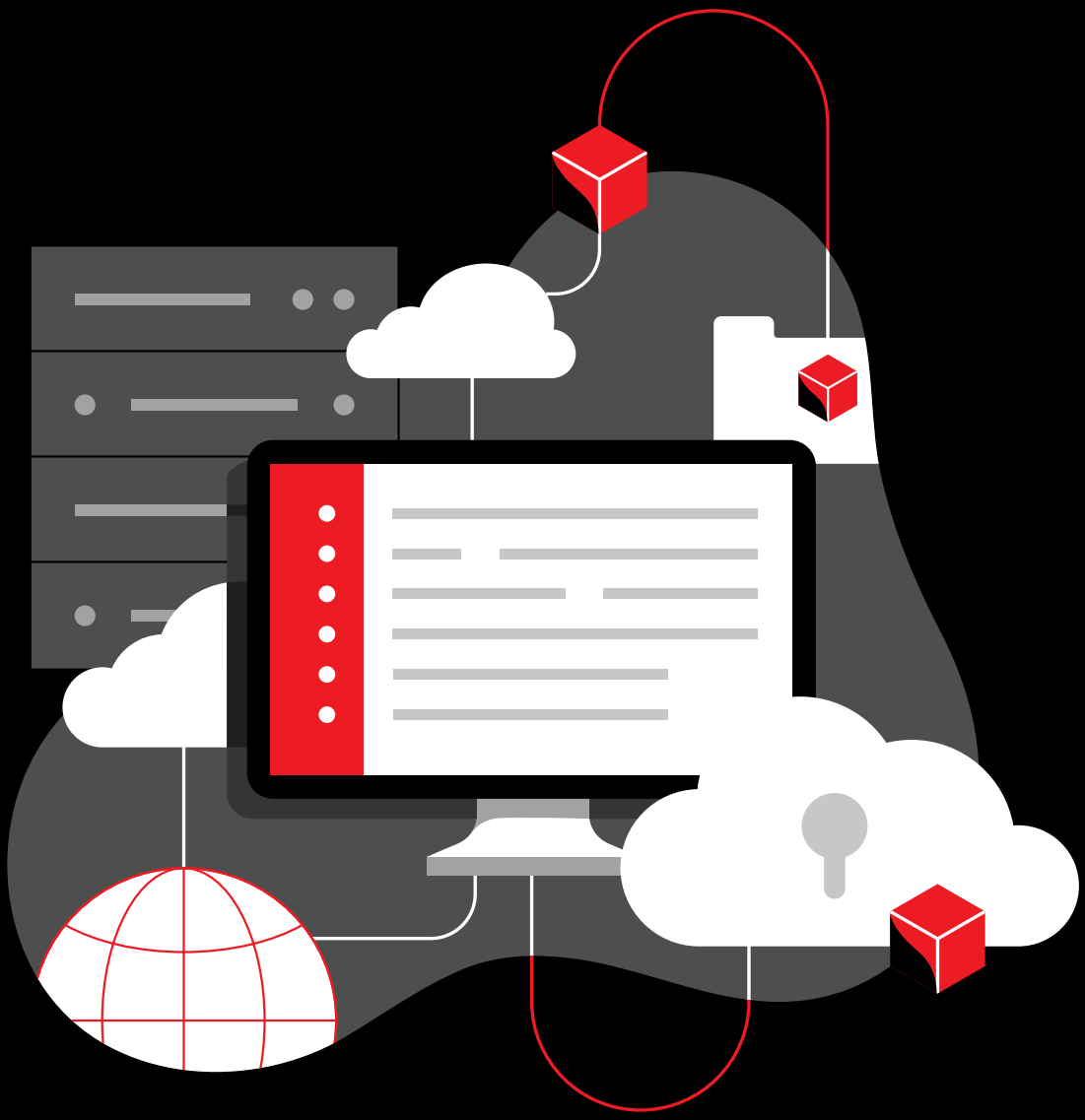
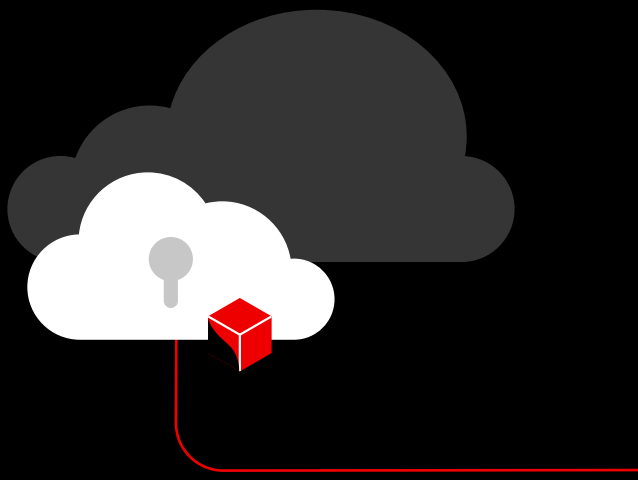
Red Hat

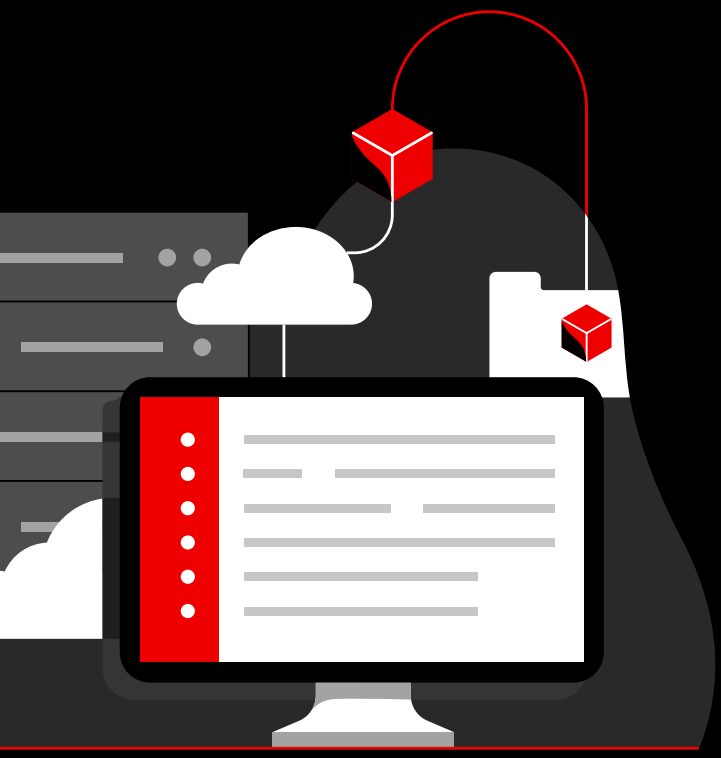


Manage your Linux environment for success

A guide to modern best practices, tools, and techniques for effective system management

Contents





Linux is the foundation for the future

Linux® provides an ideal platform for modern, innovative IT. Commonly used for highly available, reliable, and critical workloads in on-site datacenters and public cloud environments, it supports a variety of use cases, target systems, and devices.

Advanced management tools and approaches are critical for modern Linux environments, which often contain large infrastructure deployments operated by globally distributed organizations. For many teams, using manual processes to provision, configure, maintain, and upgrade these systems can be overwhelming. Organizations are also increasing workload deployments across hybrid cloud environments that encompass on-site infrastructure, public cloud resources, and edge devices. The added complexity of distributed infrastructure and workloads can impede operational visibility and compound management challenges.

A comprehensive management strategy can help you get the most from your Linux environment while protecting your assets and business. A **standardized operating environment (SOE)**, based on a consistent operating system and set of tools, is at the core of effective management strategies. SOEs can simplify your IT infrastructure to improve efficiency, reduce costs, increase uptime, speed deployment and provisioning, and boost security and productivity.

The business value of enterprise-ready Linux

To sustain modern, digital business initiatives, enterprise-ready Linux distributions provide:

- Open source innovation.
- Consistency across infrastructure.
- Container and application portability.
- Massive workload and platform scalability.
- Continuous security capabilities.
- A flexible platform for application development.

Discover the benefits of an enterprise-ready Linux distribution.

This e-book provides expert guidance for Linux administrators and architects to streamline management of hybrid cloud environments using modern best practices and automated tools.

Streamline system lifecycle management

Every system, resource, and workload has a lifecycle. System lifecycle management helps you effectively provision, configure, maintain, and upgrade systems to support your business operations and goals. An ideal lifecycle management approach will let you:

Provision

Create and deploy systems in an automated, reliable, and scalable manner.

Configure

Set up systems in accordance with established guidelines and best practices.

Maintain

Ensure that system configurations remain consistent across their lifecycle.

Upgrade

Modernize systems to improve security, functionality, or performance.

Common lifecycle management challenges

Several circumstances can make it difficult to manage systems effectively.

- **Environment sprawl.** Larger environments contain a greater number of systems, complicating system status and event tracking across your organization.
- **Technical debt.** Traditional systems often require special tools and processes to administer, preventing efforts to manage all systems using a single set of tools and processes.
- **Limited staff.** IT teams are not growing at the same pace as the infrastructure they manage, making it hard to get ahead of technological change, innovation, and business demands.
- **Business continuity requirements.** System management must be accomplished in a manner that does not interfere with critical business operations.

Lifecycle management best practices

Adopting these best practices can help your teams save time and effort while improving control over your IT infrastructure.

Deploy automation

The effort required to manage IT infrastructure increases in line with its scale. Use automation to streamline common tasks, reduce human errors, and free staff to focus on innovation.

Manage software

Using unsigned, unvetted, and outdated software can be risky for your business. Actively manage the supply chain and administration of the software, packages, and patches you deploy in your environment.

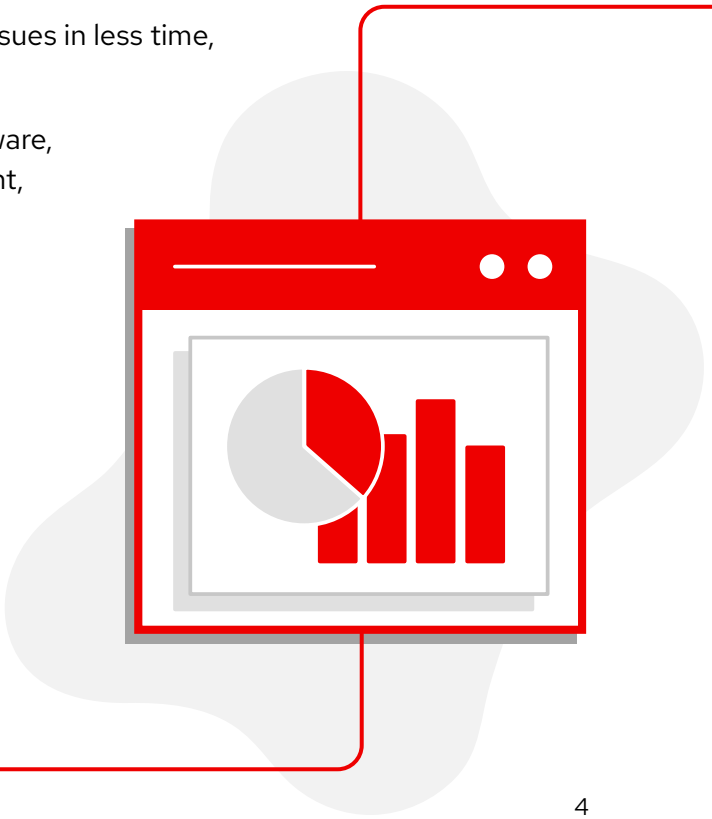
Connect tools

Integrate as many of your tools as possible via available application programming interfaces (APIs). Use your preferred interfaces to perform tasks in other tools, streamlining operations and improving productivity.

Unify Linux management with expert tools

Red Hat takes a **holistic approach to IT management** that improves speed, scalability, and stability across your entire IT environment, from physical and virtualized servers to private and public cloud infrastructure and edge devices. Based on years of Linux development and support experience, Red Hat® management tools work together to streamline IT administration, saving your team time and effort and making your environment more secure, optimized, and reliable.

- **A consistent software foundation** across hybrid cloud and multicloud environments simplifies processes and increases operational efficiency.
- **Configurable tools and baselines** reduce false positives and provide an accurate view of infrastructure status.
- **Automation capabilities** improve deployment and configuration accuracy and reduce the risk from human errors.
- **Customizable views** deliver the right information when you need it.
- **Automated and proactive remediation** helps you fix issues in less time, without needing to contact support.
- **Comprehensive catalogs** of supported hardware, software, and cloud partners help you customize your environment, control costs, and increase business agility.
- **An extensive library of resources** provides detailed, targeted information 24x7.
- **On-site and Software-as-a-Service (SaaS) options** let you deploy tools according to your preferences and requirements.
- **Predictive analytics capabilities** assess systems and configurations to simplify complex operational tasks and provide visibility into and control over infrastructure security and compliance.



Red Hat Insights

Continuously analyze your platforms and applications

Streamline operational tasks and infrastructure lifecycles using predictive analytics and deep domain expertise from a unique suite of hosted services for managing and optimizing Red Hat-based hybrid and multicloud environments.

Learn more about Insights. →

Red Hat Satellite

Simplify management of your Red Hat infrastructure

Increase the security, availability, and compliance of your Red Hat Enterprise Linux systems in physical, virtualized, cloud, and edge environments with a single console for streamlining system management and automating common tasks.

Learn more about Satellite. →

Red Hat Enterprise Linux system roles

Automate management and configuration

Automate common management tasks to streamline administration and ensure consistent, repeatable configurations across on-site infrastructure, cloud resources, and edge devices.

Learn more about system roles. →

Red Hat Enterprise Linux web console

Administer systems via a web interface

Accomplish complex tasks with a user-friendly web interface for managing and monitoring the health and status of your local and remote Red Hat Enterprise Linux systems.

Learn more about the web console. →

Image builder

Build and deploy system images

Create customized operating system images for consistent provisioning and deployment across environments, including installation disks, virtual machines, clouds, and more.

Learn more about image builder. →

Leapp

Upgrade your software foundation

Simplify in-place system upgrades between major versions of Red Hat Enterprise Linux to benefit from new features without reinstalling your operating system.

Learn more about Leapp. →

Adopt best practices and tools across use cases

Linux and IT management encompass many areas of your infrastructure and operations. Here are several common use cases with best practices, key recommendations, and tools for success.

Provision infrastructure with custom images

Efficient IT infrastructure provisioning is essential for organizations to meet the demands of modern business operations. However, many IT teams struggle to standardize these procedures because they use numerous ways and platform-specific management tools to provision systems. Establishing a unified provisioning strategy lets you efficiently and consistently define, build, and deploy operating system images and SOEs across hybrid cloud infrastructure.

Best practices and recommendations

Effective provisioning processes will let you consistently deploy and scale systems across local and geographically distributed environments, including on-site infrastructure, public cloud resources, and edge devices.

- **Separate system definition from provisioning.** Use platform-agnostic tools to ensure consistent system operations and enhance compatibility across different environments.

- **Adopt a comprehensive, cross-platform management tool.** Look for technologies that let you define systems once and deploy them across environments.
- **Apply infrastructure as code (IaC) methodologies.** Describe infrastructure configurations and provisioning processes using approaches that support version control, automation, and repeatability.
- **Implement role-based access controls (RBAC).** Control access to provisioning tools and resources based on users' roles and responsibilities to improve security and governance.
- **Define clear standards.** Establish provisioning procedures, configurations, and best practices to ease knowledge sharing and troubleshooting across your organization.
- **Integrate continuous integration/continuous deployment (CI/CD) pipelines.** Use automation to test, validate, and deploy infrastructure changes and boost IT agility and reliability.
- **Implement monitoring and alerting mechanisms.** Track provisioning activities, detect anomalies, and monitor the health and performance of provisioned systems and resources.

Key Red Hat management tools

Red Hat Insights

Analyze your hybrid cloud deployments to predict risk, access recommended actions, and track costs, backed by decades of Red Hat technical knowledge and expertise.

Red Hat Satellite

Provision physical and virtual machines across on-site datacenters and public cloud environments from a single console. Analyze and assess infrastructure to discover existing hosts and optimize resource use. Automate and speed post-provisioning tasks using Red Hat Ansible® Automation Platform directly from Red Hat Satellite.

Image builder

Build standard, optimized operating system images that can be deployed across runtime environments using an on-site tool, a hosted service located at console.redhat.com, or both. Streamline your path from development to production with images that are compatible with major cloud providers and virtualization technologies.

Manage and update configurations

Misconfigurations can lead to poor performance, inconsistencies, and noncompliance with standards, negatively affecting business operations and security. Even when base images are configured properly, system settings can become outdated due to end-user changes and installations, ad hoc fixes, and new image deployments. The process of identifying systems that require attention, determining remediation steps, prioritizing actions, and tracking completion and validation is often too complicated to perform manually in large-scale environments. Regular monitoring of systems, along with automated configuration management and remediation, can simplify these processes, helping you maintain system integrity, adhere to compliance requirements, and increase operational efficiency.

Best practices and recommendations

An effective configuration management strategy will let you consistently define configurations, build systems according to baselines, identify operational and performance issues, detect noncompliant systems, and control drift to ensure reliable operations across your environment.

- **Limit the number of base configurations.** Each distinct configuration directly affects management time and effort. Like systems can be managed with less time, effort, and staff.
- **Centralize configurations.** Modify base configurations in a unified way and roll new settings out to all applicable systems at once.
- **Audit configurations and processes.** Identify inefficiencies, vulnerabilities, and opportunities for optimization to ensure that systems operate efficiently while maximizing performance.
- **Automatically monitor for configuration changes.** Regularly and continuously monitor systems to ensure consistency across your hybrid cloud environment.
- **Analyze configuration issues using advanced technologies.** Adopt management tools that let you rapidly prioritize findings and apply prescriptive remediation actions from a single console.
- **Automate remediation processes.** Use automation technologies to detect and update systems with outdated, poorly performing, or noncompliant configurations.
- **Validate configuration updates.** Comprehensively test updates to increase reliability and limit potential errors across your environment.

Key Red Hat management tools

Red Hat Satellite

Increase consistency by applying, tracking, and remediating host configurations simultaneously across local and remote systems. Define configurations with human-readable, declarative language to automatically configure your hosts and view detailed change reports via a single console.

Red Hat Insights

Identify operational risks and access remediation guidance based on Red Hat support cases, industry best practices, and issues found by our technology and service partners. Detect configuration drift that can lead to performance, availability, security, and compliance issues. Compare your system configurations to customized baselines, other systems, and historical profiles to find changes and notify stakeholders before end users are affected.

Red Hat Enterprise Linux system roles

Automate the management and configuration of Red Hat Enterprise Linux systems with a collection of Ansible roles. Reduce technical burdens with consistent and repeatable system configuration. Choose from a library of roles to configure many operating system features like networking, storage, and metrics.

Maintain systems through complete lifecycles

IT system maintenance requires a holistic approach to ensure reliability, availability, and security across hybrid cloud infrastructure. Regular patching is essential to address vulnerabilities and safeguard systems against emerging threats. Continuous monitoring and auditing processes can help identify and remediate security and compliance issues promptly, minimizing the risk of data breaches or regulatory violations. Finally, by addressing performance and resource use challenges, you can optimize system functionality to meet evolving business demands.

Best practices and recommendations

Prioritizing and automating proactive maintenance activities increases the integrity and performance of your IT environment while effectively mitigating potential risks.

- **Scan systems regularly.** Implement automated monitoring at regular intervals to help identify compliance issues and security vulnerabilities before they affect business operations or result in a breach.
- **Adopt actionable insight.** Tools that provide information tailored to your environment can help you identify which compliance issues and security vulnerabilities are present, which systems are affected, and what potential impacts you can expect, all in less time.
- **Customize results from management tools.** Some compliance checks may not apply to certain systems due to their specific configuration, use, or workload. Choose technologies that let you define business context to reduce false positives, manage business risk, and provide a more realistic view of your security and compliance status.
- **Apply prescriptive, prioritized remediation actions.** Adopt technologies that provide prescriptive remediation instructions to eliminate the need to research actions yourself, save time, and reduce the risk of mistakes. Prioritization of actions based on potential impact and systems affected can help you make the most of limited patching windows.
- **Patch often and test your patches.** Keep systems up to date to boost security, reliability, performance, and compliance. Patches should be applied frequently to keep pace with important issues, and immediately for critical bugs and defects. Test patched systems for acceptance before placing them back into production.
- **Generate and analyze intuitive reports.** Look for tools that produce clear reports about which systems are patched, which need patching, and which are noncompliant with security and regulatory policies. Comprehensive reporting can increase auditability and help you gain a better understanding of the status of your environment.
- **Deploy automation.** As the size of your infrastructure grows, it becomes harder to manage manually. Use automation to streamline common tasks, improve consistency, and ensure regular monitoring and reporting.
- **Connect your tools.** Distributed environments often contain different management tools for each platform. Integrate these tools via APIs and use your preferred interfaces to perform tasks in other tools. Using a smaller number of interfaces streamlines operations and improves visibility into the security and compliance status of all systems in your environment.

Key Red Hat management tools

Red Hat Satellite

Lower the risk of security vulnerabilities and increase compliance with government requirements, industry regulations, and corporate standards. Automatically identify hosts that require updates due to common vulnerabilities and exposures (CVEs), compliance risks, or performance issues. Then patch and update systems at scale to remediate issues.

Red Hat Insights

Streamline patching and update management across your environment. Review Red Hat product advisories, available patches, and affected hosts to create update plans. Configure reusable patch templates to control which hosts receive which updates. Deploy your updates remotely to any host—regardless of location—from a single web console.

Red Hat Enterprise Linux system roles

Simplify security management with automation content supported by Red Hat. Configure many advanced Red Hat Enterprise Linux security features, including SELinux, firewalls, and virtual private networks.

Red Hat Enterprise Linux web console

Administer many aspects of your operating system more efficiently with a simplified web-based management tool. Accomplish tasks like managing storage and users, configuring network interfaces and firewalls, performing system updates, monitoring system performance, and inspecting logs—even if you're new to Linux.

Upgrade operating systems

Operating system upgrades are a crucial part of system lifecycle management. Upgrades not only help you maintain operational efficiency, but also ensure that critical infrastructure remains current with technology advancements. With in-place upgrades, you can bring newer versions to existing systems, allowing users and applications to benefit from new features, performance improvements, and security enhancements. Alternatively, you can migrate applications and data to new installations—including different platforms, architectures, or cloud environments—to adopt more modern technologies and align your IT infrastructure with evolving business requirements. Regardless of your approach, careful planning, testing, and implementation are essential to minimize disruptions and ensure a smooth transition. Through proactive and strategic upgrades, you can take advantage of new innovations to increase productivity, improve security, and maintain a competitive edge in changing markets.

Best practices and recommendations

Successful operating system upgrades require effective planning, execution, and management to ensure continued stability and security across hybrid cloud infrastructure.

- **Create a detailed upgrade plan.** Develop a detailed upgrade plan that includes timelines, roles and responsibilities, backup and rollback procedures, and communication strategies to minimize disruptions and ensure a smooth transition.
- **Perform a thorough compatibility assessment and remediate identified issues.** Before initiating an upgrade, conduct a comprehensive compatibility assessment to ensure that existing applications and hardware are compatible with new versions, and consider automating remediation of identified issues.
- **Back up critical data and configurations.** Before upgrading, perform complete backups of critical data, applications, and system configurations to mitigate the risk of data loss or corruption during the upgrade process.
- **Perform and test upgrades in a controlled environment.** Perform upgrades and conduct extensive testing in a controlled environment to identify and address any compatibility issues, performance bottlenecks, or unforeseen challenges.
- **Implement phased rollout strategies.** Consider implementing phased rollout strategies to gradually upgrade systems in batches or groups, starting with less critical systems or departments, to minimize the impact on operations and facilitate troubleshooting.

- **Provide user training and support.** Offer comprehensive training and support to familiarize your organization with new features and workflows.
- **Monitor and evaluate post-upgrade performance.** Continuously monitor and evaluate post-upgrade performance metrics, user feedback, and system stability to identify any issues or areas for optimization, and take proactive measures to address them promptly.

Key Red Hat management tools

Leapp

Perform in-place upgrades to the next major version of Red Hat Enterprise Linux while retaining your original subscriptions, system configurations, custom repositories, and third-party applications. Identify potential upgrade issues and automate remediation where possible using the included preupgrade analysis report.

Red Hat Satellite

Keep your expensive cloud- and datacenter-based hardware resources up to date to lower your total cost of operations (TCO). Use job templates to simultaneously conduct in-place upgrades on multiple Red Hat Enterprise Linux hosts without performing full reinstallations.

Red Hat Insights

Run the preupgrade analysis task on connected Red Hat Enterprise Linux systems to identify potential issues and receive remediation guidance before you upgrade.

See success in action

The Met Office

The Meteorological Office, the U.K.'s national weather service, provides weather- and climate-related services daily to people around the world. Seeking to establish a comprehensive approach to server management, the Met Office adopted Red Hat Insights to complement its use of Red Hat Satellite. With the support of a Red Hat Technical Account Manager, the Met Office has now significantly improved visibility into its server environment.

The Met Office first started by testing Insights on several of their machines with known issues. The issues were surfaced immediately, and the IT team decided to move forward with wider deployment. The team used Satellite—in accordance with internal change management processes—to simplify installation of Insights across their entire estate.

Insights has made it much easier for the team to prioritize tasks, see if there are issues, and understand which systems are affected and how serious the issue is. It has also helped the Met Office bring their server estate to the desired standard by identifying and remediating configuration issues.

The Met Office plans to continue to use Insights and Satellite to manage their overall environment and improve their security posture in a more proactive manner.

> I saw that Red Hat Insights could help to provide a top-down overview and allow us to adopt a **more holistic approach to our estate management**. Red Hat Satellite does a great job at surfacing issues on individual machines, whereas Red Hat Insight's strength lies in tying in common issues across the estate rather than treating it on a machine-by-machine basis.
>
> **Chris Wilkinson**
> Senior Systems Engineer,
> The Meteorological Office, U.K.

Read the success story

Ready to start managing for success?

Linux is a key platform in modern hybrid cloud environments.

A comprehensive management strategy can help you get the most from your Linux environment while protecting your assets and business. Red Hat provides interoperable management tools that empower your teams to increase the performance, reliability, and security of Linux environments of all size.

Learn more about managing for success: redhat.com/management

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