Keynote I

Software Hardware Co-optimization

Prof .Kingsum Chow
Chief Scientist, Technology Infrastructure
Alibaba Infrastructure Service

Abstract

Hardware and software configuration parameters directly impact the performance of computer systems in the data center. This presentation describes how to approach the performance co-optimization problem from three viewpoints: the CPU clock-ticks, the cycles per instruction, and the number of instructions to complete a task. It suggests the roles that can be played by hardware developers, software developers, compiler writers, and managed runtime systems. It also introduces a large-scale performance data monitoring and analysis system that can set directions for system optimizations.

Speaker's Bio

Kingsum is currently a Technology Infrastructure Chief Scientist at Alibaba Infrastructure Services. Before joining Alibaba in May 2016, he was a Principal Engineer and Chief Data Scientist in the System Technology and Optimization (STO) division of the Intel Software and Services Group (SSG). He joined Intel in 1996 after receiving Ph.D. in Computer Science and Engineering from the University of Washington. Since then, he has been working on performance, modeling and analysis of software applications. At the Oracle Open World in October 2015, Intel and Oracle CEO's announced the joint Cloud lab called project Apollo led by Kingsum in the opening keynote in front of tens of thousands of software developers. He has been issued more than 20 patents. He has presented more than 80 technical papers. In his spare time, he volunteers to coach multiple robotics teams to bring the joy of learning Science, Technology, Engineering and Mathematics to the K-12 students in his community. His teams appeared in national and world championships three times, taking home best programming in 2010 and best sensor technology and machine learning for robotics in both 2014 and 2015.

.

Keynote2

Intelligent Information Processing and Visual Net Logo-Based Simulations of Immune Computation (IC)

Prof. Tao Gong
College of Information Science and Engineering,
Donghua University

Abstract

Immune system is a complex defending system for the health of a body, and the modeling of this immune system is as complex as that of the brain. This immune system is of natural parallel nonlinear recognition ability, and it can discriminate selfs and nonselfs in normal immune responses. This immune system is based on some complex pattern recognition mechanism in its models and functions. One of the difficult problems in understanding this immune system is how to generate the simulation results in biological shapes, which are similar to cells and molecules. We propose a visual simulation approach of the tri-tier immune system against the viruses with Java Applet technique. The immune network is built on the normal model, the tri-tier immune model and the parallel computing of the immune cells against the viruses. The embedded immune medical system is a artificial intelligent immune system with adaptive learning and parallel computing. SARS patients' lungs show different degree of flake or patchy ground glass density shadow. The shadow shows a trend of progress, because in some cases a small shadow may quickly grows into a large shadow. The super-resolution reconstruction can help us to detect more shadows, so we can use this method for decrease early lesions. Though these single images have low resolutions, we can use the super-resolution reconstruction approach to break through the resolution limits of the medical images, in order to generate the high-resolution image for better disease analysis. We use the chest CT sequence images of the SARS patient for the reconstruction experiments, and the experiments are simulated in Matlab. When the simulation was completed, the simulation model was viewed on both the NetLogo client and the remote web browser, after the model was saved as the Java Applet and embedded into the web pages.

Speaker's Bio

Prof. Tao Gong received the MS degree in Pattern Recognition and Intelligent Systems and PhD degree in Computer Science from the Central South University respectively in 2003 and 2007. He is an associate professor of immune computation, Vice Head of Automation Department, Assistant Director of Research Department at Donghua University, China, and he was a visiting scholar at Department of Computer Science and CERIAS, Purdue University, USA. He is the Editors-in-Chief of the journal Immune Computation, and an editorial board member of some international journals. He was a Technical Committee Chair of ISEEIP 2012, and a Publicity Chair of ISA 2012 and ICSI3 2015. He was Invited Speaker for some conferences such as SecTech 2012 and ICAMR 2014. He was also a program committee member of some international conferences such as IEEE ICNC 2011, IEEE BMEI 2011, WMSE 2011, ICARIS 2012, AITS 2012, CCA 2012, ASP 2012, IST 2012, ISA 2012 and SIS2013 etc. He is a Life Member of Sigma Xi, The Scientific Research Society, a Vice-Chair of IEEE Computer Society Task Force on Artificial Immune Systems, and Chen Guang Scholar of Shanghai. His research has been supported by National Natural Science Foundation of China, Shanghai Natural Science Foundation, Shanghai Educational Development Foundation and Shanghai Education Committee etc. He has published over 100 papers in referred journals and international conferences, and over 20 books such as Artificial Immune System Based on Normal Model and Its Applications, and Advanced Expert Systems: Principles, Design and Applications etc. His current research interests include computational immunology and immune computation. He is also a committee member of intelligent robots committee and natural computing committee in the Association of Artificial Intelligence of China.

Keynote3

Bio-Inspired Information Technique

Prof. Xin Ma
School of Information Science and Engineering,
Shandong University

Abstract

The goal of our activity is to propose bio-inspired mechanisms to solve complex problems such as distributed resource allocation in cognitive radio, self-syncronization, distributed detection and estimation in wireless sensor networks. A modern trend in the design of complex engineering systems is to endow the system with self-organization and self-healing capabilities. Nature is full of examples of biological systems capable of accomplishing extremely complex tasks, even if constituted by simple components, in many cases without the intervention of any central entity having full control of what is going on.An example is the design of radio access mechanism for cognitive networks mimicking the behavior of a flock of birds swarming in search for food in a cohesive fashion without colliding with each other. Another example is bats navigation and location system. Bats have good navigation and locationing capabilities by sound which can give inspiration for radar, which mainly depend on the coordination of organs of Larynx, Vocal tract and Face construct and ears.. Bioinspired technique leverage this knowledge to develop new technologies and translate them into products that meet real world challenges.

Speaker's Bio

Xin Ma received his Ph.D. degree from Institute of Acoustics, China Academy of Sciences, Beijing in 2005. He is currently a Professor in the School of Information Science and Engineeringat Shandong University. He is the inventor or co-inventor of 20 patents, the author or co-author of 80 papers and 2 books inthereasof digital signal process and electronic devices design.He has been undertaken a number of national research projects and provincial or ministerial research topics.Now his research workmainly focuses on the Bioinspired Signal Process and its Applicaiton.

Keynote4

Cyber physical systems in Smart Grid

Prof. Ting Yang
Key Laboratory of Smart Grid of Ministry of Education
School of Electrical Engineering and Automation
Tianjin University

Abstract

Cyber physical systems (CPS) refer to the class of systems which offer close integration of computation, networking, and physical processes. In the real world, CPS range from miniscule such as pacemakers to large-scale such as power grid. Among them, since mutual coupling between energy flow and information flow is an important feature of Smart grid (SG), SG becomes a typical cyber physical system. In order to realize the SG, we will have to heavily depend on CPS that will be able to seamless integration and interaction of the power network infrastructure as the physical systems, and information sensing, processing, intelligence, and control as the cyber systems. This lecture covers the introduction of CPS in Smart Grid: 1) CPS architectures, which are designed specifically for interfaces between power networks and cyber systems. 2) Communication technologies, which are vital for efficient and effective interaction between the physical systems and the cyber systems. 3) Modeling and simulation tools, which are critical to ensure that the large-scale network CPSs of SGs can operate seamlessly and components. 4) Reliability and Security technologies, which are the basement for CPS and trustworthy SG to detect, prevent, and mitigate the cyber-attacks. In summary, this lecture focuses on effective and efficient interaction between and integration of physical systems and cyber systems, and presents CPS technologies in SG to make electrical power system more efficient in operations, more economically viable, and environmentally sustainable.

Speaker's Bio

Dr. Ting Yang is currently a Chair professor of Theory and Advanced Technology of Electrical Engineering, at the School of Electrical Engineering and Automation, Tianjin University, China. He was the cooperative research staff of Imperial College London (2008), University of Sydney, Australia (2011, 2015). Prof. Yang is the winner of the "New Century Excellent Talents in University Award" from Chinese Ministry of Education. He is the leader of tens of research grant projects, including the International S&T Cooperation Program of China, the National High-Tech Research and Development Program of China (863 Program), the National Natural Science Foundation of China, and so on. Prof. Yang is the chairman of two workshops of IEEE International Conference (the 6th IEEE International Conference on Cloud Computing Technology and Science–IEEE Cloud Com, the 18th IEEE International Conference on Parallel and Distributed Systems–IEEE ICPADS), and the editor in Chief of the Special Issues "Ubiquitous Data-Centric Sensor Networks" of the international journal of DSN. He is the author/co-author of four books, more than one hundred publications in internationally refereed journals and conferences (such as IEEE Trans. on Instrumentation and Measurement, IEEE Trans. on Cloud Computing, Journal of Applied Energy, Journal of Network and Computer Applications). Prof. Yang is a senior member of the Chinese Institute of Electronic, the fellow of Circuit and System committee, the fellow of Theory and Advanced Technology of Electrical Engineering, and the member of International Society for Industry and Applied Mathematics. Professor Yang's research effort is focused on information and communication technologies in industrial application, big data and cloud computing.