An Overview of the Red Hat Enterprise Linux version 3 product family

Abstract

This white paper provides information on the family of *Red Hat Enterprise Linux* and *Red Hat Desktop* products. It describes the family's features and benefits and also gives a brief overview of *Red Hat Applications,* a suite of layered products designed for Red Hat Enterprise Linux environments.

Revision 3q – June 2004

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Enterprise Linux product family overview

During 2002 and 2003 Red Hat greatly expanded its range of open source products by releasing a family of Enterprise operating system solutions. Sold under the name Red Hat Enterprise Linux, they provide the industry's premier Linux environment for commercial deployments.

The Enterprise Linux family has been rapidly adopted and supported by a wide range of Independent Software Vendors (ISVs) and Original Equipment Manufacturers (OEMs). It offers excellent performance, proven by numerous audited benchmarks, and a comprehensive array of services delivered by Red Hat and its partners. As a result, Red Hat Enterprise Linux solutions, deployed on certified commodity hardware and running a wide variety of enterprise-caliber applications, are delivering the capabilities of traditional proprietary Unix systems but at significantly lower cost.

The initial release of Red Hat Enterprise Linux family – version 2.1 – is described in earlier white papers (see *An Overview of the Red Hat Enterprise Linux product family* – March 2003). Meanwhile, this paper describes the latest release of the family – version 3 – which was delivered in October 2003.

Red Hat Enterprise Linux products

A major goal for version 3 of the Red Hat Enterprise Linux family was to expand and standardize support for multiple processor architectures. At initial release a total of five distinct architectures were supported in seven variants. These include:

•   Intel x86 compatible (32-bit)
•   Intel Itanium (64-bit)
•   Advanced Micro Devices AMD64 (64-bit) and Intel EM64T
•   IBM PowerPC   (eServer iSeries and eServer pSeries)
•   IBM Mainframe (eSeries zSeries and S/390)

Perhaps the most important feature of Red Hat's multi-architecture development process is that all implementations are built from an identical source code. The primary benefit of this commonality is that all the products are completely compatible, regardless of architecture. This assists ISVs in supporting their applications on multiple architectures and also simplifies system administration and product support.

The individual members of the Enterprise Linux family remains essentially unchanged from version 2.1:

•   Red Hat Enterprise Linux AS
•   Red Hat Enterprise Linux ES
•   Red Hat Enterprise Linux WS

In May 2004 a new member of the Red Hat Enterprise Linux product family was introduced:
• Red Hat Desktop

Red Hat Enterprise Linux features

The Red Hat Enterprise Linux product line, as described above, is created from a common source code pool, and provides a very high degree of standardization across architectures. From a functionality viewpoint the individual products are also quite similar, with differentiation between the products based on just two criteria – whether they are designed for client or server deployment, and the size of the physical hardware on which they are deployed.

An important feature of the family is that it is cleanly subsetted. That is, all the features of a low-end product are also available in a high-end product. Therefore, upgrades from one family member to another to do not result in the loss of features, and server products can be deployed in client environments.

The following sections outline the major features of each Red Hat Enterprise Linux family member.

Red Hat Enterprise Linux AS

Red Hat Enterprise Linux AS (*"advanced server"*) is the top-of-the-line enterprise Linux solution, designed for large departmental and datacenter server deployments. Red Hat Enterprise Linux AS is the only family member that supports IBM iSeries, pSeries and zSeries/S-390 systems. Enterprise Linux AS is available with Standard Edition support; also, it is the only family member that is available with Premium Edition support, which offers 24x7 coverage with a 1 hour response guarantee. When used with Intel x86-compatible systems, Red Hat Enterprise Linux AS is best suited for systems with more than 2CPUs and more than 8GB of main memory.

Typical Red Hat Enterprise Linux AS deployments would be used to support:
• Medium to large-scale databases and database applications
• Web and application servers
• Corporate applications such as CRM, ERP and SCM

(Note that the High Availability Clustering feature included in version 2.1 of Red Hat Enterprise Linux AS is not included in version 3. High Availability Clustering is now available as a separate product. Refer to the Red Hat Application section of this paper for additional information.)

Red Hat Enterprise Linux ES

Red Hat Enterprise Linux ES (*"entry/mid server"*) provides an entry-level and mid-range server operating system for the Intel X86 market. It supports 1-2 CPU systems with up to 8GB of memory and is suitable for a wide range of applications – ranging from the edge-of-network to medium scale departmental deployments. It includes the same capabilities as Red Hat Enterprise Linux AS and is differentiated by its support for smaller systems and lower price. Enterprise Linux ES is available with Basic Edition and Standard Edition support.

Typical Red Hat Enterprise Linux ES deployments are used to support:
• Corporate Web infrastructures
• Edge-of-network applications (DHCP, DNS, firewalls, etc.)
• Mail and File/Print serving
• Small-medium database and departmental applications

Red Hat Enterprise Linux WS

Red Hat Enterprise Linux WS (*"workstation"*) is the high-end desktop/client partner for Red Hat Enterprise Linux AS and Red Hat Enterprise Linux ES. Red Hat Enterprise Linux WS supports 1-2 CPU 32-bit and 64-bit Intel and AMD systems (including Itanium2), and is ideal for all desktop environments. This includes desktop productivity applications (document creation, email, instant messaging, browsing, etc), client-server deployments, software development environments, and targeted ISV client applications (such as Electronic Design Automation, Oil/Gas, and visualization/rendering applications). While Red Hat Enterprise Linux WS is based on the same software core as the server products, it does not include a number of network server applications (such as DNS and DHCP). Therefore it is suitable only for use in client environments. Enterprise Linux WS is available with Basic Edition and Standard Edition support.

HPC with Red Hat Enterprise Linux WS

Red Hat Enterprise Linux WS is usually the most cost effective Enterprise Linux product for use in High Performance Computing (HPC) environments. In these environments it is deployed in a headless workstation mode, without a monitor, keyboard or mouse. A few common HPC-related packages are included in the Enterprise Linux family, such as PVM and LAM.

Red Hat Desktop

Red Hat Desktop is the high-volume desktop/client member of the Red Hat Enterprise Linux family. It supports 32-bit Intel x86 and 64-bit Intel EM64T and AMD64 systems with one CPU and up to 4 GB of main memory. It provides the same software functionality as Red Hat Enterprise Linux WS, but for smaller systems and at a lower price point.

Product Summary

The following table summarizes the features of the Red Hat Enterprise Linux family.

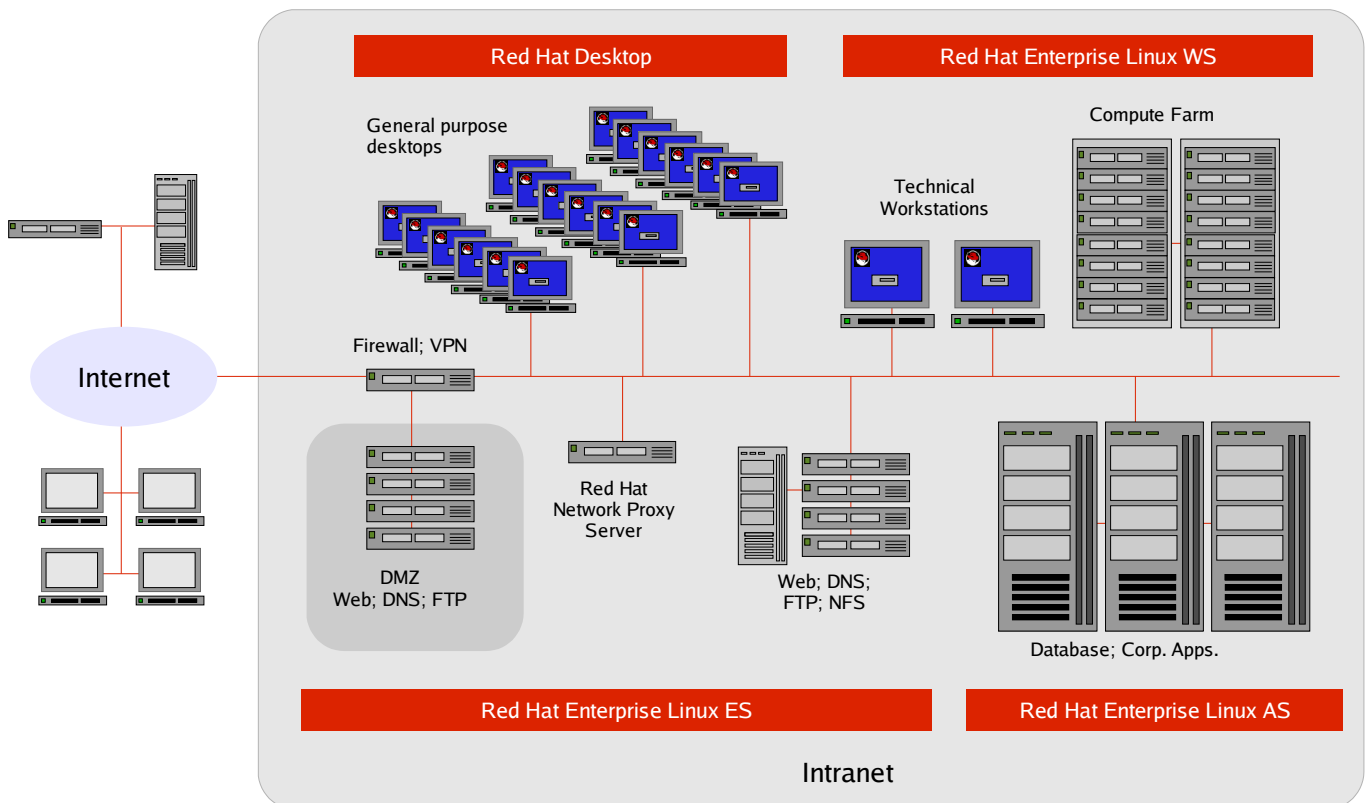| Feature	Red Hat Enterprise Linux AS	Red Hat Enterprise Linux ES	Red Hat Enterprise Linux WS	Red Hat Desktop
Supports X86 systems	Yes	Yes	Yes	Yes
Supports Intel EM64T and AMD64 systems	Yes	No	Yes	Yes
Supports Intel Itanium2 systems	Yes	No	Yes	No
Supports IBM Z, I, & P series systems	Yes	No	No	No
Supports systems with >1 CPUs[1]	Yes	Yes	Yes	No
Supports systems with >2 CPUs	Yes	No	No	No
Supports >4GB of memory	Yes	Yes	Yes	No
Supports >8GB of memory (X86)	Yes	No	Yes	No
Subscription to Red Hat Network	1 year	1 year	1 year	1 year
12x5 services available	Yes	Yes	Yes	N/A[2]
24x7 services available	Yes	No	No	N/A
Includes desktop applications	Yes	Yes	Yes	Yes
Includes network server applications (for example: dhcp, dns)	Yes	Yes	No	No
Supported by leading ISV applications	Yes	Yes	Yes	Yes

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1 A CPU chip containing multiple hyper-threaded processing elements is counted as a single CPU.
2 Red Hat Desktop is only sold in multi-unit packs bundled with Red Hat Network Proxy or Satellite Server. It provides 1 year of Help Desk Escalation Support

Example Configuration

The figure below shows a typical commercial Intranet deployment, with many small/medium servers, several high-end servers, and a modern High Performance Computing (HPC) compute farm.

The graphic demonstrates how Red Hat Enterprise Linux family products can be deployed across a corporate IT infrastructure. Red Hat Enterprise Linux ES proves ideal for providing network services such as web servers, mail servers, file/print servers and background network management services such as DHCP and DNS. Meanwhile Red Hat Enterprise Linux AS is used to host large-scale server applications and corporate databases. Red Hat Enterprise Linux WS is used for technical or development workstation deployments and also proves ideal for an HPC compute farm for services such as data-mining or financial modeling. Lastly, Red Hat Desktop meets the needs of the general purpose desktop user. Note that the entire environment can be provisioned, updated and managed using the Red Hat Network Proxy Server that is included in the configuration.

Technical Features

A primary feature of Red Hat Enterprise Linux products is that they include technologies and features that provide a premier enterprise-quality computing environment. Features are selected on the basis of their appropriateness for commercial deployment (such as support for large SMP systems) and must also exhibit a high degree of reliability. This is significantly different from most Linux distributions, where the focus is usually on providing the latest features as soon as possible (often at the expense of stability) and concentrating on serving low-end markets.

Red Hat Enterprise Linux version 3 was produced in close collaboration with Red Hat's major customers and ISV/OEM partners to ensure it provided the features they required. Development occurred over an 18 month period, with almost six months dedicated to beta testing. The release includes more than 100 major new features and approximately 350 minor new features. The following list outlines a few of the more important features:

- The kernel for Red Hat Enterprise Linux version 3 is based on the 2.4.21 Linux kernel. However, it also includes numerous features that have been back-ported from the Linux 2.6 kernel. These include the Native Posix Threading Library and a number performance-related features.
- Support for larger server systems has been included. For x86 SMP systems, up to 16 logical CPUs (8 hyperthreaded CPU pairs) are supported and up to 64GB of main memory. SCSI and Fibre Channel I/O subsystems can be approximately double the size, with up to 256 devices. Support for new storage buses, such as Serial ATA (SATA), is also provided.
- An important feature of the Enterprise Linux 3 family is that it provides forward compatibility for existing Enterprise Linux 2.1 systems. Compatibility libraries for version 2.1 are included, so that it is possible to run version 2.1 applications without the need for a rebuild. Of course, rebuilding an application will usually result in slightly higher performance as it will benefit from improvements in the compiler. Note that some multi-threaded applications may need modification prior to running correctly with the new Native Posix Threading Library in Red Hat Enterprise Linux 3. The legacy LinuxThreads implementation is available for applications if these changes cannot be made.
- All Red Hat Enterprise Linux products include Red Hat's Bluecurve desktop environment, which has been available for the past year in Red Hat's open source community-based products. Bluecurve provides the industry's most highly regarded Linux desktop GUI – a combination of the best features of GNOME and KDE - with a highly consistent and attractive interface. Also included is a full suite of office productivity applications, such as OpenOffice.org desktop productivity suite, Ximian's Evolution as a leadership mail client and several state-of-the-art web browsers, such as Mozilla. Red Hat Enterprise Linux version 3 not only provides an exceptional server

environment, it provides a highly competitive desktop.

- Of the many new technologies included in Red Hat Enterprise Linux perhaps the most exciting is the enhanced handling of user process and kernel virtual address space in Intel x86-compatible systems. Traditionally, 32-bit x86 systems had a fixed 4GB virtual address space, which was allocated such that the kernel had 1GB and each user process 3GB (referred to as the 3-1 split). This allocation has been in use for many years, but has become restrictive as physical memory sizes have grown. With Red Hat Enterprise Linux version 3 it is possible to configure a 4-4 split, where each user process and the kernel are allocated 4GB of virtual address space. There are two important benefits to this new feature:
  - The larger kernel virtual address space allows the system to manage more physical memory – up to 64GB of main memory is supported by Enterprise Linux 3 on x86-compatible systems.
  - The larger user virtual address space allows applications to use approximately 30% more memory (3.7GB), improving performance for applications that take advantage of the feature.

  This feature is unique to Red Hat Enterprise Linux and means that x86-compatible systems can be expected to have a longer life-span and better performance.
- Red Hat works closely with many industry standards groups to ensure the widest possible standards support. Red Hat Enterprise Linux 2.1 has been COE (Common Operating Environment) certified by DISA (U.S. Defense Information Systems Agency). Red Hat Enterprise Linux 3 is NIAP/CC EAL 2 (National Information Assurance Partnership; Common Criteria; Evaluation Assurance Level) certified. EAL 3+ and COE certifications are in process at the time of writing and expected to be complete by July 2004. These security evaluations are recognized internationally, and reflect the maturity and quality of the Red Hat Enterprise Linux product family. Furthermore, to ensure easy migration of applications across Linux environments, Enterprise Linux 3 is Linux Standard Base Runtime Environment 1.3 compliant. Refer to http://www.linuxbase.org for information on the LSB specification.
- The new release includes a large selection of security features. These include ACL (Access Control List) support for ext2/3 file systems, which enables fine-grain access control to any file system object. This feature is also supported on NFS-mounted file systems. Additionally, kernel-level IPsec support (which uses a kernel-level cryptography capability) has been included.
- Another major new feature included in Enterprise Linux 3 is the Native POSIX Threading Library. This feature, designed and implemented by Red Hat, provides excellent performance for multi-threaded applications (for example, Java applications). Offering performance several orders of magnitude greater than previous Linux multi-threading mechanisms, this feature enables Red Hat Enterprise Linux to compete directly with proprietary Unix systems in deployments where multi-threaded applications are used.
- Red Hat Enterprise Linux 3 includes GCC3.2, the latest stable development

environment for application developers. GCC 3.2 provides many new features, including full support for ANSI C++, more complete ISO C99 support, and multiple architectural support enhancements, such as an improved Itanium instruction scheduler and support for Pentium IV instruction pipelining.

- To improve support for large storage subsystems, Red Hat Enterprise Linux includes an LVM (Logical Volume Manager). This technology permits multiple storage devices to be combined and controlled with maximum flexibility. Storage allocation can be managed to meet application needs rather than being reliant on the underlying physical storage, and operations such as dynamically increasing the size of a file system are supported.

- Another useful new feature provided with Enterprise Linux 3 is support for diskless systems. Such systems are booted across the network and access their primary disk storage remotely. Red Hat Enterprise Linux version 3 provides a GUI-based utility that administrators can use to create a script-based infrastructure for hosting multiple diskless systems. The design minimizes disk space usage and allows the diskless systems to be centrally managed. Typically, a large Enterprise Linux AS system will set aside a disk that it uses to host an Enterprise Linux ES system image. Each diskless client will boot across the network, accessing the Enterprise Linux ES image being served by the Enterprise Linux AS host. Multiple clients can share the Enterprise Linux ES image because their node-dependent files are maintained separately by the Enterprise Linux AS server. This feature can also be used with Enterprise Linux WS in thin-client and HPC environments.

- With the availability of Update 2, in May 2004, several third party applications have been included in Red Hat Enterprise Linux products that simplify the deployment of client systems. These include Adobe Acrobat Reader, Macromedia Flash Player, Real Player, etc.

This brief list of features provides an overview of the breadth and scale of Enterprise Linux improvements. Focusing on performance, scalability, availability, application development and standards support, Red Hat Enterprise Linux version 3 provides the world's leading enterprise-strength Linux computing environment.

Support Services

Red Hat Enterprise Linux and Red Hat Desktop solutions are sold by Red Hat and its partners as complete packages that include the physical product and a maintenance/support package that can be selected by the customer. Various levels of maintenance and support are available, as shown in the table below.

Support Type	Offering	Coverage	Red Hat Enterprise Linux AS/ES/WS
Basic	• Red Hat Network • Software Support	• 1 year • 30 days; Mon-Fri 9-9 ET North America (Mon-Fri 9-5 Rest of world); One business day response	ES & WS only
Standard	• Red Hat Network • Software support	• 1 year • 1 year; Mon-Fri 9-9 ET North America (Mon-Fri 9-5 Rest of world); 4 hour response	AS, ES, & WS
Premium	• Red Hat Network • Software support	• 1 year • 1 year; 24x7; 1 hour response	AS only

Note that maintenance is delivered using Red Hat Network, which provides Internet-based access to updates, upgrades, patches and errata released by Red Hat. Also, Red Hat Desktop is sold as a bundled solution with Red Hat Network Proxy Server and includes a year of Help Desk Escalation Support.

Additionally, a comprehensive selection of Professional and Consulting Services is available from Red Hat and its partners. These services are designed to help customers design, configure, deploy, and manage Red Hat Enterprise Linux systems. Migration services from proprietary Unix and Windows systems are also available, as are custom engineering and application development services.

Application Availability

As described earlier, Red Hat Enterprise Linux has been rapidly adopted by leading ISVs. The following is a selection of ISVs providing supported applications today, or are actively porting their applications.

A brief summary of applications supported includes:
- *Oracle*
    - 9*i,* 9iRAC, 9*i* Application Server, 8*i,* 11*i* eBusiness Suite, Oracle Collaboration Suite
- *Veritas*
    - Foundation Suite, VCS, NetBackup Business Server and Datacenter
- *BEA*
    - WebLogic Server 7.0, WebLogic Jrockit
- *IBM*
    - WebSphere v5, DB2 v8.1, various Tivoli products, Directory Server 5.1
- *Reuters*
    - Reuters Market Data System
- Plus key products from:
    - *BMC, CA, EMC, Legato, Rogue Wave* and many others

See redhat.com for a complete list of certified applications:
http://www.redhat.com//solutions/migration/applist.html.

A critical feature of the Red Hat Enterprise Linux family is that ISVs only need to certify their applications once. Because all family members share a common core (e.g. kernel, development tool-chain, & libraries) their application environments are identical. This means application certification on a single family member accrues to all members (note, however, that individual ISVs may choose to not support their applications on specific Enterprise Linux products – for example, it is usually impractical to support a large server application on a

small client system).

Benchmarks

For many IT organizations the availability of Industry-standard, audited benchmarks is an important component in the purchase decision process. Red Hat Enterprise Linux has achieved world record results for TPC-C using Oracle 9*i* RAC and ECperf using Oracle 9*i* AS. These benchmark results are documented at their associated web sites and in other Red Hat white papers.

In September 2003, Hewlett Packard announced a world record 4-processor TPC-C benchmark achieved with Red Hat Enterprise Linux AS, version 3, and Oracle 10g Standard Edition Database running on a single 96GB, HP rx5670 Itanium system. The database was deployed on 356 disk drives that provided 6.8TB of storage. The TPC/C results were 136,110 tpmC @ $3.94/tpmC. For the application server tier, 10 x HP DL360G3 systems (each dual CPU, with 4GB main memory) running BEA Tuxedo 8.1 were used.

Two other benchmarks were run on the same machine and make an interesting comparison. The first was with Windows/SQL Server, achieving 121,065 tpmC at $4.79, the other with HP UX/Oracle, achieving 131,639 at $7.25. Note that the Red Hat Enterprise Linux 3 result is better than both of these in terms of performance and price/performance. At the time of publishing this was the best 4 processor performance number and it also beat several published 8 processor results.

In December 2003, Red Hat, Oracle and HP announced the overall performance world record result for TPC/C, based on a 16 node HP Integrity cluster running Oracle 10G RAC with Red Hat Enterprise Linux 3 AS. This benchmark was only the second to achieve in excess of 1,000,000tpmC, beating the previous record holder by 17%. It used a database of approximately 90 Terabytes, deployed on a storage subsystem that included over 2000 disks. The result was approximately 50% faster that the fastest Microsoft Windows results, and 98% faster than the fastest Sun Solaris result. The benchmark also produced the lowest $/tpmC cost of the top 10 performance-related results.

Additional benchmarks are regularly being performed with Red Hat Enterprise Linux 3. Please refer to www.redhat.com/software/rhel/benchmarks for the latest benchmark result information.

Red Hat Applications

With Red Hat Enterprise Linux established as the leading Linux operating system for the commercial environment, Red Hat is working to take the benefits of open source software further up the software solution stack – to the middleware and application layers. Red Hat's strategy is to provide a set of optional layered products that can be used to enhance the standard Red Hat Enterprise Linux system. The following products, offered with full maintenance and support services, are available today, and Red Hat plans to deliver additional products during 2004.

Red Hat Global File System

Red Hat Global File System (GFS) is an open source, POSIX-compliant cluster file system and volume manager that executes on Red Hat Enterprise Linux servers attached to a storage area network (SAN). It works on all major server and storage platforms supported by Red Hat. The leading (and first) cluster file system for Linux, Red Hat GFS has the most complete feature set, widest industry adoption, broadest application support, and best price/ performance of any Linux cluster file system today.

Red Hat GFS allows Red Hat Enterprise Linux servers to simultaneously read and write to a single shared file system on the SAN, achieving high performance and reducing the complexity and overhead of managing redundant data copies. Red Hat GFS has no single point of failure, is incrementally scalable from one to hundreds of Red Hat Enterprise Linux servers, and works with all standard Linux applications.

Red Hat GFS is tightly integrated with Red Hat Enterprise Linux and distributed through Red Hat Network. This simplifies software installation, updates, and management. Applications such as Oracle 9i RAC, and workloads in cluster computing, file, web, and email serving can become easier to manage and achieve higher throughput and availability with Red Hat GFS.

Red Hat Cluster Suite

Red Hat Cluster Suite allows between 2 and 8 server systems to be clustered in a high availability configuration. High availability clustering (sometimes referred to as "failover clustering") is a technology widely used in commercial operating system environments; it allows standard applications to be available almost continuously, with automatic recovery from hardware failures and shutdowns.
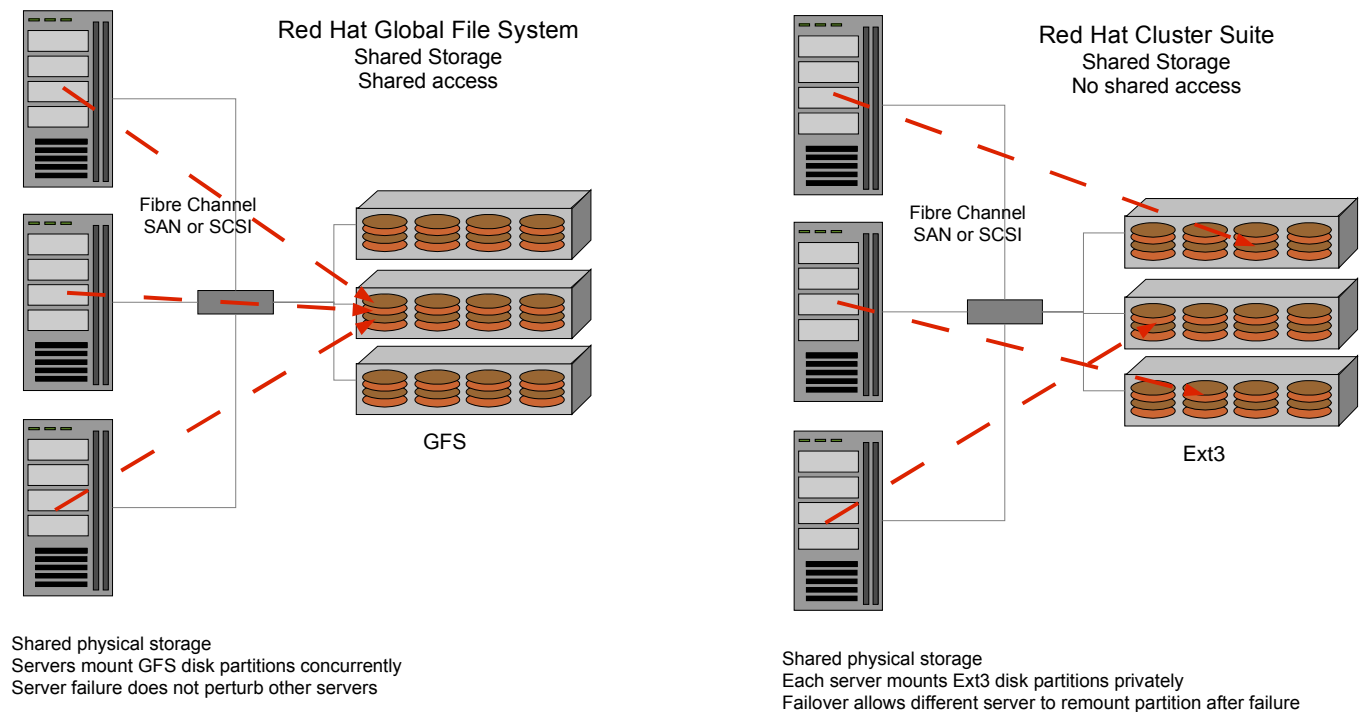
Red Hat Cluster Suite is described in detail in a separate white paper "An Overview of Red Hat Cluster Suite". Please refer to that paper for additional information.

Comparing Red Hat Global File System and Red Hat Cluster Suite

The crucial difference between Red Hat Cluster Suite and Red Hat Global File System relates to their data access capabilities. Cluster Suite configurations permit a single node to access a given disk partition at a time. GFS configurations permit multiple nodes to concurrently access the same disk partition, and files on the partition. Cluster Suite provides high availability by failing over applications between nodes. GFS provides high availability and scalable performance by allowing distributed applications to execute in parallel on multiple nodes. Cluster Suite failover capabilities are also included in GFS, ensuring high availability for applications that do not support parallel operation.

Red Hat Global File System and Red Hat Cluster Suite can be deployed on Red Hat Enterprise Linux AS or ES systems, using Intel x86/Itanium2/EM64T and AMD AMD64 systems.

The figures below show the storage access provided by the two products. It can be seen that Red Hat Cluster Suite provides a simple, low-cost, high availability capability, while Red Hat Global File System provides a sophisticated data sharing capability that can be scaled across multiple nodes, each adding to overall application throughput.

Red Hat Global File System
Shared Storage
Shared access

Fibre Channel
SAN or SCSI

GFS

Red Hat Cluster Suite
Shared Storage
No shared access

Fibre Channel
SAN or SCSI

Ext3

Shared physical storage
Servers mount GFS disk partitions concurrently
Server failure does not perturb other servers

Shared physical storage
Each server mounts Ext3 disk partitions privately
Failover allows different server to remount partition after failure

Note that high availability clustering should not be confused with High Performance Computing (HPC). HPC is primarily used in technical environments

and is not appropriate for most commercial applications. For HPC configurations Red Hat recommends using Red Hat Enterprise Linux WS as a compute platform on which to build an HPC solution.

Red Hat Developer Suite

Red Hat Developer Suite is a fully featured Integrated Development Environment (IDE) for application developers based on the open source Eclipse project. Eclipse provides an environment for developers to efficiently create a wide variety of applications in a rapidly growing set of languages, including support for C/C++ and Java application development.

Eclipse supports a wide range of operating systems beyond Red Hat Enterprise Linux, including Windows XP, Windows 2000, Windows 98, Windows ME and Sun Solaris 8. This simplifies migration of developer skills and applications from these platforms to Red Hat Enterprise Linux.

Eclipse also supports a plug-in capability that allows language- and environment-specific extensions. The initial release of Red Hat Developer Suite includes plugins for C/C++, Java, RPM and profiling; additional plugins will be provided as they become available. For detailed information on Eclipse refer to the project website at http://www.eclipse.org.

Red Hat Content Management System

Red Hat Content Management System (CMS) is a complete workflow-based engine to manage content creation and delivery for an intranet, extranet or Internet site. With CMS, an unlimited number of people can easily create content for a website, have the content approved by an editor and published live on the website. CMS also has built-in support for templating, content lifecycle management, permissioning, versioning, categorization and user-defined content types. It is the most fully supported and full featured open source CMS available.

Red Hat Portal Server

Red Hat Portal Server is a framework to aggregate local and remote content along with applications into an easy-to-configure web interface. Portlets can be created from ready-made or custom templates. Templates are also personalizable – to reflect the look and feel desired by the enterprise, a specific department or the end user. Portal Server allows your department, community or entire organization to easily access information and communicate more effectively.

Red Hat Web Application Framework

Our suite of content and portal solutions are built on top of the Red Hat Web Application Framework (WAF). This open architecture utilizes standards and technologies familiar to J2EE developers and a best-of-breed approach to

continually evaluate and adopt new standards. WAF reduces the resources required to develop and maintain data-oriented web applications as well as the risk associated with being locked-in to one static architecture.

Red Hat WAF, CMS and Portal Server run on any J2EE servlet container as well as both Oracle and PostgreSQL databases. We optimize to run on Red Hat Enterprise Linux, but also deploy on Unix and Windows environments. Our wide range of interoperable layers always provides both an open source and proprietary option. This allows you to determine the best combination for each of your deployments.

Go to www.redhat.com/software to learn more about the growing family of Red Hat Applications.

Summary

Red Hat Enterprise Linux provides a high-quality operating system solution for the full range of commercial IT environments - from the desktop to the datacenter. It delivers excellent performance, and has enthusiastically adopted by the OEM and ISV community. It is available in certified hardware configurations with extensive commercial application support.

Enterprise Linux products are delivered with comprehensive Red Hat services, and Red Hat has partnered with ISVs and OEMs to deliver complete service solutions. For example, Oracle provides single-point-of-contact support for Red Hat Enterprise Linux. And Red Hat offers professional services to assist customers design, configure, deploy and manage Red Hat Enterprise Linux solutions.

With Red Hat Enterprise Linux and Red Hat Desktop, customers benefit from capabilities, performance, applications and services previously available only with proprietary solutions – along with all of the cost advantages of Linux.