

**Migrate to Red Hat[®]
Enterprise[®] Linux:
Lower the Total Cost of
Ownership**

A Management White Paper

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Migrate to Red Hat® Enterprise® Linux: Lower the Total Cost of Ownership

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Executive SUMMARY

INTRODUCTION

IT organizations are continuing to face unprecedented years of economic pressure to lower costs while meeting and/or improving business service levels. For many organizations, the impact is beginning to reach their core business applications, which previously were not completely immune to financial pressures but were thought to be too risky for major platform changes. Organizations are now achieving significant costs savings by migrating core enterprise business applications to open systems running Red Hat Enterprise Linux (RHEL).

In the 1990s and 2000s, many organizations migrated their core business applications from mainframes to powerful UNIX/RISC-based servers running proprietary operating systems. RISC systems replaced mainframes with significant price-performance improvements, particularly for the high end applications that required significant computer resources while providing high availability and service levels. Sun SPARC, HP PA-RISC, and IBM POWER are key examples of these system technologies.

During this time, organizations began implementing open system Linux software, personified by market leader Red Hat, on Intel x86 server architectures. Such solutions were proven to provide significant price-performance improvements compared to proprietary RISC-based software and systems. However, few organizations ran core business applications on Linux.

In the last several years, prior inhibitors to the use of Linux to support core systems – questions about intellectual property infringement, market acceptance, and enterprise-level support – have been overcome. The combination of:

- Proven reliability of Red Hat Enterprise Linux at a lower cost than proprietary software
- Knowledge that Red Hat Enterprise Linux is enterprise-ready from both feature and support perspectives
- Powerful and cost-effective x86 servers

has resulted in many enterprises installing Red Hat Enterprise Linux (RHEL) as a platform for core business applications to achieve high system reliability at a lower total cost of ownership (TCO).

RESULTS

This white paper provides an analysis of five organizations that migrated enterprise applications from proprietary legacy systems to RHEL solutions. In each case, the organization's current system(s) had reached end of life from a hardware or application perspective. At these management decision inflection points, each organization decided to compare the cost and benefits of either staying the course with RISC platforms or migrating the existing legacy RISC-based servers to an RHEL x86-based solution. In all cases, the RHEL solutions were significantly less expensive than the legacy systems while supporting other business objectives such as improved business continuity and higher application performance.

Importantly the study also looks at non-financial, strategic decision-making information – the rationale for migrating to RHEL, decision-making process taken, and benefits received. While cost is a key consideration, it is not always the most important reason organizations move from RISC systems to RHEL-x86 solutions.

The 3 year TCO of the RHEL solutions are, on average, \$79,764 per 4-core system, 41% of the \$195,501 per system legacy system cost for a savings of 59%. ROI averaged 350%, with a high of 1,186% and a low of 89%.

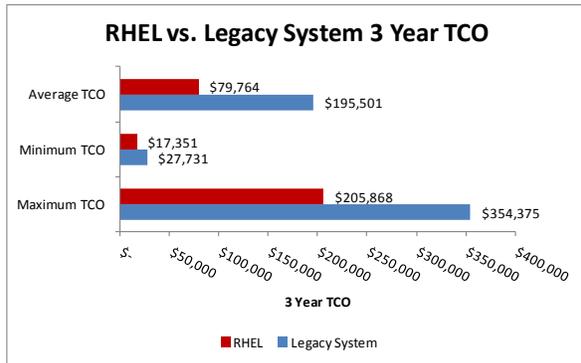


Figure 1a. RHEL Solution vs. RISC System 3 Year TCO

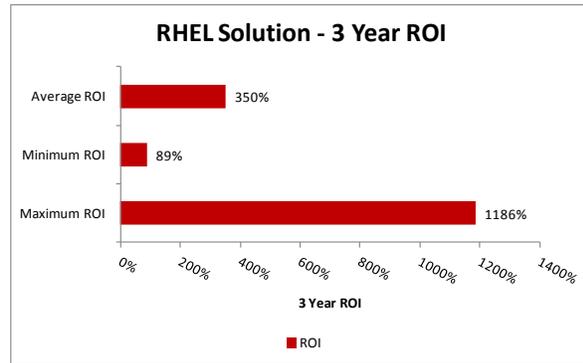


Figure 1b. RHEL-x86 Solution ROI

While all organizations achieved savings, there was high variability of savings by organization. Variability was primarily due to the complexity of the solutions being analyzed and the hardware savings that accrued to the RHEL solution. While all solution components – hardware, software, and labor - contributed to the value obtained in the RHEL solution, the major contributor was the savings in hardware enabled by RHEL – replacing proprietary RISC servers with lower cost blade servers. In several cases, organizations spent under \$200,000 to replace one million-dollar RISC servers.

The primary reason for migrating away from the legacy systems was not always cost saving, though cost savings was the reason most mentioned:

Reason for Migrating to RHEL	Percent of Respondents	
	Primary Reason for Migrating	All Reasons for Migrating
Additional Capacity or Performance Needed	40%	60%
Cost	20%	100%
Current System Technology End of Life	20%	40%
Improved Business Continuity	20%	20%
Alignment With Corporate Direction		40%
Application Requirement / Fit		20%
TOTAL	100%	N/A (multiple responses allowed)

Figure 2. Drivers For Migrating to RHEL-x86 Solutions

RISC systems tend to be large, monolithic servers. The preference of organizations who participated in the study is for RHEL-x86 solutions that are based on a large number of smaller blade servers. The RHEL-x86 architecture provides significant application right-sizing and scaling compared to RISC systems. In addition to cost, the long-range viability of specific RISC architecture-based product lines was questioned. For some organizations, applications running on RHEL-x86 architectures had less downtime – improved business continuity – than applications running on RISC servers. While all of these reasons for migrating to RHEL-x86 are well known, what is most interesting is that when asked to pick the top reason for migrating, cost was the primary reason in only 20% of the organizations who participated in the study.

CONCLUSIONS AND RECOMMENDATIONS

In the last two years, migration to RHEL from RISC systems has accelerated in order to take advantage of the price performance advantage of the RHEL-x86 blade hardware solutions and the significantly improved RHEL support for virtualization, clustering and high availability technologies. Consequently, organizations have begun to successfully implement RHEL-x86 solutions in support of core business applications. This survey and analysis shows the positive financial results of these implementations.

In particular, organizations that are reaching end of maintenance agreements on RISC systems should consider investing in an RHEL solution to replace the incumbent legacy systems, which is when all organizations in this study considered a migration. While some organizations compared the cost of new RISC server-based legacy systems to new RHEL-x86 solutions, others compared only the cost of obtaining an additional 3 years of support for the RISC legacy systems (no hardware replacement) to new RHEL-x86 solutions. In all cases the RHEL-x86 solutions provided superior financial return.

- An average 61% three year TCO savings of \$115,737 per 4-core system for legacy RISC systems
- Improved system admin coverage from 1 system administrator per 56 systems to a 1:92 ratio
- Average ROI of 350%

In addition to cost savings, organizations are seeing service level and business agility benefits.

Organizations who participated in this study chose RHEL over competing solutions to provide additional capacity, better system and application performance, and improved business continuity that they felt could not be delivered by x86 operating systems such as Windows.

Finally, from a strategic perspective, each organization in this study chose an RHEL solution because the RHEL open system software that provides them architecture, financial, and operational flexibility to choose the best hardware platform for their application and business goals at a given time while allowing the hardware platform decision to change in the future. Choosing an HP-UX, Sun Solaris, or IBM AIX-based RISC system tends to lock an organization into the vendor's higher-priced hardware and software platform, resulting in higher switching and migration costs if in the future a decision is made to change vendor hardware.

METHODOLOGY OVERVIEW

Alinean interviewed five organizations over a one month period to understand the financial assessments and decision-making process used by organizations to make technology decisions that resulted in the deployment of RHEL solutions. Several conversations were held with each study participant.

The organizations interviewed all migrated from a RISC platform-based solution to an RHEL Linux solution. Interviewee organizations were chosen who had migrated mission-critical applications from one platform to another.

Hardware, software, and cost information was provided by study participants. In some cases list pricing was used in lieu of actual pricing to reduce the impact of vendor discounts from the analyses or when actual purchase prices were not available.

Five companies with a range of applications, users, and systems were chosen to participate in the study:

	Company A	Company B	Company C	Company D	Company E
Application	PeopleSoft HCM and Oracle Database	Clinical Management	Peoplesoft HR and Finance	Risk Management	Oracle Database and Associated Systems
Number of Users	18,000	5,000	2,000	60	Unavailable
Legacy System	IBM POWER p570 Power5	HP 9000 rp4440-8 PA 8800	IBM BladeCenter 701 POWER7	Sunfire E15000 SPARC (UltraSparcIV)	HP9000 rp7410 / rp5470 PA-RISC
Total Number of Cores	18	48	120	196	24
RHEL System	HP DL380 G6 Intel Xeon	HP DL385 AMD Opteron	IBM BladeCenter HS22 Xeon	IBM X3850 Xeon	HP BL680c G5 Xeon
Number of Cores	200	44	120	160	30

Figure 3. Organization Profiles

Results have been consolidated and summarized to maintain confidentiality.

Organizations compared legacy RISC systems to RHEL solutions at the end of a maintenance cycle, typically three years. When comparing the cost of the incumbent legacy system environment to the cost of a RHEL solution, organizations took one of two approaches:

1. If the legacy system was sufficiently meeting business needs, organizations compared the cost of maintaining the existing system for an additional three years to the cost of a new RHEL solution
2. If the legacy system was not meeting business needs, organizations compare the cost of buying new RISC systems to a RHEL solution.

Organizations that participated in our study, regardless of the approach taken, chose the RHEL solution as the most cost effective option.

FINANCIAL ANALYSIS

Hardware, software, and labor costs were analyzed to identify the variation in these cost categories between the legacy systems and RHEL solution.

One important finding of the study: the number of cores is a more important driver to the hardware cost, price/performance, and financial analysis than number of servers. While traditionally the number of servers is the primary metric against which to measure server price and performance, the popularity and success of multi-core chips and multiple-processor servers makes the number of servers less important than the number of cores.

For example, one organization replaced one Sun Solaris E15000 consisting of over 150 cores with numerous HP blades 8 and 16 core servers. Comparing cost per system metrics of a 150 core server to an 8 core server would not provide relevant metrics.

To perform comparisons across systems we normalized systems using 4-core systems as a base. This means for example, if one system consisted of 20 servers each with 2 cores (40 core total) at a cost of \$100,000 and another system consisted of 2 servers each with 20 cores (40 core total) at the same cost of \$100,000, these systems were considered to be equally priced, each costing \$10,000 per a normalized 4-core system. The alternative, pricing the former system to be \$5,000 per system (20 servers at \$100,000) and the latter to be \$50,000 per system (2 servers at \$100,000), is not an accurate reflection of comparable systems.

The three year TCO calculation included the initial hardware and software purchases, hardware and software maintenance, labor, and migration costs. Organizations typically excluded applications from the

TCO analysis, as most often application license and support costs were priced on a per user basis, thus having the same cost for both the legacy RISC system and RHEL solutions.

OVERALL FINANCIAL SUMMARY

Hardware, software, and system admin labor costs were summarized to create an average 4-core system three year TCO cost for the legacy RISC systems, \$195,501 and the RHEL solutions, \$115,737. The organizations that participated in this study obtained an average 3 year TCO savings of 59%. Of course, there is a cost to the migration, an average of \$14,185 per system. The ROI of 350% was calculated by dividing the net savings by the RHEL hardware and software purchase prices and migration costs.

		3 Year Average Costs / 4 Core System			
		Legacy	RHEL	Savings	% Savings
Hardware		\$ 113,321	\$ 9,237	\$ 104,084	92%
Software		\$ 9,732	\$ 2,469	\$ 7,263	75%
System Admin - Labor		\$ 72,448	\$ 53,873	\$ 18,575	26%
Migration		\$ -	\$ 14,185	\$ (14,185)	
3 Year Cash Flow		\$ 195,501	\$ 79,764	\$ 115,737	59%
3 Year ROI			350%		

Figure 4. RHEL-x856 TCO and ROI

Each topic will be detailed in following sections of this report.

HARDWARE

The original server hardware configurations of all organizations used one of the major RISC architectures - HP, IBM, and Sun (now Oracle) systems were reviewed. A summary of the legacy systems:

- HP PA-RISC (40% of study participants)
- IBM POWERx (40%)
- SUN SPARC (20%)

	Legacy Systems			RHEL Solution		
	Average	Minimum	Maximum	Average	Minimum	Maximum
Number of Cores	81	18	196	117	30	200
Number of 4 Core Servers	20	5	49	29	5	50
Three Year TCO	\$ 113,321	\$ 19,445	\$ 231,111	\$ 9,237	\$ 4,960	\$ 16,830

Figure 5. Hardware Analysis

The legacy systems averaged 81 cores while the RHEL solutions averaged 117 cores, an increase of 44%. At the same time the 3 year TCO hardware cost dropped an average of 92%, from \$113,321 per 4-core system to \$9,237.

While organizations had different business motivations for migration to RHEL solutions, we see that a prime benefit is the improved TCO of x86 blade architectures compared to RISC architectures.

The three year TCO cost includes both the initial hardware cost and maintenance, though maintenance is often included in the initial purchase cost.

SOFTWARE

Software maintenance licensing costs of HP, IBM, and Sun RISC systems are typically higher than the similar subscription and licensing costs of RHEL-based blade solutions. The following are key factors:

1. RHEL Open Source operating system software costs less than proprietary RISC-based operating systems such as Solaris, HP-UX, and AIX. The cost of proprietary operating systems consists of a one-time license fee, sometime bundled into the overall system cost, plus a yearly maintenance fee. The maintenance fee is based on a percent of either the initial software license fee or on the overall system. With RHEL, there is no upfront license fee. The purchase cost of a RISC OS along with the yearly license fees are usually higher than the low yearly subscription price of RHEL.
2. Processor-based Data Base Pricing: Oracle database software, the most popular database of organizations that participated in our study, is priced using an Oracle Processor Core Factor. The Oracle Processor Core Factor is based on the number of cores in the server on which Oracle is installed.

For example, the Oracle Processor Core Factor for IBM POWER6 and POWER7 processors is 1.0, for HP PA-RISC processors is .75, while the Intel Xeon and AMD Opteron Oracle Processor Core Factor is .5. From an Oracle database perspective, this means that, assuming the same number of cores, Oracle in an RHEL blade solution is 66% the cost of Oracle in an HP PA-RISC configuration and 50% the cost of Oracle in an IBM POWER6 or POWER7 configuration. While the above-mentioned technologies were the ones used by organizations in this study, more recent x86 technologies may have a higher Oracle Core Factor than .5.

3. For the participants in this study, applications such as PeopleSoft that utilize user-based pricing did not impact the cost between systems, so pricing is the same in both RISC and RHEL blade systems.

RISC-based legacy systems averaged \$9,732 in software costs per system, 75% more than the RHEL solutions which averaged \$2,469. While all study participants had lower software costs for the RHEL solution compared to the RISC-based systems, there was high variability in absolute costs. The reason for the variability was that in some cases organizations were running high cost applications or databases, resulting in a high three year software TCO. In other cases, organizations were not running such applications, or the applications had equivalent costs in the RISC and RHEL environments so they were excluded from the analysis.

For the organization who participated in this study, software licensing savings were:

	Legacy Systems			RHEL Solution		
	Average	Minimum	Maximum	Average	Minimum	Maximum
Number of Cores	81	18	196	117	18	200
Number of 4 Core Servers	20	5	49	29	5	50
Three Year TCO	\$ 9,732	Not Available	\$ 17,530	\$ 2,469	\$ 1,245	\$ 4,641

Figure 6. Software Analysis

The calculation is highly sensitive to the number of software products running on servers, software licensing approach – per physical server or per core, and allocation of software maintenance costs from a bundled hardware and software purchase. One organization spent approximately \$10,000 in software maintenance costs per RISC server and only \$950 per x86 server, though there were many more x86 servers. For organizations that had the same number of physical servers before and after migration, the differences were not as dramatic.

The above software costs above are generally lower than the actual software costs for each alternative. As previously mentioned, organizations excluded from their TCO analysis software that was priced the same for each alternative. Some organizations were charged an annual allocation from their central IT group for software such as Oracle or PeopleSoft, regardless of the system(s) on which the software was running. These costs were excluded from the TCO calculations as well.

SYSTEM ADMINISTRATION LABOR

System administrator labor costs are the cost of resources required to provide ongoing hardware, software, and system support for the legacy and RHEL solutions. Labor that is independent of systems, such as storage, database, and application support, was excluded from system administration labor calculations.

The organizations that participated in this study had varying applications on RHEL and therefore varying support requirements. Across all organizations, RHEL solutions saved on average 54% in labor costs - \$675 vs. \$1,465 admin cost per system - of the legacy systems environment.

	Legacy Systems			RHEL Solution		
	Average	Minimum	Maximum	Average	Minimum	Maximum
# of Admins	1.4	0.5	3.8	1.4	0.25	3.8
Coverage - Servers per Admin	56	5	67	92	11	120
Cost per Server	\$ 1,465	\$ 87	\$ 3,855	\$ 675	\$ 48	\$ 1,729

Figure 7. System Administrator Analysis

Note that the average number of administrators was the same between alternatives – 1.4 per organization – while coverage significantly increased. RHEL system administrators covered 92 servers per person while for the legacy system administrators covered 56 servers per person. The result shows that organizations did not decrease the number of system administrators but the same number of system administrators covered more systems. The required support varied based on the scope of the reported support, which is related to the system complexity.

Regardless of the system size, all organizations achieved higher coverage rate and lower cost per system with the RHEL solutions compared to the legacy RISC systems. This advantage was due to the fact that RHEL-x86 solutions had more 4-core systems than the RISC systems, so the same number of system administrator resources covered more RHEL-x86 systems. 80% of the organizations estimated they maintained the same number of system administrator support staff while 20% said the required amount of system administrator support decreased with the RHEL-x86 systems.

Conclusions from the study:

- System admin resource requirements for the RHEL solutions range from 1 admin: 11 systems to 1 admin: 120 systems
- Equivalent system administrator resource requirements for the legacy system range from 1 admin: 5 systems to 1 admin: 67 systems
- The number of system administrator resources required to support a system highly varies based on the system requirements. All systems required minimal RHEL admin support. Variability across systems was the result of DBA, storage, and networking resource differences.

The fact that RHEL solutions require less system administrator support than legacy RISC systems has been publicized in several studies. Overall, RHEL solutions require less system administrator support than RISC systems. This makes sense, as RHEL solutions provide higher availability and require less hands-on management than the RISC systems.

MIGRATION APPROACH AND COSTS

All organizations that participated in this study performed comprehensive planning and testing before undertaking their migrations. Once the decision to migrate to a RHEL solution was made, the migration to a RHEL solution took .8 to three staff resources (FTEs), working one-half to a full year. The operating system migration – RISC system OS to RHEL – was generally a small percent of the overall migration. All companies took advantage of the migration opportunity to address business imperatives that RHEL

supported - increased capacity, improved performance, virtualization, and database or application upgrades – that required significantly more testing than a simple migration from a RISC system to a RHEL solution. To provide an apples-to-apples comparison, the effort to incorporate additional business imperatives into the new RHEL-x86 solutions were excluded from migration costs, to the extent possible.

In this analysis, we measured only the OS migration costs, not the effort that supported improved and additional systems and/or application capabilities.

To estimate migration labor costs, the resources used to perform the migration were identified and costed using industry standards rates. Variability is due the complexity of the migration and number of servers being migrated.

Migration Effort			
	Average	Minimum	Maximum
FTEs	1.8	.8	3.0
Cost per Organization	\$ 228,293	\$ 90,872	449,249

Figure 8. Migration Analysis

Analysis of the migration approaches used yields the following key points:

- Migrating to RHEL solutions requires a relatively small amount of labor if only current application functionality is being migrated. If additional functionality is being migrated, migration effort will vary based on the required functionality.
- Organizations migrate using their standard project management and migration processes.
- A benefit of migrating to RHEL is that, unlike most proprietary OS licenses, RHEL subscriptions do not require an up-front purchase cost and are not tethered to specific machines. Therefore, RHEL subscriptions can be used on test servers and then migrated to production servers, as appropriate.

Validating the view that RHEL solutions have entered the mainstream, organizations used their typical IT project planning approach and execution to perform the migration – no special activities required. Most often this involved a cross-functional team addressing project governance and an overall project manager (part-time or full-time depending on the scope of the migration) to manage the effort. A test system was configured using the RHEL solution hardware and software. Once testing was complete, a production environment was built and the legacy system(s) were migrated to production. Depending on the application, some organizations migrated all applications at once while others performed a phased migration.

STRATEGIC DECISION-MAKING

The decision to use RHEL for mission critical applications is a strategic as well as financial decision. Compared to several years ago, many organizations are using RHEL solutions to support mission critical applications. What has changed?

Our interviews show that, compared to even three years ago, organizations are now very comfortable that RHEL solutions are appropriate, mainstream technology. Questions about intellectual property ownership, technical support maturity, and technology risk have been overcome. Consequently, the business value of the target RHEL-x86 solution and related TCO are the primary decision criteria.

Organizations migrate to different operating systems and environments for many reasons. The study supporting this white paper analyzed at what point in the technology life cycle organizations migrated to RHEL.

All organizations interviewed migrated to RHEL when a server maintenance period expired, typically at the end of three or six years. At these decision points, organizations compared the benefits and costs of two primary alternatives:

- RHEL vs. the cost of maintaining the current legacy server environment
- RHEL vs. refreshing the legacy servers with newer models in the same technology family

The organizations studied were asked why they migrated to RHEL from the incumbent system. The drivers that drove organizations to expend the time and effort to migrate from one environment to another were:

Reason for Migrating to RHEL	Percent of Respondents	
	Primary Reason for Migrating	All Reasons for Migrating
Additional Capacity or Performance Needed	40%	60%
Cost	20%	100%
Current System Technology End of Life	20%	40%
Improved Business Continuity	20%	20%
Alignment With Corporate Direction		40%
Application Requirement / Fit		20%
TOTAL	100%	N/A (multiple responses allowed)

Figure 9. Reason for Migrating to RHEL

Specifically, migration reasons were:

- “The RISC systems were past the maintenance contract. Our data center team recommended going to RHEL as a cost savings measure.”
- “Lack of ability to grow capacity prevented us from meeting significant business application needs.”
- “We wanted higher system availability.”
- “They [the legacy system vendor] had a dead-end architecture.”

The legacy systems studied were all RISC systems – HP PA-RISC, IBM POWER, or Sun SPARC while the new systems were all blade systems, showing that the price-performance of RHEL blade systems is significantly driving migration away from RISC systems.

Interestingly, these organizations earlier had the opportunity to use RHEL on blade servers when the original legacy system was procured but went with a RISC solution rather than a RHEL solution. In the three to six years after the original decision, each organization surveyed made a different decision.

Most often mentioned, three years ago organizations did not think that Linux was “prime time” ready as the OS for core mission critical systems. Organizations were interested in Linux as a part of a low cost solution, but considered Linux a business risk to be running enterprise applications. The choice of a RHEL solution by these organizations has shown that the following concerns have been overcome: lack of track record running mission critical business applications, questions whether “crowdsourcing” provided the necessary technical support, and unfamiliarity with major Linux vendors.

Objection That Was Overcome	Percent of Respondents
There will be a business disruption / downtime	80%
We don't have the skills	40%
Applications can't be transferred - too old, won't perform, etc.	20%
Too risky - Linux not ready for core enterprise applications	20%
Our tech staff knows UNIX not Linux	20%
It will take too long	0%
There is no need	0%

Figure 10. Objections Were Addressed

There were several common approaches organizations interested in migrating to RHEL took in order to address the objectives. The most common two approaches were to (1) obtain industry and application validation that that target solution would work via professional organizations, vendor references, and peer networking, and (2) performing a proof of concept to test both technical capabilities and cost assumptions.

In addition to overcoming these historical objections to open source software, organizations mentioned that a major reason for migrating core business applications to RHEL-x86 solutions was the availability of enterprise-level technologies. While each study participant mentioned different capabilities, the ones that had the most interest were virtualization (Red Hat Enterprise Virtualization), clustering (High Availability Add-On for Red Hat Enterprise Linux), and systems management (Red Hat Network Satellite).

In making the decision to use RHEL for enterprise applications, several barriers to adoption were overcome:

1. As previously mentioned, the perception that Linux was not ready for mission critical applications. Every study participant mentioned overcoming this barrier.
2. Skills / training. For organizations that had Linux skills, training was not an issue. For organizations that did not have Linux experience, one to five staff members took the Red Hat training to obtain relevant certifications such as Red Hat Certified System Administrator (RHCSA) and Red Hat Certified Architect (RHCA).

In all cases, the move to a RHEL solution following traditional IT decision-making within each organization.

The technical decision was made by the CIO or senior technology manager in 60% of the organizations. In 40% of organizations the technical decision was made by a cross-functional team.

IT was responsible for cost justification in 20% of organizations; the CFO was responsible for cost justification in 20% of the organizations. In 60% of organizations the cost justification was made by a cross-functional team.

A value that several organizations mentioned is that RHEL subscriptions can easily be used on test servers and then moved to production servers as needed. Some RISC operating systems are tied to a named server and cannot be repurposed on a different server.

This, once again, shows that RHEL solutions have become mainstream – no special decision-making is needed. RHEL solutions are not considered R&D or one-off solutions but are solutions that are chosen based on superior TCO, high performance, and lower risk than competitive technologies.

MANAGEMENT AND BUSINESS AGILITY BENEFITS

In addition to financial benefits, organizations that participated in the study mentioned that of the RHEL solutions contributed to several management and business agility benefits compared to RISC solutions:

- Scalability – the ability to manage capacity growth by using blade servers, with more granularity and growth headroom than with RISC systems.
- Support for grid computing - distributing workloads across many relatively small blade servers.
- Shorter system deployment time - blade servers being deployed in days or hours with no system downtime, compared with legacy systems that required the system to be taken off-line. Because of the low cost systems, organizations mentioned that less administrative time - paperwork and management approvals - were needed to make changes.
- Consolidation of workloads – some organizations consolidated multiple RISC system workloads into one instance of RHEL, optimizing IT resources and utilizing consolidated workload management.
- Higher availability and less downtime, with no single point of failure. While unmeasured by these organizations, study participants' perspective was that the RHEL systems had higher availability than the RISC systems, due to fewer system failures and less maintenance that require systems to be offline.
- Most flexibility in changing hardware vendors or supporting multivendor solutions, taking advantage of the wide adoption of RHEL on HP, IBM, Oracle / Sun, Dell, and other major hardware vendors.