



Optimize Your Microsoft SQL Server 2019 Database

With Cisco UCS and HyperFlex systems

Give your updated Microsoft SQL Server 2019 database and associated applications industry-leading performance, reduced complexity, and support for future initiatives by deploying them on Cisco UCS® and Cisco HyperFlex™ systems.

Every major software update enables more features and benefits for your business. It also requires more of your infrastructure. Maintaining response times for queries and transactions with Microsoft SQL Server 2019 can be challenging—unless you have infrastructure that has been proven effective to deliver the best Microsoft SQL Server performance from x86-architecture systems.

To reduce complexity in your environment, you will want to standardize on Microsoft SQL Server 2019 wherever you possibly can. You will also want to standardize on a platform that has superior support for your applications and databases. This will reduce the number of management interfaces your staff have to learn and interact with.

Highlights

- **Best performance:** Consistently demonstrates the best performance on Microsoft SQL Server tests.
- **Flexible infrastructure:** A foundational platform for your current and future database and application modernization.
- **Simple:** We give you consistent simplified orchestration and management.

Cisco UCS blade and rack server solutions

Cisco UCS B200 M5 Blade Server



Delivers an excellent price/performance ratio in a fully-managed blade-server form factor. This

enterprise-class server offers market-leading performance, versatility, and density without compromise for your database workloads.

Cisco UCS C240 M5 Rack Server



The Cisco UCS C240 M5 Rack Server is a

2-socket, 2-Rack-Unit (2RU) rack server offering industry-leading performance and expandability. It supports a wide range of storage and I/O-intensive infrastructure workloads, from databases, big data, and analytics to collaboration.

Cisco UCS C480 ML M5 Rack Server



The Cisco UCS C480 ML M5 Rack Server is a purpose-built

server for AI/ML workloads. It is storage- and I/O-optimized to deliver industry-leading performance for machine learning.

Migrating to a new database enables a re-examination of outstanding IT issues to see if new solutions can address them. Issues such as workload balancing across your data center, enforcement of IT policies, determining when unauthorized patches are loaded, ensuring SQL Server licensing enforcement, and business and IT process mapping may now have a proven solution that can be easily implemented.

Additionally, many companies are ramping up their artificial intelligence (AI), machine learning (ML), and big data capabilities. You probably want to be sure both your database and supporting infrastructure can support these initiatives quickly and easily.

We have both converged and hyperconverged infrastructure solutions to support all these requirements with Cisco Unified Computing System™ (Cisco UCS) and Cisco HyperFlex systems.

Flexible infrastructure

Cisco UCS and HyperFlex systems are an excellent foundation for all your applications and initiatives. Both Cisco UCS and HyperFlex systems are intelligent infrastructures that simplify operations and accelerate application deployment in physical and cloud-computing environments. They are entirely programmable, using unified, model-based management. This enables you to more easily and quickly deploy enterprise applications—bare-metal, containerized, and

virtual—such as Microsoft SQL Server 2019. Our infrastructures deliver, from the core to the edge, massive and simplified scaling to quickly move with your business, and reduced complexity with service profiles that allow you to deploy one or thousands of systems identically in a matter of minutes.

All Cisco UCS servers can be configured with higher clock-rate processors that have a lower core count. This can help lower licensing costs for Microsoft SQL Server 2019 without sacrificing computing power.

Cisco UCS

Cisco UCS is a key component of our converged infrastructure solutions that enables you to choose which enterprise-class storage you want to configure together with your Cisco servers and networking. Cisco UCS servers are stateless, delivering a highly flexible server environment that allows dynamic use of server hardware. The unified I/O infrastructure uses a high-bandwidth, low-latency unified fabric to support networking, storage I/O, and management traffic. This increases performance, security, and manageability by extending the fabric directly to servers and virtual machines. You can choose to deploy SQL Server 2019 as either bare metal or virtualized. Cisco UCS offers an array of rack-optimized servers with 2nd Gen Intel® Xeon® Scalable processors to help lower your SQL Server licensing investment.

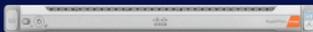
Cisco HyperFlex systems

Cisco HyperFlex HX220c M5 All NVMe Nodes



If you need to facilitate real-time business intelligence, start with infrastructure that can accelerate your database performance. Cisco HyperFlex HX220c M5 All NVMe Nodes combine the simplicity of hyperconverged infrastructure (HCI) with exciting new levels of performance. Using Intel Optane™ technology, HyperFlex All NVMe provides unmatched virtual-machine density and the capability to power the most performance-sensitive workloads.

Cisco HyperFlex HX220c M5 All Flash Nodes



Cisco brings the power and performance of all-flash storage to the HyperFlex family. Based on Intel Xeon Scalable processors, these fifth-generation servers have faster processors, more cores, and faster and larger-capacity memory than previous-generation servers. In addition, they can also utilize Intel 3D XPoint nonvolatile memory, which can be used as both storage and system memory, increasing your virtual server configuration options and flexibility for applications.

Cisco and Microsoft have worked to create [Cisco Validated Designs](#) built on Microsoft reference architectures. All solutions and reference architectures are field tested and validated to help simplify the implementation and deployment of SQL Server workloads on Cisco UCS.

Cisco UCS Manager

Together, Cisco and Microsoft provide an integrated management experience for both bare-metal and virtual workloads. [Cisco UCS Manager](#) provides flexible, standards-based management tools and interfaces through a comprehensive, open API that works with and extends the Microsoft System Center suite of tools. Cisco UCS Manager supports the entire Cisco UCS server and Cisco HyperFlex series hyperconverged infrastructure portfolios. Cisco UCS Manager enables:

- **Consistent setup and reduced service calls and downtime:** Best-practice server setup is captured in a service profile housed in the systems' fabric interconnects. This enables servers to be set up exactly the same, which reduces human error and enables fast redeployment of applications to meet availability and seasonal changing needs.
- **Ability to add a new instance in minutes, not hours or days:** Add new instances of SQL Server quickly, leveraging Cisco and Microsoft best practices and drastically cutting the time normally required for database setup.

- **Immediate testing if a workload is CPU- or memory-constrained:** Perform “what if” system resource testing by moving workloads within the system to help determine performance bottlenecks without leaving your data enter.
- **Automatic application of profile when a new server is added to your system:** Adding new server nodes is painless because preferred service profiles are automatically loaded when a new server is placed into the system rack and cabled to the fabric interconnects.
- **Quickly scale up or out:** You can easily meet cyclical business IT requirements as your business needs change by simply adding another server that can be used for a short period then quickly repurposed, if needed, for another application through the simple application of a different service profile.
- **Rolling upgrades:** SQL Server instances running on two servers can be migrated to a new version one server at a time, thus ensuring access to your critical data during the migration process.

Cisco HyperFlex systems

Cisco HyperFlex systems is our hyperconverged infrastructure solution that delivers 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.

Cisco HyperFlex systems, continued

Cisco HyperFlex HX240c M5 All Flash Nodes



With all-flash-memory storage

configurations and a choice of management tools, Cisco HyperFlex systems are deployed as a preintegrated cluster with a unified pool of resources that you can quickly provision, adapt, scale, and manage to efficiently power your databases and your business. This system delivers excellent high-performance to high-capacity databases.

AI/ML support

If AI/ML initiatives are in your future, both Cisco UCS and HyperFlex systems support graphic processing units (GPUs) to add focused computing support to your project. With Cisco HyperFlex, you can scale your computing independently by adding compute-only nodes with GPUs. This will give you ultimate flexibility and control of your environment.

Cisco HyperFlex offers a variety of flexible hyperconverged infrastructure configurations to meet your business needs. For your business-critical needs, you can count on the performance and availability of Cisco HyperFlex all-flash and all-NVMe clusters. Physically, the system is delivered as a cluster of three or more nodes that are integrated into a single system by a pair of Cisco UCS 6200 or 6300 Series Fabric Interconnects.

Your Microsoft SQL Server 2019 database and associated applications can gain:

- **Storage efficiency:** You can choose between hybrid, all-flash, and all-NVMe storage technologies to meet your business demands and price point. The Cisco HyperFlex HX Data Platform creates and 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, deduplication, compression, and optional encryption, helping reduce your storage costs without affecting performance.
- **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.

- **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.
- **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.

Big data support

When performing big data analytics, one of the most expensive operations with regards to efficiency and processing time is moving data in and out of memory. This is compounded when a server experiences a failure and needs to reboot, thereby flushing standard DIMM memory. Microsoft SQL Server 2019 now supports persistent memory. Persistent memory enables you to maintain data within memory for faster access. This capability, combined with Cisco UCS support for Intel Optane DC persistent memory, enables even more memory density than standard DIMMS; it is also nonvolatile memory, which means if there is a reboot, the data remains in memory. This enables you to process very large amounts of data in a much shorter amount of time.

Microsoft SQL Server 2019 also supports Apache Spark and Hadoop Distributed File System (HDFS) to store massive amounts of data and access it quickly.

Excellent performance

Once again Cisco has delivered the best [TPC-H performance using Microsoft SQL Server 2019](#) (Figure 1) with a 30TB result of 1,278,277 TPC-H composite query-per-hour performance (QphH) and about \$0.94 \$/QphH. This excellent performance result was delivered by a Cisco UCS C480 M5 30TB rack server running Red Hat Linux 8.

TPC-H is a decision-support benchmark. It consists of a suite of business-oriented ad-hoc queries and concurrent data modifications. The

benchmark models decision-support systems that examine large volumes of data, execute queries with a high degree of complexity, and give answers to critical business questions.

Cisco has been the long-time performance leader running Microsoft SQL Server. What these results mean for you is that a large and expensive system is not required to achieve these excellent results. Not only does Cisco's solution deliver the fastest in queries; it also offers the best in price to achieve this performance.

Comparisons are made against vendor participants with TPC-H benchmarks that use the same Intel Xeon Scalable processors and that purchase memory from the same suppliers. The Cisco advantage is our architecture and close working relationship with Microsoft.

Figure 1 Cisco consistently delivers the best performance on Microsoft SQL Server for x86-architecture servers. Results shown are at the date the result was posted.



Streamlined Management

Cisco InterSight software delivers a new level of software-as-a-service (SaaS) intelligence that supports lifecycle management with continuous improvement. It is tightly integrated with the Cisco® Connected TAC (Technical Assistance Center) and Cisco Smart Call Home. Expertise and information flow seamlessly between Cisco InterSight and Cisco UCS and HyperFlex users. Remediation and problem resolution are supported with automated upload of error logs for rapid root-cause analysis. We have a strong track record for management solutions that deliver policy-based automation to daily operations. Cisco InterSight SaaS is a natural evolution of our strategies. We designed Cisco UCS and HyperFlex to be 100 percent programmable. Cisco InterSight simply moves the control plane from the network into the cloud. Now you can manage all of your Cisco UCS and HyperFlex infrastructure wherever it resides through a single interface.

Integrated with Microsoft System Center

Cisco UCS and HyperFlex systems were designed with management embedded and with an application-programming interface (API) so that other management systems could also manage these systems. Microsoft Systems Center has these APIs integrated so that you can use management tools that your staff is already familiar with. In addition, Cisco developed a PowerShell-based command line interface (CLI) called PowerTool to give you ultimate management flexibility.

Learn more

- [Microsoft on Cisco](#)
- [Cisco UCS](#)
- [Cisco HyperFlex systems](#)
- [Cisco Intersight software](#)
- [Cisco Workload Optimization Management](#)
- [AppDynamics](#)
- [Cisco Tetration](#)

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Application management support

Modern application architectures, like those that use Microsoft SQL Server 2019, make it nearly impossible to manage IT complexity at scale without intelligent and automated intervention. We can provide you with excellent tools to provide higher-order application visibility, security, performance, and workload optimization.

- **Cisco Workload Optimization Manager:** Cisco Workload Optimization Manager is a real-time decision engine that drives continuous health in your IT systems. The intelligent software 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, maximize elasticity with public cloud resources, and quickly model infrastructure and workload growth scenarios to determine how much infrastructure you will need and when you will need it.
- **AppDynamics®:** Our smart approach to performance management allows you to connect application performance and user experiences to business outcomes. With AppDynamics you can actively monitor, analyze, and optimize complex application environments at scale, and correlate and act on performance data in real time. By tapping into automated, cross-stack intelligence, you can gain visibility across servers, networks, and containers whether on premises or in the

cloud. You can pinpoint and fix application issues and understand the effect of code on user experience and application performance. You can even visualize revenue paths for better business insight.

- **Cisco Tetration™:** Cisco Tetration monitors, manages, and automates policy-based security across data centers to protect your enterprise. It alerts your IT staff to out-of-policy application workloads so that you remain compliant and don't inadvertently overextend your Microsoft SQL Server 2019 software licenses. Dependency mapping gives you exceptional visibility. With this insight, you can better understand which applications use which databases and the network routes your data takes. As growth occurs, you can maintain security and immediately close unexpected gaps.

Cisco for Microsoft SQL Server 2019

Whether you are looking to upgrade to Microsoft SQL Server 2019 or deploy it for the first time, Cisco is an excellent choice. We consistently deliver the highest levels of performance with our Cisco UCS and Cisco HyperFlex systems. We make deploying, managing, and scaling your infrastructure easy. And we have application-focused management capabilities that give you application visibility, security, performance, and optimization. And we provide these capabilities and infrastructure in a cost-effective way.