

Preface

The way in which IT resources and services are being provisioned is currently in flux. Advances in distributed systems technology have allowed for the provisioning of services with increasing flexibility. At the same time, business and academia have started to embrace a model wherein third-party services can be acquired with minimal service provider interaction, replaced, or complemented. Organizations have only started to grasp the economic implications of this evolution.

As a global market for infrastructures, platforms, and software services emerges, the need to understand and deal with these implications is quickly growing. In addition, a multitude of new challenges arise. These are inherently multidisciplinary and relate to aspects such as the operation and structure of the service market, the cost structures, the quality experienced by service consumers or providers, and the creation of innovative business models. These challenges emerge in other service domains as well, for example, in the coordinated operation of the next-generation electricity grids that are characterized by distributed generation facilities and new consumption patterns.

The GECON conference series brings together researchers and practitioners from academia and industry to present and discuss economics-related issues and solutions associated with these developments and challenges. The contributed work comprises successful deployments of technologies, extensions to existing technologies, economic analyses, and theoretical concepts, achieving its objective of building a strong multidisciplinary community in this increasingly important area of the future information economy.

The 12th edition of GECON took place in the city of Cluj-Napoca, Romania, the heart of Transylvania, the land “beyond the forest” and the home of Dracula. Built on the grounds of the ancient Roman city of Napoca, with one of the most vibrant economies, Cluj-Napoca is among the largest cultural and educational cities in the country.

Founded in 1581, Babeş-Bolyai University (UBB) is the oldest university in Romania and has a long history of education, research, and serving the local community. Currently, UBB is the largest university in the country, bringing together more than 38,000 undergraduate, graduate, and doctoral students, enrolled in 516 programs that are offered in Romanian, Hungarian, German, English, and French. The university is evaluated and ranked among the top three universities in Romania for the quality of its programs and research.

For the first time in the conference’s 12-year history, we launched the call for papers of the conference around eight specific tracks as follows: Economics of Big Data; Smart Grids; Community Nets and the Sharing Economy; Economically Efficient Resource Allocation and Service Level Agreements; Economics of Software and Services; Economics of Service Composition, Description, and Selection; Economic Models of Networked Systems; Legal Issues, Economic, and Societal Impact.

Each track was led by two chairs and included a specific description for topics of interest, helping the authors to better position their contribution in the conference. GECON 2015 attracted 38 high-quality submissions, and the Program Committee selected 11 long papers and nine work-in-progress papers for presentation at the conference. These 20 papers together with an invited paper submitted by Prof. Dana Petcu and based on a very welcomed keynote lecture form the current proceedings. Each paper received between three and five, reviews. The schedule of the conference was structured to encourage discussions and debates on the presented topics. We hope that we succeeded in boosting an open and informal dialogue between the presenters and the audience, enabling the authors to better position their work and increase the impact on the research community.

We organized the contents of the proceedings according to the thematic topics of the conference sessions as follows:

In the “Resource Allocation” section, the allocation optimality problem is debated from two perspectives: the resource provider and the service user. The paper of Leonardo P. Tizzei et al. attacks the problem of the financial losses incurred by pricing models for IaaS cloud providers when applications release resources earlier than the end of the allocated time slot. The authors present a tool to create and manage resource pools for multi-tenant environments and demonstrate its effectiveness. The paper of Ovidiu-Cristian Marcu et al. handles the problem of scheduling tasks in hybrid clouds for small companies with a fixed restricted budget. The authors propose an architecture that meets the challenges encountered by small business in their systems for task scheduling and discuss the efficiency of the proposed strategy. In their paper, Dmytro Grygorenko et al. discuss cost-aware solutions to manage a virtual machine placement across geographically distributed data centers and to allow providers to decrease the total energy consumption while keeping the customers satisfied with high-quality services. They propose a Bayesian network constructed out of expert knowledge and another two algorithms for VM allocation and consolidation and show the effectiveness of their approach in a novel simulation framework. Iliia Pietri and Rizos Sakellariou tackle the problem of choosing cost-efficient resource configurations in different scenarios, depending on the provider’s pricing model and the application characteristics. They analyze two cost-aware resource selection algorithms for running scientific workflow applications on deadline and with a minimum cost. Finally, Pedro Alvarez et al. propose a method to determine the cheapest combination of computing instances to execute bag-of-tasks applications in Amazon EC2, considering the heterogeneity of the resources as well as the deadline and the input workload provided by the user.

The “Service Selection” section includes the well-received keynote lecture delivered by Prof. Dana Petcu. The keynote was centered around the scientific contribution developed in a couple of European FP7 and H2020 projects as well as in a project supported by the Romanian National Authority of Research. The mentioned projects developed support platforms for ensuring a certain quality level when using multiple clouds. The paper analyzes the existing approaches to define, model, evaluate, estimate, and measure the QoS offered to cloud-based applications, with an emphasis on model-driven engineering techniques and for the special case of data-intensive applications. The second contribution to the service selection topic comes from Kyriazis et al., who present an approach for selecting services to meet the end-to-end QoS requirements

enhanced with a relevance feedback mechanism regarding the importance of the content and the service. The effectiveness of the approach is demonstrated in a real-world scenario with a computer vision application. The paper of Mathias Slawik et al. presents the Open Service Compendium, a practical, mature, simple, and usable approach to support businesses in cloud service discovery, assessment, and selection. Developed within the H2020 Cyclone project, this information system offers business-pertinent vocabularies, a simple dynamic service description language, and match-making functionality.

One of the major topics of interest at the GECON 2015 conference was “Energy Conservation and Smart Grids.” In this section, the team of Prof. Ioan Salomie from the Technical University of Cluj-Napoca, Romania, contributed two papers that address optimization of energy consumption in data centers. The first paper authored by Marcel Antal et al. defines energy flexibility models for hardware in data centers aiming to optimize the energy demand profiles by means of load time shifting, alternative usage of non-electrical cooling devices, or charging/discharging the electrical storage devices. The second paper authored by Cristina Bianca Pop et al. presents a particle swarm optimization method for optimizing the energy consumption in data centers. An additional paper on energy conservation has been contributed by Alberto Merino et al. Their paper deals with requirements of energy management services in short- and long-term processing of data in massively interconnected scenarios. They present a component-based specification language for building trustworthy continuous dataflow applications and illustrate how to model and reason with the proposed language in smart grids. The paper of Baseem Al-athwari and Jorn Altmann considers user preferences when adjusting the energy consumption of smartphones, in order to maximize the user utility. They show how the model can be employed and how the perceived value of energy remaining in the smartphone battery and the user’s perceived costs for energy consumption in cloud-based applications and on-device applications vary. Richard Kavanagh et al. present an architecture that focuses on energy monitoring and usage prediction at both PaaS and IaaS layers, delivering energy metrics for applications, VMs, and physical hosts. They present the initial results of the architecture utilizing a generic use case, building the grounds for providers passing on energy consumption costs to end users.

The next section, “Applications: Tools and Protocols,” presents three contributions that shows how grids and clouds can enhance various application domains. The paper of Soheil Qanbari et al. introduce the “Diameter of Things,” a protocol intended to provide near real-time metering framework for Internet of things (IoT) applications. The authors show how the diameter of things can be deployed to implement real-time metering in IoT services for prepaid subscribers and pay-per-use economic models. Tanwir Ahman et al. present a tool to explore the performance of Web applications and investigate how potential user behavioral patterns affect the performance of the system under testing. The third paper, authored by Mircea Moca et al., introduces E-Fast: a tool for financial markets allowing small investors to leverage the potential of on-line technical analysis. The authors present results obtained with a real service implementation on the CloudPower HPC.

The “Community Networks” section brings together two contributions investigating cloud applications deployed in community networks, as a complement to traditional

large-scale public cloud providers. The paper of Amin Khan et al. models the problem of reserving bandwidth for guaranteeing QoS for cloud applications. They evaluate different auction-based pricing mechanisms for ensuring maximal social welfare and eliciting truthful requests from the users. The paper of Roger Baig et al. presents a sustainability model for the guifi.net community network as a basis for a cloud-based infrastructure. The authors assess the current status of the cloud community in guifi.net and discuss the operation of different tools and services.

The section on “Legal and Socio-Economic Aspects” brings the technical models discussed within the conference closer to the business and society. The paper of Cesare Bartolini et al. describes the legal challenges incurred by cloud providers’ viability, as the commercial Internet is moving toward a cloud paradigm. Given that the cloud provider can go out of business for various reasons, the authors propose several ways of mitigating the problem from a technical and legal perspective. Kibae Kim explores the ICT innovation systems of various countries with respect to the key drivers for economic growth. Given the world-wide knowledge base of patents, the paper undertakes a network analysis, identifying how the cluster of developing countries is linked with the developed ones and how the structure of the innovation network evolved during its history. The last paper in this topic was contributed by Sebastian Floerecke and Franz Lehner. In their paper, they perform a comparative analysis of the dominating cloud computing ecosystem models, identifying relevant and irrelevant roles of market players acting in the system. They define the Passau Cloud Computing Ecosystem model, a basis for investigating whether each role can be actually covered by real actors and which typical role clusters prevail in practice.

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