



# FlexPod Overview

## Introduction

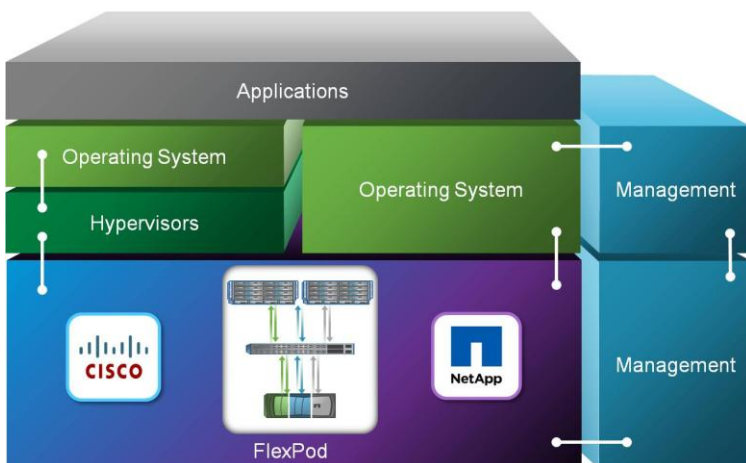
Business leaders are laying out clear mandates for their IT departments as they navigate the current economy. IT infrastructure has to consolidate to save energy costs, and it has to host more applications, share resources across different departments, and become more secure.

Chief information officers (CIOs) translate these requirements into fewer data centers and consolidated server, networking, and storage resources that can host multiple applications shared by diverse departments. They want IT to operate as a service, like large public service providers.

Cisco and NetApp have developed the FlexPod platform to meet these demanding requirements.

FlexPod is a data center platform that hosts infrastructure software and business applications in virtualized and bare-metal environments. The platform has been tested and validated across leading hypervisors and operating systems from VMware, Red Hat, and Microsoft and can be managed by FlexPod ecosystem partner software (Figure 1).

**Figure 1.** The FlexPod platform



## Value Proposition

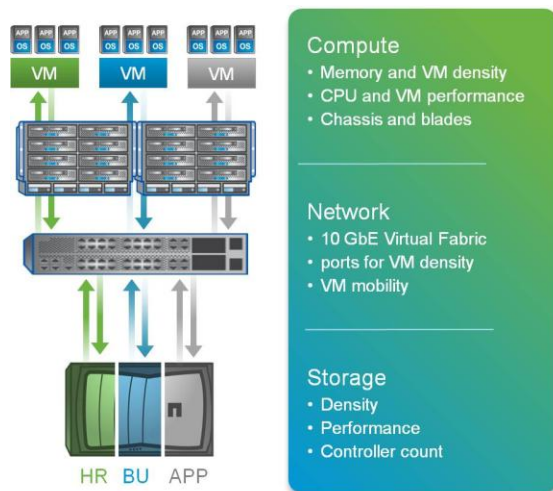
FlexPod combines servers, storage resources, and the network fabric to create an agile, efficient, and scalable platform for hosting applications. FlexPod allows hardware to be abstracted into service profiles, resulting in a very agile platform. The platform is configured and tested with industry-leading virtualization and native OS environments using the Cisco® Validated Design methodology. The resulting design guides are used by FlexPod partners and Cisco and NetApp service teams to deploy the platform across many different industries. FlexPod is delivered with a unique set of programmable interfaces that allow automation of deployment, fault monitoring, and use-based billing.

## FlexPod components

FlexPod builds on the core capabilities of both the Cisco and NetApp portfolios of industry-leading products (Figure 2):

- Cisco Unified Computing System™ (Cisco UCS™): Deploys high-performance, expanded-memory server architecture
- Cisco Nexus® switching: Converges Fibre Channel and Ethernet on a unified 10 Gigabit Ethernet fabric.
- NetApp storage: Provides storage access through Network File System (NFS) and Common Internet File System (CIFS) using Small Computer System Interface over IP (iSCSI) or Fibre Channel over 10 Gigabit

**Figure 2.** FlexPod system components



Servers on FlexPod can be deployed quickly because FlexPod allows server characteristics to be abstracted into service profiles. Service profiles can be mapped very quickly to physical servers, in contrast to traditional approaches that require manual configuration for every change.

This abstraction also allows FlexPod to operate as a highly efficient private cloud platform. Servers can be provisioned on a project-by-project basis and return to the server pool rapidly after their use. The provisioning of these servers can be controlled by the administrator role, and the use of the platform can be metered for chargeback purposes.

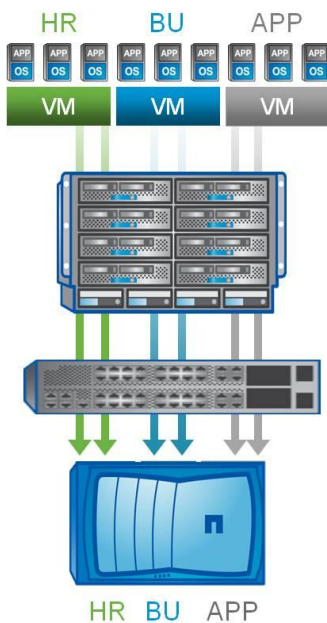
FlexPod's capability to abstract server, network, and storage characteristics into profiles also allows multiple workloads to share hardware while maintaining separation of application and data.

This approach results in greater utilization of resources compared to traditional server deployments.

*“In the past, because we needed at least six hours to deploy code out to our Web servers, we were only able to make changes once a day. Today, we use Cisco UCS service profiles, NetApp rapid cloning, and our custom orchestration tool to deploy or update as many as 60 virtual servers in less than 30 minutes. And it’s all automated—we’ve replaced a complicated, mistake-prone 100-step runbook process with push-button code deployments that are bulletproof and complete 92% faster.” —Andy Lapin, chief architect, Kelly Blue Book*

FlexPod enables its computing, networking, and storage resources to be securely partitioned through the use of service profiles and APIs. This feature allows multiple enterprise clients and applications to share FlexPod in a mutually exclusive way (Figure 3).

**Figure 3.** FlexPod multi-tenant capability



*“The FlexPod validated data center solution built on a flexible, shared infrastructure is a much better way of doing IT. It’s cost effective and makes it easy to add storage, plug in additional blades, assign new server profiles, and bring up new multi-tenant environments. End-to-end secure multi-tenancy also dramatically simplifies compliance.”*

*—Clayton Sikes, AZDES server virtualization specialist*

Many data centers are designed to run virtualized servers to gain application workload agility and better hardware resource utilization. Other data centers need to support non-virtualized servers. Either design can greatly benefit from FlexPod’s service profiles, unified virtual networking, and APIs.

The FlexPod management ecosystem of solution developers delivers solutions that streamline the deployment of FlexPod, orchestrate service delivery, and enable self-service IT.

## FlexPod case studies

FlexPod was introduced by Cisco and NetApp in November 2010. Since then, the platform has been adopted rapidly by enterprises seeking to deploy virtual desktops, an agile platform for hosting enterprise applications, or software-as-a-service (SaaS) delivery platforms.

### Virtual Desktop infrastructure

Virtual desktop infrastructure (VDI) benefits IT administrators by reducing maintenance costs, improving security, and simplifying data backup. It benefits end users by allowing them to access their workspaces across a wide range of devices and geographies. It benefits the business by prolonging the life of existing desktops and enabling applications to be deployed across newer platforms such as phones and tablets.

Enterprises adopting VDI have to contend with greater deployment and management complexity in the data center. This complexity increases the cost of the solution and has to be amortized over a larger number of desktops.

FlexPod allows enterprises to gain the full benefits of Citrix XenDesktop 5's agility and flexibility at the platform layer.

Citrix XD 5 specifies a certain amount of memory to support a certain number of users. Each additional server deployed results in greater capital expenditures (CapEx) and operating expenses (OpEx). FlexPod has more memory per server and allows administrators to run more virtual desktops per server with superior end-user performance.

More servers also implies more network adapters, connections, and configuration complexity. FlexPod's unified fabric reduces the number and types of adapters, cables, configurations, and management tools required.

In addition, a fast data center network is needed to help ensure simultaneous broadcasting of the OS to multiple desktops. FlexPod's unified fabric coupled with a Cisco Nexus data center network leading to the WAN provides several optimizations that help ensure low latency.

### Dominion Enterprises

Dominion Enterprises is a marketing services company that provides cloud-based advertising and management software and magazines for multiple industries: apartments, power sports, employment, automotive, real estate, and travel. The company has grown organically as well as through numerous strategic acquisitions—and almost every acquisition has come with its own IT infrastructure. Traditionally, Dominion's various media and information services business units have operated independently, with little centralized influence over their IT choices. The result was an infrastructure composed of multiple data centers and a wide range of products from various server, networking, and storage vendors.

Managing the production infrastructure was resource intensive, with many storage and server vendors involved. Power and cooling costs were mounting due to server and storage sprawl, and new initiatives often required deployment of additional physical servers, slowing time to market and increasing expenses. Thirty-two Cisco UCS blade servers, part of the overall FlexPod deployment, are the backbone of Dominion's virtualized solution, with 10 Gigabit Ethernet providing highly scalable, high-density connectivity to increase overall speed and performance. Dominion Enterprises has consolidated Microsoft SQL Server and Oracle databases through VMware, as well as applications such as Microsoft Great Plains, and is continuing to virtualize other applications and databases with great success as well.

## Cloud-based services: Radiant Communications

Radiant Communications is Canada's largest independent business-to-business broadband service provider, with more than 4000 business customers. A few years ago, Radiant realized that it faced a limitation. Its services stopped at the edge of the enterprise infrastructure.

Radiant wanted to offer cloud-based services that extended into the enterprise: computing power, application hosting, disaster recovery, and even complete virtual data centers. For service delivery, Radiant required a flexible platform that could scale easily and quickly with changes in demand. In addition, the service delivery platform had to be easy to learn and manage. When Radiant learned about the secure multi-tenancy offering from Cisco, VMware, and NetApp, the company saw a way to meet these challenges. In the final analysis, it was the reference architecture that swayed Radiant's decision.

"VMware vShield Zones, Cisco VN-Link, and NetApp MultiStore—these technologies drive the secure end-to-end solution that is core to Radiant's value proposition for cloud-computing services," says Jason Leeson, vice president for advanced hosting. The secure multi-tenancy architecture has given Radiant a valuable sales tool: credibility. "We tell our prospective customers that we're running a solution that has been validated by Cisco, VMware, and NetApp. It shows them that we have an enterprise-class offering backed by enterprise-class vendors."

*"As one of the largest independent business-to-business Internet service providers in Canada, we needed to expand our cloud hosting business with an additional data center and were looking to improve our services. Using Cisco and NetApp FlexPod for VMware, we now have a flexible and efficient shared IT infrastructure that scales easily and quickly, allowing us to deploy highly secure, multi-tenant cloud-based services on demand."*

*—Jason Leeson, vice president, advanced hosting, Radiant Communications*

## Enterprise Applications

### SAP

With the SAP Adaptive Computing concept and Adaptive Computing Controller, you can easily move SAP systems from a virtualized server to a physical server. The SAP Adaptive Computing Controller system enables SAP systems to be started, stopped, and relocated using manual, scheduled, or mass operations. The aim of SAP Adaptive Computing is to replace the previously inflexible link between the operating system and the SAP system with a central storage system and resource sharing. Resource sharing is enabled by organizing the system landscape into building blocks, which allows the system landscape to respond with great flexibility to current demands. FlexPod for SAP is designed to support this capability.

A typical SAP customer environment today consists of a variety of SAP Business Suite and SAP NetWeaver components. Processes such as tests of application patches, performance and data integrity tests, and user training all require several copies of SAP components. These copies must be refreshed, often weekly or monthly. The creation of an SAP system copy normally takes several days, and many of the steps involved in creating the copy are manual, so they consume valuable IT staff time.

Secure multi-tenancy for SAP allows organizations to clone individual SAP systems or complete SAP landscapes and to separate each clone securely from its source. In addition to standard SAP system copies including postprocessing specific to SAP, organizations now can run the cloned systems with the same system identifiers (SIDs) as the source. The isolation of these clones is assured by FlexPod, Cisco TrustSec® security, and VMware vShield on the server and network levels.

"FlexPod, now available in support of SAP applications, brings the power of the Cisco and NetApp FlexPod solution to our customers, providing them with a proven, flexible IT infrastructure that enables them to build secure private clouds. Organizations can now scale SAP solution-based landscapes on demand, helping them be ready for the future and capitalize on new growth opportunities."

—Kevin Ichhpurani, senior vice president, business development and strategic alliances, SAP

## Oracle

Data powers essentially every operation in a modern enterprise, from keeping the supply chain operating efficiently to managing relationships with customers. Oracle Real Application Clusters (RAC) brings an innovative approach to the challenges of rapidly increasing amounts of data and demand for high performance. Oracle RAC uses a horizontal scaling (or scale-out) model that allows organizations to take advantage of the fact that the price of one-to-four-socket x86-architecture servers continues to drop while their processing power continues to increase. The clustered approach allows each server to contribute its processing power to the overall cluster capacity, enabling a new approach to the management of cluster performance and capacity.

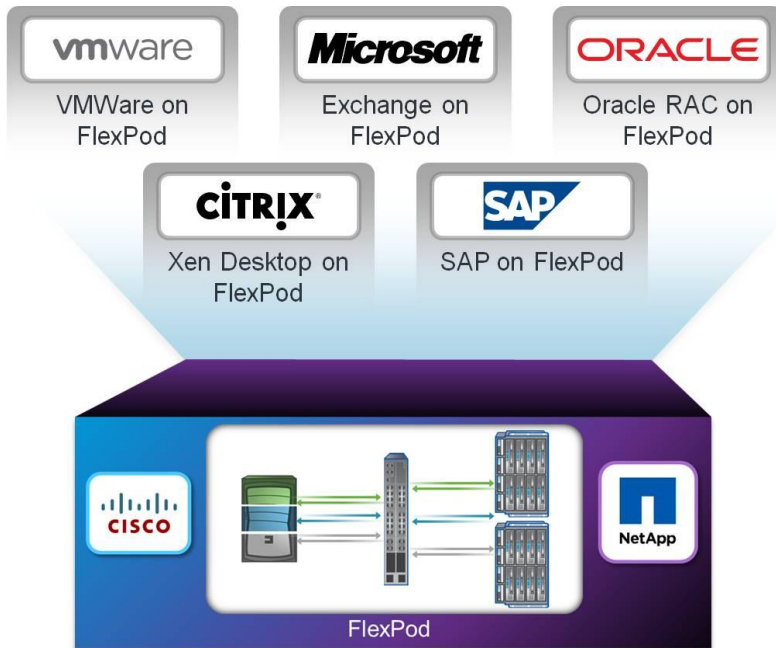
All components in an Oracle RAC implementation must work together flawlessly, and Cisco and NetApp have worked closely together to create, test, and validate a configuration of Oracle RAC on FlexPod. This configuration provides an implementation of Oracle Database 11g Release 2 with RAC technology consistent with industry best practices. To provide storage and data management capabilities, this architecture uses NetApp Fabric-Attached Storage (FAS) unified storage systems with SAS drives and state-of-the-art flash cache to further accelerate performance and provide space-efficient snapshots, disaster recovery, and cloning capabilities. Since the entire cluster runs on a single cohesive system, database administrators no longer need to painstakingly configure each element in the hardware stack independently. The system's computing, networking, and storage-access resources are essentially stateless and are provisioned dynamically by Cisco UCS Manager.

## Microsoft

The Microsoft Hyper-V Cloud Fast Track program combines Microsoft software; consolidated guidance; validated configurations from original equipment manufacturer (OEM) partners for computing, networking, and storage resources; and value-added software components.

A Microsoft Hyper-V host cluster is a group of independent servers that work together to increase the availability of applications and services. The clustered servers (called nodes) are connected by physical cables and by software. The FlexPod architecture provides the underlying unified storage, computing, and networking capabilities to make each Microsoft Hyper-V cluster perform beyond the benchmarks.

A Microsoft Hyper-V cloud consists of at least two Microsoft Hyper-V host clusters. The first consists of at least two nodes and is referred to as the management cluster. The second and any additional clusters are referred to as host clusters. Each host cluster can contain up to 16 nodes. Host clusters require some form of shared storage such as a Fibre Channel or iSCSI SAN. The Microsoft Hyper-V cloud can use the scalability of the FlexPod model to allow the deployment of complete private clouds (Figure 4).

**Figure 4.** Enterprise workloads on FlexPod

## Deploying and supporting FlexPod

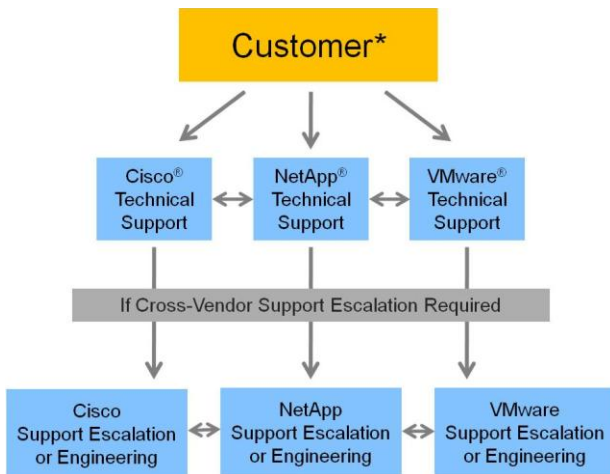
### Deployment Model

As IT departments hurry to implement business mandates to improve customer experience, there is a growing need to deploy FlexPod with speed and accuracy. The role of professional services takes on increasing importance, and Cisco and NetApp have engaged selected, certified solution partners—more than 120 partners worldwide—to offer services for FlexPod. Partners undergo extensive training in how to deploy FlexPod and how to optimize its scale and configuration flexibility to enable clients to address both current and future phases of their strategic IT plans. Both FlexPod customers and FlexPod certified partners can use NetApp and Cisco professional services experts to support their FlexPod deployment efforts and their larger IT infrastructure and data center transformation services needs.

### FlexPod Support

NetApp and Cisco share a long history of support collaboration to resolve our joint customer's technical issues. With the launch of the FlexPod platform, NetApp and Cisco have established cooperative support, with a strong, scalable, and flexible support model to address the unique support requirements of the FlexPod converged infrastructure platform. The cooperative support model uses the combined experience, resources, and technical support expertise of NetApp and Cisco to provide a streamlined process for identifying and resolving a customer's FlexPod support case—regardless of where the problem resides. Backed by joint training of technical support teams, joint technology investments, strong cross-company support engineer and management relationships, and documented escalation processes, NetApp and Cisco are committed to accelerating resolution of a customer's FlexPod support issue.

Figure 5. FlexPod support model



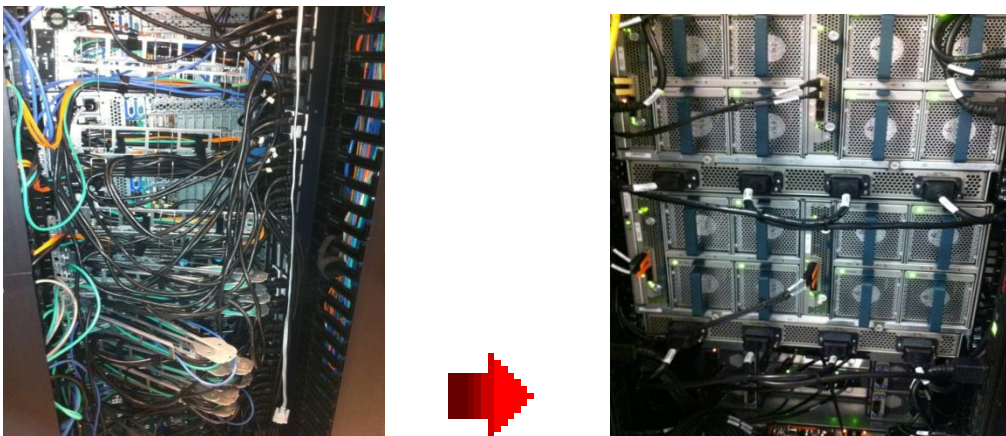
*"Another very important factor in our decision (to choose FlexPod) was the partnership between Cisco and NetApp, and their mutual commitment to support... Whenever a Cisco UCS firmware update becomes available, NetApp already knows whether we need to also upgrade our Data ONTAP 7G operating system. The free flow of information between Cisco and NetApp is advantageous, because it saves us the time to research compatibility issues for upgrades."*

*—Bart Falzarano, chief information security officer, the Walz Group*

### Enterprise response to FlexPod

CIOs want to support virtual desktops, mobile devices, and applications delivered over the public cloud. Delivering these capabilities while lowering cost and improving agility requires data centers built on an agile and efficient platform. FlexPod delivers this platform and more (Figure 5).

Figure 6. Demonstrating FlexPod simplicity





*"If you look at the hybrid cloud market that all of us are running toward, a common architecture is really critical for that virtualized infrastructure and moving from one geographic location to the next. It's really an architectural play at the core. FlexPod is a key component of that architecture. For cloud enablers like INX, I see the FlexPod [design] as an accelerator to that space. "*

*—Jonathan Groves, vice president of professional services, INX*

*"By integrating best-in-class, a complementary technology, this platform compounds the benefits of the individual components to deliver unprecedented agility, efficiency, and cost savings."*

*—Brian Denton, chief technology officer, ExamWorks, Inc.*

## For More Information

Public information is available on the [Cisco FlexPod webpage](#) and [NetApp FlexPod webpage](#). Additionally, Cisco maintains a full list of FlexPod Cisco Validated Designs on the [FlexPod Design Zone webpage](#), and you can find three-way resources including VMware at <http://www.imaginevirtuallyanything.com/us>.

You can follow FlexPod on Facebook at [www.facebook.com/flexpod](http://www.facebook.com/flexpod).

You can also consult the following solution guides and white papers:

- [FlexPod for VMware Solutions Guide](#)
- [FlexPod for VMware Deployment Model](#)
- [FlexPod in Support of SAP Applications](#)

Also see the following blogs:

- [Cisco Channels blog](#)
- [Cisco Data Center Networks blog](#)
- [NetApp's Tim Waldron's "Tim's Tales" blog](#)
- [Vaughn Stewart's storage blog](#)