources allocated to your job. For example, you could allocate 4 CPUs and 20 GB of memory to a 2-hour VNC session using the command-line mode as follows:

PBS syntax (in effect 3/29/2021)

```
vncmgr create --account PROJECT --time 2:00:00 --job-opts="-l select=1:ncpus=4:mem=20GB"
```

You do not need to specify GPU resources, as all VNC jobs are automatically placed on nodes with NVIDIA Quadro GP100 GPUs.

Run **vncmgr --help** in a Cheyenne or Casper login session for more information about using the script and customizing your session.

Running vncmgr from your local machine

You can run the **vncmgr** command directly from your local machine as shown in the example below without first starting a login session on Cheyenne or Casper. While both command-line and interactive mode will work, CISL recommends interactive mode as it will allow you to generate new one-time passwords via the query option without having to authenticate to Cheyenne every time.

Example

This demonstrates how to run **vncmgr**, create and configure a customized VNC session, and then connect to the session with a VNC client. In this example, the user is not connected to the NCAR VPN and needs to use an SSH tunnel. ([Alternative for PuTTY users.](#))

1. Run this command to get started, using your own username:

```
ssh -t -l username casper.ucar.edu /glade/u/apps/opt/vncmgr/bin/vncmgr
```

You will be prompted to authenticate, after which you will have access to the vncmgr menu. (If you exit vncmgr, you will have to rerun the command to regain access to it.)

2. Create your new VNC session with a name up to 10 characters long. The session is named "vapor" in this example. (Choose names that will help you avoid confusion if you run multiple sessions.)

```
-----
                Manage VNC desktops on Casper
-----

Active servers, reported as PBS jobs:

JobID      Name          S NCPUs  ReqMem   Time(HH:MM)
-----
-----

Use the following options to create a new VNC session,
query an existing session (which will provide you with a
new one-time password), or kill a running VNC session
and end the PBS job associated with it.

Options:
  create [SESSION]
  query  [SESSION]
  kill   [SESSION]
  refresh
  exit

Selection? create vapor
```

3. A series of prompts on the next screen (below) will ask you to specify:

- Your project code.
- The wallclock time you want in HH:MM:SS format. The default is 4 hours and the maximum is 24 hours.
- Which desktop shell to use. The default setting is 2d, which configures your desktop to use a shell with the [MATE](#) user interface.
- Any optional arguments. In the example, the user requests 20 GB of memory.

All VNC jobs must run on a node with a GP100 GPU. If you specify custom resource requirements, those requirements will be modified if

necessary to ensure that the job can run on the correct node.

```
Use these options to configure your VNC desktop session and PBS job.
The maximum time allowed for a job is 24:00:00. Available desktop shells
include 2d (GNOME2), gnome-session (GNOME3), and startkde (KDE).

Enter project code for VNC job (default=): SCSG0001
Enter time limit for VNC job (default=4:00:00): 8:00:00
Choose desktop shell for VNC job (default=2d): 2d
Additional PBS arguments for VNC job (optional): -l select=1:ncpus=1:mem=20GB
Arguments to forward to vncserver program (optional):

Resource chunks must have ngpus=1; altering custom PBS options ...
New job-opts = -l select=1:ncpus=1:mem=20GB:ngpus=1
Creating new VNC session (vapor) ...

Submitting batch job to PBS
Waiting for job to start ...
█
```

4. When the job starts, follow the instructions and choose how you want to connect to your VNC session: tunneling or using the UCAR internal network or VPN.

```
Use *one* of the following methods to connect to your VNC session. Instructions
are given for both direct remote access via tunneling and access via the UCAR VPN.
(VPN instructions: https://www2.cisl.ucar.edu/user-support/vpn-access)

SSH TUNNEL METHOD

Create an SSH tunnel to stream desktop data to your local computer:

ssh -l bjsmith -L 5901:localhost:5901 casper06.ucar.edu "bash ~/.vncmgr/tunnel-vapor"

Follow instructions given in local terminal. The local terminal session will
hang after creating the tunnel. This behavior is normal.

INTERNAL NETWORK METHOD

If you are connected to the Internal Network (on-site or via UCAR VPN), you
can simply load TurboVNC or TigerVNC and connect to the follow host:

casper06.ucar.edu:5901

The viewer will ask for a *one-time* password. Use 87208786.

Warning: if you disconnect from the VPN, your VNC connection will be disrupted.

If you disconnect from the VNC server and wish to reconnect, you will need to
generate a new password. This VNC server will timeout and shut down automatically
once wallclock limit is reached (00:00 / 08:00).

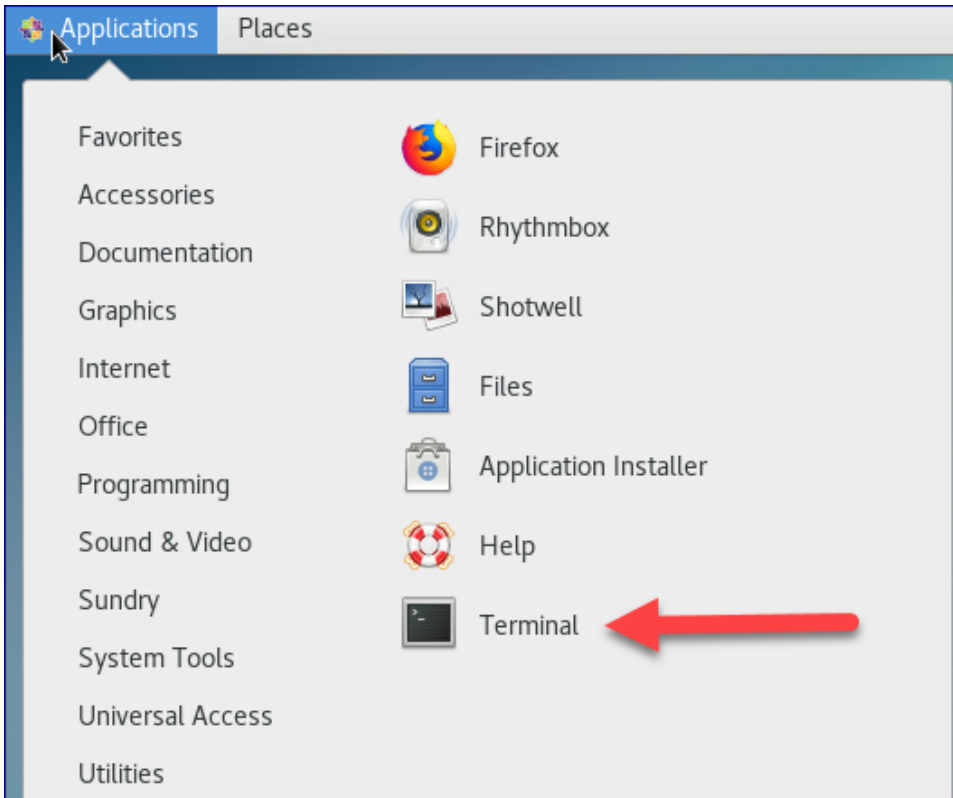
To end the PBS job and shut down the VNC server, run:

vncmgr kill vapor

Press enter to continue...█
```

Pressing enter at this point will return you to the interactive menu. Use the query option if you need to return to the instructions for creating the SSH tunnel later.

5. Your desktop on Casper will be displayed after you connect to the specified host and enter the onetime password. On the desktop, start a terminal from the list of applications.



6. To start an application, load any required modules and run the executable.

