White Paper

Optimizing Microsoft SQL Server 2014 on Cisco UCS

Microsoft SQL Server is the world's most widely used enterprise database. It provides relational database services for critical line of business (LOB) applications as well as essential infrastructure applications such as the Microsoft System Center management suite and Microsoft SharePoint. These applications are the core of today's Information Technology (IT) infrastructure.

Efficiently managing today's SQL Server database infrastructure is more challenging than at any time in the past. Today's server platforms have more computing power and capacity than ever before, but there are also more database applications, many of which need to have very high performance in addition to very high availability. These requirements must also be balanced with an ongoing need for more efficiency and lower infrastructure costs.

In this whitepaper, you'll learn why the Cisco Unified Computing System (UCS) is the optimum platform for deploying and leveraging the new features in SQL Server 2014. Cisco UCS has a unique and advanced server design that solves many of the business problems faced by legacy servers. You'll learn how Cisco UCS's features enable you to more rapidly provision and deploy servers, optimize online transaction processing (OLTP) and business intelligence (BI) workloads, and improve the availability of business-critical workloads.

Deploying New Servers Using Service Profiles and Templates

Deploying new servers and repurposing existing servers are ongoing challenges for IT today. New servers are deployed for a variety of purposes. They might serve as a virtualization platform or be used as SQL Server database servers, file servers, or print servers. In addition, as you bring new servers into the environment or migrate workloads to virtual machines, you'll often want to repurpose your existing servers so they can be used for other workloads.

Cisco UCS's unique stateless architecture enables you to quickly provision and reprovision servers based on service profiles. Cisco UCS servers are quite different from other server platforms in that they aren't statically configured. Other platforms typically come with the media access control (MAC) addresses, number of network interface cards (NICs), host bus adapter (HBA) worldwide port name, and other hardware attributes already fixed when you take them out of the box. With Cisco UCS, all of the components are stateless—nothing has a static configuration. A Cisco UCS server or blade doesn't have its configuration until a service profile is associated with it.

Service profiles are a software construct that allows you to abstract a physical server's attributes and apply them to any Cisco UCS server to meet the requirements needed for a given implementation. Service profiles are created by the administrator. Every server characteristic is defined in the service profile. Service profiles can be dynamically associated with any physical UCS server in matter of minutes.

The service profile includes the following information:

- Server definition. This definition identifies the resources (e.g., a specific server or blade inserted to a specific chassis) to which the service profile will be applied.
- Identity information. This information about the server includes the universally unique identifier (UUID), MAC address for each virtual NIC (vNIC), and HBA World Wide Name (WWN) specifications.
- Firmware revision specifications. These specifications are used to define when a specific firmware revision is required.

- Connectivity definition. This definition specifies the network adapters, fabric extenders, and parent interconnects.

You can see an overview a Cisco UCS service profile in Figure 1.

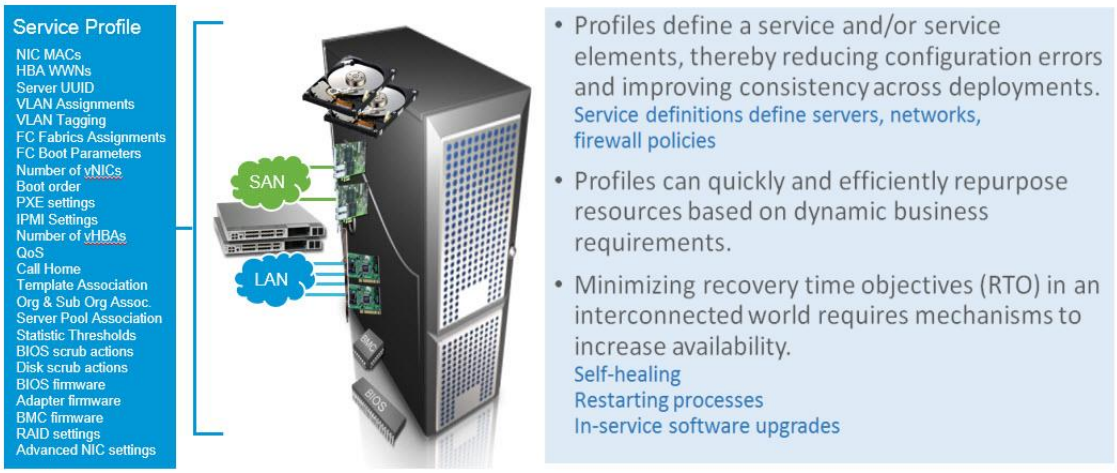

Figure 1: Cisco UCS Service Profiles

Service profiles are stored in the Cisco UCS 6100 Series Fabric Interconnects. When a service profile is deployed to a server, the Cisco UCS Manager configures the server hardware, adapters, fabric extenders, and fabric interconnects to match the configuration defined in the service profile.

Service profiles enable you to very rapidly provision and re-provision UCS servers. For instance, if you have a SQL Server system that experiences some sort of system failure, you could apply that server's service profile to another Cisco USC server. Within minutes, the server hardware of the new server would be configured exactly like the old server, enabling you to rapidly move the workload to the new server.

Each Cisco UCS server or blade must have a service profile. Service profile templates enable you to easily create service profiles. You can create multiple service profile templates, where each template defines a standard server role in your organization. For instance, you might create a service profile template to standardize your SQL Server installations or create a service profile template for your Microsoft Hyper-V or VMware hosts. Using service profile templates, you can quickly and easily create new service profiles for each new Cisco UCS server in your organization.

Children's Hospital Uses Cisco UCS to Accelerate Its SQL Server Deployments

Children's Hospital in Colorado is one example of a company that leveraged Cisco UCS's service profiles and service profile templates to rapidly upgrade its IT infrastructure. Children's Hospital was using SQL Server on Hyper-V. It upgraded its infrastructure to Cisco UCS B230 M2 Blade Servers and Cisco UCS B200 M3 Blade Servers. The upgrade involved building out more than 15 new servers. Using Cisco UCS service profiles, the Children's Hospital IT staff provisioned the 15 servers in a day. Without them, it would've likely taken weeks to configure and provision the new servers. For more information about how Cisco UCS service profiles can speed up the deployment of your Cisco UCS servers, you can check out the Understanding Cisco Unified Computing System Service Profiles web page. To learn more about how Children's Hospital upgraded to Cisco UCS, you can download the case study "Hospital Deploys Cisco UCS to Support Medical Applications."

Extending SQL Server Virtualization with Unified Fabric

Recent research conducted by the Gartner Group has revealed that more than 50 percent of all server workloads are virtualized. Gartner further predicts that this will grow to 86 percent in 2016. It wasn't too long ago that server consolidation ratios were low in the range of 3:1 or 4:1 and that database workloads like SQL Server were considered too resource-intensive to virtualize. The advancements in hardware platforms and virtualization technologies have changed all of that. Nowadays, it's common for businesses to have server consolidation ratios of 10:1 to 15:1. The high performance and massive scalability offered in today's server and virtualization platforms have made it possible to virtualize resource-intensive SQL Server workloads just like other server applications. Today, most businesses plan on implementing all new servers, including SQL Server instances in a virtual environment, unless there are compelling business reasons not to.

While it's possible to virtualize SQL Server instances—even highly resource-intensive mission-critical SQL Server instances—you need to be sure that the platform you select will support the high compute, input/output (I/O), and networking requirements. The scalability and expandability provided by Cisco UCS make it the ideal platform for virtualizing SQL Server. The latest generation of Cisco UCS uses either two or four Intel Xeon E7-4800 v2 or Intel Xeon E7-8800 v2 processors, providing up to 60 cores in a virtualization host. This enables you to reserve enough physical cores to handle the processing requirements of multiple virtual machines with high compute requirements.

The ability to support large amounts of random-access memory (RAM) is also a critical component in a virtualized server consolidation environment because the amount of physical RAM is the overall limiting factor to the number of virtual machines that can be run concurrently. With Hyper-V and VMware vSphere supporting up to 1 terabyte (TB) of RAM per virtual machine, the ability of the host to support large amounts of RAM is critical. The Cisco UCS B460 M4 Blade Server provides support for up to 96 dual inline memory module (DIMM) slots for a total of up to 3TB of RAM per host. Even beyond this, the Cisco UCS C460 M4 Rack Server can provide up to 6TB of RAM, using up to 96 x 64 DIMMs. Cisco UCS's high memory capacities enable you to run multiple highly scalable virtual machines simultaneously.

The virtualization platform's networking capabilities can be even more important than the basic compute and memory capabilities. In a server consolidation environment, the network is often the bottleneck that restricts traffic to the virtual servers. This is due to the fact that, in a virtualized server consolidation environment, all of the client network connections are routed through the networking support provided by the virtualization host. When all the traffic for 10 or 15 business-critical servers is funneled through a single host, that host must provide high-performance, highly scalable networking capabilities.

Cisco UCS's unique Unified Fabric and SingleConnect technologies provide significant networking advantages over more traditional host architectures. A traditional host server that acts a virtualization host will have many networking and storage interfaces. For example, a typical virtualization host might have a number of Ethernet connections for client connectivity, management, live migration, virtual machine connectivity, and possibly Internet small computer system interface (iSCSI) storage. In addition, there are often HBAs for Fibre Channel and Storage Area Network (SAN) connectivity. This scenario can be expensive because you need lots of NICs and HBAs to support the multiple connections. If you're using blade servers, you often need additional switches to go with those NICs.

Cisco UCS takes a different approach to networking. Cisco's Unified Fabric on the UCS server exposes multiple 10 gigabyte (GB) Fibre Channel over Ethernet (FCoE) ports that can be configured in a variety of ways. There's no need to physically separate the storage traffic from the networking traffic. Unified Fabric enables you to wire once for bandwidth. You don't need to support a collection of separate NICs because both the Ethernet and storage traffic can run on the same wire. Policies assigned by the administrator control both the configuration and bandwidth allocation. This vastly simplifies infrastructure cabling and enables you to use policies to configure the required connections. You can see an overview of a redundant Unified Fabric configuration in Figure 2.

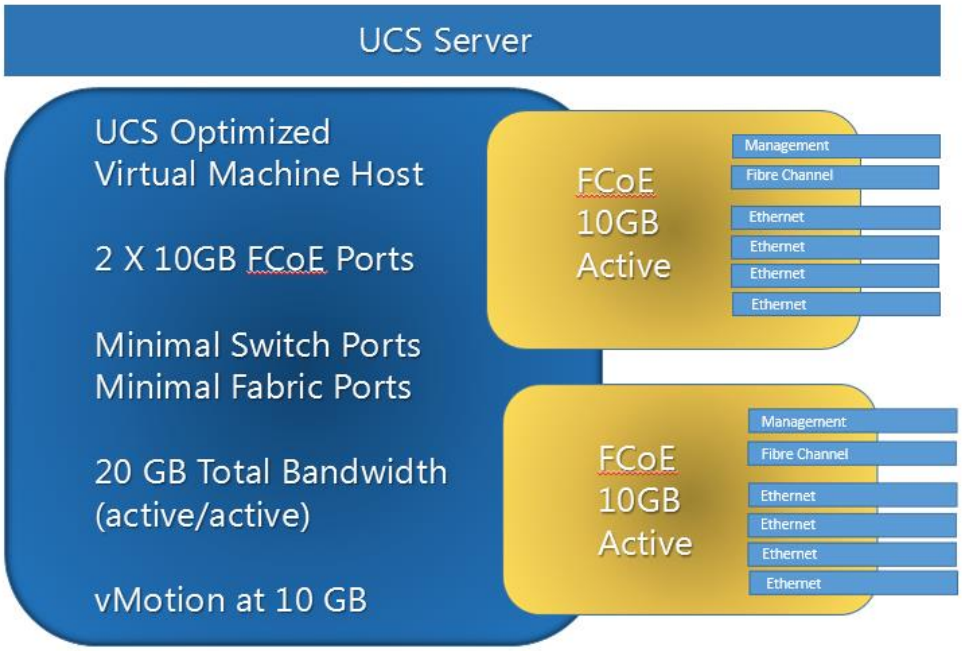

Figure 2: Cisco Unified Fabric Overview

In Figure 2, the Unified Fabric has been configured in a redundant fashion, where two 10GB FCoE ports have been redundantly configured to handle management, Ethernet, and Fibre Channel traffic—all out of the same connection. With Unified Fabric, this configuration requires only two cables instead of the 12 cables that would ordinarily be needed in a legacy server. This radically simplifies the physical infrastructure and cabling requirements. However, the real value lies in the flexibility of the configuration and dynamic operations of the fabric.

This is just one example of how the Unified Fabric might be configured. The interfaces aren't fixed at a certain speed. They can have dynamic Quality of Service (QoS), which allows different connections to acquire and release addition bandwidth according to the policies provided by the administrator. For SQL Server workloads running on virtual machines, this enables the administrator to guarantee that there's adequate network bandwidth available to the virtual machines. In addition, mobility is enhanced. Operations like vMotion and Live Migration can be extremely fast in this environment because dynamic QoS enables different connections to acquire more bandwidth as needed, guaranteeing that a certain amount of bandwidth will be available.

In the Cisco UCS platform, Virtual Interface Cards (VICs) replace legacy NICs. When you need to add network bandwidth to a legacy server, you typically need to add multiple NICs. The number of NICs you can add is limited by the expandability of the server, and each NIC typically functions at a preset speed. Cisco's VICs are converged adapters that can support up to 256 vNICs or virtual HBAs (vHBAs) per host, and they can provide between 20GB and 80GB of network bandwidth. Network bandwidth is vital for successfully consolidating SQL Server workloads. VICs provide you with a tremendous amount of throughput and flexibility. When used as a part of the Cisco Unified Fabric, they virtually eliminate the problem of network bottlenecks in virtual server workloads.

Optimizing OLTP Workloads

With CPU speeds hitting a plateau, Microsoft has been working on using memory-optimization technologies to increase both relational database and BI performance. Without a doubt, the most important new feature in SQL Server 2014 is the new In-Memory OLTP engine. SQL Server 2014's In-Memory OLTP engine lets you move select tables and stored procedures into memory, facilitating high-performance, low-latency data access. Previously code-named Hekaton (the Greek word for 100, which represents Microsoft's goal of getting 100x performance improvement with the new engine), SQL Server 2014's In-Memory OLTP engine is an all new query

processing engine that's built from the ground up using memory-optimized tables and a new lock-free design. In conjunction with the new lock-free design, Microsoft introduced a stored procedure compilation process that takes interpreted Transact-SQL (T-SQL) code and compiles it into native Win64 code. The goal is to reduce the number of instructions that the CPU must execute to process the query. A shorter code path equates to faster executing code. The new query processing engine and the compiled stored procedures are the primary factors driving the high-performance In-Memory OLTP engine.

Although Microsoft's goal was to have 100x performance improvements, the actual performance improvement that you'll get from the In-Memory OLTP engine depends a lot on the type of workloads that you're running. At the high end, web session state and read-heavy workloads will benefit the most, with anywhere from a 10x to 30x improvement. At the low end, legacy applications and a Transaction Processing Council benchmark C (TPC-C) type of application will benefit the least, with a 2x to 5x improvements. With that said, even a 2x improvement in the performance of a business-critical application is a fantastic gain. You can see a high-level overview of the main features of SQL Server 2014's In-Memory OLTP engine in Figure 3.

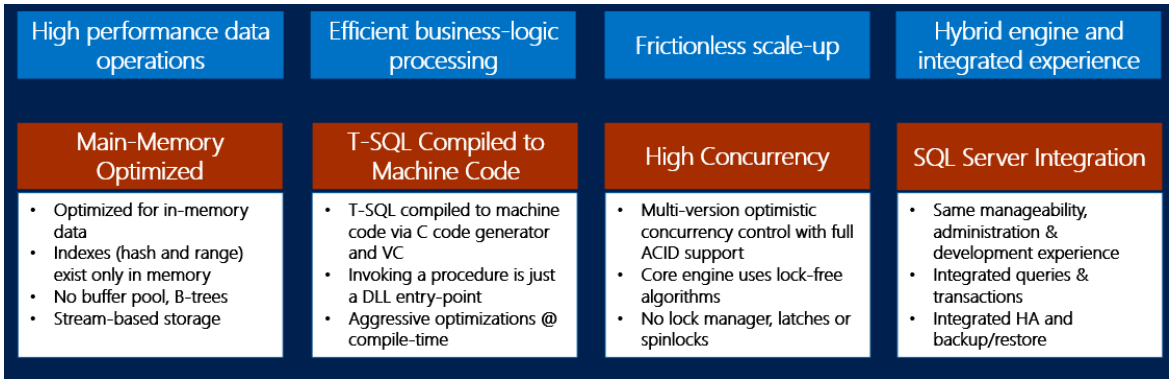

Figure 3: Overview of SQL Server 2014's In-Memory OLTP Engine

Internally, the new In-Memory OLTP engine doesn't use internal locks or latches. Although locks and latches protect data integrity, they also slow down the processing speed. Instead, the In-Memory OLTP engine uses a new high-speed, optimistic, multi-version concurrency-control mechanism. When a row in a memory-optimized table is modified, the In-Memory OLTP engine makes an entirely new version of that row and timestamps it. This process is very fast because it's done entirely in memory. The engine then analyzes and validates any updated rows before committing them. This design is faster and more scalable than the traditional locking mechanism used by SQL Server's relational database engine because there are no locks or other wait states that prevent the processor from running at full speed. Because this optimistic processing creates a lot of different row versions, it leaves a number of discarded rows in memory. To handle these discarded rows, Microsoft implemented a new lock-free garbage collection process as part of the In-Memory OLTP engine. The garbage collection process periodically cleans up all the unneeded rows.

To take full advantage of the performance improvements offered by SQL Server 2014's new In-Memory OLTP engine, you need to be running your SQL Server instances on a platform that can provide the processing power and high memory capacity required by the new memory-optimized technology. Cisco UCS servers' high performance and extreme memory capabilities make them an optimal platform for supporting SQL Server 2014's In-Memory OLTP engine. The high memory capacities of the Cisco UCS C-Series Rack Servers and Cisco UCS B-Series Blade Servers coupled with the servers' high-performance Xeon E7 v2 processors enable you to take full advantage of SQL Server's In-Memory OLTP engine. The Cisco UCS rack-mounted and blade servers are available in configurations that offer up to four Intel Xeon E7 v2 processors. The servers provide 96 DIMM slots that can support up to 3 terabytes (TB) of memory using 32GB DIMMs in the B-Series Blade Servers and up to 6TB of RAM using 64 GB DIMMS in the C-Series Rack Servers.

Progressive Insurance Uses CISCO UCS and In-Memory OLTP for a 4x Performance Gain

One company that leveraged Cisco UCS and SQL Server 2014's In-Memory OLTP engine for substantial application performance gains is Progressive Insurance. This Fortune 500 Company has long made customer service a competitive strength. Progressive Insurance provides customers with a web application that gives them the ability to buy, change, renew, and cancel their auto insurance policies. Progressive planned to add additional types of policies to the application, including motorcycles, recreational vehicles, boats, and even Segway scooters. However, the company felt the application would be unable to handle the increased workload and still provide an acceptable response time to its customers. To address this issue, Progressive tested its application using the new In-Memory OLTP engine on its Cisco UCS B200-M3 server with 256GB of RAM. In those tests, the In-Memory OLTP engine boosted the processing rate from 5,000 transactions per second to 21,000—a 320 percent increase. You can learn more about Progressive Insurance's use of the In-Memory OLTP engine on Cisco UCS servers in the case study "Progressive Data Performance Grows by a Factor of Four, Fueling Business Growth Online Experience."

Another important feature in SQL Server 2014 that's designed to improve the performance of OLTP workloads is the new buffer pool extension. Buffer pool extensions are designed to improve the performance of read-heavy OLTP workloads when the system's memory might be maxed out. Buffer pool extensions enable you to expand the buffer by utilizing flash-based solid state disk (SSD) drives to expand SQL Server's buffer pool. In this type of scenario, the SQL Server workload would benefit from the added data caching provided by the buffer pool, but the server might not have enough memory available. Buffer pool extensions essentially expand the buffer pool of a system that has already reached its maximum memory capacity. Leveraging SSD capacity can be less expensive than buying more RAM or having to replace servers. By utilizing the new buffer pool extensions, read-heavy workloads can experience performance gains of anywhere from 4x to 10x.

Cisco UCS servers provide a high degree of expandability that enables you to take full advantage of SQL Server 2014's buffer pool extensions. Most important, both the Cisco UCS B-Series Blade Servers and the Cisco UCS C-Series Rack Servers provide a high-performance 12 gigabits per second (Gbps) Serial Attached SCSI (SAS) controller, ensuring that there's adequate I/O bandwidth for the SSD drives. For expandability, the Cisco UCS B460 M4 Blade Server provides four useable PCI Express (PCIe) mezzanine slots and four hot-pluggable drive bays supporting hard disk drives (HDDs) and SSD drives with SAS or Serial ATA (SATA) interfaces. The Cisco UCS C460 M4 Rack Servers provide up to 10 PCIe 3.0 slots and up to 12 front-accessible, hot-swappable Small Form Factor (SFF), SAS, SATA, or SSD drives. You can use the available PCIe expansion slots to add high performance PCIe flash-based storage enabling you to fully utilize SQL Server 2014's buffer pool extensions.

Optimizing BI and Data Warehousing Workloads

BI and data warehousing (DW) have become critical components for many businesses today. They provide improved business insights by turning your data into actionable information, which can provide competitive advantages. BI and data warehouse systems do this by capturing large amounts of historical data from your LOB applications and other applications. Online analytical processing (OLAP) queries can then use this massive amount of data to detect trends and uncover relationships, which can help the organization make better and more informed business decisions. Many companies today are also using real-time BI data to make their businesses more dynamic and event-driven.

SQL Server 2014 supports BI and DW with its Analysis Services, Integration Services, and Reporting Services subsystems. One of the most important DW enhancements in SQL Server 2014 is the new updateable columnstore index. Columnstore indexes are another of Microsoft's high-performance in-memory technologies. First introduced in SQL Server 2012, the columnstore index provides significantly improved performance for DW queries. Microsoft states that for some types of queries, columnstore indexes can provide up to 10x performance improvement. In the original implementation of the columnstore index, the underlying table had to be read-only. In order to make any changes to the data in the table, the columnstore index needed to be dropped and re-created. SQL Server 2014 eliminates this restriction. The new updateable columnstore index enables updates to be performed to the underlying table, without first needing to drop the columnstore index.

BI and DW workloads typically have massive data storage requirements, and they're one the key drivers fueling the tenfold data growth every five years. Technologies like the columnstore index and tabular data models can also have very high memory requirements. Unlike OLTP workloads, which often consist of a mix of read and write I/O operations, OLAP workloads are commonly characterized by a large percentage of read operations. Because the Cisco UCS Blade Servers support up to 3TB of RAM and the Cisco UCS Rack Servers support up to 6TB of RAM, they can take full advantage of SQL Server's memory-optimized technologies. The Cisco UCS Unified Fabric provides the high-bandwidth, low-latency, virtualization-aware network connectivity for high-capacity Fibre Channel, iSCSI, or network-attached storage.

Cisco is a participant in Microsoft's SQL Server Fast Track Data Warehouse program. Working in conjunction with Microsoft, Cisco has produced several DW reference configurations that can accelerate and take the guesswork out of your DW deployments.

Maximizing Availability

Availability is a critical component in the vast majority of SQL Server implementations. SQL Server provides the core relational database services that empower LOB applications, enterprise resource planning (ERP) solutions, customer relationship management (CRM) systems, eCommerce solutions, web applications, and even server-management platforms like Microsoft's System Center management suite. For many organizations, 24x7 availability is the goal. Cisco and Microsoft provide several technologies that can enhance SQL Server's availability.

Cisco UCS service profiles help protect against server hardware failure by enabling you to quickly and easily move the entire configuration of a given server to a different physical server. This approach increases overall availability and dramatically reduces the time required to replace an individual server that has failed, whether it's a physical SQL Server system or a virtualization host.

In the virtual environment, Live Migration can be used to protect your SQL Server workloads from planned downtime by migrating workloads to different hosts, enabling you to perform maintenance on the first host. Perhaps more important is the ability to protect against unplanned downtime. SQL Server 2014 provides AlwaysOn failover cluster instances (FCIs) and AlwaysOn availability groups (AGs) to protect against unplanned downtime.

An AlwaysOn FCI is essentially the same thing as a SQL Server failover cluster in earlier releases. It provides protection at the server level and entails running a SQL Server instance on a Windows Failover cluster. With Windows Server 2012, you can have up to 64 nodes in the Windows Failover Cluster. If a cluster node includes a SQL Server instance and that cluster node fails, the SQL Server instance can be automatically restarted on another cluster. This failover process can take several minutes, depending on the workload of the SQL Server instance, as the transactions from the failed node must be applied to the new node before the database can come online.

First introduced in SQL Server 2012, AlwaysOn AGs provide protection from unplanned downtime at the database level. AlwaysOn AGs support one primary replica and up to eight secondary replicas. Each replica is located on a separate SQL Server instance running on a Windows failover cluster node. AlwaysOn AGs can protect multiple databases, all of which can be automatically failed over from the primary replica to a secondary replica as a unit. Unlike AlwaysOn FCIs, AlwaysOn AGs can be available in a matter of seconds after a failover. AlwaysOn AGs can have both synchronous and asynchronous secondary replicas at the same time. Synchronous replicas provide automatic failover, so they're typically used in high-availability scenarios. You can have a maximum of two synchronous replicas in an AG. Asynchronous replicas are typically used in disaster recovery scenarios, where the secondary replicas are in separate geographical locations from the primary replica. The secondary replica databases are able to provide read-only access, enabling the replicas to be used for both reporting and backup purposes. This can allow you to offload some of the workload and I/O from the primary server. SQL Server 2014 provides the new AlwaysOn Azure integration, enabling you to have asynchronous secondary replicas in Windows Azure for disaster recovery. You can see an overview of AlwaysOn AGs in Figure 4.

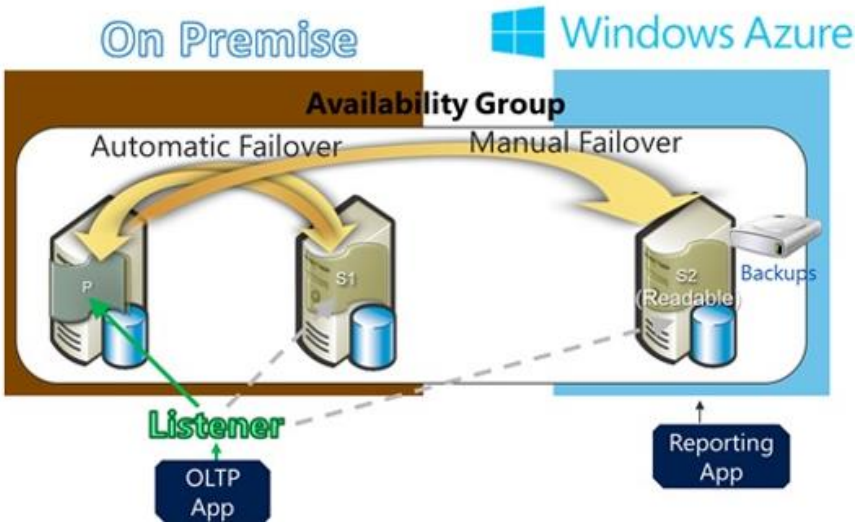

Figure 4: SQL Server 2014's AlwaysOn Availability Groups

Cisco UCS's high-bandwidth, low-latency Unified Fabric networking is the ideal platform for supporting SQL Server AlwaysOn AGs. The performance provided by synchronous replicas depends in large part on the network latency that exists between the primary replica and the synchronous secondary replica. Under synchronous-commit mode, the primary replica doesn't send the transaction confirmation to the client until the secondary replica has hardened the log to disk. This means that the application must wait until the secondary replica has received the transactions, written them to disk, and confirmed these actions with the primary replica. In this scenario, networking performance is a critical factor in maintaining the performance level of the application that's running on the primary replica. The Cisco UCS Unified Fabric is highly configurable and supports dynamic QoS, ensuring the connection between the primary and secondary replicas has the maximum performance of bandwidth.

Managing Workloads with UCS Manager

Today, most businesses are faced with the task of managing more servers and applications than ever before, placing a premium on operations efficiency. Businesses need insight and control of their physical and virtual SQL Server workloads as well as other workloads. They also need tools to automate operations whenever possible. Cisco's UCS Manager provides deep management capabilities for Cisco UCS servers. It integrates seamlessly with System Center 2012 R2 and Windows PowerShell to provide a true single-pane-of-glass that can manage both physical and virtual assets across your IT infrastructure.

All Cisco UCS Fabric Interconnects can be managed with Cisco UCS Manager's Extensible Markup Language (XML) application programming interface (API). This API is what enables Cisco UCS servers to be configured with service profiles. The XML API enables you to manage Cisco UCS servers from a number of different clients, including the UCS Manager GUI, UCS Manager CLI, PowerShell, and System Center 2012 R2. You can see an overview of the Cisco UCS management framework in Figure 5.

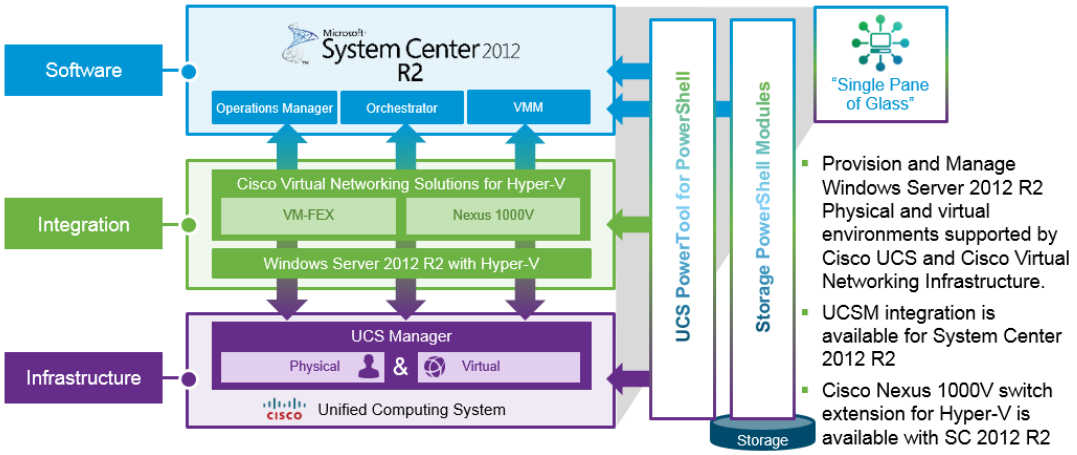

Figure 5: Cisco UCS Management Framework

Cisco's UCS PowerTool PowerShell library is the glue that integrates System Center Operations Manager, Orchestrator, and Virtual Machine Manager (VMM) with Cisco UCS Manager. Cisco worked closely with Microsoft to design its UCS PowerTool, making it very familiar and natural to use for administrators who are familiar with PowerShell. UCS PowerTool provides more than 1,850 PowerShell cmdlets. It has fully visibility into Cisco UCS Manager's XML API—anything you can do with the XML API you can do through UCS PowerTool. Some of the common tasks for which you might use the UCS PowerTool include:

- Obtaining server inventories
- Getting environmental statistics
- Finding hardware faults
- Getting power and cooling statistics
- Managing the network configuration
- Managing service profiles and service profile templates
- Launching the UCS KVM console
- Synchronizing managed objects
-

Administrators can quickly learn the UCS PowerTool cmdlets by logging in with the UCS Manager GUI, then running the ConvertTo_UcsCmdlet. As you perform tasks in the UCS Manager GUI, the cmdlet will automatically generate the equivalent UCS PowerTool commands.

Cisco UCS has deep integration with Microsoft's System Center management suite. Companies that run a lot of SQL Server instances often use Operations Manager to track the health of the operating systems and the SQL Server instances. Cisco provides a UCS Management Pack for System Center Operations Manager. Cisco's Operations Manager Management Pack enables to you have deep monitoring capabilities into the Cisco USC hardware as well as your applications and operating systems. The Management Pack is extremely easy to configure. You don't need to tell it about all of the different servers in your domain. Instead, you connect it to the UCS Manager, and it will automatically discover your entire Cisco UCS domain.

Cisco also provides a user interface (UI) extension for VMM to help you manage your private cloud's physical and virtual infrastructure from a single console. Cisco's UI extension for VMM allows you to register a UCS domain in VMM, giving you deep management information for your UCS hosts. The VMM UI add-in enables you to change power status, view host errors, associate a service profile to a hypervisor, and manage firmware on the hosts.

System Center Orchestrator is used to automate operations in a data center, and Cisco's UCS PowerShell library can be leveraged in Orchestrator workflows. Cisco provides an Orchestrator Integration Pack that exposes multiple UCS management activities that you can drag-and-drop onto Orchestrator workflows to standardize and automate

common host management tasks such as backing up UCS, creating Virtual LANs (VLANs), and creating service profiles from templates.

You can learn more about the Cisco UCS management tools and download the Operations Manager Management Pack, the VMM UI extension, the Orchestrator Integration Pack, and a Configuration Manager Integration Pack from the communities.cisco.com website.

Simplified, Standardized, Scalable, and Available

Cisco UCS's advanced architecture provides the optimum platform for both physical and virtual SQL Server deployments. Cisco UCS enables you to simplify and standardize your SQL Server 2014 implementations as well increase performance, scalability, and availability. Cisco UCS's unique stateless architecture enables to quickly deploy and redeploy servers. Its extreme processing power, high memory capabilities, and advanced networking capabilities make Cisco UCS the ideal platform for virtualizing SQL Server as well as running OLTP and BI workloads. To learn more about running SQL Server 2014 and other Microsoft server workloads on Cisco USC, please visit www.cisco.com/go/microsoft . To learn more about the Cisco UCS servers, please visit www.cisco.com/go/ucs.

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