Trust and Reputation on Federated Computing Infrastructures

by Dr. Fabrizio Messina

Abstract

Large-scale federations of computing infrastructures consist of nodes that individually manage local resources intended to serve clients. The goal of federations is to achieve better overall Quality of Service (QoS), reliability and cost efficiency by utilizing multiple resources spread over different geographical sites. Federated nodes may be part of different local organizations or computational domains, as companies and research centers. The main purpose of federations, i.e. the common goal to achieve, represents the basis of the resource sharing model, and different intermediate actors may take part in this process, as Grid Resource Brokers or inter-cloud Brokers.

This talk will focus on three different trust-based, decentralized approaches aimed at improving the QoS perceived within a large-scale federation of computing infrastructures. The first one is based on the adoption of a fully decentralized resource finding algorithm along with a trust model for accurately evaluating the trustworthiness of its interlocutors. The resource finding algorithm is designed to allow any node to find the most suitable collaborators in an efficient way by organizing the nodes of the federation in an overlay network, while the trust model allows the clients to improve the final QoS by discerning the most reliable nodes.

The second approach is aimed at improving the final QoS of dynamic Grid Federations. The novel part of this approach is the combination of an extended model of virtual organization, i.e. Dynamic Grid Federations, which provides more flexibility and dynamicity to virtual organization, as well as the combination of an agent-oriented trust-aware framework, which is designed to observe and characterize past behaviors of nodes in terms of resource sharing and consumption, and to determine the trust relationships occurring between each pair of nodes. Therefore, by combining trust and historical behaviors into a unified convenience measure, software agents are able to support a fully decentralized, greedy procedure, aimed at controlling the grid formation process, which enable an improvement of the global QoS of the federation.

Another trust-based approach exploits a decentralized procedure which leads to the formation of coalitions between nodes, along with a trust model for a network of software agents, designed to assist federated the computing federation. In this solution, the concept of Global Capital will reflect the global QoS offered by the federation.

About the Speaker

Fabrizio Messina received his Master Degree in Computer Science from the Department of Mathematics and Informatics of the University of Catania in 2005, and its Ph.D. in Computer Science in 2009 from the same department. He was involved in several scientific projects concerning Grid Computing (2009-2012), and Cloud Computing (2012-2015). He is currently working as post-doctoral researcher in the Department of Mathematics and Informatics of the University of Catania, where he teaches Web technologies and Cloud Computing. He is co-authors of about 50 research papers on International Conferences and Journals. His research interests include Parallel and Distributed Simulations, Intelligent Systems, Grid and Cloud Computing, Trust and Reputation systems.