What is going on in

Operating Systems Research:

The OSDI & SOSP Perspective

Dilma M. da Silva
IBM TJ Watson Research Center, NY
dilmasilva@us.ibm.com

Main OS conferences

OSDI

- **Operating Systems Design and Implementation**
- **sponsored by USENIX**

- SOSP
  - **Symposium on Operating Systems Principles**
  - **sponsored by ACM**

- Usenix Annual Technical Conference, HotOS

- FAST, NSDI

- Ottawa Linux Symposium

- Eurosys

OSDI'04: 6th Symposium on Operating Systems Design and Implementation

- **San Francisco, CA, Dec 6-8, 2004**

- **~ 500 attendees**

- **193 submissions; PC read 45 papers; 27 papers accepted**

- **Paper summaries available at http://www.usenix.org/publications/login/2005-04/openpdfs/osdi04.pdf**

- **Papers available at usenix.org**

"Kernel" Paper Highlights

- **(Best Paper Award) "Recovering Device Drivers" (Univ of Wash)**

  - Goal: enable apps to run when device drivers fail

  - Builds on Nooks work

  - Basic idea: Shadow drivers – monitor, learn, replay

  - Tested on 2.4.18; 98% examined errors were recoverable

- **"Unmodified Device Driver Reuse and Improved System Dependability via Virtual Machines" (Univ of Karlsruhe, Germany)**

  - Run unmodified device driver (DD), with its original OS, in a virtual machine; export access to the device to other hosted virtual machines

  - Client VMs run a stub driver to communicate with the driver VM

  - Describes solutions for issues on achieving DD/OS isolation via VM

- **(Best Paper Award) "Using Model Checking to Find Serious File System Errors" (Stanford, Microsoft)**

"Kernel" Paper Highlights (cont)

- **"CP-Miner: A tool for Finding Copy-past and Related Bugs in Operating Systems Code" (UIUC-Urbana-Champaign)**

- **"Boxwood: Abstractions as the Foundation for Storage Infrastructure" (Microsoft)**

- **"Energy-Efficiency and Storage Flexibility in the Blue File System" (Univ of Michigan)**

- **"Life or Death at Block-Level" (Univ of Wisconsin, Madison)**

- **"Program-Counter-Based Pattern Classification in Buffer Caching" (Purdue University)**

"Non-Kernel" Paper Highlights

- **"MapReduce: Simplified Data Processing in Large Clusters" (Google)**

- **"Automatic Misconfiguration Troubleshooting with PeerPressure" (Microsoft)**

- **"Enhancing Server Availability and Security Through Failure-Oblivious Computing" (MIT)**

- **"ksniffer: Determining the Remote Client Perceived Response Time from Live Packet Streams" (IBM Research,Columbia Univ)**

SOSP'06: 20th Symposium on Operating Systems Principles

- **Brighton, England, Oct 23-26, 2005**

- **~ 500 attendees**

- **155 submissions; 6 PC members read each paper (3 reviews written) and make cut of 75 papers; those got 3 more reviews. Many PC members read all submissions**

- **20 papers are accepted**

- **Blind review**

Problems in Security and Isolation

- **Enforcing untampered execution of code on legacy systems**

- **Allowing a single process to serve many clients, *with no leaking of information between clients***

- **Enforce isolation between kernel modules (helps detect bugs, limit their damage)**

- **Enforcing untampered execution of code**

  Pioneer: Verifying Code Integrity and Enforcing Untampered Code Execution on Legacy Systems (CMU, IBM Research)

- **Allowing a single process to serve many clients, *with no leaking of information between clients***

  Labels and Event Processes in the Asbestos Operating System (UCLA, MIT, NYU)

- **Enforce isolation between kernel modules (helps detect bugs, limit their damage)**

  Mondrix: Memory Isolation for Linux using Modriaan Memory Protection (UT-Austin, MIT, Purdue)

Problems in Learning from the Past

- **We may have been attacked! Have we?**

  Detecting Past and present Intrusions through Vulnerability-Specific Predicates (Univ Michigan)

  – Virtual machine introspection and virtual machine replay

- **Have I seen this problem before?**

  Capturing, Indexing, clustering, and Retrieving System History (Stanford, HP)

  – Statistical methods

- **Where is my data?**

  Connections: Using Context to Enhance File Search (CMU)

Problem: Bugs

- **RaceTrack: Efficient Detection of Data Race Conditions via Adaptive Tracking** (Microsoft Research, Berkeley)

- **(Best paper) Rx: Treating Bugs as Allergies – A Safe Method to Survive Software Failures** (UIUC)

Opportunity: spare cycles, can I use it? (But be aware of eletricity bills!)

- **Speculative Execution in a Distributed System** **(Univ of Michigan)**

- **FS2: Dynamic Data Replication in Free Disk Space for Improving Disk Performance and Energy Consumption** **(Univ of Michigan)**

- **Hibernator: Helping Disk Arrays Sleep through the Winter** **(UIUC, HP)**