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THE VIRTUAL WORLD

BY PETER GALLI

A virtualization virtuoso

REVIEW: SWSOFT'S VIRTUOZZO FOR LINUX 3.0 TAKES EFFECTIVE OPERATING SYSTEM TACK

By Jason Brooks

AS OF LATE, ENTERPRISES have grown considerably more enamored of x86 server virtualization technologies—and of the consolidation and utilization benefits that flow from running more servers on fewer physical machines. SWSOFT's Virtuozzo for Linux 3.0 offers enterprises a compelling path to virtualization's less-is-more virtues, while delivering system management benefits that competing products aren't designed to match.

Solutions from VMware and Microsoft virtualize a complete machine, and, from a system management standpoint, running virtual servers on these products is an awful lot like running a set of physical boxes. Rather than virtualize a complete x86 machine, Virtuozzo virtualizes only the operating system layer. Guest instances—or VPSes (virtual private servers), in Virtuozzo parlance—operate under the kernel of the host machine, in much the same way that Containers do in Sun Microsystems' Solaris 10.

As a result, a Virtuozzo host system enjoys a more intimate relationship with the guest instances it hosts—one that allows for all sorts of man-

agement opportunities, such as very granular resource allocation controls. In fact, Virtuozzo's management prowess—which we found excellently exposed through the product's administration tools—impressed eWEEK Labs enough to grant the product our Analyst's Choice designation.

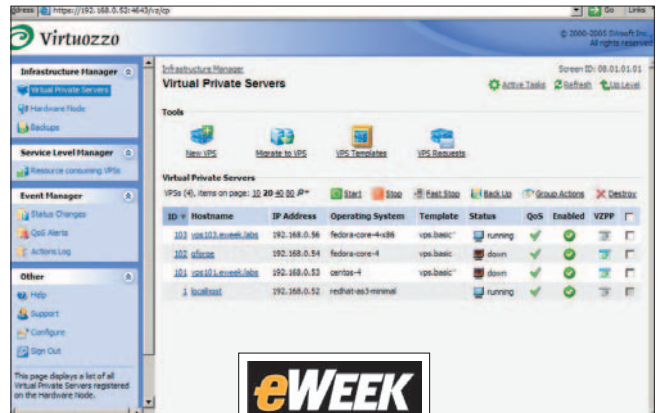
The main functional limitation of Virtuozzo's virtualization approach is that the applications to be virtualized must run on Linux, just as Containers-hosted applications must run on Solaris. However, because a broader range of applications run on Linux than on Solaris, this requirement is much less onerous for Virtuozzo machines than it is for Solaris boxes.

Companies interested in consolidating Linux servers onto fewer, more manageable machines would do well to evaluate the product further.

SWSOFT also sells a Windows version of Virtuozzo, which we plan to test when the next version becomes available.

Cost-effective

THE X86 AND X86-64 VERSIONS of Virtuozzo for Linux 3.0 are each priced at \$1,000 per physical CPU. The Itanium version of Virtuozzo for Linux costs \$1,500 per CPU. Dual-core



We could manage every VPS on our node through Virtuozzo's Web console or delegate admin rights to particular VPSes to certain users.

the most out of Virtuozzo's management capabilities.

These configuration tasks, which we

could accomplish using template-creation tools that ship with the product, will add up to higher initial deployment costs in terms of time. However, organizations should expect to offset that expense with savings in long-term maintenance.

chips do not count as multiple CPUs for the purposes of licensing. The product's fat-client management console is priced at \$1,000 per seat, and its Web-based management interface costs \$350 per server.

We found Virtuozzo fairly easy to install and configure, although properly creating templates for guest operating systems and for applications will take a bit more time and know-how than installing applications on regular physical hardware.

While it's possible to install applications on a VPS just as you would on a physical system, you have to create and use templates for the sorts of VPSes and VPS applications that you wish to deploy to get

could accomplish using template-creation tools that ship with the product, will add up to higher initial deployment costs in terms of time. However, organizations should expect to offset that expense with savings in long-term maintenance.

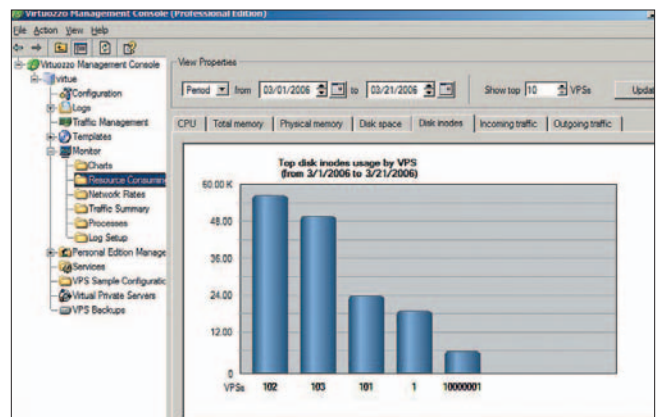
SWSOFT has recently launched an open-source project called OpenVZ, for which the company has released the core of Virtuozzo under the GNU GPL (General Public License). OpenVZ lacks the

management tools of Virtuozzo, but it promises to offer a free point of entry for sites interested in giving the Virtuozzo model a try. (For more information on OpenVZ, go to openvz.org.)

According to SWsoft, the minimum hardware requirements for Virtuozzo are a Pentium III server with at least 1GB of memory and 4GB of available hard drive space. Virtuozzo for Linux supports the x86, ia64, AMD64 and EM64T (Extended Memory 64 Technology) processor architectures. eWEEK Labs tested Virtuozzo on a machine powered by a single 2.53MHz Pentium IV chip with 1GB of RAM.

Like Solaris Containers, Virtuozzo VPSes can operate with reduced processor, memory and disk overhead because guests don't run their own kernel. In addition, overlapping binaries and libraries for similar guests running together on a machine can be shared, so it's possible to squeeze more VPSes onto a system than you could with a full-machine virtualization approach.

For the host machine, Virtuozzo supports Red Hat Linux 9, Fedora Core versions 1 through 4, RHEL (Red Hat Enterprise Linux) 3 and 4, CentOS 3.4 and 4, and SLES (SUSE Linux Enterprise Server) 9.



We used Virtuozzo for Linux 3.0's thick-client management console to track the resource usage of our virtual private servers.

We were impressed with the range of management tasks we could undertake from all the Virtuozzo tools.

In addition to connecting directly to one of our guest instances via SSH (Secure Shell)—as we've been accustomed to doing with the VMware and Microsoft Virtual Server products we've recently tested—the Virtuozzo management consoles enabled us to start, stop and set default run levels for installed services. We could also browse and modify the file systems of the VPSes we'd created.

We could manipulate a variety of network configuration options on our VPSes, such as setting firewall rules, configuring network interfaces and setting traffic-shaping properties.

We also could add, remove and modify users and groups on our guest instances, as well as configure per-user disk quotas using Virtuozzo's resource allocation features.

Virtuozzo exposes a somewhat dizzying array of resource allocation beancounters with which we could fine-tune the share of our host system so that each guest instance was assured access.

For example, the console presented us with 21 memory-related parameters to configure, either individually or,

Running Virtuozzo requires installing a Virtuozzo kernel on your Linux box—the version we tested was based on the 2.6.8 version of the Linux kernel, the same version that RHEL 4 currently runs.

Applications that require particular kernel modules other than those that ship with the default Linux kernel may not work with Virtuozzo, although most Linux applications will run fine under Virtuozzo.

On the guest side, Virtuozzo supports Red Hat Linux 7.1, 7.3 and 9; RHEL 3 and 4; Fedora Core 1 through 4; CentOS 3.4 and 4; SUSE 8.2 through 9.3; SLES 9; and Debian 3.0 and 3.1.

The installation media with which we conducted our tests included templates for Fedora Core 4, RHEL 4, SLES 9 and a few other operating system templates, as well as application templates for common Linux stack components, such as MySQL and PHP.

Management muscle

WE APPRECIATED THE FLEXIBILITY that Virtuozzo offered us for managing VPSes.

We could create, monitor, update and manage our guest instances from a fat-client graphical console application that ran on both Windows and Linux workstations, from a Web-based administration portal, or from the command line of our Virtuozzo for Linux host system.

EXECUTIVE SUMMARY

Virtuozzo for Linux 3.0

Taking a different tack than full-machine virtualization products, such as those from VM-

ware, SWsoft's Virtuozzo for Linux 3.0 delivers solid consolidation and utilization benefits—while providing some very slick management options—by virtualizing at the operating system level. In fact, Virtuozzo's excellent management capabilities

earned it an Analyst's Choice award in eWEEK Labs' tests. For more information, go to www.virtuozzo.com.

COST ANALYSIS: The x86 and x86-64 versions of Virtuozzo for Linux 3.0 are each priced at \$1,000 per physical CPU, or \$1,500 per CPU for the Itanium platform. The product's fat-client management console is priced at \$1,000 per seat, and its Web-based management interface costs \$350 per server. Virtuozzo's closest competitors, in terms of virtualization approach, are Linux VServers, Solaris 10's Containers and the SWsoft-sponsored OpenVZ project. All three are free, but the Linux-based options lack the breadth of management tools that Virtuozzo offers, and, with Solaris 10, compatibility with Linux-based applications can be an issue.



KEY PERFORMANCE INDICATORS

USABILITY	EXCELLENT
PERFORMANCE	EXCELLENT
MANAGEMENT	EXCELLENT
HARDWARE SUPPORT	GOOD
SOFTWARE SUPPORT	GOOD

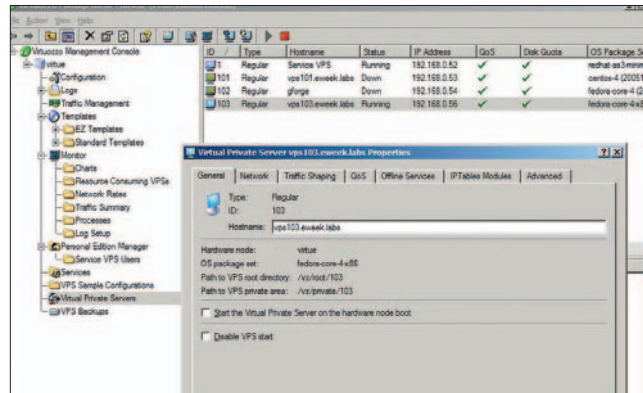
EVALUATION SHORTLIST

- **Linux VServer Project** Linux VServers approach virtualization in much the same way that Virtuozzo does, but the project lacks Virtuozzo's level of polish (linux-vserver.org)
- **OpenVZ project** OpenVZ is an open-source project based on the Virtuozzo core; the project is still young, but we've been impressed with it in early testing (openvz.org)
- **Solaris 10's Containers** For applications that run on Solaris 10, the Sun operating system's Containers functionality is worth consideration for consolidation and boosting system utilization (www.sun.com/software/solaris/utilization.jsp)

more simply, by choosing a sample configuration such as that for a VPS with 256MB of RAM.

We could also bump up the resource settings for a particular VPS en masse—such as by raising CPU, memory and storage limits by a factor of 1.5 across the board—or individually.

The product's management tools also include consoles for managing FTP, mail and HTTP servers. During tests, we were able to get an FTP server on one of our Fedora Core 4 guests up and running rather simply by choosing the application template for ProFTPD



We could keep tabs on and manipulate the VPSes we'd created without requiring a separate management framework.

for our VPS and checking the access, upload and connections options we desired.

We were impressed by the set of monitoring tools offered. We could choose which diag-

nostic characteristics to chart and then track them from the Virtuozzo consoles. We could also access detailed network traffic information.

We could join two or more hosts running Virtuozzo into a cluster, which enabled us to migrate VPSes from one host to another without disrupting their uptime, as well as back up our VPSes between the hosts in the cluster. 🍌

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