

Risk Management in Grid Computing *

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Abstract

The Grid is an approach to high-performance and large scale networked computing that has the potential to dramatically alter how computing resources are allocated for large projects. Built on the Internet and the World Wide Web, it is a class of infrastructure comprising a set of high-speed computers, storage systems and networks, plus a set of Grid services (or middleware) to coordinate the ensemble of resources. By providing scalable, secure, high-performance mechanisms for discovering and negotiating access to remote resources, the Grid promises to make it possible for scientific collaborations to share resources on an unprecedented scale, and for geographically distributed groups to work together in ways that were previously impossible.

Grid technologies have reached a high level of development, but adopters underline core shortcomings related to security, trustworthiness, and dependability of the Grid for commercial applications and services. Users

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require a job execution with the desired priority and quality and negotiate Service Level Agreements (SLAs) to define all aspects of the business relationship. Nevertheless, providers are still cautious on adoption as agreeing on SLAs including penalty fees is a business risk: for example a system failure can lead to SLA violation. Providers need risk assessment methods as decision support for accepting/rejecting SLAs, for price/penalty negotiation, for activating fault-tolerance actions, and for capacity and service planning. Grid end-users need the estimation and aggregated confidence information for provider selection and fault-tolerance/penalty negotiations.

This research (recently funded by the European Commission) addresses risk awareness and consideration in SLA negotiation, self-organising fault-tolerant actions, and capacity planning. It will develop and integrate methods for risk management in all Grid layers. The corner stones are risk management scenarios reflecting the perspective of Grid end-users, resource brokers, and resource providers. The results will support all Grid actors by increasing the transparency, reliability, and trustworthiness as well as providing an objective foundation for planning and management of Grid activities. Thus, this research will supply Next Generation Grids with additional innovative and required components to close the gap between SLAs as concept and accepted tool for commercial Grid uptake.

This research will produce generic and interoperable open-source software for risk assessment, risk management and decision support in each Grid layer. The outcome quality will be demonstrated in provider environments and in close interaction with customers.