

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

Student: Lawrence Eric Meyer Jr, PhD student, Florida International University
FIU/FAU Advisor: Prof S. Masoud Sadjadi, Florida International University

PIRE International Partner Advisor: Rosa M. Badia, Barcelona Supercomputer Center

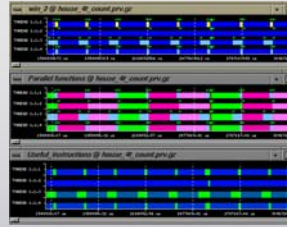
I. Research Overview and Outcome

Problem Statement

A significant problem facing portal driven eScience applications and environments is the ability to respond to user specified time and performance constraints. The need for user driven performance constraints requires a solid understanding of the performance of user applications in various environments in order to design feedback systems allowing systems to meet those performance requests.

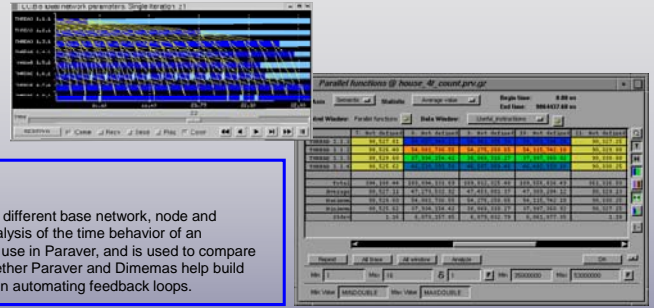
Motivation and Impact

To build to build a useful web based portal driven architecture supporting hurricane forecasting using WRF, we need to understand the complexity and runtime issues of the application suite and how different architectures and deployment strategies impact the user experience and application run time.



Paraver

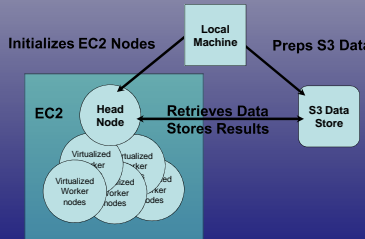
The current version of Paraver was installed on the local system and run with available WRF V2 traces to examine both the tool and it's capabilities.



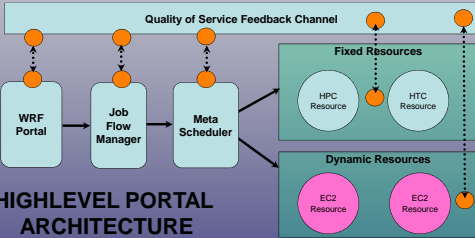
Dimemas

Dimemas is a simulator allowing for testing different base network, node and computation configurations to construct an analysis of the time behavior of an application. Dimemas generates trace files for use in Paraver, and is used to compare actual trace files vs anticipated tracefiles. Together Paraver and Dimemas help build performance analysis profiles of WRF for use in automating feedback loops.

Current EC2 and S3 Dynamic Architecture



HIGHLEVEL PORTAL ARCHITECTURE



Goals

- The goal of the summer research was:
- Install and learn the Paraver and Dimemas programs
- Attend International Conference on Automated Computing
- Attend the International Summer School on Grid Computing
- Deploy and run WRF System V2 & V3 on Mare Nostrum
- Deploy and run WRF System V2 & V3 on EC2 clusters

Conclusions and Future Work

Early analysis of current traces already in place shows high levels of synchronized processes across compute instances. In a virtual environment this should correlate to a significant performance decrease compared to HPC computing due to the lack of dedicated high speed interconnects. The performance degradation should be somewhat comparable to HTC resources.

Future work:

- Extend access to the Mare Nostrum HPC completing WRF simulations
- Complete the S3 and EC2 automated runtime environments for WRF
- Deploy the EC2 environment into the current MetaScheduler as a grid accessible resource
- Implement a performance feedback loop in the WRF Portal Architecture

II. International Experience

Barcelona Supercomputer Center

The Nexus II building seen at the left was the main office and central point of contact for my adviser Dr. Badia. The people, the lab, the computer were all a joy to work with. The tremendous number of projects and research activities being completed there never ceased to amaze me. Exposure to others' active research projects, discussions on cloud computing, autonomous computing, HTC developments and current HPC research was truly a broadening experience.

Barcelona

Traveling to unfamiliar countries is always an experience. Barcelona ranks as my best trip ever to a foreign country. The friendly people of Barcelona, the amazing architecture including Gaudi, the food and nightlife made for a never ending list of thing to see and do.

Conferences

PIRE gave me the opportunity to attend several international conferences including the International Conference on Automated Computing and the International Summer School on Grid Computing. These conferences introduced me to many of the leaders in the autonomic and grid computing fields.

Travel

The opportunities to travel are amazing! Some of the fun places are shown below. First is Figuerés, home of the Salvador Dalí Museum and the largest fort in Europe. Second is and Tarragona home to one of the best examples of Roman ruins in Spain. Both of these trips were done using local easy to trains. The transportation system in Spain was fantastic, easy and cheap to travel just about anywhere!



III. Acknowledgement

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