Climate-in-a-Box (CIB) Workshop: Introduction and Overview

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CIB Staff

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CIB Vision

- CIB seeks to:
  - Develop/improve models through a more efficient “open” model development and validation process
  - Open climate/Earth science model development and validation to a community beyond traditional domain scientists
**CIB Motivations**

- NASA/NOAA climate/earth science models are difficult to use
  - Can be challenging for domain experts
  - Non-typical users (e.g., non-domain scientists, policymakers) may want to run models
CIB Motivations

- Supercomputing resources are not always readily accessible
  - Wait times in job queues can be extensive
  - Arduous application process for foreign nationals
CIB Goals

- Make NASA/NOAA climate/earth science models more accessible
- Explore desktop supercomputing architectures
- Package models and support software as a “toolkit” for desktop supercomputers
- Explore use of the system for “open” model development/validation
CIB Stages

- Port models to architectures other than typical supercomputers
  - Explore desktop architectures
  - Develop model process management tools
- Develop automated software management system
- Explore virtualization
CIB Overview

Desktop System
(testing, development, lower resolution runs)

Preconfigured Toolkit

Data/Process Management Tools
(workflow tool)

NASA/NOAA Models

Analysis Tools

User Additions

User-Provided Models/Tools

Traditional Cluster
(high resolution runs)

Model Run Information

Workflow “Switch” Capability
Modeling Toolkit

- Models (ModelE, GEOS5, WRF)
- Analysis tools (GrADS, NCL)
- Social networking/collaboration capabilities through NASA’s Modeling Guru (modelingguru.nasa.gov)
- Process management tools (e.g., workflow tool/NASA Experiment Designer)
Desktop Architectures

- Cray CX1
  - Project currently has 2 CX1’s
  - Cirrus: Development machine
  - Nimbus: Operational machine

- SGI Octane III
  - Evaluated a test machine
Nimbus Configuration

- 8 “compute nodes”
- Each node has
  - Two Intel 2.6GHz quad-core Nehalem CPUs
  - 24Gb DDR2 RAM
  - One 320Gb 7200rpm hard drive
- Infiniband and GigE networks connecting the compute nodes
Workflow Tool

- Simplifies/Automates model execution management and other processes
- Provides common look and feel between models and between systems
- Allows for experiment sharing and repeatability
Workflow “Switch” Capability

- Enable model execution to be as seamless as possible between CIB and larger cluster or other CIBs
  - Large HPC systems can be used for validation and simulations at a higher resolution
- Data movement through workflow or shared/open resource
- Virtualization: explore a virtual image that can be moved from CIB to larger cluster or other CIBs
Workshop Expectations

- Will not be providing
  - Desktop architecture sys admin training
  - Details on model science or model codes
- Software you will see and use has been tuned to our environment
Workshop Goals

- Provide overview of Climate in a Box (CIB)
  - Models
  - Workflow Tool
  - Distributed Modeling System

- Provide hands-on training to CIB users
  - Running CIB models
  - Developing Workflows for CIB models

- Receive feedback from CIB users on all aspects of CIB
Workshop Agenda Day 1

- Introduction and Models
  - Welcome (8:30am-9am)
  - GEOS-5 (9am-12pm)
  - Lunch Offsite
  - WRF (1-3pm)
  - ModelE (3-4pm)
Workshop Agenda Day 2

- Workflow Tool and Distributed Modeling System
  - Introduction to the NASA Workflow Tool (8:30-9am)
  - NASA Experiment Designer (NED; 9-10am)
  - Running the GEOS-5 Workflow (10-10:30am)
  - Creating a Workflow Part I (10:30-11:30am)
  - Lunch Offsite
  - Creating a Workflow Part II (12:30-2:30pm)
  - Distributed Modeling System (2:30-3:30pm)
  - Wrap-up (3:30-4:00)
Welcome!
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