

The Right Platform for Database and Application Deployments

Cisco HyperFlex Systems and Microsoft SQL Server



Simplify

- Use preintegrated clusters that are fast to deploy, simple to manage, and easy to scale



Respond

- Deliver results faster with a solution that provides fast access to growing volumes of data



Optimize

- Take advantage of always-on inline compression, deduplication, and monitoring



Perform

- Eliminate bottlenecks with a system that securely distributes and optimizes data across scalable servers and storage tiers

Our solution offers the capacity and performance you need to reduce IT sprawl and deliver insight faster and at less cost.

If your organization is like most, Microsoft SQL Server databases are used throughout your operation. Maybe you rely on these databases for online transaction processing (OLTP), data warehousing, or batch processing. Perhaps you use business intelligence, online analytical processing (OLAP), or report generation tools. Most likely, you use a mix of these systems. Whatever the workloads, your databases need to perform if they are going to be able to give your business applications and users fast access to information.

Cisco HyperFlex Systems and Microsoft SQL Server

As computing and storage resources are added to accommodate and process growing volumes of data, your IT organization can be left with a sprawling complex of databases and infrastructure. That's when performance starts to decline and costs start to rise. Cisco HyperFlex™ systems running Microsoft SQL Server deliver the scalability and performance you need at a price you can afford. Our solution is fast to deploy, simple to manage, and easy to scale and secure, making it a trusted platform that won't get in the way of running your business.

“HyperFlex’s approach ensures high performance of Microsoft SQL and Oracle databases and critical applications with faster delivery of the environment, lower costs, and more effective management.”

Edivaldo Rocha
CEO, CorpFlex

Read the [case study](#).

Innovative foundation

These innovative systems combine software-defined computing in the form of Cisco Unified Computing System™ (Cisco UCS®) servers and software-defined storage with the powerful Cisco HyperFlex Data Platform software. The result is a cluster that powers up and configures itself quickly to accept your application, database, and other workloads.

Innovation does not end at the server. Our hyperconverged solutions place added emphasis on the network, as storage I/O makes significant east-west traffic demands. When you investigate hyperconverged offerings, choose one whose roadmap includes innovation across computing, storage, and network components, improving the entire system: Cisco HyperFlex systems.

Fast deployment

Time is money. Cisco HyperFlex systems are delivered as a preintegrated cluster that is up and running quickly. Integrated management detects new components, allowing this self-aware and self-integrating system to adapt quickly to changes in hardware configuration. This is made possible through Cisco UCS. Within the system, every aspect of a node’s identity, configuration, and connectivity can be set through software. This capability significantly increases efficiency and security, and reduces deployment time. From unboxing to being ready to run a workload, nothing deploys more quickly than Cisco UCS.

Proven performance

Driving performance at the end user level requires a holistic approach in designing your solutions. Simply adding low-latency storage is not enough. This is why we designed HyperFlex systems to have balanced and high performance. Configurations using All Flash and All NVMe nodes, together with our standard high-bandwidth, low-latency network and fast computing, supports consistent high performance even for large databases. Our configurations allow you to run your database and applications on one platform and get predictable performance every time.

All Flash storage

The All Flash storage devices are combined into a single distributed, multitier, object-based data store that allows all cluster resources to participate in I/O responsiveness. A purpose-built, high-performance, scale-out file system dynamically distributes data across the data store. As you scale the cluster, every new and existing component contributes processing power and storage capacity. When every cluster resource can participate in I/O responsiveness, you experience faster results.

All NVMe storage

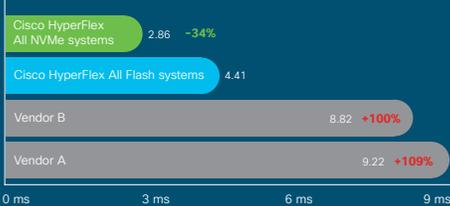
All NVMe configurations take these same benefits one step further by providing even greater IOPS with lower latency and greater density. This makes Cisco HyperFlex All NVMe systems ideal for ultra latency-sensitive databases and applications.

Stunningly fast

Aggregate I/O operations per second (IOPS)
(higher is better)



Total latency (lower is better)



Source: [Enterprise Strategy Group](#)

All NVMe Nodes

- Intel® Optane™ SSD DC cache and Intel 3D NAND SSD capacity
- Fastest solution for ultra-latency sensitive databases
- HyperFlex innovations and Intel® Volume Management Device (VMD) enhance reliability, availability, and serviceability for NVMe storage
- Intel Optane technology reduces write cache cost per terabyte

Performance and efficiency

- Cisco HyperFlex Acceleration Engine improves performance and efficiency in the data center with faster and lower-latency data compression operations. More compression makes more efficient use of storage resources for databases.

Performance at every layer

When Microsoft SQL Server virtual machines can access all of the resources in the cluster, performance skyrockets. Why does this matter? The databases and applications within your virtual machines need massive amounts of east-west traffic bandwidth and low latency to handle bursts of application and user activity. With our solution, you get a solution designed to eliminate bottlenecks.

- **Fast response:** The data platform is built on a log-structured file system that uses a caching layer to accelerate read requests and write responses optimized for flash-based storage media. Incoming data is striped across the number of nodes you define to meet your data availability requirements. When data is added or updated, the system simply appends a new block and updates the metadata, requiring little use of the server's processors. Data being moved from cache to disk is deduplicated and compressed. This process occurs after the write operation is acknowledged, so there is no performance penalty for these operations. In addition, we store the most frequently used data in the caching layer to accelerate read operations.
- **Access to capacity and bandwidth:** The distributed architecture allows every virtual machine to use the storage input/output operations per second (IOPS) and capacity of the entire cluster, regardless of physical location.
- **Fast storage and networking:** All Flash and All NVMe configurations

and high throughput at the networking layer deliver fast access to large databases and consistent performance.

- **Fast fabric interconnects:** Our integrated networking provides high-bandwidth, low-latency, deterministic connectivity that carries all production IP, hyperconvergence-layer, and management traffic over a single set of cables.
- **Consistent network performance:** All traffic reaches any other node in the cluster with only a single network hop, accelerating east-west traffic.
- **Security:** Every connection in the cluster is treated as its own microsegment, with the same level of security as if it were supported with a separate physical link, making the integrated network more secure.

Stunningly fast

The Enterprise Strategy Group tested Cisco HyperFlex Hybrid, All Flash, and All NVMe systems using HCIBench, an industry-standard tool that tests the performance of hyperconverged clusters. Months of baselining and iterative testing using various read/write profiles and block sizes showed that Cisco HyperFlex systems handle more I/O—and handle it faster—than other tested platforms.

Storage efficiency

The HyperFlex Data Platform optimizes storage tiers for an excellent balance between price and performance, delivering an environment that exceeds most

database service-level agreements (SLAs). Data is continuously optimized with real-time, always-on deduplication, compression, and optional encryption, helping reduce your storage costs without affecting performance. Dynamic data placement in server memory, caching, and capacity tiers increases application performance and reduces performance bottlenecks.

Easy scalability

Independent scaling allows you to match the resource needs of your Microsoft SQL Server environments. You can start small and scale to support hundreds or thousands of users and petabytes of data. As you add nodes to the cluster to expand capacity, data is automatically rebalanced across shared resources. Using thin provisioning, you can size your data store larger than the cluster and expand the solution as your databases grow.

Integrated network fabric

In many platforms, networking is an afterthought. In contrast, Cisco UCS fabric interconnects give you a single point of connectivity that lets you use Cisco HyperFlex nodes and Cisco UCS servers together—a feature that no other hyperconverged vendor offers. After deployment, you can scale the cluster to its maximum size without needing to redesign the network.

As your environment grows and begins to span your enterprise, you can use Cisco® Application Centric Infrastructure (Cisco ACI™) to implement a software-defined network. Cisco ACI provides automated, policy-based

network deployment that secures your applications within isolated containers. The network can attach directly to virtual machines and physical servers with increased security, real-time monitoring and telemetry, and automated performance optimization. You can interconnect your entire data center network, integrating your hyperconverged cluster into your existing infrastructure, and achieve consistency at scale.

High data availability

Your enterprise applications and databases must be available all the time. The system replicates data across nodes based on policies that you set to meet your data availability requirements. You can even replicate data to local or remote clusters for backup or disaster-recovery purposes. In the unlikely event of a failure, systems configured with five or more nodes can keep running even if all drives fail on two nodes simultaneously. And the cluster automatically recovers. In the event of a drive or node failure, lost data is regenerated using the redundancy mechanisms built into the system. Plus your administrators can perform system maintenance tasks without disruption. That's a database deployment you can count on.

Unified management helps reduce costs

IT management shouldn't be an afterthought. All Cisco UCS platforms, including Cisco HyperFlex systems, have embedded model-based management. Automation is

Continuous workload performance

When software makes the right workload decisions in real time, your teams benefit. Cisco Workload Optimization Manager is a real-time decision engine. It continuously analyzes workload consumption, costs, and compliance constraints and automatically allocates resources in real time so that your databases and workloads get the resources they need when they need them. You can:

- Validate that workload requirements are met
- Use optimization analysis to better place workloads in the cluster
- Understand the amount of hardware your databases and workloads actually need
- Increase workload density
- Improve application response times

controlled through the Cisco UCS management API by higher-level tools that allow you to configure a cluster in minutes, with no risk of configuration creep or noncompliant settings. You can choose from a set of unified management tools (Figure 1).

- **Cisco HyperFlex Connect:** This intuitive, HTML 5-based management tool is device independent, giving you access to all cluster features through any device, anywhere. All cluster data platform features can be managed through this interface.
- **Cisco Intersight™ software as a service:** This cloud-based management gives you instant access to all of your clusters, regardless of where they are deployed. High-level resource inventory and status are provided by Cisco Intersight dashboards. A

recommendation engine helps you proactively respond to impending issues such as the need to scale capacity. Install edge deployments simply by claiming your nodes in the interface and the platform will configure a cluster remotely. Drill down into data platform operations and you have exactly the same control as Cisco HyperFlex Connect provides—except that you do not have to host management software and you always have the most up-to-date versions.

- **Hypervisor management integration:** Cisco HyperFlex management integrates with both Microsoft Windows 2016 Hyper-V and VMware vCenter. This level of management integration enables you to manage the lifecycle of virtual machines—including storage management—without leaving the interface familiar to your administrators. These

management tools include Microsoft System Center Virtual Machine Manager (SCVMM), Microsoft Hyper-V Manager, and a VMware vCenter plug-in.

Get the most out of your databases and applications

There are many ways that our solution can help your business.

Infrastructure refresh and database migrations

If your applications and databases run on infrastructure that is due for a refresh, explore Cisco HyperFlex systems. The solutions you thought required traditional converged architecture often can run on higher-performing hyperconverged systems that are easy to manage and less costly to

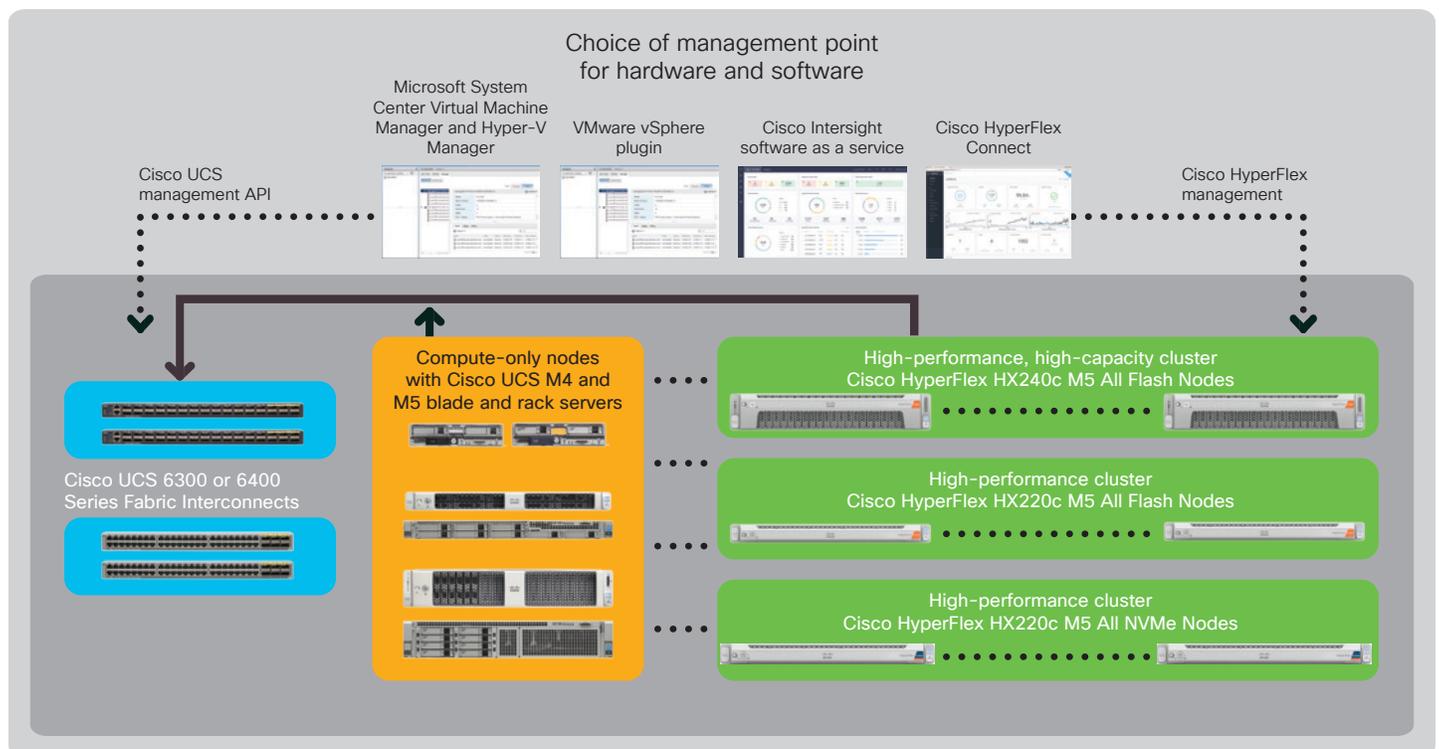


Figure 1 The Cisco HyperFlex product family is supported by a choice of unified management tools

Next steps

Read the Cisco Validated Design [Cisco HyperFlex All-Flash Systems for Deploying Microsoft SQL Server Database](#).

Read the Enterprise Strategy Group report [Mission-critical Workload Performance Testing of Different Hyperconverged Approaches on the Cisco Unified Computing System Platform \(UCS\)](#).

Read the Enterprise Strategy Group report [Mission-critical Hyperconverged Workload Performance Testing on Cisco HyperFlex All NVMe with Intel Optane DC SSD](#).

Read [Hyperconvergence for Enterprise Apps](#) at-a-glance.

Read [All NVMe At a glance](#)

For more information

- [Cisco HyperFlex systems](#)
- [Microsoft solutions](#)

operate. Indeed, migrating your existing databases to Microsoft SQL Server running on Cisco HyperFlex systems can give a boost to your existing mission-critical applications that use those databases. Your applications and users will benefit from the impressive capacity and performance improvements across CPU, memory, disk, and system I/O.

Private and hybrid clouds

Integration with Cisco ACI and Cisco Enterprise Cloud Suite make it easy to create a hybrid cloud based on Cisco HyperFlex systems. Your customers and clients can use the software's integrated service catalog to order application-local infrastructure customized the way they need it within the constraints that you determine. And when you need to augment capacity to handle periodic workload peaks, you can use a policy-based approach for engaging third-party public cloud services.

Managed services

Using applications and Microsoft SQL Server databases that run in a cloud built on Cisco HyperFlex systems can help your IT staff accelerate service delivery and lower costs. You can also tap into the high availability delivered by dedicated staff at a managed services provider.

What can you expect?

Customers tell us that the move to Cisco HyperFlex systems running Microsoft SQL Server delivers many benefits, including:

- Increased database availability
- Accelerated response times
- Lower latency for critical database and application systems
- Reduced storage footprint
- Reduced total cost of ownership

Get started

We make it easy to get started with hyperconverged infrastructure. Using our Cisco HyperFlex sizing tools, you can determine which configuration is the right starting point for your workload. You can also take the risk and guesswork out of deployment with our Cisco Validated Design guide for deploying Microsoft SQL Server Database on Cisco HyperFlex All Flash and All NVMe systems. The time is right for you to deploy high-performance databases that support your applications at any scale.