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 (CIRES/ESRL)*
- Tom Auligne (JCSDA)
- V. Balaji (Princeton University)
- Rusty Benson (NOAA GFDL)
- Ligia Bernardet (NOAA ESRL)
- Arun Chawla (NOAA NCEP)
- Philip Chu (NOAA GLERL)
- Tony Craig (NOAA NESII)
- Arlindo da Silva (NASA GSFC)
- Jim Doyle (NRL)

- Mark Iredell (NOAA NCEP)
- Jean-Francois Lamarque (NCAR)
- John Michalakes (UCAR/CPAESS)
- Phil Rasch (DOE PNNL)
- Suranjana Saha (NOAA NCEP)
- Vijay Tallapragada (NOAA NCEP)
- Gerhard Theurich (ESMF/NRL)
- Sam Trahan (NOAA NCEP)
- Mariana Vertenstein (NCAR)
- Jun Wang (NOAA NCEP)

- *Co-Chair ***

System Architecture WG Accomplishments & Challenges

- **SIP project milestones completed/progress to date:**
  - Delivered ESMF releases (e.g. 7.1.0r, March 2018) and coupling infrastructure user support for UFS applications, including FV3GFS, coupled chemistry and S2S, space weather, coastal, and air quality
  - SAWG model/DA tiger team developed design and initial prototypes for the model/DA (NUOPC/JEDI) interface
  - Defined the "Graduate Student Test" usability criteria
  - Demonstrated the Community Mediator for Earth Prediction Systems (CMEPS) in CESM (June 2018) and UFS (March 2019) running in portable, user-friendly community workflows
  - Completed report (2017): System Architecture Needs for Operational Needs and Research Collaborations

- **SIP project issues (main challenges):**
  - Establishing the graduate student test as a key metric and organizing principle
  - *Ensuring compatible and efficient interaction of the various parts of UFS, including component interface, physics interface, and DA interface*
  - Dealing with long delays in new staff access to theia

- **What do you need the other groups (or program offices) to do or know?**
  - User support for UFS integration with common infrastructure/architecture is essential, though it is difficult to write specific milestones for it

- **What project(s) should be accelerated (due to criticality to overall effort, dependency from another area, etc.)?**
  - Testing changes (e.g. CCPP physics) in coupled applications

- **Based on experience to date, what change(s) do you recommend to your working group (different composition, focus, charter/ToR, need to continue, etc.)**
  - Potential addition of a DA co-chair

System Architecture WG
Team Coordination and Dependencies

- List major team coordination/dependency successes or issues;
  - DA – model/DA tiger team is developing and prototyping interface between NUOPC/JEDI
  - Physics - developing prototype interface between CCPP/NUOPC
  - Infrastructure and Workflow Focus Team - planning for interfaces between workflows, modeling systems, and DA to be jointly designed and prototyped
  - UFS-SC - participating in the definition of UFS Applications
  - Infrastructure WG and Repo Focus Team - evolving the design of the system architecture consistent with the emerging repository strategy
  - Dynamics and Nesting - joint application projects (space weather coupling, HSUP planning for hurricane coupling) cross-participation in calls
  - Aerosols and Atmospheric Composition - joint application projects (coupling for GSD chemistry and CMAQ chemistry), cross-participation in calls
  - Marine – joint application projects (ocean and ice coupling)
  - C&O – presented Graduate Student Test and Applications on the UFS Portal, recruited grad students and others for the C&O Focus Group code evaluation

System Architecture WG
Team Coordination and Dependencies

Successes

- Global Model Suites and Marine – provided infrastructure and support for coupled systems including FV3GFS-MOM6-CICE5, FV3GFS-wave

- Aerosols and Atm Comp WG – provided infrastructure and support for FV3GFS-Chem coupled system, working on FV3GFS-CMAQ (air quality)

- Infrastructure (Repo) WG – coordinated on proposed repository strategy

- Dynamics and Nesting WG – provided infrastructure and support for coupled atm - space weather, coordinated on Hurricane Supplemental planning for nested systems

Open Issues:

- *Land and Physics WGs – coordination on a flexible implementation strategy for land surface (inline or component)*

- DA WG – coordination on design strategies for efficient implementation and coupled DA

- Infrastructure (Workflow/Data) WG – just getting started, critical for ease of use and satisfying the graduate student test