LEAD-VGrADS Demo

Status Update

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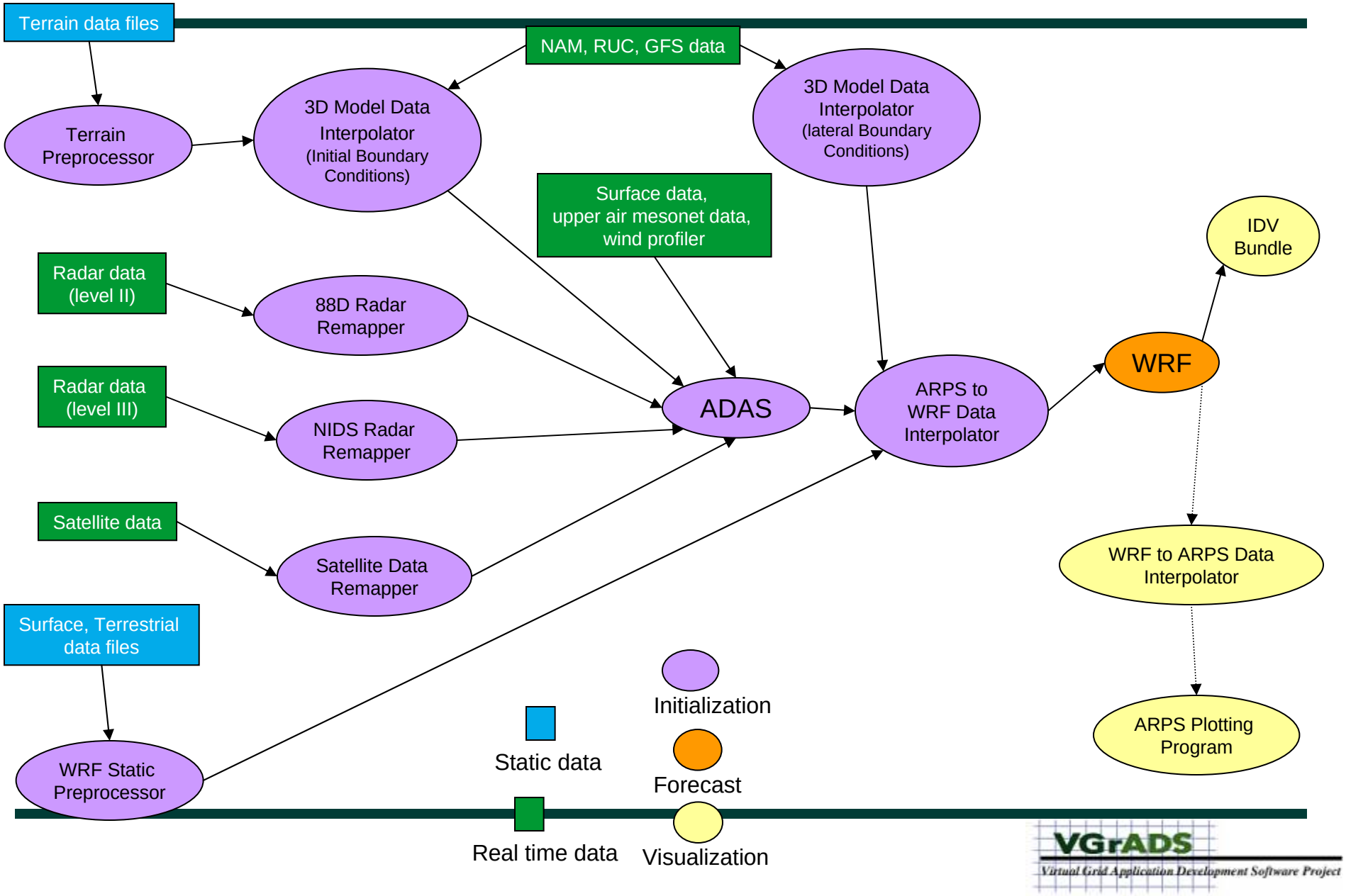
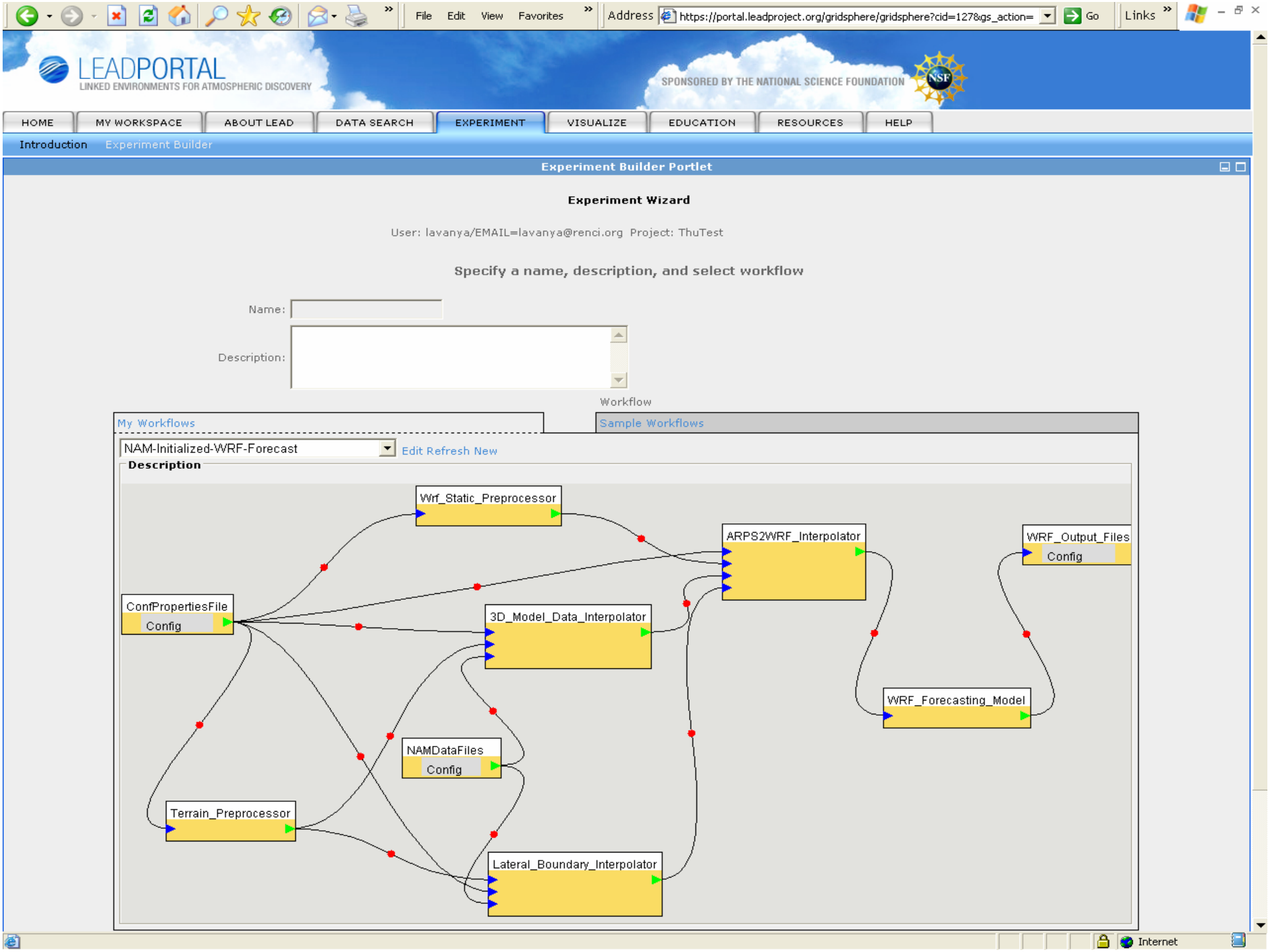
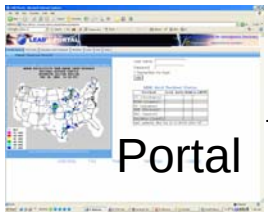
VGrADS
Virtual Grid Application Development Software Project

LEAD Static Workflow




File Edit View Favorites
Address https://portal.leadproject.org/gridsphere/gridsphere?cid=127&gs_action=
Go
Links
LEADPORTAL
LINKED ENVIRONMENTS FOR ATMOSPHERIC DISCOVERY
SPONSORED BY THE NATIONAL SCIENCE FOUNDATION
HOME
MY WORKSPACE
ABOUT LEAD
DATA SEARCH
EXPERIMENT
VISUALIZE
EDUCATION
RESOURCES
HELP
Introduction
Experiment Builder
Experiment Builder Portlet
Experiment Wizard
User: lavanya/EMAIL=lavanya@renci.org Project: ThuTest
Specify a name, description, and select workflow
Name:
Description:
Workflow
My Workflows
Sample Workflows
NAM-Initialized-WRF-Forecast
Edit Refresh New
Description
Wrf_Static_Preprocessor
ARPS2WRF_Interpolator
WRF_Output_Files
Config
ConfPropertiesFile
Config
3D_Model_Data_Interpolator
WRF_Forecasting_Model
NAMDataFiles
Config
Terrain_Preprocessor
Lateral_Boundary_Interpolator
Internet

Integrated Architecture (LEAD-VGrADS)



Portal

Workflow

Workflow Configuration Service

DAG + Constraint

Annotated DAG

Create Services

App. Factory

Launch Services

LEAD BPEL Workflow Engine

Run workflow one step at a time

Application Service (per task)

Run job

Job notification

Workflow and File Status

Event Broker

myLEAD

(subscribes to messages from the broker and knows what magic to do with input/output files and talks to RLS/DRS

LEAD Resource Broker/ VGrADS App Manager

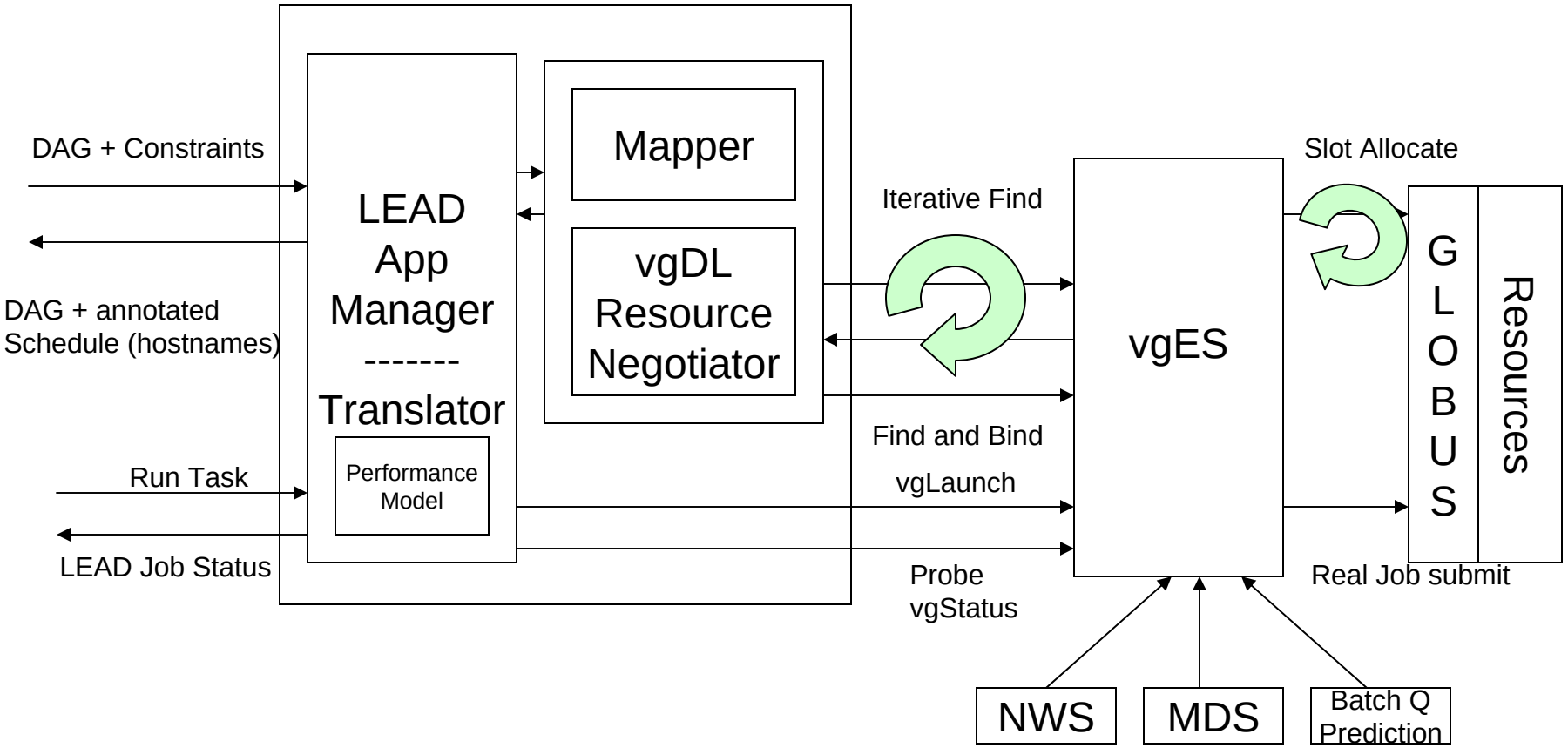
Performance Model

Scheduler Mapper

VIRTUAL GRID

Schedule towards a workflow deadline

VGrADS Demo Components



Milestones

- ☑ Aug 20 – First round exchange of jars, libraries etc
- Aug 29/30 – End to end integrated testing with 3 resource sites (real dag, fake applications)
- Sept 6 – Document issues from testing and resolve issues from testing
- Sept 15 – All demo features implemented and testing begins
- Sept 30 – End to end testing with lead applications complete, test case running every day
- Oct 7 - decide the scenario and artificial constraints
- Oct 15 – Test, test, demo viz, finalize demo details etc
- Oct 30 – keep it working!
- Nov 11 Demo time

Current Status and Open Issues [1/2]

- **Minor problems and bugs were detected and fixed**
- **NCSA TeraGrid machine inaccessible**
  - —queues were being flushed
  - —debugging is hard with queue wait times
- **Missing information for Scheduler**
  - —population of vgES database
    - Missing MDS information, will populate manually
  - —need for NWS data for data size estimates
    - Now this is setup

Current Status and Open Issues [2/2]

- **GRAM/PBS issues**
  - —PBS Glide in through GRAM doesn't get environment properly on some machines
  - —Launch of second-level GRAM
    - vgES slot manager detects status of pbs setup and stands up the GRAM
- **Slightly modified immediate goal**
  - —Get software running on one machine for simple tasks
  - —Simplified shorter DAG for end to end testing

Target Machines Update

- NCSA TG – Mercury
  - —Should we get reservations for testing
- UC TG
  - —Will add since lower load
  - —Need to collect performance model data
- IU TG/ Big Red
  - —Smaller cluster
- SDSC TG
- Rice Cray ADA
- RENCI dante
- RENCI dante
  - —Launching pad for the VGrADS stack
  - —Development machine
- IU Tyr/Other nodes
  - —For LEAD web services, etc
  - —Portal

Performance Model and Application Manager

Lavanya Ramakrishnan

Application Manager [1/2]

- **Standard LEAD Resource brokering interface**
  - —Header inputs: worflow id, task id, etc
  - —Inputs: DAG, workflow constraints (deadline)
  - —Output: AnnotatedDAG with host information (hostnames, URL for services, no procs.)
- **Scheduler interface**
  - —Input: Performance model, parsed DAG, constraints
  - —Output:
    - Start time, End time, VG information (save state)
    - cluster head node, no processors (for LEAD)

Application Manager [2/2]

- **Job submission interface**
  - —Header inputs: worflow id, task id, etc
  - —Input: contact string, RSL
  - —Synchronous Output: status
  - —Asynchronous Notification: Status from VG
- **Fault Tolerance in the App manager**
  - —Check the start and end times as jobs finish to keep track of if schedule is being met
  - —Check if expected host names and mapped hostnames match (incase there was a change in schedule)
  - —Collect performance model data

Performance Model Methodology

- **Timing data collection**
  - —Define resource classes
  - —Look-up table for application and resource with respect to no CPUs
  - —Calculate optimal number of nodes
  - —Long term: calculate timing information based on user input
- **Data size collection**
  - —consider single case
  - —Long term: project data sizes based on user input

Performance Model Queries

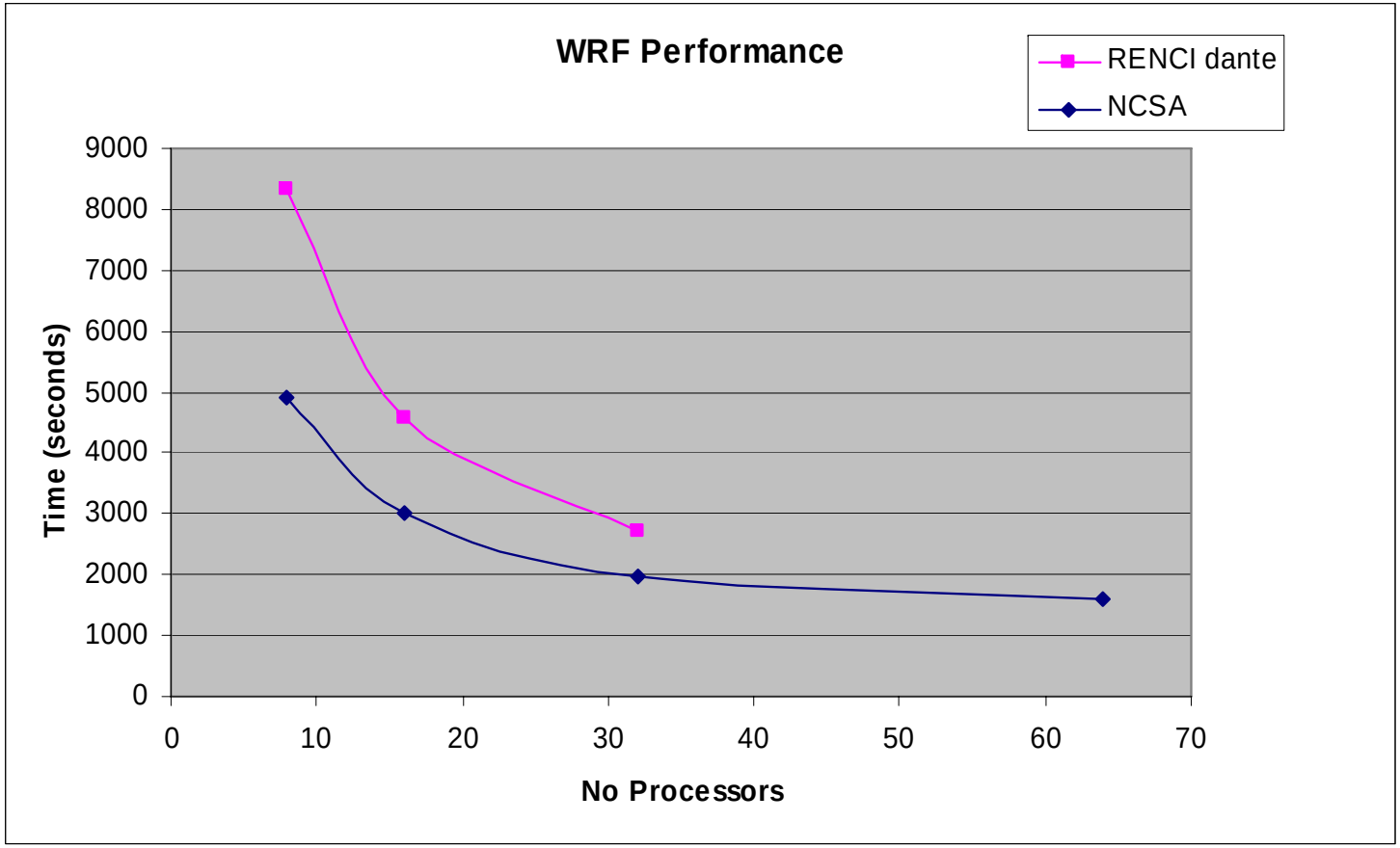
- **Get Performance Model for Task T**
- **Get Performance Model for Task T on Resource Class R**
- **Get Optimal Nodes for Task T on Resource Class R**
- **Get Optimal Task Time for Task T on Resource Class R**
- **Get Resource Classes**

Performance Model (Sample from NCSA)

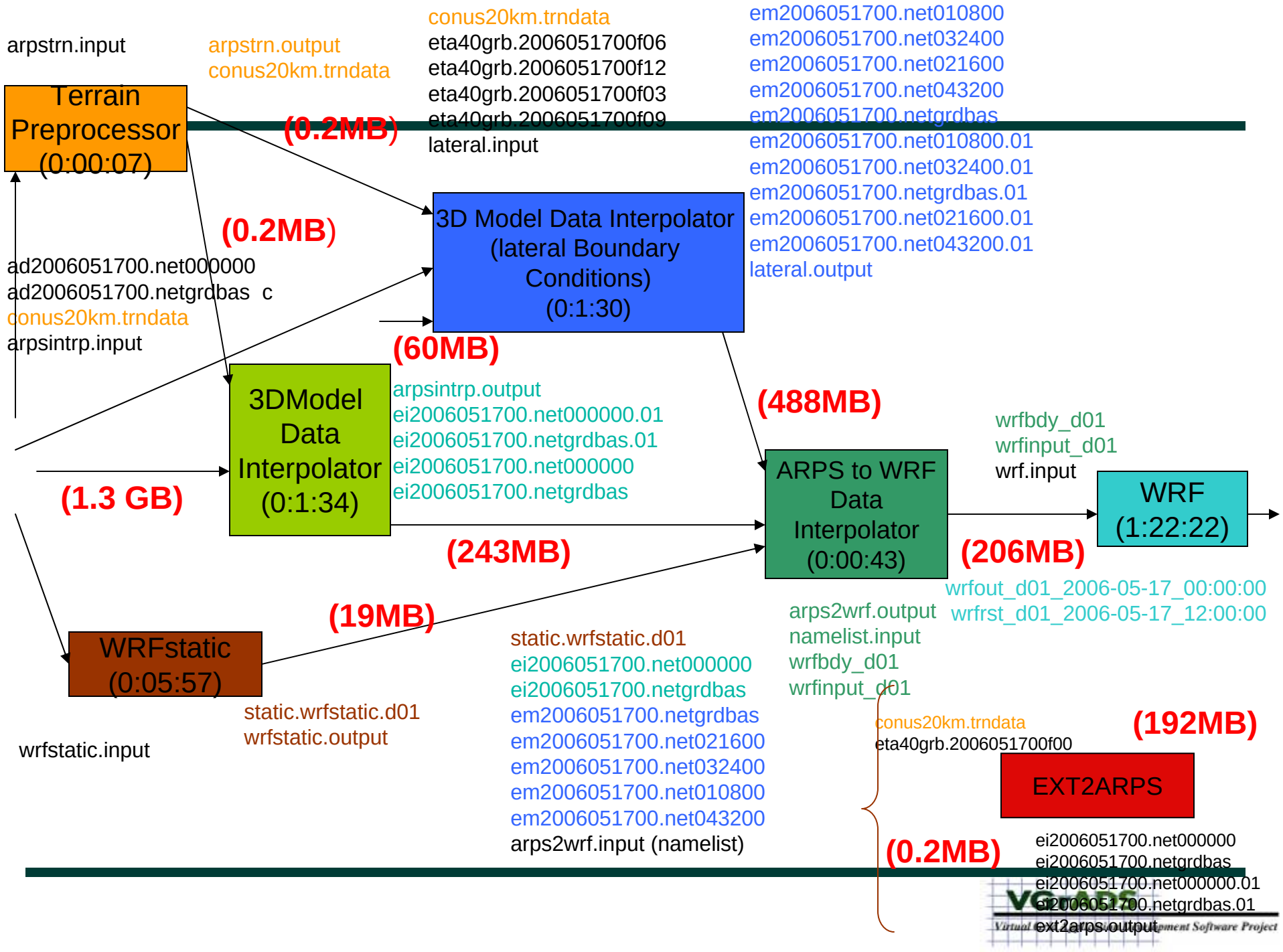
Application	Execution Time (secs) [procs]	Input data	Output data
arps2wrf	42[8 procs]	668M	198M
arpsintrp	97	1.2G	930M
arpstrn	7	32K	256K
ext2arps	32[8 procs]	15M	184M
lateral	89[8 procs]	59M	1.9G
wrf	4892[8 procs]	198M	32K
wrfstatic	354	32K	19M

WRF Performance

- Intricacies of the science of splitting processors on the X and Y domains is not considered here



Questions?


arpstrn.input
arpstrn.output
conus20km.trndata
Terrain Preprocessor (0:00:07)
(0.2MB)
conus20km.trndata
eta40grb.2006051700f06
eta40grb.2006051700f12
eta40grb.2006051700f03
eta40grb.2006051700f09
lateral.input
em2006051700.net010800
em2006051700.net032400
em2006051700.net021600
em2006051700.net043200
em2006051700.netgrdbas
em2006051700.net010800.01
em2006051700.net032400.01
em2006051700.netgrdbas.01
em2006051700.net021600.01
em2006051700.net043200.01
lateral.output
(0.2MB)
3D Model Data Interpolator (lateral Boundary Conditions) (0:1:30)
ad2006051700.net000000
ad2006051700.netgrdbas c
conus20km.trndata
arpsintrp.input
(60MB)
3DModel Data Interpolator (0:1:34)
arpsintrp.output
ei2006051700.net000000.01
ei2006051700.netgrdbas.01
ei2006051700.net000000
ei2006051700.netgrdbas
(488MB)
(1.3 GB)
ARPS to WRF Data Interpolator (0:00:43)
wrfbdy_d01
wrfinput_d01
wrf.input
WRF (1:22:22)
(206MB)
wrfout_d01_2006-05-17_00:00:00
wrfrst_d01_2006-05-17_12:00:00
(19MB)
WRFstatic (0:05:57)
static.wrfstatic.d01
wrfstatic.output
wrfstatic.input
static.wrfstatic.d01
ei2006051700.net000000
ei2006051700.netgrdbas
em2006051700.netgrdbas
em2006051700.net021600
em2006051700.net032400
em2006051700.net010800
em2006051700.net043200
arps2wrf.input (namelist)
arps2wrf.output
namelist.input
wrfbdy_d01
wrfinput_d01
conus20km.trndata
eta40grb.2006051700f00
(192MB)
EXT2ARPS
(0.2MB)
ei2006051700.net000000
ei2006051700.netgrdbas
ei2006051700.net000000.01
ei2006051700.netgrdbas.01
ext2arps.output