PIRE 2009 Project Proposal

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Student Expected Graduation Date: 2010

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Name of the PIRE International Partner's Institution: Barcelona Supercomputing Center (BCS)

Supervisor's Name and Title at the PIRE International Partner's Institution: Rosa M. Badia, Ph.D. – Grid Computing Group Manager

Project Title: Enhanced Grid Enabled Weather Research and Forecasting (WRF)/Superensemble Portal

Problem Statement: A significant problem facing portal driven eScience applications and environments is the ability to respond to user specified time and performance constraints.

Motivation and Impact: In attempting to build and provide a useful web based portal driven architecture supporting our specific eScience application WRF, we need to understand the complexity of the application, and how different architectures and deployment strategies impact the user experience. The need for high performance or throughput resources and the ability to provide results in a timely manner for weather based programs requires an intimate knowledge of what we can control from the portal architecture in terms of resources and their impact on user timing requirements. Understanding of the WRF architecture for the current versions being deployed will help build the beginnings of an feedback system to allow the software to self deploy as needed to meet user demands.

Current Status: The WRF portal design is implemented currently at FIU as a prototype system interacting with both a job flow manager and a meta-scheduler. The system currently has the ability to trigger job requests and data transfers from remote clusters. Current work at BSC include the Dimemas and Paraver profiling and tracing programs that can be used to examine, predict and tune parallel applications performance. Additional tools developed at FIU include amon and aprof that can be used to predict execution time of applications on the grid.

Research Roadmap:

1. June – explore, install and learn Paraver and Dimemas tools
2. June – Attend International Conference on Automated Computing
3. July – Attend the International Summer School on Grid Computing
4. July – Deploy and create WRF v 2.21 and v 3.0 traces in a variety of configurations
5. August & September – Create and deploy an Amazon ec2 dynamic cluster with WRF v2.2.1 and v3.0, tracing tools and Paraver installed. Duplicate tracing as performed on Mare Nostrum.
6. September & October – First draft Paper on results of trace analysis and performance results on cloud vs BCS.

Relation to PIRE Core Research Projects:
This research fits into the CI Application Layer as Hurricane Mitigation Applications, the CI Integration layer as Visualization Software Tools and Transparent Grid Enablement and the CI Enablement layer as Autonomic R.esource Management.