Simple Path to Dramatic Performance and Cost Improvements

Moving workloads without application changes to Red Hat Enterprise Virtualization and the Intel® Xeon® processor E5-2600 product family can help slash data center costs.

Organizations of all types and sizes are dedicated to the continuing pursuit of greater operational efficiency. IT departments strive to take full advantage of virtualization to mitigate the effects of forces such as increasing energy costs and growing data stores on CAPEX and OPEX in the data center.

A recent study by Principled Technologies, a technology assessment and testing firm, demonstrates how compelling these benefits can be, as illustrated in Figure 1. A middleware application was moved without changes from a bare-metal server based on the Intel® Xeon® processor 5500 series to a virtual machine (VM) under Red Hat Enterprise Virtualization 3.1 on a later-generation server based on the Intel® Xeon® processor E5-2690. The VM had 16 virtual cores and 24 GB of virtual RAM, matching the 16 logical cores and 24 GB RAM on the bare-metal server. Both the VMs and the bare-metal server ran Red Hat Enterprise Linux® 5.8.

The VM delivered 90.3 percent greater application performance than the previous-generation bare-metal server, with headroom to spare. Whereas the application had consumed the full compute capacity of the bare-metal server, the VM utilized less than half of the resources on the more powerful, newer-generation server. Even more dramatic results were generated by running a second, identical (but isolated) VM on the newer host: 143.8 percent greater application performance compared to the bare-metal server.

This result demonstrates the value of refreshing servers that are two years old or more with virtualized infrastructure on newer servers. Supporting workloads on fewer hosts helps reduce equipment and facilities requirements, and the performance boost provided by the refresh can also help lower operational expenses such as power, cooling, and support.

Figure 1. Red Hat Enterprise Virtualization and the Intel® Xeon® processor E5-2600 product family delivered far better performance than a previous-generation bare-metal server.
Red Hat Enterprise Virtualization Alleviates Common Stakeholder Concerns

One common obstacle to consolidating servers onto virtualized hosts is the concern among application owners and other decision makers about whether applications will be able to run side by side on a single server without reconfiguration. These individuals may also worry that failure of one application could affect other applications running on the same host.

The concerns of these stakeholders are understandable but unfounded. The compelling cost and performance advantages described here—achieved by migrating to Red Hat Enterprise Virtualization and the Intel® Xeon® processor E5-2600 product family—are accompanied by powerful benefits in terms of both complexity and risk:

• No application or configuration changes or re-tuning were required. The team simply installed the original OS onto the VM and then copied the application and workload configuration.

• Each VM remained isolated and independent. Identical copies of the same VM each ran in its own logical environment, defined and protected by a robust combination of hardware and software mechanisms.

Open-Source Virtualization Meets Rigorous Demands of the Enterprise

The value of enterprise virtualization has been dramatically enhanced by the robust capabilities now available from open-source hypervisors and servers based on Intel® architecture. As an alternative to proprietary solutions, Red Hat Enterprise Virtualization and Intel® Xeon® processors benefit from industry-wide co-innovation enabled by open standards and the cost benefits of high-volume manufacturing and flexible choice of equipment manufacturers.

Red Hat Enterprise Virtualization is a feature-rich, high-performance, cost-effective alternative to proprietary solutions, and it is designed specifically to take advantage of the capabilities of Intel Xeon processors. As a result, customers have the means to achieve outstanding performance, scalability, and efficiency, for outstanding consolidation ratios and cost-effective data infrastructures. The enterprise-grade hypervisor based on Kernel-based Virtual Machine (KVM) turns the Red Hat Enterprise Linux kernel into a hypervisor, designed to handle hundreds of hosts and thousands of VMs in mission-critical enterprise environments.

The combination of Red Hat Enterprise Virtualization and Intel Xeon processor-based servers benefit from the long-standing tradition of co-engineering between the two companies. Enablement in software for each generation of hardware features plays a vital role in delivering value to enterprise customers.

Intel is also a major contributor to open-source projects upstream from Red Hat Enterprise Virtualization, such as KVM and the Linux kernel itself, as well as its sponsorship of oVirt, a community for developer collaboration around virtualization. As Red Hat adopts new capabilities from these communities, it works with Intel to make them enterprise ready. As a result, Red Hat Enterprise Virtualization takes excellent advantage of Intel® Virtualization Technology (Intel® VT) capabilities throughout the hardware stack, as shown in Figure 2.

• At the processor level, Intel VT-x hardware assists accelerate virtualization by means such as improved interrupt handling and memory virtualization, as well as enhancing flexibility of VM migration across server pools.

• At the chipset level, Intel VT for Directed I/O helps map virtual I/O to physical devices, improving performance through direct assignment and enhancing reliability through device isolation.

• At the network level, Intel VT for Connectivity offloads traffic handling from the processor to the network controller, increasing performance by freeing up processor resources for other work.

Optimizations such as these have led to consistently excellent results on industry benchmarks, as shown in Table 1.

![Figure 2. Collaboration between Intel and Red Hat delivers efficient, high-performance solutions that take excellent advantage of Intel® Virtualization Technology.](image)

![Table 1. The Red Hat Enterprise Virtualization hypervisor running on Intel architecture-based servers leads two-socket and four-socket results and provides the only eight-socket SPECvirt*_sc2010 results as of September 1, 2012.](image)
Take the Next Step

Red Hat Enterprise Virtualization and servers based on the Intel Xeon processor provide a simple path to compelling cost advantages, without having to make changes to applications. This combination of hardware and software is highly tuned through a long-standing, close co-engineering relationship between Red Hat and Intel, with optimizations throughout the solution stack.

Moving their applications to newer server hardware running Red Hat Enterprise Virtualization enables organizations of all types and sizes to realize substantial cost savings while also driving up performance. Customers are benefiting from these capabilities today, as they look ahead to further innovation with Red Hat and Intel in the years to come.

Read the full performance report from Principled Technologies:
www.principledtechnologies.com/Red%20Hat/RHEV_Intel_migration_0213.pdf

For more information on Red Hat Enterprise Virtualization, visit:
www.redhat.com/rhev

For more information on Intel® Server Products and Intel Virtualization Technology, visit:
www.intel.com/xeon and www.intel.com/virtualization

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2 Testing was based on SPECjbb*2005.

3 Results current as of September 1, 2012. See www.spec.org for the latest published results.

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