

CCSM/ESMF Evaluation Plan Summary

Mariana Vertenstein
CCSM Software Engineering Group
NCAR

CCSM/ESMF Evaluation Plan

- Final goal is to have a single executable version of CCSM that can run as either a sequential or concurrent application and have plug and play functionality with different CCSM model components.
- To get there - do a multi stage evaluation process starting from stand-alone CAM.
- 3 stages in evaluation - Pre-ESMF, CCSM/ESMF Stage 1 and CCSM/ESMF Stage 2.

Pre-ESMF Stage

- Construct a new top level driver that calls CAM and all CAM surface models (CLM, CAM-CSIM, CAM-DOM, CAM-SOM)
- This code will be committed to cam-dev before Stage 1 starts.
- All code development will maintain backwards compatibility with current CAM and CCSM functionality.
- CAM will look as a component of a top level application driver.

CCSM/ESMF Stage 1

- Construct and evaluate a sequential ESMF driver application using CAM, CLM and CAM ocean and sea-ice surface models (CAM-CSIM, CAM-DOCN).
- Start with code produced at end of pre-ESMF stage.
- See ESMF/CCSM Evaluation plan for full details of evaluation process.

CCSM/ESMF Stage 2

- Stage 2 - construct and evaluate single executable, concurrent and sequential CCSM with all active components - CAM-CSIM is replaced by CSIM and CAM-DOCN is replaced by POP2.
- Also plan to construct a concurrent version of dead models at same time.

Why start with CAM?

- CCSM will require 5 ESMF features:
 1. time manager utility
 2. merging functionality
 3. M→N communication across components (including redistribution)
 4. regridding capabilities and access at the interface level to regridding weights
 5. flexibility for concurrent v.s. sequential execution

Why start with CAM (cont)?

- Changes to CAM and CLM needed for stage 1 evaluation will also be needed to produce a single executable CCSM.
- CAM is better suited for an initial test of ESMF than current CCSM:
 - CAM can perform solution separation
 - CAM can reproduce solutions on arbitrary number of processors for different communication schemes
 - CAM is well instrumented for performance testing
 - CAM is already a single executable

Why start with CAM (cont)?

- ESMF will be put in last. If evaluation is not successful, then current design ensures that ESMF can easily be stripped out and an alternative approach tried.
- Design that we are developing for Stage 1 ensures that we are not being CAM-centric and will be used in Stage 2.