

## **Presentation Title:** Towards Immortal Operating Systems

**Abstract:** Many OS crashes are caused by bugs in kernel extensions or device drivers while the OS itself may have been tested rigorously. To make an OS immortal we must resurrect the OS from these crashes. We present a novel OS-hypervisor infrastructure that allows automated and transparent OS crash diagnosis and recovery in a virtual environment. This infrastructure eliminates the need for reboots and checkpoint-restart mechanisms, which require preserving the states of critical applications before the crash happens and extensive modification to those applications. At the core of our approach is a small hidden OS-repair-image that is dynamically created from a healthy OS instance. When the OS crashes, the hypervisor dynamically loads this repair image to perform diagnosis and repair. One way of repair we have experimented with is to quarantine the offending process and resume the fixed OS automatically without a reboot. Experimental evaluations demonstrated that it takes less than 3 seconds to recover from an OS crash. This approach can significantly reduce the downtime and maintenance costs in data centers. It is the first design and implementation of an OS-hypervisor combo in the world capable of automatically resurrecting a crashed commercial server OS.