Guest Editorial for Special Section on Advanced Techniques for Efficient and Reliable Cloud Storage

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Cloud computing has emerged as a disruptive technology and new computing paradigm in which IT resources (hardware, software, applications, data storage, computing capacity, etc.) are provided as services over the Internet, through “everything-as-a-service”. It builds on the foundations of distributed computing, grid computing, virtualization, service orientation, etc. Cloud storage, which is one of the most attractive cloud services, offers numerous benefits from both the technology and functionality perspectives such as increased availability, flexibility, functionality and costs. However, Cloud environment needs to manage data center virtualization, lower cost and boost reliability by consolidating systems in the cloud.

Despite of very fast advances, the new Cloud environment creates major data management challenges such as efficient and reliable remote storage, online data query processing, outsourcing computation and secure virtualization. This special section addresses such challenging issues covering recent advances in cloud storage, with emphasis on Cloud storage service selection, Cloud data auditing, Cloud data encryption and Cloud data de-duplication. After a very rigorous review process in three rounds, four high quality papers were selected for this special section, which are arranged as follows.

In the first paper “Smart Cloud Storage Service Selection Based on Fuzzy Logic, Theory of Evidence and Game Theory”, Esposito et al. present an approach for optimal selection of Cloud services fitting the customer requirements in terms of quality of service and costs. The aim is to handle uncertainty in the expression of subjective preferences from customers in presence of rational/selfish providers, exposing untrustworthy indications concerning the quality of service levels and prices associated to their offers. Fuzzy sets theory is used to express vagueness in the subjective preferences of the customers while the selection strategy is complemented by the adoption of a game theoretic approach for promoting truth-telling ones among service providers.

In the second paper, “Public Integrity Auditing for Shared Dynamic Cloud Data with Secure Group User Revocation” by Jiang et al., the authors investigate secure remote data auditing to achieve secure and efficient public data integrity auditing for shared dynamic data. An efficient public integrity auditing scheme with secure group user revocation based on vector commitment and verifier-local revocation group signature is therefore presented, which supports the public checking and efficient user revocation and also some properties, such as confidentiality, efficiency, accountability and traceability of secure group user revocation.

Cui et al. in the third paper, “Key-Aggregate Searchable Encryption (KASE) for Group Data Sharing via Cloud Storage”, study security concerns over inadvertent data leaks in the cloud due to the capability of selectively sharing encrypted data with different users via public cloud storage. The authors propose a novel concept of key-aggregate searchable encryption and instantiating the concept through a concrete KASE scheme, in which a data owner only needs to distribute a single key to a user for sharing a large number of documents, and the user only needs to submit a single trapdoor to the cloud for querying the shared documents.

The final paper, “Secure Auditing and De-duplicating Data in Cloud” by Li et al., deals with some research issues related to data outsourcing to cloud service. In their approach they consider how to realize data deduplication in cloud while achieving integrity auditing. Aiming at achieving both data integrity and deduplication in cloud, they propose two secure systems to enable integrity auditing and secure de-duplication on encrypted data.

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Vincenzo Loia received the PhD degree in computer science from the University of Paris VI, France in 1989. From 1989, he is a faculty member at the University of Salerno where he teaches situational awareness, IT project & service management. His is currently a full professor of computer science at the Department of Management and Innovation Systems. He was a principal investigator in a number of industrial R&D projects and in academic research projects. He is author of more than 350 original research papers in international journals, book chapters, and in international conference proceedings. He edited four research books around agent technology, Internet, and soft computing methodologies. He is founder of the CO.RI. SA. (Research Consortium on Agent System). He is a coeditor in chief of Soft Computing, and a founder and editor in chief of Ambient Intelligence and Humanized Computing, both published from Springer-Verlag. He serves as an associate editor in several international journals, among them IEEE Transactions on Industrial Informatics, IEEE Transactions on Systems, Man, and Cybernetics, International Journal on Granular Computing. He has held in the last years several roles in IEEE Societies in particular for Computational Intelligence Society (chair of Emergent Technologies Technical Committee, IEEE CIS European Representative, vice-chair of Intelligent Systems Applications Technical Committee). His current research interests focus on hybrid approaches for situational awareness and cognitive-based systems applied in various domains.

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