TECH NOTES

RED HAT ENTERPRISE LINUX 6 SERVER: FEATURES AND BENEFITS

Red Hat Enterprise Linux 6 is the best platform to tranform current and future technology innovations into the best value and scale for IT solutions. Each release delivers important new capabilities that advance that vision. Below are some of the new features of Red Hat Enterprise Linux 6.

EFFICIENCY, SCALABILITY, AND RELIABILITY

A new kernel task scheduler algorithm allows all tasks to get their fair share of CPU time, and reduces the amount of time that the kernel needs to schedule tasks. Improved hardware awareness allows the kernel to not only take better advantage of multi-core and NUMA architectures, but, when possible, consolidate tasks to fewer CPU sockets, reducing power consumption.

Power Management

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 Red Hat Enterprise Virtualization Manager) visibility into system resource usage so that workloads can be migrated/optimized across configurations.

Scalability

Red Hat Enterprise Linux 6 supports more sockets, more cores, more threads, and more memory.

File Systems

File system updates provide a range of capabilities and scale to give users choices that match their workloads.

- The new default file system, ext4, is faster, more robust, and scales to 16TB.

- The Scalable File System add-on contains the XFS file system which scales to 100TB.

- The Resilient Storage add-on includes the high availability GFS2 file system.

- NFSv4 is significantly improved over NFSv3, and backwards compatible.

- Fuse allows filesystems to run in user space, allowing testing and development on newer fused-based filesystems (such as cloud filesystems).

Reliability, Availability, Serviceability (RAS)

RAS features provided by hardware and enabled by software allow systems to continue operating when they require hardware changes or encounter failures that would have halted previous generations of system.

High Availability[1]

Clustering provides high availability solutions that keep your systems operating in the face of localized failures, and isolates unresponsive applications and nodes so that they can't corrupt critical enterprise data. Administrative management has been simplified and streamlined.

[1]x86_64 CPU architecture support only. x86 support related to RHEL guests.

UNPRECEDENTED RESOURCE MANAGEMENT

Red Hat Enterprise Linux forges new ground in managing processing, memory, storage, and network resources.

System Resource Allocation

Cgroups, and their associated controller system services, allow groups of system tasks to use a constrained set of system resources. This can reduce resource contention, provide better and more predictable performance, and thereby help applications better meet SLAs.

Storage

New and flexible storage capabilities include:

- support for transactional use of a logical volume, particularly roll-back

- high availability of LVMs by mirroring synchronization metadata

- better management of large memory allocations with significant performance increases when allocating virtualized guest memory

- better dynamic control of DM-multipathing for improved performance

- support for very large SAN-based storage

- support for thin provisioning, simplifying administration

- better tuning and performance for SCSI and ATA I/O.

Networking

Red Hat Enterprise Linux 6 offers an advanced networking stack that meets the complex networking challenges of today's enterprises. It features performance improvements, leverages multi-core CPUs for efficient send and receive, adds support for new multi-media RFCs, and is IPv6-ready.

DESIGNED-IN SECURITY

Red Hat Enterprise Linux provides a complete portfolio of security technologies with solutions for all facets of your system, data, and communications security challenges.

Access Control

SELinux continues to introduce and improve innovative security capabilities.

- Greater coverage of system services by SELinux policies makes RHEL 6 more secure and resistant to security exploits, protecting system operation and data.

- SELinux sandboxing allows users to run untrusted applications safely and securely.

- File and process permissions have been systematically reduced whenever possible to reduce the risk of privilege escalation.

- New utilities and system libraries provide more control over process privileges for easily managing reduced capabilities.

- Walk-up kiosks (as in banks, HR departments, etc.) gain additional protections to ensure secure public use.

Enforcement and Verification of Security Policies

Standardization of information concerning the security of enterprise systems will lead to more accurate and timely information, minimizing the window of security vulnerability. This information can also be used to automatically verify the presence of patches and system security configuration, and examine systems for signs of compromise.

VPN

The Openswan VPN provides secure communications using a general implementation of IPsec that works with Cisco IPsec.

Identity and Authentication

The new System Security Services Daemon (SSSD) provides centralized access to identity and authentication resources, and enables caching and offline support. SSSD presents a generalized interface to clients that need identity and authentication, and should be the service of choice for access to identity/authentication services across the enterprise.

Updates to Kerberos include an improved experience for the end-user, system administrator, and developer.

STABLE APPLICATION DEVELOPMENT AND PRODUCTION PLATFORM

Red Hat Enterprise Linux is the development and deployment platform of choice with an efficient, scalable, and robust operating system, certified security and flexible deployment options on physical and virtualized platforms, and a wide variety of powerful development languages backed by excellent debugging and tuning tools.

Web Infrastructure

New releases of Apache, the world's most popular web server, and Squid, a high-performance web proxy, continue to provide the most capable and secure web server tools available. Memcached is a highly scalable and flexible object caching system that meets a broad range of database needs, from applications that run on small systems to very large systems that reside in the cloud.

Java

Java is the predominant language for web applications, and this new release of the open source Java development and deployment framework keeps pace with the evolving Java ecosystem.

Development

A thorough updating of a wide range of web application development languages and tools (Ruby, gcc / gdb, PHP, Perl, and TurboGears) reinforces Red Hat Enterprise Linux 6as the best stack for web applications.

Application Tuning

Support for building and debugging applications is required for development environments. Red Hat Enterprise Linux includes pioneering capabilities:

- SystemTap uses the kernel to generate non-intrusive debugging information about running applications.

- The tuned daemon monitors system use and uses that information to automatically and dynamically adjust system settings for better performance.

- SELinux can be used to observe, then tighten application access to system resources, leading to greater security.

Databases

Red Hat Enterprise Linux ships with three widely used and stable databases (PostgreSQL, MySql, and SQLite). Their capabilities and performance make them excellent for enterprise businesses.

System API / ABI Compatibility and Stability

The API / ABI Compatibility Specification defines the life cycle of Red Hat Enterprise Linux 6 public interfaces that applications can depend on for delivering reliable and consistent operating system services. ISVs rely on this assurance to drive their application development and certification of operation with RHEL versions. This specification allows ISVs to be confident that their applications will run properly throughout a defined set of RHEL releases.

INTEGRATED VIRTUALIZATION

Virtualization is a foundation for data center planning. Red Hat Enterprise Linux 6 is an excellent virtualization host, and is designed to be a superior guest on any of the major hypervisors.

Kernel-Based Virtualization

Red Hat Enterprise Linux 6 features virtualization, based on the KVM hypervisor, fully integrated into the kernel. This approach delivers kernel improvements to all virtualized applications, and ensures that the application environment is consistent for physical and virtual systems, simplifying the adoption of virtualization. To ensure forward compatibility, Red Hat Enterprise Linux 6 is able to run as a full or paravirtualized Xen guest on a Red Hat Enterprise Linux 5 Xen-based host. The ability to easily move guests between hosts can be used to consolidate resources onto fewer machines during quiet times, or free up hardware for maintenance downtime.

Leverages Kernel Features

Red Hat Enterprise Linux 6 features form a foundation of the benefits of virtualization:

- Hardware abstraction allows applications to move from physical to virtualized environments independently of underlying hardware.

- Increased scalability of CPUs and memory provides more guests per server.

- Selectable I/O schedulers and support for asynchronous I/O provide flexibility and performance benefits for block storage.

- Cgroups and related CPU, memory, and networking resource controls provide the ability to reduce resource contention, improve overall system performance, and help applications meet SLAs.

- Reliability, Availability, and Serviceability (RAS) features minimize downtime.

- Multicast bridging provides intelligent packet routing and enhanced network efficiency.

Guest Acceleration

Various capabilities, including guest access to physical resources through virtual interfaces, provide advantages to guests:

- Single physical hardware resources can be shared by multiple guests.

- Guest memory allocation, particularly at start-up, is significantly quicker.

- Reuse (deduplication) of identical pages across virtual machines improves memory use.

- Access to system interrupts via software signals provides flexibility and convenience.

The tickless kernel defines a stable time model for guests, avoiding clock drift.

Advanced paravirtualization interfaces, offering higher performance, include non-traditional devices such as the clock (enabled by the tickless kernel), interrupt controller, spinlock subsystem, and vmchannel.

Guest Security

sVirt protects guests from one another (for example, a compromised guest cannot harm or access another guest), eliminating risks from co-tenants in virtualized environments.

Microsoft Windows Support

Windows WHQL-certified drivers enable virtualized Windows systems, and allow Microsoft customers to receive technical support for virtualized instances of Windows Server.

ENTERPRISE MANAGEABILITY

Red Hat provides two categories of control for the data center operations. Our Smart Management modules and Satellite servers centralize and automate common management functions so that data centers can scale systems without burdening the staff. Red Hat also packages the platform in system administrator-friendly packages that allow the tailoring of installations to application needs.

Installation, Updates, and Deployment

A collection of powerful system management tools enables system administrators to automate routine tasks of server deployment and day-to-day operations.

RAS (Reliability, Availability, and Serviceability)

Enhanced error reporting speeds triage and resolution of software failures.

Routine Task Delegation

Under administrative control, users can perform specific system operations without requiring administrator privileges, empowering users and saving administrative time.

Printing

Printing changes include improved printing, printer discovery, and printer configuration services. Improved monitoring of ink and toner supply levels and printer status provides efficient inventory management. Automatic discovery of printer information simplifies PPD configuration for postscript printers.

Microsoft Interoperability

Red Hat Enterprise Linux services have access to Microsoft Windows file and print services, and to Microsoft Exchange servers using native protocols.