THE DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING PRESENTS:

PROFESSOR HUNG-WEI TSENG

HOLISTIC SYSTEM DESIGN -- THE AVENUE TOWARD THE DATA-CENTRIC FUTURE

ABSTRACT

The rapid growth of datasets in applications significantly changes the landscape of modern computer architectures as they incorporate hardware accelerators, GPGPUs, non-volatile storage devices, in addition to traditional architectural components. However, these computers as well as programs running on top of them still inherit the half-century-old, layered system design that relies on the relatively slowly evolved CPU technologies. As a result, the overhead of layering has become an emerging bottleneck in performance.

To allow computers make efficient use of modern heterogeneous computing units and data storage devices, and lead to performance improvements, we should revisit the entrenched layered system. Instead of local optimizations, we should take a holistic view of our system components when designing applications. To facilitate holistic system design but still maintain the benefits of layered design, we need to revisit the interface that each component exposes, remove redundant layers, and rethinking the roles of system components.

In this talk, Hung-Wei will demonstrate how holistic system design and the three philosophies can dramatically change the system performance. We can achieve a speedup of 2.5x for key-value store, accelerate approximate computing by 1.5x, and allow untethered VR gaming to be possible.

BIOGRAPHY

Hung-Wei is currently an assistant professor in the Department of Electrical and Computer Engineering at University of California, Riverside. He is now leading the Extreme Storage & Computer Architecture Laboratory and focusing on tackling the performance issues in modern heterogeneous computer systems through intelligent data storage. He is recognized by Facebook faculty research award for his research in accelerating data-intensive applications through revisiting the storage system design. Prior to joining UCR, Hung-Wei was an assistant professor at NC State University and a postdoctoral scholar in the Department of Computer Science and Engineering at University of California, San Diego. He got his PhD from Department of Computer Science and Engineering at University of California, San Diego. His thesis work with Professor Dean Tullsen, data-triggered threads, was selected by IEEE Micro "Top Picks from Computer Architecture" in 2012.

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