

# White Paper

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## **Data Management and Analysis**

### ***Cisco and Microsoft: Optimal Infrastructure Strategies***

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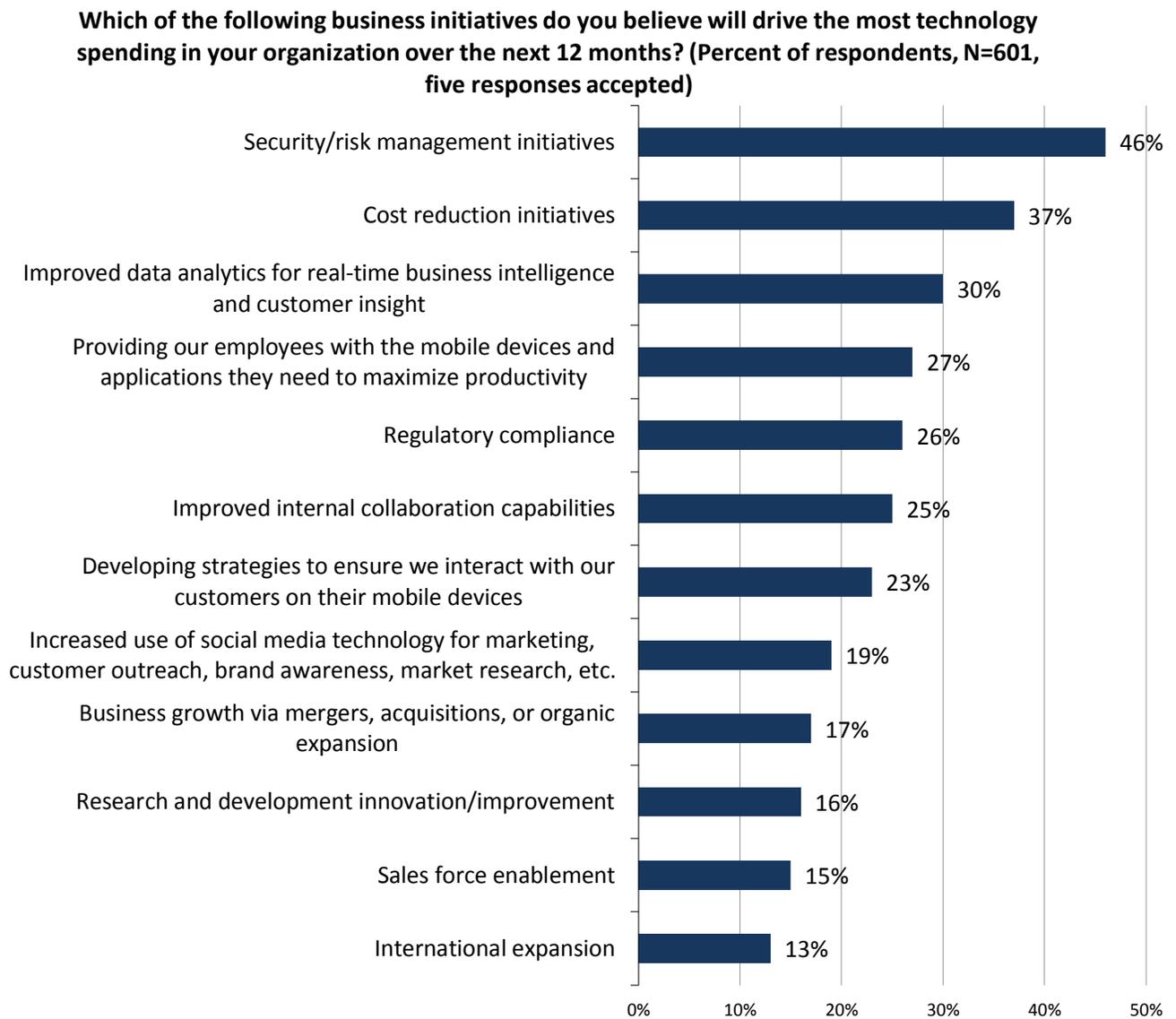
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## Cisco UCS and Microsoft SQL Server 2014: Complementary Technologies for Data Management

We’re experiencing a disruptive period of data transformation—and managing today’s database infrastructures during this disruptive period is not only critically important, but also more challenging than ever. An historic growth in data and cutting-edge technology trends, like the Internet of Everything, is causing an explosion in connections and data creation that is reshaping everything we do. Organizations depend on their data for business intelligence and customer insights so they can make informed business decisions and promptly take action on them to enhance customer experiences. Access to and manipulation of all this data creates enormous opportunities for organizations to innovate quickly.

Indeed, according to ESG research, improved data analytics for real-time business intelligence is one of the most commonly identified business initiatives expected to impact IT spending in 2015 (see Figure 1).<sup>1</sup>

*Figure 1. Business Initiatives that Will Have the Greatest Impact on IT Spending Decisions over the Next 12 Months*



Source: Enterprise Strategy Group, 2015.

<sup>1</sup> Source: ESG Research Report, *2015 IT Spending Intentions Survey*, February 2015.

## Market Trends and Priorities

Mission-critical workloads and big data solutions are growing exponentially, requiring petabytes of information that must be processed in real time. To do this, these solutions need increased I/O performance, very high availability, low latency, and high throughput. The underlying compute, memory, networking, and management requirements for these capabilities can be daunting—even for today’s advanced computing platforms. These capabilities not only add complexity to data center operations, but also must be balanced against an omnipresent concern to hold down costs.

Driven by directives from C-suite executives, a more cost-effective use of infrastructures is needed to decrease the data center footprint and other related expenses. Additionally, simplifying the deployment and management of these infrastructures and workloads is key at a time when companies are faced with managing rapidly growing numbers of servers and applications. One way to do this is for IT to use the right tools to automate operations whenever possible, and provide a unified management approach.

While businesses are looking to IT to be brokers of services, applications, and new capabilities, legacy infrastructures are holding them back. Legacy infrastructures simply are not designed to handle the unique needs of any application, at any time, in any location, at any scale. What’s needed is a new infrastructure model that addresses these fundamental complexity challenges of data center transformation.

Migration is another key factor driving the move to more advanced platforms. With the end of support for Windows Server 2003 and SQL Server 2005/2008 coming soon, organizations will move to the newer solutions, but should be aware of the need to transform their underlying infrastructures in order to best support these advanced operating systems and enterprise applications.

**Bottom line:** Enterprises are seeking a simplified, integrated approach that provides efficient, flexible infrastructures that can be deployed, managed, moved to the cloud, and scaled as needed to support advanced applications and workloads.

At a time when many organizations are making sweeping architectural changes because they are either unsatisfied with their underperforming legacy systems or need to migrate from them, [Cisco](#) and [Microsoft](#) offer attractive alternatives.

## The Cisco UCS-Microsoft SQL Server 2014 Platform

Working together, Cisco and Microsoft satisfy today’s data management demands by creating integrated infrastructures that provide support for a diverse set of applications and use cases, including big data, data management, large-scale data warehousing, and analytics backed by IT management and insights. By implementing Cisco’s United Computing System (UCS) next-generation data center platform and Microsoft’s SQL Server 2014 enterprise database, businesses can build on a foundation designed to fully strengthen their competitive profiles. Taken from another perspective, UCS is the optimum compute platform for Microsoft workloads, and SQL Server is the Microsoft workload most optimized for UCS.

**Cisco UCS** is an advanced data center platform that unites compute, network, storage access, and virtualization in a system targeted at reducing the total cost of ownership and bolstering business agility. Specifically, Cisco UCS integrates a low-latency, lossless 10 gigabit Ethernet unified network fabric with enterprise-class x86-architecture servers. The system is an integrated, scalable, multi-chassis platform in which all resources are under the umbrella of a unified management domain. Cisco UCS provides extreme processing power, high memory, and advanced networking capabilities for virtualized or bare metal environments.

**Microsoft SQL Server 2014** provides users with large-scale data warehousing and analytical solutions backed by IT management and insights. This enables users to quickly crunch through data sets to make complex, real-time decisions. It also provides the capability to quickly deploy and alter applications. Microsoft SQL Server is integrated with the underlying Cisco UCS capabilities via a differentiating architecture at every stack—compute, network, I/O, virtualization, and management. It is one of the best choices of foundation for the Cisco and Microsoft cloud-ready

platform, providing data access, analysis, and reporting across on-premises and off-premises clouds. Working as a team, Cisco and Microsoft provide a strong foundation for demanding enterprise workloads.

## Architectural Advantages: Optimized for Data and Applications

### High Consolidation Ratios Reduce Data Center Footprint and TCO

The Cisco UCS-SQL Server platform is very compelling to companies that are interested in consolidating SQL Server workloads in either virtualized or bare metal configurations. These organizations are especially attracted to the level of consolidation ratios that can be achieved in a standard UCS rack unit, which is possible because racks accommodate high amounts of memory and compute as well as massive amounts of throughput. Naturally, consolidating workloads down to a smaller subsystem offers the advantage of implementing them on fewer servers—thereby reducing hardware costs and related licensing costs, in addition to saving on power and cooling.

### Service Profiles Repurpose Servers Quickly

Cisco UCS service profiles allow the repurposing of servers in minutes, enabling organizations to quickly adapt to changing business requirements or workload fluctuations through just-in-time resource provisioning. Every server provisioned in Cisco UCS is specified by a service profile, which defines a physical server's attributes and its storage and networking characteristics. These are stored in the Cisco UCS 6100 Series Fabric Interconnects so they can be used in a portable, repeatable fashion for any given implementation. When a service profile is deployed to a server, UCS Manager automatically configures the server, adapters, fabric extenders, and fabric interconnects to match the configuration specified in the service profile. This automation of device configuration is highly valuable because it reduces the number of manual steps required to configure servers, network interface cards (NICs), host bus adapters (HBAs), and LAN and SAN switches. This technology makes all workloads portable, whether virtualized or not.

According to Cisco, the enormous workloads associated with SQL Server can be moved from one server to another in seven minutes with the aid of Cisco UCS service profiles. With the implementation of Microsoft failover clustering in high-exposure environments, users will not experience any inconvenience because automated failover takes place when a node fails. However, they want their failed nodes to be up and running again as quickly as possible so they can return to standard operating procedure and be back in line with their compliance efforts. With service profiles, the failed nodes can also be fixed and standing back up in seven minutes. Organizations gain a huge advantage from service profiles, which enable optimized utilization, efficiency, and performance.

### In-Memory OLTP Improves Database Performance

Users appear to be eager to realize the value of the new In-Memory online transaction processing (OLTP) functionality that comes with SQL Server 2014, to increase both relational database and business intelligence performance. According to Microsoft,<sup>2</sup> In-Memory-OLTP can considerably improve OLTP database application performance, offering predictable, sub-millisecond low latency and high throughput with linear scaling for database transactions. While there are a number of things on which performance improvements rely, 5-to-20 times performance improvements are possible.

To take full advantage of the performance improvements offered by SQL Server 2014's In-Memory OLTP engine, users need to run SQL Server on a platform that can provide the processing power and high memory capacity required by this new technology. Cisco UCS servers' high performance and extreme memory capabilities make them an optimal platform for the In-Memory OLTP engine.

There is also strong interest in the ability to leverage Microsoft's columnstore indexing. This is another high-performance, in-memory technology that offers performance improvement for storing, retrieving, and managing data in data warehousing applications by employing a columnar data format.

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<sup>2</sup> Source: This description has been adapted from the [Microsoft Developer Network knowledge base](#).

- Cisco UCS infrastructure supports the very high memory requirements for columnstore indexing.
- Cisco UCS Blade Servers support up to 3TB of RAM, and Cisco UCS Rack Servers support up to 6TB of RAM, giving them the ability to take full advantage of SQL Server's memory-optimized technologies.

### **AlwaysOn Technology Maximizes High Availability and Fault Tolerance**

SQL Server's AlwaysOn functionality is another powerful feature that dovetails advantageously with the Cisco UCS infrastructure to enhance high availability, a critical component in SQL Server implementations such as CRM systems, e-commerce solutions, ERP solutions, and web applications. The AlwaysOn technology blends a variety of Microsoft technologies—database mirroring, log shipping and replication, and failover clustering—into a single model. Users are able to leverage this SQL Server technology to provide fault tolerance and offload primary servers by running reporting from standby servers.

SQL Server AlwaysOn technology with Cisco UCS service profiles and high-bandwidth, low-latency Unified Fabric networking greatly enhances the ability to provide overall availability, and makes it easy to add extra nodes to the solution.

### **Implementing Private Cloud Architectures Is Simple – Right Out of the Box**

Users can implement a very powerful private cloud architecture for SQL Server right out of the box with Cisco UCS. Cisco UCS also supports the high compute, I/O, and networking requirements needed to virtualize highly resource-intensive, mission-critical workloads such as SQL Server. The scalability and expandability of Cisco UCS make it an ideal platform for virtualizing SQL Server. Users can also extend their UCS implementations into FlexPod or VSPEX private cloud environments.

### **Integration of Cisco UCS PowerTool with Microsoft PowerShell Enables Unified Management**

IT is being tasked with managing more servers and more applications, and businesses are placing increased importance on operational efficiency. This means that IT needs unified management tools to control, gain insight into, and automate their SQL workloads. Cisco UCS Manager provides deep management capabilities for Cisco UCS servers, and integrates seamlessly with Microsoft System Center (a free download off the Cisco Developer Network) and Windows PowerShell to provide a single pane of glass that can manage across the IT infrastructures.

Cisco UCS PowerTool's extensive library of PowerShell cmdlets is the glue that integrates System Center with Cisco UCS Manager. UCS PowerTool is very familiar and easy to use for administrators who are acquainted with PowerShell. UCS PowerTool enables users to perform a few common tasks, which include: obtaining server inventories, finding hardware faults, and managing the network configuration.

### **Role-based Access Enables Operational Efficiency**

UCS has also found favor with developer organizations by providing them with role-based access control, which grants developers autonomy over a subset of servers they may deploy and control in a variety of environments. This takes a load off of IT, and streamlines operations by making more efficient use of limited administrator resources.

### **Microsoft SharePoint and Microsoft Dynamics Workloads Are Also Optimized**

In a market highly populated by data warehousing systems, Microsoft SharePoint and Microsoft Dynamics are making a mark among third-party applications for industries such as healthcare and finance with their SQL Server deployments. In this environment, businesses are finding that their SharePoint implementations significantly reduce the data center footprint—usually a two- or threefold reduction in servers. These high-value systems tend to rapidly become complex due to different levels in their deployments—i.e., web front-ends, application tiers, database tiers, and, in some cases, server clusters in the application tiers. Highlighted by service profiles, overall Cisco UCS management focuses on simplifying entire architectures and streamlining business processes.

## Benefits and Benchmarks

### Benefits of Uniting Cisco UCS and Microsoft SQL Server

- Integrating Cisco UCS with Microsoft SQL Server provides a powerful tool for dealing with big data, data analytics, and data warehousing by featuring faster I/O performance, increased scalability, and high availability.
- Cisco UCS and SQL Server provide fluidity for users, allowing them to choose the data management environment best for them—physical, on-premises private cloud, off-premises cloud service, or hosted. Users can move easily among those infrastructures because Cisco UCS, Windows Server 2012, and SQL Server can support them all.
- Simplifying data center management with service profiles, role-based access, and UCS PowerTool—PowerShell management promotes IT operational efficiency and makes it easier to deploy, manage, and scale workloads.
- Automation of device configuration enables standardized implementations, relocation of enormous workloads, and the return of failed nodes to production environments in seven minutes via Cisco UCS service profiles.
- Integrating Cisco UCS Manager and PowerTool with Microsoft System Center and PowerShell enables users to holistically manage and orchestrate server, networking infrastructure, and application software.
- Consolidation of Microsoft SQL Server and SharePoint workloads decreases data center footprints, reduces power and cooling, and cuts back on hardware and licensing costs.

### Cisco UCS C460 M4 Rack Server Tops TPC-H Benchmarks

In recent TPC-H testing performed by Cisco, the Cisco UCS M4 Rack Server, which plays a prominent role in joint Cisco UCS-Microsoft SQL Server systems, delivered the top TPC-H results for non-clustered systems at the 1,000GB scale factor. In so doing, Cisco demonstrated how it outperformed competing systems.

The TPC-H is an industry-standard, decision-support system benchmark designed to measure the capability of a system to examine large amounts of data, process queries with a high degree of complexity, and return answers to critical business questions. It evaluates a composite performance metric and a price-to-performance metric that measure the performance of various decision-support systems by running sets of queries against a standard database under controlled conditions.

## The Bigger Truth

Successfully navigating the perilous waters of change in this disruptive time of data transformation requires rapid decisions and reactions. Terms like “time to market” and “time to value” reflect the sense of urgency that businesses are feeling across an array of industries as they make all-important choices about how to purchase and deploy data center technologies.

Cisco and Microsoft appreciate the implications of that urgency, and have joined forces to lighten the heavy burden of database infrastructures and enterprise workloads. Cisco Unified Computing System and Microsoft SQL Server 2014 work better together than alone toward the common goal of creating integrated infrastructures that meet the needs of today’s demanding marketplace, providing a powerful tool for data management, analytics, big data, and data warehousing.

Consolidating Microsoft SQL Server workloads in either bare metal or virtualized configurations creates competitive advantages based on consolidation ratios, which offer massive amounts of throughput that other vendors have been unable to match. Features like In-Memory OLTP, AlwaysOn technology, and service profiles further expand the gap between Cisco, Microsoft, and their challengers.

Technical virtuosity and market savvy can be challenging to find within a single company when diverse technologies like data center infrastructures and enterprise workloads are being fine-tuned to work together. Cisco and Microsoft have the advantage of working together to integrate products with uniquely different—but highly valuable—profiles. By doing so, Cisco UCS and Microsoft SQL Server 2014 are enabling an enterprise value ecosystem—helping organizations to be agile and innovate, which will ultimately affect their revenue and market growth.



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