



*Aberdeen Group*

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**Red Hat: Readying  
Linux for the Enterprise**

**An Executive White Paper**

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# Red Hat: Ready Linux for the Enterprise

## Executive Summary

When a small company such as Red Hat begins to compete with large, experienced enterprise operating system platform suppliers, it has to have sufficient infrastructure in place. Infrastructure, in this context, means having enterprise-quality products, significant brand recognition, partnerships with important noncompetitive suppliers, relationships with the most important independent software vendors (ISVs), enterprise-quality service and support, and the ability to “scale” from a company accustomed to working with small businesses to a company capable of working with large enterprises. Very few small companies are able to do this successfully in a relatively short time period. It is Aberdeen’s perspective that Red Hat is positioned to do that. In only a few years, Red Hat has become the dominant Linux operating system platform supplier, and for a small company of about 700 employees, Red Hat has amazing brand recognition and loyalty.

Success in the enterprise for any operating system platform supplier is measured by its success in working with the large and important ISVs. This means providing an operating system platform that is “attractive” to the ISVs. For proof, one only needs to look at two of the most successful operating system platforms — Microsoft Windows and Sun Solaris. They both have one thing in common — more ISV applications are certified on them than any other operating system platforms by far. Microsoft and Sun have been successful because they not only have provided good development platforms with additional software capabilities, but also have developed excellent relationships with all of the large ISVs. For Red Hat to be successful as an operating system platform supplier, it will have to compete with Windows and Solaris (and other RISC-based Unix platforms), not only for customers, but also for favor among ISVs.

Customer demand for ISVs’ applications on Linux is increasing because of the reliability of Linux and the potential cost savings (to customers) of running enterprise applications on Linux. Red Hat is at the forefront of this demand, providing Red Hat Linux Advanced Server, an enterprise-quality, Linux-based operating system platform; by extending its support infrastructure to satisfy enterprise-level requirements; and by developing relationships with the ISVs that hold leading market shares in their respective markets.

This Aberdeen *Executive White Paper* focuses on showing the readiness of Red Hat to provide an enterprise-quality operating system platform, and it describes Red Hat’s readiness to support and work with ISVs to help them move their applications into the enterprise using Red Hat Linux Advanced Server. Aberdeen suggests that Red Hat’s service/support infrastructure; its server platform capabilities — Red Hat Linux Advanced Server; and its relationships with ISVs and middleware and systems vendors (Dell, HP, and IBM) already have enough traction to ensure the company’s success in promoting Linux as a mature operating system platform that is ready for the enterprise.

**Enterprise Readiness**

From Aberdeen's point of view, a company is ready for the global enterprise and ready to compete with other enterprise suppliers when it can provide the following:

1. Executives and staff who are knowledgeable with respect to how large enterprises do business.
2. A service/support infrastructure to support potentially large enterprises.
3. A strategy for transitioning from working with small businesses to working with medium-sized to large enterprises.
4. Products that can host large-scale e-business applications.
5. Realistic product release cycles and product road maps that can be shared with ISVs.
6. The ability to scale (in terms of people) to meet the requirements of working with medium-sized to large companies.
7. Relationships with the most important independent hardware vendors (IHVs), ISVs, middleware suppliers, and systems suppliers in place. Most of the large systems vendors — Dell, HP, IBM, Intel, and others — are already Red Hat's partners.
8. Sufficient brand recognition to attract customers.
9. The ability to rise to a new level of competition (that includes large vendors such as Sun) that requires enterprise-quality products and more service/support.

In the remainder of this *White Paper*, Aberdeen describes Red Hat's degree of readiness for the enterprise and then evaluates it against these requirements.

**Red Hat — Sensitive to Supporting ISVs**

With few, if any, exceptions, ISVs port their applications to multiple operating system platforms, and to only those platforms where there is customer demand and good potential for revenue growth and profitability. To be competitive, ISVs have to provide support for their applications and optimize their performance on each platform. These two tasks are time-consuming and expensive. To get the attention of ISVs, an operating system platform supplier must have sufficient market share and brand recognition. Red Hat has both. The company is the runaway leader among the Linux operating system platform suppliers in terms of market share (United States and worldwide), and the Red Hat brand is among the most recognizable among suppliers, large or small.

Each company with an interest in Linux has the opportunity to influence the feature set for releases of Linux, and the Linux community that develops Linux kernels is cognizant of the features required to move Linux forward. But there is no general canvassing of a broad cross section of companies (with an interest in

Linux) to determine what features they would like in Linux. To date, Linux distributors such as Red Hat, SuSE, and The SCO Group (formerly Caldera International); small companies such as Covalent, Linux NetworX, and VA Software; ISVs such as Borland, Computer Associates, and Oracle; and systems vendors such as Dell, HP, IBM, Intel, and Sun provide the bulk of the requirements for new features for Linux, and employ many of the software engineers who do the actual development.

Red Hat understands that if it wants ISVs to port their applications to its enterprise Linux operating system platform, Red Hat Linux Advanced Server, then it has to work with the Linux community to ensure the implementation of those Linux features that ISVs need to have for competitive implementations of their applications on Linux. Red Hat is also responding to the platform requirements of ISV applications by expanding the capabilities of Red Hat Linux Advanced Server beyond the capabilities provided by the Linux kernel. Red Hat is implementing features in Red Hat Linux Advanced Server prior to their being implemented in a release of the Linux kernel (a subsequent section addresses Red Hat's efforts in this area in detail). These features are open sourced under GNU Public License (GPL).

ISVs also need road maps for Linux operating system platform releases, and they need release schedules that are much longer than the typical three- to six-month product release cycle that is adhered to by many Linux distributors. Red Hat Linux Advanced Server is on a 12- to 18-month release cycle, and the company has product road maps for product releases over the next several years.

### **Building an Ecosystem Around Red Hat Linux Advanced Server — Red Hat's ISV Strategy**

Developing an information technology (IT) ecosystem is a time-consuming and long-term project. An ecosystem is a combination of IHVs (systems, storage, and networking) and ISVs (primarily infrastructure and application-level ISVs) that come together to enable organizations to deploy and migrate systems per their business needs. The focus in this section and in this *White Paper* is on infrastructure ISVs.

Because Red Hat wants Red Hat Linux Advanced Server to make an impact in the enterprise sooner rather than later, it is selecting the ISVs with which it develops partnerships very carefully. Aberdeen believes that the number of ISVs supported on an operating system platform is not important. Rather, it is the quality of the ISVs supported, as well as the overall market share that they maintain that counts. Red Hat's ISV strategy is to develop relationships with core infrastructure ISVs whose applications have significant market share.

ISVs are reluctant to support their applications on an operating system platform without sufficient user demand or if the platform cannot host ISV applications in their targeted market segments. Getting ISVs to host their applications on Red Hat

Linux Advanced Server is Red Hat's first order of business. An important concurrent (or next) step is to get ISVs to view Red Hat Linux Advanced Server as a tier 1 operating system platform.

Today, Red Hat's Premier ISV partners list includes Alias|Wavefront, BEA, BMC, Borland, Check Point, Computer Associates, IBM (DB2, Lotus, Tivoli, WebSphere), Legato Systems, Novell, Oracle, Reuters, Rogue Wave, Softimage, Synopsys, TIBCO, and VERITAS. These Premier ISV partners have agreed to support Red Hat Linux Advanced Server and future releases of Red Hat Linux Advanced Server.<sup>1</sup> Some of them already have their applications available on Red Hat Linux Advanced Server. In addition, Red Hat is continuing to expand its ISV partnerships by pursuing even more enterprise-class applications.

The collective set of applications provided by the Premier ISV partners includes database applications, middleware, systems management software, storage software, and application software. Oracle 9i (and 9i RAC) on Red Hat Linux Advanced Server is already available. Later this year IBM will support its next release of DB2 UDB on Red Hat Linux Advanced Server. The combined market share of these two database applications approaches 65%.

BEA's WebLogic Server and Oracle 9i Application Server are currently available on Red Hat Linux Advanced Server. IBM has confirmed that WebSphere Version 5 will be available on Red Hat Linux Advanced Server. By early 2003, Red Hat Linux Advanced Server will be hosting ISV applications that own nearly 70% of the application server market.

By early 2003, BMC, Computer Associates, and Tivoli will have ported their primary systems management software to Red Hat Linux Advanced Server. These three vendors account for more than 50% of the enterprise systems management market. In July 2002, VERITAS announced the availability of its Cluster Server, NetBackup, and Foundation Suite on Red Hat Linux Advanced Server. Red Hat is working with other potential partners, such as EMC and Legato, in the storage software area, and expects software that owns more than 50% of this market to be available on Red Hat Linux Advanced Server by the first quarter of 2003.

By enabling the core infrastructure ISV applications such as those listed above, Red Hat is poised for a much larger number of ISVs to make their applications available on Red Hat Linux Advanced Server. For example, Oracle claims to have 3,500 ISVs whose applications are currently using Oracle on Linux as their underlying database management system. And because most of these ISV applications are written to Oracle APIs, the ISVs need only to test their applications on Oracle on Red Hat Linux Advanced Server, not port them. This same logic can also be applied to

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<sup>1</sup> Some of these partners also currently have their applications available on Red Hat Linux.

DB2, BEA WebLogic Server, WebSphere Application Server, and other ISV infrastructure-oriented applications.

**Red Hat Linux Advanced Server — Ready for the Enterprise**

Red Hat's operating system platform for hosting ISV applications is Red Hat Linux Advanced Server. Although Red Hat Linux is aimed at small businesses and consumers, Red Hat Linux Advanced Server is targeted at medium-sized and large enterprises. Red Hat Linux Advanced Server currently runs on Intel 32- and 64-bit platforms. In mid-2003, Red Hat Linux Advanced Server 3.0 will also be available for IBM's eServer i, p, and zSeries servers and AMD "Hammer" x86-64 servers.

In September 2002, HP announced that later this year it will deliver Itanium 2-based servers running Red Hat's Advanced Server and workstations running Red Hat's Advanced Workstation — HP Workstation zx2000 and HP Workstation zx6000. The workstations are targeted at scientists, engineers, and others developing/running floating-point-intensive applications that require high performance and large memory bandwidth.

Today, Advanced Workstation is essentially the same Linux-based operating system as Red Hat Linux Advanced Server. The main differences involve packaging and pricing, and Advanced Workstation does not support high-availability clustering. In the Red Hat Linux Advanced Server 3.0 time frame, Red Hat Linux Advanced Server and Advanced Workstation will become more different — Red Hat will add an interactive development environment (IDE) and more graphics capabilities to Advanced Workstation, whereas Red Hat Linux Advanced Server will focus on clustering, large-scale symmetric multiprocessor (SMP) architectures, large memory, and so forth. But both of these products will maintain the same Linux kernel and common application binary interface/application program interface (ABI/API) so that application certification for one automatically accrues to the other.

*Red Hat Product Development Road Map Philosophy*

Most IHVs, ISVs, and IT organizations within enterprises are not able to handle frequent releases of operating system platforms, such as the three- to six-month schedule used by most Linux distributors. As a result, Red Hat is embarking on separate development/release schedules for Red Hat Linux and Red Hat Linux Advanced Server. Red Hat Linux is on a six-month release schedule, and Red Hat Linux Advanced Server is on a 12- to 18-month schedule. To enhance and simplify its support of ISVs, Red Hat is trying to ensure that most, if not all, ISVs are using the same release of Red Hat Linux Advanced Server. Red Hat Linux and Red Hat Linux Advanced Server are distinct products with overlapping code bases.

Red Hat Linux Advanced Server Version 2.1 was released in May 2002. The next release, Version 3.0, will be made available in the second or third quarter of 2003. Version 3.0 will be a 32- and 64-bit release, supporting Intel x86, AMD x86-64, In-

tel Itanium 2, and all of IBM's eServer platforms. Red Hat Linux 8.0 was released in October 2002, and Red Hat Linux 8.1 is expected to be available in the second quarter of 2003.

New Linux features will generally appear in Red Hat Linux releases before they appear in Red Hat Linux Advanced Server releases, because of the differences in release schedules and to ensure that the features have been fully tested and qualified for use in enterprise environments. For example, some of the Linux features in Red Hat Linux 8.0 will appear in Red Hat Linux Advanced Server 3.0, several months after 8.0 is made available. But Red Hat Linux Advanced Server will continue to be ahead of Red Hat Linux in terms of reliability, availability, scalability, and manageability capabilities for the enterprise. New open source products will go to the Red Hat Linux consumer line first.

### *Reliability, Availability, Scalability, and Manageability*

When the requirements for deploying enterprise systems are described, reliability, availability, scalability, and manageability (RASM) are almost always mentioned. Enterprise systems must satisfy RASM requirements at a much higher level than those required by off-the-shelf consumer systems. To move Red Hat Linux Advanced Server into the enterprise, Red Hat is providing RASM capabilities that are competitive with those found in proprietary enterprise operating system platforms.

Red Hat is working with its partners — such as HP, IBM, and Oracle — to enhance the capabilities of Red Hat Linux Advanced Server in the RASM areas. For example, Oracle and Red Hat have worked closely together to develop, test, and improve Linux in the areas of performance, reliability, scalability, clustering, and manageability.

### **Reliability**

To ensure high quality through extensive stress testing and quality assurance, and to be more in line with ISV release cycles, Red Hat is releasing new versions of Red Hat Linux Advanced Server on an extended release cycle. This release cycle gives Red Hat the opportunity to integrate and thoroughly test enterprise technology developed by Red Hat and the open source community. To increase application stability over the long term, Red Hat is also committed to providing upward compatibility for the Red Hat Linux Advanced Server product family. Thus, applications certified on one release of Red Hat Linux Advanced Server would only require minimal modifications, if any, before being certified on new releases (unless an application has been enhanced in some way to make this impossible).

### **Availability**

To ensure high degrees of availability, Red Hat Linux Advanced Server provides two integrated high-availability solutions — Internet Protocol (IP) Load Balancing and Red Hat Cluster Manager. IP Load Balancing provides network load balancing for environments such as Web hosting server farms by distributing incoming network re-

quests across a group of servers (which service the requests). Red Hat Cluster Manager is introduced with Red Hat Linux Advanced Server. Cluster Manager uses application failover technology similar to that used in proprietary cluster solutions, such as HP's TruCluster Server and SteelEye's LifeKeeper. Cluster Manager is ideally suited for database and file serving and enterprise commercial applications. It provides full Network File System (NFS) failover — a nontrivial extension for clustering solutions — and data integrity. Cluster Manager can be configured as active/active or active/passive configurations and requires no alterations to applications.

### **Scalability**

The potential performance of large enterprise systems cannot be realized with the standard Linux kernel. Red Hat Linux Advanced Server is optimized for Intel-based SMP servers with up to eight processors. To ensure that Red Hat Linux Advanced Server can scale linearly per application requirements, Red Hat — with the participation of some of its partners, such as HP, IBM, and Oracle — has provided several kernel enhancements. These enhancements are open source and have been submitted to the Linux community for inclusion in future releases of Linux.

The enhancements include:

- *Asynchronous I/O support* — This support permits applications to issue one or more I/Os and continue processing while awaiting completion of the I/O. This type of support is critical for providing fast response times and high throughput for database management systems.
- *I/O spinlock contention reduction* — Spinlocks are used by Linux to coordinate access to critical section code that only one central processing unit (CPU) at a time is permitted to execute. By implementing finer granularity spinlocks, Red Hat Linux Advanced Server provides increased parallel processing in SMP environments.
- *Improved processor scheduler* — The Red Hat Linux Advanced Server scheduler includes an enhancement to the Linux process scheduler that provides improved scheduling for large-scale SMP systems.
- *Bounce buffer elimination* — This enhancement to the Linux kernel is designed to reduce or eliminate buffer copying while allowing device drivers to access the contents of an I/O buffer regardless of its location in memory. Bounce buffer elimination solves a memory-mapping problem for I/Os in systems with more than 1 GB of memory.

### **Manageability**

When total-cost-of-ownership (TCO) studies are done, the cost of systems management is a significant portion of the cost of ownership. IT organizations are constantly striving to increase the number of systems that can be managed per systems administrator, or they are attempting server consolidation to gain the same



results. Nevertheless, the manageability of systems has a large effect on long-term TCO, and it is an area in which there is much focus when system acquisition is at hand.

Manageability involves trying to make a system as error-free as possible, providing effective system management tools and monitoring system components to prevent failures before they occur — all with the intent of increasing system uptime. In the first release of Red Hat Linux Advanced Server, attention has been paid to management features that are not well developed in standard Linux products — monitoring systems and resolving Linux kernel-level problems.

The manageability features that Red Hat has implemented include:

- *Red Hat Network* — Red Hat's basic Internet-based systems management infrastructure.
- *Network Console* — Allows all kernel messages to be logged by another system on the network. The Network Console can be used to centralize the handling of message logs from multiple servers, even for geographically remote servers and to ensure that information critical to the identification and resolution of system crashes is not lost.
- *Netcrashdump* — Allows a Red Hat Linux Advanced Server system to transmit a complete crash dump across the network to a single node (referred to as a sink node) that can be used to accept crash dumps from many servers. Simplifying the management and archiving of crash dumps is important for resolving crash problems.

### **Red Hat's Service/Support Infrastructure**

Deploying a high-quality enterprise operating system platform such as Red Hat Linux Advanced Server requires top-quality automated management services, professional services, and technical support. One of the most important service/support ingredients is Red Hat Network (RHN).

Red Hat is augmenting its service/support infrastructure via alliances and relationships with some of its largest partners. For example, for the first time in its history, Oracle offers frontline support for an operating system — Red Hat Linux Advanced Server. Oracle, in conjunction with Red Hat, provides technical support for critical operating system issues to ensure that joint customers receive prompt issue resolution. For example, if Oracle support engineers, working with a customer, determine that a patch to Red Hat Linux Advanced Server is required for the user to get up and running as quickly as possible, Oracle, with collaboration from Red Hat support, will create the patch and release it to the user. Red Hat, however, is responsible for determining which patches are rolled back into Red Hat Linux Advanced Server.

In September 2002, IBM and Red Hat announced a multiyear alliance that includes services and support for software and servers. As part of this alliance, Red Hat will deliver Red Hat Linux Advanced Server for all four of IBM's eServer platforms. In addition, IBM Global Services (IGS) will provide Red Hat Linux Advanced Server and Red Hat Network managed services. IGS will complement these products with comprehensive joint service and support offerings. In addition, IBM and Red Hat will team to provide comprehensive end-to-end service and support to customers with Linux technical knowledge and engineering resources. Together, the two companies provide one-stop service and support for their customers' Linux service/support requirements.

### *Red Hat Network*

RHN is a network-based service that allows enterprises to deploy and manage Red Hat Linux Advanced Server (and other Red Hat product) environments. RHN generates and saves an inventory of the hardware and software for a user system using a Red Hat-supplied software agent. The software agent is open source, but RHN is a proprietary service.

Today, the management of most large computer installations requires many system administrators with lots of duties. RHN is designed to reduce much of the "baby-sitting" often required to maintain and deploy systems and install updates and patches. RHN allows systems administrators to define groups of systems and assign system administrators to groups (providing role-based administration). System administrators then build "channels" (containers for software packages) to hold software packages for different groups of servers, such as Web servers, database servers, and application servers. A system administrator can control the software packages available to a group of systems by managing them on the appropriate channels. System administrators use RHN to download packages from Red Hat Network servers, where they are stored, to update systems, install patches, check and resolve inter-package dependencies, and so forth.

Deployment of systems is simplified greatly via the provisioning capabilities of RHN. Provisioning allows certain system administrators to create virtual system images and define rules with respect to how the images are provisioned. A virtual image can be placed on an available server and then, using KickStart<sup>2</sup> configuration files, an image can be derived for each type of server and for groups of servers of the same type. These images can then be installed over an internal network or the Internet in a secure fashion.

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<sup>2</sup> KickStart is the standard automated install process for Red Hat Linux and Red Hat Linux Advanced Server.

Enterprise customers can choose to deploy and use Red Hat Network in a combination of three modes — standard, proxy, and satellite. The standard mode, provided with all Red Hat Linux Advanced Server subscriptions, maintains the repository of software packages and inventory of customer configurations on Red Hat Network servers outside the enterprise firewall at Red Hat facilities. All errata and packages are downloaded directly from Red Hat servers.

The Red Hat Network Proxy Server provides an extension to standard RHN that enables a server located on a customer's site to cache software packages for distribution across a local network. Proxy Server is useful for enterprises that have many systems that consume considerable bandwidth receiving updates or that have customized packages that are distributed within an enterprise. It serves as a local software package repository, reducing the amount of Internet traffic needed to receive updates, patches, and so forth. System administrators can also use the Proxy Server to create custom channels. Proxy Server maintains a secure, authenticated connection to Red Hat's RHN database in order to manage system inventory information.

Red Hat Network Satellite allows customers to create a complete RHN infrastructure that is fully contained within their local environments (within the enterprise's firewall). With an RHN satellite configuration, the satellite server maintains all software packages (like the Proxy Server) and also the configuration inventory of all the managed systems. Enterprises can establish their own upgrade process, control the channels that provide upgrades to systems, and determine when to connect to Red Hat's RHN servers to obtain updates to Red Hat software packages. Because RHN utilizes an Oracle database, the satellite configuration requires the user to have an Oracle database license.

Other RHN features include:

- Monitoring capabilities that include capturing hardware information, such as CPU utilization, I/O load, disk utilization, and network I/O load
- The ability to store the software and hardware configurations and other information specific to each registered system; and to hold data about updated software packages
- Automatic downloading and installation of Red Hat software update packages within a few hours of their release
- A persistent link to the technical knowledge and expertise of the Red Hat technical staff
- Very fast notification of bug fixes, security patches, and performance enhancements
- Management of multiple systems, at any time, from anywhere via the Web using a browser enabled by Secure Sockets Layer (SSL)

- Proactive notification of system administrators when new packages are available
- Maintenance of a comprehensive dependency database (currently with more than 1.5 million dependencies), which ensures that package dependencies are resolved during updates

When Red Hat Linux Advanced Server is purchased, RHN and support are included at three levels (the prices given below are today's prices, and they are machine based, not CPU based):

1. Red Hat Linux Advanced Server with Premium Support — \$2,500 per year, 24×7, with one-hour response, installation support (includes phone and e-mail support), and RHN for one year
2. Red Hat Linux Advanced Server with Standard Support — \$1,500 per year, 5×12 (business hours) with four-hour response, installation support (includes phone and e-mail support), and RHN for one year
3. Red Hat Linux Advanced Server with Entry support — \$800 per year with installation support and RHN for one year

### *Professional Services*

Red Hat Professional Services assists customers at each stage in their solution and network life cycle, from strategy and planning to development, integration, validation and testing, deployment, and ongoing systems management. The Professional Services portfolio of offerings allows buyers to select the level of expertise and service required along with the degree to which Red Hat assists in infrastructure deployment. Red Hat has extended the reach of its Professional Services by forging a partnership with Dell Professional Services to sell and market Red Hat Professional Services.

Red Hat Professional Consulting has established several practices to meet the rapidly changing requirements of IT infrastructures:

- Comprehensive IS/IT Deployment and Operations
- Client Directed Engineering
- Custom Software Development
- Custom Corporate Learning Solutions

Red Hat Professional Services delivers these consulting services over a range of expertise areas in Linux and open source software:

- Linux migration and integration
- High-availability clustering
- High-performance computing

- Embedded technologies
- Stronghold/Apache
- GNUPro/GNU Tools
- Content and collaboration management
- Web application and infrastructure development
- Security

Additionally, Red Hat has established a number of engineering services that include enterprise operating system engineering services, e-commerce engineering services, and communication infrastructure engineering services. These services are available for organizations that require assistance with respect to kernel enhancement, custom builds, Web server application development, integrating networks, and so forth.

### **Aberdeen Conclusions**

Overall, Red Hat fares very well when its readiness for the enterprise is compared against Aberdeen's list of readiness requirements. Red Hat's senior management staff has sufficient experience working with large enterprises and important ISVs, with executives from companies such as Borland, Compaq/Digital, IBM, PriceWaterhouseCoopers, and Sybase. As a result, Red Hat has avoided one of the mistakes — lack of management experience in working with large enterprises and important ISVs — that small technology companies have often made when trying to compete with established enterprise suppliers.

Red Hat's current service/support infrastructure is sound, and RHN is a good management/maintenance capability. Integration of RHN with products of large systems management suppliers like CA and Tivoli is currently lagging. However, when this type of integration becomes important to buyers, Red Hat will respond quickly. Because Red Hat intends to compete with large operating system suppliers, such as Microsoft and Sun, it will have to continue to enhance and enlarge its service/support function and continue to build on the relationships that it has with some of the world's largest systems vendors — Dell, HP, and IBM.

Aberdeen's experience working with small emerging suppliers who try to make the transition from doing business with small companies to doing business with large enterprises indicates that suppliers often lack the ability to "scale," in terms of their staff and organizations, to meet the demands of enterprise customers and ISVs. This inability to scale makes it difficult to compete at the enterprise level. For example, large enterprises often require worldwide service/support and some ISVs require technical staff to be on-site to help with porting/optimization issues. Often, lack of capital is a hindrance to this type of scaling, but it is also caused by lack of planning and underestimating the demands that large enterprise customers can place on the supplier's sales, technical support (system installation and inte-

gration), and training functions. Red Hat has done a good job developing service/support and training worldwide, and has solid strategies in place to meet the demands of enterprise customers and ISVs with the partnerships that it is creating.

One thing at which Red Hat excels is getting the attention of large systems vendors and important ISVs — important and necessary ingredients for success. The company's significant brand recognition and large market-share lead over its Linux rivals have helped Red Hat develop strong partnerships with Dell, HP, IBM, and other large suppliers; and relationships with ISVs such as BEA, CA, and Oracle. The relationships with the large systems vendors offset most of the obvious advantages that experienced operating system platform vendors, such as Microsoft and Sun, may have with respect to Red Hat.

An important challenge ahead for Red Hat, as it moves Red Hat Linux Advanced Server into the enterprise, is rising to the level of its competition — Microsoft Windows and Sun Solaris. They are the two platforms with the most certified ISV applications, and they represent barriers to Red Hat Linux Advanced Server's success in the enterprise. Both Microsoft and Sun can argue that Red Hat Linux Advanced Server is tied to the Linux development process, preventing Red Hat from making enhancements at a pace that competes with their platforms. But Linux is being developed faster than any other modern operating system. This rapid development is occurring because there are hundreds of companies that are helping to develop and test Linux — for example, Dell, HP, IBM, Intel, Linux NetworX, Oracle, Red Hat, Sun, SuSE, and The SCO Group. Organizations such as the open source development labs (OSDLs) and IBM's Linux Technology Center and thousands of programmers are also accelerating Linux development.

Red Hat is not waiting for features required by the enterprise to make their way into the Linux kernel. Instead, it includes features/functionality ahead of Linux kernel releases to significantly improve Red Hat Linux Advanced Server's reliability (already one of the strongest attributes of Linux), availability, scalability, and manageability.

Linux is following the path of its predecessor, Unix, into the enterprise. It is Aberdeen's perspective that, before the end of this decade, Linux, and not Windows, will have replaced Unix in many of the important areas where Unix is currently the primary operating system platform. And Red Hat, with Red Hat Linux Advanced Server, is positioned to be the leading Linux-based enterprise operating system platform supplier.

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