

Simplify Deployment and Operations of Containerized Applications

What if you could accelerate, simplify, and eliminate errors when deploying containerized applications?

Cisco, NetApp, and Red Hat provide a fully modular, validated, FlexPod solution to support application modernization through the entire lifecycle of a Red Hat OpenShift deployment, including automating cluster deployments, simplifying scaling and management, and streamlining day 2 operations.

As part of digital transformation and IT modernization, organizations are adopting hybrid cloud and multicloud environments, deploying cloud-native applications, and embracing the containerized application model to improve performance. The growing use of containerized applications on Kubernetes clusters delivers benefits such as scalability, agility, and speed. With all these changes taking place, many IT teams struggle to manage these complex environments, reduce risk, and simplify their operations.

The FlexPod Data Center for Red Hat OpenShift Container Platform solution can simplify infrastructure deployment and help ease the burden on IT teams. We provide a validated, integrated data center architecture that incorporates compute, storage, and network design best practices to ensure compatibility between various components. Our solution provides high availability and flexible, cost-effective operations that support a wide variety of use cases and workload types.



Trends and challenges

Faster IT services with containers

Delivering IT infrastructure and services faster, seamlessly, and across complex hybrid environments seems to be a common request from today's digital organizations. Reasons include the need to accelerate application development and delivery and enhance CI/CD workflows and practices.

Deploying containers allows everything that is needed—application executables, microservices, libraries, and configuration files—to be stored together on shared infrastructure. Because speed is the new scale, it's important to deploy containers on a platform that's built to perform and does not require your IT staff to spend extensive amounts of time provisioning all the components (computing, networking, storage, containers, and management) to work together. Our converged infrastructure solution provides the automation features you need to reduce complexity, lower risk, and increase agility.

Whether you need a few or tens of thousands of containers managed by Kubernetes clusters, we make it easy to deploy what you need, when you need it. The Cisco and NetApp FlexPod Data Center for Red Hat OpenShift Container Platform solution combines these technologies into a solution that supports application modernization in a multicloud or hybrid cloud environment.

Key customer benefits

- **Integrated, Cisco® validated solution** that supports the entire Red Hat software-defined stack and aligns with Cisco, NetApp, and Red Hat best practices for a standardized, highly available, and scalable architecture
- **Accelerated application development and delivery** from developer-friendly workflows, open APIs, built-in continuous integration and continuous delivery (CI/CD) pipelines, and source-to-image capability so you can go straight from application code to container
- **Automated life cycle management** from streamlined installation, simplified management, hybrid cloud-ready design, and push-button updates for the platform, container host, Kubernetes cluster(s), and application services
- **Cooperative support model** with Cisco Solution Support and support for component monitoring, solution automation and orchestration, and workload optimization

How it works/ Key features/ Components

The [FlexPod](#) Data Center for Red Hat OpenShift Container Platform solution is a pre-designed, integrated, fully modular, and validated architecture for your data center that includes Cisco Unified Computing System™ (Cisco UCS®) modular, blade, and/or rack servers, Cisco Nexus® 9000 Series and Cisco MDS switches, Cisco UCS 6000 Series Fabric Interconnects, Cisco Intersight® Infrastructure Manager, NetApp AFF and FAS flash storage arrays, NetApp ONTAP software, NetApp Astra Control Center, and Red Hat OpenShift Container Platform, shown in Figure 1. FlexPod solutions provide high availability with no single points of failure, deliver rich data management and protection capabilities, maintain cost-effectiveness, and support a wide variety of workloads.

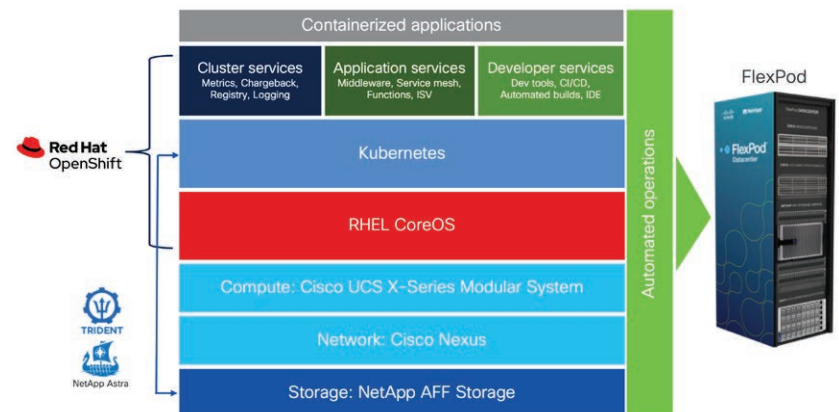


Figure 1 FlexPod Datacenter for Red Hat OpenShift Container Platform Solution Stack

The solution supports organizations wherever they are on their IT modernization journey. [Red Hat OpenShift Container Platform](#), an enterprise-ready Kubernetes platform, delivers full-stack automated operations to manage multicloud and hybrid cloud deployments. It improves developer productivity with a self-service platform on which to build and run containerized applications. With Red Hat OpenShift Container Platform, you can quickly start creating new cloud-native applications, enable existing applications for the cloud, or spawn an environment for a new microservice in minutes. Integration with FlexPod simplifies the deployment and management of the container infrastructure and extends the benefits of automation to the entire stack.

Additional integrations include Cisco Intersight® with NetApp Active IQ Unified Manager and, if required, VMware vCenter to deliver monitoring, orchestration, and workload optimization capabilities for three layers (bare metal, virtualization, and storage) of the FlexPod infrastructure. The modular nature of the Cisco Intersight platform also provides an easy upgrade path to additional services, such as Intersight Workload Optimization and Intersight Cloud Orchestrator.

Maximize resources through increased consolidation

With this solution, your IT staff can consolidate more workloads onto fewer servers so there are fewer components to buy and manage. Safely sharing these IT resources requires strong application isolation capabilities so that one application environment does not impact another. Built on proven open-source technologies, Red Hat OpenShift Container Platform integrates architecture, processes, platforms, and services, and provides a powerful cluster management and orchestration system for multitenant environments. Whether you need to deploy in your enterprise data center, at the edge, or in a hybrid cloud/multicloud environment, Red Hat OpenShift Container Platform provides everything you need: an enterprise-grade Linux operating system, container runtime, monitoring, container registry, authentication, and authorization solutions, to quickly and easily provision, isolate, run, and secure environments and applications.

Gain agility

This integrated solution takes the guesswork out of making components work together and perform. Your IT staff can deploy systems faster—and your users can access agile application development resources faster—so that you can focus on strategic business objectives. The verified reference architecture with detailed design and implementation guidance helps reduce risk and guesswork by giving your IT administrators and architects a guidebook for implementation. By following the guidelines provided in the [Cisco Validated Design](#), your staff can quickly deploy the containers they need to get work done.

When more resources are needed, you can scale and repurpose systems without having to adjust your software or your networking capabilities or interrupt operations. You can easily add or upgrade computing, network, or storage resources, or scale out if you need multiple consistent deployments (adding more integrated systems) for greater performance and capacity. With built-in automation and powerful tools, you can consistently deploy, monitor, and manage your IT infrastructure and better support your development teams. Your IT staff simply defines profiles, and the solution automatically configures the infrastructure as needed. By automating layers of repeatable and error-prone manual configuration that your IT staff likely performs today, you can consistently deliver applications and services in less time and with end-to-end consistency.

Accelerate applications

The [Cisco UCS X-Series Modular System](#) provides a future-ready design with cloud-based management, allowing for much faster and efficient response to workload and scalability requirements.

The Cisco UCS servers used in a FlexPod solution are powered by Intel Xeon Scalable processors, delivering up to 60 cores per socket for superior performance and scalability. The CPUs provide excellent memory channel performance.

Processing isn't the only thing that's fast in this solution. The [NetApp AFF A-Series All Flash Arrays](#) deliver the industry's highest performance, superior flexibility, and best-in-class data services and cloud integration to help you manage and protect your business-critical data on-premises and across hybrid clouds. It supports both NVMe over fibre channel (NVMe/FC) and NVMe over TCP (NVMe/TCP) with the industry's lowest latency for an enterprise all-flash array and accelerates data access, with up to 11.4 million I/O operations per second (IOPS) and consistent sub-milliseconds latency.

Support more data

Infrastructure configuration is flexible and allows you to take advantage of storage improvements to accelerate applications and reduce the burden on your IT staff and budgets. And with NetApp ONTAP software, you can cluster storage and scale up to 24 nodes, use it on-premises, or tier it to a private or public cloud. 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 for end-to-end security and protection.

Simplify management

[Cisco Intersight](#) cloud-based infrastructure management as a service extends computing to anywhere you need it, at any scale. A single interface delivers simplified configuration and visibility of resources, helping to reduce costs and mitigate risk. Cisco Intersight is the management platform for the Cisco UCS X-Series Modular System.

A recommendation engine can tell you when you vary from best configuration practices, and a connection to the Cisco Technical Assistance Center (TAC) enables the software to automatically open service requests should problems arise. [Cisco Workload Optimization Manager](#) continuously analyzes workload consumption, costs, and compliance constraints and automatically allocates resources in real time. You can determine when, where, and how to move and resize workloads, and quickly model infrastructure and workload growth scenarios.

[NetApp Astra Trident](#) automates the persistent volume provisioning process for containerized deployments. It monitors volumes, selects storage with varied characteristics and costs, and presents composable storage infrastructure to containerized workloads without complexity. It enables advanced data management capabilities to provide storage deployment flexibility for your containerized applications.

[NetApp Astra Control Center](#) offers storage and application-aware data management services for stateful Kubernetes workloads deployed on-premises and in hybrid cloud environments. Astra Control enhances your data lifecycle management capabilities with such features as automatic management of persistent storage, creation of application-aware, on-demand snapshots and backups, and migration of applications and data between Kubernetes

Trust a proven platform

These components are integrated and validated, and—where possible—the entire stack is automated so that you can deploy the solution quickly and economically while eliminating many of the risks associated with researching, designing, building, and deploying similar solutions from the ground up. FlexPod is trusted worldwide to help organizations like yours deliver better infrastructure. Let us show you how.



Use cases

Industry	Use case description	Industry	Use case description
Financial Services	<ul style="list-style-type: none"> • Detect fraud faster • Enhance customer services 	Telecommunications	<ul style="list-style-type: none"> • Improve customer services • Optimize network operations
Energy	<ul style="list-style-type: none"> • Optimize field operations • Improve worker safety 	Manufacturing	<ul style="list-style-type: none"> • Predict equipment failures • Perform preventative maintenance
Automotive	<ul style="list-style-type: none"> • Create and deploy autonomous driving technologies • Automate component testing 	General: Customers working with cloud-native microservices	<ul style="list-style-type: none"> • Point-in-time application representation with snapshots of containerized applications, including configuration details, for application restoration to a known good state • Full copy application backups taken on a predefined schedule, for on-demand restoration • Application portability and migration with clones, across Kubernetes clusters or within the same cluster • Customize application consistency by defining “quiesce” states by leveraging the execution hooks • Automate application-level disaster recovery by configuring a business continuity disaster recovery plan for your containerized applications
Government/ 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 • Accelerate server onboarding and application delivery with automated workflows 		
Healthcare	<ul style="list-style-type: none"> • Increase clinic and hospital efficiency • Improve diagnostics 		

FlexPod as a service aligns IT with your business needs

With a flexible consumption model, you can match IT costs to usage and make changes as your business grows. You avoid large up-front capital outlays and free up resources for other needs. FlexPod as a service allows you to choose the delivery model that best suits your business, customize your IT to match the dynamic tech landscape, and gain financial flexibility. You benefit from speed, agility, and scale with cloud-like economics. [Learn more.](#)

Financing to help you achieve your objectives

Cisco Capital® can help you acquire the technology you need to achieve your objectives and stay competitive. We can help you reduce CapEx. Accelerate your growth. Optimize your investment dollars and ROI. Cisco Capital financing gives you flexibility in acquiring hardware, software, services, and complementary third-party equipment. And there’s just one predictable payment. Cisco Capital is available in more than 100 countries. [Learn more.](#)

FlexPod: Power and flexibility for DevOps deployments

FlexPod is a trusted, secure solution that unleashes the potential of your DevOps environments and accelerates application development and delivery.

- Simplify container deployments
- Secure the environment and your data

Cisco UCS X-Series: Improve efficiency in your data center

This modular system, designed for today's applications, provides the functionalities of both blade and rack servers: compute density, storage capacity, and expandability.

- Adapt to any application
- Reduce power consumption and operating costs

Red Hat OpenShift Container Platform: Create and manage containers

Red Hat OpenShift Container Platform is a complete application platform for both traditional and cloud-native applications, built on Kubernetes, enabling faster development and release life cycles for application modernization.

- User-friendly console
- Enhanced visibility across multiple deployments

Three industry leaders working together

Cisco, NetApp, and Red Hat bring innovative, tested, and pre-integrated joint solutions to market, saving you the time and expense of integrating and validating multiple technology vendors. They work together to update solutions and reference architectures, incorporate the latest technologies, validate integrations, and train support engineers so you can keep pace with technological change. Their solution, designed to meet the needs of modern applications and processes, supports the deployment of containerized applications in hybrid cloud environments.

Learn more

Visit our website and solution pages:

- [Red Hat and Cisco partner site redhat.com](https://www.redhat.com/en/partners/cisco)
- [Cisco and NetApp: FlexPod](https://www.netapp.com/resources/cisco-flexpod)
- [Red Hat and NetApp partner site at netapp.com](https://www.netapp.com/resources/red-hat)
- [Cisco-RedHat-FlexPod Design Guide](#)
- [FlexPod Datacenter with Red Hat OpenShift Container Platform and NetApp Astra Design Guide](#)



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