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Economics of Grids, Clouds, Systems, and Services

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Preface

The commercial exploitation of distributed computing technologies is slowly starting to become popular under the general area of cloud computing. These solutions allow selling and buying of resources (i.e., computing, network, software, and data resources) on demand. Existing solutions in this area are diverse, ranging from Infrastructure-as-a-Service (IaaS) models via Platform-as-a-Service (PaaS) to Software-as-a-Service (SaaS) models. Although the economics of these services is not yet fully understood and the interoperability between such services is still lacking, a common market for computing services is slowly developing.

Such a market would allow buyers and sellers of computing services to trade their excess capacity or make available their capacity at a cost. However, it is still not possible for a market participant to act as a resource provider or seller, or trade based on the current level of demand. Another example of a developing open market is the emergence of Web2.0-based services. These enable consumers to create new services by aggregating services from multiple providers. The benefit of these solutions is that "value" can be created by combining services at different prices.

The GECON workshop series is intended to enable researchers and practitioners from academia, industry, and national research laboratories to identify economics-related issues and solutions associated with the development of services. Such work can comprise extensions to existing technologies, successful deployments of technologies, economic analysis, and associated theoretical concepts. The purpose of this workshop is to gather original work and build a strong community in this increasingly important area of the future economy.

The 7th International Workshop on the Economics of Grids, Clouds, Systems, and Services (GECON 2010) attracted a number of high-quality paper submissions. In total, we received 19 submissions, of which 6 were accepted as full papers and another 6 as "work-in-progress" papers. Each paper was reviewed by between 3 and 5 international experts.

For the proceedings, the 12 accepted papers of this workshop have been grouped into 4 sessions – with each session consisting of 3 contributions: (1) Service Evaluation and Trust; (2) Service Pricing and Software Licenses; (3) Adoption of Grid and Cloud Services; and (4) Value Chains and Service Level Agreements. It is to be noted that there continues to be high interest in Service Level Agreements (SLAs) as important enablers for service-oriented systems, since over 40% of the papers report on the use of SLAs.

In the first session on "Service Evaluation and Trust", the contribution by Frank Dickmann et al. entitled "Technology Transfer of Dynamic IT Outsourcing Requires Security Measures in SLAs" uses a questionnaire-based approach to assess the need for security within Service Level Agreements (SLAs). The authors interviewed around 75 experts at the CeBIT fair in Germany to gather their data. It is really interesting to see a paper that discusses user perception of security and highlights the need to focus

on specific security challenges for SLAs in grid and cloud computing. The paper entitled "Service Selection Decision Support in the Internet of Services" by Konstantinos Tserpes et al. discusses how a "Quality of Experience", gained from multiple customers using a particular service, could be used to support service selection. The authors identify how collaborative filtering techniques can be used to relate user ratings, and thereby group users with similar types of ratings for services. Simulation is used to validate the approach. The final contribution in this session, entitled "Resource-Level QoS Metric for CPU-Based Guarantees in Cloud Providers" by Goiri et al. proposes a CPU allocation metric for allowing cloud resource providers to dynamically allocate their capacity for this resource among the running services depending on demand. The work is motivated by the observation that current cloud providers do not support fine-grained resource level QoS guarantees on their SLAs – with most commercial providers focusing on resource availability guarantees. The customer's CPU usage is used in the metric definition, but "fake" SLA violations are avoided when a customer's task does not use all its allocated resources.

In the second session on "Service Pricing and Software Licenses", Silagi et al. identify "A Framework for Building Intelligent SLA Negotiation Strategies under Time Constraints". The contribution makes use of an agent-based system utilizing Bayesian learning for negotiating SLA parameters under time constraints. Their work shows that setting time constraints may actually lead to better results. It forces players to learn the required parameters more quickly. A comparison with other strategies is also provided by the authors. The contribution by Rohitratana and Altmann, entitled "Agent-Based Simulation of the Software Market under Different Pricing Schemes for Software-as-a-Service and Perpetual Software" focuses on developing a simulation to support the pricing of software licenses, comparing three different schemes: derivative-follower (DF), demand-driven (DD) and competitor-oriented (CO). The simulation involves two types of agents: customer agents and vendor agents – and the authors show which of the three schemes DF, DD or CO should be followed in a particular context. The software license theme is continued in the paper by Ziegler et al. entitled "Software Licenses as Mobile Objects in Distributed Computing Environments", which focuses on supporting license management within grid computing and service-oriented environments, decoupling license usage from authorization, and expresses authorization by SLAs. The contribution focuses on supporting license management via mobile objects that do not need to be managed by a centralized server – and instead may move to the environment/host where they are needed.

The next two sessions, "Adoption of Grid and Cloud Services" and "Value Chains and Service Level Agreements", focus on work-in-progress contributions that are at an early stage of maturity. Heine and Strebel in "IaaS Adoption Determinants in Enterprises" discuss organizational challenges that have limited the uptake of Infrastructure-as-a-Service (IaaS) as an IT provisioning model. The authors use an interview-based approach – having identified 50 experts (and finally interviewing 20 of these). Oberle and Fisher in "ETSI CLOUD – Initial Standardization Requirements for Cloud Services" report on standards that are necessary for realizing future interoperable clouds. This contribution identifies the European cloud standardization landscape and the term "cloud computing", and provides a list of requirements, divided into 11 categories, about standardization issues of cloud-computing-related areas. It summarizes the out-

come of an ETSI (European Telecommunications Standards Institute) Technical Committee on Cloud Computing workshop, where experts from industry and research came together. Tobias Knoch then discusses how low resource utilization in grid computing systems could be explained by using the Inverse Tragedy of the Commons theory, in the paper "Approaching the Internalization Challenge of Grid Technologies into e-Society by e-Human Grid Ecology". In the final session, Markus Böhm et al. in their contribution "Towards a Generic Value Network for Cloud Computing" describe the transition from linear value chains to generic "value networks", identifying the role of different actors involved in a cloud computing market. The authors use an interview-based approach to identify future "value" streams within this emerging area. Petri et al. in their contribution "SLA as a Complementary Currency in Peer-2-Peer Markets" identify how SLAs can be used as a complementary currency to support resource exchange within a distributed system. They use a PeerSim-based simulation to demonstrate profit/loss that can arise within a market of collaborating peers, exchanging SLAs. Finally, Ul Haq et al. in their paper "SLA Validation in Layered Cloud Infrastructures" present an approach for combining SLAs across different infrastructures. The authors present a multimedia data sharing scenario to validate their approach.

To make this workshop a success, many people contributed to this event. In particular, we would like to express our gratitude to the organizers of the 2010 Euro-Par conference for their support in co-locating the GECON 2010 workshop at Ischia in Naples (Italy). We would also like to thank Alfred Hofmann of Springer for his help in getting the proceedings printed on time. Finally, our gratitude goes to Marcel Risch for his time and effort in setting up the website.

July 2010

Jörn Altmann
Omer Rana

Organization

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