Spring 2018 Seminar Series

Enabling Time-Sensitive Computing on Virtualized Systems Through Cross-Layer Scheduling

WEDNESDAY APRIL 18, 2018

11:00 AM – RB1-150C (new research building)

Virtualization enables flexible application delivery and efficient resource consolidation, and is pervasively used to build various virtualized systems including public and private cloud computing systems. Many applications can benefit from computing on virtualized systems, including those that are time sensitive, but it is still challenging for existing virtualized systems to deliver application-desired timeliness. In particular, the lack of awareness between VM host- and guest-level schedulers presents a serious hurdle to achieving strong timeliness guarantees on virtualized systems. This talk will present RTVirt, a new solution to time-sensitive computing on virtualized systems through cross-layer scheduling. It allows the two levels of schedulers on a virtualized system to communicate key scheduling information and coordinate on the scheduling decisions. It enables optimal multiprocessor schedulers to support virtualized time-sensitive applications with strong timeliness guarantees and efficient resource utilization. Experimental results show that RtVirt can meet application deadlines (99\%) or tail latency requirements (99.9th percentile) nearly perfectly; it can handle large numbers of applications and dynamic changes in their timeliness requirements; and it substantially outperforms the existing solutions in both timeliness and resource utilization.

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Dr. Ming Zhao is an associate professor of the Arizona State University (ASU) School of Computing, Informatics, and Decision Systems Engineering (CIDSE), where he directs the research laboratory for Virtualized Infrastructures, Systems, and Applications (VISA, http://visa.lab.asu.edu). His research is in the areas of experimental computer systems, including cloud, big-data, and high-performance systems as well as operating systems and storage in general. He is also interested in the interdisciplinary studies that bridge computer systems research with other domains. His work has been funded by the National Science Foundation (NSF), Department of Homeland Security, Department of Defense, Department of Energy, and industry companies, and his research outcomes have been adopted by several production systems in industry. Dr. Zhao is a recipient of the NSF Faculty Early Career Development (CAREER) award, the Air Force Summer Faculty Fellowship, the VMware Faculty Award, and the Best Paper Award of the IEEE International Conference on Autonomic Computing. He received his bachelor's and master's degrees from Tsinghua University, and his PhD from University of Florida.

Host: Dr. Jun Wang