Contribution ID: **99**   Type: **Presentations**

A review of usage accounting and charge models in the UK NGS.

Thursday, 11 April 2013 12:00 (30 minutes)

Impact

The UK NGS was one of the first production national initiatives to address the grid computing needs of the academic community regardless of subject area. Resources made available to those communities were necessarily diverse and heterogeneous. From the outset the NGS looked to support researchers whose work might be funded in different ways, from the support of individual or small projects, through to large communities: either Virtual Organisations (VOs) or indeed organisations.

At the same time the NGS had to support multiple forms of resource provision: resources provided as a consumable products, resources donated, resources shared and resources funded directly to the grid infrastructure as a whole.

The NGS formed bilateral agreements between itself and institutions (as a legal entity for the provision of resource), and "Members"were categorised as either Associates, Partners or Core Members. Associates agreed to support a minimum subset of grid protocols; partners agreed to support protocols and donate a subset of resource for access by members of the ngs.ac.uk VO (see below); core resources supported the agreed grid software stacks, the ngs.ac.uk VO and other "recognised"VOs, as well as providing a portion of the NGS core services.

The NGS was initially a project tasked with the creation and maintenance of a heterogeneous grid infrastructure in the UK. As part of that task it formed a community built from members who had academic research to perform and would do so with "Free At The Point Of Use"(FATPOU) grid compute and data facilities this community was realised in the formation of the ngs.ac.uk VO later expressed through VOMS technologies. Some researchers would also have access to other "Charged At The Point Of Use"(CATPOU) resources –those from NGS Associate Members –registration and access to these resources would remain out of the control of the NGS.

To allow the grid to function the NGS had to develop IT infrastructure to support its diverse resources, cross site charging models, accounting, policing, user management, peer review, and this had to be secure, open, auditable and standards based.

This presentation and paper will describe the evolution of the NGS accounting and charge models, the User Accounting System and registration processes, the use and development of relevant standards and technologies. A summary of our experiences over the last ten years will be presented.

Summary

We present the experiences of the UK NGS in its pursuit of accounting and charge models over the last ten years. We describe the modelling of the community as individuals, members of organisations and members of Virtual Organisations. We describe how the NGS supported both "Charged"and "Free"heterogeneous grid resources. We describe the tooling chosen and developed to meet the needs of our resource providers so that grid usage could be controlled and where necessary policed. We describe the formation of Virtual Organisations and how they were expressed and handled within the infrastructure. We describe the technologies and models developed in the pursuit of a UK National Grid Service and we present some of the concepts still missing from the overall environment.

Description

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On a technological front we describe the NGS RUS tooling, Usage Record (UR) generation, consumption and retention of URs, the User Accounting System (UAS) and some recent work on integration with APEL.

On a architectural front we describe how the charge models environment was envisaged and how the NGS grid economy was expected to be formed with resource sharing, resource cross charging, brokering and rudimentary banking. We describe some pieces of the puzzle which still need to be addressed.

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Session Classification: EGI Accounting Workshop

Track Classification: Operational Services (Track Lead: T Ferrari and M Krakowian)