Impressions from the 2006 USENIX Annual Technical Conference

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Summary

USENIX ’06: USENIX Annual Technical Conference
May 30-June 3, 2006, Boston, MA, USA.
Held in conjunction with FAST-OS PI Meeting and Workshop

http://www.usenix.org/events/usenix06/tech/

- About 700 attendees
- 194 paper submissions, 36 acceptances
- 3 tracks: Systems Practice and Experience Refereed Papers, Invited Talks, Guru Is In Sessions
- Atul Adya, Microsoft and Erich Nahum, IBM T.J. Watson Research Center, Program Co-Chairs
- USENIX ’07 will be June 17-22, Santa Clara, CA.
Optimizing Network Virtualization in Xen

- Aravind Menon, EPFL; Alan L. Cox, Rice University; Willy Zwaenepoel, EPFL

- Retains the usual dom0/domU split (no direct access)

- Redefine the virtual network interfaces to incorporate high-level network offload features (even if HW does not support) — checksum offload, S/G IO, TCP segmentation offload

- Optimize data transfer path - no page flipping on tx, replace flipping by copying on rx

- Utilize superpages and global page mappings.

- Overall improvement in transmit performance of guest domains by a factor of 4.4!
High Performance VM-Bypass IO in VMs

Jiuxing Liu, IBM Watson; Wei Huang, Ohio State; Bulent Abali, IBM Watson, Dhabaleswar K. Panda, Ohio State

Direct hardware access for faster and more efficient IO from virtual machines, utilizing IB hardware, including direct userspace access.

Nearly the same raw performance as InfiniBand running in a non-virtualized environment.

Frontend/Backend drivers for Xen/dom0 control over privileged operations, data path operations carried out directly against the adapter.

Source code available:

http://xenbits.xensource.com/ext/xen-smartio.hg
Panel: Universities and Industry

“Is University Systems Teaching and Research Relevant to Industry?”

Moderator: Gernot Heiser — Andy Tanenbaum, Orran Krieger, Margo Seltzer, Sun, Intel Research, HP Labs, others?

Answer is not obvious at all...

Universities should be teaching students to think, not to work in industry – which they don’t

Are Open Source and Linux alternative education sources?

Universities in funding crunch, running after the money – too much influence by industry on curriculum (industry agreed)
Invited Talk: Gold and Fool’s Gold

Successes, Failures, and Futures in Systems Research

Butler Lampson, Microsoft Research

Failure: we didn’t invent the web! old, wasteful, flaky and doesn’t scale…

Catastrophe mode - write software that expects to fail and handles it gracefully

Conclusions for Engineers:
  - Understand Moore’s law
  - Aim for mass markets — Computers are everywhere
  - Learn how to deal with uncertainty
  - Learn how to avoid catastrophe
Invited Talk: Pixar Technology

Why Mr. Incredible and Buzz Lightyear Need Better Tools: Pixar and Software Development

Greg Brandeau, VP of Technology, Pixar Animation Studios

“Cars” rendered on a cluster of x86-64 machines running Linux (Fedora Core)

Moved to x86-64 to break the 4GB wall

Using Linux because it’s the best they have, but it’s by no means good enough

Development tools are awful — gdb was someone’s MSc thesis 20 years ago — can we have dtrace for Linux please?

Perfectly happy to pay for improvements, but can’t find anyone to do it
Replay Debugging for Distributed Apps

Dennis Geels, Gautam Altekar, Scott Shenker, and Ion Stoica,
University of California, Berkeley

liblog is new lightweight replay and debugging tool for distributed C/C++ applications

liblog logs and replays deterministically the execution of distributed applications

Consistent replay of arbitrary subsets of nodes

Mixed environment of logging and non-logging processes

No hardware of kernel patches needed — LD_PRELOAD based
Runtime Hardware Reconfiguration

- System- and Application-level Support for Runtime Hardware Reconfiguration on SoC Platforms
- Dimitris Syrivelis and Spyros Lalis, University of Thessaly, Hellas

Enable programs running on a reconfigurable SoC to modify the underlying FPGA at runtime

Applications may request the addition and/or removal of softcore devices at any point in time

System reconfiguration via a fast suspend-resume mechanism — entire FPGA is reconfigured, including softcore CPU!

Reconfiguration is transparent to the application; device drivers deal with the disappearing and reappearing devices
IP Only Server

Muli Ben-Yehuda, Oleg Goldshmidt, Elliot K. Kolodner, Zorik Machulsky, Vadim Makhervaks, Julian Satran, Marc Segal, Leah Shalev, and Ilan Shimony, IBM Haifa Research Laboratory

Poster and short paper presented by Oleg to a very warm reception

“If this was a product, I’d buy it”

“Google has several departments who would be very interested in this — and by the way, we’re hiring”

Great feedback, USENIX is a good venue to present at

Let’s do it again next year...