China 中国通信 Communications

Feature Topic: Cloud Computing
Guest Editors: CUI Yong, Rajkumar Buyya, LIU Jiangchuan

An Efficient Adaptive Failure Detection Mechanism for
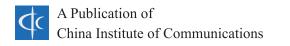Cloud Platform Based on Volterra Series

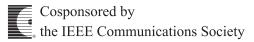Differentiating Data Collection for Cloud Environment
Monitoring

MPTCP Incast in Data Center Networks

"Smart Cafe": A Mobile Local Computing System
Based on Indoor Virtual Cloud

CLOUD COMPUTING

CUI Yong   **Rajkumar Buyya**   **LIU Jiangchuan**

Cloud computing is a novel computing paradigm that utilizes remote cloud resources to achieve a high-performance computation. Cloud provides infrastructure, platform and software as different on-demand services. China has made remarkable progress in cloud-based products and operating system technology. The government, enterprises and research institutions are all active in the development of cloud computing-related projects. Despite the progress, many important problems still need to be resolved. The goal of this Special Topic Issue is to explore the research and developments related to cloud computing.

In particular, this Special Topic Issue contains a collection of papers that will provide both theoretical advances and practical experiences for cloud computing. We received 37 manuscripts in response to our call for papers, and we have accepted 4 papers for this special issue.

The first article, *"An Efficient Adaptive Failure Detection Mechanism for Cloud Platform Based on Volterra Series",* is authored by Rongheng Lin, *et al*. This study presents an efficient adaptive failure detection mechanism based on volterra series. Its contributions are applying volterra filter in cloud heartbeat prediction, introducing error feedback during prediction and a user factor for different QoS requirements. The detailed implementation is proposed and evaluations are performed in Beijing and Guangzhou experiment environment.

The second article, *"Differentiating Data Collection for Cloud Environment Monitoring",* is authored by You Meng, *et al*. This paper shows that using a concept of urgent data, the new system can shorten the response time for most 'urgent' queries while guarantee lower bandwidth consumption. Several urgent data collection strategies that focus on reducing the urgent data volume are proposed and evaluated to guarantee the efficiency. A cloud environment, MagicCub, is used as a test bed. Extensive experiments show that when using urgent data, the monitoring system can lower the response latency compared with existing monitoring approaches.

The third article, *"MPTCP Incast in Data Center Networks",* is authored by Ming Li, *et al*. This paper investigates the cause why the goodput collapses even if MPTCP is able to actively relieve hot spots. It proposes an equally-weighted congestion control scheme for MPTCP, namely EW-MPTCP. The goal is to mitigate Incast collapse by allowing multiple MPTCP subflows to fairly compete with a single-TCP flow at the shared bottleneck. The simulation results show that the solution mitigates the Incast problem and noticeably improves

goodput in data centers.

The last article, *"'Smart Café': A mobile local computing system based on indoor virtual cloud"*, is authored by Lingjun Pu, *et al*. This paper implements a mobile local computing system based on indoor virtual cloud. This system mainly addresses three key issues: 1) It creates a parser to generate the "methods call and cost tree" for each application and identify resource-intensive methods. 2) It designs a self-learning execution controller to make offloading decisions. 3) It constructs a social scheduling based application-isolation virtual cloud model. The evaluation results demonstrate its effectiveness and efficiency by using CPU-intensive calculation applications and memory-intensive image translation applications.

Biographies

CUI Yong, is currently a full Professor in Tsinghua University, the Deputy Director of Network Technology Institute and the co-chair of IPv6 Transition Softwire WG of IETF. He received the BE degree and the Ph.D. degree from Tsinghua University, China in 1999 and 2004, respectively. He has published around 100 academic papers on refereed journals and conferences. He received the National Award for Technological Invention in 2013, the Influential Invention Award of China Information Industry in both 2012 and 2004. He also won the two Best Paper Awards. He authored 3 Internet standard documents, including RFC 7040 and RFC 5565, for his proposal on IPv6 transition technologies. He serves at the Editorial Board on both IEEE TPDS and IEEE TCC. His major research interests include mobile wireless Internet and computer network architecture.

Rajkumar Buyya, is a Professor of Computer Science and Software Engineering, and Director of the Cloud Computing and Distributed Systems (CLOUDS) Laboratory at the University of Melbourne, Australia. He received his BE and ME degree from Mysore and Bangalore Universities in 1992 and 1995 respectively and PhD from Monash University in 2002. He has authored over 400 publications. Microsoft Academic Search Index ranked Dr. Buyya as one of the Top 5 Authors during the last 10 years (2001-2012) in the area of Distributed and Parallel Computing. He published the latest book "Mastering Cloud Computing" in 2013.

LIU Jiangchuan, is an Associate Professor in the School of Computing Science at Simon Fraser University, British Columbia, Canada, and an EMC-Endowed Visiting Chair Professor of Tsinghua University, Beijing, China. He received the Bachelor of Engineering from Tsinghua University, China, in 1999, and PhD from The Hong Kong University of Science and Technology in 2003. He won ACM Multimedia Best Paper Award in 2012 and ACM TOMCCAP Nicolas D. Georganas Best Paper Award in 2013. He served as the vice TPC Chair of IEEE INFOCOM'11, the TPC Co-Chair of IEEE/ACM IWQoS'2014 and Area Chair of ACM Multimedia'2014.