

Porting CESM to Cheyenne

Recommended minimum module versions for any cesm on cheyenne:

intel/17.0.2 mpt/2.19 netcdf/4.6.1 netcdf-mpi/4.6.1 pnetcdf/1.11.0

PIO libraries must be updated:

Cesm1_0x can update to pio1_7_3

Cesm1.2.2.1 can update to pio1_8_14

Versions more recent than cesm1_4:

It is recommended that users who want to port versions newer than cesm1_4 update to the latest cesm2 version.

Using the cesm2 create_test on Cheyenne

Users running cesm2 create_test on cheyenne should use qcmd or an interactive session. Please avoid running create_test or case.build on the login nodes. The syntax for qcmd is qcmd -- ./case.build

versions prior to cesm1_4:

- Add the following files to scripts/ccsm_utils/Machines
 - a. [env_mach_specific.cheyenne](#)
 - b. [mkbatch.cheyenne](#)
- Add the following machine description to config_machines.xml

```
<machine MACH="cheyenne">
  <DESC>
    NCAR SGI, os is Linux, 36 pes/node, batch system is PBS
  </DESC>
  <OS>LINUX</OS>
  <COMPILERS>intel,gnu</COMPILERS>
  <MPILIBS>mpt,mpi-serial</MPILIBS>
  <RUNDIR>/glade/scratch/$CCSMUSER/$CASE/run</RUNDIR>
  <EXEROOT>/glade/scratch/$CCSMUSER/$CASE/bld</EXEROOT>
  <DIN_LOC_ROOT>${ENV{CESMDATAROOT}}/inputdata</DIN_LOC_ROOT>
```

```

<DIN_LOC_ROOT_CLMFORC>$ENV{CESMDATAROOT}/lmwg</DIN_LOC_ROOT_CLMFORC>
<DOUT_S_ROOT>/glade/scratch/$CCSMUSER/archive/$CASE</DOUT_S_ROOT>
<DOUT_L_MSROOT>esm/$CASE</DOUT_L_MSROOT>
<CCSM_BASELINE>$ENV{CESMDATAROOT}/ccsm_baselines</CCSM_BASELINE>
<CCSM_CPRNC>$ENV{CESMDATAROOT}/tools/cime/tools/cprnc/cprnc.cheyenne</CCSM_CPRNC>
<BATCHQUERY>qstat -f</BATCHQUERY>
<BATCHSUBMIT>qsub</BATCHSUBMIT>
<SUPPORTED_BY>cseg</SUPPORTED_BY>
<GMAKE_J>8</GMAKE_J>
<MAX_TASKS_PER_NODE>36</MAX_TASKS_PER_NODE>
<PES_PER_NODE>36</PES_PER_NODE>
</machine>

```

- Perl issues - The perl code has several statements of the form "foreach \$var qw(a b c)", the version of perl on Cheyenne requires that these lines be changed to "foreach \$var (qw(a b c))" The following list may differ and may be incomplete depending on the specific code version
 - ccsm_utils/Case.template/ConfigCase.pm line 440
 - ccsm_utils/Tools/cesm_setup line 236
 - models/drv/bld/build-namelist line 784
- PE-layouts - The out of the box pelayout is probably wrong - Cheyenne has 36 cores per node and little or no performance benefit has been measured using SMT mode therefore you should configure your pe-layout to use multiples of 36 tasks for each component. However the pop ocean component is not well suited to 36 tasks - try using multiples of 32 instead for pop.

We have created an update to the cesm1_2_2 release code with these changes in:
https://svn-ccsm-models.cgd.ucar.edu/cesm1/release_tags/cesm1_2_2_1

Notes and gotchas about working on cheyenne

• Sharing svn checkouts between yellowstone and cheyenne

If you did an svn checkout on yellowstone, then try to interact with it using svn on cheyenne, you may get a message like this:

```

svn: E155036: Please see the 'svn upgrade' command
svn: E155036: The working copy at '/glade/p/work/sacks/cesm_code/clm2_trunk_oldsvn'
is too old (format 10) to work with client version '1.8.10 (r1615264)' (expects format 31). You
need to upgrade the working copy first.

```

To fix this problem, you should run the following on cheyenne, within the checkout:

svn upgrade

In order to continue working with this repository on yellowstone – and to avoid this problem with future checkouts on yellowstone – do the following on yellowstone:

module load subversion

(This will use a newer version of svn on yellowstone.)

cesm2 only: If you get a runtime error that looks like

-1:/glade/u/apps/opt/mp/2.15-sgi715a158/bin/omplace: line 535: cannot create temp file for here-document: No space left on device

Look for and remove the line: `<arg name="threadplacement"> omplace </arg>`
in `env_mach_specific.xml`.

If you get an internal compiler error in cam while building with the intel/17.0.1 compiler: edit the file `Macros.make` in your case directory and change `HAS_F2008_CONTIGUOUS := FALSE`

`!dir$` and `!DIR$` directives: In some versions of cam prior to cam5_4_103 these directives are present in physics and rrtmg subdirectories. Depending on configuration these may cause the model to segfault during initialization. Removing the directives from the code solves the problem.

If you need to restart a case from cesm1_5 using cesm2 you will need to comment out lines 258-276 of file `seq_rest_mod.F90`. The budget calculation has changed in a non-backward compatible way. You only need to do this once, after you have produced new restart files you can uncomment this code and proceed.