

The Xen virtual machine monitor

Conley Read (cread@cs.ucr.edu) 1/12/05



Status

- Showtime.
- The Xen project has stable ports of Linux 2.4, Linux 2.6, and NetBSD for VMM use. Installation documentation is available at xen.sf.net.

Technology

- Xen requires OSs to be ported to the Xen x86 architecture.
- Xen runs in privileged mode while Guest OS runs in unprivileged mode and modified OS kernel utilizes Xen hypercalls for privileged instructions.
- Xen does not utilize trapping or JITC.
- Xen maintains functionality similar to VMware including VM migration.

History

Xen was originally part of "building an Open Infrastructure for Global Distributed Computing," under the name XenoServers, a project devoted to building a "public infrastructure for wide-area distributed computing."

Future

- X86/64 and IA64 Linux ports are nearing completion.
- ARM and PPC architecture support is planned

OS support

The Xen VMM runs stable ports of Linux 2.4, Linux 2.6, and NetBSD. "Ports of FreeBSD and Plan 9 are nearing completion," according to the Xen website, maintained at Cambridge.

Architecture support

- Xen currently runs the x86 architecture only (most recent processors made by Intel or AMD).
- Multiprocessors machines are supported.
- Basic multi core processing (SMT) is supported.

Applications

- Database server virtualization with MySQL and PostgreSQL.
- Web application server virtualization with Apache.
- Application and OS development.
- Distributed Shared Computing

Gotchyas

- OS kernel must be ported to run on Xen.
- Closed source kernels may never be ported. Windows XP's kernel was successfully ported but cannot be redistributed publicly due to license restrictions.
- Xen is Open Source and is licensed under the latest version of the GNU GPL.
- Xen implements/virtualizes fast Ethernet as a block device, which requires a specialized driver (available for Linux).

Gimmies

- The Xen VMM implementation yields higher performance and lower VMM overhead when compared to other VMMs.
- Devices are virtualized and exported to the guest OS via device channels.
- Overall and network performance meet or exceed benchmarks for Linux 2.6.
- The Linux 2.6 kernel required no code modifications in the kernel port.

Further Review

Although Xen documentation frequently mentions the importance of VM isolation and provides graphics noting machine separation, more information about Xen's "Safe Hardware Model" is available in their paper:

<http://www.cl.cam.ac.uk/Research/SRG/netos/papers/2004-oasis-ngio.pdf>

Links

<http://xen.sf.net>

<http://www.cl.cam.ac.uk/Research/SRG/netos/xen/>

<http://www.cl.cam.ac.uk/Research/SRG/netos/papers/2004-xen-ols.pdf>

News

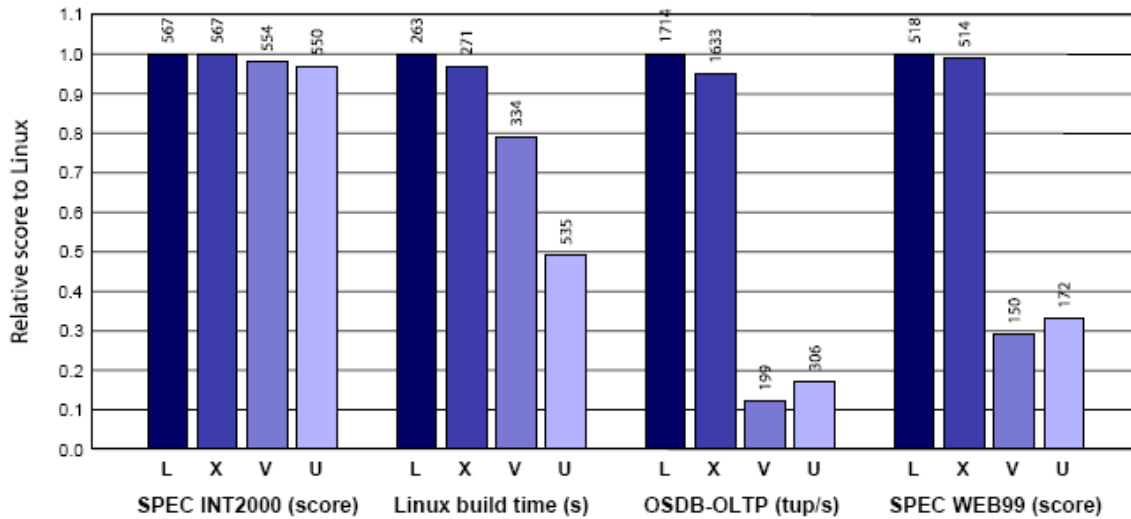
<http://www.crn.com/nl/crndirect/showArticle.jhtml?articleId=54201647>

http://www.linux-mag.com/2004-10/xen_01.html

<http://slashdot.org/search.pl?query=xen> (three articles)

Appendix

Relative Performance



Benchmark suite running on Linux (L), Xen (X), VMware Workstation (V), and UML (U)

Note: UML (skas patch on guest kernel)

- The [SPEC CPU2000](#) Integer suite
- A full build of the default configuration of Linux 2.4.22 on local disk
- [PostgreSQL](#) running the [OSDB](#) multi-user On-Line Transaction Processing (OLTP) benchmark
- [Apache 1.3.27](#) being exercised by the [SPECWeb99](#) benchmark, using `mod_specweb99` for dynamic content generation

TCP

