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EDITORIAL

Guest editorial

Special issue on autonomic and trusted computing

Laurence T. Yang · Bernady O. Apduhan · Tadashi Dohi · Manish Parashar

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Computing systems including hardware, software, communication, and networks are growing towards an ever-increasing scale and heterogeneity, becoming overly complex. Such complexity is getting even more critical with the ubiquitous permeation of embedded devices and other pervasive systems. To cope with the growing and ubiquitous complexity, autonomic computing (AC) focuses on self-manageable computing and communication systems that exhibit self-awareness, self-configuration, self-optimization, self-healing, self-protection and other self-x operations to the maximum extent possible without human intervention or guidance. Organic computing (OC) additionally addresses adaptivity, robustness, and controlled emergence as well as nature-inspired concepts for self-organization. Any autonomic or organic system must be trustworthy to avoid the risk of losing control and retain confidence that the system will not fail. Trust and/or distrust relationships in the Internet and in pervasive infrastructures are key factors to enable dynamic interaction and cooperation of various users, systems, and services. Trusted/trustworthy computing (TC) aims at making computing and communication systems as well as services available, predictable, traceable, controllable, assessable, sustainable, dependable, persistent, security/privacy protectable, etc.

L. T. Yang (✉)
St Francis Xavier University, Antigonish, Canada
e-mail: ltyang@gmail.com

B. O. Apduhan
Kyushu Sangyo University, Fukuoka, Japan

T. Dohi
Hiroshima University, Higashihiroshima, Japan

M. Parashar
Rutgers University, Piscataway, USA

This special issue is dedicated to the topic of autonomic and trusted computing. We received a total of 19 papers. Selecting these papers was extremely difficult as there were many excellent and interesting submissions. Through a careful reviewing process in which each paper was rigorously reviewed by at least three professional reviewers, finally we only accepted 4 papers.

In the first paper, Yau et al. presented an adaptable distributed trust management framework for enabling development of large-scale secure service-based systems. This framework includes a meta-model with a formal specification language for situation-aware security policies, and tools for generating and deploying security agents to evaluate and enforce trust decisions based on security policies, credentials and situational information. With this framework, large-scale service-based systems can incorporate distributed trust management to meet their trustworthiness requirements under various situations.

Pun et al. proposed a novel algorithm that improves a recently proposed generalized integer transform reversible watermarking scheme in two aspects in the second paper. One is an improved distortion control through adaptively chosen threshold in the algorithm. The other is further reducing the size of the location map to be embedded, thus less capacity is used for storing overhead so as to increase its embedding capacity. Overall, it provides high embedding capacity whereas maintains good visual quality for the embedded image. Experimental results also indicate that the proposed method has improved performance compared with the existing methods.

In the third paper, in order to ensure the service availability without any failure, Kanso et al. presented the five redundancy models supported by the availability management framework (AMF) specifications. They defined the analysis model that captures the recovery behavior of the middleware for the different redundancy models. They then used this analysis model to quantify the service availability of a media streaming application. They also performed sensitivity analysis by varying several parameters such as failure and recovery rates.

In the last paper by Dong et al., the authors proposed a fast event detection algorithm named RENDEZVOUS to accelerate the actor's event detecting process while keeping the energy consumption of sensor nodes as minimum. When designing RENDEZVOUS, the authors first study the mobility control of an actor to help the actor move around close to an event by using Reinforcement Learning techniques with collected sensory data. They then design a scheme to search nearby actors from the event side inspired by a searching behavior of desert ants. By performing both search actions in sensor and actor sides, the proposed algorithm can achieve fast event detection with negligible additional energy cost on the sensors side. Extensive simulation results demonstrate the efficiency of RENDEZVOUS.

This special issue is the result of hard work and dedication of many professional reviewers who gave time and effort to read drafts of the papers and offer constructive advice or recommendations, which greatly helped us select the best papers, which appear in this special issue. We would like to express our sincere appreciation to all authors for their valuable contributions. We believe all of these papers and the topics they cover not only provide novel ideas, new results, work-in-progress and state-of-the-art techniques, but also stimulate the future research activities in the area.