RED HAT ENTERPRISE LINUX: A HIGHER VALUE AND LOWER COST ALTERNATIVE TO MICROSOFT WINDOWS SERVER 2008

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EXECUTIVE SUMMARY

Comparisons of systems performing real-life business services show that Red Hat® Enterprise Linux® offers lower costs than Microsoft® Windows® Server 2008, improving as you scale up your deployment. Using realistic lifecycles for licensing and support exposes the genuine operational and contractual benefits you gain when choosing Red Hat over Microsoft. Red Hat Enterprise Linux subscribers derive real value, including more efficient ways of managing their IT portfolio costs and greater flexibility in building computing solutions.

Red Hat’s straightforward subscription model and observance of industry standards protect you from being locked into a single platform and forced upgrade paths. The broad Red Hat Independent Software Vendor (ISV) ecosystem, supported by the largest market share of any Linux operating system, gives you the confidence to select your solution based on business needs, features, and cost. A subscription to Red Hat Enterprise Linux gives you the most thoroughly tested, secure, and up-to-date operating system available backed by a strong global corporation to provide the support you expect. Choosing Red Hat Enterprise Linux as your platform saves you money and frees you to focus on your business opportunities.

From all perspectives, Red Hat Enterprise Linux delivers better value.

VALUE IS ABOUT COST-EFFECTIVE CHOICES

Red Hat Enterprise Linux proves its superior value over Microsoft Server 2008 with its low cost of acquisition, low cost of maintenance and support, and by giving you the freedom to tailor your IT Infrastructure to your business needs. Not only are initial costs lower for greater capabilities, higher performance, and world-class support, but the costs associated with Red Hat Enterprise Linux are lower when compared to a Microsoft Server environment that charges extra just to allow users or other systems to connect to the Windows server.

Cost of acquisition is just the initial value. As recognized by CIO Insight’s annual survey of IT Executives, the Red Hat customer expectations of superior ROI, reliability, and support have been consistently met.

A Red Hat subscription goes well beyond comprehensive phone support and timely updates. It guarantees the enterprise the reliability, scalability, and performance expected from a community of technologists, OEMs, ISVs, and customers who are committed to maintaining a state-of-the-art operating system. Red Hat is your advocate in this community as well as a major contributing participant, leveraging the work performed there to everyone’s advantage. Red Hat goes beyond the community effort to provide a stable, broadly certified operating platform that is reliable in operation and in lifecycle. Red Hat Enterprise Linux benefits from leading-edge development, the broadest and deepest testing available anywhere, and long-standing relationships with global vendors that wring the maximum performance out of new hardware. You benefit from leading performance on industry standard benchmarks, NSA-certified security, and an operating system lifecycle that offers continuing support for older hardware and lauded training and support.

1 Red Hat has been rated #1 in 3 of the past 4 years. Microsoft has never been rated higher than 20th. http://internet.ziffdavisenterprise.com/CIOI_Downloads/CIOI_0811_ResearchPDFS.pdf
A Red Hat platform goes beyond the operating system. Red Hat Network (RHN) offers easy-to-use, extensible, and powerful management for your Red Hat Enterprise Linux environment, simplifying datacenter operations and providing instant visibility into the state of your systems. Knowing at a glance that your systems are up-to-date and configured consistently is reassuring, and combined with the native robustness and security of Red Hat Enterprise Linux, it frees you from worrying about outages so that you can focus on business opportunities.

Red Hat understands that platform choice and application portability are key requirements in any IT infrastructure where architectural optimization is critical to success. Red Hat’s respect for open standards and broad ecosystem of hardware and software partners ensures that your infrastructure can meet those requirements. Red Hat enables more choices with solutions that meet those interface and functional standards—more choices means more competition, and that results in further reduced costs.

**COMPARING THE COSTS ASSOCIATED WITH DEPLOYING ON RED HAT ENTERPRISE LINUX VERSUS WINDOWS SERVER 2008**

The only way to compare costs of Red Hat Enterprise Linux and Windows Server 2008-based systems is to use a real-world scenario and a fair mapping of license and support details between the two offerings. Some previous comparisons have lacked credibility by making unfair assumptions about, for example, the level and forms of support required by Red Hat Enterprise Linux and Windows Server 2008.

Ground-rules for these comparisons are:

- Each comparison is based on a typical real-life application running on a realistically configured hardware platform.
- Hardware and applications are common to both operating systems, assumed to have the same costs in both contexts, and are therefore not named or compared.
- Consider realistic costs of the operating system, including acquisition, updates, support, and client access licensing.
- Intangibles that are hard to cost but affect the TCO, such as robustness and security, are mentioned and compared but left as un-costed differences of value.
- Use an ownership period of six years as a full product lifecycle.
- Equivalent product capabilities and support levels must be matched (e.g., mission-critical functions must be accompanied by support at the highest support-level agreement (SLA)).

Three business scenarios have been chosen as a basis for comparing equivalent Red Hat and Microsoft-based systems: a large-scale e-commerce website with a three-tier architecture, an intranet content management system, and a smaller commercial website (the latter two are presented in sidebars). Each scenario portrays a realistic service and is constructed out of the appropriate operating systems, applications, middleware, and databases used in such solutions.

Together, these comparisons demonstrate basic system building blocks, at different levels of scale and with the appropriate levels of support that can be used to extrapolate configurations and costs of the kinds of systems that most enterprises run.
**THE COMPARISON: AN E-COMMERCE WEBSITE**

Let’s consider a typical, fairly large consumer-facing three-tier e-commerce website. The presentation tier uses a set of web servers fronted by a distributing load-balancer (not shown here). Below that, the business logic tier runs a J2EE-based application serving environment, distributed across a set of cooperating machines, with one designated as a fail-over node. The data tier consists of a highly available database cluster in an active/active configuration, with a third machine available as a passive fail-over node.

**THE PRESENTATION TIER**

The presentation tier handles all user interactions with the site. This scenario calls for eight machines to deliver dynamic pages to users on the Internet. This scenario assumes that incoming requests are distributed to individual servers, working independently, by a front-end distribution application. Serving predominantly static pages would require fewer machines, while larger numbers of users could be handled by adding more machines.

Web server processes tend to not require excessive amounts of CPU cycles. Today’s CPUs are faster and more powerful than ever so dedicating entire physical servers to running a single instance of a web server can lead to severe under utilization of server hardware.

In order to increase server utilization it is now considered a best practice to run multiple web servers as virtual machines on each physical server.
Red Hat Enterprise Linux enables up to 4 virtual guests on a 2-socket server making it a perfect fit for this deployment scenario. The presentation portion of web transactions is stateless and the front-end distributor can manage live removal and addition of web servers. This means that the support requirements will be less than the other tiers, making the Red Hat Enterprise Linux Basic subscription the appropriate choice as it offers access to all updates and 24x7 on line support.

At first glance, Microsoft’s Windows Web Server 2008 would appear to be the obvious choice as comparable offering, because of its low license cost and free support for unlimited Internet connections. However, since windows Web server 2008 has no support for virtualization it can’t be considered without lowering the utilization of the server infrastructure. The next best solution for a Microsoft-based presentation tier would be to deploy Microsoft’s Windows Web Server 2008 Enterprise Edition which is significantly more expense per server ($3,999 vs. $469) but supports up to four virtual machines per server.

Unfortunately, Microsoft also charges the customer $1,999 for an “External Connector License” for each server running Windows Server Enterprise Edition so that it can be accessed by the Internet. Microsoft also charges for online technical support and upgrade rights via their Software Assurance plan which can average up to 20% for each license. As you can see in Figure 1, the costs of deploying and supporting Red Hat Enterprise Linux over six years is substantially less than Windows.

Assumptions:
1.) All prices are list;
2.) All Microsoft licenses include an average 20% annual charge over list for Software Assurance for each license.

FIGURE 2: SIX-YEAR COST OF OPERATING SYSTEM OWNERSHIP IN THE PRESENTATION TIER.
THE BUSINESS LOGIC TIER

Core functionality of this website operates in the five servers of the business logic tier. These servers are typically equipped with large amounts of memory (in excess of 4 gigabytes of RAM) and high I/O capabilities to handle a high volume of service requests from the presentation layer and data traffic to the data tier. Just as with the data tier, this layer can be scaled upward or downward in performance by adding or removing servers. Scaling upward might be necessary for more complicated transactions, while fewer machines might be required for more static activities.

Because this layer handles transient requests (the persistence of sessions, orders, customer information, etc. is maintained in the data tier) and achieves robustness by clustering at the application layer, Red Hat Enterprise Linux Standard subscription is appropriate and saves money.

The Red Hat Enterprise Linux Standard provides the same web support and update services as Red Hat Enterprise Linux Basic, with the added benefits of cluster support and 12x5 phone support coverage that provides live access during business hours.

The corresponding Microsoft offering in this scenario would be Windows Server 2008 Enterprise Edition with the Software Assurance plan. The cost of the Software Assurance contract is proportional to the operating system list price, making service for this tier inherently more expensive than the data tier. In order to add some level of phone support coverage, the Windows server customer would have to purchase an additional Microsoft support plan.

Assumptions:
1.) All prices are list
2.) All Microsoft prices include an average 20% annual charge over list for Software Assurance for each license. Microsoft’s amounts include $1,298 for a five-incident support pack that provides a fraction of the phone support of the Enterprise Linux subscription;
3.) Total reflects expenditures over six years in three different scenarios.
THE DATA TIER

A reliable data tier architecture can be built with two servers clustered in an active/active configuration, for database operation, while a third is available as a passive failover server. Because customer data is the most critical asset in the system, the machines all run Red Hat Enterprise Linux Advanced Platform Premium with 24x7 support included. This configuration can be scaled upward by adding more machines, or downward by removing one of the active machines—the two-server active/passive configuration should be considered the minimum requirement for high availability and robustness in an e-commerce service deployment.

The equivalent Microsoft operating system offering on the same hardware is Windows Server 2008 Datacenter Edition, which provides the required high-availability features for this environment and is priced by the socket.

Since the license cost of this operating system doesn’t include telephone support, or access to future upgrades, the user must purchase a subscription to Microsoft’s Software Assurance plan for each of his server licenses to begin to come close to the level of support offered with a Red Hat Enterprise Linux subscription. Even with Software Assurance, access to 24x7 phone support for a Microsoft server operating system requires that the customer purchase additional per-incident support plans. While Microsoft does provide some complementary support incidents based on the total dollars spent on Software Assurance, it is impossible to know how many additional incidents you will need to buy in order to have the coverage and response time you will need or in order to forecast your operating system support costs for the year.

Assumptions:
1.) All prices are list
2.) All Microsoft prices include an average 20% annual charge over list for Software Assurance for each license.
3.) Microsoft’s prices include a $1,298 charge for a five-incident support pack to provide a fraction of the support equivalent to the Red Hat Enterprise Linux subscription;
4.) Total reflects expenditures over six years in three different scenarios.
Without knowing how many incidents you will encounter, it is impossible to know how much Red Hat Enterprise Linux will save you. But, Red Hat Enterprise Linux costs less with no incidents, and that advantage improves with each incident. Also, your support costs will remain fixed and predictable regardless of the amount of support you need. Red Hat Enterprise Linux Advanced Platform Premium is the most robust Red Hat offering with the highest level of support, and it is priced less than the equivalent Microsoft offering. Scale up or down, and Red Hat maintains that advantage.

CHOOSING THE RIGHT OPTIONS

Maximizing your investment requires that you choose the appropriate products, configurations, and support levels to match your hardware, your service offering, and your organization. Red Hat can help you make those choices and provide the training that will let you get the most out of your environment. Here, we only discuss the options relevant to this scenario – other options are available for different situations.

All levels of the Red Hat Enterprise Linux subscription—Basic, Standard, and Premium—offer the same RHN software update plan and quarterly operating system upgrades, but differ in support plans. All offer web-based support but differ in response time. Basic and Standard subscriptions offer two-day response times, while a Premium subscription offers one-day response times. Standard and Premium subscriptions also provide telephone support for an unlimited number of incidents—Premium at 24x7 with a one-hour response. All subscription levels allow any number of system users and are priced to the number of CPU sockets, allowing any number of CPU cores per socket.

Microsoft’s licensing plan is much more complicated than Red Hat’s. Software Assurance (SA) must be purchased to provide upgrade rights and unlimited online support, while per-incident phone support can be purchased in “packs” or as-you-go. SA has a minimum term of three years with one-year extensions available, but if the SA license lapses, the customer must re-license the product to regain support. This lock-in minimizes your choices.

Of greater concern in some environments, Windows Server 2008 generally requires a Client Access License (CAL) for each user or device that accesses the service, though CALs can be bundled into the licensing plan. Depending on the number of users in your context, CALs can be a significant additional cost and management overhead (see the Intranet CMS sidebar).

Red Hat’s best-of-breed training is a key component in increasing your productivity. Red Hat Consulting experts will help you assess your team’s readiness for Red Hat-based solutions and help craft a custom corporate training plan. Flexibility that conforms to your needs, discounts for prepaid and volume registrations, and vast support resources on the web and through the open source community all provide further cost savings. With all of these resources available, you will find that Red Hat Enterprise Linux is easier to support than Microsoft products.
Those are the obvious financial factors, but there are additional hidden costs that come from your choices being limited in other ways.

The innate robustness, NSA-certified security, and Security-Enhanced Linux (SELinux) features provided by Red Hat Enterprise Linux not only reduce downtime, but protect your data and eliminate time spent installing patches and trying to keep up with security flaws.

Adherence to standards, a basic tenet for Red Hat, inherently leads to more choices for the user—more products to choose from at lower costs. This provides flexibility, sometimes in very specific ways.

Single-vendor solutions have a more basic limitation: they lock customers in to those solutions. Once committed, it becomes difficult to move to an alternative, as more and more portions of the enterprise come to depend on those solutions, whether it be document formats, specialized training, or interoperability within the enterprise or with customers.

**COST COMPARISON ROLL-UP**

Rolling up all of those numbers, the aggregate costs for the systems defined in this scenario are:

**FIGURE 4: SIX-YEAR COST OF OPERATING SYSTEM OWNERSHIP FOR THREE TIER E-COMMERCE SCENARIOS**

1.) SMALL = 4 presentation, 3 application, 2 data

2.) MEDIUM = 8 presentation, 5 application, 3 data

3.) LARGE = 16 presentation, 10 application, 5 data

4.) Note that the cost of each rolled-up Microsoft server set contains one five-pack incident contract for each year of their six year lifespan

Remember, if your volumes are high enough, Microsoft will grant a discount on your licenses, but not Software Assurance. However, if you require significant phone time resolving incidents, or you need significant per-user access to the application or data tiers, Microsoft’s costs will rise.
CONCLUSION

The value provided by Red Hat Enterprise Linux starts with a significant cost advantage over Microsoft Windows Server 2008, both from the outright purchase price of the operating system with its more cost-effective support plan, followed by lower cost over the life of your investment. Red Hat Enterprise Linux support levels are more flexible than Microsoft and better match real-world needs, particularly when you consider that with Red Hat Enterprise Linux, if necessary, you can use an unlimited number of incidents without additional charges.

As you become familiar with the many features of Red Hat Enterprise Linux Advanced Platform and RHN systems management, you’ll find that Red Hat Enterprise Linux is significantly easier to support than Windows Server 2008 (e.g. remote installation of systems). It’s also easier to take advantage of Red Hat’s comprehensive online support resources. Further, Yankee Group’s 2008 Server Operating System Reliability survey found that Red Hat Enterprise Linux continues to make significant improvements in reliability, while Windows Server 2003 showed increases in downtime.

Cost is not the only advantage that Red Hat Enterprise Linux offers—operating systems are not commodities. Red Hat’s commitment to standards leads to more product choices, reducing costs further and giving you flexibility in how you construct your datacenter. You won’t be locked into proprietary Microsoft products or APIs, but will have a choice of best-of-breed solutions from leading vendors. If Microsoft fails you, you are locked-in to its solutions. With Red Hat, you’ll receive a carefully assembled distribution with better price, service, support, and other benefits.

Red Hat Enterprise Linux offers NSA-certified security and renowned robustness that lead to heightened uptime, less risk, and fewer headaches. Ultimately, Red Hat Enterprise Linux increases customer satisfaction.

No matter how you look at it, Red Hat Enterprise Linux is the most cost-effective operating platform choice, while also delivering better all-around value.

7  2008 Server OS Reliability Survey
APPENDIX A:
AN INTRANET CONTENT MANAGEMENT SYSTEM (CMS)

A corporate CMS, used for managing internal documents, has a different set of requirements and expectations than externally facing systems. The scale of usage is generally known ahead of time, system maintenance and backups can be scheduled to modestly interrupt the high availability required for consumer business, and there are specific individuals that use the system. That there are specific users will have a significant impact on cost in the form of Client Access Licensing (CAL).

For this scenario, a community of up to 100 users accesses a central server system to search for, read, and modify documents. The server is composed of a cluster of two servers that handle all tiers of the CMS application.

Each server runs Red Hat Enterprise Linux Advanced Platform Standard subscription under the assumptions mentioned above. Moreover, with a predictable workload and one application, support can be managed by an internal IT team with basic, business-hours support. Windows Server 2008 Enterprise Edition with SA support bundled with 25 CALs is the equivalent offering, though CALs must be purchased for more than 25 users.

Beyond the basic cost differential of the Red Hat and Microsoft operating systems, there is one factor that makes Red Hat’s solution significantly less expensive: Red Hat has no per-user charges, while Microsoft requires a CAL for each user.8

![Figure 5: Intranet CMS Costs](image)

1.) License price with CALs included

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8 See the CAL Guide for details of Microsoft CAL licensing
APPENDIX B: A BASIC WEBSITE

The TomCat server in the Red Hat configuration can serve Java Server Pages (JSPs), but in this example is expected to primarily serve static pages. There has been no compromise in the robustness of the data tier, which uses an active/passive two-machine cluster. Even when less commerce is transacted, user identity and behavior is of critical business value.

![Figure 6: Basic Website](image)

As with the other scenarios, the two data-tier servers would run Red Hat Enterprise Linux Advanced Platform Premium or Windows Server 2008 datacenter, while the web/application-tier servers would run Red Hat Enterprise Linux Standard or Windows Server 2008 Enterprise and Microsoft’s External Connector license.

Adding additional machines can provide higher performance. This hardware configuration also takes advantage of Red Hat’s ability to designate one machine to serve as a passive fail-over for different applications—in this case, from either tier of the site. Remember, since the Microsoft licenses don’t come with upgrade rights or phone support, the Microsoft customer would have to purchase both a Software Assurance plan for each license and some level of incident support to even come close the level of coverage that comes with a Red Hat Enterprise Linux subscription. Those two facts mean that the cost of implementing this simple architecture and maintaining it for 6 years on a Windows Server 2008 platform could run as high as $54,071 for licenses, Software Assurance and phone support, while the same architecture built on Red Hat Enterprise Linux and Red Hat’s superior subscription based support model would cost $36,270 and provide unlimited phone support.

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