

# Red Hat Enterprise Linux

## A Feature /Function/Benefit Analysis

### Red Hat Enterprise Linux Feature-Function-Benefit Summary

The following table is a brief summary from the two tables that form the main part of this analysis.

| <i>Feature</i>               | <i>Function</i>   | <i>Benefit</i>   |
|------------------------------|---|--|
| Support for 7 architectures  | Supports Intel x86, Itanium2, EM64T; AMD64; IBM z, i, p, S/390 architectures                    | Common application platform for customers and ISVs; improved quality                     |
| Red Hat Applications         | Optional layered products enhance the capabilities of the base system                           | High availability systems; IDE-based development; data management services               |
| OEM/ISV certifications       | Extensive application/hardware support by leading ISVs/OEMs                                     | Ability to deploy major commercial applications on certified hardware                    |
| Maintenance and services     | Red Hat and its partners offer a wide range of Enterprise Linux services                        | Elimination of deployment risk--Enterprise Linux is the safest choice for the enterprise |
| Performance                  | Red Hat Enterprise Linux has achieved world record performance in industry benchmarks           | Proven performance; Enterprise Linux delivers unbeatable price/performance and TCO       |
| 4-4 Memory Split             | Increased Kernel and User address space for x86 systems   | Support for very large physical memory. Support for larger user applications             |
| Native Posix Thread Library  | High-performance multi-threading capability   | Improved performance for multi-threaded applications (for example, Java)                 |
| Based on Linux 2.4.21 kernel | Latest stable kernel with numerous additions from the Linux 2.6 kernel                          | Enterprise stability combined with the latest technical features                         |
| Improved scalability         | Support for larger systems – SMP, memory and I/O  | Ability to support high-end server and storage hardware                                  |
| Forward compatibility        | Red Hat Enterprise Linux v.2.1 compatibility libraries included with system                     | Ability to run Red Hat Enterprise Linux v.2.1 applications easily                        |
| Standards support            | Red Hat Enterprise Linux v.3 is LSB 1.3 and NIAP CC EAL2 compliant                              | Meets international industry standards, minimizing deployment risk                       |
| Improved desktop             | Includes BlueCurve, personal productivity applications, and integrated third party applications | Suitable for general desktop and technical workstation environments                      |
| Enhanced security            | Support for file system ACLs and kernel-level IPsec cryptography                                | Ability to ensure that user/application files and network communications are secure      |
| Improved compiler/tools      | GCC 3.2 and debugging/profiling tools included  | Compiler is ANSI C++ compliant and generates high performance code                       |
| Logical volume manager       | Combine, partition and manage complex storage systems easily                                    | Enterprise-capable storage management  |
| Diskless system support      | Allows Red Hat Enterprise Linux server to host Enterprise Linux for multiple diskless clients   | Improved client manageability/security Reduced hardware/management costs                 |
| Enhanced Java support        | Multiple Java implementations are available (gcj, BEA, IBM, Sun)                                | Expanded choice for Java environments, including open source and proprietary             |
| Enhanced networking          | New features include Kernel IPsec, channel bonding and NFS improvements                         | Improved LAN, VPN, and NFS file serving stability and performance                        |

## Red Hat Enterprise Linux Product Family Feature-Function-Benefit analysis

The following table provides a Feature-Function-Benefit analysis of the Red Hat Enterprise Linux product family.

| <b>Feature</b>                       | <b>Function</b>  | <b>Benefit</b>  |
|--------------------------------------|--|---|
| Multiple system architecture support | Red Hat Enterprise Linux v.3 supports 7 system architectures: Intel x86, Itanium2, EM64T; AMD64; IBM zSeries, iSeries, pSeries, S/390. A common source code base is used for all architectures.  | Ability to deploy a common enterprise-strength Linux environment across a wide range of hardware. The common S/W platform and APIs make it easier for ISVs to port/support and deliver their applications to a wider range of customers. It also ensures that there is no feature skew between architectures, further improving stability and quality |
| Optional <i>Red Hat Applications</i> | Red Hat Enterprise Linux v.3 supports a growing family of optional layered products that can be used to enhance the base operating system. These include <i>Red Hat Global File System, Red Hat Cluster Suite, Red Hat Developer Suite, Red Hat Portal Server</i> and <i>Red Hat Content Management System</i> . Other products are under active development | Customers can enhance their systems to provide features such as high availability clustering, a sophisticated IDE (integrated development environment) for application developers, and extensive data management services   |
| Two servers, two desktops            | Red Hat Enterprise Linux v.3 family products – AS, ES and WS, and Red Hat Desktop, are designed to support systems from the high-end server, through the entry/mid-range and HPC server, to the desktop, with features and services that meet the needs of these environments  | Red Hat Enterprise Linux & Red Hat Desktop can be deployed across the complete IT infrastructure: desktop, department, compute farm and datacenter (including mainframes). Commonality leads to improved IT department efficiency and reduced costs   |
| Application support                  | Red Hat Enterprise Linux and Red Hat Desktop have been certified by all leading Independent Software Vendors (ISVs)  | The applications that enterprise and commercial customers need to run their business are available  |
| Hardware certification               | Red Hat Enterprise Linux and Red Hat Desktop have been certified on hardware from leading systems vendors  | Customers can deploy on desktop, server and storage hardware secure in the knowledge that it will work correctly and is supported   |
| Extensive services                   | Red Hat Enterprise Linux and Red Hat Desktop are provided with a selection of maintenance and support services, up to 24x7 with 1 hour response, unlimited incidents, for 5 years. Services are available from Red Hat and its partners  | Elimination of deployment risk, today and in the future. Red Hat and its partners deliver services world wide to ensure that customer deployments are successful  |
| Proven performance                   | Red Hat Enterprise Linux has completed numerous audited industry benchmarks achieving excellent results – including two world records (TPC-C with Oracle 9i RAC and Ecpertf with Oracle 9iAS)  | Customers deploying Red Hat Enterprise Linux can be assured of excellent performance, using commodity industry hardware and leading ISV applications. Result: unbeatable price/performance and TCO  |
| System management                    | <i>Red Hat Network</i> provides the system maintenance and monitoring capabilities required by enterprise systems. Features include automated notifications and updates and the ability to monitor correct system and application operation.   | Reduced system administration costs; improved system security through audited and automated updates. Simplified system and application management   |

## Red Hat Enterprise Linux v.3 Technical capabilities Feature-Function-Benefit analysis

The following table provides a Feature-Function-Benefit analysis of the new technical capabilities provided in Red Hat Enterprise Linux v.3.

| <i>Feature</i>   | <i>Function</i>  | <i>Benefit</i>  |
|--|--|---|
| 4-4 Memory Split (x86-only feature)  | <ul style="list-style-type: none"> <li>Increases the size of the kernel virtual address space from 1GB to 4 GB.</li> <li>Increases the size of the per-process virtual address space from 3GB to almost 4GB (3.7GB)</li> </ul>   | <ul style="list-style-type: none"> <li>The enlarged kernel virtual address space allows support for much larger physical memories (up to 64GB).</li> <li>The enlarged per-process virtual address space allows user applications to be almost 30% larger, enabling higher performance for applications that take advantage of the increase</li> </ul> |
| Native Posix Thread Library (NPTL)   | A Red Hat designed kernel-level multi-threading capability that is fully Posix compliant. Very high performance. The first practical multi-threading implementation for Linux.   | Greatly expands the reach of Linux into the Enterprise by enabling high-end multi-threaded applications, previously restricted to proprietary Unix environments, to migrate to Linux. Especially valuable for Java applications, which are often heavily multi-threaded. Major enterprise application enabler.  |
| Linux 2.4.21 kernel with numerous features from the Linux 2.6 kernel                   | Enterprise Linux v.3 uses the latest commercially stable Linux kernel. It also includes significant enterprise features from later development kernels that have been backported and hardened for commercial use.  | Customers benefit from the latest stable Linux core combined with the latest technologies, integrated into a complete and stable package. Result: stability without sacrificing performance and technology  |
| Significant enhancements in SMP, memory and I/O scalability                            | <ul style="list-style-type: none"> <li>Enhanced process scheduler supports up to 16 logical CPUs (or 8 hyperthreaded CPU pairs) and includes hyperthreading optimizations. This is double the number supported by Enterprise Linux v.2.1.</li> <li>Memory management features include the 4-4 split (see above), Huge-TLBFS (Translation Buffer file system), and Reverse Virtual Memory Mapping.</li> <li>I/O features include support for larger I/O subsystems (up to 256 devices, double the Red Hat Enterprise Linux v.2.1 limit), and support for 64-bit DMA.</li> </ul> | Enterprise Linux v.3 systems can scale successfully on much larger server systems than Red Hat Enterprise Linux v.2.1 with more CPUs, more memory, and larger SCSI and Fibre Channel I/O subsystems. Put simply, Enterprise Linux v.3 supports servers that are approximately twice the size supported by Red Hat Enterprise Linux v.2.1.             |
| Red Hat Enterprise Linux v.2.1 forward compatibility with Red Hat Enterprise Linux v.3 | Red Hat Enterprise Linux v.2.1 compatibility libraries are provided with Red Hat Enterprise Linux v.3. (Some multi-threaded applications may need modification to take advantage of the new Native Posix Thread Library.)  | Red Hat Enterprise Linux v.2.1 applications can run on Red Hat Enterprise Linux v.3 systems without needing to be rebuilt. This results in easy, pain-free upgrades.  |

| <b>Feature</b>                        | <b>Function</b>  | <b>Benefit</b>  |
|---------------------------------------|--|---|
| Enhanced standards support            | <ul style="list-style-type: none"> <li>Red Hat Enterprise Linux v.3 is LSB (Linux Standards Base) 1.3 certified.</li> <li>Red Hat Enterprise Linux v.3 is NIAP Common Criteria (EAL level 2) certified.</li> </ul>   | <ul style="list-style-type: none"> <li>LSB 1.3 support allows application providers to code their applications to the accepted Linux API standard. They can be confident that their application will run on all LSB-compliant Linux products.</li> <li>Third-party validation of Red Hat Enterprise Linux v.3 security capabilities to an accepted international standard. Confirmation of the quality of Red Hat's development processes. Specified by the US Department of Defense as part of its procurement process – providing other customers with a clear indication of the maturity, quality and stability of Red Hat Enterprise Linux</li> <li>Customers can also be confident that Red Hat is not attempting to fork the Linux codebase to lock them into a Red Hat-specific solution.</li> </ul> |
| Greatly improved desktop capabilities | <p>Red Hat Enterprise Linux v.3 includes many new desktop features. These include:</p> <ul style="list-style-type: none"> <li>BlueCurve GUI (graphical user interface), a widely praised GUI, first delivered in Red Hat Linux 8, which combines the best elements of Gnome and KDE.</li> <li>Personal productivity applications such as: <ul style="list-style-type: none"> <li>Document preparation: OpenOffice.org</li> <li>Fully featured email client: Ximian Evolution</li> <li>Numerous web browsers, including Mozilla</li> <li>Many miscellaneous desktop applications (e.g. CD writer, graphics editors)</li> </ul> </li> <li>Ability to perform all standard system administration functions with consistent graphical tools (e.g. network and printer management, user account management).</li> <li>With the availability of Update 2, in May 2004, numerous third party applications – such as Adobe Acrobat and RealPlayer – are integrated into the desktop environment</li> </ul> | <p>Red Hat Enterprise Linux WS and Red Hat Desktop are ideally suited for desktop and workstation environments. Beautiful to look at, easy to use, and with all the tools a desktop user needs. The Evolution mail client provides the look and feel of Microsoft Outlook, and the OpenOffice.org document preparation suite can read, modify and create Microsoft-compatible file formats, greatly simplifying migration from a Microsoft desktop environment.</p> <p>The desktop environment provided with Red Hat Enterprise Linux WS and Red Hat Desktop is also included in the server-focused products, Red Hat Enterprise Linux AS and ES.</p>   |

| <b>Feature</b>              | <b>Function</b>  | <b>Benefit</b>  |
|-----------------------------|--|---|
| Enhanced security features  | <p>Red Hat Enterprise Linux v.3 has numerous new security features. These include:</p> <ul style="list-style-type: none"> <li>• Support for file system ACLs (Access Control Lists), allowing much finer access control to all files and devices</li> <li>• IPsec uses kernel-level cryptography to optimize communications</li> <li>• Stronghold, previously a separate layered product for Red Hat Enterprise Linux v.2.1, is now integrated into all Red Hat Enterprise Linux v.3 products. So Stronghold high security web-server features are available to all Red Hat Enterprise Linux v.3 customers at no additional charge.</li> </ul> | <p>Red Hat Enterprise Linux v.3 further improves on the security features provided by Red Hat Enterprise Linux v.2.1. ACLs are possibly the most important feature, allowing applications and their data files to be fully locked-down and immune to malicious or inadvertent damage.</p>   |
| Improved compiler toolchain | <p>Red Hat Enterprise Linux v.3 provides a GCC 3.2-based toolchain, and several application development tools (such as Oprofile and mudflap). The new compiler, which is fully ANSI C++ compliant, delivers many new code generation improvements. The development tools simplify debugging and performance tuning of new applications.</p>  | <p>The latest toolchain has been eagerly awaited by the application developer community. Applications built with the new tools will usually perform better (due to compiler code generation optimizations) and be easier to debug. Faster applications; reduced development times.</p>  |
| Logical volume manager      | <p>Red Hat Enterprise Linux v.3 includes the LVM1 contributed to the open source community by Sistina. An LVM allows disk storage to be coalesced into single pool and then partitioned according to application requirements. Other storage management capabilities include the ability to dynamically expand logical volumes. (Ext2/3 files systems can be expanded when unmounted.)</p>   | <p>Storage management is a vital component of any enterprise deployment, and now sophisticated storage management comes to Red Hat Enterprise Linux v.3. Previously customers needed to purchase high-priced commercial LVM products. LVM further establishes as a high-end enterprise solution.</p>  |
| Diskless system support     | <p>Red Hat Enterprise Linux v.3 provides the tools to deploy configurations with diskless systems. An standard server system can be configured as a host for diskless clients. The clients boot and access all operating system files across the network.</p>  | <p>Diskless systems offer several benefits, including:</p> <ul style="list-style-type: none"> <li>• The ability to deploy lower cost servers that consume less power and generate less heat. This can be a critical factor for large configurations.</li> <li>• Simplified system management – multiple clients can boot from a single, hosted image which is managed and updated as a single system.</li> <li>• Improved security – clients do not need to contain any data. This is useful for client systems located in high risk areas, and also useful for ensuring that valuable data is centrally controlled.</li> </ul> |
| Enhanced Java support       | <p>BEA and IBM Java implementations are available for Red Hat Enterprise Linux v.3 (on an individual architecture basis). The open source gcj Java compiler environment is provided as part of the base product.</p>   | <p>Updated Java, in combination with NPTL, provides support for the latest Java features and greatly improved performance. This is another vital step for in the enterprise.</p>  |

| <b>Feature</b>                       | <b>Function</b>  | <b>Benefit</b>   |
|--------------------------------------|--|--|
| New and enhanced networking features | <p>Many networking enhancements are included in Red Hat Enterprise Linux v.3. These include:</p> <ul style="list-style-type: none"><li>• Channel bonding improvements (a feature that provides aggregated performance for systems configured with multiple network adapters).</li><li>• A kernel level IPsec implementation improves the performance of Linux-to-Linux VPN network infrastructures</li><li>• Significant NFS stability improvements and improved client-side directory caching performance</li></ul> | All these features deliver improved networking performance. NFS improvements have been widely requested by customers, so this is a very important feature. |

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