Strategic Implementation Plan (SIP) for a Community-based Unified Forecast System

System Architecture Working Group

Presented by

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System Architecture WG
Membership

- *Jim Kinter (GMU/COLA) ***
- *Cecelia DeLuca (ESRL/NESII) ***
- Tom Auligne (JCSDA)
- V. Balaji (GFDL)
- Rusty Benson (GFDL)
- Ligia Bernardet (ESRL/GMTB)
- Arun Chawla (EMC)
- Philip Chu (GLERL)
- Anthony Craig (NESII)
- Arlindo da Silva (NASA GMAO)
- Jim Doyle (NRL)

- Dave Gill (NCAR/MMM)
- Mark Iredell (EMC)
- Tara Jensen (NCAR/GMTB)
- Jean-Francois Lamarque
- John Michalakes (NRL)
- Phil Rasch (DOE PNNL)
- Suranjana Saha (EMC)
- Vijay Tallapragada (EMC)
- Sam Trahan (EMC)
- Mariana Vertenstein (NCAR CGD)
- Jun Wang (EMC)

- *Co-Chair ***

System Architecture WG
Project Milestone Accomplishments

- **SIP project accomplishments to date:**
  - Features and optimizations for UFS in ESMF v7.1.0 (release candidate Feb 2018, coordinated with FV3GFS release in March 2018)
  - Community mediator based on NUOPC/NEMS running in simple CESM and GFDL coupled configurations
  - Coupling support for FV3GFS with write components, atm-wave, atm-chemistry, atm-ionosphere, coastal surge, seasonal apps

- **SIP project issues (what slows down progress):**
  - Simultaneous changes at EMC create a challenging development environment (repo, website, workflow, etc.)
  - "Graduate student test" of get code and run it not a pass for UFS yet
  - Open questions about where coupled UFS workflows will be supported to the community

System Architecture WG

CMEPS = Community Mediator for Earth Prediction Systems

- GOAL: leverage community expertise to develop coupled UFS applications
- Aim to support multiple coupling science approaches (GFDL, CESM, etc.)
- CMEPS developed and distributed through CIME community github repository
- Validated simple coupled configurations of CESM (active atm & land, data ice & ocn) and GFDL models (active atm & land, data ice, same grid), adding complexity
- Working toward Mar 2018 milestone of running simple CMEPS configuration at EMC
- Sharing some mediator phases and customizing others enables multiple centers to understand and use the same coupling system

Typical mediator run phases

- *prep_atm*
- *generate_xgrid*
- *atmocn_ocnalb*
- *prep_ice*
- *other run phases …*

CESM

CMEPS

atm — ocn
lnd — ice
rof

GFDL

CMEPS

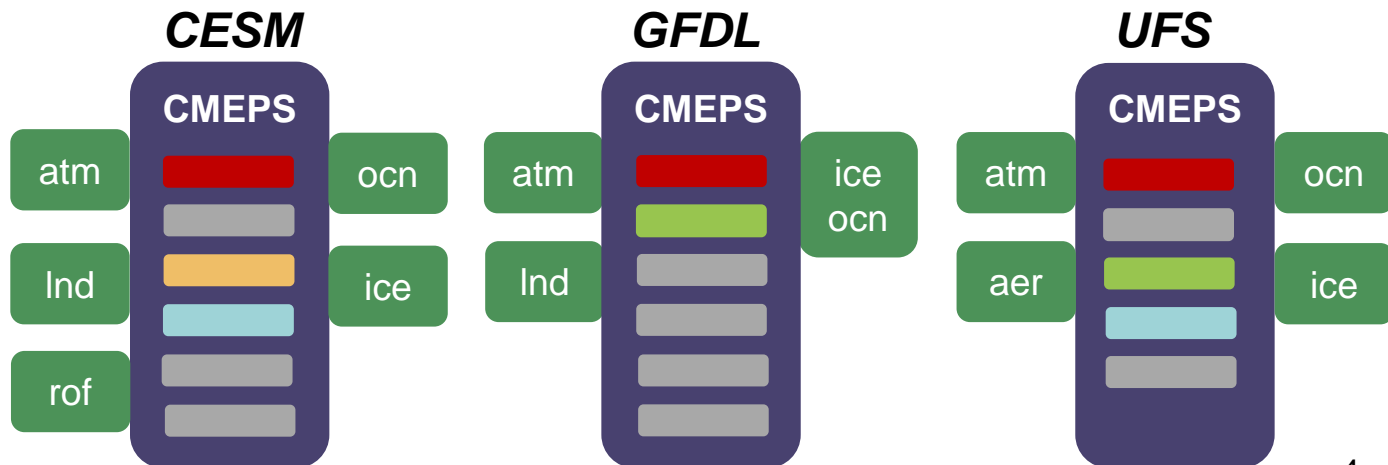atm — ice ocn
lnd

UFS

CMEPS

atm — ocn
aer — ice

Diagram is illustrative only – components are not complete/correct.

System Architecture WG
Team Coordination and Dependencies

- System Architecture interacts with most other WGs
- Implementing a unified system architecture requires open communication and coordination across WGs, EMC development teams, and EMC management
- System architecture, Infrastructure, and Comm WGs will depend on each other in addressing usability issues (e.g. the graduate student test)
  - Example: developing a community workspace that provides scientific and technical information along with code and data access