Unified Computing Overview

What You Will Learn

Unified computing is the next step in the Cisco® Data Center 3.0 vision. Unified computing unites network, computing, and virtualization resources into a single system, simplifying setup, increasing business results, and enabling just-in-time resource provisioning.

Building on existing industry standards, unified computing addresses a number of data center challenges in a holistic fashion:

- Allows IT to streamline provisioning and management of physical and virtual data center resources
- Operationalizes flexible service delivery, increasing scaling capability
- Dramatically reduces the number of physical devices needed and associated power, cooling, and cabling requirements

Unified computing is the next-generation data center architecture designed to improve IT responsiveness to rapidly changing business demands. As this document discusses, Cisco's unified computing architecture dramatically reduces data center total cost of ownership (TCO) while increasing IT agility and responsiveness.

- Increased business agility through just-in-time provisioning and mobility support for both virtualized and nonvirtualized environments
- Dramatic reduction in TCO at the platform, site, and organizational levels

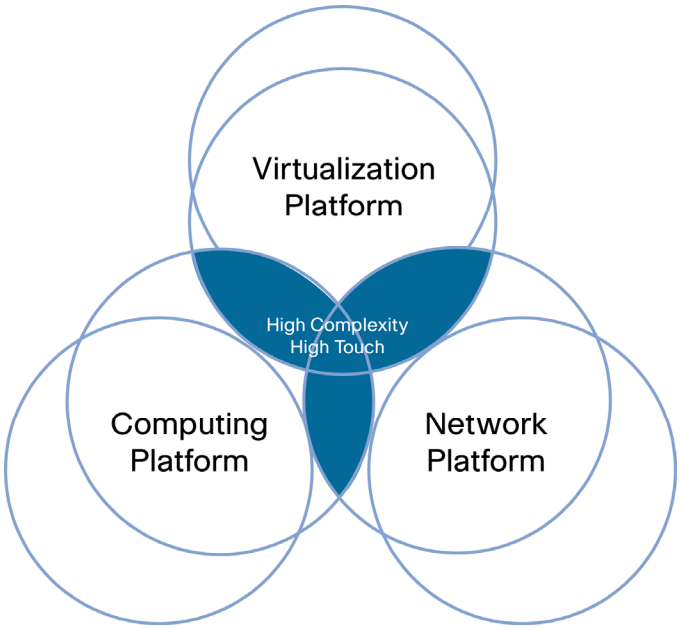
The Problem with Data Centers Today

Now more than ever, IT departments struggle to be more responsive to the business at lower cost, even as the data center remains a top cost center. Power, cooling, real estate, and the ever-increasing demand for computing, storage, and application resources all continue to push costs higher.

Today, server virtualization has increased utilization rates, temporarily reducing capital expenditures (CapEx), but significant challenges remain:

- Additional management complexity increases operating costs and creates additional IT operational burdens
- There is unclear organizational responsibility for data center management, including a lack of policy coordination, especially in virtual environments.
- Many IT departments would like to use virtualization to automate load-balancing, backup, and disaster recovery, but have difficulty maintaining consistent security and performance.
- IT departments are left with the burden of integrating complex computing, network, and virtualization components, forcing IT staff to either find a way to engineer these technologies together or pay someone else to do it.

Figure 1. Continued Architectural Complexity



Cisco believes the next-generation data center needs to be viewed across all the independent systems as a single, integrated design. Flexible data center automation is achieved by bringing together computing, connectivity, and virtualization within a single management plane, streamlining performance and function between the domains.

The Role of the Network: Unified Computing

Data centers are experiencing a market transition, with new standards, technologies, and integration conventions enabling a preintegrated data center solution rather than IT staff or consultants having to integrate their own network, computing, and virtualization platforms.

This market transition, which Cisco is embracing as unified computing, marks the natural evolution of the data center to link all data center resources together within a common management framework, bringing network awareness and transparency to the virtual machine level. The network is becoming the primary orchestrator of the data center.

This architectural shift will affect traditional technology boundaries, making it imperative that IT staff from all disciplines be able to use their respective expertise in a coordinated fashion. Open platforms and partnerships among leading data center technology providers will be essential to the support and maintenance of a unified data center.

Evolution of Unified Computing

Cisco's approach is evolutionary. It is designed to provide choice while bringing customers a truly virtualized data center in which, for the first time, the integration of network, computing, and virtualization software improves the scale, performance, and function of the virtualized architecture.

- **Phase 1, or data center networking:** This phase lays the foundation for data center cost containment through network standardization. Consistently applied network intelligence and virtualization in each area of specialization: LAN and WAN, storage networking, and server and application networking.

- **Phase 2, or unified fabric:** This phase simplifies the data center network, consolidating LAN, SAN, and high-performance computing traffic on a single network infrastructure.
- **Phase 3, or unified computing:** This phase brings real cost savings, simplifies data center management, and improves business agility through technology integration. Unified computing enables the true power of virtualization through a preintegrated architecture that brings together network, computing, and virtualization software, engineered and optimized to perform efficiently as one cohesive system.
- **Phase 4, or enterprise-class cloud:** This phase builds on the foundation of unified computing to create a flexible common platform for delivering IT as a service to the enterprise. Bringing enterprise-class security, control, and interoperability to today's private cloud architectures enables the automation of business processes to extend across the boundaries of organizations and resources.
- **Phase 5, or intercloud:** This phase represents Cisco's long-term vision of this market transition, marked by ubiquitous portable workloads and a rich cloud environment that allows many external and internal clouds to share transparently and securely, from enterprise to provider and provider to provider, based on available capacity, power cost, and proximity. This phase will encourage a new surge of innovation and investment similar to what occurred during the Internet expansion of the mid-1990s.

Why Is Cisco Focusing on Unified Computing?

The Network as the "Federator" -- Ecosystem/Open Systems Architecture for Customer Choice

Cisco has been an innovator in networking technologies and also has a long heritage of working collaboratively with other IT technology and services providers in the data center. Cisco understands how to use the network to rapidly provide information anytime, anywhere, to anybody.

The network is based on industry standards, and Cisco has a long history of authoring and co-authoring industry standards to help customers achieve the freedom of selective process automation. Similarly, the transition to unified computing and the convergence of network, computing, and virtualization technologies, must be supported by incorporation of industry standards and platforms.

Customers will need to access a variety of services and applications within and outside their corporate networks. A solution that federates access, performance, and security among all options will be crucial for supporting evolving business operations. The ultimate solution is all about open systems and creating customer choice.

Unified Computing Architecture

Dramatically Simplified Architecture

Unified computing, as Cisco envisions it, simplifies the way that servers and networks are deployed today. It centralizes switching resources, reducing network access-layer fragmentation by eliminating switching inside the blade chassis. The architecture uses a unified fabric, which provides transport of LAN, storage, and high-performance computing traffic over a single, cohesive infrastructure. This approach reduces the number of cables, I/O interfaces, and switching ports needed, cutting the size of the overall infrastructure by one third and reducing cost, risk, complexity, power, and cooling overhead.

Architecture That Continues to Meet Future Needs

The unified computing architecture provides greater flexibility and scalability for customers. As resources are integrated, optimized, and virtualized across the technology silos, IT can scale beyond what is operationally feasible in today's isolated, physical environments. IT gains the capability to provision resources faster and more securely, as pools of resources are now functioning as one entity rather than as independent areas. The need for domain-specific networking, storage, and computing expertise is still critical in the unified computing architecture, but the orchestration of the technologies is simplified in this model.

This architectural approach is a safe choice because it supports IT throughout the technology transition process, with technology already in use in fixed-server deployments, re-envisioned for new life in a completely dynamic, virtualized data center.

Main Customer Benefits

A unified computing architecture integrates network, computing, and virtualization components into a single system. This cohesive architecture removes the integration burden from customers, improves performance of the overall system, and provides crucial functions that cannot be implemented in a siloed architecture:

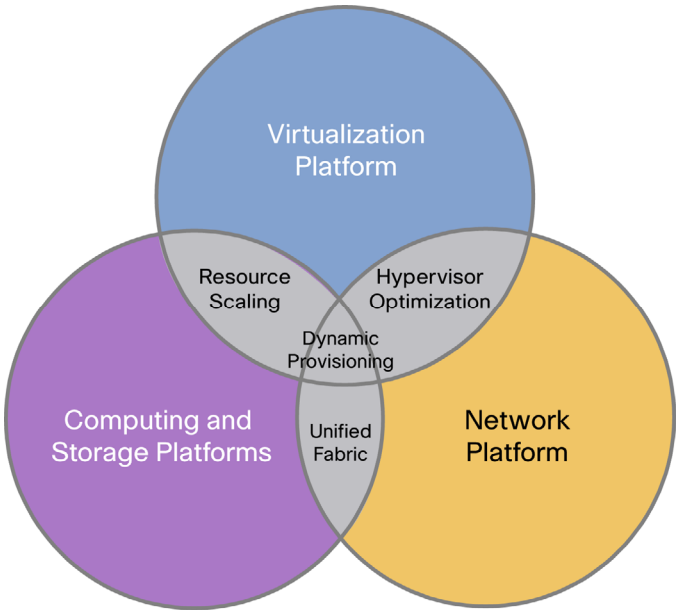
Reduces the time needed to deploy new services: With the inefficiency of domain handoffs removed, a cohesive architecture supports business services more quickly, dynamically, and efficiently.

Optimizes resources: A unified computing architecture allows customers to more efficiently reallocate resources that are underutilized. This architecture enables customers to deploy resources "just in time," as they are needed, rather than automatically, just in case they may be required, reducing operational overhead.

Reduces physical footprint: An integrated architecture reduces the number of individual components needed in a system, improving power and cooling efficiency and reducing operational costs.

Reduces points of management: As disparate technologies are integrated into one cohesive system, management is also consolidated, reducing risk from policy and configuration disconnects, and improving operational efficiency.

Figure 2. Orchestration Between Platforms



Conclusion

The unified computing architecture takes an innovative approach to data center design. Meeting the challenges of today's data centers requires a new approach to data center design that provides the capability to scale virtualized resources, reduce the time needed to deploy new applications, reprovision resources quickly and efficiently to respond to changing requirements, reduce operational complexity, and reduce power and cooling costs. The data center design must continue to draw on the domain expertise of the network, server, and storage experts, but it also must build across data center technologies. By taking a holistic approach to data center design, technology innovations optimized within a domain can be applied across domains, and by using a cohesive rather than an isolationist approach, operational efficiency is improved.

IT must not continue to apply old approaches to new problems. The way to provide a responsive, dynamic infrastructure to support changing business services is through integration and collaboration rather than isolation. The unified computing architecture offers a new approach to meet both the challenges of your data center and the challenges of today's business environment.

For More Information

- General information: http://www.cisco.com/go/unified computing/

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