Guest editorial: Secure cloud computing for mobile health services

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Seamless availability of medical and biological data to legitimate users is the top concern for healthcare systems that are being managed electronically. This demand, as a result, has paved multiple ways for modern technologies deployment in telemedicine and mobile healthcare services. The cloud computing technology deployment in healthcare systems is also considered as a part of the same initiative that has provided numerous benefits to this area. However, at the same time this also gave rise to the possibility of sensitive data exposure by various unpredictable threats associated with cloud computing technology. This threat landscape becomes more critical when it comes to the sensitive data and services management of a

healthcare system. As noticed through the recent incidents, the healthcare systems are vulnerable to multiple threats, that may have serious impact on the healthcare working environment, safety of operations, patient's data privacy and secure transmissions of medical data.

Some of the reasons for these threats are the inherited or disguised vulnerabilities that evolve with time and are present in the cloud deployment models; public or private, as well as the service delivery models; Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). Therefore, by the time these critical healthcare systems would rely on the newly deployed cloud technology, the existing vulnerabilities would have adversely affected these systems. In recent years, due to these security flaws, many healthcare organizations confronted undesired consequences in terms of reputation and losing public confidence. Although cloud security efforts and technologies have significantly evolved, however there still remains a need to address the novel threats that are continuously emerging and becoming complex with time. With evil intentions, these threats tend to pose repeated and sophisticated security attacks, which as a result continuously introduce malicious software and compromise the patient's data privacy and healthcare security.

The aim of this special issue was to attract original and the latest contributions, and to review and survey research and development on information assurance, data privacy and applications security in mobile healthcare systems. We received 16 articles, and each article was rigorously reviewed by at least three experts and finally we selected seven articles for publication.

The paper entitled “Data Damage Assessment and Recovery Algorithm from Malicious Attacks in HealthCare Data Sharing Systems” by Ramzi A. Haraty, Mirna Zbib and Mehedi Masud presents data damage assessment and

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recovery algorithm based on the concept of matrix to delete from malicious and recover from affected transactions in the data source of a healthcare system. The algorithm was evaluated for performance analysis with various approaches to show the efficacy.

The paper entitled “An Intelligent RFID-Enabled Authentication Scheme for Healthcare Applications in Vehicular Mobile Cloud” by Neeraj Kumar, Kuljeet Kaur, Subhas C Misra and Rahat Iqbal proposed an intelligent RFID-enabled authentication scheme based on Petri Nets for healthcare applications in vehicular cloud computing environment. The proposed scheme is evaluated and shows the significance against replay attack, tracking attack, user’s anonymity, eavesdropping, and cloning with forward secrecy.

The paper entitled “Cryptanalysis and Improvement of ‘A Secure Authentication Scheme for Telecare Medical Information System’ with BAN Logic Verification” by Zeeshan Siddiqui, Abdul Hanan Abdullah, Muhamamd Khurram Khan and Abdullah Sharaf Alghamdi presented an enhanced 3FA Smartphone based authentication method for a Cloud Computing environment as compared to Wu et al technique that is shown to be vulnerable in this paper. The paper also shows the efficiency for their proposed authentication mechanism.

The paper entitled “Efficient Data Integrity Auditing for Storage Security in Mobile Health Cloud” by Yongjun Ren, Jian Shen, Yuhui Zheng, Jin Wang and Han-Chieh Chao proposed an efficient data integrity auditing scheme for cloud storage for mobile health applications. The comparison of this scheme with the conventional third party auditing schemes shows significance in speeding up the tag generation and tag checking process.

The paper entitled “Semi-supervised Privacy-Preserving Cloud Clustering Algorithm for Brain Fibers” by Meiyu Huang, Yiqiang Chen, Daniel Bo-Wei Chen, Junfa Liu, Seungmin Rho, and Wen Ji proposed a semi-supervised privacy-preserving cloud clustering algorithm to solve the privacy problem in the cloud mining technique. The algorithm was evaluated using experiments and the results showed the improved clustering purity and privacy against various attacks.

The paper entitled “Providing Security and Fault Tolerance in P2P connections between Clouds for mHealth Services” by Jaime Lloret, Sandra Sendra, Jose M. Jimenez and Lorena Parra proposed a secure architecture for exchanging information, data, services, computing and storage resources between interconnected mHealth clouds. The architecture is considered to be scalable that allows adding new nodes and mHealth clouds easily with load-balancing.

The paper entitled “Privacy Preserving Secure Data Exchange in Mobile P2P Cloud Healthcare Environment” by Sk Md Mizanur Rahman, Md. Mehedi Masud, M. Anwar Hossain, Abdulhameed Alelaiwi, Mohammad Mehedi Hassan, and Atif Alamri, proposed an anonymous on-the-fly secure data exchange protocol for the environment specifically based on pairing-based cryptography. The solution presents a mechanism to allow cloud peers to dynamically generate temporary identities that are used to produce a session key for each session of data exchange. The paper shows that the proposed protocol has significant advantages for various attack handling.

In concluding this guest editorial, we would like to address our special thanks to Prof. Xuemin (Sherman) Shen, the Editor-in-Chief of Peer-to-Peer Networking and Applications for his great support and efforts throughout the whole publication process of this special issue. We are also grateful to all the authors for submitting their papers and the reviewers for their professional and timely work that helped us to select the best papers for publication. Our sincere thanks go to the editorial staff especially Ms. Melissa Fearon, Ms. Irene Bruce and Ms. Jenilyn Jaos from the Springer Journal Editorial Office for their continuous support to publish this special issue.

Dr. Haider Abbas received his MS in Engineering and Management of Information Systems (2006) and PhD in Information Security (2010) from KTH- Royal Institute of Technology, Sweden. He is serving as an Associate Editor for Electronic Commerce Research (Springer). He has received several research grants for ICT related projects from various research funding authorities and working on scientific projects in US, EU, KSA and Pakistan. His professional services

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Dr. Sana Ullah received his Ph.D. degree in Information and Communication Engineering from Inha University in 2011. He worked as an assistant professor in the College of Computer and Information Science, King Saud University, Riyadh from Dec. 2011 to Mar. 2014. He currently serves as an editor for Springer Journal of Medical Systems, KSII Transaction of Internet and Information Systems (TIIS), Wiley Security and Communication Network (SCN),

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Dr. Sudip Misra is an Associate Professor in the School of Information Technology at the Indian Institute of Technology Kharagpur. Prior to this he was associated with Cornell University (USA), Yale University (USA), Nortel Networks (Canada) and the Government of Ontario (Canada). He received his Ph.D. degree in Computer Science from Carleton University, in Ottawa, Canada, and the masters and bachelors degrees respectively

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was also awarded the Canadian Government's prestigious NSERC Post Doctoral Fellowship and the Humboldt Research Fellowship in Germany. Dr. Misra is the Editor-in-Chief of the International Journal of Communication Networks and Distributed Systems (IJCNDS), Inderscience, U.K.. He has also been serving as the Associate Editor of the Telecommunication Systems Journal (Springer), Security and Communication Networks Journal (Wiley), International Journal of Communication Systems (Wiley), and the EURASIP Journal of Wireless Communications and Networking. He is also an Editor/Editorial Board Member/Editorial Review Board Member of the IET Communications Journal, IET Wireless Sensor Systems, and Computers and Electrical Engineering Journal (Elsevier). Dr. Misra has published 7 books in the areas of wireless ad hoc networks, wireless sensor networks, wireless mesh networks, communication networks and distributed systems, network reliability and fault tolerance, and information and coding theory, published by reputed publishers such as Springer, Wiley, and World Scientific. He was invited to chair several international conference/workshop programs and sessions. He served in the program committees of several international conferences. Dr. Misra was also invited to deliver keynote/invited lectures in over 20 international conferences in USA, Canada, Europe, Asia and Africa.

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