



SCHOOL OF COMPUTER SCIENCE

Faculty Candidate Talk

Adam Belay

Stanford University

Unleashing Hardware Potential through Better OS Abstractions

Datacenter workloads have demanding performance requirements, including the simultaneous need for high throughput, low tail latency, and high server utilization. While modern hardware is compatible with these goals, modern operating systems remain a bottleneck. Better OS abstractions could significantly improve performance, yet deploying these abstractions has become intractable given the size and complexity of today's systems.

I will first discuss Dune, a kernel extension that allows OS developers to sidestep software and hardware complexity by running an OS within an ordinary Linux process. With Dune, developers can both access the capabilities of raw hardware and fall back on the functionality of a full Linux environment where convenient. I will then discuss IX and Shinjuku, two generations of new datacenter-focused operating systems that were enabled by Dune. IX provides a novel system call interface that greatly improves network throughput without sacrificing latency. For example, IX improves Memcached's TCP throughput by 5x over Linux. Shinjuku, an ongoing research effort, aims to significantly increase CPU utilization through a centralized approach to intra-server load balancing.



Bio:

Adam Belay is a Ph.D. candidate in Computer Science at Stanford University, where he is a member of the Secure Computer Systems Group and the Multiscale Architecture and Systems Team. Previously, he worked on storage virtualization at VMware Inc. and contributed substantial power management code to the Linux Kernel project. Adam's research area is operating systems and networking. Much of his work has focused on restructuring computer systems so that developers can more easily reach the full performance potential of hardware. Adam has received a Stanford Graduate Fellowship, a VMware Graduate Fellowship, and an OSDI Jay Lepreau Best Paper Award.

Monday, February 29

10:00 a.m. GHC 6115

Host: Andy Pavlo