

Introduction to Wednesday practicals

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CESM tutorial, 12 July 2023



What are we going to do today?

- **Namelist Modifications**
- **Troubleshooting model errors**
- **Code Modifications**

**“I can only show you the door.
You're the one that has to walk through it”**

(The Matrix, 1999)



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NCAR

Welcome to the CESM Tutorial

- Introduction
- Prerequisites for Success
- Basics
- Simple XML Modifications
- Namelist Modifications**
- Troubleshooting runtime errors
- Source Modifications
- Diagnostics
- Challenge Exercises
- Resources

Welcome to the CESM Tutorial

In 1983 NCAR created the *Community Climate Model* (CCM) as a freely available global atmosphere model for use by the climate research community. The scope of CCM development continued to expand and in 1994 NCAR scientists released the *Climate System Model* (CSM), a global model that included component models for the atmosphere, land surface, ocean, and sea-ice, communicating through a central coupler component. To recognize the broad community of users and sponsors contributing to this effort, the CSM was renamed the *Community Climate System Model* (CCSM). The CCSM model evolved to include ice sheet and biogeochemical modeling and was renamed the *Community Earth System Model* (CESM) in 2013.

This repository includes materials designed to be an introduction to running the CESM. The materials were developed to support the CESM tutorial and serve as reference documentation for all CESM users.

<https://ncar.github.io/CESM-Tutorial/README.html>

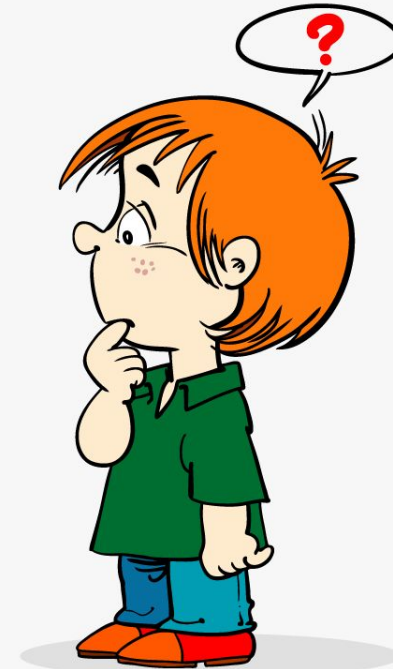
Namelist Modifications

- **What are namelists? How to modify them?**
- **For instance, let's change the output frequency of the model.**

Namelist Modifications

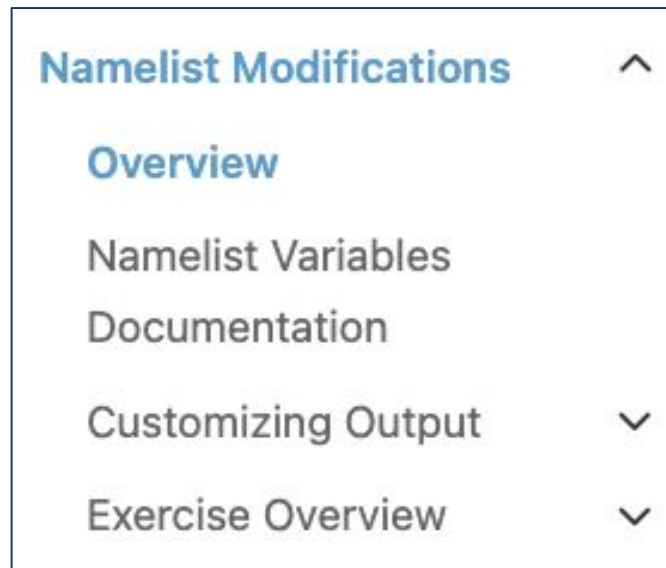
- What are namelists? How to modify them?
- For instance, let's change the output frequency of the model.

Question: By default, the model outputs **monthly** data and I need to look at the **daily** cycle...

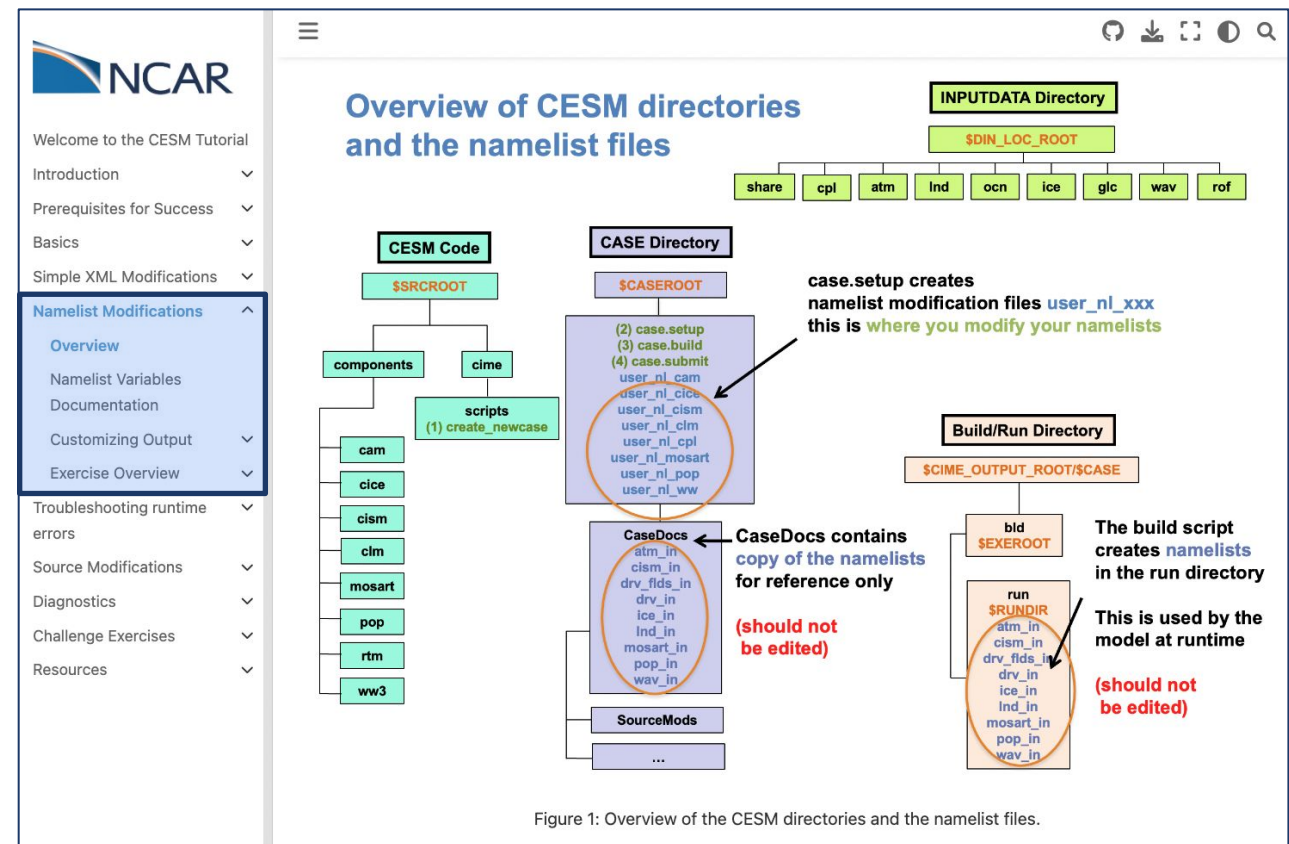


Namelist Modifications

- What are namelists? How to modify them?
- For instance, let's change the output frequency of the model.



Go step by step into the chapter:
[Namelist Modifications](#)



Troubleshooting runtime errors

- **“Help! My run crashed”**
- **Where/how can I find information about the crash?**

Troubleshooting runtime errors

- “Help! My run crashed”
- Where/how can I find information about the crash?



Troubleshooting runtime errors

- “Help! My run crashed”
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Troubleshooting runtime errors	^
The log files	
Adding debugging info	
Exercise Overview	v



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- NameList Modifications
- Troubleshooting runtime errors**
- The log files
- Adding debugging info
- Exercise Overview
- Source Modifications
- Diagnostics
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The log files

The log files are files in the format `$model.Log.*`

- When the model is running, it produces the log files in the **run directory**: `RUNDIR`.
- When the run completes successfully, the model moves the log files into the **archive** directory: `DOUT_S_ROOT`
- When the model fails, the log files remains in the run directory `RUNDIR`

Overview of CESM directories and Log files

Logs files:
- in RUNDIR while it is running
- moved to CASE/logs when run completes

QUICK TIPS
If the model crashes the log files will stay in the run directory RUNDIR

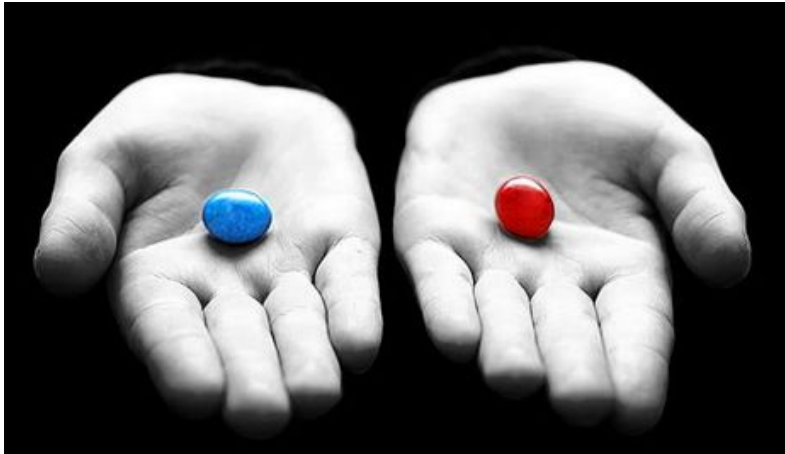
Go step by step into the chapter:
Troubleshooting runtime errors

Source Modifications

- **I am bored and I want to go to the next level and modify CESM.**
- **For instance, let's add a variable into CAM**

Source Modifications

- I am bored and I want to go to the next level and modify CESM.
- For instance, let's add a variable into CAM



Your choice: The **Red** Pill or the **Blue** Pill

The Matrix (1999): Neo, the main character is offered the choice between a red pill and a blue pill.

- The **blue pill** would allow him to remain in the Matrix (a fictional computer-generated world)
- The **red pill** would lead to his "escape" from the Matrix into the real world and embracing the sometimes painful truth of reality.

Source Modifications

- I am bored and I want to go to the next level and modify CESM.
- For instance, let's add a variable into CAM

Source Modifications	^
Overview	
Source Modification Example	
Exercise Overview	v

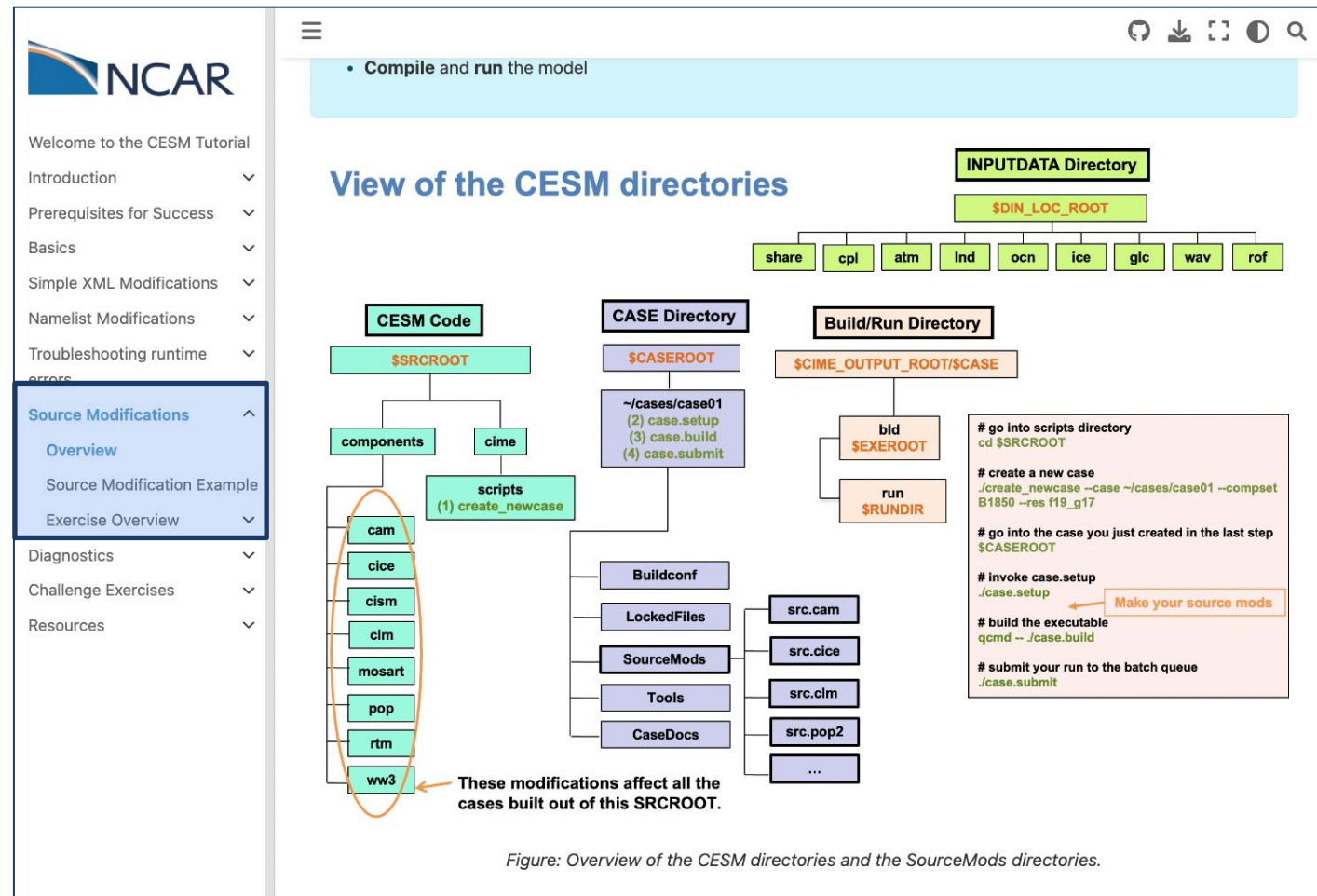
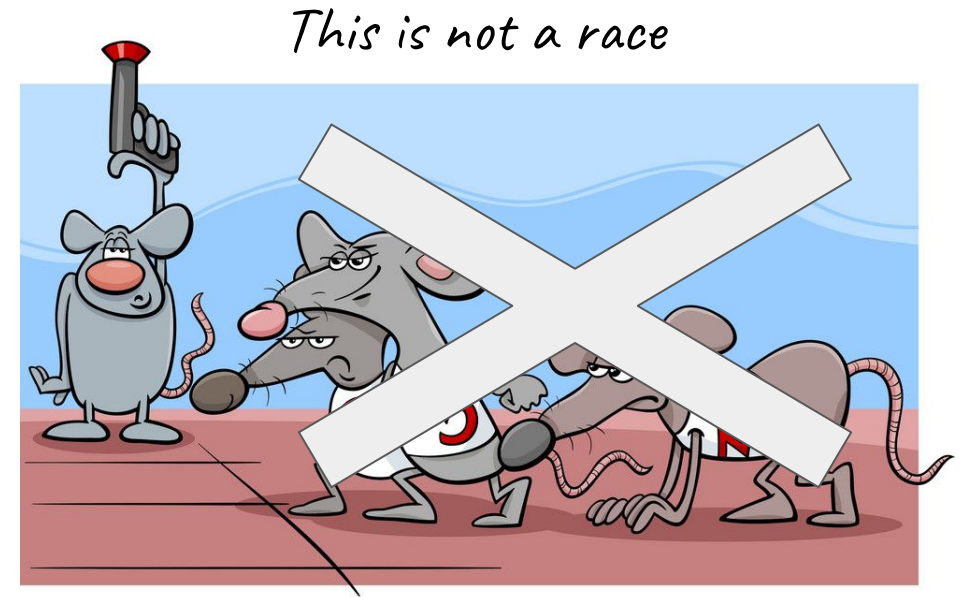


Figure: Overview of the CESM directories and the SourceMods directories.

Go step by step into the chapter:
Source Modifications

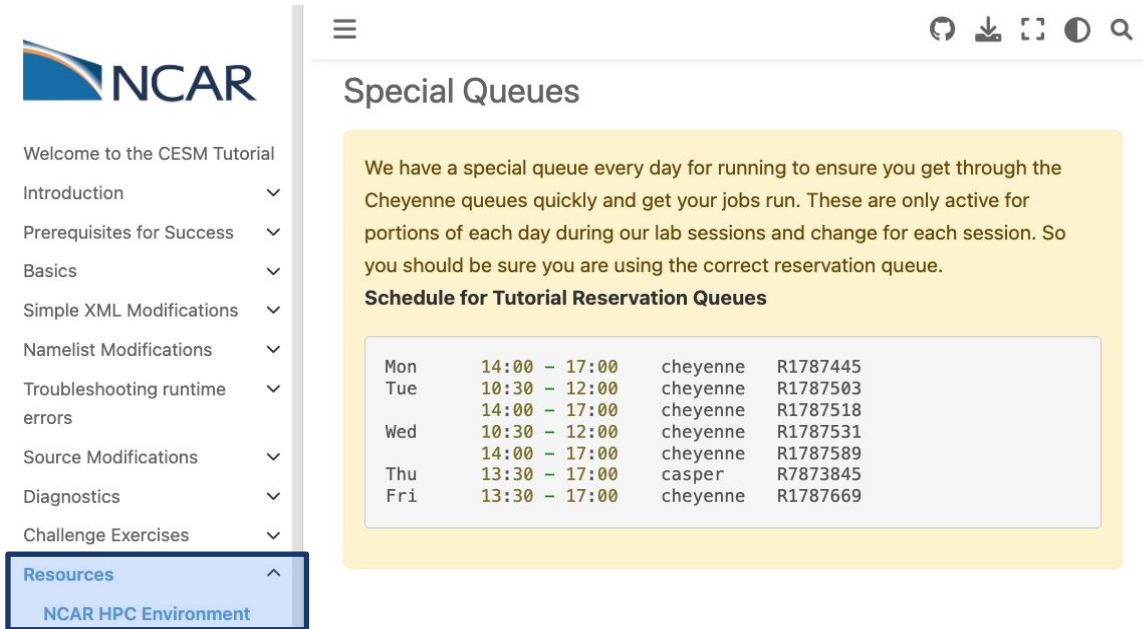
FAQs

- I have not finish Monday's exercise.
What should I do?
- I already completed all of these chapters.
What should I do?



FAQs

- I am completely confused about the tutorial special queue. What should I do?



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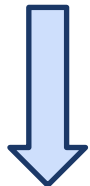
NCAR HPC Environment

Special Queues

We have a special queue every day for running to ensure you get through the Cheyenne queues quickly and get your jobs run. These are only active for portions of each day during our lab sessions and change for each session. So you should be sure you are using the correct reservation queue.

Schedule for Tutorial Reservation Queues

Mon	14:00 - 17:00	cheyenne	R1787445
Tue	10:30 - 12:00	cheyenne	R1787503
	14:00 - 17:00	cheyenne	R1787518
Wed	10:30 - 12:00	cheyenne	R1787531
	14:00 - 17:00	cheyenne	R1787589
Thu	13:30 - 17:00	casper	R7873845
Fri	13:30 - 17:00	cheyenne	R1787669



NCAR HPC Environment

If (Wed 10:30 - 12:00) then

```
./xmlchange JOB_QUEUE=R1787531 --force
```

If (Wed 14:00 - 17:00) then

```
./xmlchange JOB_QUEUE=R1787589 --force
```

If (Wed at another time) then

```
./xmlchange JOB_QUEUE=regular
```

Clarification about JOB_QUEUE

Change the job queue and account number

If needed, change `job queue` and `account number`.

For instance, to run in the queue `regular` and the project number `P93300642`, use the command:

```
./xmlchange JOB_QUEUE=regular,PROJECT=P93300642
```

Clarification about JOB_QUEUE

Change the job queue and account number

If needed, change `job queue` and `account number`.

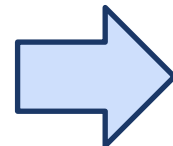
For instance, to run in the queue `regular` and the project number `P93300642`, use the command:

```
./xmlchange JOB_QUEUE=regular,PROJECT=P93300642
```

This is an example on how to change project number and queue.

This is NOT the project number you are using for this tutorial.

To know which project number and queue, please refer to: [NCAR HPC Environment](#)



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Important

Don't submit runs in premium

Don't submit the 38 month run in the special queue.

Use the regular queue.

```
./xmlchange JOB_QUEUE=regular
```

Clarification about qmove

This common only works if you have not started running yet

Yesterday



Questions ?

