

Red Hat Enterprise Linux 6

Feature Function Benefit Summary

**June 2010, based on Beta 1. Features may change prior to final product release.
Copyright© 2010 Red Hat, Inc.**

Building on the success of previous releases, Red Hat Enterprise Linux 6 is designed to be the world's leading enterprise-focus open source operating system platform. With a comprehensive set of features that span from laptop/desktop systems to the largest enterprise servers and mainframes, and with an extensive portfolio of certified hardware and applications, Red Hat Enterprise Linux 6 is suitable for physical, virtual and cloud deployments.

- The Red Hat Enterprise Linux 6 platform focuses on the following primary attributes:
- Offering a highly optimized application platform for large-scale, centrally-managed enterprise deployments.
 - Delivering maximum efficiency with the latest generation of highly scalable systems.
 - Industry-leading virtualization performance, flexibility, security for both host and guest environments.
 - Extensive support for Green IT capabilities to minimize ecological impact and carbon footprint.
 - The provision of a platform that offers customers access to leadership technology throughout the life of the product.

<i>Feature</i>	<i>Function</i>	<i>Benefit</i>
Updated kernel and core technology stack	Red Hat Enterprise Linux 6 provides a completely updated core, including the operating system kernel, compiler and developer toolchain, libraries, drivers and included applications (e.g. httpd, samba, nfs, etc). The overall platform has grown significantly, with approximately 30% more packages than the previous release, providing many new and improved features. Red Hat has been the leading developer and contributor of technologies to the Linux upstream kernel for many years and uses them to create a kernel that includes a comprehensive set of enterprise-strength capabilities. It is designed to allow future capabilities to be incorporated without impacting certified applications (by keeping APIs/ABIs stable).	Red Hat Enterprise Linux 6 provides a platform for the next decade – incorporating the latest open source technologies in a state-of-the-art solution. Secure, scalable, high-performance and manageable. ISVs enjoy a stable, flexible environment on which to deploy their applications. Customers achieve the maximum return on their IT investment, with features that provide efficient resource utilization, extensive Green IT capabilities, and rapid adoption of new technologies. Red Hat's role as the primary contributor to the Linux kernel means that Red Hat Enterprise Linux is the world's leading open source operating system and that Red Hat is the unquestioned choice for professional, supported deployments.
Virtualization	Red Hat Enterprise Linux 6 features fully integrated virtualization based on the KVM hypervisor. The tight integration means that KVM benefits from a number of core kernel features such as the tickless kernel, cgroups and the CFQ (Completely Fair Queuing) scheduler, etc. Additionally, Red Hat's leadership in KVM development has fostered the development of sophisticated paravirtualization capabilities that encompass non-traditional devices such as the clock, interrupt controller, spinlock subsystem and vmchannel. A range of new features improve scalability, I/O performance and deployment flexibility. The application environment is consistent for physical and virtual systems, simplifying the adoption of virtualization. Support for features such as transparent huge pages, SR-IOV, virtualized asynchronous I/O, and message signaled interrupts deliver performance improvements for all guests, from the largest enterprise application to the Windows desktop. Scalability increases include more memory and CPUs per guest, more guests/server. Also, to ensure forward compatibility, Red Hat Enterprise Linux 6 is able to run as a full or paravirtualized Xen guest on Red Hat Enterprise Linux 5 Xen-based hosts.	Performance and scalability enhancements make it practical to deploy large-scale enterprise applications in virtualized environments, combining the best features of physical and virtualized systems. SR-IOV-enabled performance enhancements allow I/O-bound applications to be virtualized, so IT departments can adopt a “run anywhere” capability. Support for Microsoft Windows and Red Hat Enterprise Linux guests enables rapid deployment and easy management of heterogeneous environments. The fully featured implementation includes capabilities such as Live Migration that competing products only offer as expensive options. And guest scalability matches, and usually exceeds, that of competing products.
Beta 1 - June 2010		

Feature	Function	Benefit
Performance	The wide range of performance enhancements in Red Hat Enterprise Linux 6 reaches all components of the platform. A few examples include: per-LUN flush daemons that enable dramatic performance improvements for enterprise applications deployed on large I/O subsystems (previously a single daemon was shared); kernel multi-queue network device support is used to provide QoS-based transmission and virtualization performance improvements; ticketed locks provide spinlock acquisition fairness in large-scale SMP systems (typically NUMA systems with >16 CPUs); filesystem performance improvements are provided by the new default filesystem, Ext4, and the optional XFS filesystem.	Customers and application providers will achieve industry-leading performance across all aspects of the Red Hat Enterprise Linux 6 computing environment: processor, NUMA/SMP, networking, storage, filesystem, virtualization, daemons/applications, etc. Ongoing publication of the results of industry-standard benchmarks enable customers to assess the performance of Red Hat Enterprise Linux 6, showing leadership over competing UNIX, Microsoft, and VMware products.
Client/Desktopop	Client support enhancements for Red Hat Enterprise Linux 6 focus on two areas: the native Linux desktop and VDI/HVD (Virtual Desktop Infrastructure/Hosted Virtual Desktop). Significant enhancements to the native Linux desktop include support for OpenChange, which allows MAPI access to Microsoft Exchange servers; greatly reduced boot times; improved laptop suspend, resume, docking station and projector support; many graphics/multimedia improvements; and a complete update of all desktop applications (browser, office suite, etc.). VDI/HVD capabilities enable centralized hosting of both Microsoft Windows and Red Hat Enterprise Linux desktops. High-performance, intelligent communication between the server and client, optimized for today's multimedia environments, is provided by the Red Hat-developed SPICE protocol.	Red Hat Enterprise Linux 6 client-side solutions provide a fully functional desktop that can be used to replace Microsoft Windows, offering excellent compatibility and superior security. For customers wishing to retain the Microsoft desktop experience, Red Hat's VDI/HVD technology, scalable to hundreds of desktops, allows centralized deployment and management of Windows. The SPICE protocol enables a low-cost, hosted thin client to offer the same user experience and performance as a local, fat client, while reducing hardware, deployment, and management costs.
Development	The development environment for Red Hat Enterprise Linux 6 has been thoroughly updated with the latest compilers and tools. The GCC 4.4 compiler provides OpenMP 3.0 conformance, allowing developers to create portable, parallel programs. It also provides C++0x conformance features and debuginfo handling improvements. Glibc malloc optimizations improve the speed and efficiency of large and NUMA memory allocations. The gdb debugger features numerous improvements including greatly improved C++ debugging, pretty printing of C++ classes, optimizations to assist debugging of large programs, non-blocking thread debugging, asynchronous interaction, and enhanced Python scripting capabilities. The Systemtap tracing and profiling utility can take advantage of pre-configured kernel tracepoints, C, C++ and Java user-space probing and backtracing. Analysis of core system performance can be aided by using PCL to profile processor hardware operations. The Eclipse IDE offers Java, C & C++ development enhancements, and new integration with Valgrind and OProfile.	ISVs and customers enjoy a modern application development environment in which to create, build, debug, and tune their applications. OpenJDK (TCK certified, based on the IcedTea project) now features a fully open source implementation of the Java Web Browser plugin and Java Web Start. This enables browser-based applications to avoid any dependency on proprietary Java plugins. And Red Hat's commitment to providing a consistent environment for applications that are deployed on physical servers, virtual servers, or in cloud environments means that development resources do not need to be replicated. Develop once, deploy anywhere.
Scalability	Red Hat Enterprise Linux 6 scales to the largest systems on the market today with plenty of headroom for systems expected in the next decade. Tested and supported limits will grow in step with top-of-the-line hardware capabilities, while theoretical limits are exceptionally high. For example, for x86-64 systems, limits of up to 4,096 CPUs, 33,000 IRQs, 64TB of memory, 4 million processes, and 32,000 thread per process, give an idea of the capacity of the system. In line with these increases, enhanced software algorithms, for example in the scheduler and spinlock subsystems, ensure that the operating system can handle huge systems efficiently.	For Red Hat Enterprise Linux 6, the scalability message is one of essentially unlimited headroom for the foreseeable future. And scalability features are not restricted to physical systems: Red Hat Enterprise Linux 6 also provides industry-leading scalability of virtual guests. Physical, virtual, and cloud deployments can scale to meet business requirements, eliminating the need to switch platforms when an existing platform reaches its maximum capacity. And customers with smaller configurations can be confident in the knowledge that the platform has been engineered to meet the requirements of the world's largest systems.
Beta 1 - June 2010		

Feature	Function	Benefit
Green IT	New and enhanced features, tools and APIs are focused on reducing the power footprint of Red Hat Enterprise Linux 6. These include: use of a tickless kernel, which allows processors to be switched to a low power state when idle; Active State Power Management and Aggressive Link Power Management, which reduce the power consumption of I/O subsystems; relatime drive access optimization, which reduces filesystem metadata write overhead. Ongoing application design and tuning enhancements – for example changing from polling algorithms to event-based algorithms – further increases the efficiency of the system.	Red Hat Enterprise Linux has won awards for its power efficiency and, with Red Hat Enterprise Linux 6, its capabilities have been further extended. Software optimizations mean that idle systems and I/O subsystems will consume less power than before, and that active systems will not waste power. By providing a reduced carbon footprint for all systems and applications, deployment costs are reduced. Monitoring tools and virtualization management APIs provide IT staff and applications (such as RHEV-M) visibility into system resource usage so that workloads can be migrated/optimized across configurations.
High Availability	Red Hat Enterprise Linux 6 leverages new hardware capabilities to offer a number of RAS (Reliability, Availability, Serviceability) improvements. These include: hot-add of devices and memory, and enhanced error checking for PCIe devices via AER (Advanced Error Reporting). Support for MCA (Machine Check Architecture) capabilities allows the system to recover from hardware errors that would previously have caused complete system failure. Support for advanced SCSI data integrity features – DIF (Data Integrity Field) and DIX (Data Integrity eXtension) – provides end-to-end data check-summing from the application to the storage platter. And the introduction of ABRT (Automated Bug Reporting Tool) provides a more consistent way to identify and report system exception conditions like kernel failures and userspace application crashes.	Red Hat Enterprise Linux 6 provides features that improve the availability of the system by coupling advanced error recovery with enhanced logging/reporting of errors – thereby increasing MTBF (Mean time between failures) and reducing MTTR (Mean time to repair). Support for MCA capabilities and comprehensive data integrity checking, previously only available with expensive UNIX/RISC/storage systems, positions Red Hat Enterprise Linux 6 and its underlying hardware platforms for the most demanding enterprise application environments. The plug-in architecture of ABRT, allowing it to be integrated with any problem resolution infrastructure, coupled with its support for “phone home” capabilities, make it a powerful feature for improving problem management and trend analysis.
Resource Management	The new Control Group (cgroups) feature of Red Hat Enterprise Linux 6 offers a powerful way to allocate processor, memory, and I/O resources among applications and virtual guests. Cgroups provide a generic framework for plug-in controllers that manage resources such as memory, scheduling, CPUs, network traffic, and I/O. Cgroups become increasingly important as system sizes grow, by ensuring that high-priority tasks are not starved of resources by lower priority tasks.	Cgroups gives customers fine grained control of resource utilization of physical and virtualized environments in terms of memory consumption, IO (disk & net) utilization and process priority - enabling policies to be established that govern quality of service (QoS) guarantees. Customers will be able to deploy flexible virtual and cloud environments, easily mixing critical enterprise applications with low-priority background applications while ensuring that the resources needed by both are properly allocated. Features such as cgroups take Red Hat Enterprise Linux to the next level as the strategic platform choice for the very largest IT deployments.
Security	Numerous new security features make Red Hat Enterprise Linux 6 the most secure version ever. Svirt, which is enabled by default, provides containment and isolation of virtual guests. Xace brings Multi-Level Security (MLS) capabilities to desktop environments. The Sandboxing feature allows users to containerize potentially insecure applications. The Kiosk capability allows constrained, read-only environments to be created for use in public/kiosk settings, reducing the risk of system compromise by malicious users. Policykit provides fine-grained authorization for user applications that need to do privileged operations, (using a client/server d-bus based model) – and Red Hat Enterprise Linux 6 applications are provided with default Policykit policies.	Svirt capabilities are unique to Red Hat Enterprise Linux – unmatched by competing virtualization solutions from VMware, Microsoft, or Oracle. With Svirt customers can achieve guest isolation and confidently Live Migrate virtual guests across systems, or deploy in cloud environments, without worrying about malicious adjoining guests compromising security. Using Xace, ISVs will be able to deliver “trusted” desktops to customers with high security requirements (MLS) – a capability not available with Microsoft Windows desktops. Sandboxing brings SELinux security confinement to any application, including desktop and console users, thus allowing for testing untrusted content without harm to the host. Kiosk allows customers to create fully functional environments with restrictions that are suitable for deployment in public kiosk settings such as libraries and public schools. Policykit enables applications to perform privileged operations while minimizing exposure to security flaws – offering users an improved and safer experience.

Beta 1 - June 2010

Feature	Function	Benefit
Identity and Authentication	The new SSSD (System Security Services Daemon) makes Red Hat Enterprise Linux 6 a more robust and better performing LDAP and Kerberos client. Features include offline support (eliminating the need for laptops to use duplicate user accounts), built-in caching of identity information and credentials (reducing server load), and improved robustness in the face of network congestion. Support for multiple identity domains allows clients to authenticate correctly in mixed identity environments.	Client systems can authenticate against multiple environments - Microsoft Active Directory, LDAP, Red Hat Directory Server, Kerberos, and IPA (Identity, Policy, and Audit). This offers IT departments exceptional flexibility when deploying Red Hat Enterprise Linux 6 systems into their security infrastructures. And support for disconnected clients means that laptop users can also be elegantly integrated into that infrastructure.
Networking	Networking enhancements in Red Hat Enterprise Linux 6 are focused on increasing performance and extending the support of industry standards and RFC requirements. A few of the many new features include IPv6 mobility; UDP-lite (for multimedia protocols such as VoIP); addition of TCP Illinois and TCP-Yeah congestion control algorithms; performance improvements with multi-CPU receive, multi-queue transmit and the extended use of RCU (Read Copy Update) algorithms; datacenter bridging support with 802.1p/802.1Qaz. Extensive IPv6 enhancements meet the requirements of multiple new RFCs, along with updated kernel subsystems for NFS/CIFS/RDMA.	Enhancements throughout the networking stack ensure that Red Hat Enterprise Linux 6 systems can meet the needs of today's complex, business-critical networking environments. Multimedia and performance features, coupled with IPv6 readiness, mean that IT departments can successfully deploy network-intensive virtualized and cloud environments.
Filesystems and Storage	The next generation Ext filesystem, Ext4, is the default filesystem for Red Hat Enterprise Linux 6. Ext4 combines the stability of Ext3 with significant scalability (up to 16TB) and performance enhancements. The optional XFS filesystem is available for customers deploying even larger, specialized environments with high-end servers and storage arrays. The optional GFS2 file system is designed for high-availability clusters with 2-16 nodes, and now includes support for clustered Samba deployments. Many new features in the I/O subsystem cover interconnects (FCoE, iSCSI, etc.) and hardware/software optimizations (SR-IOV, NPIV, topology awareness, thin provisioning, block discard, VSAN fabrics, etc.). LVM (Logical Volume Manager) enhancements include online resizing of mirrored volumes, dynamic multipath load balancing, and snapshot rollbacks. Storage topology awareness allows higher level software (drivers, logical volume management, filesystems, virtual guests and applications) to interrogate the storage hardware to identify optimal I/O blocking patterns - offering the opportunity to optimize performance based on physical storage capabilities.	Red Hat Enterprise Linux 6 provides support for the hardware and software technologies that allow IT departments to stay ahead of the explosive growth in their data access and storage requirements. Larger and faster filesystems; online, dynamic storage management that eliminates reconfiguration downtime; virtualized I/O performance that matches non-virtualized environments. Capabilities that meet the needs of any deployment, from the small local-storage system to the largest virtualized SAN.
Interoperability	Interoperability with Microsoft Windows environments is enhanced by the inclusion of the latest version of Samba, which offers a number of significant new and updated features. Support is provided for: IPv6, Windows 2008 (R2) trust relationships, Windows 7 domain members, and Active Directory LDAP signing/sealing policy. Additionally, full support for Windows cross-forest, transitive trusts and one-way domain trusts is available, and support for Windows management tools (mmc and User Manager) has been significantly improved.	Red Hat Enterprise Linux 6 provides improved compatibility with Microsoft Windows environments and technologies. And deployment in virtualized and clustered configurations adds flexibility and availability. These features and capabilities enable customers to build compatible, heterogeneous solutions that are robust and highly cost effective.

Beta 1 - June 2010