Keynote Speech 1:

**Computing Theory Foundations of Big Data**

Prof. Guoliang Chen  
*Shenzhen University/University of Sci. & Tech. of China, China*

**Abstract:**

Big data has gained great attention in research and application. However, most of the current efforts focus on system and application, and not much has been done on the theoretical foundation. Based on computation complexity theory, we study the computability and complexity of big data problems, and explore the research methodology and technology. This work will help improve the research mode of big data and promote its applications.

**Biography:**

Guoliang Chen received his B.Sc. degree from Xi’an Jiaotong University, China, in 1961. He is currently the Dean of the College of Computer Science and Software Engineering of Shenzhen University, and the Dean the School of Software of the University of Science and Technology of China. Prof. Chen is a member of the Chinese Academy of Sciences. His research interests include high performance computing and big data. Prof. Chen has received more than 20 national and province level awards and authored about 20 books.
Keynote Speech 2:

WInternet: From Net of Things to Internet of Things

Prof. Wei Zhao
University of Macau, China

Abstract:

Internet of Things (IoT) is a networking infrastructure for cyber-physical systems. With IoT, physical objects should be seamlessly integrated into an Internet-like system so that the physical objects and cyber-agents can interact with each other in order to achieve mission-critical objectives. Given its tremendous application potential, IoT has become popular in recent years, attracting great attentions from both academic research and industrial development. In this talk, we will first focus on fundamental issues related to IoT. We address principles that should guide research and development of IoT. We will then present several approaches that may lead to implementation of IoT and analyze their advantages and disadvantages. We will show an implementation of IoT called "WInternet" and demonstrate its application. Finally, we will discuss critical issues that must be addressed in order to fully realize the objectives and potentials of IoT.

Biography:

Professor Wei Zhao completed his undergraduate studies at Shaanxi Normal University, China, in 1977, and then received his MSc and PhD degrees in Computer and Information Sciences at the University of Massachusetts at Amherst, USA in 1983 and 1986, respectively. In 2008, Professor Zhao was appointed as the 8th Rector for the University of Macau. Prior to this position, Professor Zhao also served as the Director of the Division of Computer and Network Systems at the US National Science Foundation, the Dean of Science at Rensselaer Polytechnic Institute, and the Senior Associate Vice President of Research at Texas A&M University, making him one of the few scholars from Mainland China who have ever held such senior posts in the US federal government and high education institutions.

An IEEE fellow, Professor Zhao is internationally acclaimed for his research in the areas of Internet of Things, distributed computing, and cyber-physical systems. His research team has won numerous awards from international research community. In recognition of his outstanding achievements in scientific research and contributions to higher education, he has been conferred honorary doctorate degrees by twelve world-renowned universities. In 2011, he was appointed by the Chinese Ministry of Science and Technology as the Chief Scientist of the Internet of Things - a national 973 project. In 2012, he was elected to be an Academician of the International Eurasian Academy of Sciences.
Keynote Speech 3:

Market-Oriented Cloud Computing and Big Data Applications

Prof. Rajkumar Buyya
The University of Melbourne, Australia

Abstract:

Computing is being transformed to a model consisting of services that are commoditized and delivered in a manner similar to utilities such as water, electricity, gas, and telephony. In such a model, users access services based on their requirements without regard to where the services are hosted. Several computing paradigms have promised to deliver this utility computing vision. Cloud computing has emerged as one of the buzzwords in the IT industry and turned the vision of "computing utilities" into a reality. Several IT vendors have started offering computation, storage, and application hosting services, and provide coverage in several continents, supporting Service-Level Agreements (SLA) backed performance and uptime promises for their services. Clouds deliver infrastructure, platform, and software (application) as services, which are made available as subscription-based services in a pay-as-you-go model to consumers. The price that Cloud Service Providers charge can vary with time and the quality of service (QoS) expectations of consumers.

This keynote presentation will cover (a) 21st century vision of computing and identifies various IT paradigms promising to deliver the vision of computing utilities; (b) opportunities and challenges for utility and market-oriented Cloud computing, (c) innovative architecture for creating market-oriented and elastic Clouds by harnessing virtualisation technologies; (d) Aneka, a Cloud Application Platform, for rapid development of Cloud/Big Data applications and their deployment on private/public Clouds with resource provisioning driven by SLAs; (e) experimental results on deploying Cloud and Big Data applications in engineering, gaming, and health care domains (integrating sensors networks, mobile devices), ISRO satellite image processing on elastic Clouds, and (f) directions for delivering our 21st century vision along with pathways for future research.

Biography:

Dr. Rajkumar Buyya is Professor of Computer Science and Software Engineering, Future Fellow of the Australian Research Council, and Director of the Cloud Computing and Distributed Systems (CLOUDS) Laboratory at the University of Melbourne, Australia. He is also serving as the founding CEO of Manjrasoft, a spin-off company of the University, commercializing its innovations in Cloud Computing. He has authored over 450 publications and four text books including Mastering Cloud Computing published by McGraw Hill and Elsevier/Morgan Kaufmann, 2013 for Indian and international markets respectively. He also edited several books including Cloud Computing: Principles and Paradigms (Wiley Press, USA, Feb 2011). He is one of the highly cited authors in computer science and software engineering worldwide (h-index=80, g-index=160, 30400+ citations). Microsoft Academic Search Index ranked Dr. Buyya as the world's top author in distributed and parallel computing between 2007 and 2012.
Software technologies for Grid and Cloud computing developed under Dr. Buyya’s leadership have gained rapid acceptance and are in use at several academic institutions and commercial enterprises in 40 countries around the world. Dr. Buyya has led the establishment and development of key community activities, including serving as foundation Chair of the IEEE Technical Committee on Scalable Computing and five IEEE/ACM conferences. These contributions and international research leadership of Dr. Buyya are recognized through the award of “2009 IEEE TCSC Medal for Excellence in Scalable Computing”. Manjrasoft’s Aneka Cloud technology developed under his leadership has received “2010 Asia Pacific Frost & Sullivan New Product Innovation Award” and “2011 Telstra Innovation Challenge, People’s Choice Award”. He is currently serving as the foundation Editor-in-Chief (EiC) of IEEE Transactions on Cloud Computing. For further information on Dr. Buyya, please visit his cyberhome: www.buyya.com
Keynote Speech 4:

Programming with Big Data

Prof. Jiannong Cao

Hong Kong Polytechnic University, China

Abstract:

Big data is characterized by its volume, velocity and variety, and applies to information that exceeds the processing capacity of conventional database systems. Cloud computing provides abundant computing resources and massively parallel processing capabilities that can support the management and processing of big data. In the recent years, many projects have been carried out on coordinating the cloud computing resources to tackle the big data problem. In particular, platforms and programming models have been proposed to support the development of big data applications. In this talk, I will review existing development platforms and tools for processing different types of big data on the cloud, and discuss about the challenges in providing high-level programming support that can accommodate different big data application requirements.

Biography:

Dr. Cao is currently a chair professor and head of the Department of Computing at Hong Kong Polytechnic University, Hung Hom, Hong Kong. His research interests include parallel and distributed computing, computer networks, mobile and pervasive computing, fault tolerance, and middleware. He has co-authored 3 books, co-edited 9 books, and published over 300 papers in major international journals and conference proceedings. He is a senior member of China Computer Federation, a senior member of IEEE, and a member of ACM. He is the Chair of the Technical Committee on Distributed Computing of IEEE Computer Society. Dr. Cao has served as an associate editor and a member of the editorial boards of many international journals, including IEEE Transactions on Parallel and Distributed Systems, IEEE Networks, Pervasive and Mobile Computing Journal, Wireless Communications and Mobile Computing, Peer-to-Peer Networking and Applications, and Journal of Computer Science and Technology. He has also served as a chair and member of organizing/program committees for many international conferences, including PERCOM, INFOCOM, ICDCS, IPDPS, ICPP, RTSS, DSN, ICNP, SRDS, MASS, PRDC, ICC, GLOBECOM, and WCNC.

Dr. Cao received the BSc degree in computer science from Nanjing University, Nanjing, China, and the MSc and the Ph.D degrees in computer science from Washington State University, Pullman, WA, USA.
Keynote Speech 5:

Opportunistic Resource Utilization Networks

Prof. Ajay Gupta

Western Michigan University, USA

Abstract:

Mobile devices and embedded systems are ubiquitous in today’s world. We are increasingly becoming ever dependent on the technology at our disposal, and that at times limits our thinking to what can be achieved by the individual capabilities of our own devices. Our society functions and advances by collective wisdom, diversity, collaboration and teamwork, not by limiting ourselves to our own individual intellectual and physical abilities. So, naturally, a question arises, why should our technological creations be bound by the capabilities of a single device or a homogenous system? We should be able to harness the power of the ubiquity of multiple devices. That is, we should facilitate strong collaboration, syncing and/or networking among multiple devices to create innovative applications and advance our technologically savvy society.

Almost since the invention of computers, a wide variety of ideas have been proposed, and many commercial products developed, to harness the collective power of multiple stand-alone devices. From parallel computers to networked workstations to grids to world-wide-web to idle resource utilization to opportunistic networks to clouds – all these concepts are examples of this type of idea.

In this talk, we begin by looking at some of the creative applications that can be made possible via opportunistic resource utilization. These include, for example, providing backup communication channel for emergency situations, filming live simultaneously from multiple different angles using an ad-hoc network of smartphones, safe driving using VANETs, applying the technology to healthcare, and syncing many smartphone speakers together to make one unified speaker. We then review some of the major R&D efforts in making these applications feasible. Finally, we discuss the research efforts, in our lab and others, related to opportunistic resource utilization networks, or simply oppnets, a paradigm of specialized ad hoc networks.

Applications can benefit tremendously from using specialized ad hoc networks that can provide a natural basis for them, a basis which is more efficient and effective than what general-purpose ad hoc networks can offer. Oppnets constitute the subcategory of ad hoc networks where diverse systems, not employed originally as nodes of an oppnet, join it dynamically in order to perform certain tasks they have been called to participate in. We categorize opportunistic networks currently known in the literature into class 1 opportunistic networks, which only opportunistically use communication resources, and class 2 opportunistic networks or oppnets, which can use opportunistically all kinds of resources, including not only communication but also computation, sensing, actuation, storage, etc. Oppnets thus have a significant potential to improve a variety of applications, and to create new application niches.

Biography:

Ajay Gupta is a Professor of Computer Science at Western Michigan University and the TCPP-Chair of IEEE-CS. From 1998 to 2002, he was the Chairman of the Computer Science
Department at Western Michigan University. Dr. Gupta received his Ph.D. in Computer Science from the Purdue University in 1989, his M.S. in Mathematics and Statistics from the University of Cincinnati in 1984, and his B.E. (Honors) in Electrical and Electronics Engineering from the Birla Institute of Technology and Sciences, Pilani, India in 1982. Dr. Gupta’s research interests include sensor networks and systems, cloud computing, evolutionary computation, scientific computing, and design and analysis of parallel and distributed algorithms. He has published numerous technical papers and book chapters in refereed conferences and journals in these areas. He is a senior member of the IEEE and member of the IEEE Computer Society, the IEEE Communications Society, the ASEE and the ACM.