

Development of a Prototype NOAA Grid

www-ad.fsl.noaa.gov/ac/schaffer/ngi.html

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May 2005

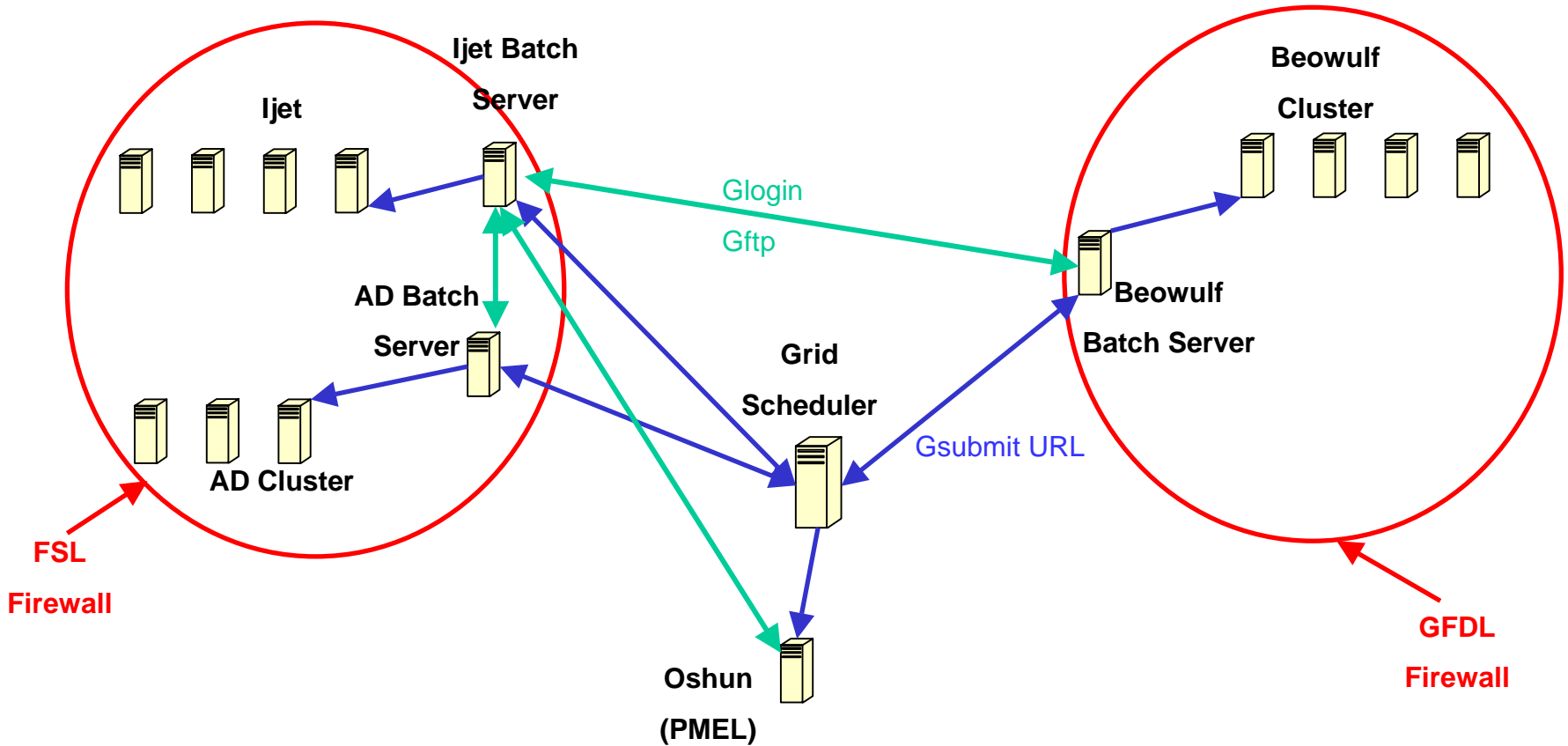
Objectives and Milestones

- Construct a prototype NOAA grid (mostly complete)
- Develop a NOAA certificate authority (partially complete)
- Develop a grid meta-scheduler (rudimentary version completed)
- Execute the ROMS, WRF and CM2 models on the NOAA grid machines (completed)
- Couple WRF/ROMS across
 - NOAA grid (failed)
 - TeraGrid (in progress)

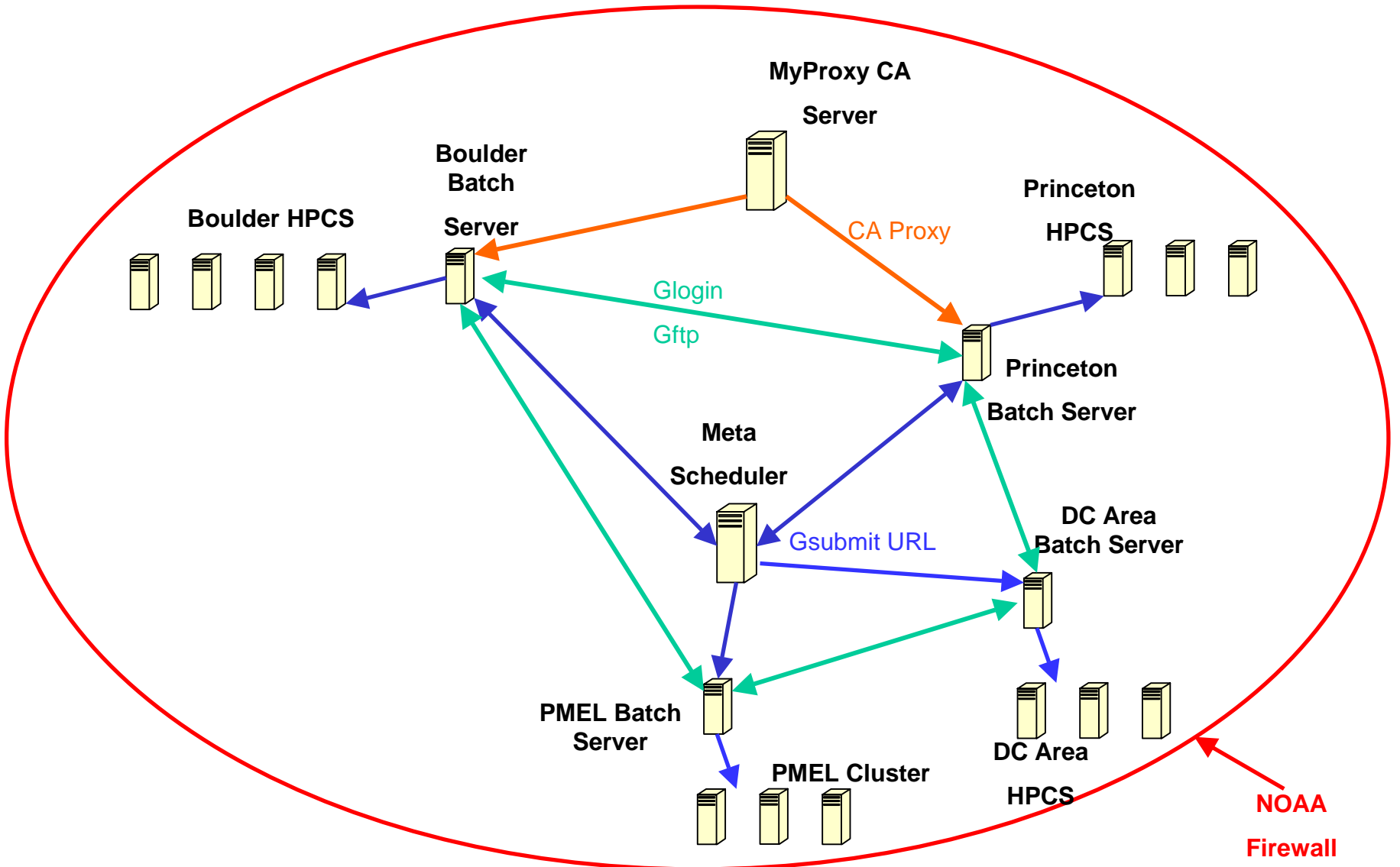
Expenditures

- FSL – 2/3 of the combined HPCC and base funds spent
- PMEL – 2/3 of the funds spent
- GFDL - ???

NOAA Grid Currently



NOAA Grid Objective



Obstacles

- Unstable software
 - Globus 3.2.1
 - Third party packages that rely on it
- Resource allocation policy needed
- Model runs may need to be preemptible
- Security infrastructure
 - Heterogeneous
 - Adds complexity
 - Reduces mutual trust
 - Fluid : 2 PMEL nodes became inaccessible just after inclusion onto the grid

NOAA Grid

Secure Access Proposal

- A secure perimeter would be constructed around the NOAA HPCS's and possibly smaller clusters
- Access to any of these nodes only possible with secure card (one-time-password) technology
 - For now, **mutually acceptable**, heterogeneous technologies allowed
 - Eventually, FIPS 201 token card readers

NOAA Grid

Secure Access Proposal

- Grid network traffic only permitted between these systems via a defined set of ports
- Security of prototype NOAA CA would be enhanced
 - A permanent CA administrator would be identified
 - Grid certificates stored in a MyProxy database on one or more highly secure nodes only accessible from grid nodes
 - Certificates would never leave these nodes
 - Users could download short-term certificate proxies to enable grid access

NOAA Grid Secure Access Proposal

- Once on the grid, users could do the following without one-time-passwords
 - Remote login to other grid nodes
 - Transfer files between grid nodes
 - Submit batch jobs to any grid clusters
- Proposal available on the grid project website

Why secure grid proposal won't fly currently

- Technical Issues
 - GFDL and FSL HPCS's share filesystems with non-HPCS nodes
 - Access to these HPCS's from lab-internal user workstations does not require a one-time-password
 - Remote login idle session timeouts are not implemented at any of these sites

Why secure grid proposal won't fly currently

- Management Issues
 - Each HPCS security administrator would be at the mercy of the other site administrators
 - What if someone forgets to apply a patch?
 - What if someone forgets to lock down a node?
 - What if the security team at one of the sites becomes short-staffed due to funding issues?
 - A highly technically competent NOAA HPCS security administrator with ultimate responsibility (and budgeting authority) is needed

Meta-Scheduling

- Rudimentary scheduler in place
 - Leveraged LeSC Globus/SGE job manager
 - User requests specific clusters
 - Input/Output file staging works
 - Jobs specified using batch system independent XML
 - No intelligence to choose optimal site automatically
 - No ability to query queue status

Meta-Scheduling

- Experiments made with 4 meta-schedulers
 - Cluster Resources, Inc. SILVER
 - Works with PBS, LoadLeveler, LSF but not SGE
 - Successful demonstration on NOAA grid using PBS
 - Support for SGE is in the works
 - EPCC Job Scheduling Hierarchically (JOSH)
 - Only works with SGE
 - Only works on some grid nodes
 - Freeware

Meta-Scheduling

- Platform, Inc. funded Community Scheduler Framework (CSF)
 - Does not work with Globus 3.2.1
 - Needs plugins for batch systems other than LSF
 - Freeware

- Condor-G
 - Does not work with Globus 3.2.1
 - Freeware

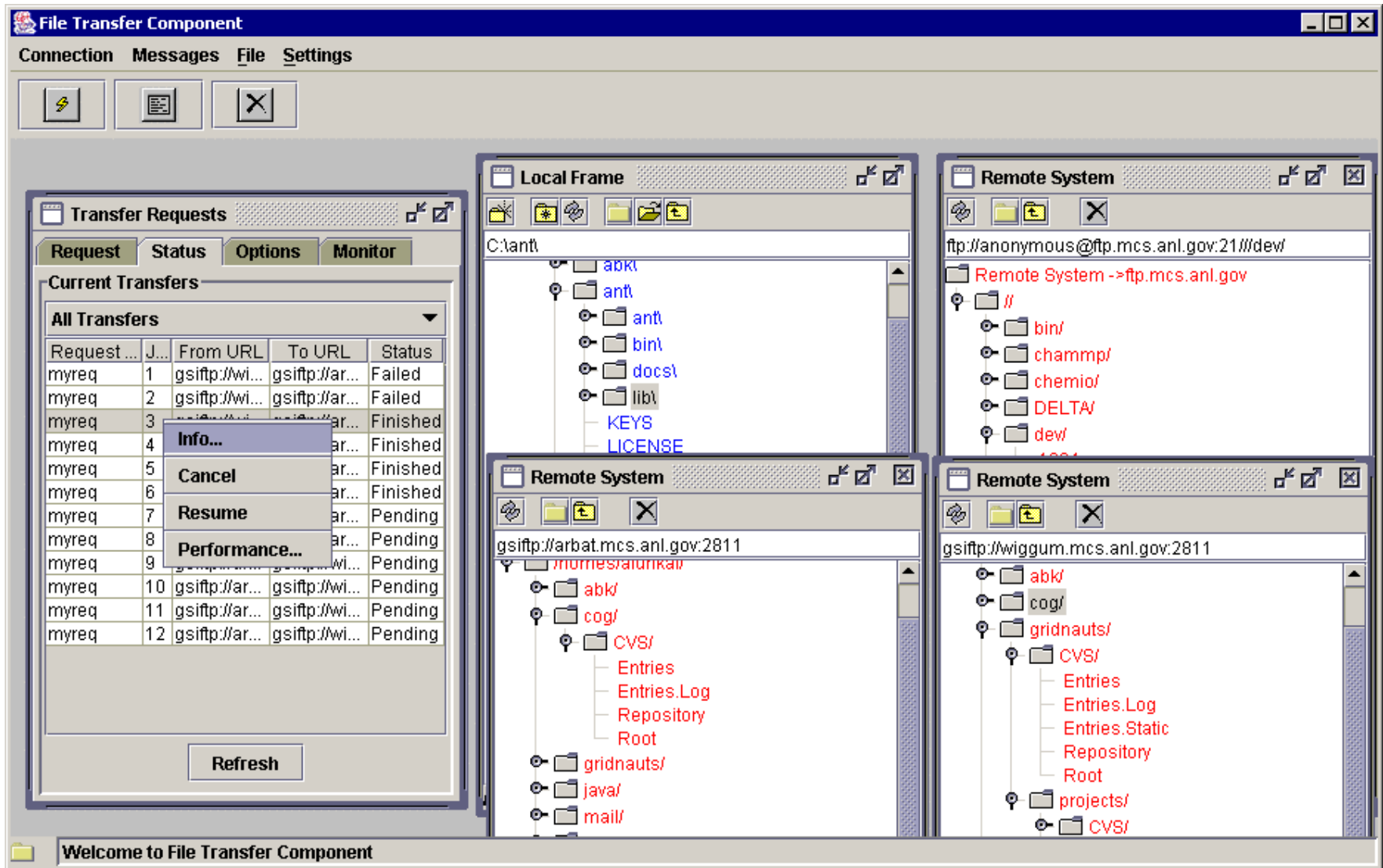
Coupled Modeling

- Coupled WRF/ROMS between PMEL/FSL previously demonstrated
- Coupled WRF/ROMS between FSL/GFDL failed due to lack of cross-grid connectivity
 - Additional firewall holes would be required
- Coupled WRF/ROMS across the TeraGrid nearly working (Chris Moore)

Remaining Work

- Upgrade to Globus 4.X (said to be much more stable)
- Enhance CA security
- Implement true meta-scheduler
- Finish coupling WRF/ROMS across the TeraGrid
- Grid-enable MAPP EarthPort
 - A java-based portal for managing testing process for WRF and other models
 - Will add
 - Single sign-on
 - Meta-scheduling
 - Grid file transfer GUI
- Upgrade NOAA grid to IPv6

Grid File Transfer GUI



Questions?

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