Virtual Desktop Infrastructure: Meet the Challenge with Cisco Unified Computing System

What You Will Learn

Virtual desktop infrastructure (VDI) is being widely deployed by IT managers to centralize employee desktops, applications, and data in the data center. Most VDI solutions today run in a virtualized data center environment to further improve the manageability and security derived from consolidating hundreds and thousands of desktops to run on a few powerful servers.

This document provides an overview of the benefits and technical challenges of VDI and explains how innovations in the Cisco® Unified Computing System can simplify VDI deployments.

Virtual Desktop Infrastructure Deployments

In a recent IDC virtualization study, nearly half of the respondents said they had completed or were completing desktop virtualization deployments[1]. The appeal of VDI is the same as for server-side virtualization: it helps IT managers easily manage and deploy desktops, meet compliance and security guidelines, and reduce overall total cost of operations. These tangible benefits have led vendors like VMware, Citrix, and Microsoft to offer different VDI solutions.

The concept of centralizing desktops to the data center is not new. However, recent developments are accelerating VDI deployments as enterprises continue to look for IT efficiencies. VDI has become a feasible option as a result of recent, major innovations in server-side virtualization and related technologies such as storage thin provisioning, rich graphic user experience, and WAN acceleration. In addition, some of the leading technology vendors have major initiatives to market VDI solutions to their customers.

Focus on Data Center Servers

All these VDI solutions have one thing in common: all applications and data now reside on servers in the data center, rather than being replicated on desktops. VDI solutions impose some unique requirements on servers, as discussed in this document. The Cisco Unified Computing System is well-suited to meet these requirements, thanks to the following innovations:

- Extended memory
- Virtualization optimization, with Cisco VN-Link technology
- Unified I/O access and unified fabric
- Unified, centralized management
- Service profiles

Cisco Unified Computing System Addresses Common VDI Challenges

Running many desktops on a single virtualized server means running multiple OS and application instances on a single server, which demands large amounts of memory. Since CPU performance is outstripping memory performance, memory bottlenecks are a common problem. Many enterprises today deploy either four-socket servers or multiple two-socket servers to address this problem. These solutions result in more expensive servers, increased

[1] Worldwide Network Consulting and Integration Services 2009–2013 Forecast and Analysis: Opportunities Due to Server Virtualization," IDC, June 2009.

power costs, and higher licensing costs. The innovative Cisco UCS Extended Memory Technology expands the capability of a two-socket server to support up to 48 DIMM slots or 384 GB of memory, using standard memory DIMMs and operating systems and hypervisors. Hence, memory-intensive VDI environments can run two-socket x86 servers, with lower capital expenditures (CapEx) as well as lower operating expenses (OpEx) over time.

Each desktop in a VDI solution typically runs in a virtual machine on the server. IT managers expect to apply network policies (for example, security or compliance policy) per desktop or virtual machine. They also expect the policies to persist as the virtual machines move between servers to balance workloads, and they expect diagnostics, provisioning, etc. to be nondisruptive in this virtual environment. Cisco VN-Link technology helps the Cisco Unified Computing System meet these expectations. The Cisco Unified Computing System provides flexibility to offer Cisco VN-Link through either the software-based Cisco Nexus™ 1000V Series Switches or Cisco's virtual interface card, the Cisco UCS VIC M81KR Virtual Interface Card.

The Cisco UCS VIC M81KR has significant benefits in a VDI environment. It provides up to 128 virtual interfaces that can be connected directly to virtual desktop virtual machines through pass-through switching or hypervisor bypass technology. Hypervisor bypass helps reduce CPU overhead dedicated to networking, thereby providing more CPU cycles to run more virtual desktops on the same server. The Cisco VIC M81KR also helps reduce the number of adapters and switches often necessary for a VDI deployment by offering unified I/O access to a unified fabric that supports standard IP protocols as well as Fibre Channel through Fibre Channel over Ethernet (FCoE) encapsulation.

Within the Cisco Unified Computing System, provisioning and management of all the virtual interfaces and policies in the system are performed centrally from Cisco UCS Manager. This approach simplifies desktop management and also provides visibility and policy enforcement to each virtual desktop to meet regulatory compliance. For example, access controls can be set up to mitigate the risk that a rogue virtual desktop will access data from another virtual desktop on the same server.

Dynamic VDI Provisioning and Deployment

IT managers expect to dynamically provision virtual desktops. For example, an IT manager in a financial institution will bring servers in the data center online as employees arrive in the morning. However, when employees go home in the evening, these servers are repurposed to run analytics useful for the next day. Similar patterns can be found in other industries; for example, in large retail environments, the shift is from sales transactions to analytics and back.

For this kind of scenario to work, the server infrastructure needs to be highly agile and offer dynamic provisioning capabilities. The Cisco Unified Computing System facilitates dynamic provisioning with service profiles. The Cisco Unified Computing System service profile abstracts compute and network attributes such as identity (universal user ID [UUID], MAC address, and worldwide name [WWN]), I/O configurations, firmware versions, and BIOS boot order so that all can quickly be applied to a hardware blade when a server needs to be deployed.

For example, the IT manager can predefine a service profile template called VDI-Service-Profile. This template has all the compute and network attributes necessary for a server to run the VDI workload. When an additional server is required, the IT manager simply instantiates a new service profile from that template. The server has all the LAN and SAN properties, such as the VLAN and VSAN required to deploy the desktops.

With this approach, the newly added server is now available to the VDI manager's compute resource pool in minutes now instead of weeks. Hence, service profiles improve business agility by quickly aligning compute, storage, and network resources with the changing VDI workload requirements.

Further, current server infrastructure has multiple management points for managing the various elements in the system. There are separate management planes for managing firmware, identities, chassis, networking, etc., each adding operational overhead and, in some cases, license costs. Cisco UCS Manager is a unified, highly available device manager that manages all the elements of the Cisco Unified Computing System from a single management point.

Focus on Reducing Total Cost of Ownership

IT managers are deploying VDI solutions to reduce both CapEx and OpEx, but they frequently find that with existing server architectures, they are simply shifting the burden from the client side to the data center.

In contrast, the Cisco Unified Computing System represents a radical simplification of traditional architectures, with its unified I/O access to a low-latency, lossless 10-Gbps unified fabric that enables a “wire-once” deployment model. It dramatically reduces the number of devices that must be purchased, cabled, configured, powered, cooled, and secured. Instead of using multiple different types of adapters, switches, and management tools, it uses 10-Gbps converged network adapters and unified fabric with an innovative fabric extender I/O architecture to unify and simplify the infrastructure. Less infrastructure makes the Cisco Unified Computing System highly energy efficient. Unified I/O with the innovative fabric extender I/O architecture helps significantly reduce cabling and dramatically simplifies management.

In addition to the savings derived from the physical design, the Cisco Unified Computing System helps decrease TCO and improve business agility by automating just-in-time provisioning through the use of service profiles. Cisco UCS Manager allows IT managers from server, network, and storage disciplines to discover, provision, and monitor all the system components from within a single tool. This capability reduces operational complexity, which both decreases risk and enables better IT responsiveness. The system is based on open standards and can interoperate with existing system management tools.

Conclusion

The Cisco Unified Computing System is designed to meet the unique requirements of VDI deployments. The Cisco Unified Computing System is an integrated, scalable, and manageable platform in which all resources are managed from a unified management domain. The simplified architecture helps reduce acquisition costs and enables more efficient power use and improved business agility to reduce ongoing operational costs.

For More Information

For more information about the Cisco Unified Computing System, please visit http://www.cisco.com/go/unifiedcomputing.

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