



Red Hat

NetApp®



Simplify application deployment and operation with containers



Deploy applications rapidly, simply, and consistently

Red Hat, Cisco, and NetApp offer a modular, validated FlexPod solution to support application modernization. This solution delivers full-stack automated operations, including:

- ▶ Cluster deployment
- ▶ Scaling
- ▶ Management
- ▶ Day 2 tasks

Accelerate IT services with containers

IT is a critical asset for today's digital organizations. As a result, IT teams need to deliver IT infrastructure and services quickly and simply across complex hybrid environments to support rapid development and deployment workflows. They also need to modernize applications and workloads to better engage customers, partners, and employees and achieve business goals.

Hybrid and multicloud environments, cloud-native applications, and containers are key components in the journey to successful digital operations. Kubernetes-based container application platforms can help your organization modernize and transform effectively and efficiently. Container architectures bring together everything needed – including application executables, microservices, libraries, and configuration files – on shared infrastructure. Speed and accuracy are essential, so it's important to choose a container platform that delivers performance, consistency, flexibility, and security.

Even so, integrating these platforms into complex IT environments yourself can be difficult and time consuming. When moving to a container-based application platform, you must reassess how you perform common operations and manage security and compliance, while researching, testing, and integrating each component together.

As industry leaders and experts, Red Hat, Cisco, and NetApp bring innovative, tested, and integrated joint solutions to market, saving your organization time and money. We work together to incorporate the latest technologies, validate integrations, update solutions and reference architectures, and train support engineers to help your teams keep pace with changing technology and approaches. Our container-based converged infrastructure solution reduces IT complexity and risk while increasing agility and innovation. The [Cisco and NetApp FlexPod Data Center for Red Hat® OpenShift® Container Platform solution](#) combines compute, networking, storage, containers, and management to support application modernization in hybrid and multicloud environments. Powered by Kubernetes, our solution makes it easier to deploy exactly what you need – from a few workloads to tens of thousands of containers – when you need it.

Fully modular and validated, FlexPod Data Center for Red Hat OpenShift Container Platform solution simplifies infrastructure deployment to ease the burden on IT teams. The solution incorporates design best practices to ensure compatibility between all components. With high availability, streamlined deployment, and automated, cost-effective Day 2 operations, you can support a wide range of use cases and workloads. No matter where you are on your container journey, the solution provides benefits and helps your organization move forward at your own pace.

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Take advantage of industry leadership

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Simplify container adoption with an integrated, validated solution architecture

Our integrated, validated solution simplifies container adoption, deployment, and operations, so your teams can focus on innovation and business value. It supports the entire Red Hat software-defined stack and aligns with Red Hat, Cisco, and NetApp best practices for standardized, highly available, and scalable architectures. Developer-friendly workflows, open application programming interfaces (APIs), built-in continuous integration and continuous delivery (CI/CD) pipelines, and source-to-image capabilities accelerate application development and deployment. The cloud-ready design and automated life cycle management streamline installation, administration, and updates across the application platform, container host, Kubernetes clusters, and application services. Like all [FlexPod](#) solutions, this solution offers high availability, rich data management and protection capabilities, cost-effectiveness, and support for a wide range of workloads. Finally, a cooperative support model with Cisco Solution Support ensures issues are resolved quickly.

The FlexPod Data Center for Red Hat OpenShift Container Platform solution provides a complete architecture that includes:

- ▶ [Cisco Unified Computing System™ \(Cisco UCS®\) X-Series](#) modular blade and rack servers.
- ▶ [Cisco Nexus® 9000 Series](#) and [Cisco MDS](#) switches.
- ▶ [Cisco UCS 6000 Series](#) fabric interconnects.
- ▶ [Cisco Intersight®](#) IT operations platform.
- ▶ [NetApp AFF A-Series](#) and FAS flash storage arrays.
- ▶ [NetApp ONTAP](#) data management software.
- ▶ [NetApp Astra](#) Control and Trident software.
- ▶ [Red Hat OpenShift Container Platform](#).

These components are integrated, validated, and automated wherever possible, allowing you to deploy the solution quickly and economically while eliminating many of the risks associated with researching, designing, building, and deploying similar solutions in-house. Each component provides key capabilities for the overall solution. Cisco UCS servers, switches, and interconnects deliver efficient datacenter infrastructure, including high-density compute, storage capacity, and networking. Cisco Intersight simplifies infrastructure configuration and visibility across clouds. NetApp all-flash storage arrays offer superior performance, flexibility, and data services to manage and protect critical data. NetApp ONTAP simplifies data management across hybrid and multicloud environments, while NetApp Astra provides application-aware data management for applications running in Kubernetes environments.

Red Hat OpenShift is a unified, enterprise-ready application platform that delivers full-stack automated operations to manage multicloud and hybrid cloud deployments. Powered by containers, Kubernetes, and DevSecOps capabilities, it provides a foundation for rapidly building, deploying, running, and managing both existing and new applications at scale and with security across hybrid and multicloud environments. Red Hat OpenShift empowers your staff to modernize, transform, and innovate to support business initiatives. It runs consistently across hybrid and multicloud environments, giving you the tools, services, and capabilities you need to be successful today and in the future. Integration with FlexPod simplifies the deployment and management of the container infrastructure and extends the benefits of automation to the entire stack.

The solution also integrates with other technologies to ease adoption and deployment in your existing environment. Cisco Intersight works with NetApp Active IQ Unified Manager and VMware vCenter to provide monitoring, orchestration, and workload optimization for bare-metal, virtualized, and storage layers within the FlexPod infrastructure. With a modular architecture, Cisco Intersight also lets you add more services, like Intersight Workload Optimization and Intersight Cloud Orchestrator, as needed.

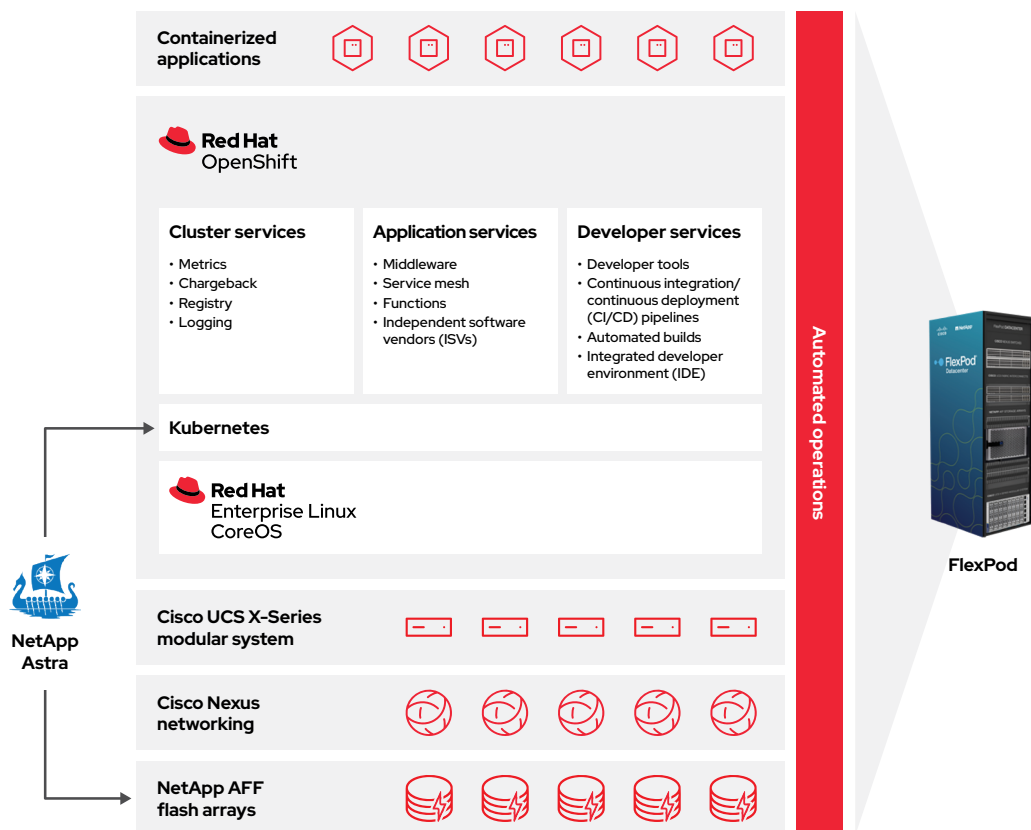


Figure 1. The Cisco and NetApp FlexPod Data Center for Red Hat OpenShift Container Platform solution combines compute, networking, storage, containers, and management to support application modernization in hybrid and multicloud environments

Consolidate and optimize IT resources

81% of IT organizations consider ensuring spend efficiency to be either somewhat or very much a challenge.¹ FlexPod Data Center for Red Hat OpenShift Container Platform simplifies IT infrastructure and allows you to consolidate your workloads and optimize costs. IT teams can deliver more workloads and services while managing fewer servers and components. Powerful cluster management and orchestration tools with multitenant capabilities let you share resources amongst applications and environments while maintaining isolation. For example, Red Hat OpenShift integrates architecture, processes, platforms, and services while ensuring workloads and containers cannot impact each other. Regardless of where you deploy – in your enterprise datacenter, at the edge, or in a hybrid or multicloud environment – Red Hat OpenShift provides everything needed to quickly and simply provision, isolate, run, and protect your applications and workloads, including an enterprise-grade Linux® operating system, container runtime, monitoring, container registry, authentication, and authorization services.

Gain flexibility and agility

Nearly 1 in 5 IT leaders say that a lack of agility in their IT technology is a barrier to digital innovation within their organization.² With FlexPod Data Center for Red Hat OpenShift Container Platform, your IT teams can rapidly deploy and deliver systems and services to developers and end users. The [Cisco Validated Design](#) provides a verified reference architecture with detailed design and implementation guidance to help IT administrators quickly deploy containers with less risk. When more resources are needed, you can scale and repurpose servers without needing to adjust software or networking capabilities or interrupt operations. Add, upgrade, or scale compute, network, and storage resources to support multiple deployments or deliver greater performance and capacity. Built-in automation and management tools help you consistently deploy, monitor, and administer your IT infrastructure. IT staff can simply define profiles and the solution automatically configures infrastructure as needed. Automation also makes common, error-prone manual configuration tasks more repeatable and consistent while reducing staff time and effort.

Developers can also take advantage of integrated, certified tools, development environments, and self-service capabilities to code at speed and improve consistency throughout application life cycles. [Red Hat OpenShift Dev Spaces](#) and a [command-line interface \(CLI\)](#) give developers fast, consistent, zero-configuration development environments, while maintaining centralized control for IT operations. [Red Hat OpenShift Serverless](#), [Red Hat OpenShift Service Mesh](#), and [Red Hat Application Services](#) offer self-service access to the runtimes, frameworks, API management, data streaming, and event-driven services that developers need to be productive. As a result, your organization can focus on innovation and strategic business objectives.

Accelerate application performance

Application performance can drastically impact end user experience and customer satisfaction. FlexPod Data Center for Red Hat OpenShift Container Platform provides a high-performance foundation for your applications. The Cisco UCS X-Series modular system provides a future-ready design with cloud-based management to efficiently support your workload and scalability requirements. [Intel® Xeon® Scalable processors](#) in Cisco UCS servers include up to 60 cores per socket to deliver excellent scalability and compute and memory channel performance.

¹ Flexera. "[Flexera™ 2022 Tech Spend Pulse](#)," July 2022.

² Nash Squared. "[Nash Squared Digital Leadership Report 2022](#)," November 2022.



This solution also provides high-performance storage. NetApp AFF A-Series all-flash storage arrays offer high performance, flexibility, data services, and cloud integration to help you manage and protect critical data across on-site datacenters and hybrid cloud environments. These storage arrays support both non-volatile memory express (NVMe) over fibre channel (NVMe/FC) and over Transmission Control Protocol (NVMe/TCP). Consistent, sub-millisecond latency and up to 11.4 million input/output operations per second (IOPS) accelerates data access for users and applications.

Support more data

64% of digital IT leaders cite big data and analytics as technologies that will give their organization a competitive advantage.² With flexible configuration, FlexPod Data Center for Red Hat OpenShift Container Platform lets you take advantage of storage technology improvements to speed applications and reduce storage management time, effort, and costs. With NetApp ONTAP, you can cluster storage and scale up to 24 nodes in on-site datacenters or tiered in private or public cloud environments. This powerful data management software includes inline data compression, deduplication, and compaction, and works with other NetApp solutions to snapshot, replicate, clone, and encrypt data.

Simplify management

Improving operational efficiency is a top priority for organizations.² FlexPod Data Center for Red Hat OpenShift Container Platform simplifies infrastructure, container, and application management. As the cloud-based management platform for Cisco UCS servers, Cisco Intersight extends compute to anywhere you need it, at any scale. A single interface simplifies resource configuration and visibility to help you reduce costs and mitigate risk. An artificial intelligence (AI) powered recommendation engine helps you configure resources according to best practices and connection to the Cisco Technical Assistance Center (TAC) allows the software to open service requests for any issues found. Cisco Intersight Workload Optimization continuously analyzes workload consumption, costs, and compliance constraints and automatically allocates resources in real time. It helps you determine when, where, and how to move and resize workloads, and lets you quickly model infrastructure and workload growth scenarios.

NetApp Astra Trident simplifies and automates persistent volume provisioning for containerized deployments. It monitors volumes, selects storage according to characteristic and cost requirements, and presents composable storage infrastructure to containerized workloads. It also provides advanced data management capabilities for increased deployment flexibility.

NetApp Astra Control offers storage and application-aware data management services for stateful workloads deployed in Kubernetes on-site and in hybrid cloud environments. It enhances data life cycle administration with automatic management of persistent storage; creation of application-aware, on-demand snapshots and backups; and migration of applications and data between Kubernetes clusters.

Key use cases for FlexPod Data Center for Red Hat OpenShift Container Platform

You can deploy the FlexPod Data Center for Red Hat OpenShift Container Platform for a wide range of workloads and use cases across industries.

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Industry	Use cases
Financial services	<ul style="list-style-type: none"> ▶ Detect fraud faster. ▶ Enhance customer services.
Energy	<ul style="list-style-type: none"> ▶ Optimize field operations. ▶ Improve worker safety.
Automotive	<ul style="list-style-type: none"> ▶ Create and deploy autonomous driving technologies. ▶ Automate component testing.
Government and public sector	<ul style="list-style-type: none"> ▶ Improve information management. ▶ Enhance critical decision support. ▶ Configure and manage storage infrastructure. ▶ Simplify operations. ▶ Automate provisioning and administration for cloud workloads. ▶ Speed server onboarding and application delivery.
Healthcare	<ul style="list-style-type: none"> ▶ Increase clinic and hospital efficiency. ▶ Improve diagnostics.
Telecommunications	<ul style="list-style-type: none"> ▶ Improve customer services. ▶ Optimize network operations.
Manufacturing	<ul style="list-style-type: none"> ▶ Predict equipment failures. ▶ Perform preventative maintenance.
Organizations working with cloud-native microservices across all industries	<ul style="list-style-type: none"> ▶ Restore applications to a known-good state on demand with point-in-time snapshots that include configuration details and full-copy application backups taken on a predefined schedule. ▶ Migrate and move applications across Kubernetes clusters or within the same cluster using clones. ▶ Customize applications with defined <i>quiesce</i> states that make use of execution hooks. ▶ Automate application-level disaster recovery by configuring a business continuity plan for your containerized applications.

Learn more

FlexPod Data Center for Red Hat OpenShift Container Platform can help your organization modernize and transform applications to succeed in a digital world. Learn more:

- ▶ [FlexPod solutions](#)
- ▶ [FlexPod Datacenter for Red Hat OpenShift Container Platform design guide](#)
- ▶ [FlexPod Datacenter for Red Hat OpenShift Container Platform and NetApp Astra design guide](#)
- ▶ [Red Hat and Cisco partnership](#)
- ▶ [Red Hat and NetApp partnership](#)



About Red Hat

Red Hat is the world’s leading provider of enterprise open source software solutions, using a community-powered approach to deliver reliable and high-performing Linux, hybrid cloud, container, and Kubernetes technologies. Red Hat helps customers develop cloud-native applications, integrate existing and new IT applications, and automate and manage complex environments. [A trusted adviser to the Fortune 500](#), Red Hat provides [award-winning](#) support, training, and consulting services that bring the benefits of open innovation to any industry. Red Hat is a connective hub in a global network of enterprises, partners, and communities, helping organizations grow, transform, and prepare for the digital future.

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