



THE FOUNDATIONS OF INFRASTRUCTURE AS CODE

Accelerate Delivery, Improve Consistency,
and Build a Foundation for AI-Ready Infrastructure



IBM
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A BETTER WAY TO BUILD AND RUN INFRASTRUCTURE

IT teams are being asked to do more with less — and to do it faster. As business executives continue to seize new technology-enabled opportunities, infrastructure management must evolve. From deploying new services to supporting AI initiatives, teams need the flexibility to provision secure, scalable, production-ready environments with minimal delay to keep pace with rapidly changing business requirements.

Cloud-like flexibility and automation are moving deeper into the data center, driven by hybrid architectures, increased use of containers, and AI workloads that require dynamic resource allocation. Static, generic infrastructure won't work in this environment. It must be flexible, repeatable, and tightly aligned with application and business requirements.

Software development teams have long embraced Infrastructure as Code (IaC) as a best practice. It's standard for DevOps teams to spin up environments using code, collaborate through code

repositories, and push changes through automated pipelines. These practices are coming to the data center — and it's a big shift.

IaC is more than just another toolset. It's a new operating model for managing how infrastructure is delivered and maintained — one that brings the speed, consistency, and automation of modern development practices to infrastructure operations.





INFRASTRUCTURE UNDER PRESSURE

Traditional models for provisioning and managing infrastructure simply weren't designed to handle this level of complexity, scale, or pace of change. When a business unit needs to launch a new service or pilot an AI capability, delays in infrastructure delivery can stall momentum. Day 2 operational tasks such as patching, monitoring, scaling, or enforcing compliance are increasingly difficult to manage using manual processes and legacy tooling. As business changes faster than ever, infrastructure teams must find ways to move at the speed of business. Otherwise, the business is forced to move at the speed of legacy infrastructure management.

By shifting from manual configuration to code-based provisioning, IT teams can standardize deployments, embed compliance into the workflow, and manage infrastructure across environments with a single source of truth. IaC is scalable, repeatable, enables version control, and integrates seamlessly with CI/CD pipelines already familiar to DevOps and application teams.

Introducing IaC to your data center doesn't require starting from scratch. However, it does require an automation platform, updated processes, and a restructuring of teams. With the right platform, processes, and training in place, infrastructure teams can unlock the agility and efficiency needed to meet the demands of modern business.

The ultimate goal of IaC is a fully automated environment that can be managed entirely through code. For example, if a team needs to capture logs from a production server every two minutes instead of every ten, an engineer can simply update a configuration file, commit the change to a shared repository, and push it through automated testing and deployment. Within minutes, the new configuration is live — no manual steps required. This level of agility and control is what makes IaC a compelling addition to the data center.



WHAT IS INFRASTRUCTURE AS CODE?

Infrastructure as Code is the practice of managing and provisioning infrastructure through code rather than through manual configuration or interactive tools. IaC is about treating infrastructure the same way developers treat application code: version-controlled, testable, repeatable, and automated.

At its core, IaC enables infrastructure teams to use code to define the desired state of networks, servers, storage, and services. Once defined, those environments can be deployed easily and reliably across environments with minimal manual effort.

Characteristics of IaC

- **Version controlled:** Infrastructure definitions are stored in a code repository, enabling teams to track changes, roll back to previous versions, and audit updates.
- **Automated:** Deployments and updates are triggered through pipelines, which reduces manual steps and the risk of error.

- **Repeatable and consistent:** Infrastructure can be recreated across environments with consistent results.
- **Scalable:** Code-based provisioning allows a single engineer to manage infrastructure at enterprise scale.

Why IaC Matters Now

Many DevOps and cloud teams have already adopted IaC to manage public cloud infrastructure. It's also the way data scientists work and is how most AI initiatives are rolled out. This is why IaC is so important right now. If you want to push the boundaries of innovation, you need flexible infrastructure. As data centers evolve to support containerization, AI, and dynamic workloads, IaC becomes a critical foundation for operational consistency and responsiveness.

In short, IaC is faster to build, easier to manage, and better aligned with modern business and development practices compared with legacy operating models.

BUSINESS BENEFITS OF IAC

As business cycles accelerate, organizations must be able to act on new opportunities quickly. **IaC directly supports strategic business goals by increasing agility, reducing time to value, and enabling more resilient, secure operations.** In fast-changing environments, it gives infrastructure teams the ability to move as quickly as the business demands.



Faster Time to Innovation

The big business benefit for IaC is to go from idea to production-ready infrastructure as quickly as possible. With code-based provisioning and automated pipelines, teams can stand up complete environments in minutes instead of days or weeks. This means IT teams can begin building and testing sooner, accelerating the feedback loop between ideas and results.

Repeatable, Consistent and Scalable

Because infrastructure is versioned and stored in a repository, it can be deployed and redeployed consistently across regions, business units, or environments without manual intervention. This eliminates configuration drift and ensures all environments are built to the same specifications.

IaC also makes it easier to scale infrastructure by allowing teams to replicate known-good configurations and apply them across workloads or geographies, without starting from scratch each

time. As organizations mature using IaC, they can manage larger, more complex environments with greater precision and less effort.

Agility and Flexibility

Infrastructure changes no longer require lengthy planning cycles or individual manual steps. Need to expand an environment, adjust resources, or support a new service integration? Teams can update configuration files, validate them through testing pipelines, and promote those changes to production with confidence.

This level of agility is critical in hybrid environments, where infrastructure may span public cloud, private cloud, and on-prem data centers. IaC provides a unified approach for managing these environments, enabling consistent operations regardless of location.

Embedded Security and Compliance

Infrastructure as Code enables teams to embed security policies and compliance requirements directly into the provisioning process. Role-based access, encryption, and audit trails can be defined in code and applied automatically, reducing the likelihood of misconfiguration. Tools like Terraform and Vault can enforce these controls automatically, ensuring that every environment is created in line with organizational standards.

Operational Efficiency at Scale

With traditional models, infrastructure teams often rely on specialized knowledge of specific platforms or tools — so the pace of delivery is limited by available resources. IaC changes that dynamic. By abstracting the provisioning process and codifying it in reusable modules, teams can manage more infrastructure with fewer people.

Automation also reduces the risk of configuration drift, eliminates redundant work, and supports more effective collaboration across teams. As adoption grows, the benefits compound: more standardization, faster updates, and less time spent troubleshooting.

A Foundation for AI and Modern Workloads

Many AI and analytics workloads require dynamic infrastructure that can be spun up, reconfigured, and scaled quickly. IaC provides the automation and control needed to support these advanced workloads.





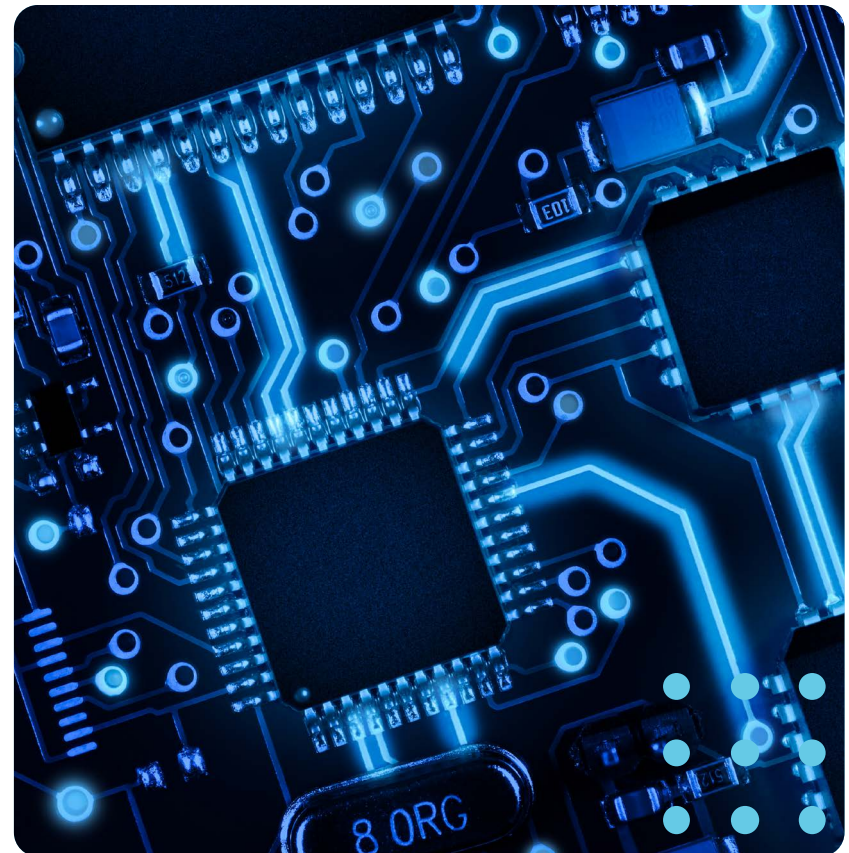
FOUNDATIONAL PILLARS OF IAC WITH IBM

Adopting IaC is about building a foundation that supports automation, repeatability, collaboration, and security at scale. While every organization will approach IaC differently, successful implementations tend to share several core components.

Code Repository: The Source of Truth

The backbone of any IaC implementation is a centralized code repository, which enables multiple team members to work on different aspects of the infrastructure code. This makes the repository a single source of truth for IaC definitions, enabling collaboration, version control, and automated deployment workflows.

Instead of logging into a cloud provider console and setting up a server, connecting storage, and establishing security rules, IT teams can do all that with code. You simply access your repository and run the code to recreate your entire environment.



The process ensures that changes are reviewed, tested, and approved before being deployed. This makes infrastructure delivery faster, safer, and easier to audit.

Code repositories also support stronger governance. Because all changes flow through the repository, teams gain a clear audit trail and a more streamlined path to compliance.

Automation Framework for Deploying Infrastructure

At the heart of any IaC strategy is the automation framework that provisions infrastructure based on the code in the repository.

Terraform, from HashiCorp, is widely used in this role. Terraform simplifies complex, multi-platform provisioning tasks and ensures that all infrastructure adheres to predefined patterns and standards. Its modular design also supports reusability, allowing teams to define infrastructure once and apply it consistently across the organization.

It enables teams to define infrastructure — compute, servers, storage, regardless of where it lives — and deploy it across public clouds, private clouds, or on-prem environments without logging into a console and manually typing or clicking to create or remove a definition. This type of automation can dramatically reduce errors, leading to improved resilience, security, and reliability. Common Day 2 tasks such as applying upgrades and patches can be automated using IaC, along with monitoring tasks.



Secrets Management: Securing the Automation Process

laC works through API calls, so it's crucial to ensure that processes have the proper permissions to secure automated interactions. A secrets management platform such as [HashiCorp Vault](#) plays a critical role in securing laC environments by managing passwords, certificates, API tokens, and sensitive configuration data. As an identity-based security tool, it automatically authenticates and authorizes access to sensitive data. It also supports zero-trust architectures.

Rather than embedding credentials in code or relying on manual distribution, Vault stores secrets centrally and makes them available to automation tools only when needed. This reduces the risk of unauthorized access.

Team Structure and Skills

laC requires a shift not just in tooling, but also in team structures and responsibilities. Traditional infrastructure teams — organized around compute, storage, networking, and other domains — are evolving into platform teams that manage infrastructure as a service.

laC Tools for Advanced Use Cases

As organizations mature in their laC journey, additional tools can be introduced to support more advanced needs. These tools are not required at the outset but provide a more complete landscape of laC solutions that may be useful as infrastructure environments grow in scale and complexity:

- [HashiCorp Nomad](#) for container management and workload orchestration
- [HashiCorp Consul](#) for service mesh, discovery, and network automation
- [IBM Turbonomic](#) as a way to monitor and optimize your environment over time
- [RedHat OpenShift](#) can be used as a container solution
- [Ansible](#) is a powerful, open-source IT automation tool that simplifies configuration management and application deployment





HOW IAC SUPPORTS MODERN OPERATIONS

At its core, modern operations is about being able to fully understand what's going on in your environment through visibility and observability, and having the ability to respond to change quickly and confidently. It aims to deliver secure, scalable infrastructure that aligns with the needs of the business without unnecessary complexity or delay. IaC plays a central role in making this possible and is the end state of modern operations: a fully automated environment that can be managed entirely through code.

IaC enables infrastructure teams to build environments that can be tested and deployed automatically to unlock faster delivery cycles and better alignment between infrastructure and applications.

IaC is more than a provisioning tool. It's the foundation for an operating model that enables speed and consistency across all phases of infrastructure management. IaC enables teams to define once and deploy many times, while maintaining full control over the state of the environment.

Supporting AI and Complex Workloads

Many modern workloads — especially AI workloads that run on top of containers — require infrastructure that is dynamic and scalable — something you can't achieve with point-and-click provisioning. Managing these environments through manual processes is slow, error-prone, and ultimately unsustainable.

IaC enables the kind of elasticity and responsiveness these workloads demand. When a new model needs to be trained or an AI pipeline needs to scale, IaC ensures that infrastructure can be deployed and updated as easily as pushing a code change. For organizations investing in AI, IaC isn't just helpful — it's essential.





BARRIERS TO ADOPTION AND HOW TO NAVIGATE THEM

Implementing IaC involves a shift in mindset, skill sets, and operating models. It requires a new structure that supports automation and platform thinking. So, the most significant hurdle is often organizational.

A New Way of Working

IaC isn't a minor change — it's a new way of working. For teams accustomed to managing infrastructure through individual consoles and change control processes, the shift to automation and code-based workflows can be a major adjustment.

In many cases, infrastructure professionals are being asked not just to adopt new tools, but to develop new skills: coding, version control, automation pipelines, and collaboration with developers. Agile methodologies such as scrums and iterative sprints should also become part of the operating rhythm for infrastructure teams. It's a different rhythm—and one that takes time to adopt.





Skills and Resource Constraints

The demand for IaC-related skills often outpaces what's readily available. Organizations may find it difficult to hire experienced Terraform, GitOps, or DevOps engineers. Upskilling existing staff is essential, but it takes time, training, and support.

In addition, teams that lack experience implementing IaC across an enterprise may not be aware of common pitfalls that can be easily avoided. When you don't know what you don't know, an outside partner can make a big difference in the pace of adoption and the results.

Team Restructuring and Role Clarity

Successful adoption often requires rethinking how infrastructure teams are structured. Traditional roles such as network, storage, and compute specialists are increasingly being integrated into cross-functional platform teams responsible for delivering infrastructure as a product.

This restructuring can introduce uncertainty about responsibilities, tools, and workflows. Without clear guidance, teams may struggle to align around a unified approach, which can stall or fragment adoption efforts.



Perception of Cost and Complexity

The upfront investment in time, training, and tooling can feel like a barrier, especially for organizations managing tight budgets. In reality, IaC reduces long-term operational costs by improving consistency, automating manual tasks, and enabling faster recovery from failure. But realizing those benefits requires investment, commitment, and a thoughtful rollout strategy.

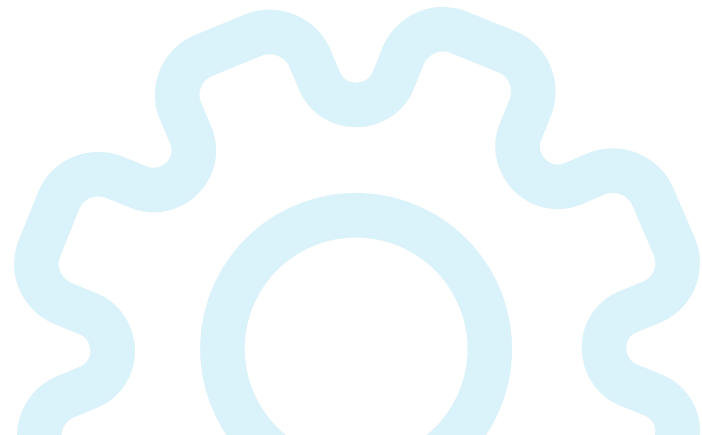


Overcoming the Barriers

Organizations that succeed with IaC tend to take a phased approach:

- **Start small:** Pilot IaC in a specific environment or for a well-scoped use case
- **Build internal champions:** Identify early adopters and support them with training and time to experiment
- **Document and share:** Develop standard patterns and reusable modules to guide broader adoption
- **Leverage external expertise:** Bring in experienced partners to accelerate success, identify blind spots, and transfer knowledge

Adoption takes time, but the payoff can be substantial: faster delivery, improved reliability, and a more modern operational model that aligns infrastructure management with the pace of business.



WHAT'S NEXT FOR IAC

As IaC adoption accelerates across industries, organizations are beginning to extend IaC practices to more advanced workflows and integrate them with emerging technologies like AI and machine learning.

AI-Enhanced Infrastructure Management

AI is beginning to play a role in optimizing IT environments. For example, IBM Watson AIOps can detect drift from the desired state, identify performance anomalies, find patterns and deliver predictive insights based on telemetry, and trigger automated remediation workflows. It can also help write automation playbooks and even draft IaC code.

These AI-driven capabilities are still maturing, but they point to a future in which infrastructure becomes increasingly self-optimizing and able to respond dynamically to workloads, performance data, and business policy.

Infrastructure *from* Code

A new concept beginning to gain traction is infrastructure from code, where the infrastructure required to run an application is generated automatically from the application code itself. While this idea is still nascent, it reflects the growing expectation that infrastructure should adapt to the needs of developers, not the other way around.





■ ■ ■ ■ ■ ■ ■ HOW IBM AND EVOLVING SOLUTIONS CAN HELP

For organizations looking to adopt or expand their use of IaC, Evolving Solutions offers practical, hands-on support.

Our team brings deep experience in both IBM and HashiCorp ecosystems and understands how to align automation strategies with real-world business requirements.

Our typical engagement is structured in three phases:

- 1. We get you started** — Our experts lead the initial implementation based on your environment and priorities.
- 2. You shadow us** — Internal teams participate and begin to take on responsibilities with guidance.
- 3. You lead, we support** — Your teams take full ownership while our team provides ongoing support and advisory.

This phased approach helps ensure short-term success and supports long-term sustainability through skills transfer, documentation, and alignment with best practices. Whether you're just starting your IaC journey or scaling across a complex, hybrid environment, we can help you move faster, avoid common pitfalls, and deliver consistent results.





Why Evolving Solutions

Our team members are among the most experienced in the industry with decades of experience and real-world experience in systems administration, architecture, security, and operations, which gives us a unique understanding of our clients' challenges and opportunities.

As IT operations experts, we understand the entire IT environment and are uniquely qualified to help organizations optimize for business value, including the knowledge and experience to help organizations get real value from IaC.

Let's Get to Work!

The path forward starts with a clear strategy, the right tools, and a team empowered to adopt a new way of working. With the right guidance, any organization can successfully adopt IaC over time.

Let us help you get started down the right path

