Guest Editorial

Introduction to Special issue on Recent Advanced Technologies and Theories for Grid and Cloud Computing

Grid and Cloud Computing has emerged rapidly as an exciting new computing paradigm and includes pervasive, personal, and peer-to-peer computing to provide computing and communication services. Tremendous advances in processing, communication and systems/middleware technologies are leading to new paradigms and platforms for grid and cloud computing. Grid and cloud computing enables the sharing of distributed computing and data resources such as processing, networking and storage capacity to create a cohesive resource environment for executing distributed applications in service-oriented computing. There might be many issues to realize and provide intelligent services and much effort and enormous attention have been focused on the cloud and grid computing environments. The research area poses challenges such as virtualization, new systems and tools, middleware technologies, service-oriented architectures and models, cloud/grid security and trustworthy, autonomous and intelligent management, and mobile cloud application and framework.

This special issue comprising seven papers is focused on various aspects of grid and cloud computing and their applications. Papers were selected on the basis of fundamental ideas/concepts rather than the thoroughness of techniques deployed. The papers are organized as follows.

The first paper entitled “Towards Enabling Cyber infrastructure as a Service in Clouds” by Lizhe Wang demonstrates the cloud via a real application, the Emergency Services Directory (ESD) system, and tests it with a High-Performance Computing (HPC) benchmark. Experimental results justify the design of Cyberinfrastructure as a Service and the implementation of the Cyberaide Creative service.

The second paper entitled “High Availability and Efficient Energy Consumption for Cloud Computing Service with Grid Infrastructure” by Young-Sik Jeong and Jong Hyuk Park presents a grid infrastructure used for server virtualization in which existing servers are used rather than bringing in new servers. Server virtualization service is provided using scheduling algorithms for distributed servers or resources in grid computing. To overcome potential performance limitations that come from using existing servers, mathematical models of Meta and Sleep Servers under the grid infrastructure environment are used to provide server virtualization service with high availability.

The next paper is “Queuing Model Analysis and Scheduling Strategy for Embedded Multi-core SoC Based on Task Priority” by Tie Qiu, Lin Feng, He Jiang, and Weifeng Sun. This paper presents a new queuing network model and performance analysis method for embedded multi-core SoC based on task handling mechanism with priority. To calculate the blocking probability and queuing situation of the implementation for every executing core, finite capacity holding nodes are added to the queuing model, and an equivalent queuing network model is obtained.

The next paper is “Secure and Efficient Data Retrieval over Encrypted Data Using Attribute-Based Encryption in Cloud Storage” by Dongyoung Koo, Junbeom Hur, and Hyunsoo Yoon. The proposed scheme here is best suited for cloud storage systems with massive amount of data. It provides rich expressiveness regarding access control and fast search with simple comparisons of searching entities. The proposed scheme also guarantees data security and user privacy during the data retrieval process.

The fifth paper is “Beyond Lightning: A Survey on Security Challenges in Cloud Computing” by Chunming Rong, Son T. Nguyen, and Martin Gilje Jaatun. This paper gives an overview of cloud computing and its security challenges. The authors emphasize that although there are many technological approaches that can improve cloud security, there are currently no one-size-fits-all solutions, and future work has to tackle challenges such as service-level agreements for security, as well as holistic mechanisms for ensuring accountability in the cloud.

The next paper “Exploiting SIMD Parallelism on Dynamically Partitioned Parallel Network Coding for P2P Systems” is by Deokho Kim, Karam Park, and Won Woo Ro. This paper presents a new data manipulation method to utilize Single-Instruction-Multiple-Data (SIMD) instruction sets, which can be successfully integrated into the dynamic partitioning of thread-level workload distribution. With exploiting both SIMD and thread-level parallelism, they achieve the speed-up of 10.86 using 8 running threads compared to the serial algorithm.
The final paper in this special issue is titled “A Novel and Efficient Source-path Discovery and Maintenance Method for Application Layer Multicast” and is authored by Jianqun Cui, Naixue Xiong, Jong Hyuk Park, Keming Jia, and Libing Wu. The paper improves on the Topology-Aware Grouping (TAG) application layer multicast by a novel source-path discovery method, called p-tracert. Their method discovers and maintains gateway addresses and the connection information among gateways in a novel and efficient way.

The guest editors wish to thank all the authors of this special issue for contributing high quality papers. We would also like to thank the referees who have critically evaluated the papers within the short stipulated time. Thanks are also due the Editor-in-Chief, Dr. Manu Malek, and the editorial staff of the journal for their support and help in preparing this special issue.

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Isaac Woungang received his MSc. and Ph.D degrees, both in Mathematics, from the Université de la Méditerranée-Aix Marseille II, France, and Université du Sud, Toulon & Var, France, in 1990 and 1994, respectively. In 1999, he received a M.Sc. degree from the INRS-Materials and Telecommunications, University of Quebec, Montreal, Canada. From 1999 to 2002, he worked as a software engineer at Nortel Networks. Since 2002, he has been with Ryerson University, where he is now an Associate Professor of Computer Science.