

Cisco Cloud Essentials for Engineers V1.0

LESSON 1

Cloud Architectures

TOPIC 1

Cisco Data Center –
Virtualization and Consolidation

Unified Data Center

- Virtualization and Consolidation

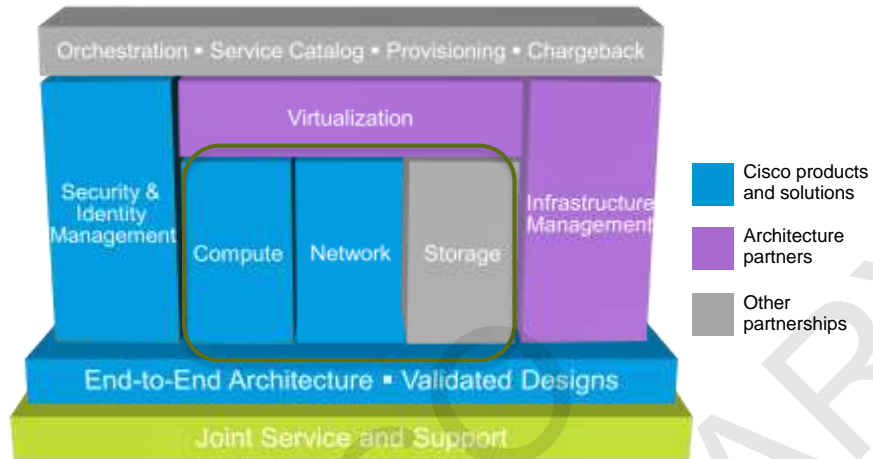


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The technologies within data centers that support cloud deployment are all about unification. Comprehensive unification is accomplished through virtualization and consolidation of data center resources.

Architecture of a Cloud Data Center

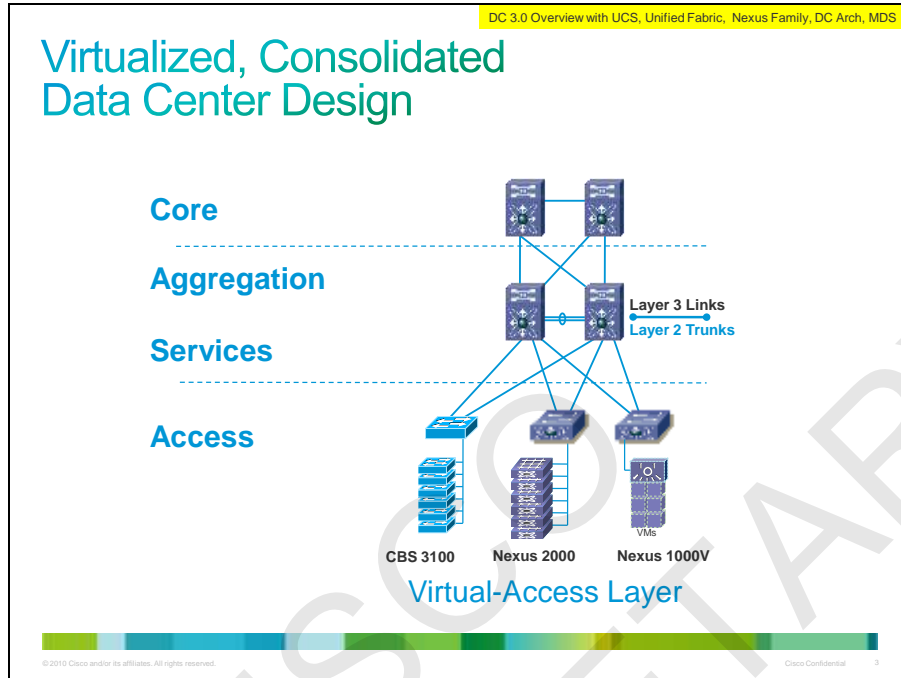


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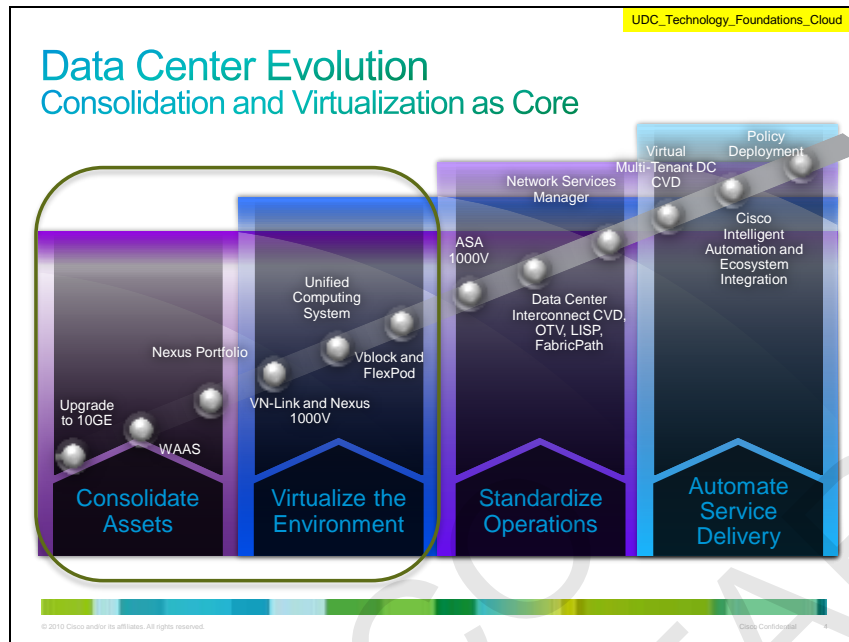
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Reliable cloud solutions must be built on a foundation of solid architecture and solid, proven designs. Management, security and orchestration are also vital data center components.

This lesson, however, will focus on the core technology components of cloud; compute, network, and storage as they are consolidated and virtualized in a data center.



All components in a Cloud Data Center reside within the familiar three-tiered network design model – consisting of the core, Aggregation and Access layers. The Nexus platform hosts the switching required at each layer to support IP Layer 2 and 3 functions. Again, this is a familiar network architecture and design model. The difference in the data center three-tier model is that network switch and adapter interfaces are consolidated. A single connection can represent hundreds of IP networks. A single wire into an Access layer switch can represent hundreds of virtual server connections that previously required individual adapters and wires to support each server.



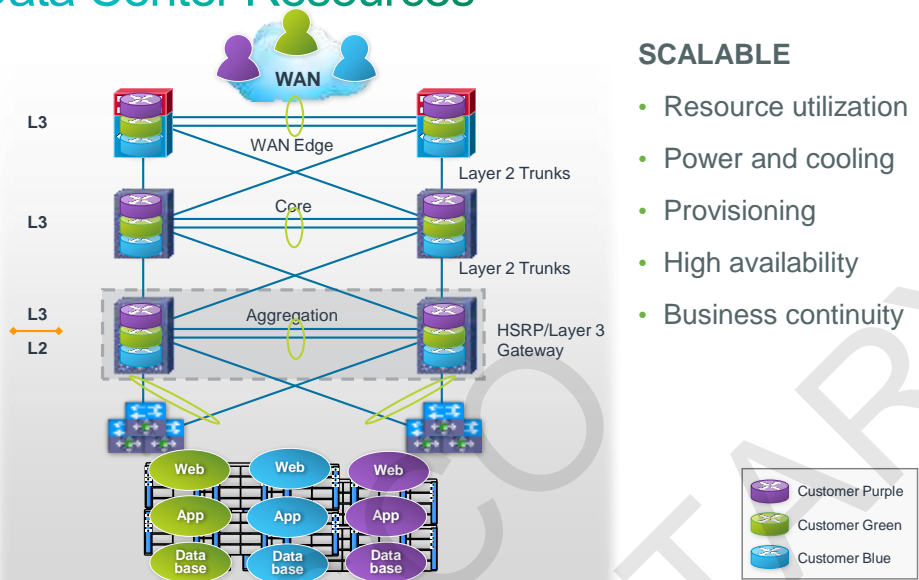
Consolidating and virtualizing resources are the foundation of Cloud Data Center deployment.

10 Gigabit Ethernet and the Nexus portfolio of switches are two examples of technology that support data center consolidation.

The next step on a migration path to cloud-ready data centers is virtualization. The Cisco Unified Computing System (UCS), the Nexus 1000V, Vblock Infrastructure Platforms, and the FlexPod Architecture are key technologies that support data center migration toward virtualization. In addition they provide the foundation to standardize data center operations and service delivery.

This lesson focuses on the technologies that support data center consolidation and virtualization.

Virtual, Consolidated Data Center Resources



A virtual, consolidated data center is responsive to data center dynamics.

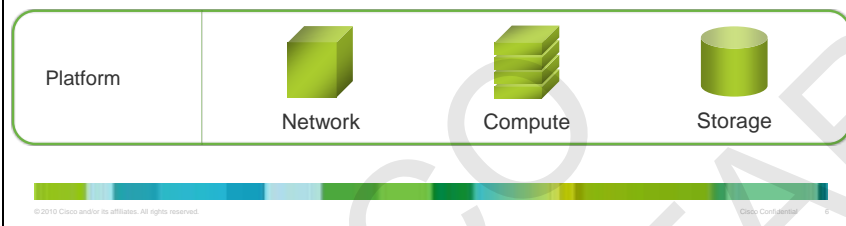
By building a uniform structure where virtual and consolidated resources are building blocks of the data center, the resources can be scaled more effectively as data center demands grow, shrink or change. Need more networks or network infrastructure resources? Add virtual Layer 2 and 3 segments at the core and Aggregation tiers.

At the Access layer, need more CPUs? – only a virtual machine needs to be added to compute resources. Need more storage for an expanding database? – only need to grow the storage components.

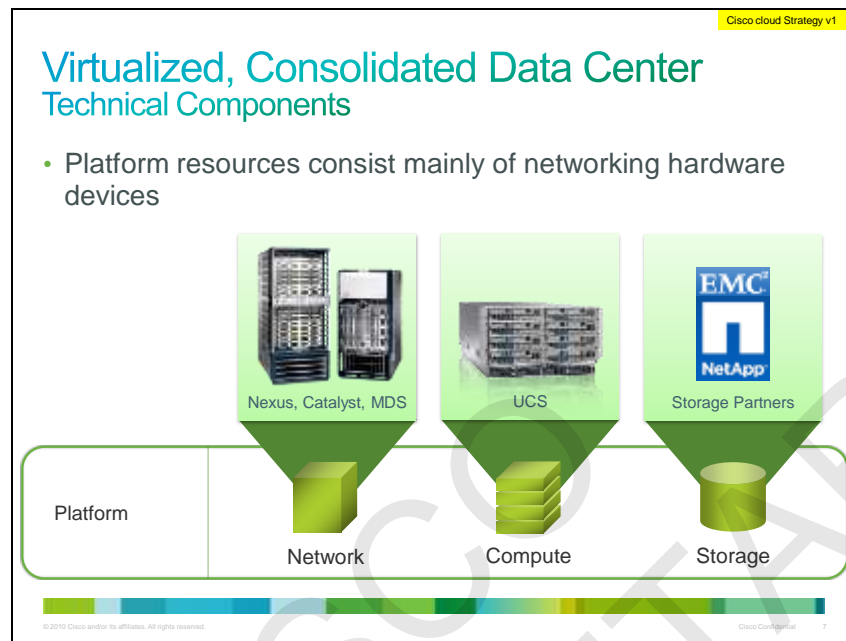
Applications residing on virtual servers are not limited by the physical components of CPUs, disks, and the underlying infrastructure associated with a single server. Each virtual server may access aggregated resources available to multiple servers.

Virtualized, Consolidated Data Center

- Consolidating data center resources provides significant savings:
 - 40% Less Cabling
 - 33% Less Power
 - 50% Fewer Servers
 - 20% CAPEX Reduction
 - 30% OPEX Reduction



A virtualized and consolidated data center reduces the need for duplication in physical resources and thereby reduces power use and expense.



We can divide the data center platform resources into Network, Compute and Storage components.

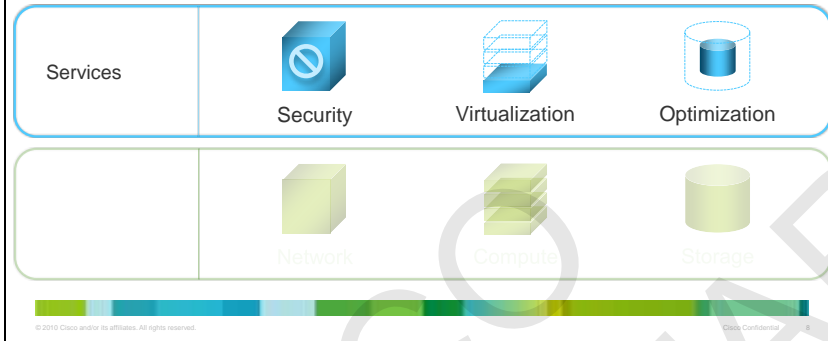
Network components consist of Nexus Data Center Switches with high-density/performance 10 Gigabit Ethernet infrastructure, Virtual Port Channel technology to maximize throughput and redundancy. Virtual Device Contexts and Virtual Route Forwarding virtualize the network infrastructure. The Nexus MDS platform provides SAN NAS switch functionality.

The Cisco Unified Computing System is designed as a converged network and x86 **compute** platform. It provides high density processing (more CPU per rack), and provides extended memory, up to 384 Gigabits – more than double other systems. It has converged fabric for IP and FCoE and provides wire-once infrastructure, drastically reducing cabling requirements. The Nexus 1000V provides a virtual switch for VMs, and stateless hardware that can be provisioned through Service Profiles.

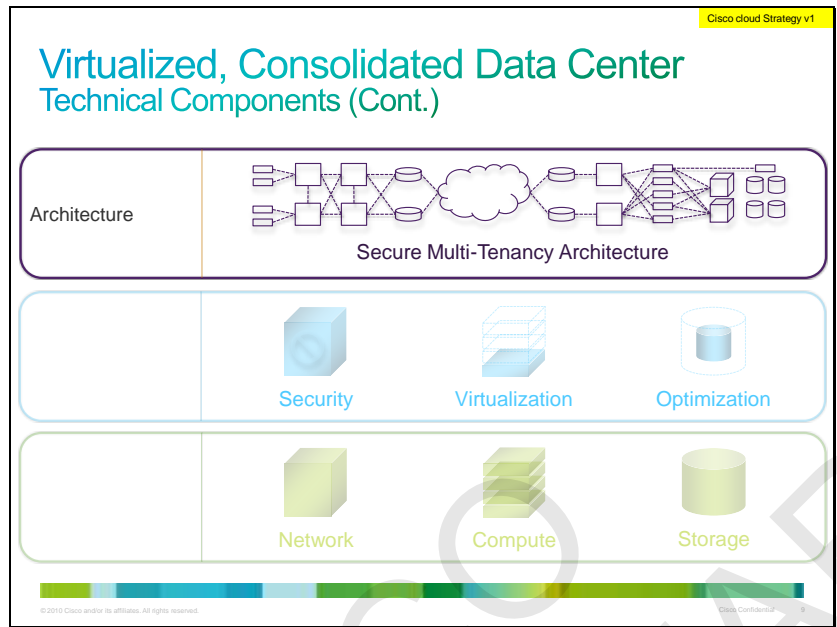
The Cisco Unified Data Center architecture involves several **storage** partners, including NetApp and EMC.

Virtualized, Consolidated Data Center Technical Components (Cont.)

- Advanced services can be layered upon the robust, stable platform



The services layer leverages the capabilities of the platform layer to enable a suite of advanced security, virtualization, and optimization services such as those shown.



The Cisco Unified Data Center architectures and validated designs apply these technology components very specifically for optimal performance and reliability. In the next part of this lesson we're going to explore the individual technologies and products that support the data center architecture or infrastructure.