

Namelist and Code Modifications

Part 1: Namelist Modifications

Part 2: Code Modifications

Part 3: Exercises and Quiz

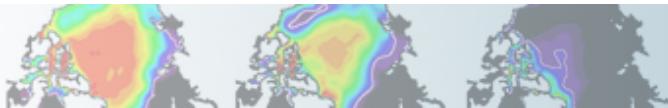
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Atmospheric Modeling and Predictability Section
Climate and Global Dynamics Division



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

(The Matrix, 1999)





Part 1: Namelist Modifications

In this section, we will:

- review the “CESM flow” and how to make namelist changes,
- see where to find documentation for namelist variables
- as an illustration, we will customize the output history files to get high frequency output



Review: The 4 commands to run CESM

Set of commands to build and run the model on "cheyenne"

```
# Set location of pre-compile code (for a faster build)
# if you use tcsh shell
setenv CESM_BLD TEMPLATE /glade/p/cesm/tutorial/templates/cesm2.1.1_b1850/bld
# if you use bash shell
export CESM_BLD TEMPLATE=/glade/p/cesm/tutorial/templates/cesm2.1.1_b1850/bld

# go into scripts directory into the source code download
cd /glade/p/cesm/tutorial/cesm2.1.1_tutorial/cime/scripts

# (1) create a new case in the directory "cases" in your home directory
./create_newcase --case ~/cases/case01 --compset B1850 --res f19_g17

# go into the case you just created in the last step
cd ~/cases/case01

# (2) invoke case.setup
./case.setup

# (3) build the executable
qcmd -- ./case.build

# (4) submit your run to the batch queue
./case.submit
```

Review: The 4 commands to run CESM

Set of commands to build and run the model on "cheyenne"

```
# Set location of pre-compile code (for a faster build) ← For tutorial only
# if you use tcsh shell
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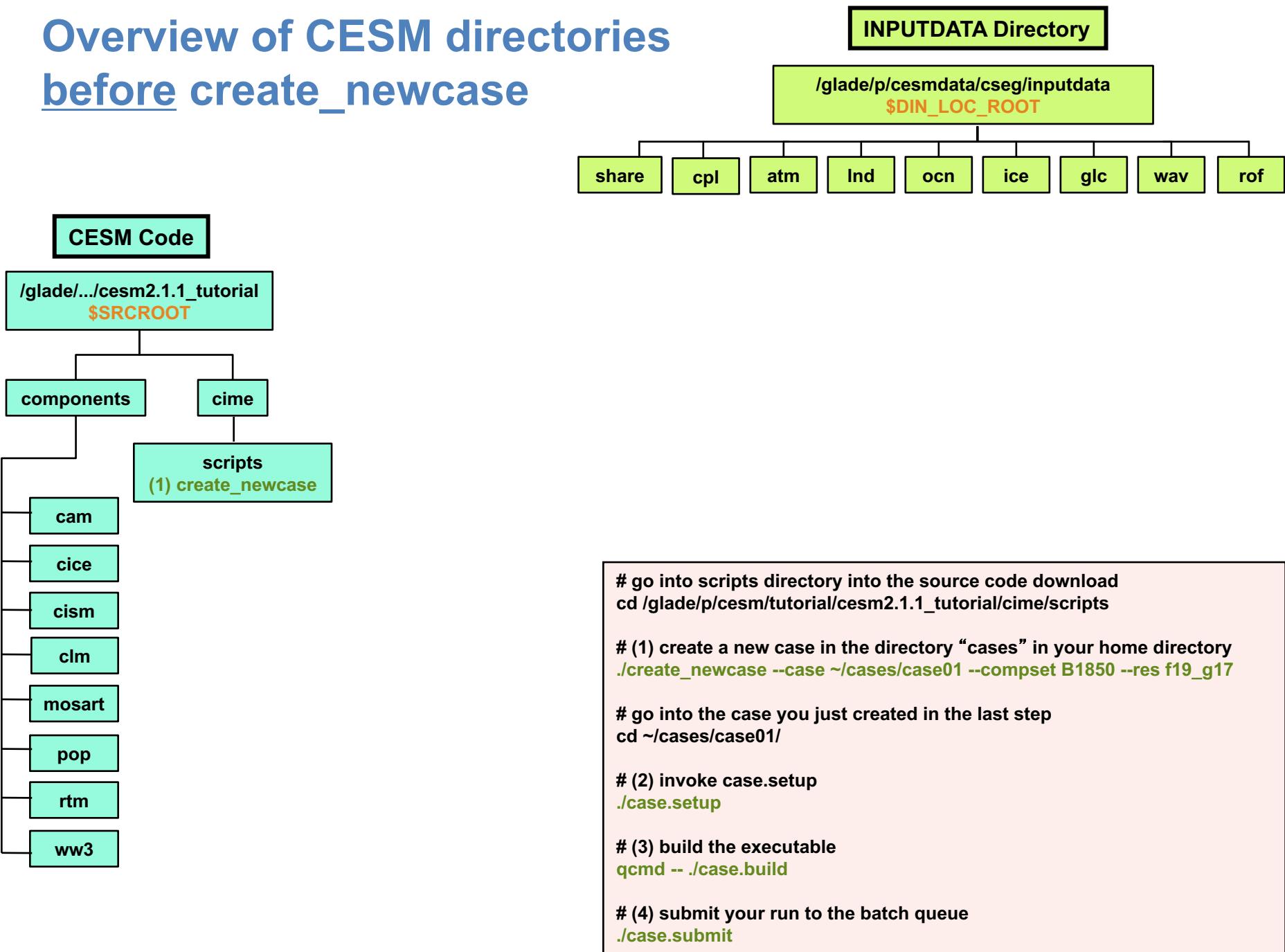
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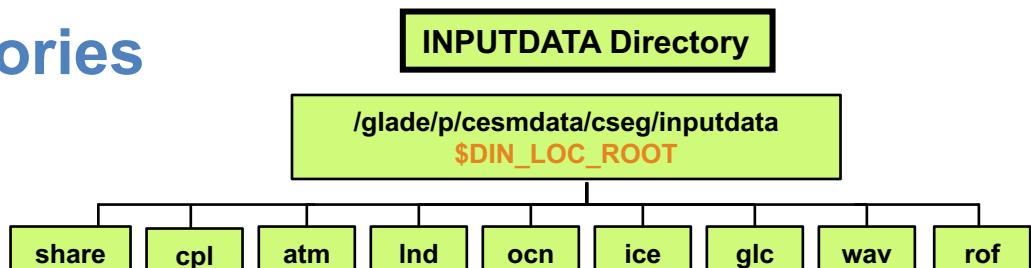
# (3) build the executable
qcmd -- ./case.build ← "qcmb" is for Cheyenne only

# (4) submit your run to the batch queue
./case.submit
```

Overview of CESM directories before create_newcase

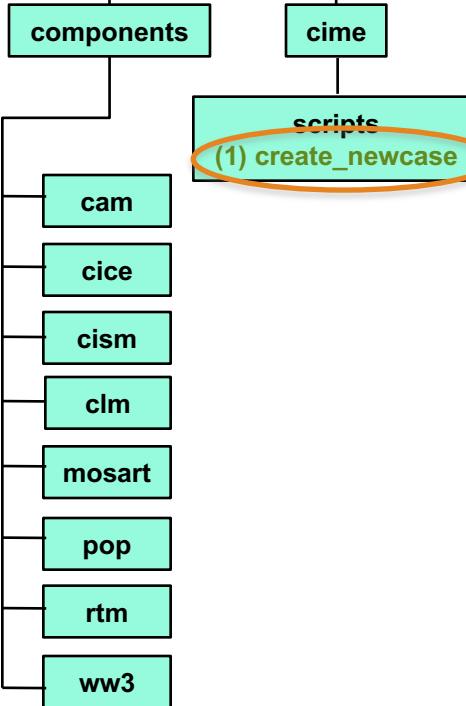


Overview of CESM directories before create_newcase



CESM Code

/glade/.../cesm2.1.1_tutorial
\$SRCROOT



```
# go into scripts directory into the source code download
cd /glade/p/cesm/tutorial/cesm2.1.1_tutorial/cime/scripts

# (1) create a new case in the directory "cases" in your home directory
./create_newcase --case ~/cases/case01 --compset B1850 --res f19_g17

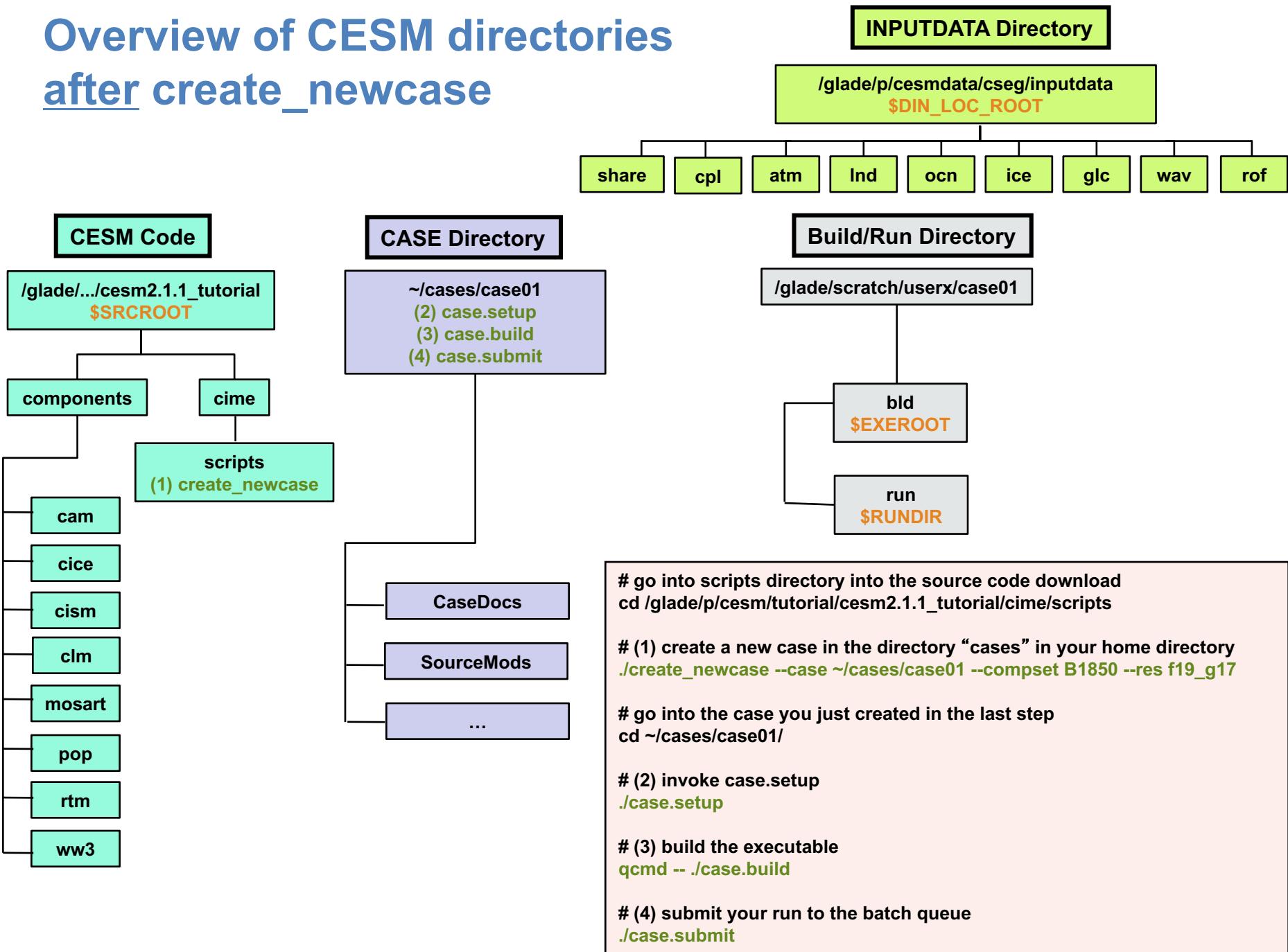
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# (2) invoke case.setup
./case.setup

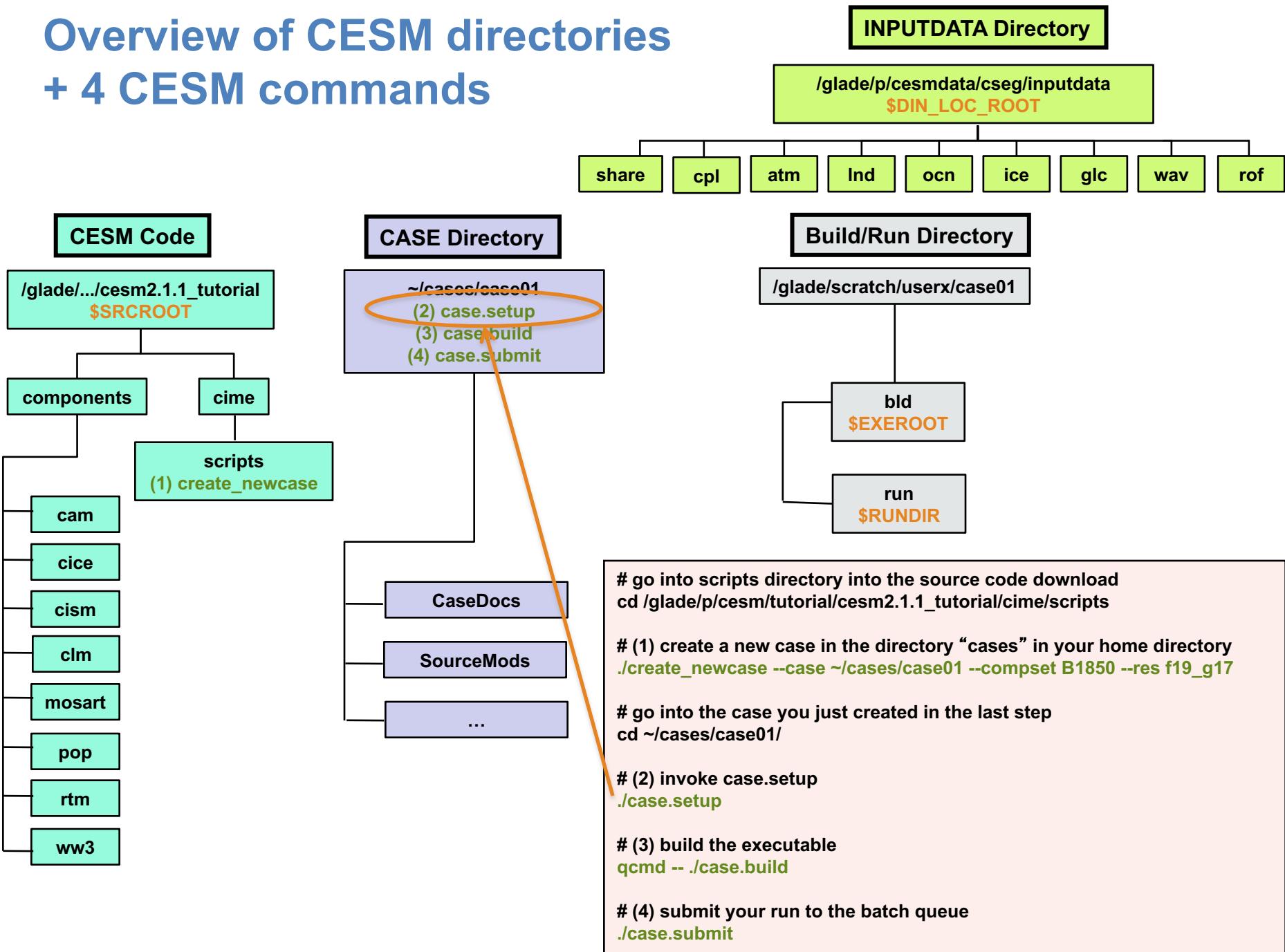
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./case.submit
```

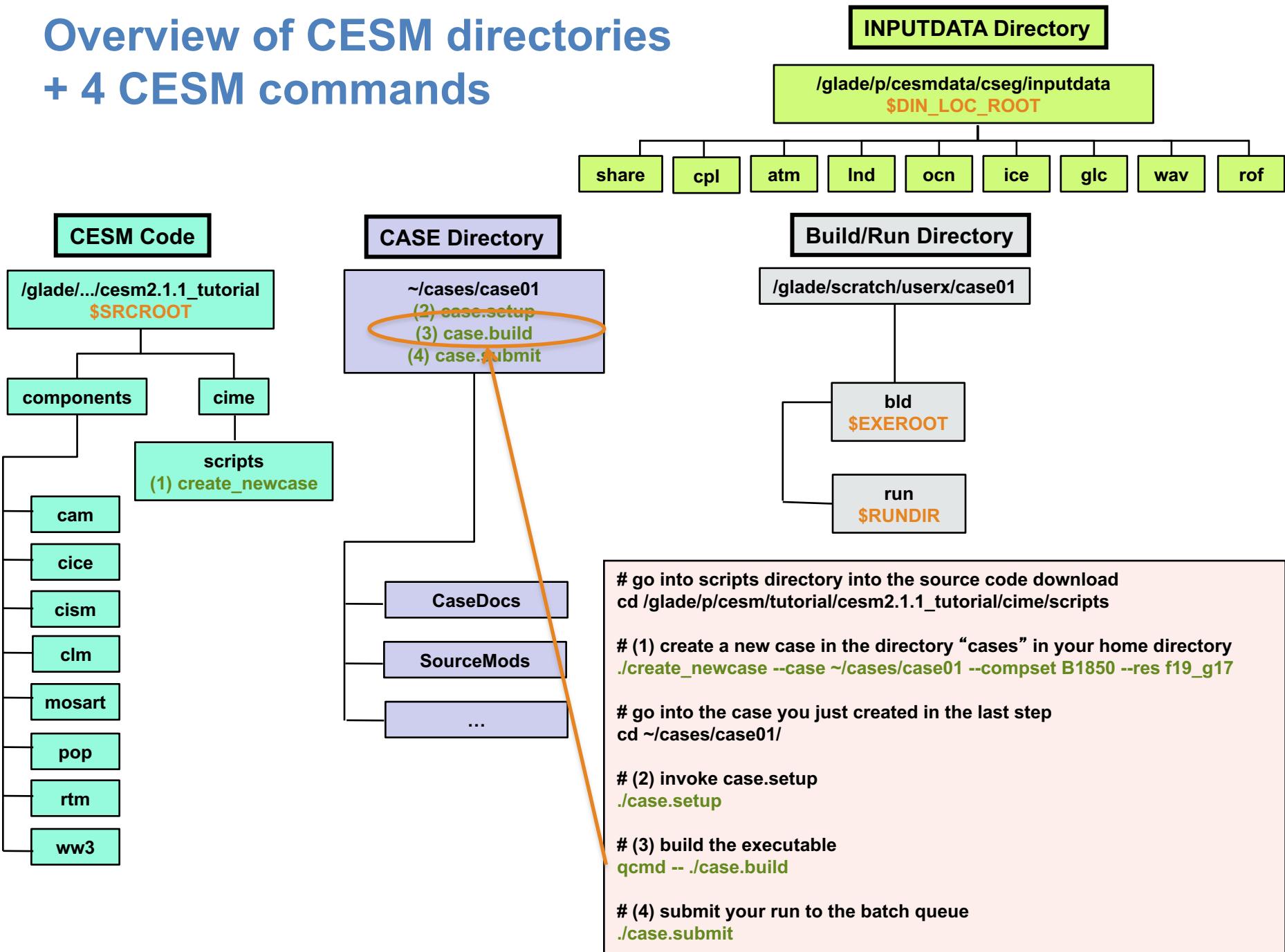
Overview of CESM directories after `create_newcase`



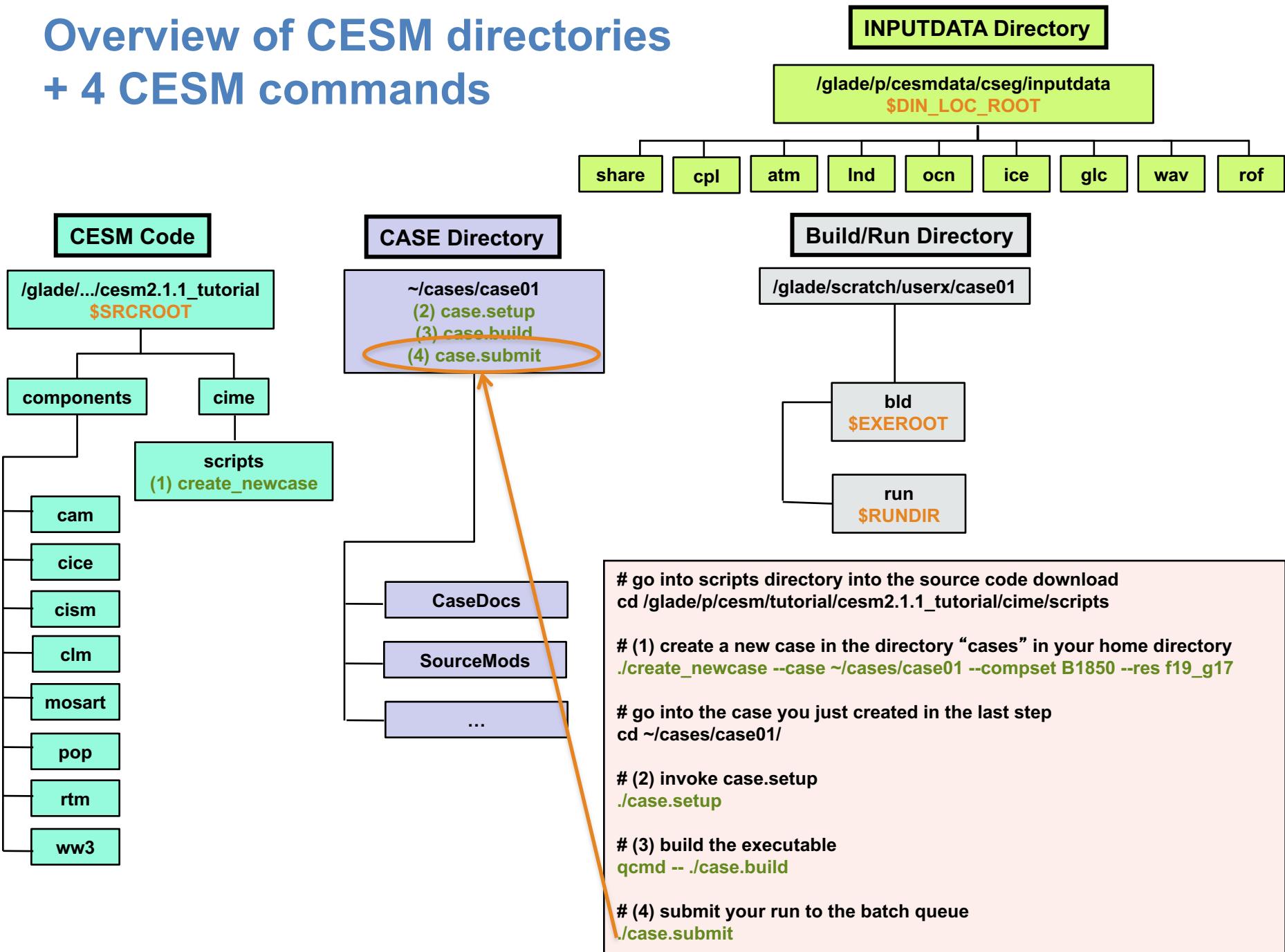
Overview of CESM directories + 4 CESM commands



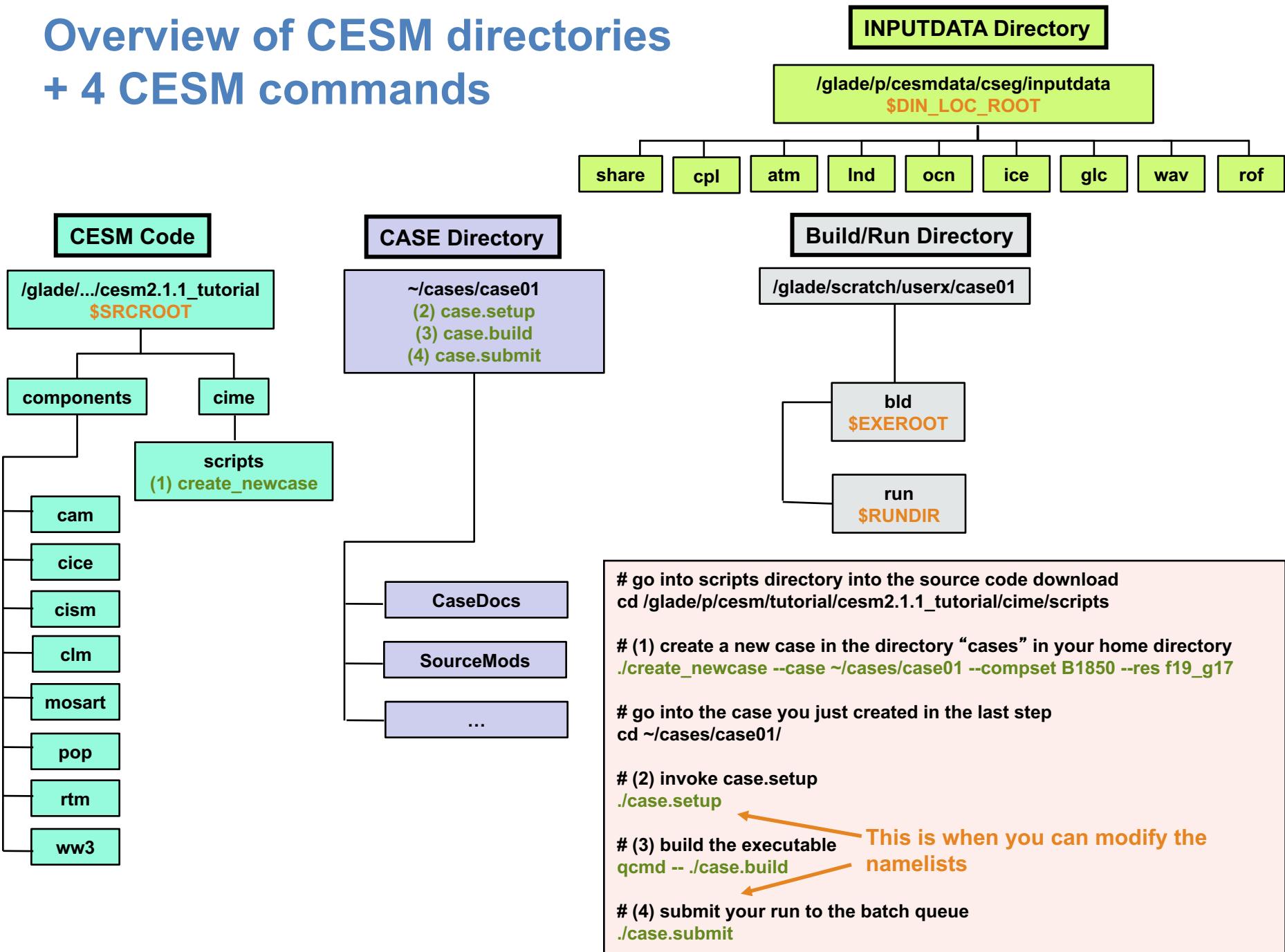
Overview of CESM directories + 4 CESM commands



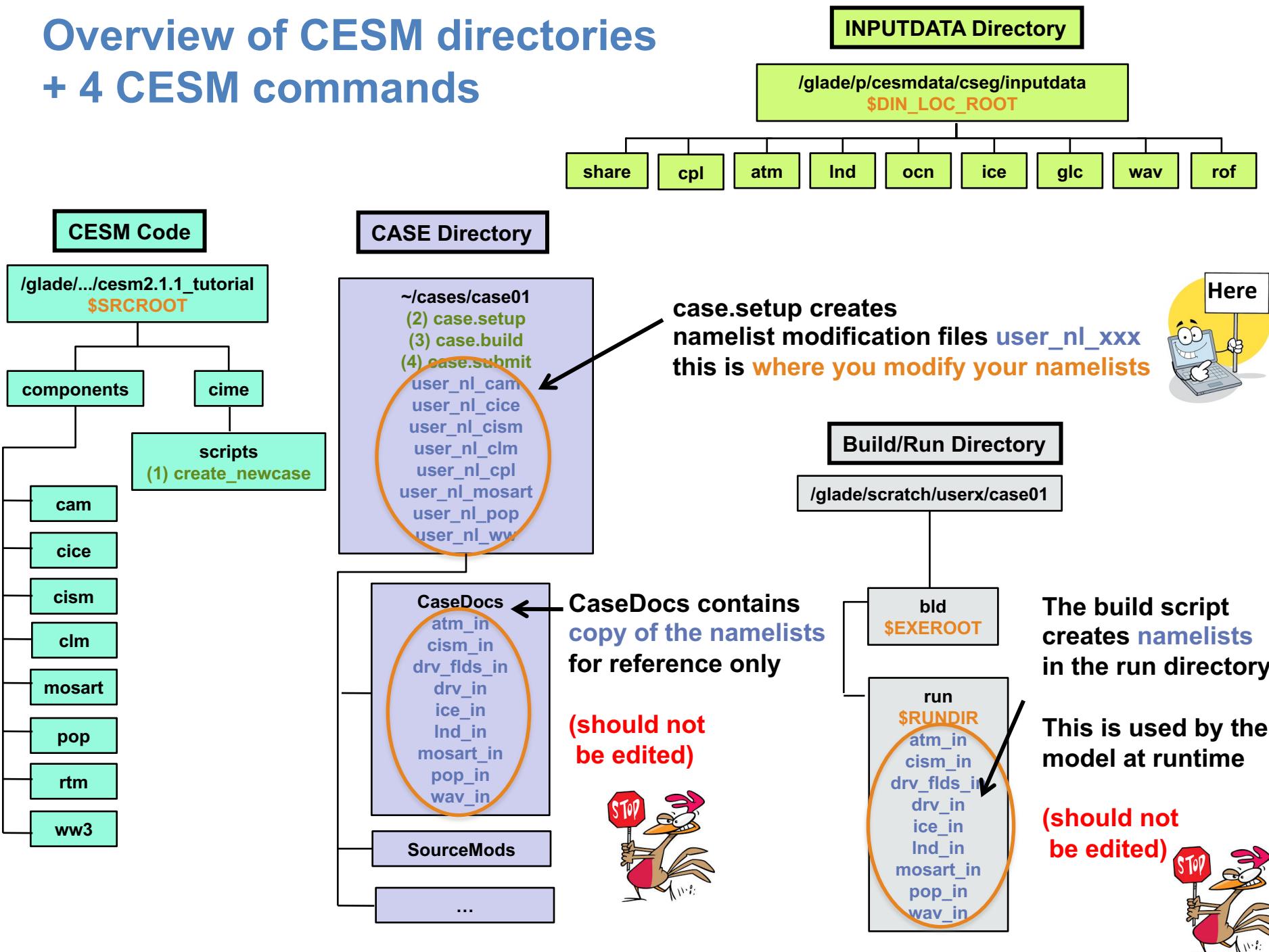
Overview of CESM directories + 4 CESM commands

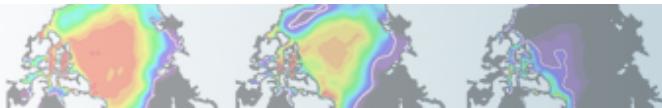


Overview of CESM directories + 4 CESM commands



Overview of CESM directories + 4 CESM commands





Part 1: Namelist Modifications

In this section, we will:

- review the “CESM flow” and how to make namelist changes,
- see where to find documentation for namelist variables
- as an illustration, we will customize the output history files to get high frequency output



Where to find info about namelists ?

<http://www.cesm.ucar.edu/models/cesm2>

The screenshot shows the CESM2 website with several sections highlighted by orange arrows pointing to specific content blocks:

- About CESM2**: Includes links to What's New in CESM2, CESM Naming Conventions, and CESM2 Known Issues.
- Scientific Validation**: Describes the validation process and includes links to CESM2 Scientifically Validated Configurations and CESMI Experiment Diagnostics.
- CIME Documentation**: Details the Common Infrastructure for Modeling the Earth (CIME) and its components.
- Prognostic Components**: Lists components such as Atmosphere, Land, Land Ice, Ocean, River Runoff, Sea Ice, and Wave.
- External Library Documentation**: Lists tools like PnetCDF Library (PIO), Model Coupling Toolkit (MCT), Earth System Modeling Framework (ESMF), and External Python Based Tools.
- Configurations and Grids**: Details component configurations and includes links to Grid Resolutions, Component Sets, and Component Configuration Settings.
- Supported Machines & Performance Data**: Lists supported machines and compilers, timing performance, load balancing data, and instructions for running on a medium-sized Linux cluster.

At the top right of the main content area, there is a sidebar titled "CESM2 QUICKLINKS" containing links to Quick Start Guide, Downloading The Code, Scientifically Validated Configurations, Prognostic Components, CESM Software Engineering, RELATED INFORMATION (Data Management & Distribution Plan, Development Project Policies & Terms of Use, DiscussCESM Forums Bulletin Board, Publication / Acknowledgment Information, CESM2 Copyright, CESM Support Policy, CESM2 Included Packages Copyright), and the CESM PROJECT (supported by the National Science Foundation (NSF)).

In “**Prognostic Components**” or in “**Components Configuration Settings**”, you can find information about namelist variables in:
“**Component Fortran Namelist settings**”

Where to find info about namelists ?

<http://www.cesm.ucar.edu/models/cesm2>

The screenshot shows the CESM2 Component Configuration Settings page. The main content area is titled "Component Configuration Settings" and contains sections for different model components:

- Atmosphere Models**: Includes Active / Prognostic Atmosphere CAM and Climatological Data Atmosphere DATM (includes Aquaplanet). Arrows point to the "CAM Namelist Definitions" and "CAM CASEROUT Variable Definitions" links.
- Land Models**: Includes Active / Prognostic Land - CLM and Climatological Data Land - DLND. Arrows point to the "CLM5.0 Namelist Definitions" and "CLM5.0 CASEROUT Variable Definitions" links.
- River Models**: Includes Active / Prognostic River Runoff Model - MOSART and Active / Prognostic River Runoff Model - RTM. Arrows point to the "MOSART Namelist Definitions" and "MOSART CASEROUT Variable Definitions" links.
- Ocean Models**: Includes Active / Prognostic Ocean - POP2 and Climatological Data Ocean - DOCN. Arrows point to the "POP2 Namelist Definitions" and "MARBL Namelist Definitions" links.
- Sea Ice Models**: Includes Active / Prognostic Sea Ice - CICE and Climatological Data Sea Ice - DICE. Arrows point to the "CICE Namelist Definitions" and "DICE Namelist Definitions" links.
- Wave Models**: Includes Active / Prognostic Wave - WW3 and Climatological Data Wave - DWAV. Arrows point to the "WW3 Namelist Definitions" and "DWAV Namelist Definitions" links.

A large orange arrow points from the "Configurations and Grids" section in the sidebar to the "Component Configuration Settings" page. A callout box on the right side states "Namelist definitions for every component".

Current Release
The current CESM supported release is CESM 2.1.1

[Learn more](#) | [View Experiments](#) | [Download current release](#)

About CESM
CESM is a fully-coupled, community, global climate model that provides state-of-the-art computer simulations of the Earth's past, present, and future climate states.

- What's New in CESM2
- CESM Naming Conventions
- CESM2 Known Issues *

* Includes known issues associated with the CESM2 CMIP6 code base and output datasets.

Quick Start
See the selected links below to help you quickly get started with CESM2

- Getting Help
- CESM2 Use Cases
- CESM2 Quick Start Guide
- Download the CESM2 Code

Configurations and Grids
Component configurations include settings required for CIME enabled models; both prognostic and data model components settings include:

- Grid Resolutions
- Component Sets
- Component Configuration Settings

Component Configuration Settings

CESM2 Version: 2.1.1
Model Version: 2.1.1
HTML created on: 2019-06-09

Namelist definitions for every component

Where to find info about namelists ?

<http://www.cesm.ucar.edu/models/cesm2>

The screenshot shows the CESM2 website with several components highlighted by blue arrows:

- CLM Fortran Namelist Definitions:** A detailed view of the CLM Fortran Namelist Definitions page, which lists variables, their namelist group, category, and entry type.
- Component Configuration Settings:** The main page where users can select model options for configuration.
- Configurations and Grids:** A section on the left side of the website.

CLM Fortran Namelist Definitions (Detailed View):

Variable	Namelist Group	Category	Entry Type
albice	clm_inparm	clm_physics	real(2)
all_active	clm_inparm	clm_physics	logical
all_urban	clmexp	mksurndata	logical
allowlakeprod	ch4par_in	clm_methane	logical
anoxia	clm_inparm	clm_vertcn	logical
anoxia_wtsat	clm_inparm	clm_vertcn	logical
atm_c13_filename	clm_inparm	clm_isotope	char*256
atm_c14_filename	clm_inparm	clm_isotope	char*256
baseflow_scalar	soilhydrology_inparm	clm_physics	real
basef_latvary_intercept	crop	physics	real

Component Configuration Settings (Main Page):

Please select a setting from the model options below

Atmosphere Models

- Active / Prognostic Atmosphere - CAM
 - CAM Namelist Definitions
 - CAM CASEROOT Variable Definitions
- Climatological Data - DATM (includes Aquaplanet)
 - DATM Namelist Definitions
 - DATM CASEROOT Variable Definitions

Land Models

- Active / Prognostic Land - CLM
 - CLM5.0 Namelist Definitions
 - CLM5.0 CASEROOT Variable Definitions
 - CLM4.0 Namelist Definitions
 - CLM4.0 CASEROOT Variable Definitions (See CLM4.0 documentation)
- Climatological Data - DLND
 - DLND Namelist Definitions
 - DLND CASEROOT Variable Definitions

River Models

- Active / Prognostic River Runoff Model - MOSART
 - MOSART Namelist Definitions
 - MOSART CASEROOT Variable Definitions
- Climatological Data River - DROF
 - DROF Namelist Definitions
 - DROF CASEROOT Variable Definitions

Ocean Models

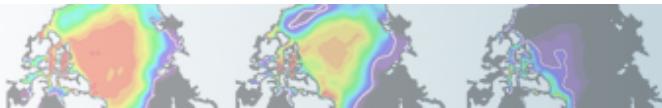
- Active / Prognostic Ocean - POP2
 - POP2 Namelist Definitions
 - MARBL Namelist Definitions
 - POP2 / MARBL CASEROOT Variable Definitions
- Climatological Data Ocean - DOCN
 - DOCN Namelist Definitions
 - DOCN CASEROOT Variable Definitions

Sea Ice Models

- Active / Prognostic Sea Ice - CICE
 - CICE Namelist Definitions
 - CICE CASEROOT Variable Definitions
- Climatological Data Sea Ice - DICE
 - DICE Namelist Definitions
 - DICE CASEROOT Variable Definitions

Wave Models

- Active / Prognostic Wave - WW3
 - WW3 Namelist Definitions
 - WW3 CASEROOT Variable Definitions
- Climatological Data Wave - DWA
V



Part 1: Namelist Modifications

In this section, we will:

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- see where to find documentation for namelist variables
- as an illustration, we will customize the output history files to get high frequency output

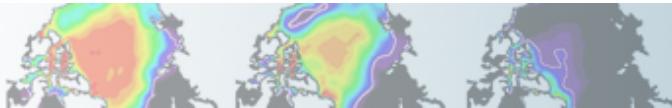


Let's change the output frequency in CAM**

By default, CESM outputs **monthly average** history files but you can output at other frequency.

For instance: to change the output frequency of a CAM history file from **monthly average** to **daily average**, we use the namelist variable: ***nhtfrq=-24***

***** In this tutorial, examples will be coming from the atmospheric model. Concepts are transferable to other model components.***



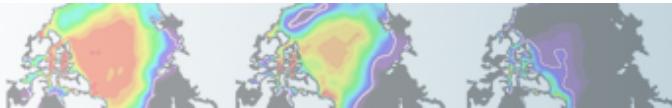
Customizing CAM history files

In this section, we will cover:

- how to change the **output frequency**
- how to output **extra variables**
- how to output **extra history files**
- how to control the **number of time samples written to a history file**

This can be achieved with 3 namelist variables:

- ***nhtfrq***: sets the output frequency
- ***fincl***: add variables to the history file
- ***mfilt***: maximum number of time samples written to a history file



Customizing CAM history files: nhtfrq

The **default** history file from CAM is a **monthly average**.

We can change the output frequency with the namelist variable **nhtfrq**

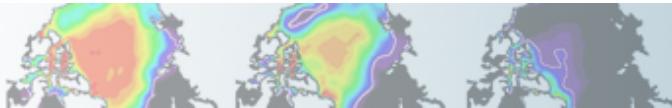
If **nhtfrq=0**, the file will be a **monthly average**

If **nhtfrq>0**, frequency is input as number of **timesteps**.

If **nhtfrq<0**, frequency is input as number of **hours**.

For instance to change the history file from **monthly average** to **daily average**, we set the namelist variable:

nhtfrq = -24



Customizing CAM history files: `mfilt`

To control the **number of time samples** in the history file, we can use the variable **`mfilt`**

For instance, to specify that we want 10 time samples on each history file, we set the namelist variable:

`mfilt = 10`

For instance, if we output daily data for a 1 year run:

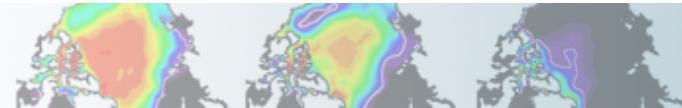
`nhtfrq = -24` => 1 *history file with 365 time samples*

`mfilt = 365`

`nhtfrq = -24` => 365 *history files with 1 time sample*
`mfilt = 1`

NB: we cannot change `mfilt` for monthly frequency.

For monthly frequency, we always have: `mfilt = 1`



Customizing CAM history files: fincl

You can output up to 10 history files: “h0”, “h1”, ..., “h9”.

The file “h0” contains the default variables (in the code: “call add_default”). This includes the variables necessary for the AMWG package.

For the files “h1” to “h9”, the user has to specify the variables to output.

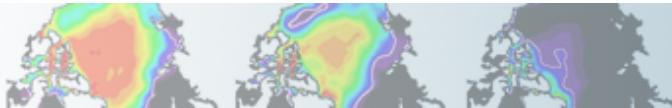
To control the list of fields in the history files we can use the namelist variables

h0 h1 ... h9
fincl1 fincl2 ... fincl10

For instance, the line:

fincl1 = 'PRECT'

is used to add the field ‘PRECT’ to the file “h0”



Customizing CAM history files: fincl

Using a ":" following a field gives the averaging flag for the output field.

Valid flags are:

A ==> Average

B ==> GMT 00:00:00 average

I ==> Instantaneous

M ==> Minimum

X ==> Maximum

L ==> Local-time

S ==> Standard deviation

For instance, the line:

fincl1 = 'PRECT:M'

is used to add the minimum of ‘PREC’ to the file “h0”



Example of customizing history files

For instance, what happens if we set:

fincl2 = 'T:I','Q:I','U:I','V:I'

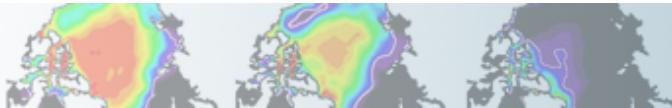
nhtfrq = 0, -3

mfilt = 1, 8

In addition to the monthly history file “*h0*”,
we output the file “*h1*” with instantaneous values of T, Q, U, V
we output these variables every 3 hour

We have 8 time samples in each *h1* file (we create a new file every day)

*NB: If you plan to run the AMWG diagnostic package, it is recommended to leave the “*h0*” file untouched and to add extra history files*



Outputting high frequency data in other components

Here is a few variables to control output frequency of land, ice and ocean

CLM

`hist_nhtfrq`: output frequency of the history file

`hist_mfilt`: number of samples on each history file

`hist_fincl`: adding variables and auxiliary history files

Example

`user_nl_clm` to output 4 extra history files with daily, six-hourly, hourly, and every time-step values of TG and TV (leaving the primary history files as monthly):

`hist_fincl2 = 'TG', 'TV'`

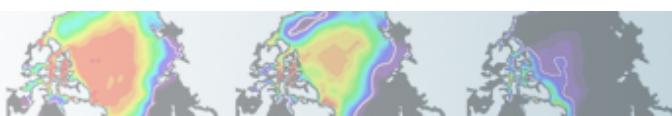
`hist_fincl3 = 'TG', 'TV'`

`hist_fincl4 = 'TG', 'TV'`

`hist_fincl5 = 'TG', 'TV'`

`hist_nhtfrq = 0, -24, -6, -1, 1`

http://www.cesm.ucar.edu/models/cesm2/settings/current/clm5_0_nml.html



Outputting high frequency data in other components

CICE

histfreq: Frequency of output written to history files ('1', 'm', 'd', 'y', ...)

histfreq_n: Frequency history data is written to history files

hist_avg: if false => instantaneous values

if true => time-averages

Example

user_nl_cice to output an extra history file with daily values (leaving the primary history file as monthly):

histfreq = 'm';'d';'x';'x';'x'

histfreq_n = 1,1,1,1,1

See: http://www.cesm.ucar.edu/models/cesm2/settings/current/cice_nml.html



Outputting high frequency data in other components

POP2

`tavg_freq = frequency at which the model fields are written`

`tavg_freq_opt = units of time for 'tavg_freq' ('nmonth', 'nhour', 'once', ...)`

`tavg_file_freq = frequency at which the model files are written`

`tavg_file_freq_opt = units of time for 'tavg_file_freq' ('nmonth', 'nhour', ...)`

http://www.cesm.ucar.edu/models/cesm2namelists/pop2_nml.html

For instance, to output a timeseries of daily averages bundled into a monthly file:

`tavg_freq_opt = 'nday'`

`tavg_freq = 1`

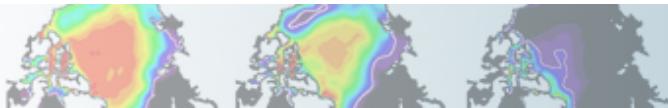
`tavg_file_freq_opt = 'nmonth'`

`tavg_file_freq = 1`



Changing `tavg_nml` variables is non standard
Do not modify these variables directly in `user_nl_pop2`
Use the workaround explained in `user_nl_pop2`





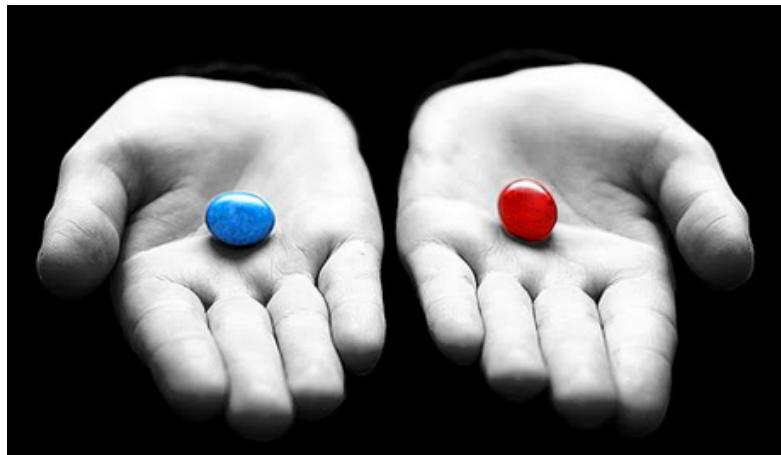
Part 2: Code Modification

In this section, we will learn how to do simple code modifications such adding a new variable



Office of
Science

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.

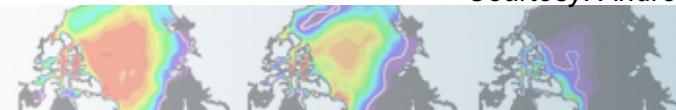
-The **blue pill** would allow him to remain in the Matrix (a fictional computer-generated world)



-The **red pill** would lead to his "escape" from the Matrix into the real world and embracing the sometimes painful truth of reality.



Courtesy: Andrew Gettelman



Principles for modifying the code

INPUTDATA Directory

/glade/p/cesmdata/cseg/inputdata
\$DIN_LOC_ROOT

share cpl atm Ind ocn ice glc wav rof

CESM Code

/glade/.../cesm2.1.1_tutorial
\$SRCROOT

components

cime

scripts
(1) create_newcase

cam

cice

cism

clm

mosart

pop

rtm

ww3

CASE Directory

~/cases/case01
(2) case.setup
(3) case.build
(4) case.submit

Build/Run Directory

/glade/scratch/userx/case01

bld
\$EXEROOT

run
\$RUNDIR

Buildconf

LockedFiles

SourceMods

Tools

CaseDocs

src.cam

src.cice

src.clm

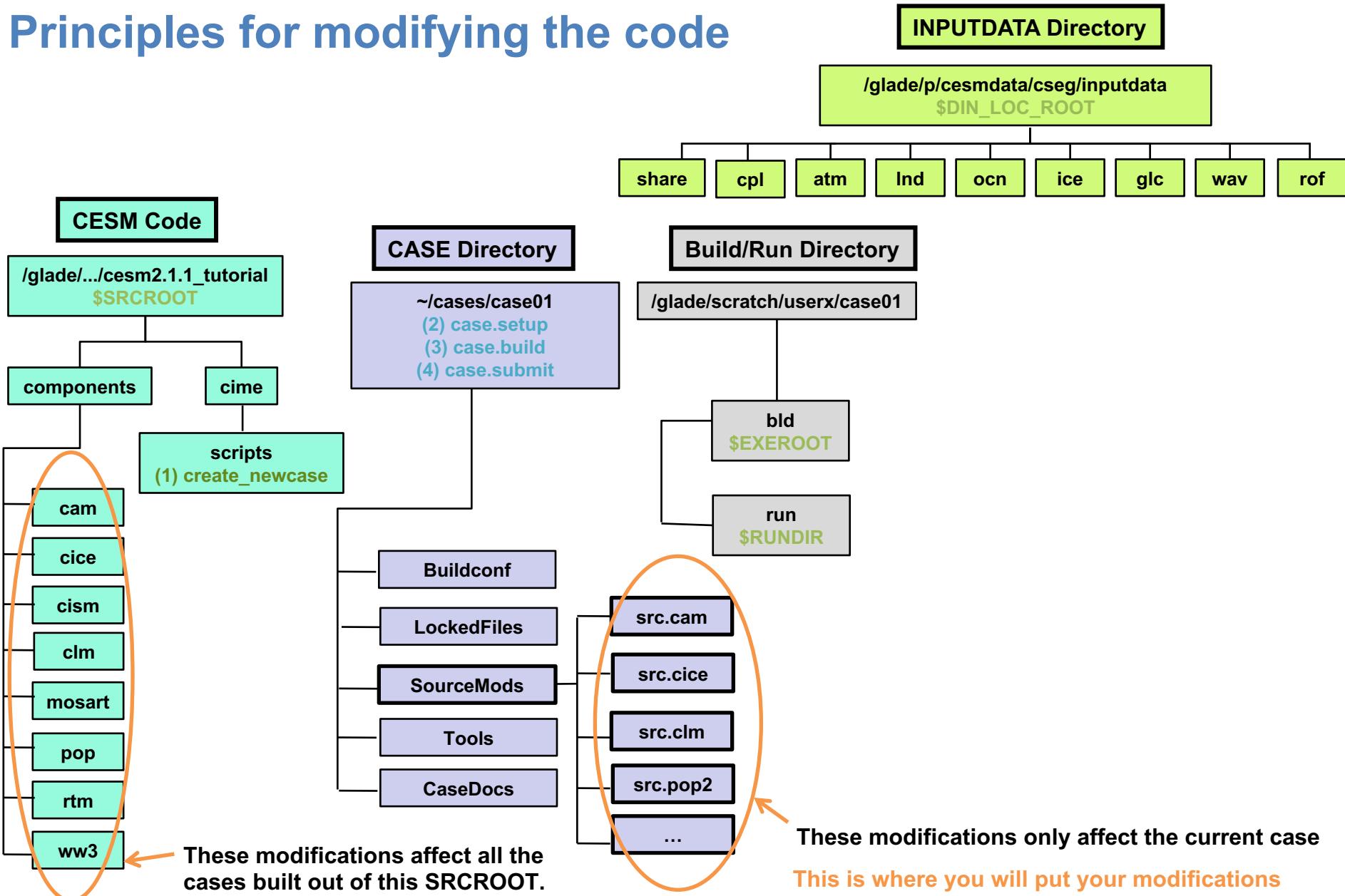
src.pop2

...

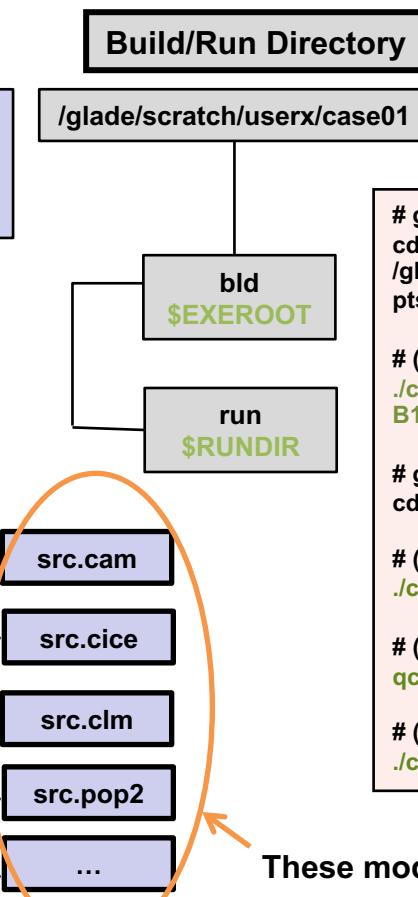
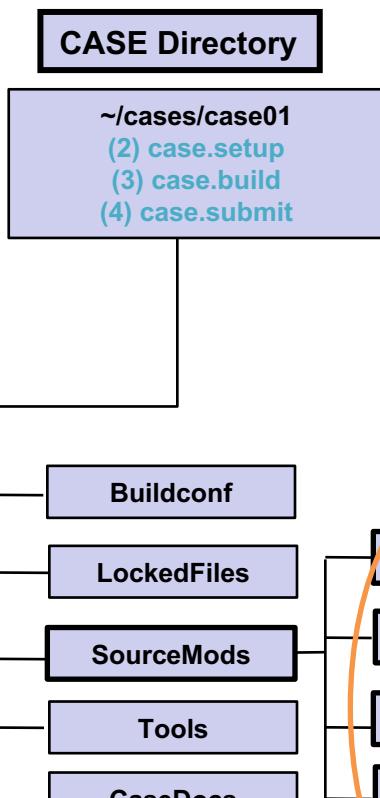
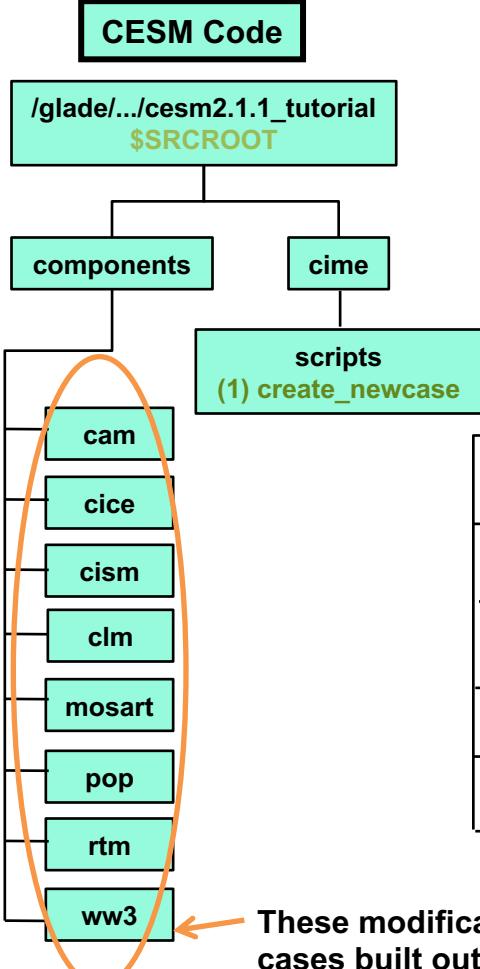
View of the CESM directories.
Where to modify the code ?



Principles for modifying the code



Principles for modifying the code



INPUTDATA Directory

/glade/p/cesmdata/cseg/inputdata
\$DIN_LOC_ROOT

share cpl atm Ind ocn ice glc wav rof

```
# go into scripts directory  
cd  
/glade/p/cesm/tutorial/cesm2.1.1_tutorial/cime/scripts
```

```
# (1) create a new case  
.create_newcase --case ~/cases/case01 --compset  
B1850 --res f19_g17
```

```
# go into the case you just created in the last step  
cd ~/cases/case01/
```

```
# (2) invoke case.setup  
.case.setup
```

```
# (3) build the executable  
qcmd -- ./case.build
```

```
# (4) submit your run to the batch queue  
.case.submit
```

Make your source mods

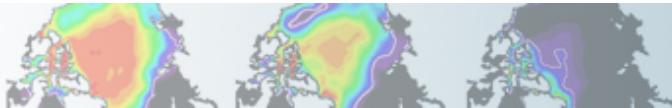
These modifications only affect the current case

This is where you will put your modifications

Modifying a subroutine

Steps to modify the code:

- Find the subroutine you want to modify
- Copy this subroutine in SourceMods
- Make your mods
- Compile and run the model



Output an extra variable

- One common thing you may want to do is to **add code to output a new variable**
- For instance, CAM has a field to output the temperature at 500 mbar (T500) but not at 750mb.
Let's add a field to output the temperature at 750 mbar (T750)

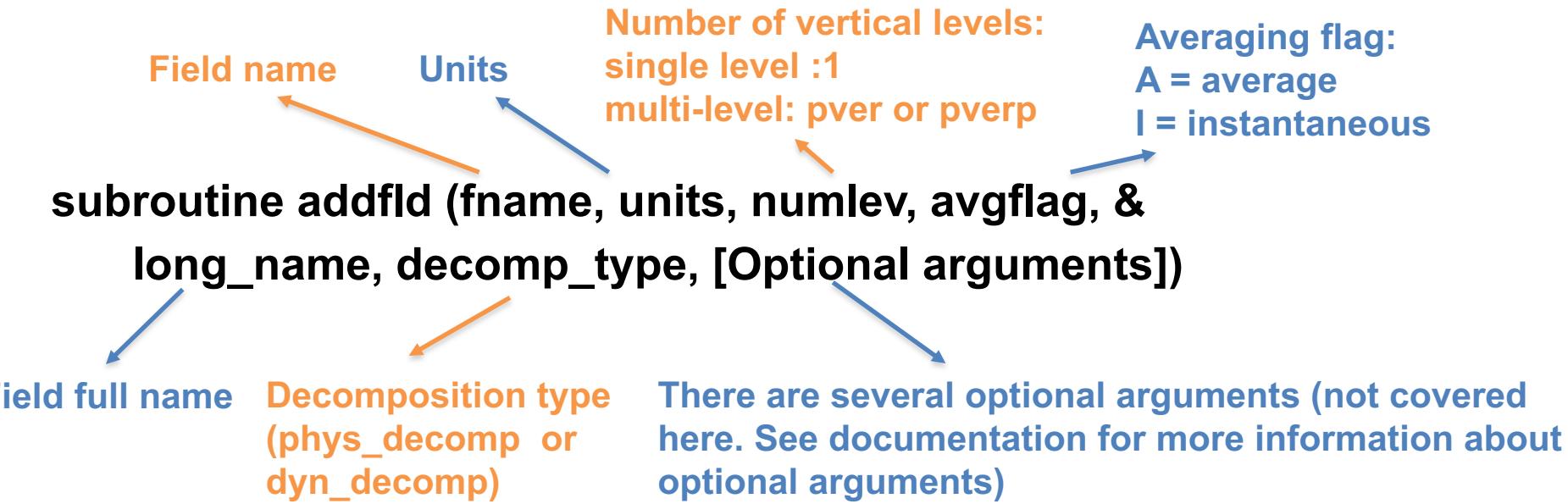
This can be done by a succession of calls:

call addfld ('T750', ...) → Add a field to master field list
call add_default ('T750',...) → Add this field to “h0” by default (optional)
call outfld('T750', ...) → Collect values for this field and write to history file



Syntax: addfld

addfld = Add a field to master field list



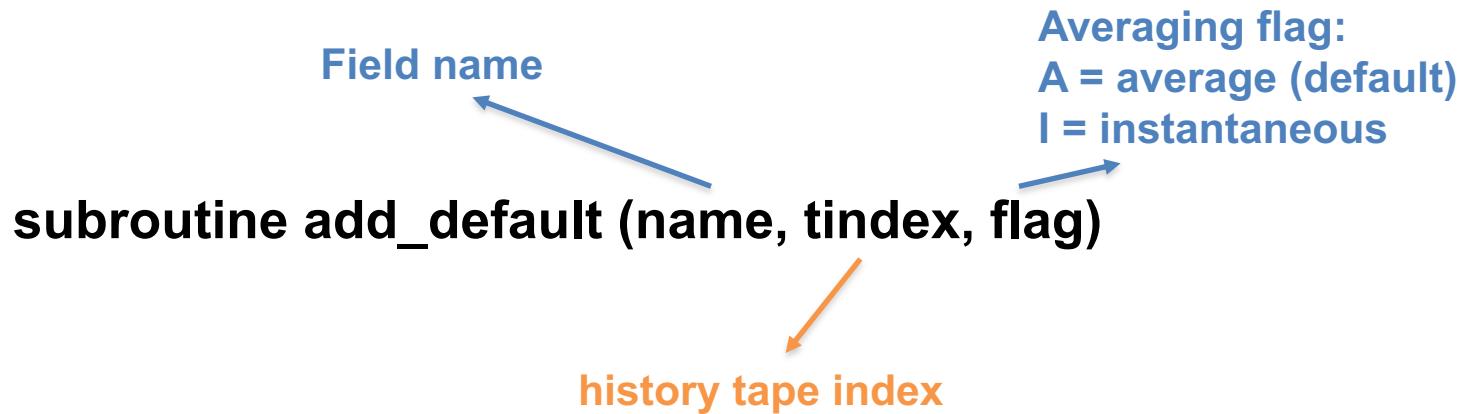
Example:

call addfld ('T500', 'K', 1, 'A', 'Temperature at 500 mbar pressure surface', phys_decomp)



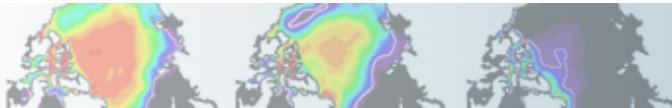
Syntax: `add_default`

`add_default` = Add a field to the list of default fields on history file



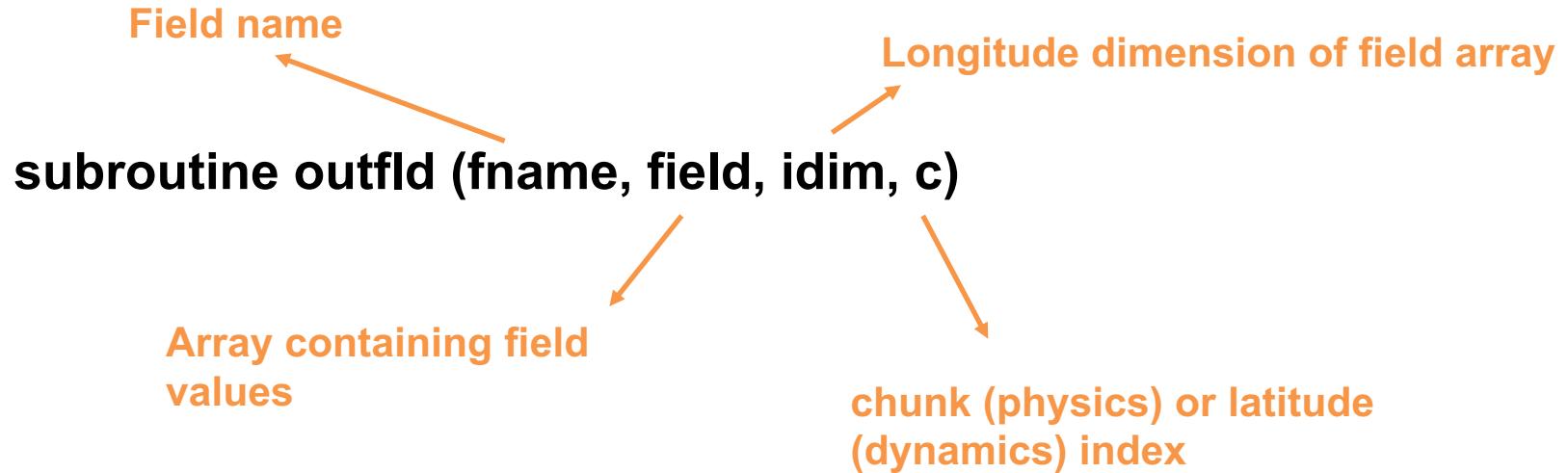
Example:

call add_default ('T500', 1, '')



Syntax: outfld

outfld = accumulate (or take min, max, etc. as appropriate) input field into its history buffer for appropriate tapes



Example:

call outfld('T500', cld, pcols, lchnk)



Where to find help ?

<http://www.cesm.ucar.edu/models/cesm2>

CESM Models | CESM2



About CESM2

CESM is a fully-coupled, community, global climate model that provides state-of-the-art computer simulations of the Earth's past, present, and future climate states.

- [What's New in CESM2](#)
- [CESM Naming Conventions](#)
- [Supported Release Tags and Notes](#)

Scientific Validation

Scientific validation consists of a multi-decadal model run of the given component set at the target resolution, followed by scientific review of the model output diagnostics.

- [CESM2 Scientifically Validated Configurations](#)
- [Experiment Diagnostics](#)
- [Experiment Output Datasets](#) *

* Please see [CESM2 Scientifically Validated Configurations](#) for data download details.

Quick Start

See the selected links below to help you quickly get started with CESM2

- [Getting Help](#)
- [CESM2 Use Cases](#)
- [CESM2 Quick Start Guide](#)
- [Download the CESM2 Code](#)

CIME Documentation

Common Infrastructure for Modeling the Earth contains the coupling infrastructure, support scripts, data models and utility libraries needed to create a single-executable coupled Earth System Model.
* CIME does not contain any prognostic components and is available in a stand-alone package that can be compiled and tested with just its data components.

- [CIME User Guide](#) *

Configurations and Grids

Component configurations include settings required for CIME enabled models; both prognostic and data model components. These settings include:

Supported Machines & Performance Data

- [Supported Machines and Compilers](#)
- [Performance and Load Balancing Data](#)
- [Running on a Medium-Sized Linux Cluster](#)
- [Verify a Machine Port](#)

CESM Project

CESM is a fully-coupled, community, global climate model that provides state-of-the-art computer simulations of the Earth's past, present, and future climate states.

CESM is sponsored by the National Science Foundation (NSF) and the U.S. Department of Energy (DOE). Administration of the CESM is maintained by the Climate and Global Dynamics Laboratory (CGD) at the National Center for Atmospheric Research (NCAR).

CESM2 Quicklinks

- [Quick Start Guide](#)
- [Downloading The Code](#)
- [Scientifically Validated Configurations](#)
- [Prognostic Components](#)

Related Information

- [Data Management & Distribution Plan](#)
- [Development Project Policies & Terms of Use](#)
- [DiscussCESM Forums Bulletin Board](#)
- [CESM2 Copyright](#)
- [CESM Support Policy](#)
- [CESM2 Included Packages Copyright](#)

Prognostic Components

Each model component page contains descriptions and documentation for active or prognostic models.

- [Atmosphere](#)
- [Land](#)
- [Land Ice](#)
- [Ocean](#)
- [River Runoff](#)
- [Sea Ice](#)
- [Wave](#)

**CESM webpage is a gold mine
for model documentation**

If you cannot find an answer in the model documentation, post your question on the **CESM Bulletin Board**

Exercise Overview



- **Exercise 1: Namelist modification**
Customize your history output
- **Exercise 2: Namelist + Code modification**
Add a new output field to the code
- **Exercise 3: Change a tuning parameter**



Exercise Overview



Find the exercises on the CESM tutorial webpage:

<http://www.cesm.ucar.edu/events/tutorials/2019/files/Practical4-exercise-hannay.pdf>

Location of these afternoon exercises

Exercise

Hints

And ... solutions

Exercise 2: Add an output field

Create a case called "b1850_T750" using the ~~compset~~ B1850 at f19_g17 resolution.

- Add an output field for the temperature at 750 mbar.
- Output daily values of T750 and T500 in the "h1" history file.
- Set the ~~namelist~~ to output a single h1 for the run.
- Make a 1-month run.

Hints for exercise 2

Use T500 as a template for your changes.
Find the subroutine containing T500 using `grep -r T500 *`

When the run is completed, go to your archive directory:

- check the fields T750 and T500 are in the file h1
- create a file with the difference between T750-T500
- For instance, you can use `ncap2 -s 'T750_minus_T500=T750-T500' b1850_T750.cam.h1.0001-01-01-0000.nc T750-T500.nc`
- Look at the difference with `ncview`.





Solutions to the exercises

At the request of previous year students, I am providing the solution.

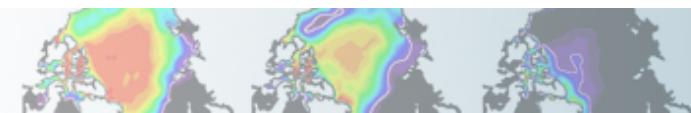
My own recommendation:

DON'T LOOK AT THE SOLUTIONS DURING THE LAB !!!

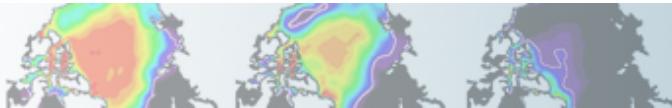
I believe:

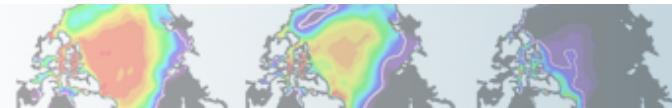
- You will only learn if you try the exercises by yourself.
- You will only learn if you do mistakes.
- Copy/paste will teach you little, indeed.
- Your best bet is to try, do mistakes, ask your neighbor, interact with each others, look at the documentation, try to understand what is wrong...

But this is my own opinion, and I am too old to believe I know the Truth.
So do what is best for you. Go to the next page at your own risk 😊



If you are sure you want to look at the solutions, click on the button...





Quizzes

At the end of the practical, please go to the online course and take the quiz.

<http://www.cesm.ucar.edu/events/tutorials/2019/quizzes.html>

To answer the questions, you can use documentation, ask questions to others or to the helper. Indeed you are strongly encouraged to do all the above. This is the way you will use CESM in the future.

How are you graded ? You can take the quizzes as many times as you want, I only retain your highest score. But please try to understand your mistakes.

If you cannot complete the quiz by the end of the practical session, you have until August 16 to complete the quizzes. If you get a perfect score, you will get a certificate of awesomeness.

“Special prize” for those who get a perfect score before Friday morning!!!



Where to find stuff ?

<http://www.cesm.ucar.edu/events/tutorials/2019/>

Thursday, August 8

Lectures

Topic: Ocean Modeling II Speaker: Peter Gent	Slides	Videos
Topic: Ocean Biogeochemistry Speaker: Keith Lindsay	Slides	Videos
Topic: Sea Ice Modeling Speaker: Alice DuVivier	Slides	Videos

Meet a Scientist

Topic: Sign up to meet one of our CESM Scientists	Scientist bios
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Specialized Talk

Topic: Simpler Models Speaker: Isla Simpson	Slides	Videos
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Practical

Topic: Namelist and Code Modifications Speaker: Cecile Hannay	Overview	Exercises	Videos
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Lab overview
(these slides)

Exercises/Solutions

Tutorial Details

- Dates:** 05 – 09 August 2019
- Location:** NCAR Mesa Lab, Boulder, CO [[More info](#)]
- Registration:** *Closed 08 March 2019

Tutorial Links

- Agenda:** View the agenda in pdf format
- Announcement:** Information about the event and how to apply to the tutorial
- Prerequisites:** Please complete the following activities to ensure you are prepared for the tutorial
- Coursework:** View the sciences presentations and the labs exercises.
- Quizzes:** Access your daily quiz.
- Visitor Wireless:** How to access the UCAR Visitor Wireless

Quizzes

2019 CESM Tutorial: Daily Quizzes

One-time registration/enrollment

To gain access to your daily quiz, you need to either use your existing account or create an account on the COMETMetEd website and then enroll in "CESMTut_2019". This is a one-time painless process.

Directions for those without existing accounts on COMET/MetEd (meted.ucar.edu)

1. Go to <https://www.meted.ucar.edu>
2. Click "Sign Up" located to the left the "Sign In" button.
3. Provide all required information and then click "Create Account" at the bottom of the page.
4. Go to <https://courses.comet.ucar.edu/course/view.php?id=226>
5. Scroll to the bottom of the Enrollment options page. Enter the enrollment key "CESMTut_2019" (without quotes), then click the "Enroll Me" button.
6. You should see the CESM Tutorial welcome message, and you will receive an email to confirm your enrollment.

Directions for those with existing accounts on COMET/MetEd (meted.ucar.edu)

1. Go to <https://courses.comet.ucar.edu/course/view.php?id=226>
2. Log on to the MetEd website.
3. Scroll to the bottom of the Enrollment options page. Enter the enrollment key "CESMTut_2019" (without quotes), then click the "Enroll Me" button.
4. You should see the CESM Tutorial welcome message, and you will receive an email to confirm your enrollment.

Daily quizzes

Once you have enrolled, follow the "Quiz Link" below to access your daily quiz.

Quiz Link: <https://courses.comet.ucar.edu/course/view.php?id=226>

Feel free to take the quiz anytime during the lab session or even after the lab session. For instance, you can take the quiz while you are waiting for the model to compile or your run to complete. However, please refrain from taking the quiz before your daily lab session. We might need to modify the quiz just before the lab session, and we would need to erase your attempts.

The goal of the quizzes is to challenge your knowledge and to create a learning experience. You can take the quiz as many times as you want. During the quiz: Feel to talk to your neighbor, to ask questions to your instructor, to look into the documentation.

Good luck ! And don't forget to have fun.

