

An OGSA-Based Accounting System for Allocation Enforcement across HPC Centers

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ABSTRACT

In this paper, we present an Open Grid Services Architecture (OGSA)-based decentralized allocation enforcement system, developed with an emphasis on a consistent data model and easy integration into existing scheduling, and workload management software at six independent high-performance computing centers forming a Grid known as SweGrid. The Swedish National Allocations Committee (SNAC) allocates resource quotas at these centers to research projects requiring substantial computer time. Our system, the SweGrid Accounting System (SGAS), addresses the need for soft real-time allocation enforcement on SweGrid for cross-domain job submission. The SGAS framework is based on state-of-the-art Web and Grid services technologies. The openness and ubiquity of Web services combined with the fine-grained resource control and cross-organizational security models of Grid services proved to be a perfect match for the SweGrid needs. Extensibility and customizability of policy implementations for the three different parties the system serves (the user, the resource manager, and the allocation authority) are key design goals. Another goal is end-to-end security and single sign-on, to allow resources—selected based on client policies—to act on behalf of the user when negotiating contracts with the bank in an environment where the six centers would continue to use their existing accounting policies and tools. We conclude this paper by showing the feasibility of SGAS, which is currently being deployed at the production sites, using simulations of reservation streams. The reservation streams are shaped using soft computing and policy-based algorithms.