Transforming the Sensing and Prediction of Intense Local Weather Through Dynamic Adaptation

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Today's case: Fixed, Coarse Model

Grids run on Static Schedule
Adaptivity in Four Dimensions

- On-demand forecast model execution in response to atmospheric conditions
- Forecast model adaptation through space (nested models)
- Forecast model adaptation through time (run-time changes to model nestings)
- Execution time adaptation in response to changes in execution environment
Adaptivity in Space ($t = t_0$)
Adaptivity in time ($t = t_{o} + 2$ hours)
Another Component of Adaptation

- Cyberinfrastructure including on-demand capability, application and environment monitoring, performance estimation and scheduling
Center for Adaptive Sensing of the Atmosphere (CASA)

- UMass/Amherst, OU, CSU, UPRM
- Concept: inexpensive, phased array Doppler radars on cell towers and buildings
- Dynamically adaptive dynamic sensing of multiple targets while simultaneously meeting multiple end-user needs
Why A Service-Oriented Architecture?

- Flexible and malleable
- Platform independence (emphasis on protocols, not platforms)
- Loose integration via modularity
- Evolvable and re-usable (e.g. Java)
- Interoperable by use of standards

**LEAD Service-Oriented Architecture**

**User Interface**

- LEAD Portal
- Desktop Applications
  - IDV
  - WRF Configuration GUI

**Portlets**

- Visualization
- Workflow
- Education
- Browse
- Control
- Ontology
- Query
- Monitor
- Control

**Client Interface**

**Configuration and Execution Services**

- Application Resource Broker (Scheduler)
- Workflow Monitor
- Workflow Engine/Factories
- VO Catalog
- THREDDS

**Application & Configuration Services**

- Application Host
- Execution Description
- WRF, ADaM, IDV, ADAS
- Geo-Reference GUI
- Decoder/Resolver Service
- Transcoder Service/ESML

**Configuration and Execution Services**

- Host Environment
- Application Description
- GPIR
- Encoder/Resolver Service

- Workflow Engine/Factories
- VO Catalog
- THREDDS
- Decoder/Resolver Service
- Transcoder Service/ESML

**Resource Access Services**

- Grid FTP
- Scheduler
- OPenDAP
- Generic Ingest Service
- RLS
- OGSA-DAI
- GRAM
- SSH
- LDM

**Distributed Resources**

- Computation
- Observations
  - Streams
  - Static
  - Archived
- Specialized Applications
- Steerable Instruments
- Data Bases
- Storage
Meteorological Command and Control

Streaming data storage

Radar allocation

NWS National Static Observations & Grids

National Weather service

Detection, prediction, data mining, and visualization tools

Monitoring, resource alloc, command and control

Community and personal data storage

Local User Imported Observations

Emergency response users

Researchers

Students

CASA

End users

Mesoscale Weather

LEAD

NWS National Static Observations & Grids

Local User Imported Observations
http://lead.ou.edu

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