

CESM Tutorial

Intro to Lab: Basics of CESM

NCAR Climate and Global Dynamics Laboratory

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NCAR is sponsored by the National Science Foundation



Lab 1 Goals

- Goal 1: Finish Prerequisites
 - https://ncar.github.io/CESM-Tutorial/notebooks/prereqs/prereqs_overview.html
- Goal 2: Checkout CESM and Explore Derecho
 - https://ncar.github.io/CESM-Tutorial/notebooks/basics/basics_overview.html
- Goal 3: Create and Run an experiment
 - https://ncar.github.io/CESM-Tutorial/notebooks/basics/exercises_overview.html

Prerequisites

- Find or Download and Install a Unix terminal shell for your laptop
 - <https://ncar.github.io/CESM-Tutorial/notebooks/resources/terminals.html>
 - Mac: Use Terminal but will likely need XQuartz
 - PC: Terminal from Start Menu or Fast X
 - Talk to helpers if you have any questions or technical issues
- Log into the Derecho supercomputer
 - “ssh -Y username@derecho.hpc.ucar.edu”

Explore Derecho

- Start in your home directory (~)
- Copy the resource file over to setup your environment.
 - Copy over the .profile file into your home directory:
 - Cp /glade/campaign/cesm/development/cross-wg/profile ~/.profile
 - Source ~/.profile
- Normally, we set up module lists and use “module save” but are using a profile file for the tutorial to keep everything simple.
- <https://ncar.github.io/CESM-Tutorial/notebooks/resources/profile.html#setting-up-your-ncar-hpc-environment>

Explore Derecho

- “gladequota” command shows your work spaces
- Home directory where you start.
 - /glade/u/home/[username]
- Work directory space is backed up and could be a good place to set up code and case directories
 - /glade/work/[username]
- Scratch directory is large but files are automatically deleted after 90 days
 - /glade/derecho/scratch/[username]
 - Where experiment output goes automatically but needs to be moved for long term storage
- Campaign space is recommended for long term storage and inputdata
 - /glade/campaign/cesm

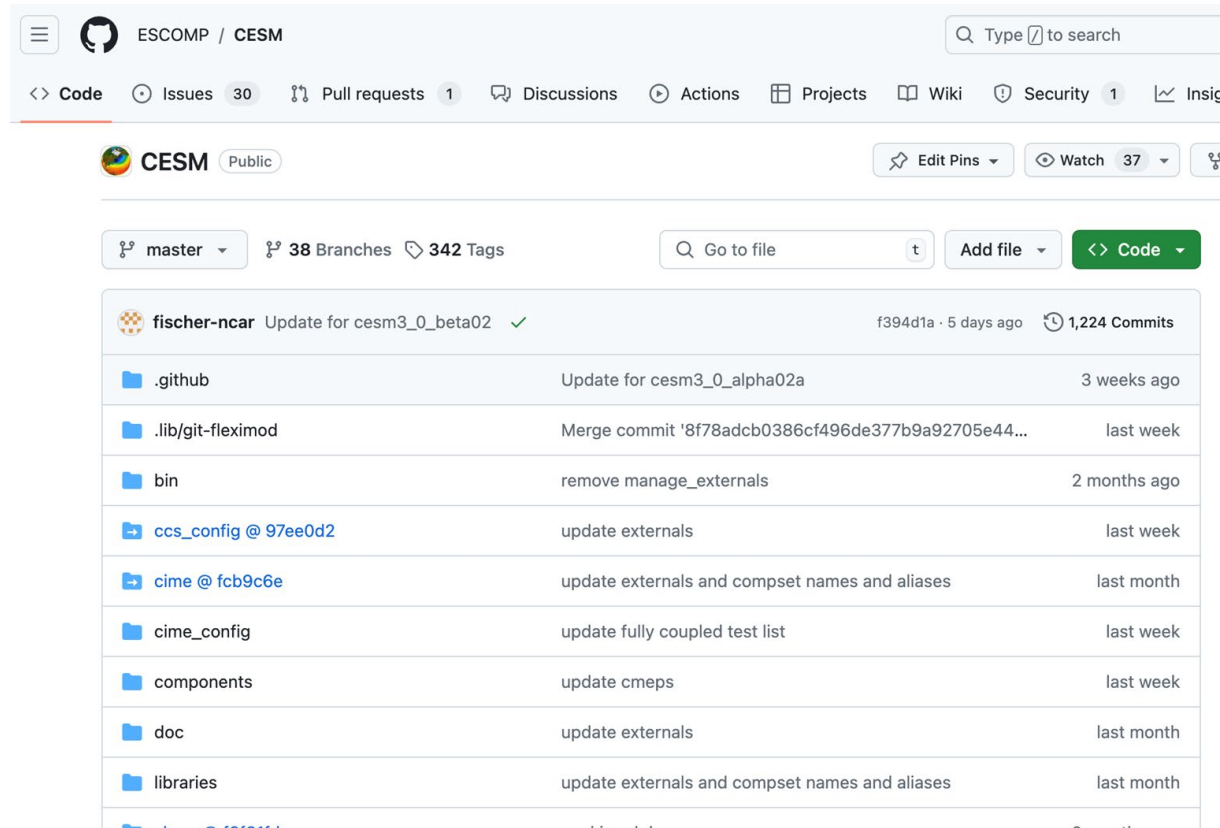
https://ncar.github.io/CESM-Tutorial/notebooks/basics/cesm_workspaces.html

Download CESM

- Use git to download and set up your CESM code
 - <https://github.com/ESCOMP/CESM>
 - CESM code is publically available
 - Instructions for downloading and checking out the correct tag are in the exercise:
 - https://ncar.github.io/CESM-Tutorial/notebooks/basics/code/git_download_cesm.html
 - Once you download it, you will use “manage_externals” to pull in code from many other repositories

Download CESM

- A good idea to explore the CESM Github pages
- <https://github.com/ESCOMP/CESM>
- Issues, discussions, and the place to start code modifications.



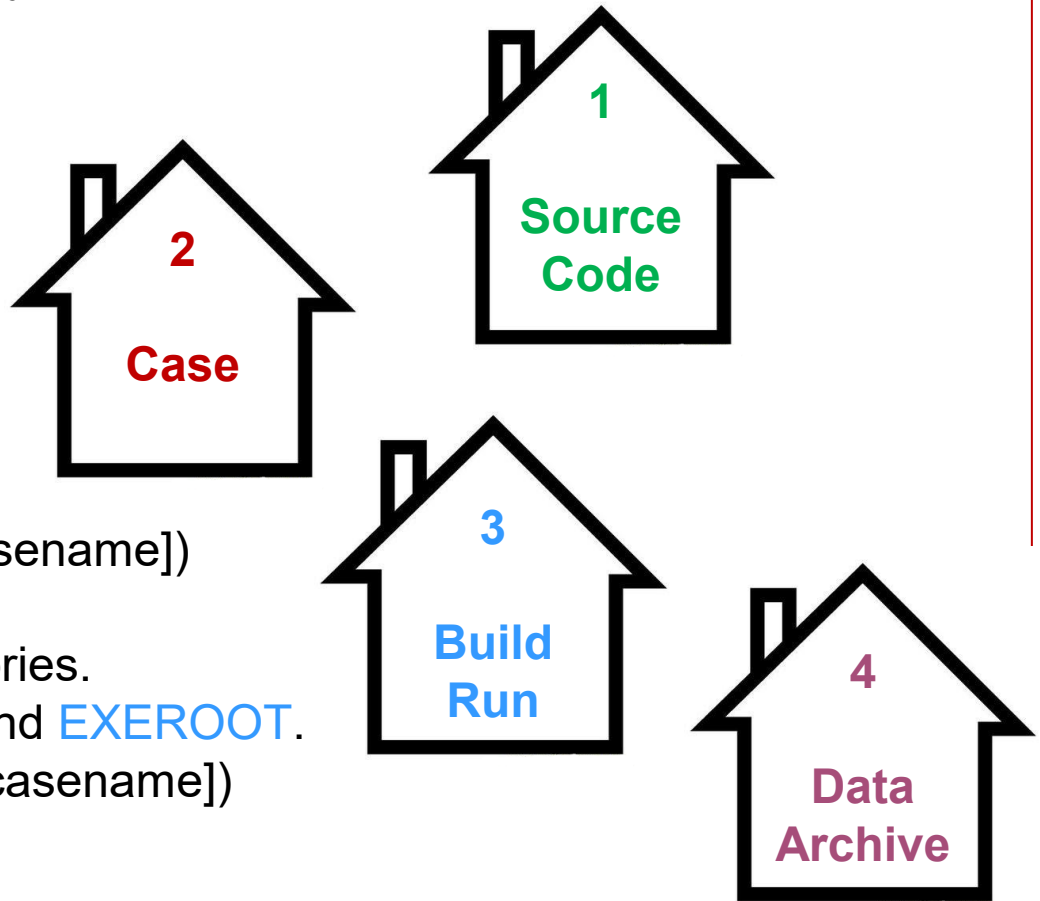
The screenshot displays the GitHub repository page for ESCOMP / CESM. The repository is public and has 38 branches and 342 tags. The current branch is master. The page shows a list of files and folders with their commit history:

File/Folder	Commit Message	Commit Date
.github	Update for cesm3_0_alpha02a	3 weeks ago
.lib/git-fleximod	Merge commit '8f78adcb0386cf496de377b9a92705e44...	last week
bin	remove manage_externals	2 months ago
ccs_config @ 97ee0d2	update externals	last week
cime @ fcb9c6e	update externals and compset names and aliases	last month
cime_config	update fully coupled test list	last week
components	update cmeps	last week
doc	update externals	last month
libraries	update externals and compset names and aliases	last month

CESM Case, Build and Run directories

You will need to be aware of 4 paths in your project, These are stored in your case directory in XML variables

- Path to your CESM code.
This is referred to as **SRCROOT** and contains **CIMEROOT**.
(/glade/u/home/[username]/code)
- Path to your case directories.
This is your **CASEROOT**.
(/glade/u/home/[username]/cases/[casename])
- Path to your build and run directories.
Referred to later as **OBJROOT** and **EXEROOT**.
(/glade/derecho/scratch/[username]/[casename])
- Path to your Archived data.
Saved as your **DOUT_S_ROOT**.
(/glade/derecho/scratch/[username]/archive/[casename])



Create an Experiment

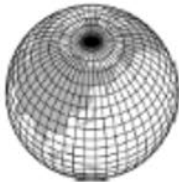
- CESM experiments are organized into “cases” and each case contains all of the parameters needed to describe a specific run.
- Use “create_newcase” in “my_cesm_code/cime/scripts” to define a new case or experiment

create_newcase requires 3 arguments

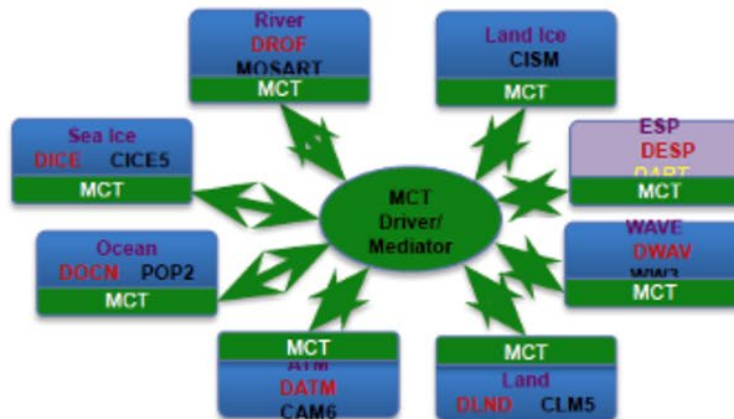
What is the casename ?



Which resolution?



Which model configuration ?
Which set of components ?



Which machine are you running on?



Sometimes Optional

First Exercise

https://ncar.github.io/CESM-Tutorial/notebooks/basics/exercises_overview.html

one time step – create a directory to store your experiment case roots

```
mkdir ~/cases
```

go into scripts subdirectory of cime

```
cd ~/code/my_cesm_code/cime/scripts
```

create a new case in the directory “cases” in your home directory

```
./create_newcase --case ~/cases/b1850.basics --res f19_g17 --compset B1850
```

go into the case you just created in the last step

```
cd ~/cases/b.day1.0
```

invoke case.setup

```
./case.setup
```

build the executable (cheyenne specific commands!)

```
qcmd -- ./case.build
```

submit your run to the batch queue

```
./case.submit
```

More Information/Getting Help

CESM Bulletin Board: <http://bb.cgd.ucar.edu/>

Forum	Topics	Posts	Last post
Announcements	29	61	Invitation to participate in CESM integrated data search survey by aliceb June 15, 2015 - 6:14pm
Bug reporting Community Bug Reporting	194	625	CCSM3 run error by janezhang8587@... July 21, 2015 - 3:03am
Climate Variability Diagnostics Package inquiries	2	20	Sign of PDO by asphilli June 9, 2014 - 10:40am
General Discussion Includes requests for new features and configuration inquiries	434	1479	CLM4 Irrigation Modification by mdfowler@... July 29, 2015 - 9:11am
GIT Issues This Forum is for the discussion of git issues in the CIME repository	3	16	svn external for a given git tag by andre May 6, 2015 - 4:04pm
Input Data inquiries	207	555	map_fv0.9x1.25_to_T85_aave_110411.nc by aliceb July 30, 2015 - 11:43am
Known Issues Posted and Moderated by CSEG only Subforums: ocean/POP2 (3), atmosphere/CAM (23), atmosphere/WACCM (12), Component Sets (COMPSETS) (5), Coupler (3), Dead and Stub Models (0), Grids (1), ice/CICE (1), land/CLM (13), land-ice/CISM (1), Machines/scripts (27), mapping (0), Utilities (1)	0	0	n/a
Model Intercomparison Project (MIP) inquiries CESM MIP simulations, including CMIP5	14	47	Notice to the Community: ESGF Nodes Going Offline by strandwg June 21, 2015 - 10:36am
New Feature Requests	1	2	user_nl feature request by jedwards August 14, 2014 - 4:18pm

- **Register** as a forums user by entering your valid information in the registration form
- **Subscribe** to forums of interest - especially the “Announcements” and “Known Problems” – this is one way that we communicate updates to you!
- **Join** the CESM participants email list at:
<http://mailman.cgd.ucar.edu/mailman/listinfo/ccsm-participants>
- **Create** a github account and opt-in to “watch” CESM related repositories

More Information/Getting Help

CESM tutorial: https://ncar.github.io/CESM-Tutorial/notebooks/basics/basics_overview.html



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Goals of This Tutorial

Yearly In-Person Tutorials

CESM Project Funding

Acknowledgements

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.

Goals of This Tutorial

Through this online tutorial you will learn how to run the CESM model, modify the model experiments, and use the model output. These tutorial materials are designed for the CESM version 2 (CESM2)

Yearly In-Person Tutorials

The CESM tutorial was started in 2010 and is typically offered as an in-person summer workshop. If you are interested in attending the tutorial, please see the [CESM webpage](#) for the most up to date information about when the tutorial will next be offered in Boulder, Colorado and the timeline for applying.

Thank You!

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To advance understanding of weather, climate, atmospheric composition and processes;
To provide facility support to the wider community; and,
To apply the results to benefit society.

NCAR is sponsored by the National Science Foundation

