

MIGRATION BEST PRACTICES FOR RED HAT ENTERPRISE LINUX

Benefits of migrating to the latest release of Red Hat Enterprise Linux include:

- Updated security
- Certification on the latest platforms and devices
- Up-to-date communication methodologies
- Performance enhancements

INTRODUCTION

IT administrators and managers are all too familiar with the saying, “If it ain’t broke, don’t fix it.” It’s an expression often used with respect to the practice of leaving complex hardware and software configurations alone—especially when systems are currently working well and delivering application services as intended. While this hands-off attitude might be acceptable in certain isolated instances, it is a dangerous long-term practice when it comes to managing the complete life cycle of datacenter IT systems. Waiting until there’s a service interruption or an outage is a sub-optimal approach. Instead, consistently maintaining your IT portfolio and proactively evolving over time is a forward-thinking strategy that can contribute to an organization’s competitive edge while promoting the continuity of business services.

When it comes to managing the life cycle of Red Hat® Enterprise Linux® systems, being proactive means keeping up with technology advances and taking advantage of new releases as they become available.

The advantage of the Red Hat Enterprise Linux subscription model is that it allows you to move to new releases at your own pace, based on a schedule that fits your timeline and IT and business objectives. As you migrate to the latest versions of Red Hat software, the cost of your basic subscription doesn’t change, so you can use the latest innovations, feature enhancements, and production-level support advantages while reducing risk and staying ahead of the technology curve. In addition, moving to the latest Red Hat Enterprise Linux release brings about new opportunities for cost savings through server consolidation and virtualization. Taking a proactive stance toward managing the life cycle of Red Hat Enterprise Linux systems helps to mitigate risk in your IT environment while making the most of your IT investments.

MITIGATING RISK IN THE I.T. LIFE CYCLE

The life cycle of a server platform begins with its initial configuration and installation. The server is set up; configured with required components and devices; and installed with the Red Hat Enterprise Linux operating system, any required non-native device drivers, and the software stack necessary to deploy application services. After performing quality assurance testing to validate the applications and any interdependencies, you can deploy the server into production and make application services available to users.



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At this point, IT administrators typically create a schedule to conduct ongoing, periodic system maintenance, applying critical patches and security-relevant bug fixes as they become available. Red Hat makes operating system updates available in errata advisories, either individually (on an as-needed basis) or by aggregating them into a minor release after testing and qualifying them against the respective, active Red Hat Enterprise Linux release.

Red Hat Enterprise Linux follows a relatively simple life cycle. Major releases of Red Hat Enterprise Linux are scheduled to be released roughly every two to three years. The newer major release consists of a 10-year life cycle, with minor releases delivered approximately every six months. Examples of major releases are Red Hat Enterprise Linux 6 or Red Hat Enterprise Linux 7. Examples of minor releases are Red Hat Enterprise Linux 7.1, 7.2, etc. For additional information, see the Red Hat Enterprise Linux Life Cycle and Update Policies at: access.redhat.com/support/policy/update_policies.

Each major release moves through four life cycle support phases—three production-level phases along with an extended life phase. For example, Red Hat Enterprise Linux 6 and 7 are offered with 10 years of production-level support followed by a three-year extended life phase. While such a lengthy time span provides a comfortable cushion of ongoing support, it is not meant to prolong a decision to migrate to a new major release. Instead, the extensive Red Hat software life cycle allows IT organizations the opportunity to plan and execute migrations carefully and methodically, recognizing that the cost and risk associated with staying on an older platform increases over time. Indeed, avoiding periodic transitions to new releases—because “it ain’t broke”—is a dangerous proposition.

Here’s why. As time passes, IT systems age, become more brittle (from both a hardware and software perspective), and may suffer a critical fault that can result in a service interruption. A number of root causes can contribute to an outage: a higher failure rate for aging system hardware, device driver incompatibilities with new or replacement hardware, and security vulnerabilities that can lead to system or data compromise. Older operating system releases may have technologies that have become outdated, including authentication and networking safeguards designed to prevent intrusion and malicious attack. Although applications are rigorously tested on new major releases, it’s not reasonable for developers to integration-test against every possible deployment configuration that follows. Administrators sometimes patch systems without the knowledge or support of the application development team, which can result in insufficient testing of resident applications. All of these factors—and more—contribute to the increased fragility of an IT system over time and a greater risk of unplanned downtime.

A sudden outage can necessitate an emergency recovery or an unanticipated, immediate migration. In either case, there are often unexpected and inflated expenses, including costs of lost productivity, administrative overtime, and the unplanned expense of replacing components or platforms. In addition, the lack of available application services can pose a competitive disadvantage and impact the organization’s bottom line.

In many ways, managing an IT system is like owning a car. You dutifully perform preventive maintenance—changing the oil, getting engine tune-ups, replacing the brake pads, and so forth—to keep the vehicle running smoothly. You bring the car in for planned maintenance checks at certain mileage points. As your vehicle ages, it still transports you from point A to point B, but it frequently requires more significant, expensive repairs. Plus, your older model vehicle doesn’t give you the benefits of newer standards like anti-lock brakes, side air bags, or the latest energy-saving hybrid engine designs. At some point, you run the risk of a catastrophic failure: a breakdown that requires

expensive major repairs, or even worse, you're involved in an accident that results in damage or injury. Planning a transition—while your current vehicle is still running smoothly—is a prudent alternative to the risks and costs that you face in the event of an unexpected failure.

In the case of an IT system, recovering from a sudden failure can be complicated by the complexities of today's highly integrated server platforms that incorporate an array of different technologies. It may be hard to find precisely the same replacement parts depending on the age of your system and the type of failed component. Exact replacements for processors, memory modules, peripheral component interconnect (PCI) cards, or storage devices may not be available any longer, and new components may have device drivers that aren't available on an earlier Red Hat Enterprise Linux release. As a result, it may be necessary to replace the entire platform. Since most new hardware platforms are qualified in conjunction with the latest operating system releases, you may be forced into suddenly migrating your applications forward. This failure scenario, in which you must rip out part of your existing IT infrastructure and quickly replace it, is akin to a sudden catastrophic breakdown in which your car is no longer drivable and you must find a new vehicle immediately.

ADVANTAGES OF FORWARD-THINKING I.T. LEADERSHIP

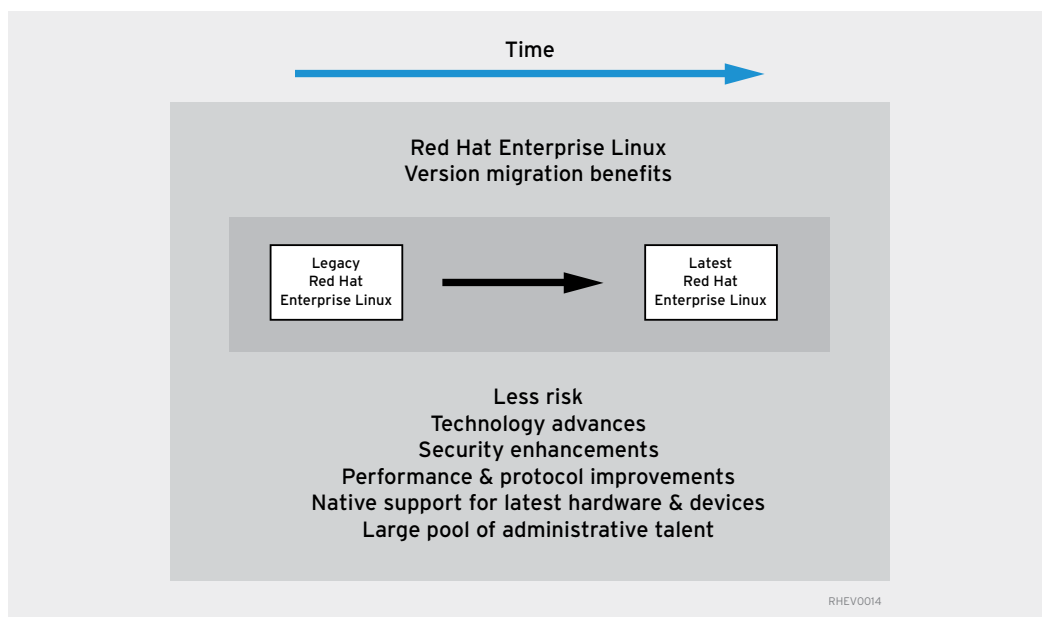
Planning the evolution of your IT portfolio is a leadership practice. By continuously evolving segments of your IT infrastructure as systems age—particularly as they reach the final phases of production-level support—you can eliminate pockets of outdated and inefficient technologies that pose greater risk.

Moving to the most current Red Hat Enterprise Linux release allows you to benefit from the latest open source software advancements. With every new Red Hat Enterprise Linux major release, the upstream development community (which encompasses many Red Hat software engineers) turns its attention toward building new, enhanced technologies for the next major release. As a result, each major release contains valuable technology advancements that enhance the secure, continuous delivery of application services. For example, Red Hat Enterprise Linux 7 delivers support for Linux containers—enabling applications to be packaged with their necessary components to simplify application deployment and speed delivery.

As you migrate to the current major release, you'll find that improvements in hardware technology can bring additional cost and performance advantages. Newer systems, for instance, offer energy-efficient designs that use less power, require less cooling, and occupy less space, reducing datacenter operational costs. Today's dense, multicore compute platforms offer efficiencies that translate into significant energy savings—some processors even have built-in, state-of-the-art features that remove power from inactive cores.

You also benefit from access to a larger pool of available administrators trained and experienced with the most current Red Hat Enterprise Linux releases. As systems become outdated and the number of older implementations decreases, there are fewer administrators who know how to best manage them, and these individuals are generally more costly to attract and retain. A technology refresh means that you can take advantage of a broader base of administrative talent with up-to-date training and expertise.

BENEFITS OF MIGRATING TO THE CURRENT RELEASE



Beyond open source innovations in the latest Red Hat Enterprise Linux release, there are specific advantages you gain by using new technologies:

- **Updated security.** Decrease the vulnerability of systems to security threats, which are constantly evolving over time. The latest operating system release contains up-to-date security technologies, including current stopgap measures and advancements in authentication and access control mechanisms.
- **Certification on the latest-generation platforms and devices.** Hardware vendors are quick to certify new servers and devices on the most recent Red Hat Enterprise Linux release (it's typically considered a "Tier 1" operating environment and therefore given high priority in the certification process). Support for advanced hardware technologies, such as multiple processor cores, large-capacity memories, and state-of-the-art storage devices, are implemented in the current release. In many cases, the latest release also includes native device drivers that provide integrated support, which can shorten your validation effort and time to deployment.
- **Up-to-date communication methodologies.** The latest Red Hat Enterprise Linux release is optimized to support recent advances in protocols and networking technologies, enabling high-bandwidth data paths and potentially eliminating the need for specialized adapters.
- **Performance enhancements.** With each new release, Red Hat engineers make improvements—enhancing file system capabilities, optimizing protocol performance, and fine-tuning the kernel—that help to increase application performance.

The open source model behind Red Hat Enterprise Linux cultivates a pattern of innovation and a strong code base, especially since the upstream community extensively inspects, reviews, and tests all contributed code. To deliver quality in each release, Red Hat engineers optimize the release and perform exhaustive assurance testing, integrating and stabilizing thousands of open source packages. This approach combines rapid innovation with optimized, stable, and fully tested software in every new Red Hat Enterprise Linux release.

OPPORTUNITIES FOR COST SAVINGS

From release to release, the cost of a basic Red Hat Enterprise Linux subscription is the same, so a change in releases is cost-neutral from a subscription perspective.

While migrating to a current major release implies some cost to requalify applications, it brings strategic opportunities to evolve your IT portfolio that can actually produce significant cost savings. Many organizations achieve dramatic cost reductions during a migration by implementing the change as part of a consolidation and virtualization initiative. By combining legacy implementations and virtualizing servers, you can conserve valuable datacenter footprint while improving resource utilization and lowering administrative overhead. It's possible to radically trim the number of aging platforms in this way—1,000 physical servers from five years ago can be folded easily into one or two racks of virtual machine servers using today's powerful hardware.

EVOLVING GRADUALLY USING VIRTUALIZATION

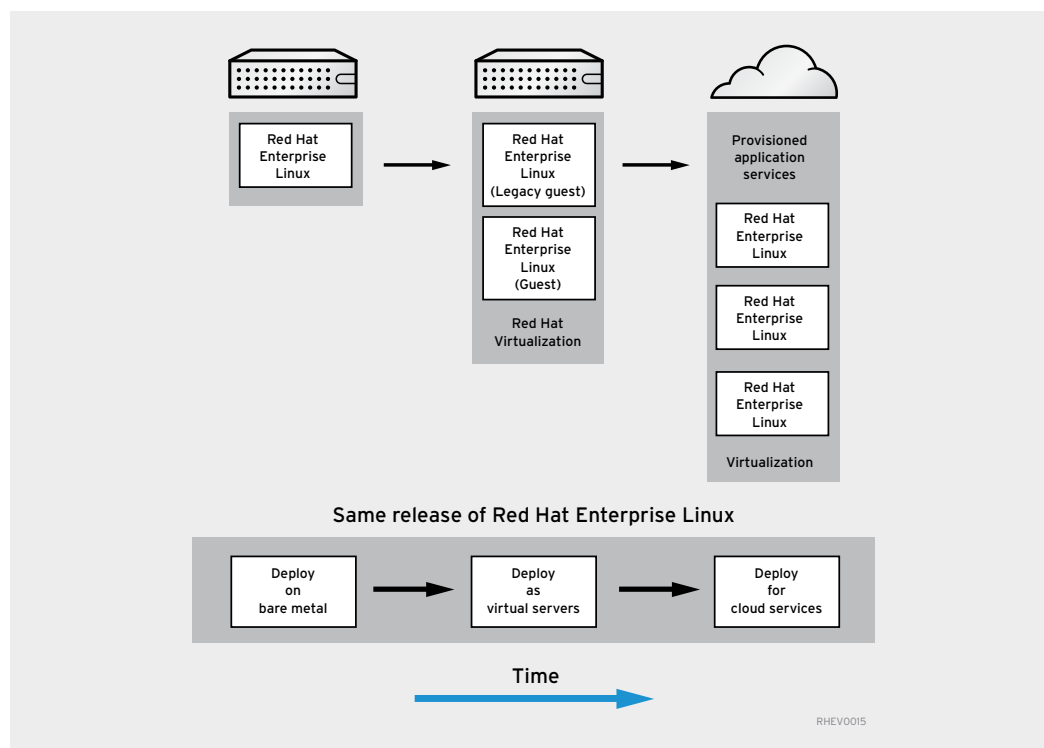
In thinking about how best to move your IT portfolio forward, virtualization offers a smooth transition path, allowing you to migrate your applications and software stack gradually to the latest Red Hat Enterprise Linux release. Virtualization provides hardware abstraction so you can run an earlier Red Hat Enterprise Linux version as a virtual guest on the latest release. For example, Red Hat Enterprise Linux 7 can host a Red Hat Enterprise Linux 5 or Red Hat Enterprise Linux 6 guest on a new-generation processor. In this way, you can take advantage of modern hardware platforms as you qualify applications to run directly on the current operating system release. For details on supported combinations of virtualized operating system versions and host releases, see the Red Hat Enterprise Linux virtualization support matrix. Virtualization brings other benefits to your infrastructure, including the ability to quickly clone application environments to achieve easy scaling, simplified back-ups, and disaster recovery through workload migration.

A CLEAR EVOLUTIONARY PATH

Migrating to the newest Red Hat Enterprise Linux release requires you to requalify your software stack. To simplify this effort, Red Hat supports binary compatibility across major releases of Red Hat Enterprise Linux, providing definitive guidelines to independent software vendors (ISVs) and developers to attain this goal. Applications that link dynamically to core libraries and that use public binary interfaces should run from release to release with equivalent functionality. Because of dynamic linking, these applications can take advantage of library enhancements, such as performance improvements, that are available in the new release's binary interfaces.

Red Hat Enterprise Linux packages are classified for application programming interface (API) and application binary interface (ABI) compatibility. Operating system packages are categorized as either compatible across three release levels (for core libraries such as glibc and glibc) or across one release level. For specifics, see the general Red Hat Enterprise Linux compatibility policy. This extensive compatibility helps simplify a transition across one or more major releases (for example, moving from Red Hat Enterprise Linux 6 to Red Hat Enterprise Linux 7) if the existing binary uses dynamically linked core interfaces. To help your staff evaluate migration issues, Red Hat offers consulting services to accelerate requalification and porting efforts.

In looking beyond the initial step of requalifying your applications, Red Hat Enterprise Linux gives you a clear path from today's legacy implementations to a future cloud services model. As the figure below illustrates, you can often run the exact same code on either a physical server, in a virtual machine, or as a cloud service all on the same version of Red Hat Enterprise Linux. Each Red Hat Enterprise Linux release retains compatibility from bare metal to the cloud, protecting your software investment in each deployment model.



THE NEXT STEP

Now is the time to begin your strategic migration to the latest Red Hat Enterprise Linux release. By planning the evolution of your legacy systems, you can avoid an unexpected failure and achieve the competitive advantage that technology leadership brings.

RED HAT CONSULTING

Red Hat Consulting can help you plan your version migration. Our global team of engineers and architects have a proven track record of applying best practices to migration efforts and helping customers fully realize the value of their Red Hat subscriptions. Our consultants are well-versed in moving software stacks—across one or more release increments—to the latest major release of Red Hat Enterprise Linux. At the same time, we strive to reach your goals for optimal performance, scalability, reliability, and return on investment.

Visit redhat.com/services/consulting to see how Red Hat Consulting can help you plan and implement your migration.

RED HAT TRAINING AND CERTIFICATION

Red Hat Training and Certification closes the gap between what you need and what you know. Whether you need to optimize existing systems or design new solutions, deepen expertise, or discover new technologies, we'll help you plan and navigate the journey. No one has more experience. From training through certification, we equip you for success so you can deliver business impact. Learn more at redhat.com/training.

RED HAT SUPPORT

At Red Hat, support is more than a break/fix activity. We partner with you on every step of your journey. You can rely on us when things don't go as planned. And, as a customer, you also have access to tools to prevent issues in your environment and content to help you plan, deploy, and operate your systems. Learn more about these resources and download the latest version of Red Hat Enterprise Linux through the award-winning Red Hat Customer Portal at access.redhat.com/home.

ABOUT RED HAT

Red Hat is the world's leading provider of open source software solutions, using a community-powered approach to provide reliable and high-performing cloud, Linux, middleware, storage, and virtualization technologies. Red Hat also offers award-winning support, training, and consulting services. As a connective hub in a global network of enterprises, partners, and open source communities, Red Hat helps create relevant, innovative technologies that liberate resources for growth and prepare customers for the future of IT.



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