Views of eScience – from the 3rd IEEE eScience and Grid Computing Conference Bangalore, India (December 2007)

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The term eScience is generally used to describe the science that is undertaken over distributed computational infrastructure (involving the use of computational and data Grids). Whereas much of the effort in Grid computing has been devoted to the development of computational infrastructure, eScience has primarily been about empowering the scientist to utilize such infrastructure in a more effective and efficient manner. As much of the science that is undertaken today requires collaboration between distributed scientific research groups/laboratories, eScience includes enabling technologies and applications.

The 3rd IEEE International Conference on eScience and Grid Computing (e-Science 2007) took place in Bangalore, India from December 10-13, 2007, building on previous successful events in Melbourne, Australia (2005) and Amsterdam, The Netherlands (2006). The conference was attended by over 200 participants, 50% of whom were international delegates. Overall, approximately 60 research papers were presented (out of 206 submitted) in the main conference. There were also three associated workshops focusing on new developments in established eScience topics on workflow, Problem Solving Environments and Grid interoperability. There were also four tutorials on themes such as Autonomic Grid Computing, Market-Oriented Grid Computing and the Gridbus Middleware, the Globus Toolkit and Application enablement on the Grid.



Inauguration of the conference with lighting of the lamp: Shri S. Ramakrishnan, Shri G. Madhavan Nair, Dr. A. K. Chakravarti, Prof. Geoffrey Fox, Dr. Rajkumar Byyya, Prof. N. Balakrishnan

The Centre for Development of Advanced Computing (C-DAC) based in Bangalore played a major role in the organization of the event, along with strong support from the Indian Government and several leading IT companies. India's "GARUDA" Grid computing project was highlighted in a number of talks and posters, and demonstrated the emphasis that has been placed on Grid computing research in India over recent years. Dr Ramakrishnan from C-DAC presented a number of projects that were being

undertaken on India's GARUDA Grid, and Dr Prahlada Rao and his team provided demonstration of some of these. These projects ranged from infrastructure monitoring (to assess the current status of Grid nodes in GARUDA), Integrated Development Environments to aid the programming of Grid applications and support their subsequent deployment, and applications that subsequently made use of this infrastructure – particularly in the area of space science and astrophysics. The conference featured a plenary session with live demonstration of Grid technologies and their e-Science applications by teams around the world.

The conference featured three keynote presentations, the range of which also demonstrated the interface that eScience provides between the application developers/users and computational infrastructure communities. The first keynote presentation from Professor Thomas Fahringer (University of Vienna) discussed how workflow-based applications could be optimized for execution over Grid infrastructure. Professor Fahringer presented a number of heuristics his team have developed to improve the overall execution time of applications on the Grid – demonstrating this with the Wien2K application. Professor Fahringer also described the need for new types of applications, such as interactive and distributed gaming, and emphasised the significant market share that such applications currently command. His talk demonstrated how Massively Multiplayer Online Games (MMOGs) could be developed using a concept similar to computational fluid dynamics codes, whereby a "cell" would contain a shared space that players within the game could occupy. Movement of players could be modelled in a similar way to the movement of molecules within the fluid.

The second keynote presentation from Professor David de Roure (University of Southampton) discussed the importance of Web 2.0 and social network technologies to improve the take up of eScience. Professor de Roure identified the importance of ensuring that the focus remained on the scientist, and the overall scientific publication process, rather than purely on improve execution speed of applications. He emphasised that it was important to ensure that one continued to take this wider viewpoint, and for the field to mature it was necessary to better understand the motivation of scientists in utilizing Grid technologies. He emphasised that it was necessary to build on the experience gained in the World Wide Web research community, as the number of users of Web technologies significant surpassed those of Grid computing. He also emphasised that eScience should be about empowering the "everyday" scientist, rather than (as presently) focusing on the "high end" scientists (who had access to large computational instruments, and the often discussed LHC development at CERN). He described 8 ways in which Web 2.0 "patterns" could be used to improve eScience, emphasising the need to integrated Web 2.0-based implementations with Grid-based implementations through the use of social network-related portals (motivated through the success of portals such as facebook). Professor de Roure described work in the myExperiment project where scientists were provided with an interface similar to facebook, and allowed such scientists to share their workflows with each other.

The third keynote was presented by Professor Xiaoming Li from Peking University, Beijing, China and talked about the importance of "trust and reputation" mechanisms within eScience and Web-based computing in general. Professor Li described work in his lab utilizing the Eigentrust algorithm, and subsequent use of this within various content sharing community within China. He discussed the need to consider "trust" measures when interaction between participants who did not have pre-established relationships was required. He also identified the difference between security related work that trust often encompasses, into the wider field of reputation management based on content-sharing networks.

During the conclusion of the conference, the Program Chair, Prof. Geoffrey Fox from Indiana University, presented best paper awards to highly rated articles by the program committee: (a) "The Data Playground: An Intuitive Workflow Specification Environment" authored by Andrew Gibson, Matthew Gamble, Katy Wolstencroft, Tom Oinn and Carole Goble (all from UK) and (b) "Model-Driven Simulation of Grid Scheduling Strategies" authored by Hui Li and Rajkumar Buyya (from The Netherlands and Australia respectively). The organizing chair of the poster and research demo, Dr. Dan Katz from Louisiana State University, then presented awards for the best posters and research demos sponsored by two IEEE Technical Committees – namely TCSC and TCPP.



Minister of State for Planning, Govt. of India, speaking during the valedictory function

This summary of the "eScience and Grid computing" conference cannot fully cover the variety of work presented at the conference. An attempt is made to present some key themes at the conference, and to highlight some new and emerging areas of interest to the community. Interested readers are referred to the proceedings of eScience 2007 for additional information – which has been published by the IEEE Computer Society Press. eScience 2008 will be held in Indianapolis, Indiana, USA during December 7-12, 2008. eScience 2009 is scheduled to take place in Oxford, England and 2010 in Brisbane, Australia.