Delivering financial services industry solutions with Red Hat Enterprise Linux and HP

Executive summary

Financial institutions face increasing pressures in the drive towards greater profits and market growth. While spending priorities may vary from one segment of the financial services industry to another, there are common IT imperatives that are underlying the spending. These imperatives include: enabling organic growth through new products and services, delivering improved operational efficiency by lowering cost of services for both infrastructure and applications, managing, monitoring and supporting silos of applications and legacy infrastructure, and providing resiliency, business continuity and compliance required by multiple authorities. In the face of exponential growth of market volumes and profit pressures across all sectors in the financial services industry, firms have increasingly begun to turn to a wide breadth of solutions on Red Hat Enterprise Linux and HP industry-standard servers to provide a flexible and cost efficient computing infrastructure.

Within the securities and investments segment, Red Hat and HP provide solutions to meet the business challenges of dramatic increases in the volume of market and trade messages with Reuters Market Data System (RMDS) 6.0, the class-leading market data platform. For database solutions to meet the ever-more-demanding needs in the information-driven financial markets, the HP BladeSystem, Red Hat Enterprise Linux, and Oracle Database 10g with Real Application Clusters (RAC) deliver solutions resulting in a compelling alternative to Oracle on RISC/UNIX or Windows. As open source grows in the Financial Services sector, the role of governance and compliance has never been more critical. To address these challenges, HP's Governance Services for Linux™ and open source provide a framework for implementing and using policies to help better manage a company's IT resources and maximize its investments.

Red Hat provides the industry's premier Linux and open source environment for commercial deployments. It is a single Linux distribution that has been tested, hardened and certified across a range of enterprise environments and supports both technical and functional enterprise requirements. Red Hat provides market-leading security features, guarantees maintenance of critical bug fixes and security updates for seven years from initial release of the product, and integrates all the necessary components of an enterprise platform, including testing and certification of associated stack solutions. Knowledge, support and advice are critical elements of any technology company's delivery model, so Red Hat is also the leading provider of Linux services. Red Hat knows the challenges that customers face when introducing and maintaining new platforms and applications, and their consultants and engineers bring substantial experience to enable solutions that leverage Red Hat Enterprise Linux.

Additionally, HP and Red Hat offer migration and assessment services to ease the costs of migrating from Sun Solaris to Red Hat Enterprise Linux on HP systems. HP and Red Hat provide everything needed to ensure a successful Linux deployment, including complete, tested and proven platform configurations, solution stacks, and high-availability clustering software. These solutions are delivered on powerful industry-standard HP systems and include access to HP and Red Hat consulting, integration, and support services.

HP and Red Hat's leadership in the Linux marketplace is the result of a committed relationship that combines engineering expertise, world-class global support, and joint solutions. The Red Hat Enterprise Linux and HP BladeSystem c-Class infrastructure deliver outstanding price/performance through industry standards. An open source architecture and modular hardware design mean that a Red Hat Enterprise Linux on HP BladeSystem c-Class solution can support a vast range of enterprise or infrastructure applications and drive consolidation and migration from proprietary systems.

The partnership of Red Hat and HP allows businesses to leverage the industry's best Linux expertise as needed to build out new and flexible computing architectures that drive innovation and save costs. From comprehensive solution design to migration to a Linux solution, Red Hat and HP are committed to helping financial institutions speed time to market through reduced implementation time, infrastructure optimization, and support services for the Red Hat Enterprise Linux solution running on the HP BladeSystem c-Class.

Section 1: The Financial Services world

Grow revenue and reduce costs

Financial institutions face increasing pressures in the drive towards greater profits and market growth. In some regions, new market entries are able to install completely new infrastructure without having to migrate from older legacy systems, giving them huge advantages over their competition. Other businesses have gone through consolidations and acquisitions and must look at new applications and IT architectures to survive.

Managing customer risk is another concern for financial institutions. Basel II remains an enormous issue, with banks needing to demonstrate capital adequacy and minimize operational risk. Additionally, the movement away from mainframe-oriented architectures towards open systems is accelerating, as financial institutions need to reduce cost and improve flexibility – an impossible task for the older, more archaic mainframe environments. However, as many institutions have discovered, the solution they purchase is only as effective as the hardware and operating system on which it is built.

"Financial services executives are confronted with dual and at time opposing challenges. The first challenge is how to create competitive differentiation that retains and acquires customers. The second challenge is how to gain further efficiency out of legacy infrastructure that is already automated and is costly, if not impossible, to fully replace."

Dynamic IT and the Integrated Banking Enterprise

Maggie Scarborough
Financial Insights—an IDC company, December 2005

Addressing the challenges in the financial sector

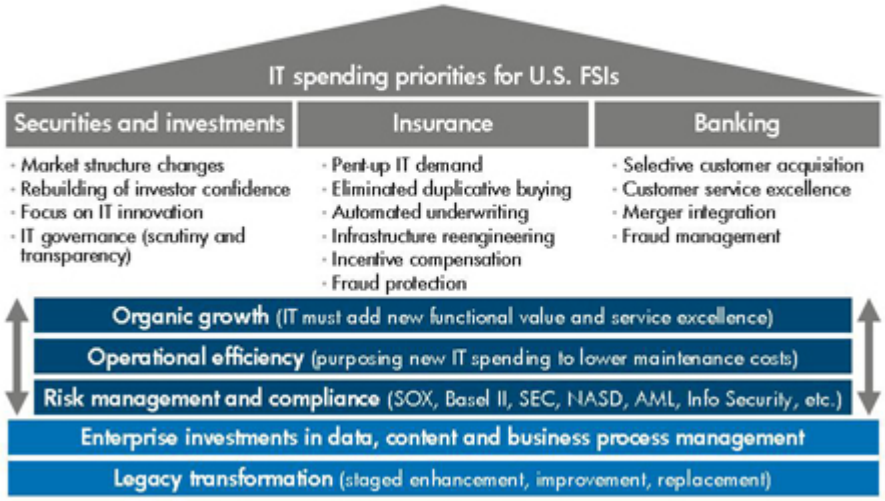
Within an industry as broad and diverse as financial services, it comes as no surprise that IT spending priorities vary from one segment to another. Banking is focusing spending on selective (profitable) customer acquisition, achieving customer service excellence as a key differentiator, managing fraud and in many corporations, delivering on merger integration. The insurance segment is investing in automated underwriting, infrastructure reengineering, incentive compensation and fraud protection. Within securities and investment firms, rebuilding investor confidence and IT governance are key, requiring scrutiny and transparency, with a continued focus on IT innovation for revenue growth and cost savings.

While spending priorities may vary, common IT imperatives underlie the spending:

- Enabling organic growth through new products and services, plus service excellence
- Delivering improved operational efficiency by lowering the cost of services for both infrastructure and applications
- Managing, monitoring and supporting silos of applications and infrastructure created "long ago and far away" (legacy infrastructure)
- Providing resiliency, business continuity and compliance required by multiple authorities

In order to deliver higher service quality, improve risk management, and manage exploding data volumes while lowering the cost of IT operations, many financial institutions are turning to industry-standard Linux platforms and relying on several key ISVs for the foundation of their FSI solutions.

IT spending priorities in the U.S. Financial Services Industry (FSI)



Source: Tower Group 2005

Red Hat and HP—foundation for FSI solutions

Managing IT investment returns during periods of high volatility can be challenging. In the face of exponential growth of market volumes and profit pressures across all sectors in the financial services industry, firms have increasingly turned to Red Hat Enterprise Linux and HP industry-standard servers as a way to dramatically improve price/performance for an increasing number of mission-critical applications. From risk applications to market data systems to equity options calculators, investment and retail banks, as well as insurance firms, are considering a broad range of Linux and open source solutions as a way to reduce costs, speed solutions delivery and enhance competitive advantage.

Ability to react quickly to market changes

Within the securities and investments segment, the dramatic rise of automatically-generated buy and sell orders through algorithmic and black box proprietary trading is leading to even more dramatic increases in the volume of market and trade messages. Volume that has increased over 2500 percent in the past five years is compounded by a trend toward fewer shares per trade. The industry is facing throughput and latency crunches, and decreasing margins per trade. The market saw a "breaking point" in mid-to-late 2000. Until that time, the growth of trading volume and volatility closely matched the growth of the value of the market. Since then, trading volume and market volatility have continued to increase exponentially, but without the benefit of market value growing at the same rate. The consequences are lower margins per trade, which reinforce the increasing importance of the ability to react quickly to market changes.

Older architectures installed in financial services IT departments are not able to respond to the demands of dramatic increases in market data. They lack the power to keep up with increasing market data volumes, the increasing regulatory environment, or the financial risk exposure that increases daily. With the onset of regulations, including RegNMS and MiFID, the industry predicts a 200-to-400 percent increase in messaging traffic, compounding already exceptional growth. These increases could strain networks, servers, storage, analysis, and auditing capabilities—every software and business component that touches your messaging data. Red Hat and Hewlett-Packard, with Reuters Market Data System (RMDS) 6.0, the class-leading market data platform, provide a solution to meet mounting business challenges.

Add RMDS 6.0, the latest version of the Reuters market data system, to the HP and Red Hat platform and experience a market-leading data solution that offers improved performance and increased flexibility through lower latency, higher update rates and new message formats.

A key feature of RMDS 6.0 is a new binary message format, which substantially reduces the size of the market data updates. This increased efficiency will allow RMDS 6.0 to support higher update rates and comfortably manage the rapid growth in volumes of real-time market data.

Reuters is a long-standing industry leader in messaging. Testing conducted by Red Hat, HP, and Reuters has shown that the new Open Message Model (OMM) dramatically reduces latency and improves throughput (over the message performance of previous versions of RMDS) by up to 150%. HP has become the first vendor to engineer an RMDS system with over 1,000,000 backbone updates per second through a single server, and 4,000,000 updates per second on fan out. This performance has only ever been achieved on Red Hat Enterprise Linux.

In recent performance tests conducted by Technology Business Development Corporation (tbdCorp), RMDS 6.0 surpassed previous benchmarks using the power and performance of Red Hat Enterprise Linux running on the Dual-Core Intel Xeon processor-based HP ProLiant DL380 server. Now Reuters can consistently deliver the ever-expanding volume of market data at more than 1.8 million updates per second.

Reuters has also introduced the Open Message Model (OMM) in this release – a new and open set of data modeling tools, which deals with complex data types. This new message model gives Reuters customers and partners the ability to publish data across their enterprise in a wide variety of formats via the RMDS platform – a key extension of Reuters commitment to the openness of RMDS.

Dexia Bank Belgium

The prospect of major cost savings is leading more and more of the world's foremost financial institutions to base their infrastructures on Intel® servers running Linux. Dexia Bank Belgium, one of Belgium's leading banks, recently implemented the Reuters Market Data System on Red Hat Enterprise Linux and the HP BladeSystem platform. This offered Dexia the industry's most advanced information capabilities, including transformational and analytical tools in addition to news feeds from a wide variety of sources. It was also the upgrade path for Dexia's existing Triarch system.

The back-office architecture for Dexia's former market data system was based on Sun servers. However, the bank discovered that implementing RMDS on the HP BladeSystem running Red Hat Enterprise Linux would reduce the number of servers and supporting infrastructure and lower its costs substantially without incurring additional risks. This Linux-based solution—which reflects a strategic shift in trading-room technology—is the outcome of Reuters, HP and Red Hat working together to deliver leading solutions.

Dexia set a cost reduction target of 20 percent for the new system and platform. Here again, the combination of RMDS, Red Hat Enterprise Linux and HP BladeSystem scored highly. Dexia also knew from experience that HP offered high standards of support as well as easily-managed technology. The first phase of Dexia's RMDS installation involved implementing the back-office infrastructure and data feed to the dealing room front office. The new back-office infrastructure was built around HP BladeSystem BL20 G2 server blades, running Red Hat Enterprise Linux. The second phase of the project saw Dexia migrating to the RMDS application.

The project was carried out by Dexia in partnership with HP and Reuters. HP Customer Services provided consultancy related to implementation and deployment, as well as support services for the hardware and for the Red Hat software subscriptions. During the implementation, HP and Reuters transferred knowledge to Dexia that would enable future in-house management of the solution.

While the migration has already reduced the cost of Dexia's hardware and software subscriptions by 50 percent, these savings do not include reductions in other system management costs, which cannot yet be estimated accurately. The new BladeSystem platform is also proving to be more stable than its predecessor, with no interruptions to availability to date. Response times are also very fast, with Dexia estimating that the performance of RMDS on the chosen platform is 15 percent higher than on the equivalent UNIX platform, even though costs are less. Dexia is also confident that HP's strategic commitment to Linux will serve it well in the future, as the industry trend to use Linux systems gathers strength.

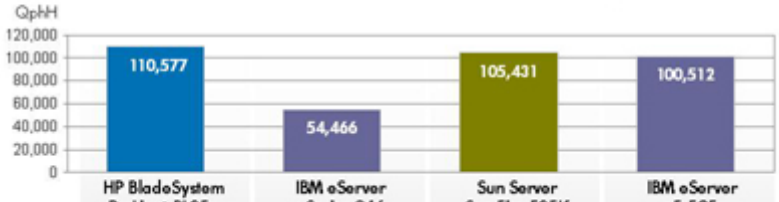
Horizontal scale out with Oracle grid computing

Financial services is an information-driven business—information about securities to hold and trade, information about interest rates, information about mortgage risks, information about customers, information about audits on information quality, information about potential fraud, and so forth. And every action that results from that information can in turn generate additional information that refines the original information. These factors, as well as the increasing numbers of customers and products, mean that the information in use by financial services companies will continue to increase. And as the availability of information increases, so too does the sophistication with which that information is used. The growing regulatory environment and auditing requirements and the increasing sophistication of algorithms operating over the data are leading to expanding and more complex use of databases, both in scale of data and pervasiveness of use. Oracle and Red Hat have worked together to boost the scalability and performance of Red Hat Enterprise Linux for Oracle environments, resulting in a compelling alternative to Oracle on RISC/UNIX or Windows®. Oracle® Database 10g is the first database designed for enterprise grid computing, the most flexible and cost-effective way to manage enterprise information. It cuts management costs while providing the highest possible quality of service. In addition to numerous quality and performance enhancements, Oracle Database 10g significantly reduces the costs of managing the IT environment, beginning with simplified installation, greatly reduced configuration and management requirements, and automatic performance diagnosis and SQL tuning.

Together, Hewlett-Packard, Red Hat and Oracle deliver optimized database solutions to meet these ever-more-demanding needs in financial markets. Recently, HP and Red Hat combined with Oracle to deliver record-setting performance, as a TPC-H benchmark placed HP ProLiant BladeSystem at the top of the 3,000 GB clustered performance category.

The information platform for FSI – Oracle grid computing with Red Hat and HP

#1 TPC-H, 3000GB — data warehouse leadership



	HP BladeSystem ProLiant BL25p	IBM eServer xSeries 346	Sun Server Sun Fire E25K	IBM eServer p5 595
Architecture	Cluster	Cluster	SMP	SMP
O/S	Red Hat Enterprise Linux 4 ES	Suse Linux Enterprise Server 9	Sun Solaris 10	IBM AIX 5L V5.3
Database Mgr	Oracle 10g R2 Ent Ed w/Partitioning	IBM DB2 UDB 8.2	Oracle 10g R2 Ent Ed w/Partitioning	Oracle 10g R2 Ent Ed w/Partitioning
CPU	AMD DC Opteron Model 285 – 2.6GHz	Intel Xeon 3.6 GHz	Sun UltraSparc IV+ 1500 MHz	IBM POWER5 1.9 GHz
Processor/Core	64 / 128	64 / 64	72 / 144	32 / 64
Availability Date	06/08/06	08/15/05	01/27/06	03/01/06

Data as of 03/27/06. See complete results at www.tpc.org

HP BladeSystem, Red Hat Enterprise Linux, and Oracle Database 10g with Real Application Clusters (RAC) deliver on the vision of a business-responsive, cost effective datacenter—one in which IT managers have the freedom and the confidence to transform datacenters into grid computing infrastructures that turn resources into competitive advantages. One of the fundamental design concepts of commercial grid computing is using large numbers of industry-standard servers. Oracle RAC allows Oracle databases to run across a cluster of HP BladeSystem servers, providing unrivaled performance, scalability and flexibility. When business requirements change, just add (or remove) a BladeSystem server and Oracle RAC maintains optimal performance by dynamically distributing the workload across the infrastructure.

Grid computing pools IT resources into a virtualized environment that can be carved up and served on-demand to support rapidly changing business demands. True grid computing can deliver database performance that surpasses the fastest mainframes, with resilience no mainframe can match—all using affordable, standards-based servers and storage.

Delivering business value and controls while managing risk

In the Financial Services sector, IT departments are charged with delivering business value with an eye on managing risk, as well as establishing, assessing and reporting against effective business controls. In an era of cost constraints, market turbulence and organizational stress, the role of governance has never been more critical.

HP's Governance Services provide a framework for implementing and using policies to help better manage a company's IT resources and maximize its investments. HP's governance model adapts to a company's unique requirements for cost savings and competitiveness. Governance practices include:

- HP OpenView Governance Solutions -- Laws such as Sarbanes-Oxley drive financial institutions and other businesses to continuously monitor compliance, improve predictability, and reduce costs associated with compliance. The HP OpenView governance practice provides enterprises the ability to effectively address operational risk, automating and centralizing controls in areas such as security, operations and change. This helps to reduce costs, minimize risk, and ultimately achieve sustained compliance with industry and government regulations. Through this business/IT alignment and effective risk management, companies can begin to move toward true IT governance.

- Linux and Open Source Governance --- Collaboratively developed open source code gives organizations an alternative to proprietary software and benefits that include greater choice, faster development and less expensive implementations. Enterprises around the world are now embracing Linux and open source and extending their implementations beyond the low-end UNIX® space and into more mission-critical application areas such as database and middleware layers. They are utilizing open source programs such as JBoss and MySQL for more complex business functions. Linux and Open Source Governance help IT organizations that may have questions about their ability to manage, integrate and support open source in their enterprise. HP Open Source Governance will inventory a company's computing infrastructure and help put management and license controls in place so that open source is governed by policies and procedures that ease management, integration and support. This governance practice helps bring change within an organization and allows the cost savings and other benefits of Linux and open source to expand an organization.
- IT Shared Service Governance is a formal process of defining the strategy for a shared service environment and overseeing its execution to achieve operational goals. HP's governance method defines key processes, organizational structure, and business metrics, beginning with the business strategy, which in turn guides IT shared-service operations, which link to business operations. The HP IT Shared Service Governance model incorporates the development of the traditional core competencies of IT governance—supply and demand management, investment management and architecture management. At the same time, it addresses the unique requirements of the IT Shared Services operating model, including customer relationship management, utilization and cost-recovery strategies.
- Service-Oriented Architecture (SOA) Governance and Architecture Service --- To realize the full business benefits of SOA, test projects must be undertaken within the context of a strategic, enterprise-wide architecture and under the control of an effective governance program. Through the SOA Governance and Architecture Service, HP is working with enterprises to help put in place the programs needed to establish and administer an SOA that enables IT to more efficiently and cost effectively support highly diverse—and often unpredictable—business requirements.

TCO Assessment Service

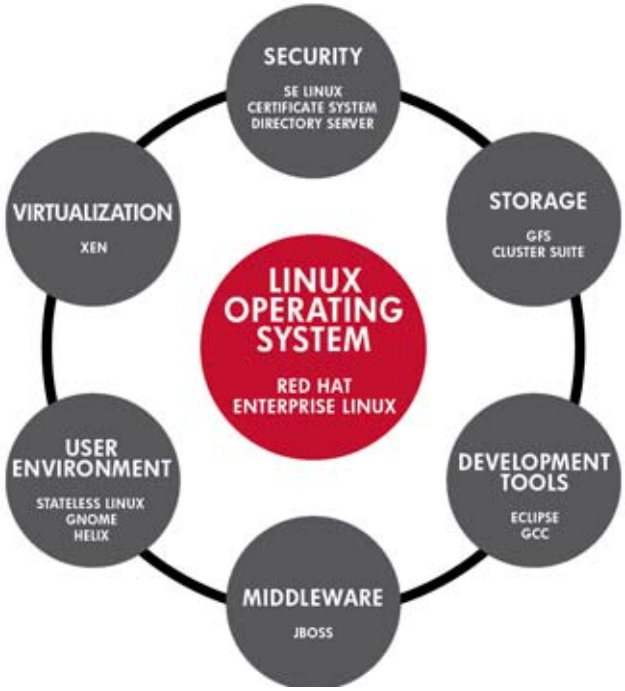
Like any Total Cost of Ownership (TCO) analysis, creating a TCO for the Linux operating system within financial services enterprises requires a thorough examination of the costs that are incurred. Financial service enterprises have unique requirements that tend to alter a more generic TCO analysis, including the cost for things like security and availability. Costs for system downtime due to breaches of security will vary based on users and industry and can be highly significant within the financial services industry. In addition, the potential for lawsuits is rife should private data end up in the hands of a hacker. Since the actual costs of security will be difficult to determine, they are grouped in the soft-cost category. SELinux in Red Hat Enterprise Linux, co-developed with the U.S. National Security Agency, now allows customers unprecedented levels of security in off-the-shelf systems—security that previously was limited to intelligence and military use. The TCO Assessment Service utilizes the HP ROIAnalyst, an easy-to-use online modeling and executive decision-making tool from Alinean Corporation that models solutions for system value comparisons and what-if analysis of different mixes and delivers the results through flexible, customizable reports.

HP consultants will work with a firm's IT management, enterprise architects and business executives to identify critical gaps in architecting and governing IT, and HP will help create a plan for providing a well-defined architecture and governance program that meets business goals.

Section 2: Red Hat Enterprise Linux

Open, stable infrastructure for the future

Red Hat provides the industry's premier Linux and open source environment for commercial deployments. Red Hat Enterprise Linux, sold by annual subscription, has been rapidly adopted and supported by a wide range of Independent Software Vendors (ISVs) and Original Equipment Manufacturers (OEMs). This platform offers excellent performance, scalability and security, and a comprehensive array of services delivered by Red Hat and its partners. As a result, Red Hat Enterprise Linux solutions deployed on certified industry-standard hardware and running a wide variety of enterprise-caliber applications are delivering the capabilities of traditional proprietary UNIX systems, but at significantly lower cost.



Stability

Red Hat maintains a single Enterprise Linux distribution that has been tested, hardened and certified across a range of enterprise environments and supports both technical and functional enterprise requirements. Red Hat Enterprise Linux is a more stable distribution due to the focus on a commercial enterprise deployment, a predictable release cycle, a minimum seven year support for each release and through upstream development in the Fedora Project where the latest open source technologies are packaged and released in a free Linux distribution. Red Hat Enterprise Linux includes the Fedora features that have proven reliable and useful for enterprise and carrier-grade deployments. Red Hat Enterprise Linux releases are provided approximately every 18 months and supported by Red Hat and its partners for seven years. During this time, Application Programming and Application Binary

Interfaces (APIs/ABIs) remain stable, so that applications continue to work for the life of the product. It is the stability offered by Red Hat Enterprise Linux that makes it practical for product certification by ISV and OEM partners.

Perhaps the most important feature of Red Hat's multi-architecture development process is that all implementations are built from the same source code. The primary benefit of this commonality is that all the products are completely code compatible, regardless of architecture. This assists ISVs in supporting their applications on multiple architectures and also simplifies system administration and product support. A critical feature of the Red Hat Enterprise Linux family is that ISVs only need to certify their applications once on each major release of the operating system.

Security

Red Hat Enterprise Linux provides market-leading security features, including Security Enhanced Linux (SELinux), Exec Shield, PIE, and Auditing. Furthermore, Red Hat also guarantees maintenance, including critical bug fixes and security updates, for seven years from initial release of the product.

For mission-critical financial services computing environments, security is a requirement, not an add-on. Accordingly, with the Red Hat Enterprise Linux, security is a major focus, and the most important new security feature is the inclusion of SELinux. This feature, developed by the U.S. government NSA (National Security Agency), provides a Mandatory Access Control (MAC) environment for all Red Hat Enterprise Linux systems. MAC security operates in tandem with the existing Linux security infrastructure, which provides the traditional Discretionary Access Control (DAC) environment. MAC improves the security capabilities of the system through a Security Policy that is imposed by the kernel, along with Role-Based Access Control (RBAC). In a traditional DAC environment, security is achieved by ensuring that applications are carefully configured and do not contain exploitable flaws. In the event that an application is compromised, it is often possible for it to damage the entire system. In a MAC environment, a set of policy rules defines what an application is permitted to do and the kernel ensures that the rules are enforced. As a result, even a badly compromised application cannot damage the entire system. In addition, Red Hat Enterprise Linux on HP ProLiant and HP Integrity servers has earned Common Criteria certification, an international ISO standard (ISO/IEC 15408) for security recognized by more than 23 governments around the world as a reliable means of determining the level of security of various technology products. This certification includes the Controlled Access Protection Profile (CAPP) at an evaluation assurance level (EAL) of 3+, similar to C2 certification under the previous U.S. National Computer Security Center (NCSC) Trusted Computer Systems Evaluation Criteria (TCSEC)—also known as “the Orange Book.” HP is also officially in evaluation with Red Hat Enterprise Linux 5 for Labeled Security Protection Profile (LSPP), Role Based Access Control Protection Profile (RBACPP) and CAPP at EAL4+. The LSPP EAL4+ is similar to the B1 certifications previously available under the U.S. Trusted Computer Systems Evaluation Criteria (TCSEC).

Ensuring that an operating system is up to date and protected by the most recent patches and security enhancements is essential in today’s Internet age, and Red Hat Network (RHN) is the mechanism that provides this value. Red Hat Network is Red Hat's Internet-based system maintenance, monitoring and management infrastructure. RHN's core capability is to analyze all the packages on each Red Hat Enterprise Linux system, identify packages for which updates are available, and resolve any dependencies that the packages require. RHN can then apply the updates as required.

RHN's strength lies in being able to manage hundreds and thousands of systems automatically, with features such as system grouping, automatic updates, continuous monitoring and alerts. Using RHN greatly simplifies the process of keeping multiple systems up to date and secure. As Red Hat continuously provides enhancements and security updates, RHN provides the mechanism to ensure that they are applied to customer systems quickly and efficiently. All Red Hat Enterprise Linux subscriptions provide one year or three years of Red Hat Network access, and can be used to download the purchased Red Hat Enterprise Linux software and layered products.

Integration

Working with strategic partners like HP, Red Hat integrates all the necessary components of an enterprise platform, including testing and certification of associated stack solutions and packaging of integrated ISO (International Organization for Standards) images, as well as facilitating the ecosystem to ensure future platform functionality. Furthermore, the JBoss Enterprise Middleware Suite, from JBoss, a division of Red Hat, is used extensively in the financial services ecosystem and Service-Oriented Architecture (SOA) to speed time-to-market for the development of enterprise Java applications.

Virtualization

Red Hat and HP are forging ahead to bring the benefits of virtualization to financial services customers. Virtualization allows multiple operating system instances to run concurrently on a single computer, and Red Hat has incorporated the Xen open source project into its Red Hat Enterprise Linux 5 system. Xen, the undisputed leader in open source virtualization, will provide the capability of running multiple instances and multiple versions of operating systems.

Virtualization opens up a range of benefits. Instead of purchasing and maintaining an entire computer for one application, each application can partition its own operating system, and all those operating systems can reside on a single piece of hardware. This provides the benefits of a distributed environment, such as security and stability, while making the most of a machine's resources. Virtualization allows an operator to dynamically control a guest operating system's allocation of CPU, memory, storage, and other resources, so each guest receives only the resources that it needs. This control eliminates the danger of a single runaway process consuming all available memory or CPU. It also helps IT staff satisfy service-level requirements for specific applications by fine tuning resource allocations. Since the guest is not bound to the hardware, one can move a running operating system instance from one physical machine to another. As a particular guest operating system begins to consume more resources during a peak period, an operator can move the offending guest to another server with less demand. With virtualized deployments, it is possible to treat computing resources—CPUs, memory, and storage—as a cache of resources and applications that can easily relocate to receive the resources they need at that time. Red Hat and HP are working closely to ensure that all the features of Red Hat's new virtualization capabilities are well integrated and supported on HP systems.

The open source platform for Service-Oriented Architecture

JBoss Enterprise Middleware Suite (JEMS) is an extensible and scalable suite of products for creating and deploying e-business applications. JEMS offers cutting-edge technology components that customers can mix-and-match and roll out into their line of business infrastructure.

Until now, enterprises looking to implement and realize the benefits of SOA have had to choose between pricey, monolithic, proprietary platforms and a cobbled together assortment of open, blended or private source components. In contrast, JEMS delivers the only cohesive suite of market-leading open source middleware products that can be used alone, mixed and matched, or as a complete unit to build and deploy applications, business processes and Web services.

HP sells and supports JBoss subscriptions and provides business and SOA services that leverage JEMS, offering Enterprise IT customers flexibility and choice. JBoss also delivers JBoss Application Server, the #1 most widely used Java application server on the market. A J2EE-certified platform for developing and deploying enterprise Java applications, Web applications, and portals, JBoss Application Server provides the full range of J2EE 1.4 features as well as extended enterprise services, including clustering, caching, and persistence.

Integrated support model

Knowledge, support and advice are critical elements of any technology company's delivery model, and HP and Red Hat provide a wide array of open source and Linux services to address customer roll-out and long-term support requirements. Red Hat Global Client Services are divided into three key service areas.

Red Hat Professional and Consulting Services

Red Hat knows the challenges that customers face introducing and maintaining new platforms and applications. Red Hat consultants and engineers can bring substantial experience in a number of areas of expertise to enable solutions that leverage Red Hat Enterprise Linux. Red Hat Professional Services offers a full set of consulting services, from design, configuration, deployment, management and implementation right through to upgrade planning. Red Hat also offers custom engineering and support services for a wide range of technologies, including the GNUPro suite of development tools, the Cygwin Linux emulation package, and custom embedded Linux solutions for a variety of target platforms.

Red Hat Certified Engineer (RHCE) training

Training and certification from Red Hat ensure that IT staff is ready for serious Red Hat Enterprise Linux deployments, while leveraging their existing UNIX® skills. It also helps businesses realize the full value of Red Hat-based solutions. RHCE certification assures a standard level of systems and network administration skills, so that a person is ready from a technical point of view for professional responsibilities in setting up, configuring and managing a Red Hat Linux server running common enterprise networking services and security. RHCE status indicates that the person has passed a realistic performance-based lab exam that tests his/her ability to install and configure Red Hat Linux; understand limitations of hardware; configure basic networking and file systems for a network; configure the X Window System; perform essential Red Hat Linux system administration; configure basic security for a network server; set up and manage common enterprise networking (IP) services for the organization; and carry out server diagnostics and troubleshooting.

Global Support Services

Red Hat's around-the-clock open source Software Support group provides highly-acclaimed production support as part of every Red Hat software subscription. HP Services supports Linux as a tier one platform, along with HP-UX and MS Windows. HP is a Red Hat Tier 1 partner and offers complete support and single point of accountability for Red Hat Enterprise Linux on HP servers. In fact, more than 99% of all open source and Linux service requests are resolved directly by HP, including those in support of Red Hat software subscriptions purchased through HP. Shielding the customer, HP works in close collaboration with Red Hat to resolve any remaining issues.

Migration to Linux

HP and Red Hat offer migration and assessment services to ease the costs of migrating from Sun Solaris to Red Hat Enterprise Linux on HP systems. Migration services offered:

- Migration Assistance
- Proof of Concept
- Assessment Services

This program has helped a range of HP customers successfully move from Sun Solaris to Red Hat Enterprise Linux. These businesses now run solutions from Red Hat and HP that deliver superior business agility, improved ROI and consistent manageability. HP and Red Hat provide everything needed to ensure a successful Linux deployment, including complete, tested and proven platform configurations, solution stacks, and high-availability clustering software. These solutions are delivered on powerful industry-standard HP systems and include access to HP and Red Hat consulting, integration, and support services.

The power of partnership

With HP and Red Hat innovations, customers can build end-to-end Linux solutions that allow them to create an always-on infrastructure with open, stable foundations for the future.

HP and Red Hat's leadership in the Linux marketplace is the result of a committed relationship that combines engineering expertise, world-class global support, and joint customer engagements. Additionally, HP and Red Hat share an excellent business development relationship where both companies continue to invest in today's fastest growing operating system—Linux. Red Hat Enterprise Linux is the leading platform for open source computing and delivers the full value of open source through a common code base from desktop to datacenter, a subscription model that delivers consistent value, and a development model that prevents vendor lock-in and fosters innovation.

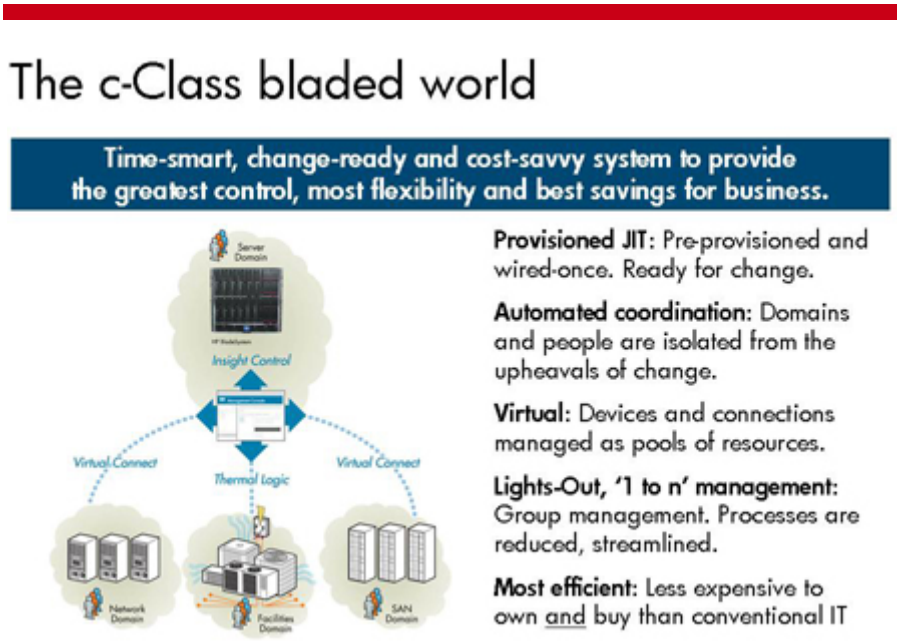
Red Hat Enterprise Linux creates a reliable, secure, high-performance platform designed for today's commercial environments—with capabilities that match or surpass those of proprietary operating systems:

- A stable and mature infrastructure based on the Linux 2.6 kernel
- Technologies to meet today's security and compliance demands
- Productivity improvements from the desktop to the core of the datacenter
- Exceptional performance and scalability for both 32- and 64-bit workloads

Section 3: HP BladeSystem c-Class

Build a better infrastructure—simply

The best way to build a better infrastructure is to simplify it with the latest open, industry-standard innovations. In addition, the distributed nature of Linux makes it ideally suited to the streamlined scale-out architecture of blades. HP BladeSystem is an adaptive infrastructure in a seventeen inch box and features an innovative consolidated headless design that matches the Linux remote access model and makes it more economical to buy and own than conventional IT. Solutions built with Red Hat Enterprise Linux and HP BladeSystem c-Class infrastructure deliver outstanding price/performance through industry standards—with enterprise-class functionality that provides businesses with the open, agile environment they will need to profit from an ever-changing business climate. An open source architecture and modular hardware design mean that a Red Hat Enterprise Linux on HP BladeSystem c-Class solution can support a vast range of enterprise or infrastructure applications, drive consolidation and migration from proprietary symmetric multiprocessing (SMP) UNIX systems and UNIX infrastructure such as Solaris, and construct high-availability cluster, grid, and high performance computing (HPC) environments.



Virtually any application capable of migrating to an x86-based server or cluster today is going to benefit more from the agile, standards-based, open architecture of a Red Hat Enterprise Linux on HP BladeSystem c-Class solution. Everything you look for when choosing an application—scalability, reliability, and performance; cost-effective operations; the ability to adapt to business changes; and improved efficiencies across the environment—is accelerated by Red Hat Enterprise Linux solutions on HP BladeSystem c-Class infrastructures.

Red Hat Enterprise Linux solutions on HP BladeSystem c-Class utilize cutting-edge technologies to create an advanced infrastructure that unifies resource management, allocation, and consumption—yet the new environment will be as familiar as the traditional infrastructures your staff has spent years building. Time-wasting activities are eliminated. It's racked and wired once, and with very few cables—greatly simplifying connectivity and reducing costs. Changes to network and storage paths are made through the management console without rewiring. Power distribution is also simplified, consolidated, and actively monitored.

Save even more with HP BladeSystem c-Class

HP BladeSystem c-Class goes beyond solving server issues. It solves infrastructure issues. To do that, HP has taken a total system approach to design, using advanced management tools to integrate computing, storage, power, and network resources into a virtualized, self-aware, automated environment. With HP BladeSystem, companies are managing a pool of resources as easily as one machine, and IT is ready to become a better service provider to your business.

The business case for adopting the HP BladeSystem c-Class in the datacenter:

- Lower acquisition costs — save more than 15 percent with as few as eight HP BladeSystem vs. comparable rack-mounted infrastructures.
- Operational cost savings — reduce the annual estimated costs for operating 100 servers from $68,800 to $8,600.

- Reduced cabling — cut cabling by 87 percent and save $100 to $350 per 10/100 network ports. Eliminate the need for KVM (keyboard/video/mouse) switches and cables through Advanced Integrated Lights-Out (iLO) management over IP and save up to $25,000 for each rack.
- Datacenter space savings — reduce the amount of space required in the datacenter by more than 50 percent.
- More efficient power usage — save over $6,000 per rack of 32 servers through reduced power consumption and lower power distribution costs.

The combination of lower acquisition costs and dramatically improved datacenter efficiency makes a strong business case for adopting the HP BladeSystem c-Class as the architectural foundation to transform the technologies, people, and processes behind your IT department. The fact is, when it comes to increased business agility, greater datacenter efficiency, and higher long-term IT value, HP BladeSystem c-Class is simply the best choice.

HP BladeSystem c-Class portfolio

The HP BladeSystem c-Class portfolio addresses today's key TCO datacenter issues, particularly those associated with server management, utilization and power and cooling. Three new HP technologies, which will be native features of the new BladeSystem and which will ultimately help users reduce overall datacenter operating expenses, differentiate HP from both competitor blade offerings and the rack-optimized form factor at the TCO level.

HP Thermal Logic technology

Many IT and datacenter facility managers do not understand the power and cooling dynamics of their datacenter facilities. Shrinking form factors have enabled users to extend the longevity of datacenter real estate where physical capacity has become an issue. Blades have played a major role in increasing overall server densities over the past two years. Essentially, the number of processors per U (U is a unit of measurement equal to 1.75 inches, the height of a rack-mounted device) has increased significantly, placing strain on power and cooling infrastructure that predates the advent of blade servers. Understanding and managing power consumption across the datacenter are key factors when reducing TCO over time. IT and facility managers also need to ensure that deployed infrastructure can operate within the confines of power and cooling capacity, as defined by existing power and cooling infrastructure, to negate the need for expensive upgrades.

When customers deploy BladeSystem c-Class blades, they can take advantage of HP Thermal Logic technology, which combines monitoring, reporting, and adaptive management functionality of power and cooling resources within the BladeSystem c7000 enclosure. This capability is enabled through built-in thermal instrumentation that affords BladeSystem manual or policy-based control of power consumption and cooling to match demand without decreasing processor performance. HP also enables customers to quantify power consumption and cooling needs across the datacenter and therefore helps IT and facility managers make informed decisions on how to maximize the ROI associated with energy investment and reduce the overall TCO associated with the infrastructure. Importantly, this management can be achieved at system and rack levels or through the creation of zones within the datacenter.

TCO associated with power and cooling is reduced via the following approaches:

- Increased efficiency of power and cooling provisioning through shared resources that allow delivery to be adapted to the most efficient state according to requirements at a given time
- Use of HP fan and cooling architecture for more power efficiency that reduces the actual power consumed and lowers the power requirement to cool the blades

- Elimination of over provisioning of power and cooling and associated energy costs and extension of the life cycle of existing infrastructure
- Enablement of users to deploy a standard, scalable solution for power and cooling across multiple server form factors

HP Virtual Connect architecture

Bandwidth bottlenecks and scalability pose significant problems for IT managers today as data-transfer volumes increase exponentially. Efficient coordination and planning are needed among the server system, the SAN, and the LANs so that servers can be added, moved, or replaced as needed. Currently-deployed technology inhibits efficient utilization of network fabric as connectivity remains attached to the server or, in the case of blades, the enclosure backplane. Furthermore, previous generations of blade servers suffer from Fibre Channel rates that limit usefulness in working environments. This situation has resulted in over-provisioned, and underutilized, connectivity fabrics to accommodate peak traffic flow. As such, TCO is negatively impacted by an over-provisioned, complex fabric infrastructure that relies on close management of server, SAN, and LAN components to maintain seamless operations.

HP BladeSystem c-Class can run up to four simultaneous redundant fabrics with eight identical, high-performance interconnect slots that can house any chosen interconnect. The backplane has the potential to support aggregated bandwidth of 5 Tb/sec or 320 Gb/sec per server bay, providing scalability and investment protection. Fibre Channel rates of c-Class blade infrastructure are twice those of p-Class systems. Connectivity becomes enclosure-dependent irrespective of processing platform, providing investment protection. Support for 10 Gb Ethernet, when available, is also built in. With the option of HP Virtual Connect modules, LAN and SAN connectivity can be aggregated into a pooled, virtualized resource that can be shared physically or virtually across c-Class blades. Viewing connectivity resources in this way enables customers to consolidate switches and thus increase utilization. Estimates show that up to 90 percent of the time spent provisioning connections between server and LAN/SAN can be removed through provisioning up to 64 server blades plus additional virtual machines on each blade, all in parallel. Cable costs can be reduced by up to 98 percent because the c-Class enclosure requires 1+1 Ethernet cables to connect to LANs and 1+1 Fibre Channel cables to connect to SANs. An added benefit is improved airflow, which leads to more efficient cooling.

Ultimately, TCO reduction is achieved as a result of all these factors allowing IT managers to reduce the number of administrators required to manage LAN and SAN connectivity, increase flexibility, reduce time spent managing switch infrastructure, remove expensive travel costs associated with switch management, increase switch fabric resilience through redundancy, and remove costly error margin by removing human intervention.

HP Insight Control management

Management and administration are the primary costs in datacenter economic models. Users are looking for solutions that can reduce the associated cost by both simplifying IT infrastructure and streamlining management processes through automation. Expenditures by IT managers today come under close scrutiny, and favorable ROI characteristics are a prerequisite, in part because recent changes in compliance requirements have driven CFOs to become more closely involved in the IT procurement process. IT managers can have a positive impact on TCO by reducing this cost, if given the tools to do so. They can improve staff productivity and satisfaction by reducing the amount of time that staff members spend on mundane maintenance operations so that they can focus on revenue-generating activities. System management is a key to enabling customers of HP solutions to deploy dynamic IT compute models and thus achieve the maximum possible ROI on datacenter infrastructure.

HP Insight Control management comprises two core components: intelligent infrastructure and Insight Control software. It forms the management link between HP Thermal Logic technology and HP Virtual Connect technology and integrates with ProLiant Essentials and HP Systems Insight Manager applications to enable single, standardized management of datacenter infrastructure.

Intelligent management is built in to the HP BladeSystem enclosure, and integrated Lights-Out Management 2 (iLO2) is a standard component in each server blade, with chassis enclosures housing the new Onboard Administrator module that enables simplified setup, diagnosis, and maintenance of the blade infrastructure, either at the rack or remotely. Further management efficiencies are gained through the ability of HP Insight Control to catalog resources, automate deployment and workload re-provisioning, and monitor the health of HP BladeSystem, providing recommendations to IT managers on how to alleviate performance bottlenecks. By incorporating HP Insight Control into future infrastructure deployments, customers will be able to deliver automation for key management processes.

Section 4: Red Hat and HP—maximizing IT investments

Red Hat Enterprise Linux and HP BladeSystem c-Class solutions address many of today's financial services industry challenges by delivering the foundation for the next generation datacenter with these attributes:

- Flexibility and serviceability: Solutions and services based on industry standards help increase the flexibility to react to customer needs—resulting in increased revenue, better-utilized resources, and happier customers.
- Improved availability: High data availability and rapid access to business-critical applications help simplify and standardize operational procedures through overall system design—saving time.
- Better performance: The latest in computing power is delivered in one-way to four-way configurations—providing a measurable performance advantage in a variety of single-application, cluster, and scale-out environments.
- Simplified manageability: Easier management helps accelerate deployments, simplify operations, support data availability—and boost IT staff efficiency.
- Increased adaptability: Hardware can be allocated to scale capacity and performance based on specific workload demands and business priorities—making a business more agile, responsive, and competitive.
- Lower cost of ownership: Greater hardware utilization, lower-cost hardware and software, and more efficient processes mean your people can perform less maintenance and create more innovation to benefit the business—all while using processes that are familiar to your in-house experts.

Red Hat and HP – creating FSI value

The partnership of Red Hat and HP allows businesses to leverage the industry's best Linux expertise as needed—access to a vast array of highly qualified and diversified skills covering all facets of open source support needs, including a deep knowledge of hardware and software environments—not just HP technologies. From comprehensive solution design or migration to a Linux solution, Red Hat and HP are committed to helping financial institutions speed time to market through reduced implementation time, infrastructure optimization, and support services for your Red Hat Enterprise Linux solution running on the HP BladeSystem c-Class.

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