



Cisco Application-Centric Infrastructure Integration with Microsoft

Cisco extends the Cisco® Application Centric Infrastructure (ACI) policy framework to the Microsoft Windows Server Hyper-V and Microsoft System Center virtual environments.

Solution Overview

Cisco ACI is a next-generation data center fabric infrastructure designed to meet today's rapidly changing business requirements. Cisco and Microsoft together enable enterprise applications such as Exchange, SharePoint, and SQL to take advantage of the ACI framework and optimize application deployment and performance.

Cisco ACI is designed using an application policy model, allowing the entire data center infrastructure to better align with application delivery requirements and the business policies of the organization. With Cisco ACI, the data center responds dynamically to the changing needs of applications, rather than having applications conform to constraints imposed by the infrastructure. The policies automatically adapt the infrastructure (network, security, application, computing, and storage) to the needs of the business to shorten application deployment cycles.

With an open, systems-based approach, Cisco ACI is designed to support leading data center infrastructure and virtualization technologies. Integrating with Microsoft Windows-based application servers running the Microsoft Hyper-V hypervisor, Cisco ACI provides tight integration between physical and virtual application environments. The Cisco ACI policy framework provides connectivity for Microsoft Hyper-V workloads through virtual topologies over Cisco Nexus® 9000 Series Switches.

Cisco ACI and its extensibility to network, applications, security, computing, and storage resources is well aligned with the Microsoft and Cisco goal of providing a holistic, unified data center infrastructure. Cisco ACI in the Microsoft-enabled data center benefits our customers with shorter application deployment times, resulting in more rapidly implemented business processes, quicker time to market, and a sustainable competitive advantage.

Challenges

The needs of today's business-critical data center applications have changed, and the infrastructure has to meet new challenges across physical, virtual, and distributed scale-out applications such as big data. Customers want to deploy these applications with full freedom to take advantage of the latest private, public, and hybrid cloud models. Application and business IT leaders expect a more agile and responsive infrastructure that allows them to deploy, change, and decommission applications free of constraints from underlying infrastructure dependencies.

Heterogeneous environments of multitier applications, with mixtures of physical and virtual workloads and services, running in a variety of OS and hypervisor environments, connected across data center locations or in a hybrid cloud, with requirements to scale out and modify policies on demand all impose different demands on the data center infrastructure.

Existing virtual and physical networking technology must change to address the following challenges:

- Dynamic, on-demand application instantiation and removal, based on current business requirements
- The fact that applications consist of both physical and virtual workloads, so that the infrastructure must support physical, virtual, and cloud management and orchestration within a single interface and model
- Increasing complexity in troubleshooting application performance in virtual environments due to poor visibility of the underlying physical environment
- Elimination of gateways between the virtual and physical fabrics, which become choke points that limit scalability and performance



The net result of these challenges is that customers face increasing operation complexity and limited business agility and responsiveness.

Solution: Cisco ACI Integration with Microsoft Virtualization

Cisco ACI is a highly flexible, open, programmable environment that can be transparently integrated into Windows Server Hyper-V virtual environments. Cisco ACI integration with Windows Server delivers simplicity without compromising infrastructure scalability, responsiveness, security, or end-to-end visibility.

The Cisco Application Policy Infrastructure Controller (APIC) is the main architectural component of the Cisco ACI integration with the Microsoft Hyper-V virtual environment. It is the unified point of automation and management for the Cisco ACI fabric, policy enforcement, and health monitoring for both the physical and virtual environments.

Applications are a collection of virtual and physical workloads interconnected by virtual and physical networks. In today's networks, the physical interconnectivity is established through VLANs and access control lists (ACLs). In today's virtual networks, everything is expected to be a virtual workload interconnected through virtual networks.

With Cisco ACI, you can build not only virtual applications (virtual mobile workloads interconnected through virtual networks and powered on or off simultaneously) and not only physical applications (physical mobile workloads interconnected through physical networks), but you can build both together. With Cisco ACI, all workloads are equal, and you can connect them to each other through policies. Cisco ACI completely abstracts the workload interconnectivity from the classic network constructs of VLANs and IP addresses.

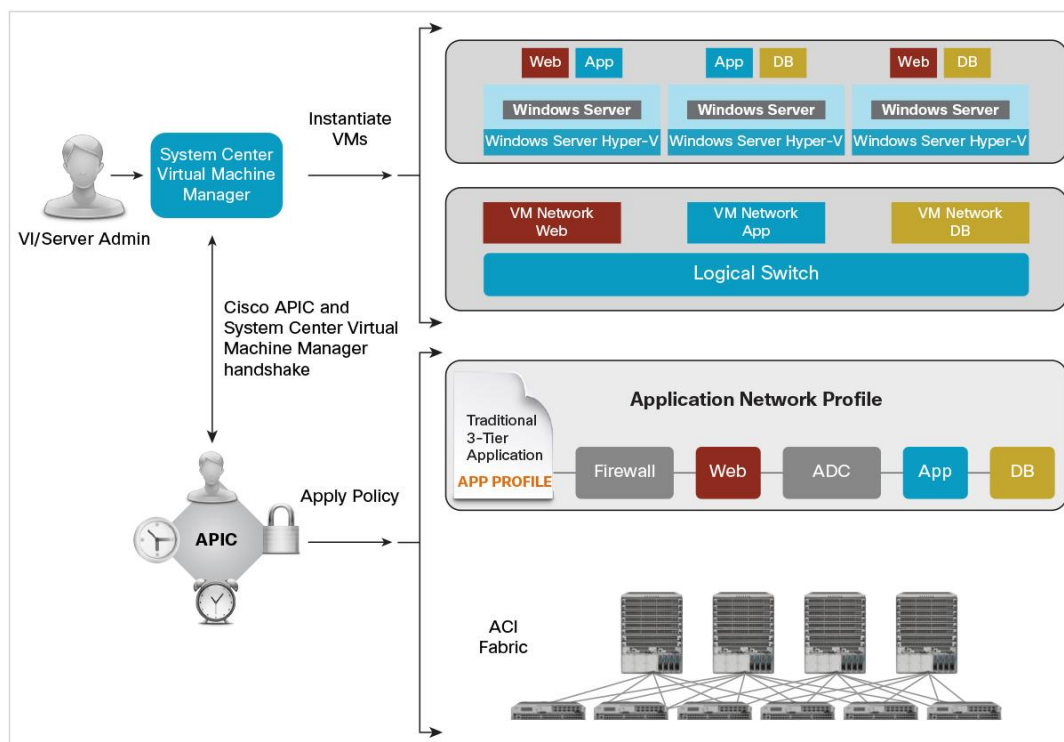
Applications with Cisco ACI have unified virtual and physical workloads and policy-based network connectivity with mobility built in.

Connecting Windows Server Hyper-V Virtual Machines to the Cisco ACI Fabric

The Cisco APIC integrates with a Microsoft System Center Virtual Machine Manager (SCVMM) instance to transparently extend the Cisco ACI policy framework to Microsoft Hyper-V workloads. The Cisco APIC uses application network profiles to represent the Cisco ACI policy. The application network profiles model the logical representation of all components of the application and its interdependencies on the Cisco ACI fabric. This policy framework also includes a Layer 4 through 7 service insertion mechanism, providing full-service lifecycle management based on workload instantiation and decommissioning.

After these application profiles are defined in Cisco APIC, the integration between Microsoft SCVMM and Cisco APIC helps ensure that these network policies can be applied to Microsoft Hyper-V workloads. The network policies and logical topologies (VLANs, subnets, etc.) that have traditionally dictated application design are now applied based on the application network profile through the Microsoft APIC (Figure 1).

Figure 1: Cisco ACI & Microsoft Windows Server Hyper-V/System Center Virtual Machine Manager Integration



The Cisco APIC integrates with System Center Virtual Machine Manager to simplify workload connectivity. To connect Windows Server Hyper-V workloads to the Cisco ACI fabric, the virtualization administrator simply needs to associate the virtual machines with the virtual machine networks created by the Cisco APIC that appear under the logical switch in Hyper-V.

The Cisco ACI fabric is designed to provide overlay independence and can bridge frames to and from: Network Virtualization Using Generic Routing Encapsulation (NVGRE), VLAN, Virtual Extensible LAN (VXLAN), and IEEE 802.1x encapsulations. This approach provides flexibility for heterogeneous environments in which services may reside on disparate overlays.

The Cisco APIC integration with Windows Server Hyper-V enables dynamic workload mobility, management automation, and programmatic policy. As workloads move within the virtual environment, the policies attached to the workloads are enforced transparently and consistently within the infrastructure.

This integration delivers a scalable and secure multitenant infrastructure with complete visibility into application performance across physical and Windows Server Hyper-V virtual environments.

Solution Benefits

Cisco ACI integration with Windows Server Hyper-V and System Center provides the following benefits:

- Improve deployment time and performance of applications such as Exchange, SharePoint and SQL, with pre-built integration between the latest versions of Windows Server, System Center, and the Cisco ACI solution
- Reduce data center complexity by using existing management framework of Microsoft System Center for virtual workloads and transparently extend Cisco ACI policy to physical and Windows Server Hyper-V-enabled virtual environments



- Realize the promise of hybrid cloud computing by enabling application velocity in cloud with consistent policy across applications, network, security and services
- Optimize application performance by enabling penalty-free overlay networks
- Provides full integrated visibility into the health of the applications such as Exchange, SharePoint and SQL by holistically aggregating information across physical and Windows Server Hyper-V-enabled virtual components
- Provides superior scalability and performance by combining the flexibility of software with the performance of Cisco ACI hardware

For More Information

- Cisco ACI strategy: <http://www.cisco.com/go/aci>
- Microsoft virtual networking: <http://www.microsoft.com/en-us/server-cloud/solutions/software-defined-networking.aspx#fbid=Z-wSsLVPicM>

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