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Keynote

Modeling Flash Crowd Performance in Peer-to-Peer Systems: Challenges and Opportunities

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The Internet is a pervasive medium for content distribution. It is estimated that in 2015, it will take us five years to view all video crossing IP networks each second. When new content is made available, file distribution systems often have to cope with a sudden surge in the number of users, called *flash crowd,* without loss of download performance. Flash crowds can have serious consequences on business revenue. For example, Amazon estimates that its sales decrease by 1% for every 100ms delay due to flash crowds, and Google reports that half a second increase in waiting time results in a 20% decrease in traffic. This keynote discusses a new approach in modeling the performance of peer-assisted file distribution systems with flash crowds [1, 3]. Peer-assisted file distribution systems extend client-server systems [2, 4]. The peers download a file as a client but at the same time act like servers by sharing the file across peers, thus improving the overall system download performance.

This keynote is divided into *three* main parts. First, we review three main approaches in analysis flash crowd performance, namely, *measurement*, *simulation* and *analytic models*. Secondly, based on insights drawn from extensive measurement studies, we propose a general analytical model for understanding flash crowd performance [1, 3]. We show that the utilization of available peer bandwidth over the duration of flash crowd can be characterized by three distinct phases called *startup*, *maximum utilization* and *end-game*. We discuss the applications of our model by users, service providers and protocols designers of peer-assisted file distribution systems. In conclusion, we highlight a number of challenges and opportunities in modeling flash crowd performance in web-based and mobile applications.

Biography

TEO Yong Meng is an Associate Professor of Computer Science at the National University of Singapore. He was a Visiting Professor at the Shanghai Advanced Research Institute, Chinese Academy of Science, China from 2010-2013. He received his PhD in Computer Science from the University of Manchester. Over the past twenty years, his research focused on parallel and distributed systems and applications. In the last five years, he has been focusing on the performance of parallel systems, cloud computing, and emergent properties in complex systems. A paper, co-authored with his PhD student, on time-based semantic validation won the **ACM SIGSIM Best PhD Student Paper Award** in 2009. Another paper on strategy-proof dynamic pricing of cloud computing resources won the **Best Paper Award** at the 10th International Conference on Algorithms and Architectures for Parallel Processing in 2010. He leads the Computer Systems Research Laboratory at School of Computing. He also served as Advisor (Director's Office) on Large-Scale Computing Systems, Asia-Pacific Science and Technology Centre, Sun Microsystems Inc. from 2007-2008, and External Grant Evaluator, European Research Council (Ideas Specific Program) from 2008-2013. He has received numerous external research grants including European Commission, Fujitsu Computers (Singapore) Pte Ltd, Fujitsu Laboratories Ltd (Japan), Sun Microsystems/Oracle (USA), Nvidia, and PSA Corporation (Singapore) among other institutions.

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