

# PRACTICE INSTRUCTIONS

*Kelly Werner (she/her)*




# LOGISTICS

- Join using the same Zoom meeting link you used for the morning session
- All students and instructors are in the main session
- Instructors have pre-assigned breakout rooms
- Everyone is muted and working individually
- When you have a question **ONLY use the hand-raise feature**



# LOGISTICS




iPhone is connecting to audio and can't hear you yet ...


An instructor will invite you to join their breakout room


Kelly is inviting you to join Kelly


Not Now


Join


 ^  
Mute


 ^  
Stop Video

 2 ^  
Participants

  
Chat

 ^  
Share Screen

  
Record

 ^  
React

Leave

# LOGISTICS

## Kelly's Breakout Room

When your issue is resolved, you and the instructor will leave the breakout room and go back to the main room

Kelly Werner



Unmute



Stop Video



Participants



Chat



Share Screen



Record



Ask for Help



Reactions

Leave Room

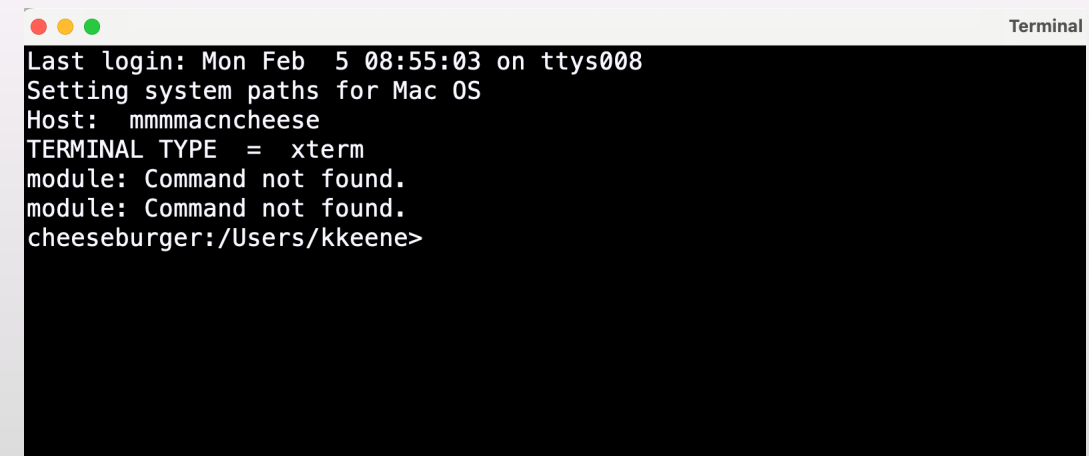
1. From your laptop, open a terminal (Unix) window

2. From the command line, log-in to NCAR's HPC system

```
ssh -X user_name@derecho.hpc.ucar.edu
```

(unless using a Mac - then use "-Y" instead of "-X")

Use the password provided by NCAR/CISL (via email)

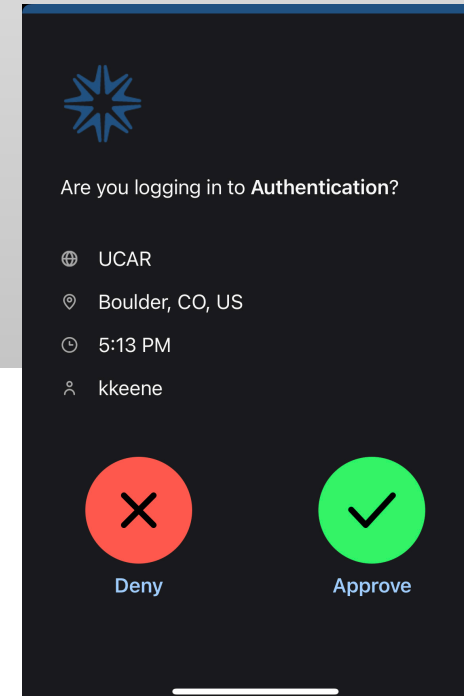
A screenshot of a terminal window titled "Terminal". It shows the output of an SSH login. A pink arrow points from the first step of the instructions to the terminal window. The text in the terminal is: "Last login: Mon Feb 5 08:55:03 on ttys008", "Setting system paths for Mac OS", "Host: mmmmacncheese", "TERMINAL TYPE = xterm", "module: Command not found.", "module: Command not found.", and "cheeseburger:/Users/kkeene>".

```
Last login: Mon Feb 5 08:55:03 on ttys008
Setting system paths for Mac OS
Host: mmmmacncheese
TERMINAL TYPE = xterm
module: Command not found.
module: Command not found.
cheeseburger:/Users/kkeene>
```

3. You should receive a DUO app notification on your smart phone

- Click the notification
- Choose "Approve"

# LOGGING-IN TO NCAR'S DERECHO HPC





# TUTORIAL WEBSITE

[https://www2.mmm.ucar.edu/wrf/OnLineTutorial/tutorial\\_practice/class\\_welcome/index.php](https://www2.mmm.ucar.edu/wrf/OnLineTutorial/tutorial_practice/class_welcome/index.php)

[Home](#)  
[Agenda](#)  
[Lectures](#)  
[Practice Exercises](#) ▾  
Practice Home  
Derecho HPC  
Case Studies  
Graphics  
Daily Quiz  
[Recorded Presentations](#)  
[WRF Users Guide](#)

## Welcome to the Basic WRF Tutorial



We are excited to meet all of you and to guide you through learning how to use the WRF model. Please take a look at the menu to the left and click on each topic to view the contents.  
**It is important that you read through all information prior to the beginning of class.**

# PRACTICE HOME PAGE

Home

Agenda

Lectures

Practice Exercises ▾

Practice Home

Derecho HPC

Case Studies

Graphics

Daily Quiz

Practice Exercises ▾

Instructions

Visualization Without X-forwarding

Recorded Presentations



WRF Users Guide

Practice Instructions Presentation

WRF System Flow Chart

Unix Commands

## The Basic WRF Tutorial Practice Session



- This website is specific to the hands-on practice sessions for the Basic WRF Tutorial.
- All work will be done on NCAR's HPC "Derecho." [Follow instructions to set up your Derecho Environment.](#)
- After you've set up your Derecho environment, you can move on to [Case Studies](#). You may need to visit the Derecho environment setup page again in the future, but once you are familiar with the setup, you can skip that page each day and start going straight to the case studies.
- To access all links associated with the practices, please click on "Practice Exercises" in the left navigation menu. Doing so will reveal a drop-down menu with additional options.

# DERECHO ENVIRONMENT SET-UP

## Derecho Environment Setup

The practical exercises in this tutorial are tailored to work on the NCAR's [Derecho](#) system. Derecho is an HPC cluster that includes the libraries needed by WRF and its pre- and post-processing tools through modules. When you first log-in to Derecho, you will be placed in your home directory (/glade/u/home/\$USER, where "\$USER" is your CISL log-in name).

### Setting-up Your Environment

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**Before going through any of the exercises in subsequent sections, you will need to run several commands to prepare your environment.**

1. First purge all loaded modules to begin from a known starting point (with no modules loaded).

```
> module purge
```

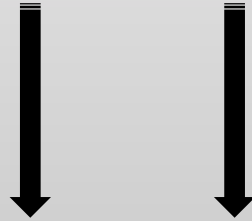
2. Now you will need to load several modules to give access to the Intel compilers as well as an MPI implementation.

```
> module load intel  
> module load ncarcompilers  
> module load cray-mpich  
> module load craype  
> module load hdf5  
> module load netcdf
```



# GO TO CASE STUDIES

## Derecho Environment Setup



After setting up your environment, scroll to the bottom of the *Cheyenne Environment Set-up* page

You are now ready to begin running the practice exercises!

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You will find all case studies [here](#). **Make sure to start with the Initial Exercise, and then do the Single Domain case** before trying other cases.

# GO TO CASE STUDIES

Home

Agenda

Lectures

Practice Exercises ▾

Practice Home

Derecho HPC

Case Studies

Graphics

Daily Quiz

Derecho Login Instructions

Visualization Without X-forwarding

Recorded Presentations



WRF Users Guide

Practice Instructions Presentation

WRF System Flow Chart

Unix Commands

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# PRACTICE CASES

***Important!***  
Read the notes!

## Run WRF Case Studies

### Important Notes – Please read!

- Complete the **Initial Exercise**, and then the **Single Domain Case** before moving on to others.
- It is not expected that you complete all the cases. *Once you have run the Initial Exercise and the Single Domain Run*, experiment with cases you are more likely to use in your research.
- Once you are more comfortable running cases, try the [Set-up and Run Your Own Case](#) exercise.
- All code has been precompiled to save time. A [Compiling exercise](#) is available if you want to experiment with compiling the code on these machines, but for all other exercises please use the pre-compiled code.
- You may find it handy to have a copy of the latest version of the [WRF-ARW User's Guide](#) open on your desktop.
- **You will need the output files from some cases (e.g., the Single Domain case) for future exercises.** Please follow instructions at the end of each exercise to save those files before starting a new exercise.



If you are new to using Unix commands, please first [go through this quick exercise](#) to become familiar with some of the common commands.

### Standard Practice Cases

It is recommend to start with these cases.

[Initial Exercise](#)    **Run this exercise first!**

[Single Domain Run](#)    **Run this exercise second!** - data from this exercise is used for several other exercises.

# START WITH THE INITIAL EXERCISE

## Standard Practice Cases

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It is recommend to start with these cases.

[Initial Exercise](#) **Run this exercise first!**

[Single Domain Run](#) **Run this exercise second!** - data from this exercise is used for several other exercises.

[Restart the model](#)

[Two-way Nested Domain](#)

[Troubleshooting Exercise](#)

[Set-up Case and Run Exercise](#)

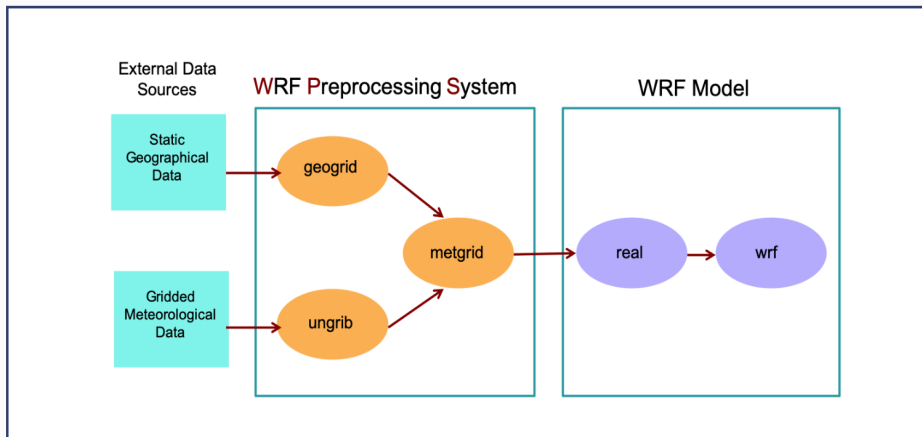
Scroll down to *Standard Practice Cases* and choose the ***Initial Exercise***

# INITIAL EXERCISE

## Initial Exercise

The purpose of this exercise is to familiarize yourself with the basic process of running WRF. For this case, the namelists have already been modified, so you should not need to make any modifications.

There are 5 steps to running WRF, broken down into 2 major programs: The WRF Preprocessing System (WPS) and the WRF model.



The **WPS** is a set of three programs that prepare input for the WRF program:

- **geogrid** : defines the model domain and interpolates static geographical data to the grids
- **ungrib** : extracts meteorological fields from GRIB-formatted input data files
- **metgrid** : horizontally interpolates the meteorological fields extracted by ungrib to the model domain defined by geogrid

The **WRF** model is broken into 2 programs:

- **real** : vertically interpolates the meteorological fields (from WPS) to WRF eta levels
- **wrf** : simulates the model run, using all previously-defined settings for the domain, input data, vertical interpolation, physics, and dynamics settings


Includes basic information on WPS and WRF processes

Pre-configured namelists

Simply issue commands for processing

# STANDARD PRACTICE CASES

Once you've completed the *Initial Exercise*, complete the ***Single Domain Run***



Troubleshooting Exercise



Set-up and Run Your Own Case



## Standard Practice Cases

---

It is recommend to start with these cases.

[Initial Exercise](#) **Run this exercise first!**

[Single Domain Run](#) **Run this exercise second!** - data from this exercise is used for several other exercises.

[Restart the model](#)

[Two-way Nested Domain](#)

[Troubleshooting Exercise](#)

[Set-up Case and Run Exercise](#)

# Cases for Specific Options

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[Idealized cases](#)

[Setting up WRF for Climate Simulations](#)

[Vortex Following Case](#)

[Compute a diagnostic variable](#)

[Increasing Frequency of WRF Output Variables](#)

[Output Additional Variables in History Files](#)

[Output Time Series Data at Station Locations](#)

[Running with Adaptive Time Step](#)

[Spectral Nudging](#)

[One-way nested run using ndown](#)

## Compile Code

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[WRF & WPS for Real Data Cases](#)

[WRF for Idealized Cases](#)

[See the Compilation Web Page](#) for compiling on your own machine.

- Derecho Log-in Instructions
- Recorded tutorial presentations
- WRF Users' Guide
- UNIX commands
- Input & output data
- THIS PRESENTATION

USEFUL  
LINKS

Home

Agenda

Lectures

Practice Exercises ▼

Virtual Mtg. Etiquette

Welco

#### Quick Links

[Derecho Log-in Instructions](#)

[Visualization Without X-forwarding](#)

[Recorded Presentations](#)

[WRF Users Guide](#)

[Practice Instructions  
Presentation](#)

[WRF System Flow Chart](#)

[Unix Commands](#)

[WRF Users Website](#)

[Practice Ex. Input/Output Data](#)

[WRF Tech Note](#)

[Compiling Tutorial](#)

[Best Practices](#)

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[General Tutorial Page](#)

[NCAR Supercomputers](#)

We are excited  
Please take a  
**It is important**



# DAILY QUIZ

Home

Agenda

Lectures

Practice Exercises

Practice Home

Derecho HPC

Case Studies

Graphics

Daily Quiz

Virtual Mtg.  
Etiquette

**Quick Links**

[Derecho Log-in](#)

[Instructions](#)



[Visualization Without X-forwarding](#)

[Recorded Presentations](#)

[WRF Users Guide](#)

[Practice Instructions](#)

## The Basic WRF Tutorial Practice Session



### Daily Quiz

After the lectures have been completed for each day, there will be a quiz available. The quizzes are fairly short, and are basically a way for us to determine if you grasped the key components from the lectures through the day. Please complete these quizzes each day. Once you submit your answers, you will be given your results, with an explanation for the correct answer to each one. If you have any questions about them, please let us know. The answers will all be confidential. We will only get results in total numbers.

Monday: [Click here to access daily quiz.](#)

Tuesday: [Click here to access daily quiz.](#)

Wednesday: [Click here to access daily quiz.](#)

Thursday: [Click here to access daily quiz.](#)

Friday: [Click here to access daily quiz.](#)

QUESTIONS?

