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# Looking for Cost-Effective, Enterprise-Class Technology?

## Red Hat Delivers with Integrated Virtualization Capabilities

Many companies assume that potential overhead of x86 virtualization technology renders it difficult to deploy with business-critical applications, such as those offered by SAP. However, by using the virtualization technologies included in the Red Hat Enterprise Linux Advanced Platform, your IT department can improve IT flexibility without jeopardizing the performance of the applications that are critical to your company's daily operations.

It is an established best practice that a business-critical application should be protected from hardware failures. Typically this requires high-availability clustering and redundant systems. In fact, Red Hat has provided high-availability clustering (Red Hat Cluster Services) as a core function of its Enterprise Linux operating system (OS) since 2002, and it has been used in thousands of installations.

Adding a virtualization layer in a high-availability cluster further insulates the application and end users from the hardware layer. In practice, the result is improved uptime, faster recovery from failure, and simplified IT maintenance. On the other hand, introducing additional technologies into the infrastructure is not without risk. When building your IT infrastructure, you need to balance performance, scalability, and complexity to develop a solution that will meet your business's needs. The Red Hat Enterprise Linux Advanced Platform provides both a leading virtualization technology and a mature high-availability solution – all in one package.

Not only does the Red Hat Enterprise Linux operating system scale well on multi-core x86 servers, it also includes a very low-overhead virtualization layer. Tight integration with the OS and support for the latest x86/x86\_64 hardware enhancements enable Red Hat systems to virtualize even high-performance applications. The advantages of a Red Hat solution, in which the OS and the virtualization layer are tightly coupled, are particularly beneficial for applications that have high demand for network and storage traffic.

### Red Hat's Virtualization Technology: What's in It for SAP Customers?

Red Hat has long partnered with SAP to deliver a reliable, scalable, secure, and affordable platform that combines the best of SAP solutions and Red Hat technologies. Many customers looking for a platform that can help them affordably grow their IT architectures for the future are running their SAP solutions on Red Hat Enterprise Linux.

SAP customers can use the complete Red Hat solution to achieve:

- **Impressive performance** – Red Hat's virtualization technology brings with it high system performance. In industry benchmarks, Red Hat's virtualization tests performed within 10% of systems without virtualization; in some cases, the overhead was as little as 2%.
- **A greener IT infrastructure** – By consolidating the number of servers companies run, virtualization also reduces the amount of energy needed to cool and power these servers. Network World recently recognized Red Hat Enterprise Linux 5 for its green operating system.<sup>1</sup>
- **Reduced costs** – Red Hat Enterprise Linux 5's open source virtualization capabilities are integrated into the OS to reduce added technology costs. And with Red Hat's open source technologies, customers are able to leverage commodity hardware, eliminating the need to purchase expensive proprietary alternatives.
- **Increased manageability** – Through open standards, managing virtualized systems also becomes easier. To enable this, Red Hat founded the *libvirt* project with a goal of creating a hypervisor-agnostic interface for managing virtual machines. The libvirt standard has

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<sup>1</sup> See [www.press.redhat.com/2008/06/26/red-hat-gets-the-green-light-as-greenest-operating-system](http://www.press.redhat.com/2008/06/26/red-hat-gets-the-green-light-as-greenest-operating-system) for more information.

Red Hat is working closely with SAP to ensure that SAP solutions are certified and supported on Red Hat Enterprise Linux to deliver the robust, secure, and high-performance solutions companies need.

## Optimize Your Operating System With Para-Virtualization

Traditional virtualization products relied on hardware emulation – intercepting and translating hardware requests from guest virtual machines. This approach creates significant overhead, especially for I/O-intensive workloads, and limits the scalability of the virtual environment. For these reasons, enterprise class workloads such as databases or ERP systems are seldom virtualized in production.

Previous customer experience might tell us that any system that needs high performance or needs to be scaled is not a candidate for virtualization. After all, applications, such as those for financial trading, that require low latency or are time sensitive have often been unable to benefit from virtualization. Until now.

In Red Hat Enterprise Linux 5, Red Hat optimized the OS to work in a virtualized environment, using **para-virtualization** to eliminate the I/O bottlenecks and remove the need for complete system emulation. Removing this overhead results in significantly better performance, especially for I/O-intensive workloads. Para-virtualization solves traditional virtualization challenges such as clock-skew – in which problems synchronizing the clock between the hypervisor and multiple virtual machines cause time to be “lost” as the guest clock runs more slowly than the host.

Red Hat Virtualization also supports dynamic resource allocation, allowing memory and CPUs to be added or removed from a live virtualized server. For example, if the system needs more CPU resources to complete a resource-intensive processing job, the user can add more virtual CPUs on the fly. Then, when the job completes, the extra CPUs may be removed and reassigned to other guests. Red Hat integrated virtualization supports up to 32 CPUs per virtual machine, providing a stable and scalable platform for your enterprise applications (see Figure 1).

since been embraced by many manufacturers, software vendors, and OS vendors, and is currently shipped in Red Hat Enterprise Linux and many of the community Linux distributions.

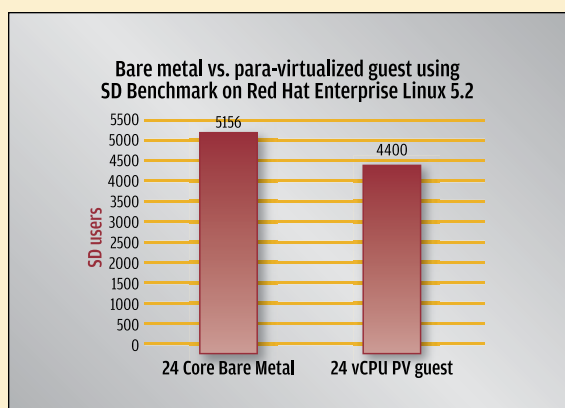
ready for production use with SAP solutions. Please see [www.redhat.com/solutions/sap](http://www.redhat.com/solutions/sap) for more information on this testing and its results.

## Test Results Prove Red Hat's Virtualization Readiness

In February 2008, SAP LinuxLabs conducted a Linux Virtualization Certification Workshop to demonstrate the readiness of different technology partners to run SAP applications in virtual servers. As a result of this workshop, SAP affirmed that Red Hat Enterprise Linux virtualization is

In November 2008, an SAP-certified result of 5,156 SD users was achieved by Red Hat Enterprise Linux 5.2 using SAP ERP 6.0, SAP NetWeaver 7.0, and IBM's DB2 running on an IBM System x3850 M2. Find more information on this benchmark at [www.redhat.com/f/pdf/Cert08066.pdf](http://www.redhat.com/f/pdf/Cert08066.pdf).

In December 2008, Red Hat demonstrated the scalability of its solution in a virtualized server environment, earning an SAP-certified result of 4,400 SD users running in a Red Hat Enterprise Linux 5.2 para-virtualized guest (see sidebar above and **Figure 1**). Testing results can be found at [www.redhat.com/solutions/sap](http://www.redhat.com/solutions/sap).



**FIGURE 1** ▶ The results of Red Hat's recent virtualization benchmark tests

## Learn More

Red Hat works closely with SAP to ensure that SAP solutions are certified and supported on Red Hat Enterprise Linux to deliver the robust, secure, and high-performance solutions companies depend on to manage their businesses. Red Hat also regularly publishes new white papers, benchmarks, reference architectures, and other documentation. To access this documentation and find out more about the many benefits of running your SAP environment on Red Hat Enterprise Linux, visit [www.redhat.com/solutions/sap](http://www.redhat.com/solutions/sap). ■