SUSE® Linux Enterprise Server 11
Positioning Document

Final

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CUSTOMER CHALLENGES

The on-going challenge for today's data center managers and professionals is to cost effectively provide their internal and external stakeholders fast, reliable, and secure access to core business applications, systems and data. As valuable new technologies (e.g., virtualization) emerge and gain acceptance, IT managers need to carefully consider how to incorporate these newly acquired technologies into their existing IT environments. Organizations grow both organically and through acquisition. As a result, IT managers often struggle to efficiently integrate, manage and maximize the utilization of their increasingly complex, often heterogeneous computing infrastructure, and minimize the risks associated with their systems being down and unproductive.

Enterprises that use server hardware in support of their business objectives similarly desire reliable, secure and affordable high-performance server operating systems to cost effectively deliver critical business services, and efficiently coordinate the activities and sharing of their scarce computing resources. Ideally, these operating systems would also be highly versatile, scalable and manageable, as well as support a wide variety of industry standard hardware, third-party software, and common development and runtime environments (e.g., Java and .NET).

Depending on their specific role in the data center, different individuals may be more or less concerned about a particular operating system attribute or feature. CIOs, CTOs and solution architects who focus on the overall alignment of IT resources to business objectives are likely to consider how well the platform enables the integration of existing and new technologies. They are also likely to consider the size and breadth of workloads the platform supports, how easy their vendor is to work with, and the long-term financial viability of the vendor supporting the platform. On the other hand, data center managers and directors are most likely to be concerned about minimizing unplanned downtime, as well as reducing the expected overall costs (both current and in the near future) of supporting and maintaining their IT infrastructure. Is there a readily available source of labor that is familiar with my platform? What platform will enable me to reduce vendor lock-in and keep my support options open, thus mitigating risk? Does the platform easily scale, and can I use it with different hardware processor architectures? How about virtualized ones? Finally, IT professionals and systems administrators are likely to be most concerned about the usefulness of the tools available to help them set up, configure, patch and maintain their IT systems, as well as whether or not any new skills learned will be transferable and marketable.

POSITIONING STATEMENT

SUSE Linux Enterprise Server is a highly reliable, scalable and secure server operating system, built to power mission-critical workloads in both physical and virtual environments. It is an affordable, interoperable and manageable open source foundation. With it, enterprises can cost-effectively deliver core business services, enable secure networks and simplify the management of their heterogeneous IT infrastructure, maximizing efficiency and value. The only enterprise Linux platform recommended by Microsoft and SAP, SUSE Linux Enterprise Server is optimized to deliver high-performance, mission-critical services, as well as edge of network, and Web infrastructure workloads. Designed for
interoperability, SUSE Linux Enterprise Server supports open standard CIM interfaces and can be managed by any management solution using CIM. This modular, general-purpose operating system runs on five processor architectures and is available with optional extensions that provide advanced capabilities for real-time computing, high availability clustering and running .NET applications on Linux. SUSE Linux Enterprise Server is optimized to run as a high-performance guest on leading hypervisors and supports an unlimited number of virtual machines per physical system with a single subscription, making it the perfect guest operating system for virtual computing. In addition, SUSE Linux Enterprise Server is backed by award-winning support from Novell, an established technology leader with a proven history of delivering enterprise-quality support services.

**BUSINESS BENEFITS**

SUSE Linux Enterprise Server helps organizations maximize efficiency and value, and mitigate risk. By using SUSE Linux Enterprise Server, IT managers and professionals cost effectively meet their internal and external service level agreements and efficiently secure and manage their IT infrastructure. With SUSE Linux Enterprise Server, companies can save money and time, and ensure that their systems continue to run and deliver business value, now and in the future.

**Save money**

Companies that use SUSE Linux Enterprise Server not only reduce the cost of their server infrastructure software, but they also save money on server hardware. SUSE Linux Enterprise Server is offered with attractive support subscription pricing. Customers can easily pursue “scale out” or “scale up” approaches for adding computing capacity and can benefit from the cost-effectiveness and performance of SUSE Linux Enterprise Server. Because it is supported on low-cost, industry standard hardware, companies using SUSE Linux Enterprise Server can leverage these commodity off the shelf (COTS) systems, saving additional money. Reducing cost with less expensive software and hardware allows data center managers to apply scarce budget towards other productive uses. A modular, general-purpose operating system, SUSE Linux Enterprise Server is offered with optional extensions that provide advanced capabilities. Enterprises pay for just what they need, avoiding unnecessary extras. And as demand grows or needs change, firms can easily and affordably add the additional capabilities they require.

**Simplify management**

Companies that use SUSE Linux Enterprise Server simplify the management of their IT environment and save time by using advanced, integrated tools to quickly and easily install, configure and manage their systems. SUSE Linux Enterprise Server includes the leading package management stack with powerful dependency resolvers, enabling dramatically faster updates than competing solutions. This enables system administrators to update their systems in minutes rather than hours. Award-winning installation tools and preconfigured profiles enable data center managers to rapidly set up popular services, both locally and remotely. Included in SUSE Linux Enterprise Server are powerful subscription management tools that help you easily track and manage your operating system software assets. SUSE Linux Enterprise Server is common information model (CIM)-instrumented, so you can
manage it with your choice of CIM-enabled solutions. Finally, built-in support diagnostic tools accelerate support communications, resulting in faster issue resolution.

Minimize risk
SUSE Linux Enterprise Server is a reliable, scalable and secure server operating system, built to power today and tomorrow’s mission-critical workloads. Microsoft and SAP recommend SUSE Linux Enterprise Server to their customers that use Linux. Companies that run SAP applications or operate mixed Windows and Linux environments minimize risk by using the server operating system recommended by Microsoft and SAP. SUSE Linux Enterprise Server is an open source server operating system, and companies that use open source operating systems take fewer risks than those adopting proprietary operating systems. Unlike proprietary operating systems, SUSE Linux Enterprise Server ships with source code, as well as operating system binaries. Transparent licensing terms and conditions, together with readily available source code, encourage choice, competition in the marketplace and technical innovation. Having choice is inherently less risky than a single source option, and competition ensures prices stay low. And since more development is taking place on Linux today than any other platform, customers using Linux operating systems, such as SUSE Linux Enterprise Server, are more likely to have quicker access to the latest technology innovations. With other platforms you may have to wait to take advantage of newer technologies.

NEW FEATURES IN LATEST RELEASE
SUSE Linux Enterprise Server 11 delivers innovative, new capabilities in systems management, RAS (reliability, availability and serviceability) and power management, making it the preferred choice of customers seeking reliable and highly manageable server solutions. It is also complemented by optional new extensions that provide advanced capabilities for high availability clustering and running .NET applications on Linux.

Fast Update Stack
SUSE Linux Enterprise Server 11 includes a new set of technologies that enable IT managers to rapidly update systems and install new packages. ZYpp, the software package management subsystem in SUSE Linux Enterprise Server 11, automates the process of installing, removing, upgrading and configuring software packages. It includes new versions of the libzypp library and ZYpper, a new, easy-to-use command line tool. Together, they dramatically accelerate the resolution of dependencies, improving update speed by more than 100 times and providing the fastest performance of any enterprise Linux distribution. Systems that might have taken hours to update now take minutes. Furthermore, improvements to the YaST systems management and configuration framework, including the YaST partitioner and AutoYaST, enable the faster deployment of systems. The inclusion of CIM providers in SUSE Linux Enterprise Server 11, together with a new cross-platform debugger, also enable more cost-effective and efficient administration, issue resolution, and management of these systems in heterogeneous IT environments.
**Reliability, Availability and Serviceability Advances**

SUSE Linux Enterprise Server 11 now supports *swap over NFS*, or support for using network file system (NFS) over Internet protocols (IP) to leverage remote storage for local server needs. No longer restricted to local storage for swap space, data center managers can utilize less costly hardware and storage, use denser “diskless” server systems and simplify server administration. This reduces acquisition, implementation, administration and management costs. By using swap over NFS, data center managers can cost-effectively protect their systems against application restarts and expensive downtime. Also new in SUSE Linux Enterprise Server 11 are *control groups* for more fine-grained management of CPU, memory, storage and networking resources. Control groups allow IT managers to assign specific hardware resources to applications, processes and threads, providing more granular control of resources and prioritized processing. This enables you to ensure that your high-priority processes and threads do not experience resource starvation and continue to execute as required. *Cpuset* is the new user tool that facilitates the creation of these control groups and enables the efficient coordination, matching and management of applications and resources.

**Green IT Innovations**

SUSE Linux Enterprise Server features innovative power saving capabilities that let you derive maximum performance per watt. For example, the Linux kernel uses periodic timer events called “ticks” that wake up the system and bring it out of its power saving “sleep” states, causing unnecessary power consumption. "Tickless idle," a new kernel feature, eliminates periodic timer ticks when system CPUs are idle. This allows the CPU to remain in power-saving states for longer periods of time, lowering system power consumption and reducing cost. Also included in SUSE Linux Enterprise Server 11 are enhancements to eliminate unnecessary timer events, as well as improved, more granular power profiles which are file-based and can be more easily used by IT managers for enterprise-wide power management.

**Modular Extensions with Advanced Capabilities**

SUSE Linux Enterprise 11 also delivers new modular extensions that offer advanced capabilities for high availability clustering and running .NET applications on Linux. SUSE Linux Enterprise High Availability Extension is an integrated suite of open source clustering technologies that enables firms to implement enterprise-class clusters at the lowest cost, making high availability more affordable than ever. Included in SUSE Linux Enterprise High Availability Extension are:

- A POSIX-compliant cluster file system
- A clustered logical volume manager
- Policy-based health monitoring, membership layer and clustering software
- Distributed remote block device management
- Tools to increase administrator efficiency

Customers can use this extension with SUSE Linux Enterprise Server to create highly available services, ensure continuous access to their systems and data and reduce unplanned downtime. SUSE Linux Enterprise Mono Extension enables organizations to run Microsoft .NET-based server applications on SUSE Linux Enterprise Server. Customers can leverage existing .NET-based applications, build new ones and run them both on Linux, reducing cost, increasing performance and
improving productivity. These new extensions complement an existing server add-on—SUSE Linux Enterprise Real Time Extension.

**KEY FEATURES AND BENEFITS**

**Integrated Systems Management**
SUSE Linux Enterprise Server delivers a comprehensive set of time-saving installation, configuration, deployment and administration tools. These tools help IT managers efficiently manage and secure their IT infrastructure and ensure their systems deliver maximum business value. These graphical and text-based tools support single servers and groups of servers and operate locally as well as remotely. They enable system administrators to easily install and configure services and patch and update their systems.

Included in SUSE Linux Enterprise Server is **YaST**, a powerful suite of graphical tools for installation and configuration. System administrators can use YaST to simplify server installation and easily configure networks. In addition, they can use it to efficiently implement robust open source services included with the operating system—such as file and print, DNS, DHCP and Apache Web services—both physical and virtual. Firms can also use open APIs to write YaST plug-ins for their own applications. Plug-ins for key, third-party software, such as SAP applications and Oracle databases, come prepackaged with SUSE Linux Enterprise Server.

SUSE Linux Enterprise Server also includes **AutoYaST**, which uses control files to extend the functionality of YaST to larger groups of systems. With AutoYaST, system administrators can deploy groups or subsets of fully configured systems, in parallel and without user intervention, saving time and money.

SUSE Linux Enterprise Server delivers the market’s fastest package management system, enabling you to quickly and easily search for, install, remove and update packages. An enhanced version of **ZYpp**, the package management subsystem that includes **libzypp** and ZYpper, incorporates intelligent dependency resolution algorithms, making SUSE Linux Enterprise Server’s automated package management system the leading solution available. Systems that would have taken minutes or hours to update, now take just seconds or minutes.

SUSE Linux Enterprise Server is instrumented in accordance with the Distributed Management Task Force’s (DMTF) Common Information Model (CIM) standard. Included is a small footprint CIM broker (SFCB) to manage communication between clients and CIM providers that are written against the Common Manageability Programming Interface (CMPI) and Web Based Enterprise Management (WBEM) specification. By adhering to these standards, SUSE Linux Enterprise Server can be managed by a wide range of third-party and Novell solutions that support the CIM standard, allowing system administrators to simplify and drive down the cost of managing heterogeneous IT environments that include Linux, Windows and UNIX systems.
Reliability, Availability and Serviceability

SUSE Linux Enterprise Server supports *swap over NFS*, or support for using network file system (NFS) over Internet protocols (IP) to leverage remote storage for local server needs. No longer restricted to local storage for swap space, data center managers can utilize less costly, diskless servers, and simplify server administration—thus reducing acquisition, implementation, administration and management costs. By using swap over NFS, data center managers can cost effectively protect their systems against application restarts and expensive downtime.

SUSE Linux Enterprise Server also comes with several kernel-level features and power management capabilities that enable IT managers to get the maximum performance from their systems. SUSE Linux Enterprise Server comes with *control groups* for more fine-grained management of CPU, memory, storage and networking resources. Control groups allow IT managers to assign specific hardware resources to applications, processes and threads, providing more granular control of resources and prioritized processing. By using control groups to ensure your critical processes and threads have sufficient resources, you ensure their availability.

SUSE Linux Enterprise Server includes scheduler enhancements that enable system administrators to optimize the platform for specific workloads. Asynchronous and multipath I/O capabilities reduce overall disk read/write times and enable the accessing of storage devices through multiple channels for better load balancing, improved performance and increased availability.

Cross-platform Virtualization

SUSE Linux Enterprise Server delivers the leading implementation of *Xen*, the proven open source virtualization hypervisor. It includes graphical and command line tools for the creation, configuration, deployment, migration and life cycle management of Linux and Windows virtual machines. IT managers can increase resource utilization, provision business services faster, and increase business continuity by using this capability integrated in SUSE Linux Enterprise Server. It supports paravirtualization (with modified guest operating systems) as well as full virtualization (with unmodified guest operating systems), delivering maximum flexibility and performance.

Novell offers a complementary product that includes device drivers for certain Linux and Windows operating systems. SUSE Linux Enterprise Virtual Machine Driver Pack includes paravirtualized network, bus, and block device drivers that allow you to run fully virtualized Windows Server 2003, XP and 2000, and Red Hat Enterprise Linux 4 and 5 workloads on SUSE Linux Enterprise Server with near-native performance.

In addition, SUSE Linux Enterprise Server is optimized to work with popular third-party virtualization hypervisors, including VMware ESX (the hypervisor component of VMware Infrastructure) and Microsoft Hyper-V. SUSE Linux Enterprise Server includes a VMI-enabled (VMware’s Virtual Machine Interface) kernel, allowing more efficient communication with VMware ESX and thus delivering superior performance when running as a guest operating system. In addition, deep technical collaboration between Novell and Microsoft has resulted in optimized cross-platform virtualization, ensuring customers have maximum choice and achieve the best performance from their virtualized workloads—whether they are running Windows Server guests on SUSE Linux Enterprise Server with Xen, or SUSE Linux Enterprise Server guests on Windows Server with Hyper-V. When run as a guest...
operating system on VMware ESX, Microsoft Hyper-V, or an implementation of Xen, SUSE Linux Enterprise Server delivers outstanding performance. In addition, customers can run unlimited SUSE Linux Enterprise Server guests per physical system, for the price of a single subscription, making it the lowest-cost operating system for virtual deployments.

**Interoperability with Other Platforms**

SUSE Linux Enterprise Server is designed for interoperability with Windows and other operating platforms, making it the ideal choice for heterogeneous IT environments.

Microsoft recommends SUSE Linux Enterprise Server to customers who run Windows and Linux in their organizations, and works with Novell to ensure that joint customers have optimized, fully supported Linux and Windows solutions. Novell and Microsoft have closely collaborated on cross-platform virtualization to ensure customers have maximum choice and achieve the best performance from their virtualized workloads. As a result, SUSE Linux Enterprise Server supports Windows Server 2008 guest operating systems running in paravirtualized Xen environments, and is itself supported as a guest operating system in "enlightened" Hyper-V virtual environments.

Novell and Microsoft have also collaborated on directory and identity federation. Businesses with mixed Linux and Windows environments often require that users on the Windows side have access to resources on the Linux side, and vice versa. SUSE Linux Enterprise Server includes Samba, an open source implementation of the Server Message Block (SMB) networking protocol that supports commonly used directory and domain infrastructures, including Novell eDirectory, Microsoft Active Directory and domains, and openLDAP. With Samba, SUSE Linux Enterprise Server easily integrates into existing Windows file-and print-environments. Enterprises whose user accounts principally reside in Active Directory can easily provide access to resources running on SUSE Linux Enterprise Server and Novell eDirectory.

Technical collaboration between Novell and Microsoft in cross-platform systems management has resulted in Novell developing an Advanced Linux Management Pack that plugs into Microsoft System Center and extends its capabilities. The next release of Microsoft System Center Operations Manager 2007 in Q2 2009 will support this Advanced Linux Management Pack and allow system administrators to monitor and manage their SUSE Linux Enterprise Server platforms and Windows Server platforms from a central, unified System Center console, simplifying the management of their mixed IT environment and reducing costs.

SUSE Linux Enterprise Server also interoperates well with traditional UNIX operating environments. SUSE Linux Enterprise Server adheres to the Portable Operating System Interface (POSIX), a family of specifications and standards for user and software interfaces to an operating system. As a POSIX-compliant operating system, SUSE Linux Enterprise Server is compatible with other POSIX-compliant UNIX variants, such as Solaris, AIX, and HP-UX.

**Green IT**

SUSE Linux Enterprise Server features innovative power saving capabilities that let you derive maximum performance per watt. Many Linux operating systems include periodic timer ticks that cause unnecessary power consumption by waking the system up and bringing it out of its power saving
“sleep” state—roughly every millisecond for newer kernels operating at 1000Hz. “Tickless idle” is a kernel feature in SUSE Linux Enterprise Server that eliminates periodic timer ticks when system CPUs are idle. With tickless idle, the CPU can remain in power saving states for longer periods of time, lowering system power consumption and reducing cost. SUSE Linux Enterprise Server also delivers several enhancements to eliminate unnecessary timer events, as well as improved, more granular, file-based power profiles. IT managers can use these profiles to implement power management policies more efficiently across a broad set of systems.

**Comprehensive Security**

SUSE Linux Enterprise Server comes with numerous security features that, when used together, give data center managers a better way to secure their systems from attacks, malicious applications and viruses.

*AppArmor* application security, combined with other security best practices, allows data center managers to effectively protect their critical applications and data from external and internal threats. AppArmor uses security profiles to specify which system resources individual programs may access, and with what privileges. Today, experienced hackers are becoming faster and faster at exploiting security vulnerabilities. Companies that limit themselves to periodically downloading, testing and applying security patches to their servers can leave their systems dangerously exposed. The whitelisting approach in AppArmor, when combined with traditional blacklisting security approaches made possible with the firewall infrastructure included in SUSE Linux Enterprise (e.g., iptables, packet filters), provides customers with superior, comprehensive, proactive protection.

SUSE Linux Enterprise Server also includes a wide range of other security capabilities, like certificate creation and management, an integrated firewall, virtual private networking, encryption, authentication, access control lists and intrusion detection. SUSE Linux Enterprise Server 11 includes support for the Trusted Platform Module (TPM) standard to help facilitate the authentication of common hardware devices.

**High Performance Computing**

SUSE Linux Enterprise Server—already used by the majority of the world's largest supercomputing sites—is increasingly being utilized by leading commercial firms to build affordable, yet high performance parallel computing clusters for digital rendering, large scale simulations, data warehousing, and other transactional line-of-business applications. Its advanced memory management, multi-pathing, and I/O capabilities, coupled with support for high speed interconnects and multi-threaded file systems, make SUSE Linux Enterprise Server the preferred choice today for high performance computing (HPC). Novell works with many third party vendors, such as SGI, HP, IBM, Teradata, Cray, Cluster Resources and others, to deliver optimized HPC solutions to joint customers. Novell participates in Intel's Cluster Ready program to help customers reduce the complexity and risk associated with buying an HPC cluster solution. SUSE Linux Enterprise Server is a certified “Cluster Ready” software component of Intel's Cluster Ready program.
Advanced Networking

SUSE Linux Enterprise Server contains an optimized network stack and supports today's advanced networking protocols. It supports Internet Protocol version 6 (IPv6), the next-generation Internet layer protocol for packet switched internetworks and the Internet, as well as its predecessor, IPv4. IPv6 has a much larger address space than IPv4, and this expansion provides flexibility in allocating addresses and routing traffic, eliminating the need for network address translation. Support for IPv6 continues to increase in importance, with many national governments beginning to mandate its use.

In addition, SUSE Linux Enterprise Server includes the latest version of the Open Fabrics Enterprise Distribution (OFED), an open source software stack used for implementing affordable, high speed RDMA (remote direct memory access)-capable fabrics and unified interconnects based on InfiniBand and 10 Gigabit Ethernet.

SUSE Linux Enterprise Server includes support for Fibre Channel over Ethernet (FCoE) and Data Center Bridging (DCB). Open-FCoE enables the encapsulation of Fibre Channel frames as Ethernet packets, and allows enterprises with a Fibre Channel over Ethernet forwarder (FCF) to access their existing Fibre Channel storage using an Ethernet adapter. DCB is a collection of Ethernet enhancements designed to allow network traffic with differing requirements to operate and coexist on Ethernet through enhanced transmission selection, priority-based flow control and congestion notification. Enterprises can use Open-FCoE and DCB to run SAN and LAN traffic over the same link, saving time and money.

SUSE Linux Enterprise Server supports the Simple Network Management Protocol (SNMP) to extend network visibility to a wide range of network attached devices, and make it easier for system administrators to manage these devices using a common set of tools and interfaces. Virtual Private Networking (VPN) functionality is provided in SUSE Linux Enterprise Server with an open source IP security stack, Strongswan.

Modular Extensions

Available with SUSE Linux Enterprise Server are modular extensions that offer advanced capabilities for real-time computing, high availability clustering, and running .NET applications on Linux. These optional extensions offer customers choice, as well as allow enterprises to pay for just what they need and use. And as demands grow or needs change, firms can easily and affordably add the additional capabilities they require.

SUSE Linux Enterprise Real Time Extension is an optional add-on to SUSE Linux Enterprise Server that delivers high performance real-time computing capabilities. It is specifically engineered to reduce the latency and increase the predictability and reliability of time-sensitive mission-critical applications. Using SUSE Linux Enterprise Real Time, enterprises can respond more rapidly to changing business needs and market conditions, increase the availability of critical systems and processes, ensure they meet service level agreements—even under heavy system loads—and improve hardware utilization. Organizations thus maximize revenue opportunities and lower infrastructure costs.

SUSE Linux Enterprise High Availability Extension is an integrated suite of open source clustering technologies that enables firms to implement enterprise-class clusters at the lowest cost, making high
availability more affordable than ever. Included is a POSIX-compliant cluster file system, a clustered
tactical volume manager, policy-based health monitoring, membership layer and clustering software,
distributed remote block device management, and tools to increase administrator efficiency.
Customers can use this extension with SUSE Linux Enterprise Server to create highly available
services, ensure continuous access to their systems and data, and reduce unplanned downtime for
their mission-critical workloads—such as databases, messaging systems, and other enterprise
applications and services.

SUSE Linux Enterprise Mono Extension enables organizations to run Microsoft .NET-based server
applications on SUSE Linux Enterprise Server. Customers can leverage existing .NET-based
applications, and build new ones, running them on Linux to reduce cost, increase performance and
improve productivity.

**Simplified Subscription Management**
Managing server subscriptions and support entitlements is made easier with Novell Customer Center
and the Subscription Management Tool. Included with SUSE Linux Enterprise Server, Novell
Customer Center is a Web-based portal that facilitates the registration, entitlement and tracking of
SUSE Linux Enterprise subscriptions. It allows IT managers to maintain compliance with their
maintenance and support entitlements, stay notified of the latest software updates, and easily access
them. Subscription Management Tool goes one step further by establishing a proxy system with
repository and registration targets. This helps customers centrally manage software updates within
their firewall on a per-system basis, while maintaining corporate security policies and regulatory
compliance.

**High Quality Service and Support**
SUSE Linux Enterprise Server 11 delivers innovative diagnostic and reporting tools to accelerate
problem determination and issue resolution. Novell Support Link is a new YaST module and data
collection technology that automatically captures support configuration information and sends it to
Novell via secure HTTP, if and when the user chooses. Novell Support Link works with Novell
Customer Center and Novell Support Advisor, a proactive support automation, diagnostic, and self-
help tool, to help resolve issues faster and more accurately. Novell Support Advisor reads log files and
configuration settings, maps them to the latest known issues, analyzes the data, and generates
results and recommendations for the user. Problems are diagnosed more effectively, and issues are
resolved faster with more efficient, accurate, holistic incident reporting.

SUSE Linux Enterprise Server is also backed by the award-winning Novell global support
organization. Hundreds of Linux-trained associates worldwide provide enterprise quality support
services 24 hours per day, every day. VARBusiness Report Card ranked Novell as number one in
server operating system support, primarily because the Novell technical support organization meets
more than 99 percent of its service level agreements, and 65 percent of all calls are resolved within
five minutes.
Vibrant and Growing Ecosystem
As a result of the Novell focus on developing interoperable solutions and our successful history of collaborating with other technology vendors to meet customer needs, SUSE Linux Enterprise Server is surrounded by a large and rapidly growing ecosystem of software and hardware partners. SUSE Linux Enterprise is the preferred Linux distribution for SAP, and is recommended by SAP to its customers who want to run SAP applications on Linux. SUSE Linux Enterprise Server is supported by major hardware vendors around the world and runs on a wide range of servers and storage devices, from industry standard systems to IBM System z.

Complete Development Environment
Included with SUSE Linux Enterprise Server is a comprehensive development environment. SUSE Linux Enterprise Software Development Kit includes all of the major open source compilers, libraries, debuggers, simulation tools, and editors necessary for developers, IHVs and ISVs to create applications, or port them to SUSE Linux Enterprise Server. The toolkit contains several integrated development environments (IDE), as well as support for popular modern programming languages, such as C, C++, Java, Perl, Python, PHP and Ruby. Also included is Tomcat, a popular application for serving Web applets.

TARGET WORKLOADS AND USE CASES
SUSE Linux Enterprise Server is suitable for a wide range of workload types and sizes. When open source software and Linux first emerged in the enterprise computing market about a decade ago, firms primarily used SUSE Linux Enterprise as a development environment, and as a low-cost platform for reliable and secure infrastructure and edge computing services. Linux saw increasing use on servers sitting on the outermost “edge” of the data center, providing essential services like file and print sharing, networking and firewall services. Today, SUSE Linux Enterprise Server is still an affordable, reliable, robust server operating system for these infrastructure and edge computing services.

During the Internet boom in the late 90’s, the deployment of Linux in the enterprise was accelerated by the superior performance and low cost of Apache, and the congruence of open source software development processes to emerging Internet business models. Although UNIX was still the preferred platform for more serious firms, Linux was “good enough,” and its low cost and scalability made it an attractive alternative for cost conscious Internet-based companies. And the Apache Web server was just plain better. Today, the majority of Linux server operating system deployments are on this middle tier of Internet services and Web-based workloads. SUSE Linux Enterprise Server is a reliable, scalable, secure, high performance platform for Web servers and Web application servers.

In recent years, Linux has increasingly been seen as a viable platform for running mission-critical enterprise workloads. Increased ISV acceptance and endorsement has resulted in the growing availability, certification and support of many third-party enterprise applications on SUSE Linux Enterprise Server. Together with the ongoing enhancements and continual hardening of the Linux
kernel, SUSE Linux Enterprise Server is generally considered by most to be a Tier One operating system, along with Solaris, Windows Server, and Red Hat Enterprise Linux.

**Infrastructure**
- File and print
- E-mail
- Firewall
- DNS and DHCP

**Web**
- Web serving—Apache
- Web application serving—Tomcat, Geronimo, WebSphere
- Web caching and proxy

**Mission Critical**
- ERP—SAP
- Database—Oracle

**Defensible Differentiators**
SUSE Linux Enterprise Server is differentiated from other server operating systems like Red Hat Enterprise Linux, Sun Solaris and Microsoft Windows Server 2008, by its interoperability, affordability, and vendor endorsements.

**Most interoperable**
SUSE Linux Enterprise Server is uniquely designed for maximum interoperability with Windows environments—something that Red Hat Enterprise Linux and Solaris cannot match. Since 2006, Microsoft and Novell have been working together, specifically in the areas of cross-platform virtualization, identity federation, and cross-platform systems management, to ensure that SUSE Linux Enterprise Server environments and Microsoft Windows Server 2008 environments share data, communicate more easily with each other, and can be managed with a common set of tools. Furthermore, an optional SUSE Linux Enterprise Mono Extension allows customers to run Microsoft .NET server applications on Linux, increasing interoperability and performance, reducing cost and improving productivity. Interoperability is part of a larger, more pragmatic company-wide mission to give Novell enterprise customers the ability to use the best technology—open source or proprietary—in support of their business objectives. We recognize that heterogeneous data centers are today's reality, and we are committed to helping our customers maximize the utilization of their heterogeneous IT resources.

**Lowest cost**
SUSE Linux Enterprise Server is the lowest cost server operating system platform. SUSE Linux Enterprise Server environments costs less than traditional UNIX environments when taking into consideration the cost of operating system software licenses, support and maintenance subscriptions, hardware, and systems management tools. Various market research firms that have conducted total cost of ownership (TCO) studies comparing UNIX and Linux environments confirm savings ranging
from 45 to 80 percent when using Linux. Subscription pricing for SUSE Linux Enterprise Server is lower than Solaris for x86 and x86-64 on systems with more than two CPUs. Although Solaris subscriptions cost slightly less than SUSE Linux Enterprise Server subscriptions for one and two CPU systems, Sun charges extra for server management tools that are included with SUSE Linux Enterprise Server. Subscription pricing for Solaris for SPARC mimics that of Solaris for x86, but SPARC hardware is generally more expensive than hardware based on Intel and AMD processors. When all these facts are taken into consideration, one concludes that SUSE Linux Enterprise Server is more affordable than traditional UNIX.

**Recommended exclusively**
SUSE Linux Enterprise Server offers the strongest partner ecosystem of any enterprise Linux vendor, backed by recommendations from Microsoft and SAP. SUSE Linux Enterprise Server is the only Linux server operating system to be recommended by both Microsoft and SAP. Microsoft recommends SUSE Linux Enterprise Server to customers who run Windows and Linux in their data centers. This unique endorsement is made possible by the deep technical collaboration that exists between the two companies in the areas of cross platform virtualization, identity federation, and cross platform systems management, together with the joint support programs that have been implemented to ensure customers have seamless, comprehensive one-stop support for their virtual Linux and Windows services. Similarly, SAP also recommends SUSE Linux Enterprise Server to customers that run SAP applications on Linux. This preferred relationship is made possible by the ongoing collaboration between the two companies to optimize the performance of SAP's applications on SUSE Linux Enterprise Server. Together, SAP and Novell are reducing the complexity of application deployments, lowering costs and giving customers a single point of contact for acquiring and supporting a complete data center stack. SAP recommends SUSE Linux Enterprise Server for hosting SAP Business ByDesign, SAP Business All-in-One, and SAP NetWeaver Business Intelligence Accelerator.

**PRODUCT DESCRIPTIONS**

**25-word Description**
SUSE Linux Enterprise Server is a highly reliable, interoperable and manageable server operating system that enables firms to cost-effectively and securely deliver mission-critical services.

**50-word Description**
SUSE Linux Enterprise Server is a highly reliable, scalable and secure server operating system, built to power both physical and virtual mission-critical workloads. With this affordable, interoperable and manageable open source foundation, enterprises can cost-effectively deliver core business services, enable secure networks and easily manage their heterogeneous IT resources, maximizing efficiency and value.

**100-word Description**
SUSE Linux Enterprise Server is a highly reliable, scalable and secure server operating system, built to power both physical and virtual mission-critical workloads. With this affordable, interoperable and
manageable open source foundation, enterprises can cost-effectively deliver core business services, enable secure networks and easily manage their heterogeneous IT resources, maximizing efficiency and value. Recommended by SAP and Microsoft, SUSE Linux Enterprise Server is optimized to deliver high-performance mission-critical services, as well as run edge of network, and web infrastructure applications. This modular operating system runs on five processor architectures and is available with optional extensions for real-time computing, high availability clustering, and running .NET applications on Linux.

**COMPETITIVE MESSAGING**

In the server operating system market today, Sun Microsystems, Red Hat, and Microsoft are primary competitors for Novell. All three vendors offer server operating systems for the same markets Novell targets with SUSE Linux Enterprise Server.

**Sun Microsystems**

Sun's primary server operating system product is Solaris, a UNIX operating system. Sun offers two versions of Solaris today, for both x86 and SPARC systems—OpenSolaris and Solaris. Only Solaris, however, is targeted at the high-end data center. In prior years, Sun also offered a product called Trusted Solaris, but in November of 2006, the extensions that turned Solaris into “Trusted Solaris” were incorporated into Solaris 10.

While OpenSolaris is currently positioned as a next-generation, feature-rich operating system that’s ideal for students, Web 2.0 application developers, and open source developers, Solaris is positioned as a high-end enterprise quality server operating system for rock-solid, longer term deployments. Solaris 10, released in early 2005, includes many utilities and data center features, such as Dynamic Tracing (DTrace), Containers, Logical Domains (LDoms), Predictive Self Healing, and ZFS. DTrace is a well received application debugging and performance troubleshooting tool. Containers and LDoms are Sun’s approach to virtualization and workload management. For predictive self healing, Solaris includes Fault Manager and Service Manager, two utilities that help system administrators maximize availability in the face of software and hardware faults. Finally, ZFS is Solaris’s general purpose file system that doesn’t require a separate volume manager.

Sun promotes Solaris as free of charge to end users, regardless of the number or type of systems you want to run it on. In order to use Solaris for perpetual commercial use, however, each system running Solaris 10 must have an entitlement. An “entitlement document” is delivered with each new Sun system, from Sun Services as part of a valid service agreement, or via e-mail when you register your systems through the Sun Download Center.

For users that want service and support for their Solaris implementation, Sun offers several subscription options. While Sun offers just one server operating system product to its enterprise customers, like Red Hat and Microsoft, Sun charges different subscription prices based on the underlying hardware platform, ranging from US$324 to $4,320 and beyond. Please see the appendix for a more detailed table which summarizes the list prices from Sun's Web site for Solaris 10.
Sun is a formidable competitor, with many competitive advantages. Solaris 10 is perceived in the market today as a highly reliable and scalable data center operating system, capable of running mission-critical workloads. A large number of mission-critical ISV applications are certified on Solaris (on SPARC). Sun has a large installed base of data center customers (over 1.4 million) and significant experience selling into, and supporting the enterprise. Sun markets and sells hardware in addition to its software, and can potentially use this revenue stream to undercut its competitors on software pricing.

On the other hand, multicore SPARC servers are generally more expensive than Intel- and AMD-based x86-64 systems, generally eroding any cost advantages of running mission-critical workloads on Solaris. While Sun has made tremendous strides in tuning and optimizing Solaris on SPARC, application performance generally is still considered to lag behind Linux on commodity x86-64 platforms. Coupled with the increasing availability of applications on open source, and the scalability and reliability improvements in Linux, the market continues to witness the migration of mission-critical services from Solaris to Linux. To date, ISVs have not certified in large numbers on Solaris for x86.

SUSE Linux Enterprise Server is positioned against Sun as a lower cost Solaris alternative, that delivers all of the reliability, security, performance and scalability of UNIX, but at a more affordable price. Furthermore, using SUSE Linux Enterprise Server rather than Solaris allows IT managers to use lower cost COTS systems, and the open source platform reduces vendor lock-in and mitigates risk.

**Red Hat**

Red Hat currently offers products for three “general compute areas” with its Enterprise Linux “family” of operating systems—servers, clients, and “miscellaneous variants for specific environments,” like high performance computing (HPC) and messaging, realtime and grid (MRG). All Red Hat Enterprise Linux products for a given release are based on a common technology core, and share common kernels, APIs/ABIs, libraries, development toolchain, management tools, and packages. Red Hat claims that since it uses a common code base and feature set that is the same regardless of the underlying hardware, a single application certification applies across its entire family.

In its general purpose server operating system category, Red Hat offers two versions: Red Hat Enterprise Linux, and Red Hat Enterprise Linux Advanced Platform. Red Hat Enterprise Linux is promoted as the “foundation” of the entire family, with the broadest range of capabilities, including virtualization. It is designed for servers with up to two processor sockets, and supports up to four virtualized guest operating systems. Red Hat recommends using it for departmental and network applications, file and print serving, and small Web servers. According to the company, it is suitable for small and medium-sized, fixed-function server environments.

In contrast, Red Hat Enterprise Linux Advanced Platform supports servers of any size, as well as an unlimited number of virtualized guest operating systems. Red Hat claims that Advanced Platform has been “designed from the ground up” to dramatically reduce server acquisition and operating costs, improve service levels and simplify IT, for all types of servers from white boxes to mainframes, for both scaling up and scaling out. Advanced Platform includes an integrated, open source server and
storage virtualization environment, which allows it to serve as a foundation for seamless computing grids. Red Hat recommends using it for databases, ERP and CRM applications, SOA environments, large Web servers, grid deployments, blade/rack server consolidation and high availability, and corporate/enterprise applications.

Most of Red Hat's Enterprise Linux server operating system family is offered in one year and three year subscription options. Pricing is comparable to Novell, with annual subscriptions ranging from $324 to $18,000. Please see the appendix for a more detailed table that summarizes the list prices from Red Hat's Web site (and Dell's Web site for HPC pricing) for Red Hat Enterprise Linux.

Red Hat is a well-recognized technology brand, and is the current market share leader among enterprise Linux distributors. All things being equal, it is the preferred choice for most firms that are considering a Linux server operating system. Red Hat Enterprise Linux has significant adoption and mindshare in the markets Novell is targeting. Furthermore, it has significant experience selling in these markets. There are more enterprise applications that are supported on Red Hat Enterprise Linux than on SUSE Linux Enterprise today, and more mission-critical applications are supported on Red Hat Enterprise Linux than on any other Linux distribution.

Red Hat does have certain weaknesses, however. Red Hat's strong association with open source lessens its appeal to those enterprises that acknowledge and have adopted a multi-platform, heterogeneous data center strategy. Furthermore, Red Hat's size and scope limit its ability to be an effective global provider of support services. Many enterprises question Red Hat's ability to provide 24x7 data center support.

SUSE Linux Enterprise Server is positioned against Red Hat Enterprise Linux as the enterprise Linux distribution recommended by SAP and Microsoft for their customers that want to run mission-critical applications on Linux. SUSE Linux Enterprise Server is designed for interoperability, and more ISVs certify their applications on SUSE Linux Enterprise Server than they do on Red Hat Enterprise Linux.

**Microsoft**

Microsoft's latest server operating system family is Windows Server 2008. While Microsoft currently offers eight different editions of its server operating system to meet the needs of different types of customers, three of them in particular correspond to the three data center segments described earlier: “Standard Edition” for the lower tier, “Enterprise Edition” for the middle tier, and “Datacenter Edition” for the high-end server OS market segment. Each successive edition adds increased functionality and scalability.

Windows Server 2008 Standard is Microsoft's base server operating system, and is positioned as a robust, general purpose operating system with enhanced Web and virtualization capabilities. The Enterprise edition builds on top of the Standard edition by adding additional Active Directory certificate, file, network policy and access, terminal and clustering services, and is positioned as an enterprise-class platform for deploying business-critical applications. The Enterprise edition also includes support for tools like Windows Systems Resource Manager. The Datacenter edition builds on top of the Enterprise edition by supporting systems with 32 socket x86 systems and 64 sockets x86-64 systems (Standard supports four socket systems, while Enterprise supports eight socket systems). It also
supports the hot add and replace of memory and CPU (hot add of memory is only supported with their Enterprise edition). It is positioned as an enterprise-class platform for deploying business-critical applications and large-scale virtualization.

As a traditional, proprietary software vendor, Microsoft charges a license fee for the right to use its server operating system binaries, a separate fee for the client access licenses or external connectors to connect to the server, and separate maintenance and support fees. Volume licensing customers typically receive discounts in the 10–30 percent range. Client access licenses retail for $40 each, but are offered to volume customers for as much as 50 percent off. External connectors are available only through volume licensing programs, and prices for those start at $1,800. Packaged support offerings for medium sized enterprises start at $8,299 for Essential Support Service Packages, and go up to $42,299 for Premium Foundation Service Packages. Please see the appendix for a more detailed table that summarizes the list prices from Microsoft's Web site for its various Windows Server 2008 operating system editions.

Although Microsoft's roots are in client operating systems, its size and resources make it a formidable competitor in the high-end mission-critical server OS market. Microsoft is a large company with abundant resources that can be used to execute its competitive strategies. It enjoys a large installed base of server operating systems (approximately five times that of Linux). Furthermore, this large base is growing almost as fast as Linux. Many applications run on Windows Server 2003 (approximately 12,000), and a similar number can be expected to run on Windows Server 2008. Furthermore, many of these applications are well integrated with Microsoft's Windows Server product line. Microsoft has built a large developer community as well as the number one developer tool set in the industry. Many developers are trained to use Microsoft's development environment, and continue to churn out applications that run on Windows Server. Microsoft has built a sizable indirect channel business and enjoys relatively higher penetration in small and medium sized business segments.

On the flip side, Microsoft's products are perceived as less secure than those of its competitors. Its products are also viewed as less innovative, and slower to release. Microsoft's Server products (Windows Server 2003) are estimated to exhibit longer downtimes, and take longer to patch than those of its competitors. In the Yankee Group's 2007-2008 Global Server Operating System Reliability Survey, Windows Server 2003 recorded on average across survey respondents 8.9 hours of downtime, compared to a little over one hour for SUSE Linux Enterprise Server. It also took system administrators on average 26 minutes to patch a Windows 2003 server, compared with 16 minutes for SUSE Linux Enterprise Server.

SUSE Linux Enterprise Server is positioned against Microsoft Windows Server 2008 as a highly reliable, scalable, and manageable open source operating system that delivers affordable enterprise-quality business services, on a transparent, open platform that reduces vendor lock-in and mitigates risk.
### SUSE Linux Enterprise Server Pricing

#### SUSE Linux Enterprise Server Pricing (in USD)

<table>
<thead>
<tr>
<th>Server Operating Systems</th>
<th>Basic</th>
<th>Standard</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUSE Linux Enterprise Server for x86 and x86-64 – one year subscription (per server per year)</td>
<td>$349</td>
<td>$799</td>
<td>$1,499</td>
</tr>
<tr>
<td>SUSE Linux Enterprise Server for Itanium – one year subscription (per socket per year)</td>
<td>$750</td>
<td>$850</td>
<td>$1,000</td>
</tr>
<tr>
<td>SUSE Linux Enterprise Server for Power – one year subscription (per socket per year)</td>
<td>$750</td>
<td>$850</td>
<td>$1,000</td>
</tr>
<tr>
<td>SUSE Linux Enterprise Server for System z – one year subscription (per IFL per year)</td>
<td>$11,999</td>
<td>$15,000</td>
<td>$18,000</td>
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<tr>
<td>SUSE Linux Enterprise Real Time Extension – one year subscription (per server per year)</td>
<td>$2,500</td>
<td>$2,500</td>
<td>$2,500</td>
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<tr>
<td>SUSE Linux Enterprise High Availability Extension – one year subscription (per server per year)</td>
<td>$699</td>
<td>$699</td>
<td>$699</td>
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<tr>
<td>SUSE Linux Enterprise Mono Extension – one year subscription (per server per year)</td>
<td>$200</td>
<td>$200</td>
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</table>

#### Competitor Pricing

### Microsoft Windows Server 2008 Pricing (in USD)

<table>
<thead>
<tr>
<th>Server Operating Systems</th>
<th>License</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows Server 2008 Standard Edition (with 5 client access licenses)</td>
<td>$999</td>
</tr>
<tr>
<td>Windows Server 2008 Standard Edition (with 10 client access licenses)</td>
<td>$1,199</td>
</tr>
<tr>
<td>Windows Server 2008 Enterprise Edition (with 25 client access licenses)</td>
<td>$3,999</td>
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<tr>
<td>Windows Server 2008 Datacenter Edition</td>
<td>$2,999</td>
</tr>
<tr>
<td>Windows Web Server 2008</td>
<td>$469</td>
</tr>
<tr>
<td>Windows Server 2008 for Itanium-based Systems</td>
<td>$2,999</td>
</tr>
<tr>
<td>Windows Server 2008 Standard Edition without Hyper-V (with 5 client access licenses)</td>
<td>$971</td>
</tr>
<tr>
<td>Windows Server 2008 Standard Edition without Hyper-V (with 10 client access licenses)</td>
<td>$1,171</td>
</tr>
<tr>
<td>Windows Server 2008 Enterprise Edition without Hyper-V (with 25 client access licenses)</td>
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</tr>
<tr>
<td>Windows Server 2008 Datacenter Edition without Hyper-V</td>
<td>$2,971</td>
</tr>
</tbody>
</table>
### Solaris 10 – One-year Subscription Prices (in USD)

<table>
<thead>
<tr>
<th>Support Level</th>
<th>1–2 CPUs, x86/x64</th>
<th>3+ CPUs, x86/x64</th>
<th>1–2 CPUs, SPARC</th>
<th>3–4 CPUs, SPARC</th>
<th>5–8 CPUs, SPARC</th>
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</thead>
<tbody>
<tr>
<td>Basic</td>
<td>$324</td>
<td>n/a</td>
<td>$324</td>
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<tr>
<td>Standard (12x5)</td>
<td>$720</td>
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<td>$720</td>
<td>$1,440</td>
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<tr>
<td>Premium (24x7)</td>
<td>$1,080</td>
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<td>$2,160</td>
<td>$4,320</td>
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### Solaris 10 – Three-year Subscription Prices (in USD)

<table>
<thead>
<tr>
<th>Support Level</th>
<th>1–2 CPUs, x86/x64</th>
<th>3+ CPUs, x86/x64</th>
<th>1–2 CPUs, SPARC</th>
<th>3–4 CPUs, SPARC</th>
<th>5–8 CPUs, SPARC</th>
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</thead>
<tbody>
<tr>
<td>Basic</td>
<td>$864</td>
<td>n/a</td>
<td>$864</td>
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<tr>
<td>Standard (12x5)</td>
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<td>$3,600</td>
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<tr>
<td>Premium (24x7)</td>
<td>$2,952</td>
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<td>$5,904</td>
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</table>

### Red Hat Enterprise Linux Pricing (in USD)

<table>
<thead>
<tr>
<th>Server Operating Systems</th>
<th>Basic</th>
<th>Standard</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Hat Enterprise Linux (for 32/64-bit x86, Itanium 2, and IBM Power) – one year subscription</td>
<td>$349</td>
<td>$799</td>
<td>$1,299</td>
</tr>
<tr>
<td>Red Hat Enterprise Linux Advanced Platform (for 32/64-bit x86, Itanium 2, and IBM Power) – one year subscription</td>
<td>n/a</td>
<td>$1,499</td>
<td>$2,499</td>
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<tr>
<td>Red Hat Enterprise Linux for Mainframe Computing – one year subscription</td>
<td>n/a</td>
<td>$15,000</td>
<td>$18,000</td>
</tr>
<tr>
<td>Red Hat Enterprise Linux for HPC Compute Nodes – one node, one year subscription renewal (Dell)</td>
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<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Red Hat Enterprise Linux (for 32/64-bit x86, Itanium 2, and IBM Power) – three year subscription</td>
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<tr>
<td>Red Hat Enterprise Linux for HPC Compute Nodes – one node, three year subscription renewal (Dell)</td>
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