

Agent Based Computational Grids: Research Issues and Challenges

Omer F. Rana

Cardiff University, UK

Abstract. As computer and computational scientists have to manage access to increasingly complex computing and data resources, this becomes a time consuming task. This is especially true for Computational Grids, which can involve the integration of resources distributed across multiple administrative domains. Deciding which systems to use, where the data resides for a particular application domain, how to migrate the data to the point of computation (or vice versa), and data rates required to maintain a particular application “behaviour” become significant. To support these, it is important to develop brokering approaches based on intelligent techniques – to support service discovery, manage performance based on data from monitoring tools, and support data selection. Although the use of broker-based techniques can be found in literature today – very few of these fully utilise the potential of an agent-based system. Intelligent agents provide a useful means to achieve the objectives outlined above. An important and emerging area within Grid computing is the role of service ontologies – especially domain specific ontologies, which may be used to capture particular application needs. Using these, scientists may be able to share and disseminate their data and software more effectively. This has been recognised as being important by both the computer and computational science community – and current efforts towards establishing “Semantic Grids” is a useful first step in this direction.

The role of agent standards and how they can be integrated with Grid computing is explored. Specialist activities that can be undertaken by agent-based computing are outlined, along with example implementation of such systems. Research challenges that still need to be addressed are highlighted, along with possible benefits that overcoming such challenges will bring.