Remote Visualization

Using the NICE EnginFrame Remote Visualization Platform

Going Native

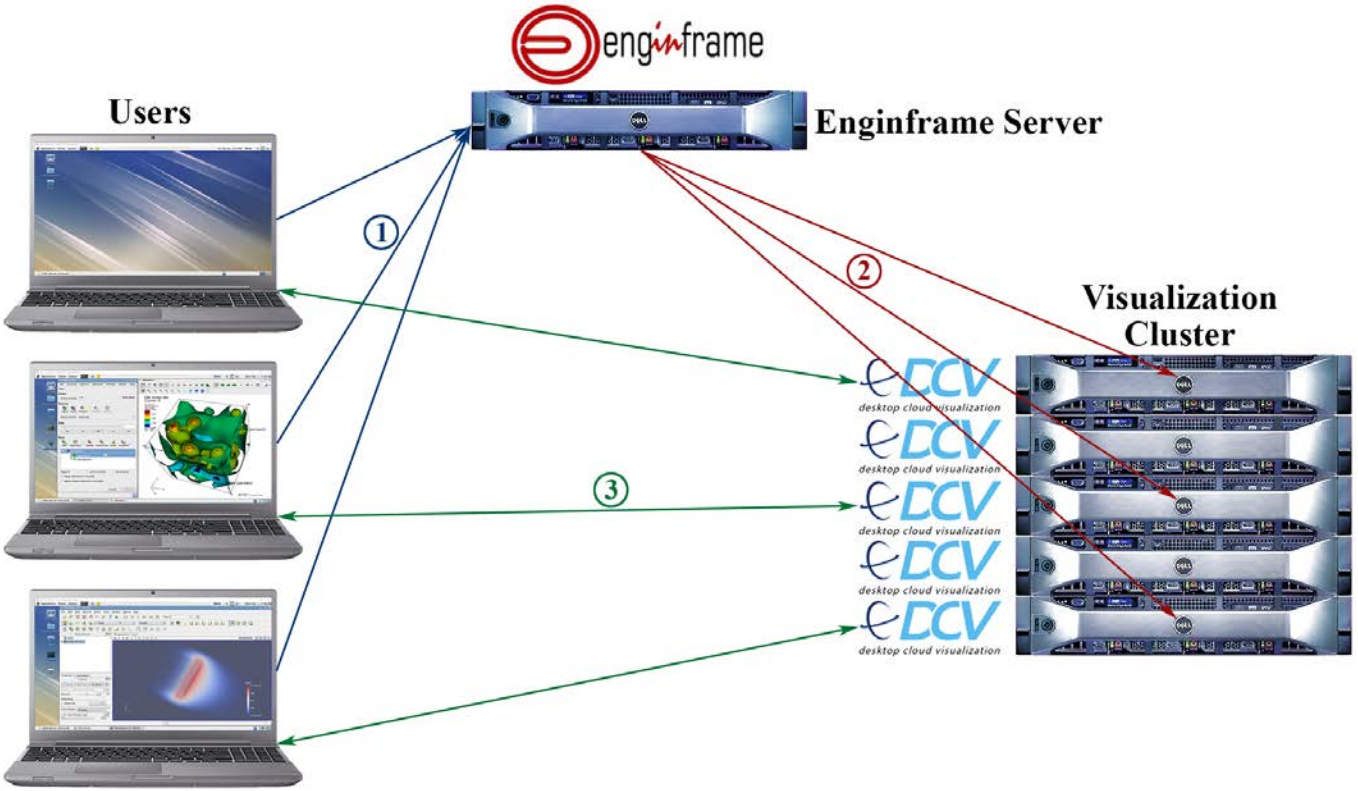
- Using native X-tunneling is hard and very slow.
- Using native VNC is less-hard, slightly faster but not always available.
- Using ‘native’ methods means you are transferring all of your data and updates back and forth so if you are playing with large datasets it could take a very long time for updates (large latency issues).
- If working only on a local machine you may not have decent or even required graphic or memory capabilities.
- If working on a local machine you probably do not have a local copy of your data and if you do it may be to large to run.
- Almost impossible to collaborate your work with others.

Remote HPC Visualization

- Using remote HPC visualization eliminates the X-tunneling connectivity issues!
- Only keystroke and mouse commands travel to the remote desktop and only updated screenshots travels back to the user so vastly less bandwidth issues!
- Remote visualization clusters utilize the latest and greatest graphic hardware!
- You work right beside your datasets!
- You can easily share your work, live, with other users.

EnginFrame Remote Desktop Architecture

1. User requests a remote desktop job via EnginFrame.
2. EnginFrame creates a new SLURM job and starts a DCV-VNC session and launches a Remote Desktop.
3. The user connects to the DCV Remote Desktop and does their desired work. Only keystroke and mouse commands travel to the Remote Desktop and only updated screen shots from the Remote Desktop travels to the user.



Requirements to Use EnginFrame

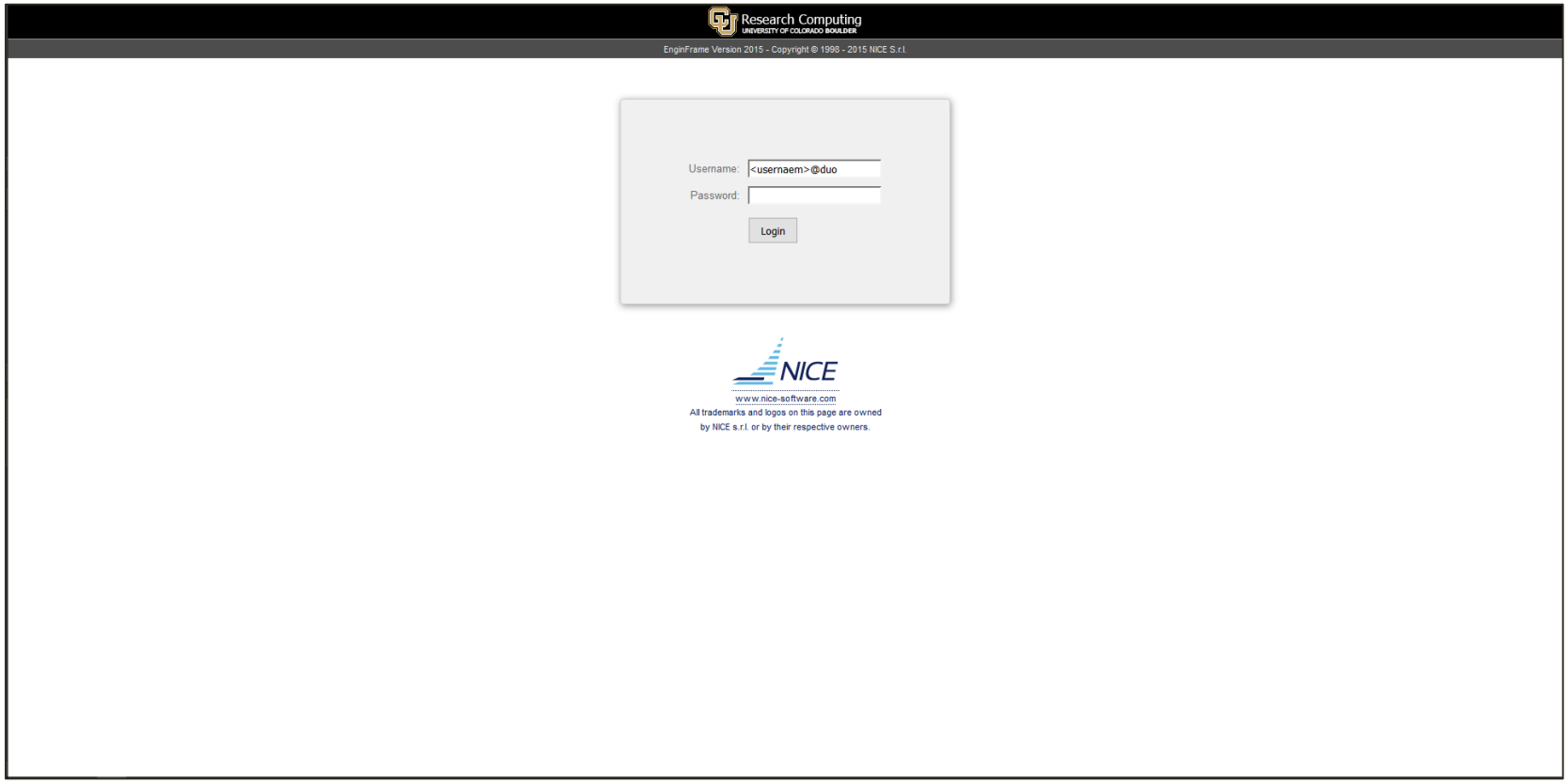
In order to access the visualization cluster, users must meet the following requirements:

- You must have an account with CU Research Computing.
- You must have a ‘Duo’ dual authentication account through CU Research Computing.
- You must have access to the internet and an internet browser (eg FireFox, Chrome, Safari, ect).
- You must install the NICE DCV Endstation for your operating system. This can be obtained from;

  http://www.nice-software.com/download/nice-dcv-2016

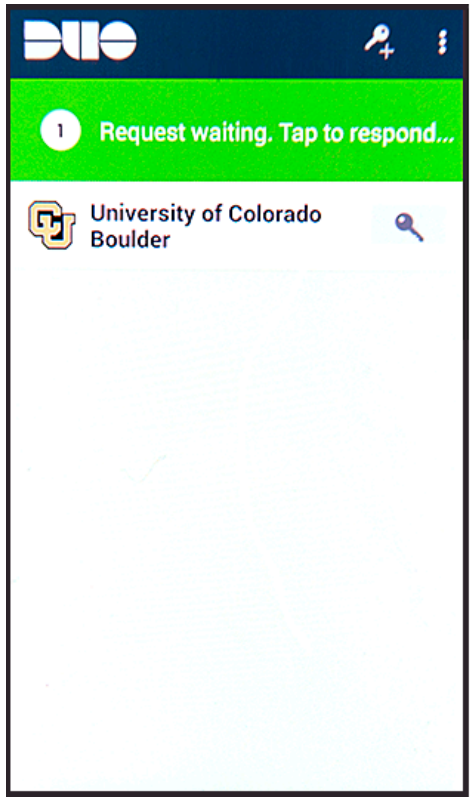
Logging into EnginFrame

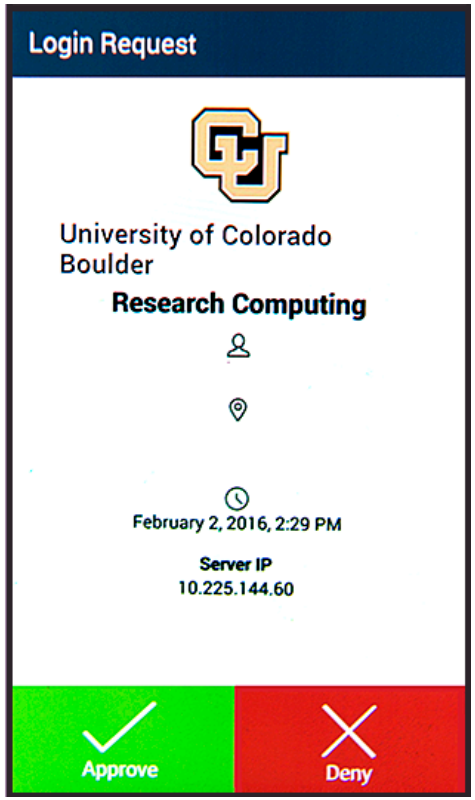
- From a browser navigate to : https://viz1.rc.colorado.edu/enginframe.
- For ‘Username’ enter your username.
- For Password enter ‘duo:’ + your Identikey password (eg. if your Identikey password was foomeister then enter ‘duo:foomeister’) .
- Click ‘Login’ to begin Duo authentication (see next slide).



Duo Authentification

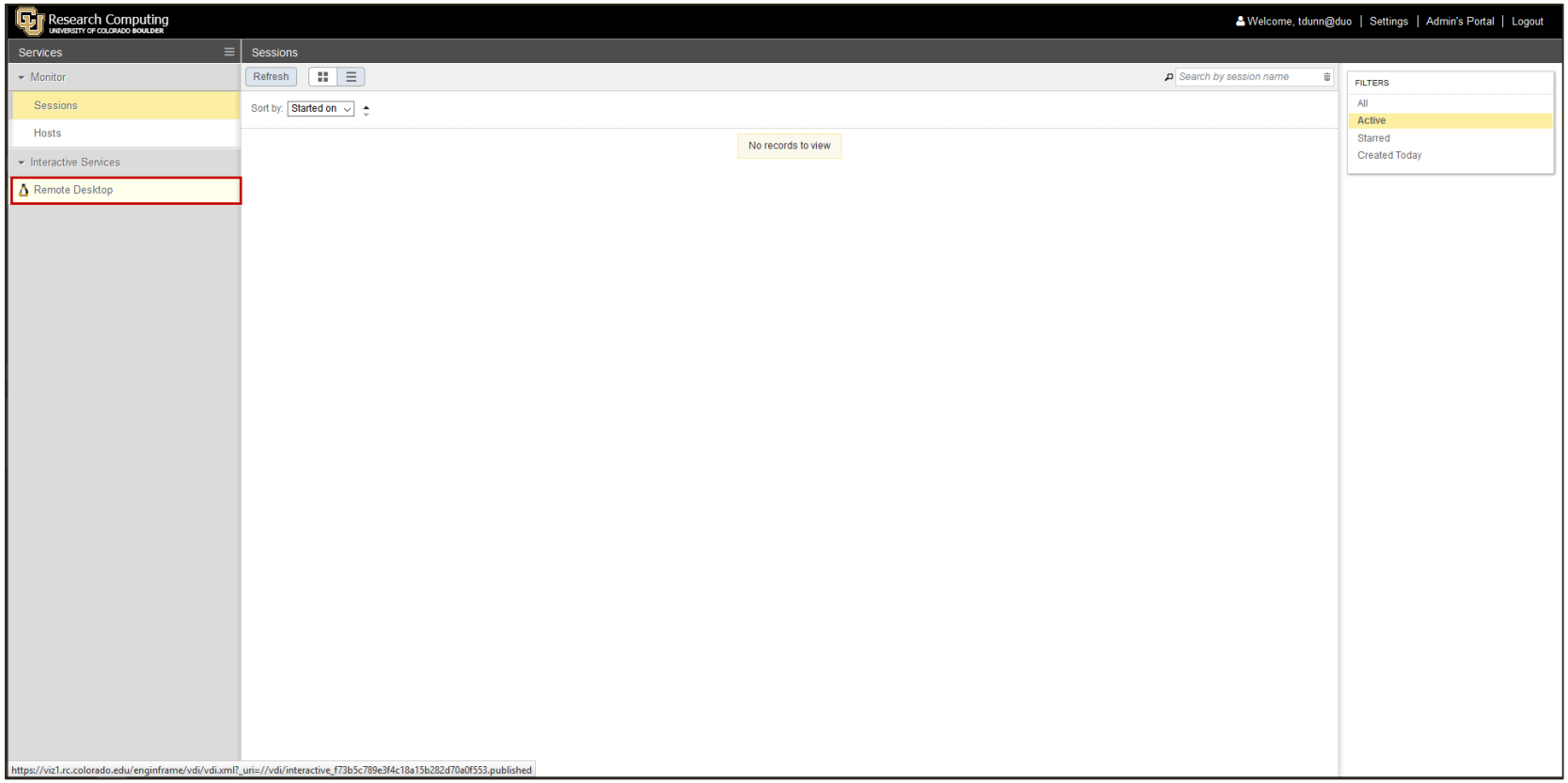
- After clicking on ‘Login’ your phone will alert you to an incoming Duo authentication.
- Open your Duo app and click on ‘Request waiting. Tap to Respond…’.
- Next click on ‘Approve’.
- You will receive a message informing you authentication was approved and the EnginFrame VDI page will appear (see next slide).
- ***Note**: App graphics will vary by phone type.*





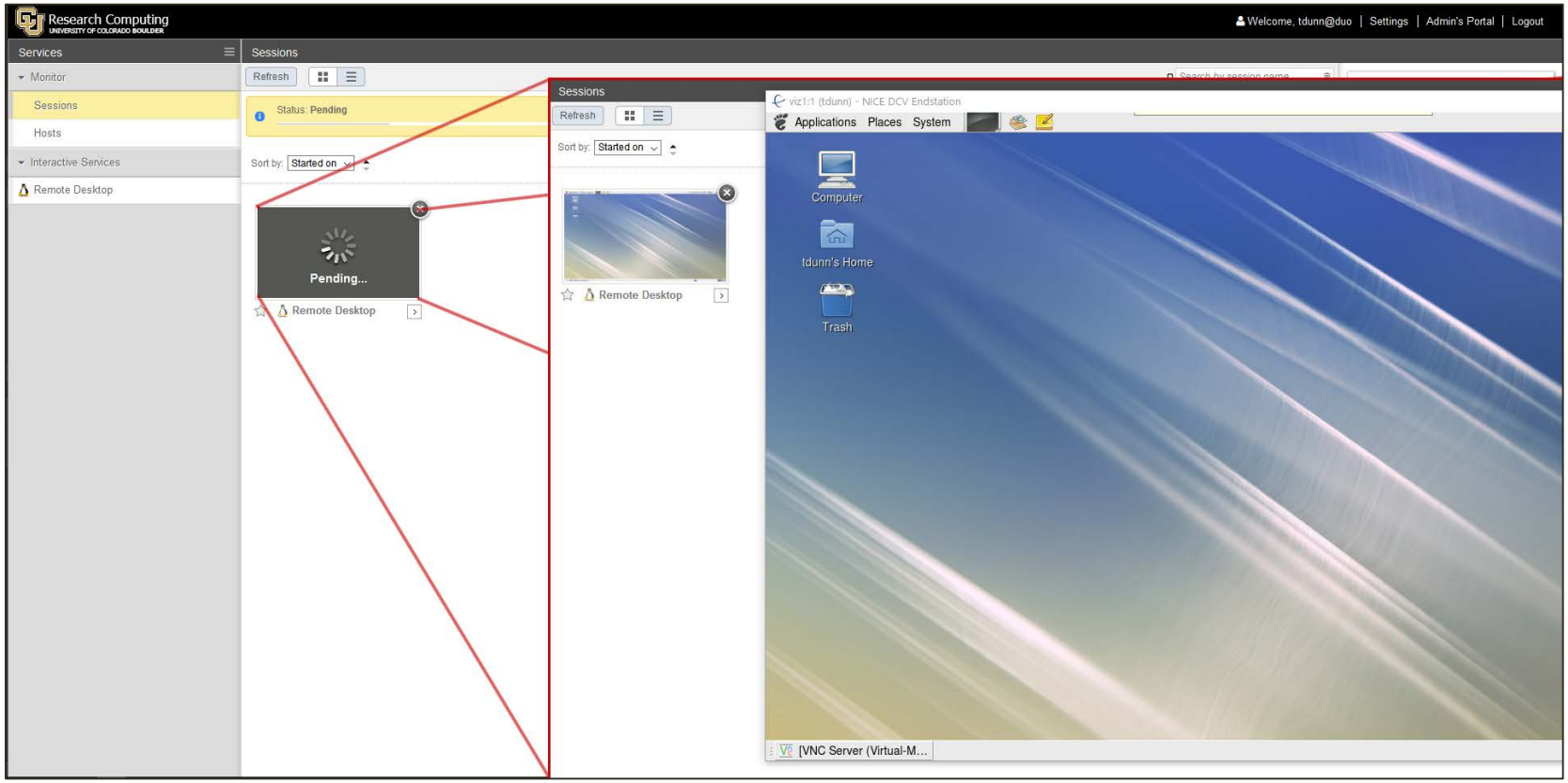
Starting a Remote Desktop Session

- To create a Remote Desktop click on the ‘RC Remote Desktop’ link under ‘Interactive Services’.
- If you are in a special group or class you may also see other sessions. Use the one that is correct for your instructed needs.



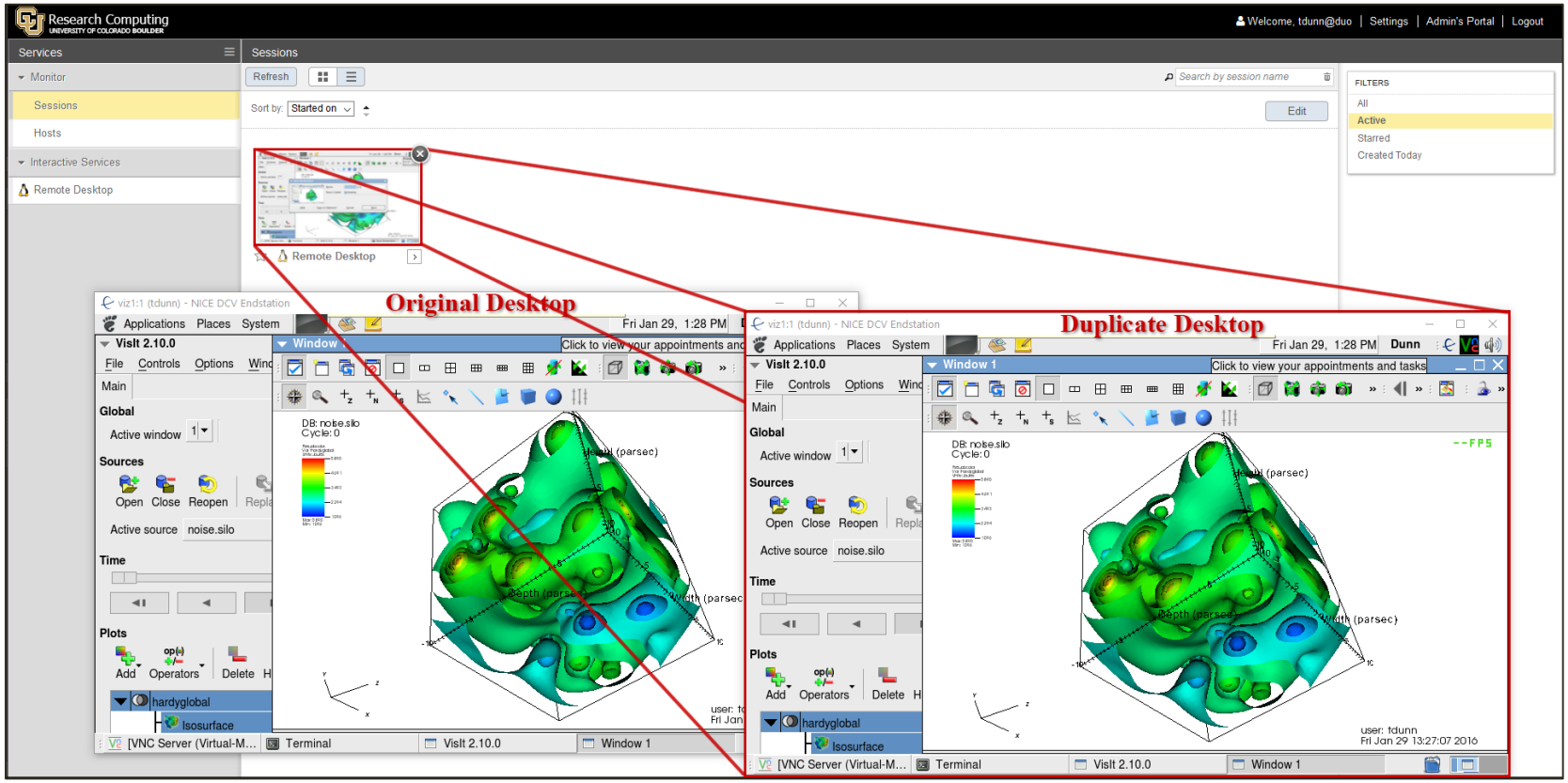
Connecting to a Remote Desktop Session

- You will be in a ‘Pending’ status state as you wait for the job scheduler, SLURM, to start a new job on the visualization cluster.
- Once a job has started the remote desktop will start and launch your Linux based RC Remote Desktop.
- A thumbnail of the remote desktop will be displayed in the Sessions browser



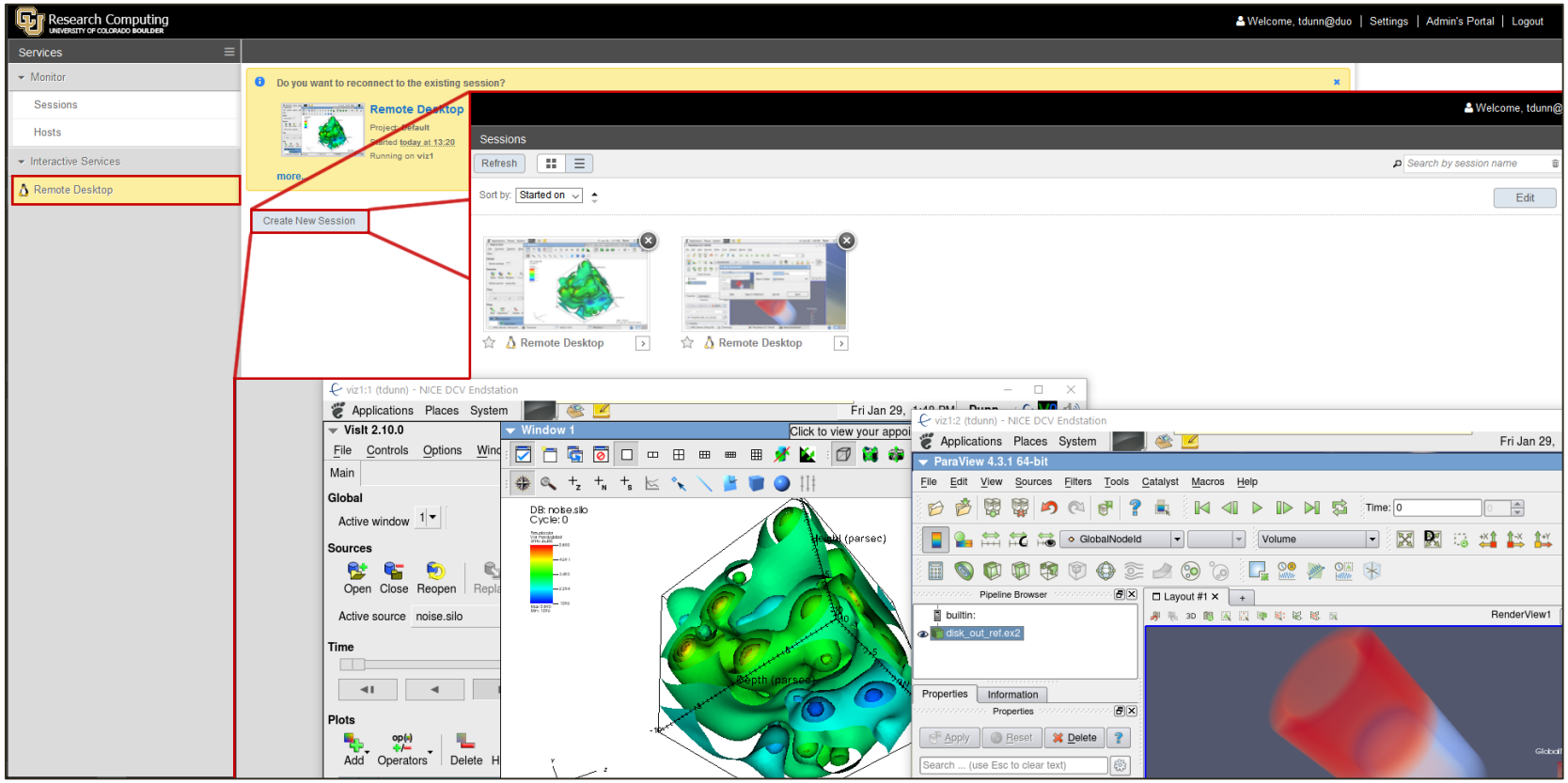
Creating Multiple Concurrent Sessions

- By clicking on your ‘Remote Desktop’ in the Sessions browser you can duplicate your ‘Remote Desktop’ session.
- Changes you make in one Remote Desktop is reflected in the duplicate session(s).



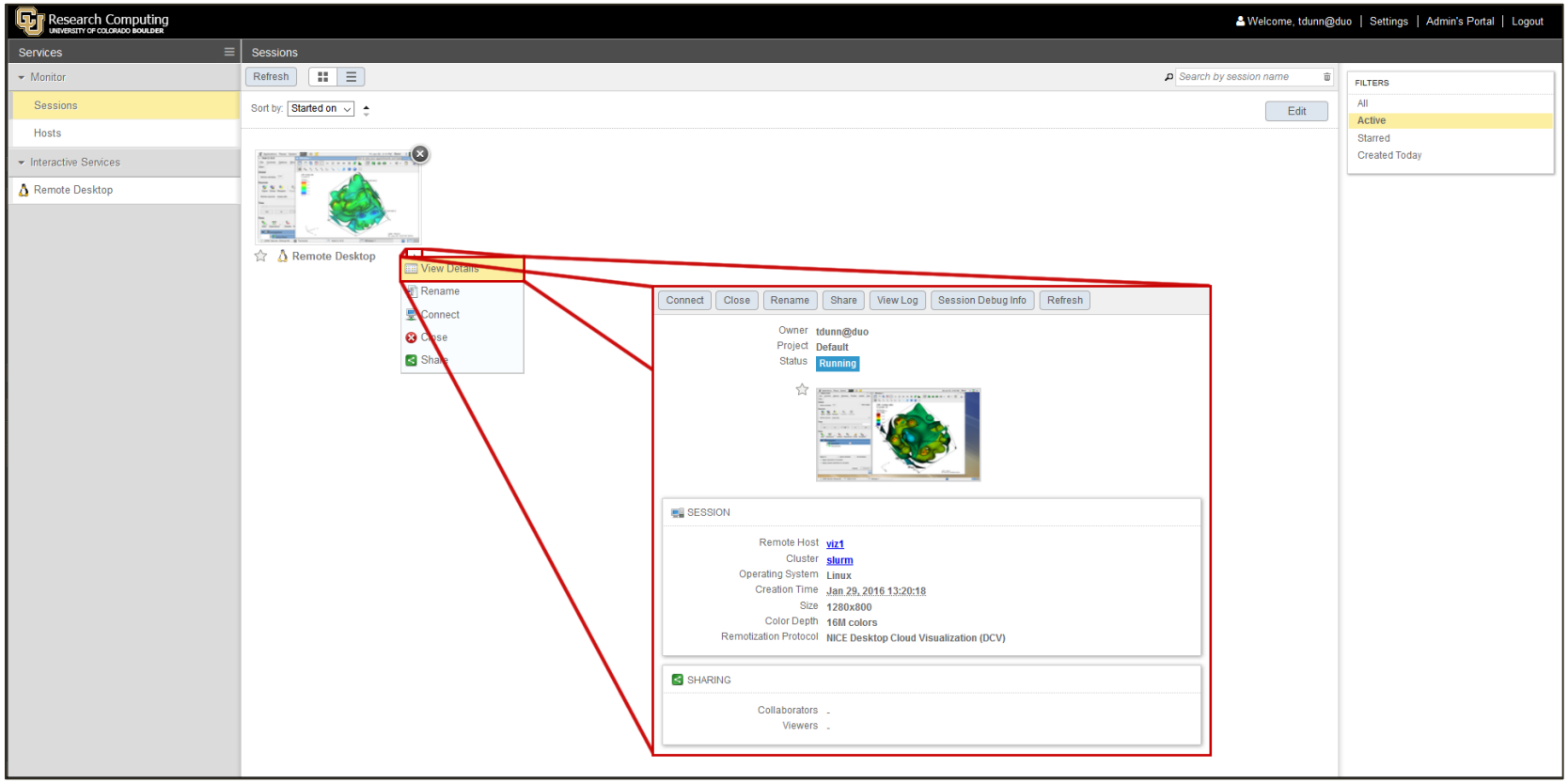
Creating Multiple Separate Sessions

- By clicking on your ‘Remote Desktop’ under ‘Interactive Services’ you can create a new, separate ‘Remote Desktop’ session.
- Changes you make in one Remote Desktop are NOT reflected in the new session(s).



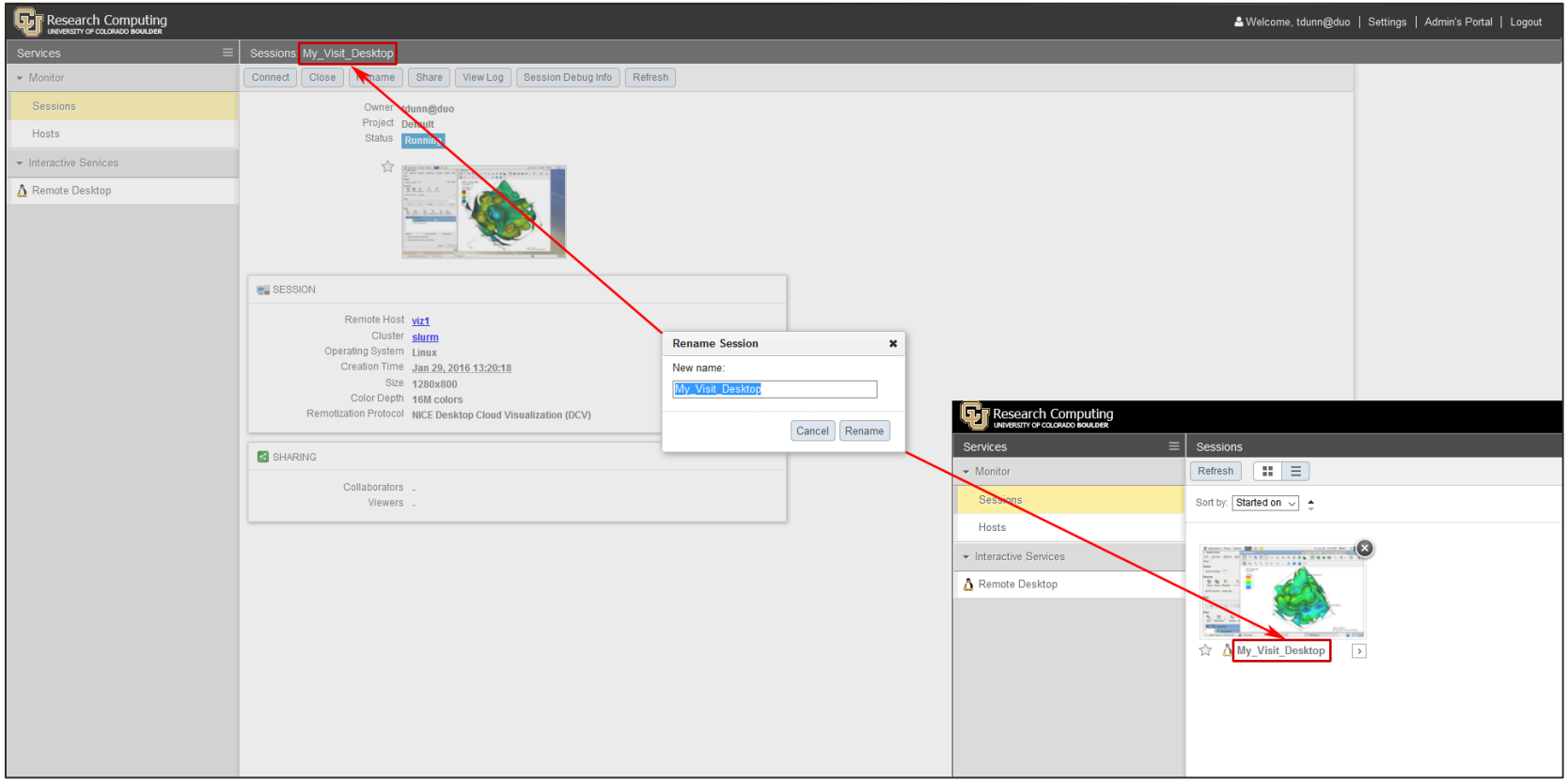
Session Details

- Clicking on the arrow next to your ‘Remote Desktop’ will open a hotkey menu.
- Selecting ‘View Details’ will send you to the ‘View Details’ page.
- The ‘View Detail’ hotkey menu and browser page allows you to ‘Connect’, ‘Close’, ‘Rename’, ‘Share’, ‘View’ logs, and ‘Refresh’ your remote desktop session(s).
- You can return to the Sessions browser by clicking on ‘Sessions’ under the ‘Monitor’ service.



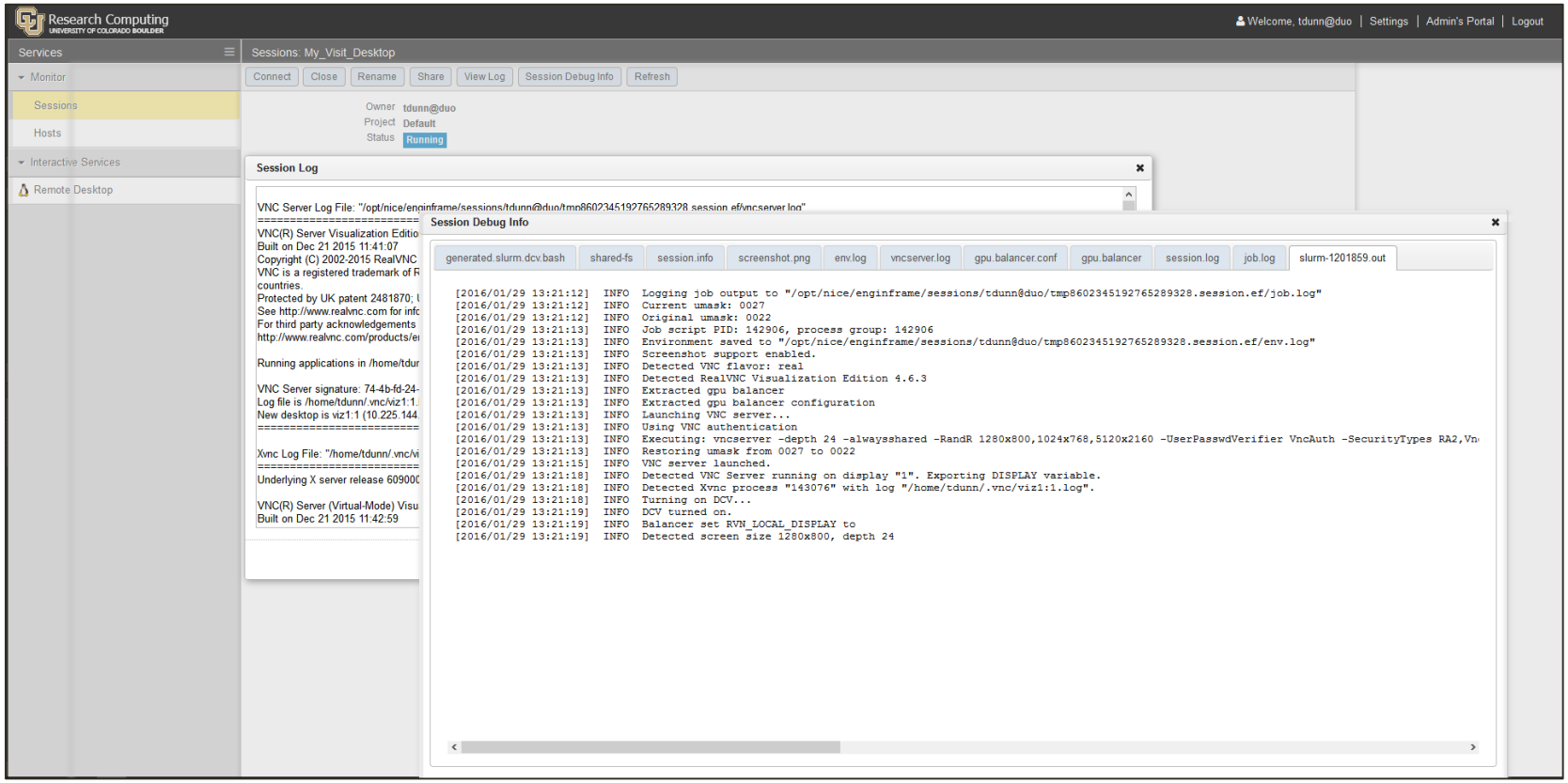
Renaming Sessions

- Renaming allows you to change the name of your session so if you have multiple sessions and/or sharing your work with others they an be easily identified.



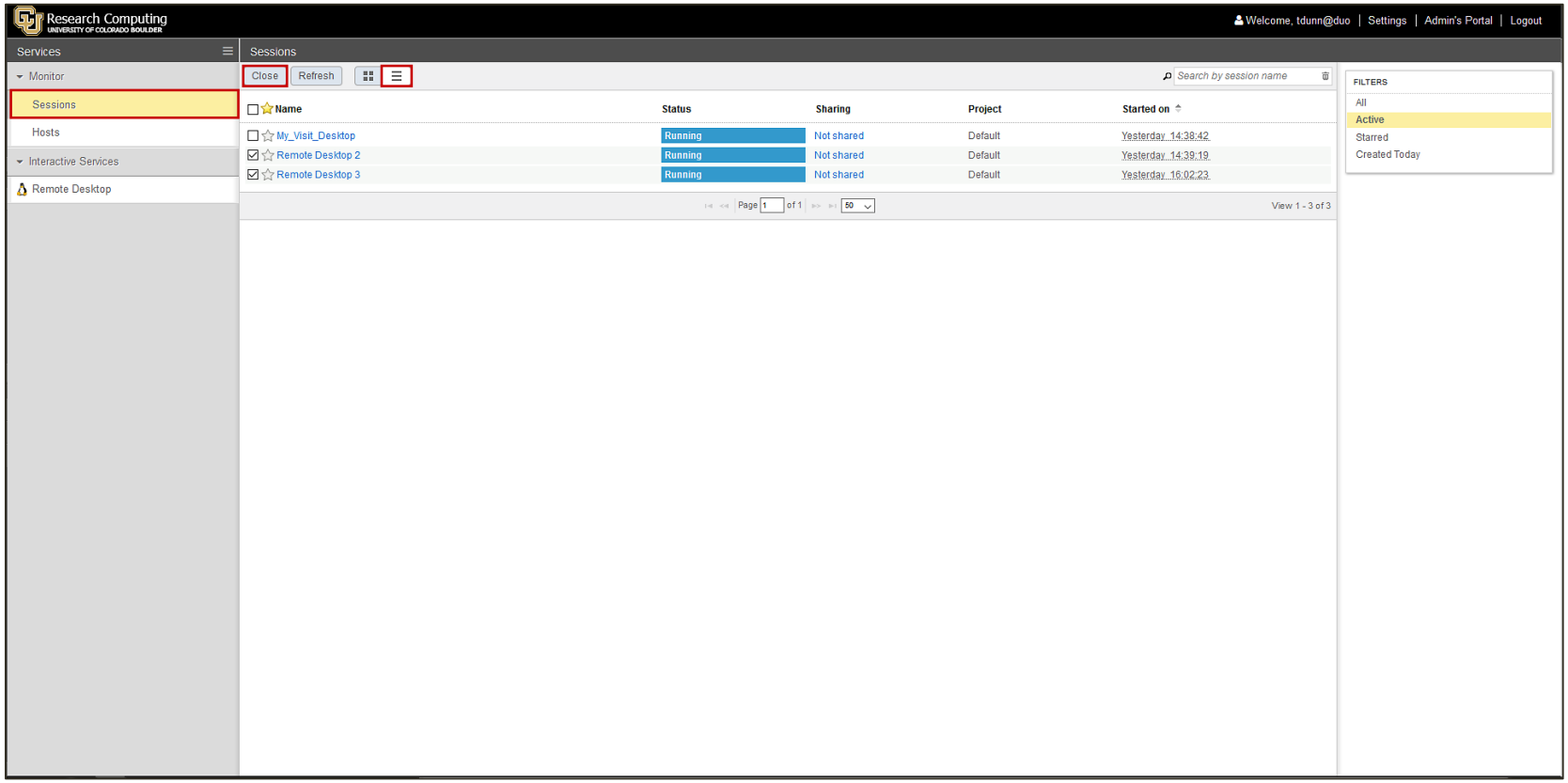
View Logs

- The ‘View Log’ and ‘Sessions Debug Info’ selections allow you to look at some of the various logs that EnginFrame generates.
- If you run into problems with your sessions and you need to submit a ticket to rc-help@colorado.edu, you may be asked to provide some of this information to help resolve your issues.



Closing a Session

- You can close a session by clicking on ‘Close’ or clicking the ‘X’ button at the top right of a the sessions thumbnail image.
- Alternatively, to close one or more sessions at once from the Sessions browser, click on the ‘List’ view icon, choose which session(s) you desire to close and click on ‘Close’.

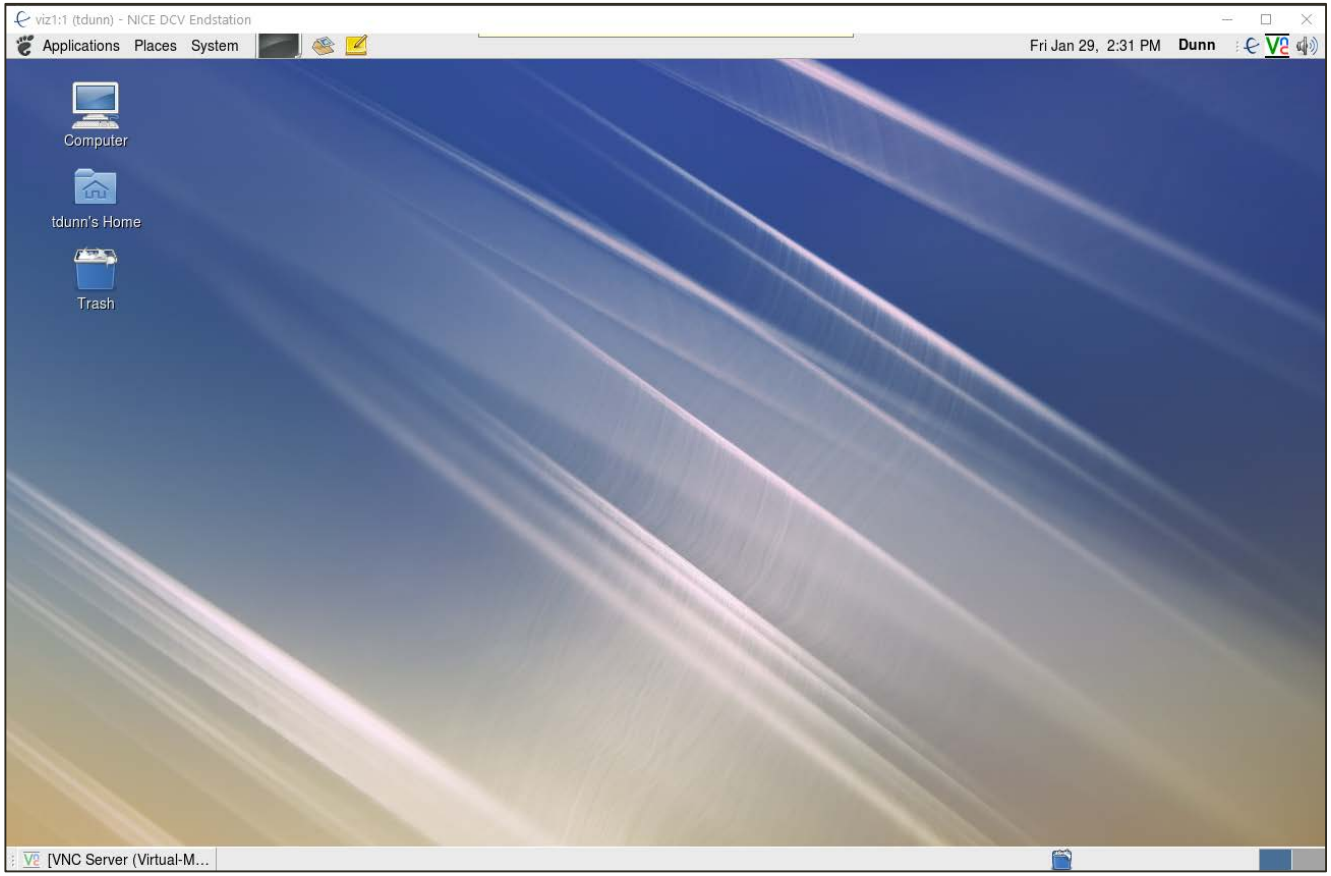


Session Lifetime

- Any remote desktop session you create will be available for a maximum of 24 hours.
- During that 24 hour lifetime your session resides fully on the visualization cluster. Thus;
  - If you close your browser tab or even the browser itself, you can open a new browser/browser tab, log back into EnginFrame and reconnect to your session(s).
  - If you turn of your machine off or loose power to it you can restart it, log back into EnginFrame, and reconnect to your session(s).
  - After 24 hours you will loose anything not saved either by you or by an application specific backup file system.
  - If the visualization cluster looses power or if SLURM issues arise you may loose your session and any work not saved will be lost.

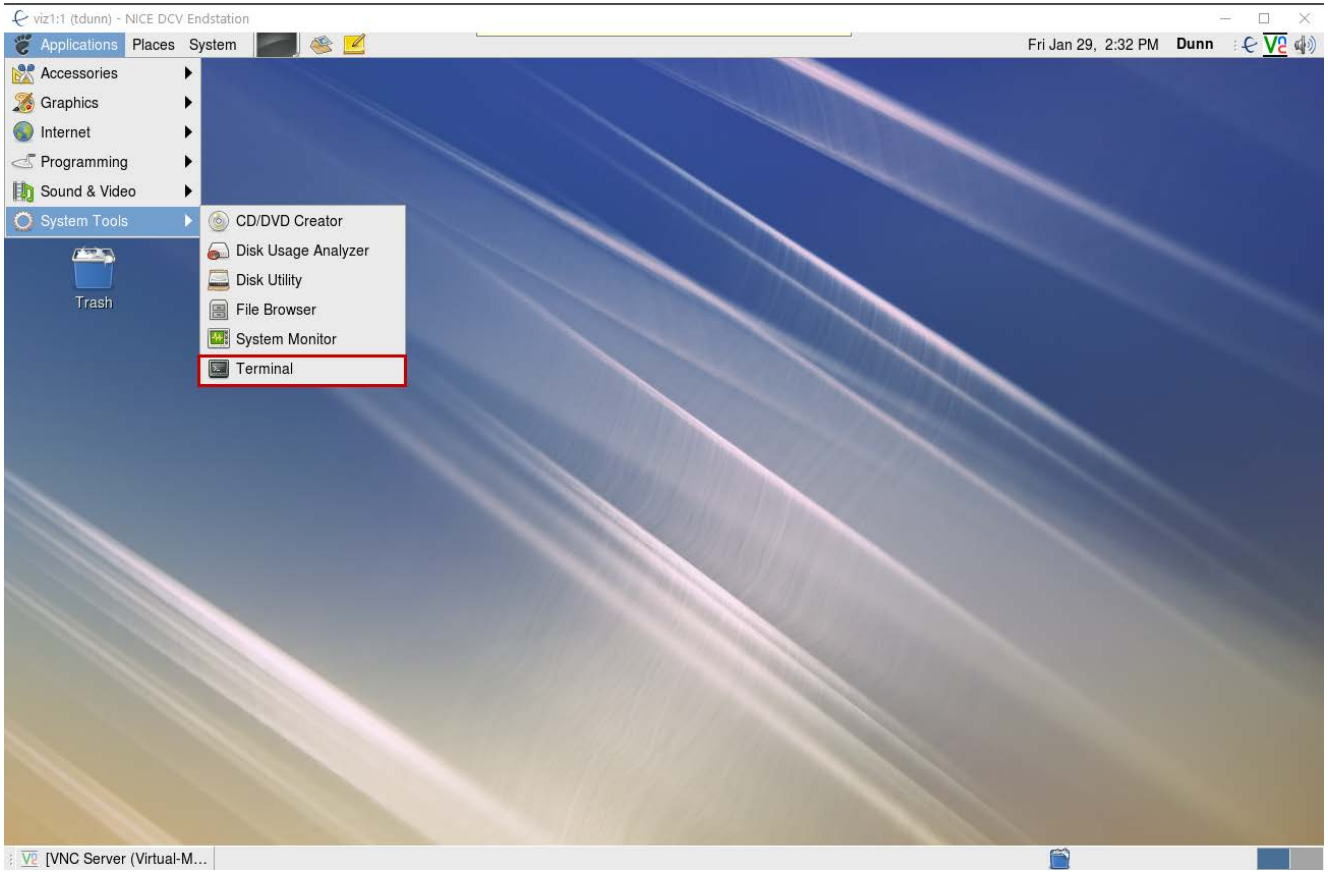
The Remote Desktop

- When your Remote Desktop starts you will have a new DCV desktop running Redhat Linux with a slim Gnome desktop.
- You will automatically be set to your default CURC home directory running what ever environment you have set up.



Accessing a Terminal Window

- To access a Terminal window, your most important tool in a Linux environment;
  - Click on the ‘Applications’ menu item and select ‘System Tools’=>’Terminal’
  - To create a fast to use desktop launcher left click on ‘Applications’=>’System Tools’ then right-click on ‘Terminal’ a new sub-menu will open, select ’Add this launcher to desktop’.



Running a Visualization Application

- To run a visualization application on the visualization cluster you may use either the ones installed on Janus (or Summit in a few months) by loading the appropriate module and then launching it.

- It is important to note that only the new LMOD module system will be accessible from the visualization cluster. If you already have an account on Janus then you just need to open a terminal window, making sure you are in your home directory, and typing;

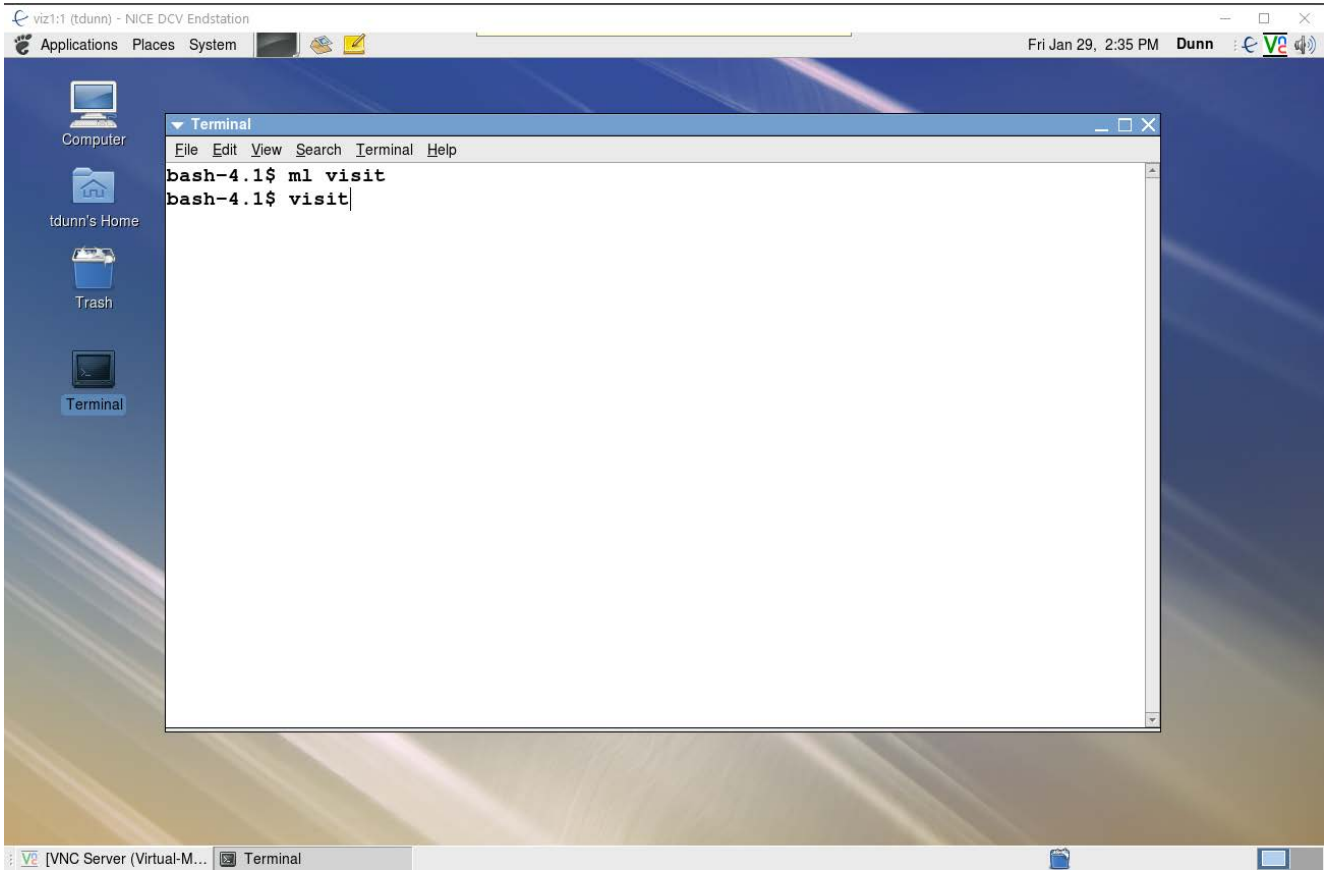
  touch ~/.lmodrc.lua

  Next restart your terminal session and you will now be setup to access LMOD modules.

- If you have your own visualization application installed on Janus (or Summit) you can just start it as defined by how you setup your installation of the application.

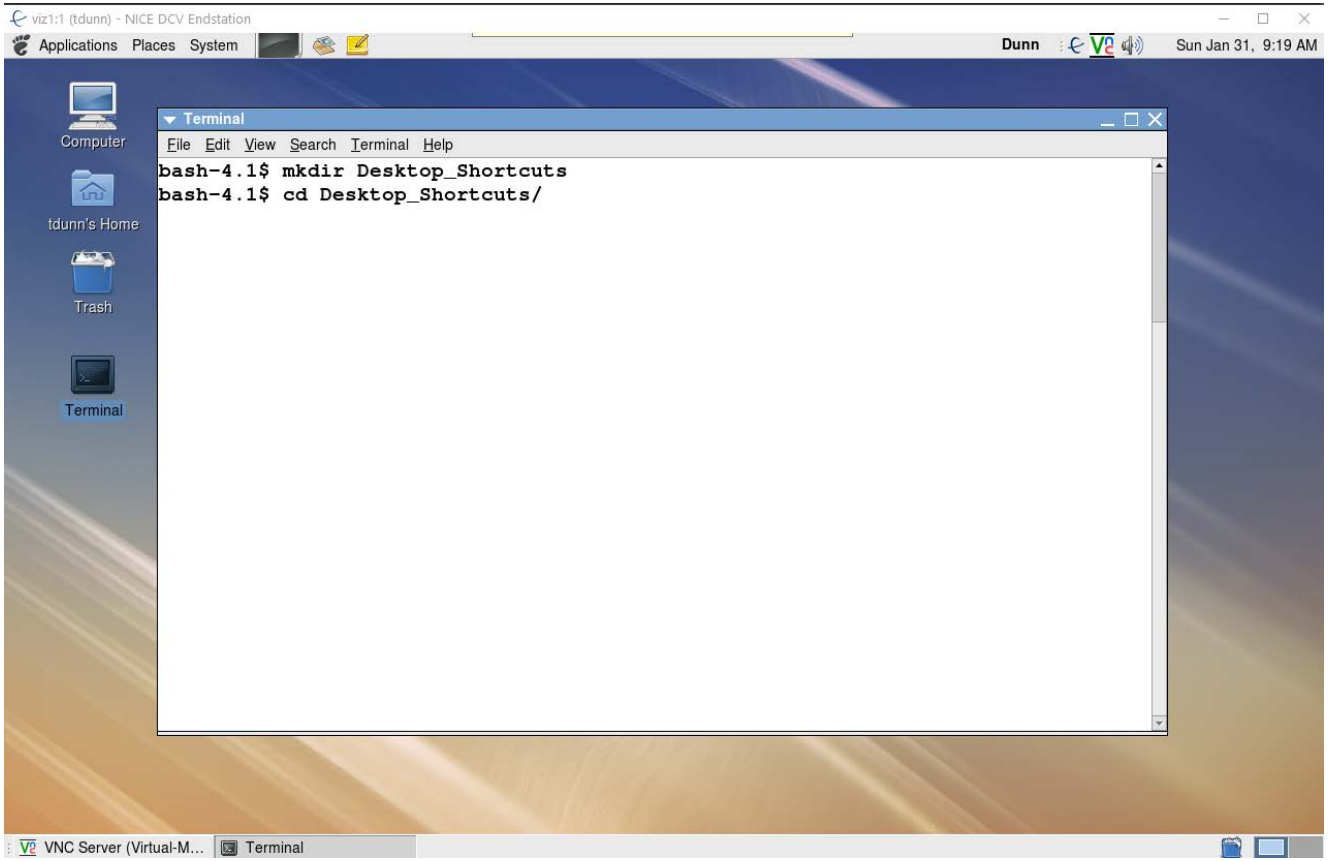
Running a Visualization Application

- To start a visualization application (e.g. Visit), open a terminal window and type the following commands.
- ml <name of module> where ml is LMOD's shorthand for module load.
- <name of application to run>



Creating a Desktop Launcher - 1

- To create a desktop launcher start by first opening a terminal window.
- I suggest you create a new directory to save your launchers to and then changing directories to it by typing;
  - mkdir <name of your new directory>
  - cd <name of your new directory>



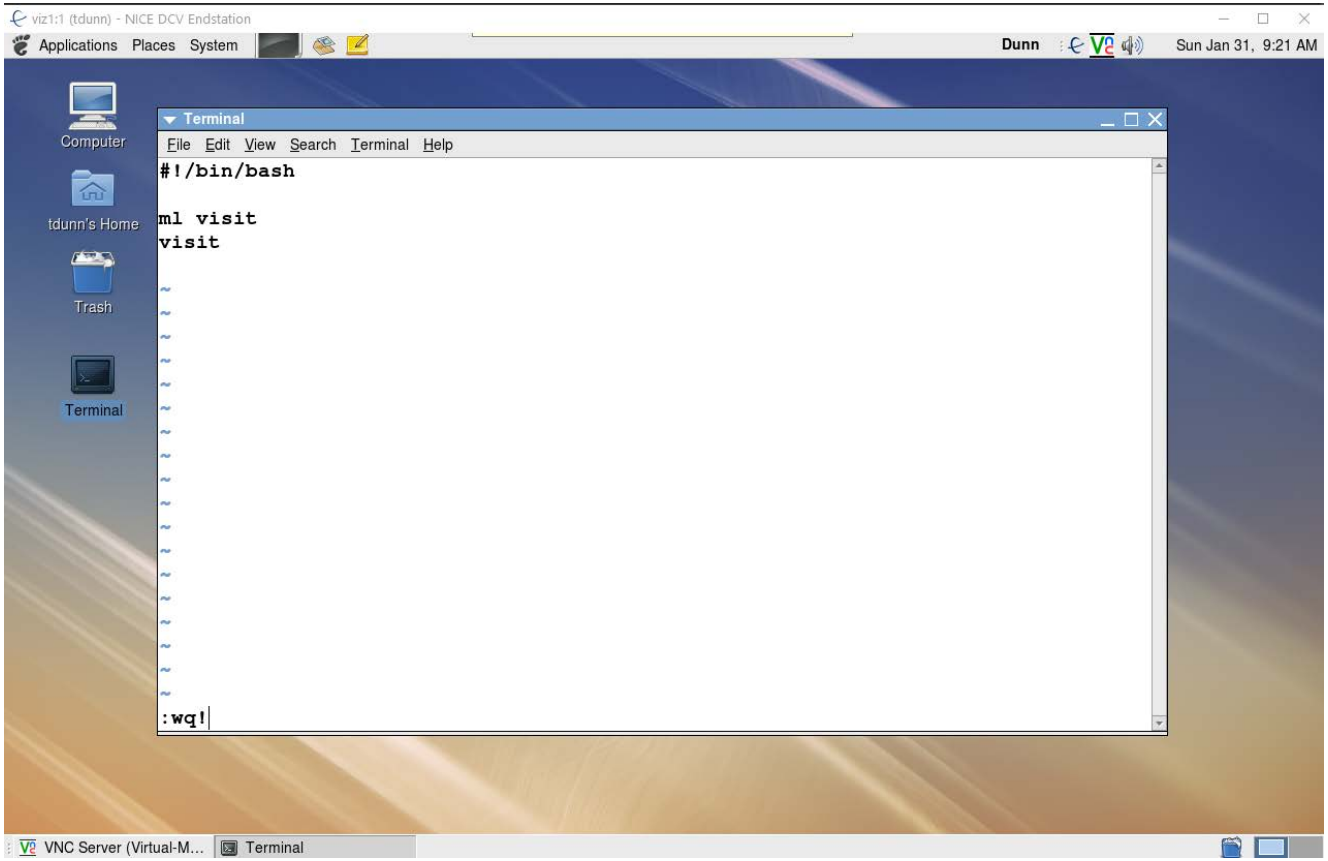
Creating a Desktop Launcher – 2a

- Next you need to create a new file that will actually launch your application for you. In this example we will load the visit module and launch it using a script written with the vi editor.
- From your terminal window, and inside your new directory type;
  - vi Visit_2.10.0
  - Hit ‘i’ to move to ‘Insert’ mode and then type to following lines;

    #! /bin/bash
    ml visit
    visit
  - To save and close the file type

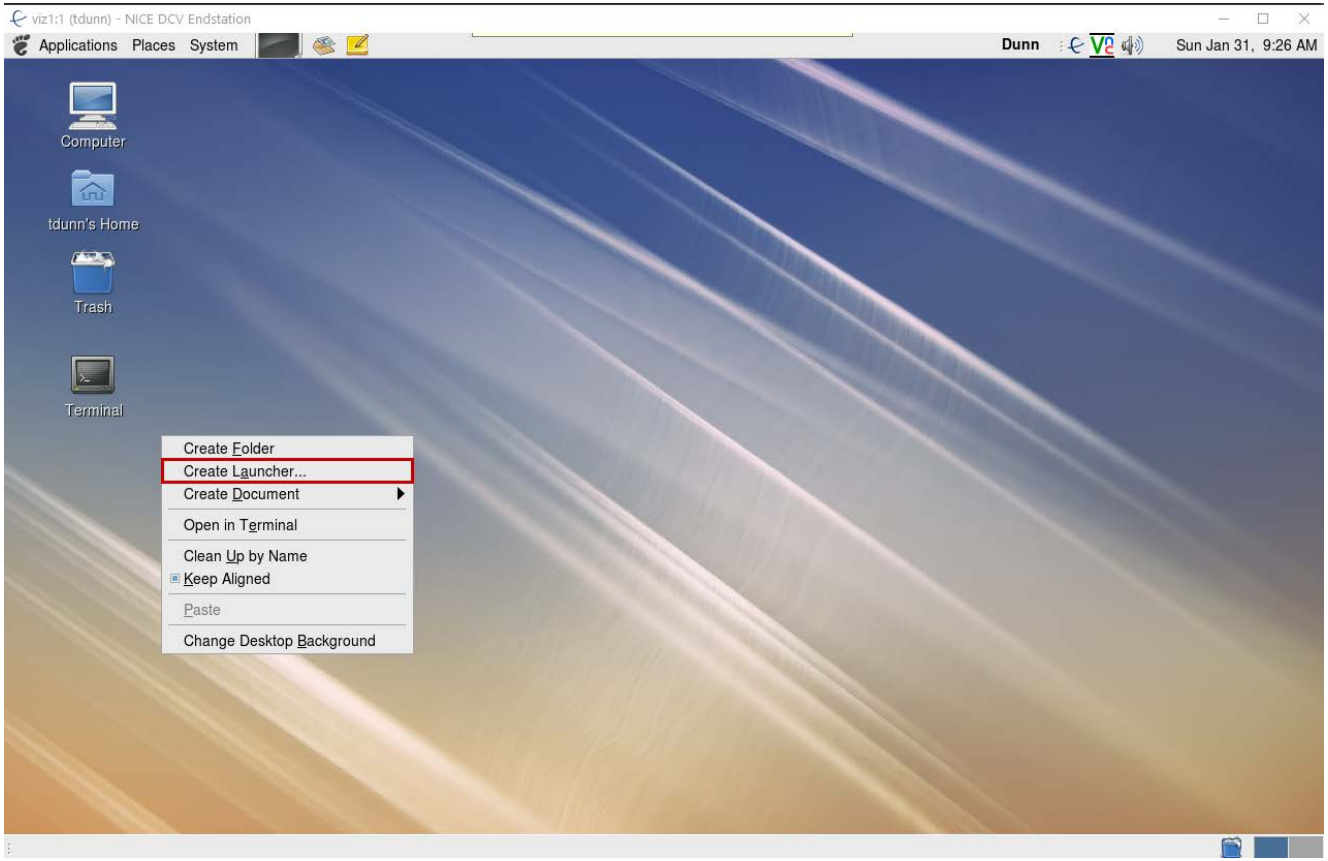
    :wq!
- Next we need to make the file executable by typing;
  - chmod a+x Visit_2.10.0

Creating a Desktop Launcher – 2b



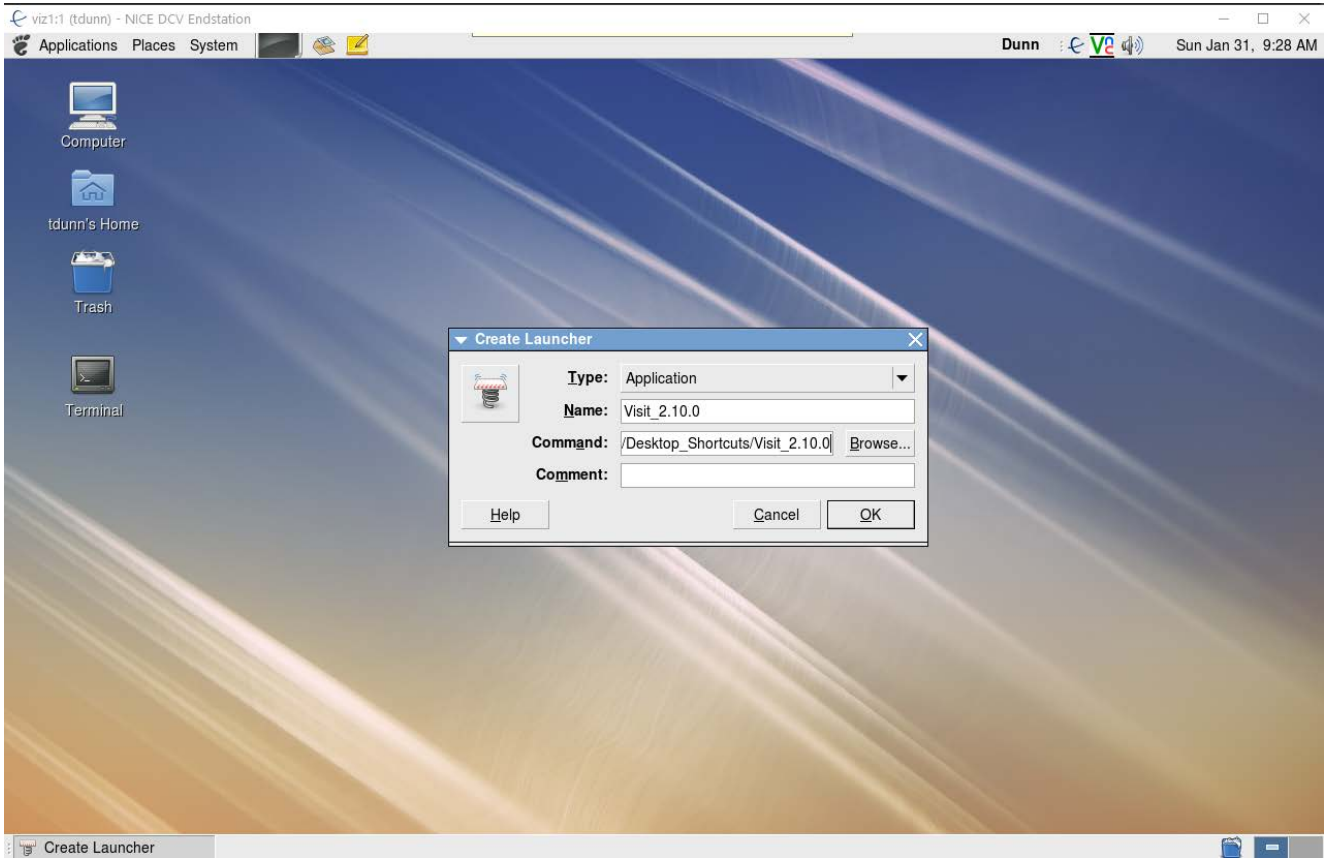
Creating a Desktop Launcher – 3a

- To create the desktop launcher right click on the desktop
- Choose ‘Create Launcher’



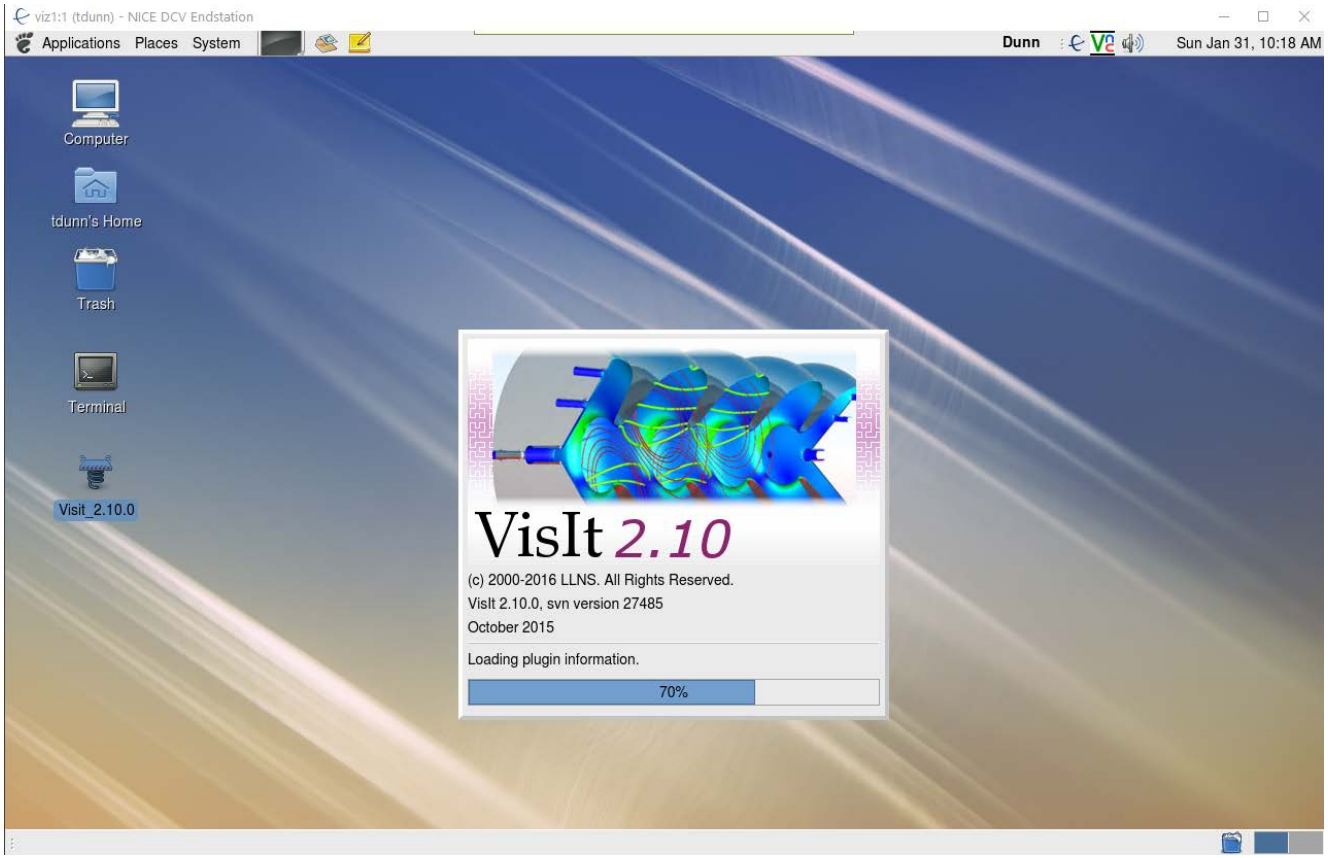
Creating a Desktop Launcher – 3b

- For ‘Type’ choose ‘Application’
- For ‘Name’ type the name that will be associated with your launcher to open your application.
- For ‘Command’ click on the ‘Browse’ button and navigate to and select the file you just created. When done hit ‘OK’



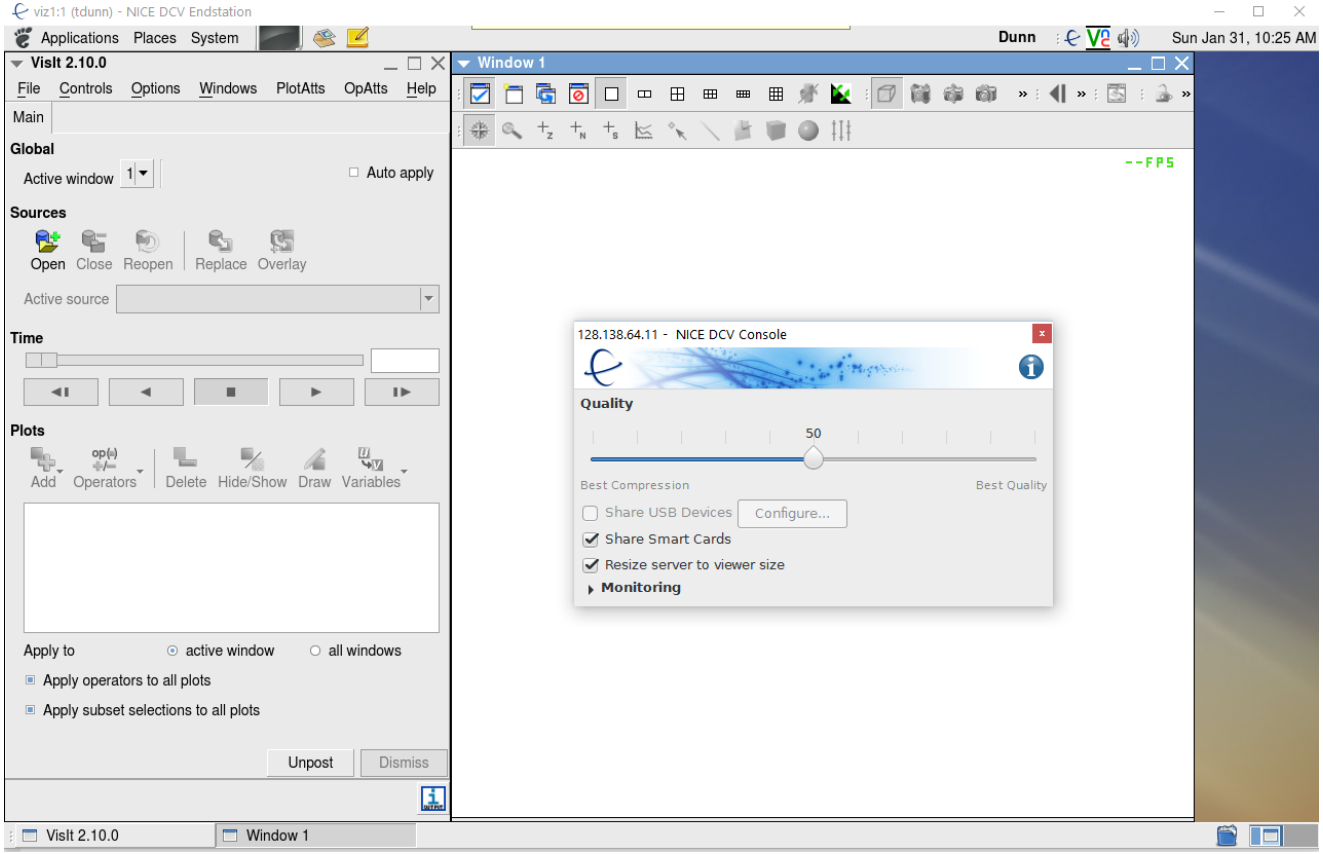
Creating a Desktop Launcher – 4

- Clicking on your new ‘Visit_2.10.0’ desktop launcher will now open Visit for you automatically.



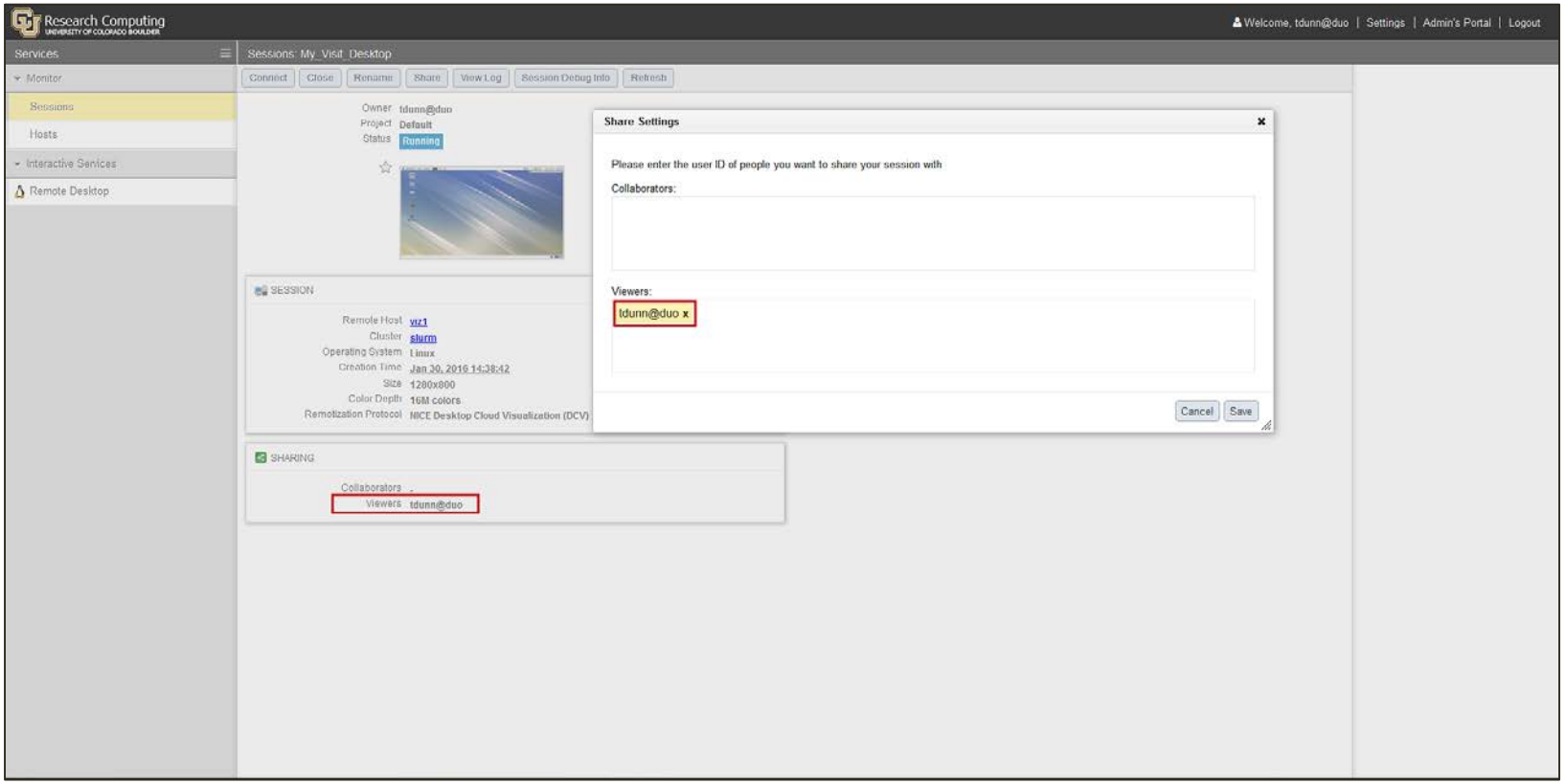
The NICE DCV Console

- You can adjust the Quality ⟷ Frame Rate response by opening the NICE DCV Console by pressing;
  - For Windows: ctrl+shift+F9
  - For MacOS: cmd+fn+9
- Moving the 'Quality' slider to the left results in faster performance but lower quality.
- Moving the 'Quality' slider to the right results in lower performance but higher quality.



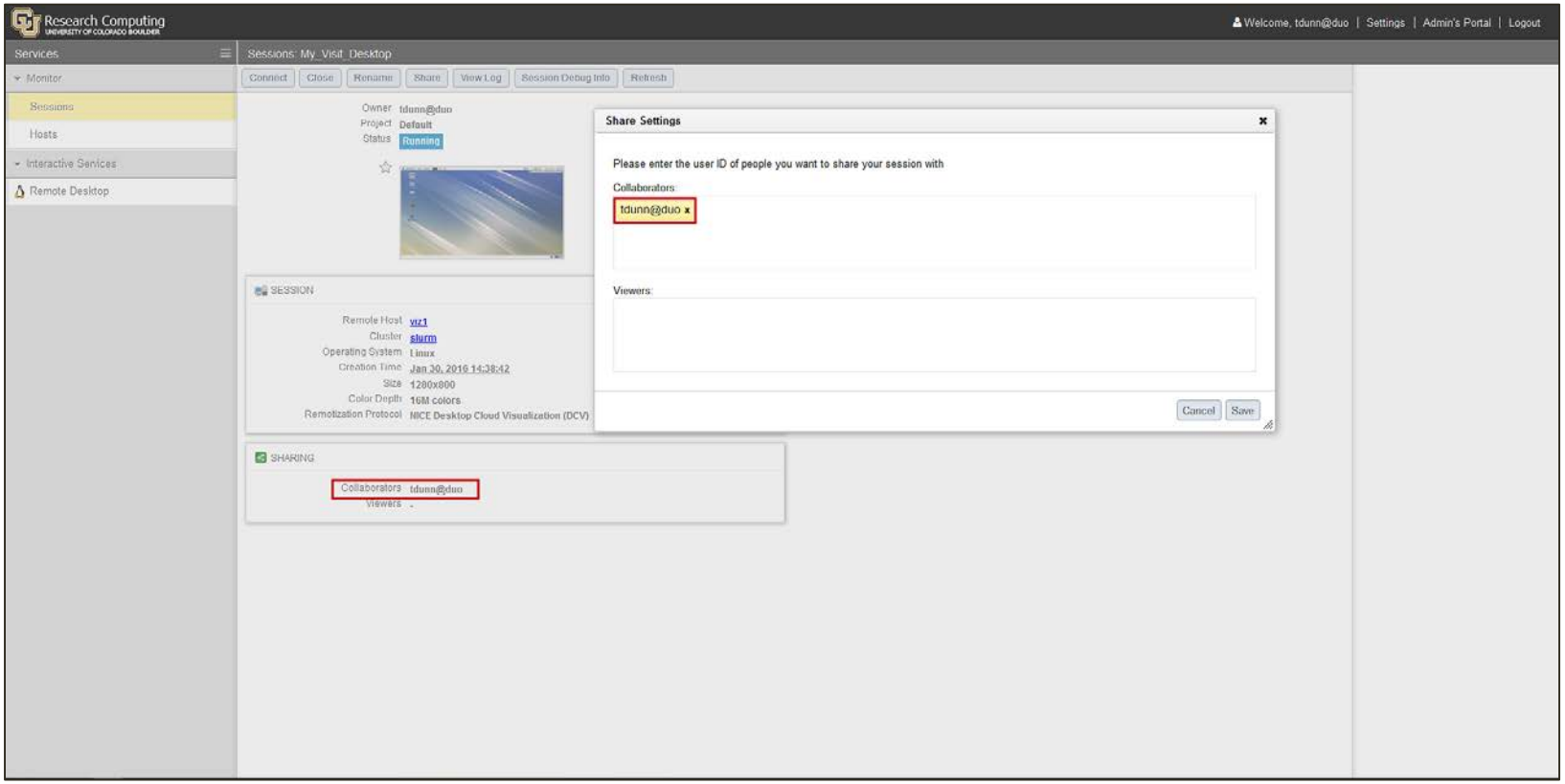
Sharing Sessions - Viewing

- You can share your session with other users by going your session ‘Details’ and choosing ‘Share’.
- By clicking in the ‘Viewers’ box type the username+@duo. Once EnginFrame will locate the user(s) you specified click ‘Save’.
- By logging into EnginFrame your selected users will receive a notification and will be able to launch a remote desktop to watch work you are doing in the shared session.



Sharing Sessions - Contributing

- You can share your session with other users by going your session ‘Details’ and choosing ‘Share’.
- By clicking in the ‘Collaborators’ box type the username+@duo. Once EnginFrame will locate the user(s) you specified click ‘Save’.
- By logging into EnginFrame your selected users will receive a notification and will be able to launch a remote desktop to watch and contribute work to the shared session.



File Transfer – SCP

To move files from your remote session to your local machine, or vice versa, you can use SCP the 'Secure Copy' command line tool.

- **For MacOS, Linux, Windows+cygwin users:**
  - To copy from the remote machine to your local, from the command line type:
    - scp <path to file to transfer>:<user-name>@duo@login05.rc.colorado.edu <path to save it to>
  - Example, assume my user name is foo and I want to transfer TEST.png, which is in my /home directory, to my current directory, type
    - scp /home/foo/TEST.png:foo@duo@login05.rc.colorado.edu .
  - To copy from your local to the remote machine, from the command line type:
    - scp <path to file to transfer> <user-name>@duo@login05.rc.colorado.edu:<path to save it to>
  - Example, assume my user name is foo and I want to transfer data.silo, which is in my current directory, to /projects directory on Janus type
    - scp /home/foo/data.silo foo@duo@login05.rc.colorado.edu:/projects/foo
- **For non-Cygwin Windows users:**
  - Download and install WinSCP from https://winscp.net/eng/download.php
  - Setup the WinSCP session the same as you would for Putty making sure you use your Duo authentication username (foo@Duo) and password.

File Transfer – Globus

- You may also use your Globus account to transfer data. This is the preferred method for file transfer management with CURC resources. If you do not have a Globus account you may freely register for one from Globus.org. For more information please read the CURC 'File and data transfer' help guide.

- Use the 'CU-Boulder Research Computing' endpoint and your Duo authentication username and password for the remote endpoint and your local machine endpoint (which you must create if you have not done so already.)