

RED HAT ENTERPRISE VIRTUALIZATION PERFORMANCE: SPECVIRT™ BENCHMARK

DATASHEET

AT A GLANCE

- The performance of Red Hat Enterprise Virtualization can be compared to other virtualization platforms using the SPECvirt_sc2010 benchmark.
- SPECvirt_sc2010 measures hypervisor performance using realistic workloads. As of March 1, 2013, RHEV leads VMware in performance on comparable servers defined by CPU count.
- The RHEV subscription model provides high performance at a lower cost-per-SPECvirt_sc2010 than VMware.

OVERVIEW

Red Hat® Enterprise Virtualization (RHEV) is the strategic virtualization alternative for organizations looking for better total cost of ownership, faster return on investment, accelerated break-even, and freedom from vendor lock-in.

RHEV consists of both a hypervisor technology and an enterprise virtualization manager. The RHEV hypervisor, based on the Red Hat Enterprise Linux® kernel and the Kernel-based Virtual Machine (KVM) hypervisor technology, offers the high performance and scalability that Red Hat is known for.

Hypervisor performance is a key factor in deciding which virtualization platform to implement, and Red Hat Enterprise Virtualization performance, as measured by the SPECvirt_sc2010® benchmark, leads the industry both in terms of highest overall performance and highest number of performant virtual machines on a single server.

WHAT IS SPECVIRT_SC2010®?

SPECvirt_sc2010 is the first vendor-neutral benchmark designed to measure the performance of datacenter servers that are used for server virtualization. The benchmark was developed by the non-profit Standard Performance Evaluation Corporation (SPEC) virtualization subcommittee, whose members and contributors include AMD, Dell, Fujitsu, HP, IBM, Intel, Oracle, Red Hat, Unisys and VMware.

SPECvirt_sc2010 uses realistic workloads and SPEC's proven performance measurement methodologies to enable vendors, users and researchers to compare system performance across multiple hardware, virtualization platforms, and applications.

The benchmark utilizes several SPEC workloads representing applications that are common targets of virtualization and server consolidation. SPEC modified each of these standard workloads to match a typical server consolidation scenario of CPU resource requirements, memory, disk I/O, and network utilization for each workload. These workloads are modified versions of SPECweb2005, SPECjAppServer2004, and SPECmail2008.

Scaling is achieved by running additional sets of virtual machines (VMs), called "tiles," until overall throughput reaches a peak. All VMs must continue to meet required quality of service (QoS) criteria.



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An example of a SPECvirt_sc2010 tile is shown below in Figure 1:

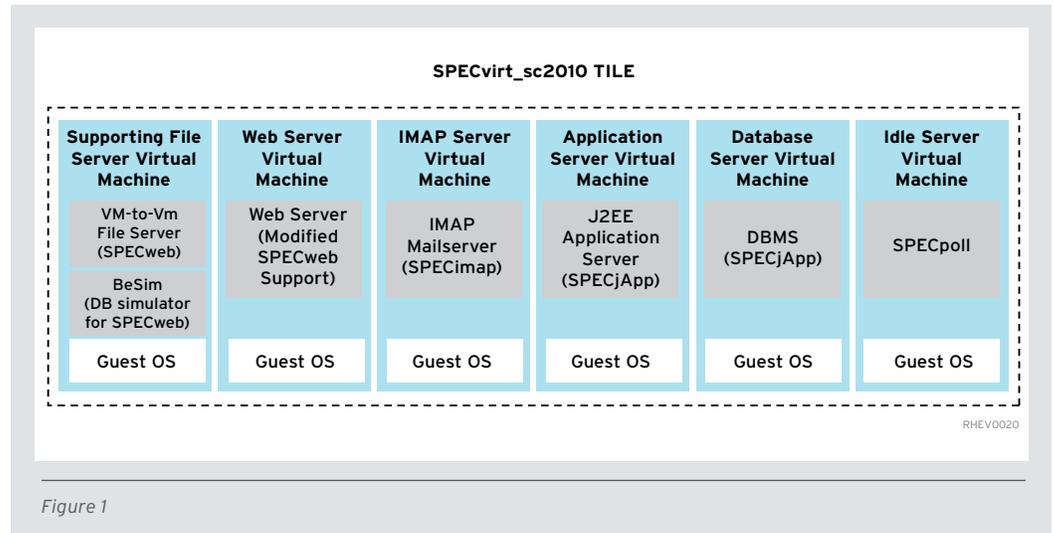


Figure 1

Scaling the workload on the tested system consists of running an increasing number of tiles. Peak performance is the point at which the addition of another tile (or fraction) either fails the QoS criteria or fails to improve the overall metric.

HOW DOES RHEV PERFORM ON SPECVIRT_SC2010®?

As of March 1, 2013, 21 SPECvirt_sc2010 benchmark results have been published by organizations testing both Red Hat Enterprise Virtualization and VMware ESXi hypervisor platforms. All SPECvirt_sc2010 scores below are measured as XXXX@YYY where XXXX is the raw performance score and YYY is the number of VMs that yielded that score.

PERFORMANCE PER CORE AND PER CPU

Below in Table 1, the best SPECvirt_sc2010 score for each category of core count is compared. RHEV leads VMware in the 12, 20, and 40 core categories and has the only published 64 and 80 core scores.

TABLE 1

Number of cores	Best VMware SPECvirt_sc2010 score	Best RHEV SPECvirt_sc2010 score
12	1221@78	1367@84
16	1570@102	1763@108
20	1878@120	2442@150
32	2742@168	N/A
40	3824@234	4682@288
64	N/A	5466@336
80	N/A	8956@552

As shown in Table 2, RHEV also leads VMware in the two- and four-socket server category and has the only published scores for eight-socket servers, including the single server with the highest overall performance (8956) and the highest number of performant virtual machines (552 VMs)

TABLE 2

Number of CPU	Best VMware SPECvirt_sc2010 score	Best RHEV SPECvirt_sc2010 score
2	1878@120	2442@150
4	3824@234	4682@288
8	N/A	8956@552

CONSIDERING COST/PERFORMANCE

When deciding which virtualization solution to deploy, it is important to consider not only the raw performance of the platform but also how much it will cost to achieve that performance. Like all Red Hat products, RHEV is sold on a subscription basis. Unlike proprietary software, there is no high upfront license fee. Instead, you pay per socket per year for the software you use.

RHEV has always been less expensive than VMware on a one year and three year basis. (See the separate **Red Hat Enterprise Virtualization: Competitive Pricing Guide** for more details), but value of RHEV can also be measured in terms of how it costs for a certain amount of performance compared to VMware.

For this paper, the three-year costs for the 7 submitted SPECvirt_sc2010 scores that were published as of November 15, 2012 were compared. Each SPECvirt_sc2010 submission contains detailed information on the number of sockets on each tested system as well as the vRAM configuration of each virtual machine. This information was used to price Red Hat and vSphere.

The cost to license the 7 listed environments for three years was calculated, and then the calculated license cost was divided by the performance value of the SPECvirt_sc2010 score to calculate dollars per SPECvirt_sc2010 (\$/SPECvirt_sc2010 performance).

For example, in the first score listed in the results page at www.spec.org/osg/virt_sc2010/results/specvirt_sc2010_perf.html, the SPECvirt_sc2010 score 2721@168 was achieved on a 4 socket system (per the Physical Configuration section in the Full Result Disclosure). RHEV pricing is based on socket count only, so the cost to license RHEV with business hour support for this environment is:

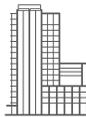
$$\text{\$999/socket-pair/year} \times 2 \text{ socket pairs} \times 3 \text{ years} = \text{\$5994}$$

The calculated value of \$/SPECvirt_sc2010 performance over three years for RHEV for this configuration is therefore:

$$\text{\$5994} / 2721 = \text{\$2.20/SPECvirt_sc2010}$$

WHAT'S NEXT

For more information, please go to www.redhat.com/rhev or contact your Red Hat authorized reseller or local Red Hat sales office.



ABOUT RED HAT

Red Hat is the world's leading provider of open source solutions, using a community-powered approach to provide reliable and high-performing cloud, virtualization, storage, Linux, and middleware technologies. Red Hat also offers award-winning support, training, and consulting services. Red Hat is an S&P company with more than 70 offices spanning the globe, empowering its customers' businesses.

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RHEV COST IS LOWEST PER SPECVIRT_SC2010 PERFORMANCE

As you can see in Figure 2, the cost to license RHEV for three years for each of the systems tested in the SPECvirt_sc2010 benchmark is the lowest whether you are looking at 2, 4, or 8 socket systems. The average cost is \$1.71/SPECvirt_sc2010.

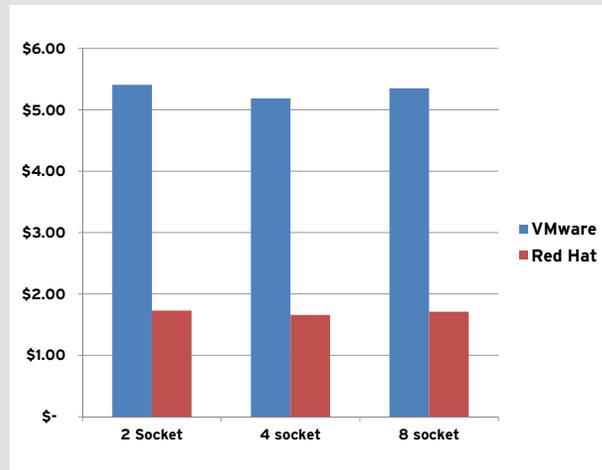


Figure 2

VMWARE VSPHERE COST IS HIGHER FOR THE SAME PERFORMANCE

VMware vSphere is more expensive than RHEV over the three year period, averaging \$5.33/SPECvirt_sc2010. That is roughly 3.1 times the cost per SPECvirt_sc2010 of RHEV. This is due to the upfront license fee and the Support and Subscription (SnS). The environments were priced using vSphere Enterprise edition.

SUMMARY

In conclusion, Red Hat Enterprise Virtualization not only offers great performance on the only independent virtualization benchmark, it does so at a great cost/performance ratio.

DISCLAIMER

Red Hat product offerings, pricing, and terms and conditions are accurate as of March 1, 2013 and are subject to change and local pricing. Pricing for non-Red Hat virtualization platforms and guest operating systems are based on published retail or volume license pricing in the United States as of March 1, 2013 and is subject to change and local pricing.

SPEC®, SPECvirt™, and SPECvirt_sc® are trademarks or registered trademarks of the Standard Performance Evaluation Corp. (SPEC). Competitive numbers shown reflect results published on www.spec.org as of March 1, 2013. The comparison presented is based on core count versus SPECvirt_sc2010 score (Table 1), CPU count versus SPECvirt_sc2010 score (Table 2), and license cost divided by SPECvirt_sc2010 performance score for each published system under test (SUT) based on (a) 1 Red Hat Enterprise Virtualization Standard subscription per SUT socket for three years, and (b) vSphere Enterprise Edition license per SUT socket plus three years of Enterprise Edition Gold SnS per SUT socket. For the latest SPECvirt_sc2010 results visit www.spec.org/osg/virt_sc2010.