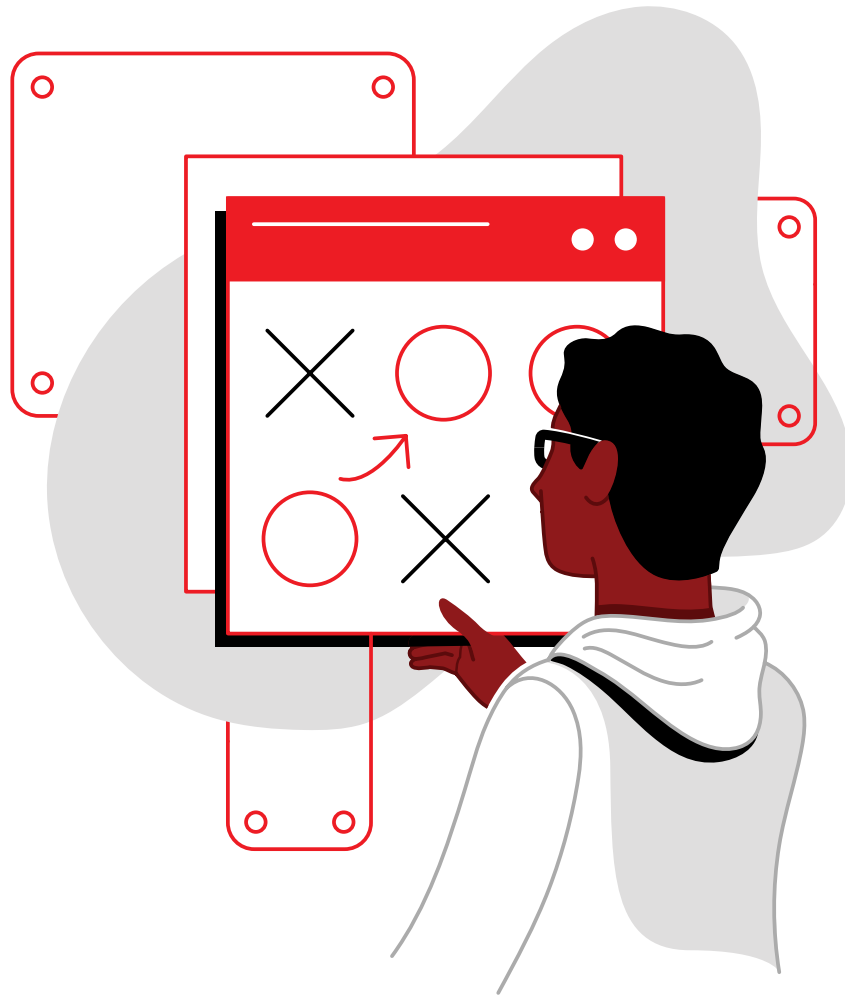# Automate infrastructure workflows

Build a unified, automated pipeline for infrastructure operations

Red Hat

See what's inside

IT infrastructure is a critical business asset

Today's businesses depend on IT infrastructure and applications. As a result, IT teams now play a strategic role in their company's success. Even so, IT budgets are not increasing, and IT teams must manage increasingly large, complex, and disparate IT infrastructure without hiring new staff.

Most organizations use a domain-centric approach to infrastructure management. Each team manages their own area of expertise using their preferred tools and methods. Tools, techniques, and best practices are rarely shared between teams. This redundancy and lack of collaboration result in higher costs and lower efficiency. Additionally, because domain expertise is concentrated, only a few staff members may be able to perform a given task, causing delays if those staff members are unavailable.

Infrastructure automation can help you optimize and transform your IT

Automation is essential for both IT optimization and digital transformation. To support business success, IT environments must be efficient, scalable, and reliable. Infrastructure automation can help your organization streamline operations, improve agility, boost productivity, and increase security and availability.

Most organizations that have started to automate their infrastructure are doing so by domain. As with overall infrastructure management, each team uses their chosen automation tools and processes, prompting higher costs, lower efficiency, and limited collaboration. Additionally, many automation tools do not integrate with each other and different teams often take dissimilar approaches to infrastructure automation. This results in time-consuming manual handoffs between teams that can significantly delay projects and resource delivery, even though automation is applied to tasks within the workflow.

Increase your automation benefits with a holistic approach

A holistic approach to automation can help you save time, increase quality, improve employee satisfaction, and reduce costs throughout your entire infrastructure and organization. IT teams can be more productive, reduce errors, improve collaboration, and free up time for more meaningful, thoughtful work.

A holistic approach to infrastructure automation can help your organization:

The need for automation

Across industries, organizations are automating to overcome infrastructure management challenges.

52%

of organization boards expect IT to increase efficiencies through automation.[1]

86%

of organizations cite too many manual processes as a challenge in managing IT spending.[2]

Speed operations and development.	Improve agility and responsiveness.	Boost productivity and efficiency.	Increase reliability and availability.	Improve security and compliance.

1 Harvey Nash and KPMG, "**CIO Survey 2019: A Changing Perspective**," 2019.

2 Flexera, "**2020 Flexera Digital Transformation Planning Report**," February 2020.
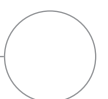
What is infrastructure automation?

Infrastructure automation uses software to create repeatable instructions and processes to replace or reduce human interaction with IT systems. Automation software works within the confines of those instructions, tools, and frameworks to perform tasks with little to no human intervention. Most IT tasks can be automated to some extent. Examples include:

- Managing physical infrastructure
- Administering virtualized environments
- Provisioning cloud resources
- Managing networks
- Administering storage and data
- Deploying applications
- Running standardardized operating environments (SOEs)

Streamline ongoing infrastructure operations

You can also automate ongoing operations across your environment. Examples include:

- **User and access management.** Add, remove, and change user access to resources.
- **Troubleshooting and debugging.** Check system health and collect and log data.
- **Inventory management.** Create inventories of your assets and compare configurations to your desired state.

Task automation or workflow automation?

Effective IT infrastructure management requires you to automate both individual tasks and entire workflows.

Task automation streamlines single functions performed by one person on one infrastructure resource. It speeds operations at the staff action level and reduces the time it takes to perform specific job functions.

Workflow automation connects multiple tasks into a single progression. It speeds operations at the process level and moves automatically from one task to the next, reducing wait times due to handoffs between teams. Workflow automation also facilitates self-service operations while preserving IT control over resources.

The benefits of automation

Organizations that deployed a holistic automation platform experience:

68%
more productive IT infrastructure management teams[3]

44%
more efficient infrastructure configuration management[3]

31%
more productive network management teams[3]

20%
faster network provisioning and deployment[3]

41%
more efficient application environment management teams[3]

20%
more efficient application security management[3]

What can you automate?

You can automate most aspects of your infrastructure. In fact, a key use case for infrastructure automation is connecting teams, processes, and tools into a single, automated workflow. An example of a unified, automated build pipeline is shown in Figure 1.
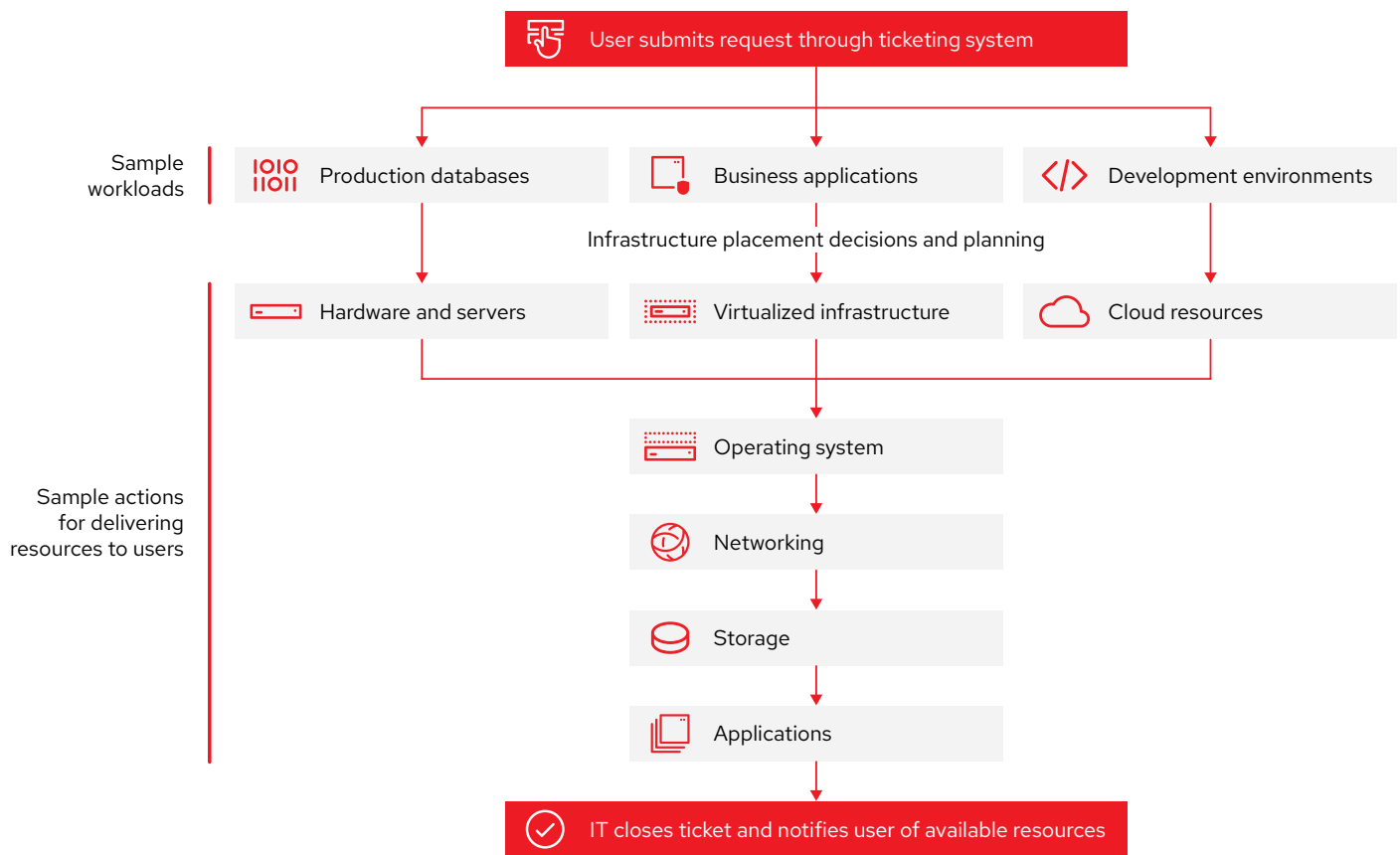

Figure 1. Automation can help you streamline entire workflows like build pipelines.

The following sections follow this workflow to demonstrate how you can use automation to streamline a request for IT resources, as well as other domain-specific use cases.

Step 1: Identify workload requirements

Each workload has different requirements that determine where it should be deployed. Some workloads need high-performance infrastructure while others call for high availability or increased flexibility. Resource use and cost may also be a consideration.

Identify the key requirements of your workload. Depending on your IT environment, you may choose to deploy your workload on physical, virtualized, or cloud infrastructure. You should also consider storage, networking, and security requirements at this time.

Automate your build pipeline
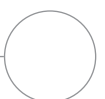
Base infrastructure considerations

Step 2: Set up base infrastructure

Infrastructure is the underlying foundation for all IT operations and users. Automating underlying infrastructure life-cycle management streamlines operations and improves accuracy and security. It also allows you to consistently deploy applications and workloads across hybrid environments, including physical, virtualized, and cloud infrastructure. Regardless of infrastructure, automation can help you:

- Change resource configurations.
- Monitor and correct configuration drift.
- Apply and enforce security policies.

- Update and patch systems.
- Monitor system health and log results.
- Rotate system logs.

- Track inventory across infrastructures.
- Update, sync, and perform comparisons within your configuration management database (CMDB).

Hardware and servers

Physical infrastructure is often chosen for performance-sensitive applications like production databases.

Why automate?

Once servers are installed in your data-center, most administration operations are carried out using a management interface. Automation platforms can interact with these tools to speed operations and reduce setup errors.

Automation use cases

- Provision physical server resources.
- Configure BIOS and disk settings.
- Install media on servers.
- Power servers on and off.
- Diagnose hardware issues.

Recommendations

Look for an automation platform that integrates with your hardware management interfaces through application programming interfaces (APIs) based on open standards like **Redfish**.

Virtualized resources

Virtualized environments are often chosen for workloads that require high reliability like business applications.

Why automate?

Automation can help you manage your virtualized environments more effectively to optimize costs and control sprawl. You can even automate the virtualization hypervisor itself to simplify updates.

Automation use cases

- Provision virtual machines (VMs).
- Assign IP addresses and attach storage to VMs.
- Move and load balance workloads.
- Manage hosts within clusters.
- Find and delete unused VMs.
- Create, manage, and apply templates for hosts and VMs.

Recommendations

Look for an automation platform that supports your chosen virtualization hypervisors.

Cloud services

Cloud infrastructure is often chosen for workloads that need to be spun up and down to optimize resource use and cost like development environments.

Why automate?

Cloud environments are designed for automation. Most cloud components and services need to be completely automated to maximize their value.

Automation use cases

- Provision VMs according to templates and security profiles.
- Set up user credentials, roles, and virtual private cloud (VPC) access.
- Manage hybrid and multicloud environments consistently.
- Orchestrate failovers.
- Ensure consistent network connections between your clouds.

Recommendations

Look for an automation platform that integrates with your chosen cloud providers.
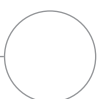
Operating system, networking, and storage considerations

Step 3: Install an operating system

Most organizations use varied IT stacks within their business. Manually managing each of the different components can be tedious and error-prone.

Why automate?

Automation can help you define and manage a **standardized operating environment** to improve efficiency, reduce costs, increase uptime, and boost security. You can also unify management of mixed **Linux**® and **Windows** environments.

Automation use cases

- Install, update, and manage operating system (OS) images.

- Apply security settings and set up authentication services.

- Manage compliance with corporate and regulatory requirements.

Recommendations

Look for an automation platform that supports the OSes you use. An agentless platform simplifies management of multiple OSes, as there is no agent to maintain on the system themselves.

Siemens

uses automation to speed management tasks and improve communications security across the business.

Step 4: Set up networking

Networks connect all areas of your IT and business infrastructure. They must be managed to allow the right access and bandwidth to the right users, applications, and data at all times.

Why automate?

Automation can help network teams confidently make predefined, pre-tested changes on demand. It can also help teams accomplish more within each change window. Finally, automation can improve change accuracy.

Automation use cases

- Create and manage firewall ports access control lists (ACLs), and virtual local area networks (VLANs).

- Patch and maintain switches.

- Remediate predefined issues.

- Manage and audit changes

Recommendations

Look for an automation platform that allows you to connect and maintain network devices from many vendors via a single interface.

"We actually have a process out right now that closes about 97-98% of the tickets that come in via automation."

Bart Dworak
Software Engineering Manager, Microsoft

Step 5: Configure storage

Applications rely on data, and data is a critical business asset. Storage systems must be configured and managed to provide the right data to the right applications and users.

Why automate?

Automation can help storage teams reduce manual work to speed operations. Predefined storage requests can be automatically provisioned and storage resources can be scaled dynamically to meet changing needs.

Automation use cases

- Configure and connect storage to servers, VMs, apps, and users.

- Set up backup agents and validate backup client configuration.

- Expand storage allocations.

- Consolidate storage systems and migrate data.

Recommendations

Look for an automation platform that can manage storage systems from many vendors via a single interface.

HCA Healthcare

automates data collection, analysis, and proactive notification processes for its Sepsis Prediction and Optimization of Therapy (SPOT) platform.

Automate your build pipeline
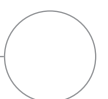
Application considerations

Step 6: Deploy applications

Application deployment is the end goal of our example build process. As key business assets, applications and workloads must be configured properly to ensure optimal performance and security.

Why automate?

Automation can help you consistently deploy applications across development, test, and production environments as well as physical, virtual, and cloud infrastructures according to corporate, regulatory, performance, and cost requirements.

Automation use cases

- Install, configure, and patch applications.

- Load data into applications and connect to other required systems.

- Configure credential access to applications.

- Dynamically scale application resources.

- Manage application life cycles through DevOps approaches and continuous integration/continuous deployment (CI/CD) pipelines.

Recommendations

Look for an automation platform that can manage as much of the application life cycle as possible via a single interface. CI/CD, DevOps, and software stack management capabilities allow you to accelerate development and deployment.

Organizations that deployed a holistic automation platform experience:

26%
faster application patching[4]

20%
more efficient application security management[4]

25%
more efficient application configuration management[4]

### Migrate your SAP environments more easily

Many organizations rely on SAP® databases and applications to manage their business and must migrate to SAP HANA® and S/4HANA® by 2027 to continue receiving support from SAP.

Key migration steps include:

- Creating and configuring the target infrastructure.

- Deploying new SAP software on the target infrastructure.

- Replicating data from the existing to the target environment.

- Moving virtual IP addresses to the new copy of the data.

- Testing the new setup.

- Deprecating the old environment.

All of these steps can be accomplished using infrastructure automation, increasing the speed and accuracy of the process.

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4 IDC White Paper, sponsored by Red Hat. *"Red Hat Ansible Automation Improves IT Agility and Time to Market," June 2019. Document #US45090419.*
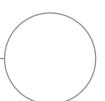
Streamline complete workflows with a unified automation platform

A unified automation platform is central to effective workflow automation. Automation platforms deliver a consolidated foundation on which multiple people can automate consistently. They also provide ways to efficiently manage and share automation content across your organization. A unified platform allows everyone in your organization to participate. While each team can still create automation for their own domain, all domains are connected into the same automation workflow and strategy. A unified platform also encourages teams to collaborate and share automation assets, best practices, and learnings.

There are many automation solutions available, but not all include the capabilities your organization needs to automate effectively across your entire infrastructure. Look for automation platforms that offer:

Complete support
Promote IT availability and reliability with platforms that provide enterprise-grade support, including quality and security testing, integration, and clear roadmaps.

Vendor interoperability
Use and automate your preferred infrastructure technologies via standard, open interfaces that allow vendors to create modules or plugins for your automation platform.

Simple adoption
Allow staff across your organization to build and deploy automation quickly and effectively with simple, human-readable automation and intuitive tools.

Massive scalability
Deploy automation consistently across your entire IT organization with a platform that scales across infrastructure, operating systems, management tools, and user roles.

Agentless deployment
Quickly and securely connect and automate your infrastructure components without needing to install and maintain an agent on each device.

Automate across your entire organization

IT automation can have profound impact across your business. Read these e-books to learn how automation can help you transform the way people, processes, and platforms work together, manage your network infrastructure, and simplify your security operations center:

- **The automated enterprise: Unify people and processes**

- **Network automation for everyone: Modernize your network with Red Hat Ansible Automation Platform**

- **Simplify your security operations center**
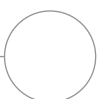
Automate your infrastructure with Red Hat Ansible Automation Platform

A foundation for building and operating automation services at scale, **Red Hat® Ansible® Automation Platform** delivers all the tools and features you need to automate your infrastructure. It combines a simple, easy-to-read automation language with a trusted, composable execution environment and security-focused sharing and collaboration capabilities. Multiple domain teams can use Red Hat Ansible Automation Platform, allowing you to create, scale, and deploy your automation across your entire IT organization.

Red Hat Ansible Automation Platform is a single framework that helps you automate all aspects of your infrastructure, from servers and network devices to operating systems, application, and security. Through modules, it connects your existing automation tools and processes with a common language. Red Hat Ansible Automation Platform is also agentless, so you can easily automate components without installing automation software on them. Finally, Red Hat Ansible Automation Platform includes monitoring and logging capabilities to help you understand and manage how automation is used across your organization.

"[Red Hat Ansible Automation Platform] is recognized as an outstanding automation and orchestration language and platform among our customer base."

Joseph Tejal
Red Hat Certified Specialist in Ansible Automation, formerly at Datacom

64% of enterprises currently use or plan to use **Ansible** as their cloud configuration tool.[5]

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5 Flexera, "**2020 Flexera State of the Cloud Report**," April 2020.
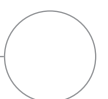
Siemens

Enhance communication security through automation

Challenge

Siemens is a global technology company focusing on electrification — from power generation, transmission, and distribution to smart grid solutions and the efficient application of electrical energy — as well as the areas of medical imaging and laboratory diagnostics. The company uses public key infrastructures (PKIs) — a collection of processes and policies for creating, using, managing, and storing digital certificates and other secure communications components — across its organization to reliably protect access to sensitive information. Siemens is increasingly using PKIs to also secure Internet of Things (IoT) communications and now maintains two PKI environments for these different use cases. To support growing PKI use, the company sought a more robust automation solution that would help its teams accommodate demand while reducing configuration complexity.

Solution

To simplify and better automate its PKI environment, Siemens worked closely with Red Hat Consulting to replace its legacy automation solution with Red Hat Ansible Automation. With expert support and training, Siemens' PKI team is now using Ansible Automation Platform to automate manual management tasks and improve communications security across the business.

"We needed more automation, and for this Red Hat Ansible Automation [Platform] was the perfect choice, but we were not experts in Ansible... It's important to maximize our IT investment, so we wanted as much detail as possible from Red Hat's experts."
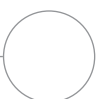
Rufus Buschart
Head of PKI, Siemens

Optimized Ansible for Windows-based security environment

Improved IT efficiency by automating management tasks

Enhanced in-house Ansible expertise with dedicated, expert consulting and training

Ready to automate your infrastructure?

Your business relies on your IT infrastructure and applications. IT automation can save time, improve employee satisfaction, and reduce costs. Red Hat offers a unified automation platform that connects your IT infrastructure, processes, and teams to deliver more business value.

Automate your infrastructure with Red Hat Ansible Automation Platform: redhat.com/ansible

Take advantage of IT automation expertise

Red Hat offers services, training, and certification to help you implement infrastructure automation quickly, effectively, and according to best practices.

Red Hat Services Program: Automation Adoption

Red Hat Training and Certification: Red Hat Ansible Automation Platform

Red Hat