

Private Cloud—Efficiency and Flexibility to Advance Business Innovation

What You Will Learn

This white paper addresses technical professionals who are expanding your use of virtualization and evolving IT toward a private cloud. The evolution to the private cloud follows a predictable path, with predictable challenges along the way. This white paper spotlights our customers' experiences and outlines technology requirements that can facilitate your migration to cloud computing. This document will provide you with a broad understanding of the Cisco® vision for private cloud computing and a detailed blueprint for how to transition your existing data center to a private cloud.

Why Evolve Your Data Center to a Private Cloud?

The evolution to all forms of cloud computing—private, public, and hybrid—is being influenced by a combination of consumer behaviors and the ever-increasing pace of business. Consumers continue to demand more connected life services online, from any location, at any time, and from any personal device. These same expectations and devices are being brought to the workplace with demands that IT organizations deliver the same types of services in a business context. The combination of higher expectations and increasing demands for services is forcing IT to rethink how to deliver services to users internally and externally.

From a budgetary perspective, IT organizations feel increasing pressure to reduce overall IT costs. Initiatives that can simplify IT operations through consolidation, standardization, unification of platforms, and automation of the IT infrastructure offer the potential for tremendous cost savings. But that is only part of the equation. These same initiatives must also allow IT to be more nimble, allowing the business to launch new applications and services more quickly.

In the past, IT organizations often spent as much as 70–80 percent of their resources just maintaining the existing infrastructure. The advent of cloud computing promises to break this paradigm. The evolution to a private cloud environment can guide significant improvements in efficiency and agility, ultimately freeing IT resources from the burden of maintenance to focus more on delivering innovation.

This white paper will review the predictable stages that IT organizations follow as they transform their data centers to support a private cloud, highlighting the typical obstacles that may threaten further progress. We will identify requirements to observe at each phase and demonstrate how Cisco solutions and best practices have helped businesses, large and small, overcome these obstacles.

How Do You Know You Are Ready?

Most organizations make the decision to evolve to using a private cloud when they hit a crossroads triggered by early success with virtualization. They have reaped the power, cooling, facilities, and licensing cost savings benefits of virtualizing some of their servers. They have also improved their responsiveness to user requests. So of course, the organization asks for greater cost savings and the expectations for turnaround on new requests increases.

That is when most IT organizations start to feel pressure. They have exhausted the early gains and efficiencies of virtualization, but virtualization is not yet the foundation of their approach. Virtualization requests are often treated as exceptions. As the number of exceptions increases, so does organizational friction because the processes and resources simply do not exist to take virtualization to the next level.

Virtualization blurs the line between IT organizations (storage, compute, networking, and applications), but the organizations are still structured independently of each other. They lack the tools to manage greater numbers of virtual machines or to automate the provisioning process. They are concerned about virtualizing their mission-critical applications.

Unfortunately, some organizations give in to virtual machine stall at this point. The disadvantages of increasing virtualization may appear, in the short term, to outweigh the advantages, and the organization declines to invest further in virtualization. This, unfortunately, restricts their benefits of virtualization significantly.

For other organizations, however, this phase is simply an inflection point. Either a virtualization advocate steps forward or an executive mandate is given that virtualization is no longer the exception. It will be the rule, and the IT organization makes the conscious decision to expand virtualization and begin the transition to the private cloud. The destination for these companies is not just one that combines server and application virtualization in one data center—but in every data center—using automation and intelligent networking to convert IT infrastructure agility into business agility. For these organizations, IT is not viewed as a support function; it is a force of innovation that is critical in delivering competitive advantage.

Requirements for Every Stage of the Transition

At Cisco, we have seen that customers follow a predictable path on their journey to a private cloud, although the path can have many entrances and exits. There are three general phases that apply to most transitions: IT Infrastructure, business applications, and IT as a service. Customers typically start the transition by migrating easy-to-manage IT infrastructure or test and development workloads to realize cost savings.

As customers better understand the benefits and potential of virtualized infrastructure, they consider its use for their mission-critical business application workloads. When implemented using standardized modular architectures, virtualization not only saves money, it also improves service levels for all workloads. As customers approach fully virtualized data centers and the private cloud, they can realize significant cost and agility benefits by increasing automation levels and transitioning to a model that delivers IT as a service, a dynamic, scalable, secure infrastructure that is cost-efficient, easy to manage, and transforms IT from a perceived cost center to an enabler of the customer's business.

Three technology initiatives occur simultaneously to support these three phases of the transition to the private cloud. The first is focused on consolidation and achieving cost savings by addressing inefficiencies in network infrastructure, IT resources, development and testing, and older systems. The second technology initiative focuses on pervasive virtualization of business applications and production environments, with improved business agility being the primary goal. The third brings greater levels of automation to the entire system, allowing IT to truly offer IT as a service to internal and external customers. While the enhanced automation capabilities are truly the catalyst that ultimately releases IT resources from a significant portion of maintenance tasks, efficiencies in the consolidation and pervasive virtualization stages can also influence greater levels of innovation for the business.

Knowing that a private cloud will ultimately provide your organization with better efficiencies and agility, it is pivotal not to view these three initiatives as separate phases, but as interconnected phases. The technology decisions you make at the consolidation phase can accelerate or impede your success at the virtualization and automation phases.

We will examine each of these technology initiatives, and highlight the challenges you will encounter, primary requirements, and how to avoid obstacles with solutions designed specifically to facilitate your transition to the private cloud.

Primary Objectives for Consolidation

- Standardize LAN and SAN infrastructure
- Unify network operations
- Reduce cabling
- Increase application bandwidth ten-fold
- Facilitate dynamic QoS
- Increase Multitenancy and compliance

Consolidation

Challenges and Requirements

In the consolidation phase, organizations are focused on reducing costs related to their IT infrastructure by promoting greater coordination and sharing within the data center. To maximize consolidation, IT organizations need to obtain the efficiency benefits of unifying their platforms and networks, while still helping to ensure that the architecture continues to support compliance and multitenancy requirements as virtual machines travel across data centers.

Existing data center architectures were built before virtualization, and are typically siloed in functionality. They were designed for individual applications. Consequently, they are characterized by multiple platforms running multiple operating systems, by high capital expenditures due to poor system utilization (because resources are isolated and unshared), and by highly inefficient power and cooling and complex management requirements.

One of the first things to do at this point is to consolidate and simplify. A successful consolidation strategy should focus on creating a unified foundation for the network fabric (LAN and SAN networks), computing and services (firewall, load-balancing, intrusion detection) for a unified operating environment, consolidation of branch servers and storage (wide area application services), as well as high utilization, dynamic management, and a reduced footprint.

In traditional architectures, networks were typically defined by usage (data, storage, and telephony) and isolated. Consequently, isolated ports were required on every system and each network needed to be managed by a different team, resulting in a highly inefficient model.

Over time, convergence of the data and communications networks helped improve network efficiency. Now, 10 Gigabit Ethernet allows organizations to also converge the LAN and SAN traffic onto a unified data center fabric, helping to prepare for a consolidated private cloud architecture in which shared network services, supported by a cross-functional staff model, are the standard. This efficient, simplified, and shared architecture can better handle future applications.

In traditional environments, it was easy to prove that separation of crucial applications and data that were required to meet customer requirements and compliance issues, because they resided on separate servers. As you consolidate your data center in preparation for the private cloud, you will want to ensure that your network has the intelligence to maintain the correct security, quality of service (QoS) requirements, and other policies with the correct virtual machines, and is capable of continuing to deliver a multitenant data center whether you are virtualizing applications on the same server or across multiple data centers.

Cisco Innovations for Consolidation Facilitates the Transition to the Private Cloud

To consolidate your environment effectively and lay the best foundation for the evolution to the private cloud, you need a comprehensive set of innovative unified fabric, unified network service, and unified computing solutions which are specifically designed to maximize consolidation and support pervasive virtualization. Cisco delivers the essential infrastructure for building clouds in a way that is unified, consolidated, and virtualized, so you have the necessary building blocks to deploy cloud-like services.

Cisco Unified Fabric allows:

- Architectural flexibility and scale
- Consolidated I/O
- Workload mobility
- Simplified management
- Virtual machine-aware networking

Cisco Unified Network Services unify application, policy, and security services to help enable greater infrastructure flexibility, responsiveness, and consistency. Innovations you can implement include:

- Virtualizing network and security services to align with virtualized servers
- Increasing security and compliance for any data center architecture
- Propelling open APIs
- Accelerating a multitenant cloud experience
- Providing on-demand delivery
- Embedding fabric intelligence for end-to-end network services

The Cisco Unified Computing System integrates compute, network, and virtualization to help enable significant capital and operating expenditure savings, pervasive virtualization, and highest application performance and availability.

Innovations include:

- Consolidation of network, compute, storage access and virtualization
- Scalable and dynamic compute resources for open, virtualized and nonvirtualized environments
- Embedded management
- Open API integration for complete system-level automation
- Ecosystem expansion to more than 40 independent software vendors

Cisco Unified Fabric

Cisco Unified Fabric provides a single, flexible, highly scalable network infrastructure for your data center. Cisco Unified Fabric allows IT organizations to migrate from isolated Ethernet, LAN, or storage networks and consolidate around a single network OS and consolidated I/O—with the intelligence to be virtual machine-aware, and to support maximum virtual machine mobility and security. Cisco Unified Fabric also helps dramatically lower costs through a simpler management model.

Cisco Unified Network Services

While server virtualization can increase immediate cost benefits for IT organizations, it can also create challenges for networking and security teams. In the past, applications and network and security policies were all fixed to physical devices. In a virtualized environment, those applications, within a virtual machine, can now be mobile to facilitate high availability or workload balancing. However, this can leave the network and security teams without visibility into those operations, opening the risk of performance or compliance issues. Just as servers are being virtualized, the network and security elements must become virtualization-aware and capable of operating in a more dynamic environment.

Cisco offers a comprehensive suite of offerings, called Cisco Unified Network Services, that help ensure that a consolidated environment can support multitenant experiences and meet compliance requirements by enhancing security, policy, and maximum application performance wherever the application may reside in your private cloud.

Cisco Unified Network Services unify the way application delivery and security services are provided in your data center network or computing environment, providing consistent and flexible services delivery using policy-based provisioning across:

- **Any service type:** Improving application availability, security, acceleration, and performance monitoring
- **Any form factor:** Supporting network services on Cisco-dedicated appliances, embedded modules, and VMware virtualized platforms
- **Any environment:** Delivering services from network core or computing edge, or both

A few of the capabilities Cisco Unified Network Services can support include multitenant virtual server security, virtualized application acceleration, and virtualized application and network performance monitoring,

Cisco Unified Computing System

The Cisco Unified Computing System™ (UCS) is the first compute platform specifically designed for maximum consolidation and virtualization, and to facilitate the migration to cloud computing. Unlike traditional architectures, Cisco UCS integrates compute, network, and virtualization into a highly efficient, simplified, automated architecture. The resulting platform helps customers direct greater utilization of compute assets, is vastly simpler to manage and operate, and delivers far greater virtual machine performance and mobility

Benefits of Consolidation: The Taser International Experience

- Taser International worked with Cisco to address challenges it was facing in introducing an innovative service to transform policing and digital multimedia evidence management. The online solution had to scale to manage exabytes of evidentiary data, most of which were video-based. In addition, the solution needed to deliver outstanding responsiveness and quality of service, as well as lower total cost of ownership. Finally, the solution needed to protect sensitive law enforcement information from unauthorized disclosure and protect the integrity of evidence.
- Taser selected Cisco based on its ability to deliver superior consolidated and virtualization with solid security. By implementing Cisco Unified Computing system and Cisco Unified Fabric, Taser increased operational agility and administrative efficiency, saving \$900,000 in capital costs and \$37,000 in annual energy costs.

Virtualization

To maximize virtualization:

- Virtualize network services
- Increase virtual machine density
- Increase virtual machine performance
- Promote virtual mobility (intra- and inter-site)
- Increase virtual machine-aware security

Challenges and Requirements

The goal of this phase is to systematically increase the percentage of the infrastructure that is virtualized, increasing the number of applications per server or desktops per server to gain the greatest efficiencies. IT organizations progress along a learning curve as they try to improve their agility—rolling out new applications faster and offering new services that provide the benefits of the virtual infrastructure, like virtual desktop infrastructure (VDI). To the extent that these organizations can take full advantage of tested and proven processes to accelerate their results and mitigate risk, they increase the likelihood of an unobstructed migration to pervasive virtualization.

Those organizations who suffer from virtual machine stall are often those that neglect to adapt organizational practices to support a virtualized environment for the long term. To achieve pervasive virtualization, the virtualized data center must be designed to facilitate, and not fight change. Consequently, IT organizations must put an emphasis on implementing solutions that provide ease of management and tight security.

Cisco Innovations for Pervasive Virtualization

To achieve the greatest value from virtualization, including but not limited to efficiency, mobility, and simplified deployments, it is important to understand the multiple aspects of virtualization and how the infrastructure can enhance that functionality.

The Essential Role of the Network in Virtualization and Cloud Computing

The success of your efforts to deliver pervasive virtualization, the private cloud, or even hybrid cloud solutions, will depend on the performance, availability, and intelligence of the network that connects all of the elements of each data center, and the data centers, themselves. You will need to know that the network will be able to:

- Deliver anywhere, anytime connectivity with any device
- Scale and grow efficiently
- Handle all types of information, such as big data, data analytics, video, and all other data that are causing big bandwidth growth, while delivering the highest QoS
- Help ensure that the network is secure from end to end

Cisco is the only company that can deliver this caliber of network performance, availability, and security, end-to-end—from the end user, across the network, to the data center. Following is a brief summary of just some of advantages of Cisco Borderless Networks that provide superior support for pervasive virtualization and private clouds:

- The extensive Cisco product line, with leadership solutions in every category, helps you build sufficient bandwidth to increase your virtualization density, promote rapid and reliable application mobility, deliver always available services, and meet user expectations for the highest QoS even when using the largest data analytic applications or bandwidth-consuming video
- Network intelligence that extends from the user through the network and to the data center allows service prioritization capabilities, letting you to effectively achieve QoS agreements.

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- Policy management capabilities travel with virtual machines across the network within and between data centers to minimize risk and promote end-to-end security, trust, privacy, control, and compliance.
 - Cisco delivers a self-healing network that can automatically redirect workloads transparently in the event of failure.
 - Cisco's high-performance and resilient network supports highest application mobility and availability to increase IT efficiency and integrate with service provider networks in hybrid cloud scenarios.

Network Virtualization

In a virtualized environment, the network no longer stops at the cable that plugs into the back of a server. With virtualization, it now extends into the server as a software version of a network switch, a firewall, a load-balancer or several other network functions. In order to continue to provide the expected levels of network services, such as high-availability, dynamic QoS, security, and application acceleration, the network services need to become virtualized and virtual-machine-aware. Cisco Unified Network Services allow network and security teams to maintain complete visibility of the virtualized environment in the same way they did with the physical environment, but with all the benefits of virtualization without the loss of security or control.

Virtual Machine Efficiency

Increasing virtual machine efficiency becomes an essential promoter of overall data center efficiency. For many applications, such as VDI and IT infrastructure applications, a high density of virtual machines per server will create a greater return on investment (ROI). Some servers are not designed to increase virtual machine density because the lack of memory creates a block to adding new applications. With Cisco UCS, however, innovative memory expansion technology allows organizations to host many more virtual machines than existing server architectures, without sacrificing performance.

Virtual Machine Performance

To meet the expectations of applications managers, you will need an infrastructure designed to deliver outstanding performance for all types of applications—not just lower-tier applications, but also mission-critical applications. Cisco data center solutions provide the right foundation for even the most demanding applications. For instance, many applications require access to high-performance I/O or need to be able to maintain very low latency. Cisco UCS overcomes these challenges with innovations like 10 Gigabit access and hypervisor-bypass capabilities from the Cisco virtual network interface card (vNIC) to increase throughput and performance for memory-intensive applications. In addition, the ability of the Cisco UCS to deliver dynamic QoS by taking advantage of capabilities like vMotion's dynamic resource scheduling allows you to prioritize applications in shared infrastructures to help ensure you meet specific application service-level agreements (SLAs).

Virtual Machine Consistency

By migrating applications to virtual machines instead of utilizing physical servers, IT organizations can simplify their overall operational model by creating operational process that can be consistent from development and testing production, to backup, and finally to disaster recovery. We offer Cisco UCS solutions for rack mount, blade server, and branch offices that allow IT organizations to build consistent virtual machine operations. Combined with Cisco UCS service profiles, companies can create extremely consistent and flexible virtual environments that can improve many aspects of IT operations.

Virtual Machine Mobility

Data centers need to be designed to support frequent change. Virtual machines can be migrated manually or dynamically from one server to another to improve load balancing or resource utilization, allow maintenance, or address specific geographic needs. To maximize virtual machine mobility will require you to build a highly scalable Layer 2 environment or Layer 2 emulation if you are moving between data centers.

Examworks Achieves Breakthrough Productivity and Savings through Pervasive Virtualization

To conduct business on a national scale, ExamWorks needed a data center infrastructure that could deliver centralized backups, disaster recovery, and the ability to comply with regulations. ExamWorks worked with Cisco to implement virtualization and build a private cloud to host its main business applications and virtual desktops. They selected Cisco UCS and Cisco Unified Fabric because they were designed specifically to support pervasive virtualization, and were proven to support the scale and speed they needed. Benefits included:

- **Very low IT resource requirements:** ExamWorks was able to support 450 employees in multiple locations with just two centralized IT personnel. Even as the company grows, it anticipates annual savings of \$1.1 million.
- **Reduced capital expense:** Cisco UCS hosts 1000 virtual desktops, costing two-thirds less than a traditional server.
- **Lower cabling and desktop costs:** ExamWorks expects to save approximately \$333,000 annually.
- **Reduced energy consumption:** The smaller footprint of the Cisco UCS reduces ExamWorks' energy consumption by at least 50 percent.

To increase automation:

- Reduce points of management
- Install stateless computing
- Facilitate open APIs for automation and orchestration
- Allow policy-based provisioning
- Simplify overall IT operations

This will help enable:

- Self-service IT capabilities
- IT as a service
- Dramatic increases in efficiency, productivity, and agility

Cisco Unified Fabric is designed to build highly scalable, high-performance Layer 2 networks that can span a single data center or multiple data centers, facilitating your evolution to cloud computing. For instance, by leveraging Cisco Nexus® 1000V Series Switches, Cisco Fabric Path, Overlay Transport Virtualization (OTV) and Cisco Locator/ID Separation Protocol (LISP), network administrators can build extreme flexibility into their designs to take full advantage of virtual machine mobility. And, the Cisco Unified Fabric allows you to build this capability at the pace your business needs, extending investment protection for existing Layer 3 architectures or mixed environments.

Virtual Machine Security and Policy

To help ensure security and adherence to compliance requirements as you virtualize your data centers and evolve to private cloud architecture, you will need to ensure that the right policies follow a virtual machine wherever it moves. Without proper security and network visibility, IT's ability to increase the pace of virtualization and cloud can be delayed

Cisco Unified Network Services—which include Cisco Nexus 1000V Series Switches and Network Analysis Module Virtual Service Blades, Cisco Virtual Network Service Data Path (vPath) technology, and Cisco Virtual Security Gateway—provide dynamic security policy management and visibility while virtual machines move within and across the data center. This comprehensive visibility of virtual machine and security policies meets the requirements of both network and security administrators and because the switching, security, intrusion-detection, and policy capabilities are all virtualized, they also lay the foundation for hybrid cloud architectures in the future. In addition, Cisco Nexus switching products can provide dynamic QoS policies that can be extended from server to access to core, enforcing policy for SLAs across tiers of applications.

Tested and Proven Virtualization Solutions Accelerate Your Journey

The combination of all these virtualization enabling and enhancing functionalities allows Cisco to offer a complete, unified data center infrastructure for private clouds. But Cisco does not stop here. To simplify your evolution to pervasive virtualization—and to the private cloud—Cisco offers a comprehensive list of Cisco-validated designs for a wide range of solutions that incorporate ecosystem partners like SAP, VMware, Citrix, Microsoft, and others to take full advantage of the power of the Cisco data center infrastructure. These [validated designs](#) include step-by-step processes and specific resource requirements to remove the risk and speed time to market of your virtualized solutions.

Automation

Once you have established a pervasive virtualization foundation for your data center, introducing automation solutions can dramatically increase efficiencies, productivity, and agility, including the ability to deliver IT as a service.

Challenges and Requirements

Business demands for IT services continue to grow, but, unfortunately so can your IT costs, if the systems are not managed with greater efficiency. In order to keep the value of IT services growing faster than IT costs, IT organizations need to expand automation across all processes by simplifying deployments, reducing operational costs, improving productivity, and increasing business time-to-market, while decreasing the opportunity for error.

Integrated Automation Solutions Speed Deployment of Cloud-based Services

Benefits of Cisco intelligent automation for private clouds:

- Dramatically reduces provisioning time for new services
- Implements best practices and enforces policies
- Maximizes asset utilization
- Promotes efficient reuse of IT intellectual capital
- Creates an adaptable cloud
- Uses existing physical and virtual infrastructure resources
- Improves employee productivity and promotes business alignment with IT

To accomplish this, you need to ensure that your virtualized IT infrastructure is designed, from its foundation, for simplified management. To preserve existing investment in management platforms and the management systems that govern data center solutions, IT organizations must also seamlessly integrate existing investment in other management platforms within the existing data center ecosystem. In addition, as these organizations continue to evolve to the private cloud, the number of requests from internal constituents will continue to increase. You will need solutions that allow you to meet these requirements quickly and build solutions to leverage the power of your cloud-based infrastructure.

Cisco Innovations in Automation

Cisco offers a wide range of automation capabilities that are inherent in the Cisco data center architecture, and are delivered through our open platform integrated with industry leaders in the management category, and through integrated service catalog solutions that leverage best-of-category automation partners.

Automation Capabilities Built into Cisco Data Center Infrastructure

Cisco offers many levels of automation that can help you roll out new IT services faster and with more flexibility and efficiency. For instance, Cisco UCS service profiles facilitate stateless computing, which is the foundation of private cloud solutions. In addition, Cisco UCS can be automated through an open XML API, including servers, network and storage I/O, allowing system-level deployments.

Cisco Unified Network Services facilitate dynamic network capabilities such as firewall and switching and integrate with tools like VMware Site Recovery Manager (SRM) to deliver automated capabilities such as automated backup or disaster recovery. By utilizing Cisco Wide Area Application Services (WAAS) technology, IT organizations can run applications traffic and their backups more efficiently, regardless of where users or applications are located.

One way to address the increasing demands for cloud-based services by internal constituents in a more efficient manner is to provide internal users with self-service access to IT offerings using fast, automated delivery. To accomplish this, IT operations teams need to create a catalog of standardized service offerings with the capability to provide a self-service portal for users, implement policy-based controls, and manage the service lifecycle. This self-service solution allows users to automate various aspects of their operations, including service and infrastructure provisioning, service change management, metering and billing/chargebacks, and resource management across various aspects of their infrastructure, including compute, virtualization, network, storage, and applications.

Cisco Intelligent Automation for Cloud combines these capabilities to provide a single platform with which enterprises can build private clouds. This advanced automation and orchestration software provides automation across the various elements of Infrastructure as a Service (IaaS) and platform as a service (PaaS) clouds. The Cisco Intelligent Automation for Cloud solution provides a web-based, self-service interface that helps end users to view service options based on their role, organization, and other access controls. They can order services, provide configuration information through dynamic forms, and track and manage their services and usage on an ongoing basis. The catalog also allows IT to associate costs with various services, which can be integrated with billing and financial services for chargeback if desired. The order process can also manage policies such as the lease period, so that services that are no longer needed can be expired and the associated resources pulled back into the pool.

Cisco and BMC Strategy: One unified infrastructure, enabling the cloud

- Optimized IT investment
- Interoperable management
- Portable workload images
- Long Distance Live Motion

Cisco Intelligent Automation for Cloud is built to integrate easily with any data center device and solution in the ecosystem, using either the standard connectivity or customization. Its core engine, Cisco Tidal Enterprise Orchestrator, is open and interoperable and has rich integration capabilities that support interfaces from command-line interface (CLI), web services, and script support such as PERL, Powershell, Simple Network Management Protocol (SNMP) integration, to allow any data center system, including public clouds, to enter the fabric of automation.

Open Ecosystem to Deliver Best of Category Solutions

The Cisco automation strategy for cloud computing is to take full advantage of an open ecosystem of partners. Cisco UCS Manager and Cisco Data Center Network Manager 4.0 integrate to deliver a simplified, unified, and open management solution, with programmable APIs to easily integrate with your other management platforms in the ecosystem. Cisco has certified our cloud solutions to work with leading automation and management vendors such as BMC, CA, IBM, HP, VMware, EMC, Ionix, and many others.

Following is one example. Cisco and BMC are working together to deliver one unified architecture to facilitate automated cloud solutions. Together, we have created the integrated Cloud Delivery Platform (CDP) to help IT organizations easily deploy end-to-end cloud services. The integrated CDP helps cloud providers eliminate many of the complex, manual steps required to set up and provision a cloud computing service, promoting greater end-to-end simplicity across the cloud network. The joint solution is built on new levels of integration of BMC's comprehensive Cloud LifeCycle cloud computing software orchestration and management solution with Cisco data center networking, compute, and storage solutions.

The integrated system is designed to operate in large-scale private, public, and hybrid cloud environments and deliver breakthroughs in efficiency, time to market, service quality, reduced complexity, and improved compliance. For instance, with this single integrated solution, cloud providers can deploy end-to-end cloud services running on a cloud computing infrastructure that spans applications networks, computing, and storage. Using this platform, cloud providers can use one-click provisioning to automate and optimize the initial provisioning and configuration of new cloud offerings. And, using a highly secure network container architecture, the Cisco and BMC joint solution automates physical and virtual partitioning of multitenant cloud infrastructure, including the intelligent placement of containers based on size and security needs. Load balancing, firewalls, and class-of-service management can be automatically attached to each container.

You can find up-to-date information about other management innovations at <http://www.cisco.com/en/US/netsol/ns340/ns394/ns224/index.html>

New Choices in Implementing Private Cloud Solutions

We have reviewed some of the challenges, opportunities, and technology decision points you will face as you plan your migration to cloud-based technologies. Today, you have numerous choices in how to acquire, build, and consume IT services. Your organization not only can determine whether you want to build your own private cloud infrastructures rather than purchasing prevalidated, presized components of virtualized data centers, but you also have an increasing choice of cloud service packages that accelerate implementation of cloud-based solutions. Additionally, you have the choice of whether to implement hybrid cloud models, because a growing number of cloud service providers offer solutions that can be consumed as individual services.

Winterflood Securities Automates Provisioning of New Services

Winterflood Securities routinely processed up to 250 million market data updates daily, with peaks often passing 30,000 updates per second. The reliability, speed, and flexibility of its trading platform became crucial.

Winterflood upgraded its data center infrastructure to Cisco UCS and implemented Cisco Unified Fabric and Cisco Unified Network Services to improve its performance and agility. Because quickly capitalizing on new market opportunities marks the difference between success and failure in the capital markets industry, Winterflood wanted to take full advantage of the automation capabilities facilitated by its new data center. Winterflood now relies on its Cisco data center solutions to deliver the flexibility to provision a new service overnight, so it can go live in time for the next day of trading.

Ultimately, the best choices will be comprised of the best cloud-enabling technologies. Whether you are consuming a service delivered by a service provider or creating your own, the more efficient and high-performing the infrastructure, the higher the QoS and the lower the cost.

So, as you make your decisions, look for the elements we have already discussed in the consolidation, virtualization, and automation section. Expect all vendors to deliver the equivalent of a Cisco-validated design to provide you with all of the information you need to implement a solution successfully and increase the full potential of the underlying technologies. Because the cloud computing category will continue to see significant innovations in the coming years, demand that your vendors demonstrate an open environment so that you can take advantage of the best-of-category solutions that emerge.

The Cisco philosophy is to offer choices to our customers. In addition to providing you with the essential building blocks, architectures, and integrated systems for building private clouds, we also work with the best partners in each category, to provide fully tested and prevalidated, solutions such as Vblock Infrastructure Platforms from VCE and FlexPod for VMware solutions with NetApp.

Vblock Infrastructure Platforms

When VCE launched Vblock Infrastructure Platforms, they were the industry's first completely integrated IT offering combining best-in-class virtualization, networking, computing, storage, security, and management technologies with end-to-end vendor accountability. These integrated units of infrastructure help organizations rapidly deploy virtualization and cloud-based solutions so customers quickly see a return on their technology investments. Vblock solutions are also designed to help customers reduce the total cost of ownership with integrated, tested, and validated solutions built upon a standard infrastructure designed to reduce management and maintenance costs. Vblock Infrastructure Platforms offer flexible EMC-based storage capacities and leading processing and network performance, as well as support such incremental capabilities as enhanced security and business continuity, propelled by the integration of Cisco data center solutions with VMware vSphere. VCE Vblock Infrastructure Platforms are optimized for a wide range of virtualized solution deployments with ready-to-deploy Vblock-powered solutions for SAP, VMware View, and Microsoft Exchange, to name a few.

FlexPod

FlexPod for VMware solutions are also founded on a data center infrastructure that is optimized for virtualized environments, including Cisco data center solutions, VMware vSphere, and NetApp FAS storage. The FlexPod for VMware configuration comes as a complete data center in a one-rack cabinet that you can deploy quickly and easily. As an example, the base FlexPod configuration can support 1500 users for these four popular workloads simultaneously: VDI, MS Exchange, MS SharePoint, and Microsoft Structured Query Language (SQL) Server. FlexPod for VMware is also designed to be easily flexed to meet configuration requirements in your specific environment. You will be able to rely on step-by-step design guides and sizing tools, so there is no guesswork involved.

Changing the Paradigm: Evolving IT from a Support Function to an Essential Ingredient of Business Differentiation

As you move from a virtualization mindset to a private cloud mindset, you change the goal from saving money to enhancing organizational agility and delivering innovative solutions. While the evolution may involve steep learning curves and some organizational discord at times, we believe that most obvious signs of progress in your migration come in the form of the new innovations that you build. The innovations may start out simply, in the form of faster response time, happier users, and fewer emergencies. Ultimately, other innovations will be far-reaching, coming from your internal clients, who are now able to offer fundamentally new types of services, with greater reliability and performance, and at lower costs than were possible in the old structure. Your IT organization may be perceived less often as a support function, and more proactively sought out when product and service strategy discussions take place.

Cisco IT Delivers Elastic Infrastructure Services Based on Private Cloud

Cisco IT is deploying an internal private enterprise cloud to provide end-to-end IaaS to all of its business entities worldwide. As Cisco has pursued its own migration from pervasive virtualization to a fully automated, unified Infrastructure with increasing automation capabilities, the company has implemented a platform based on Cisco UCS with VMware vSphere, Unified Fabric, Unified Network Services, and Cisco networking solutions to virtualize more than 65 percent of its data center infrastructure.

During that time, Cisco has reduced the time it takes to provision a server from weeks or days to just 15 minutes. By July 2011, the goal is to increase that percentage of virtualization to 80 percent and to have reduced server total cost of ownership by more than 32 percent.

Before the virtualization process started, roughly 70 percent of Cisco IT resources were focused on maintenance activities instead of projects that would increase innovation. Today, Cisco IT invests 60 percent of its resource time in activities designed to deliver innovation to the company, and the trend is increasing.

Internal indications may be more subtle. Your IT staff may find that they are able to say yes more frequently and decline requests less often. There may be fewer overtime hours required to support off-hours system maintenance or emergency updates. You may see higher levels of cross-training in your employees and experience lower turnover.

Taking Your Next Step

As you take your next step toward the private cloud, here are some recommendations:

- Evaluate your current status in your consolidation and virtualization process. What are the greatest challenges that you are experiencing? Where are the greatest untapped opportunities? Are your IT organizations ready to consider changes?
- Create an initial plan for your next step. Do you have a new set of applications that you are considering? Is there a project for which the budget is less than usual? Do you have organizational support to try a cloud-based approach? Create your initial goals for the project and then identify both technology and organizational changes that might be required. Analyze your strengths and weaknesses. Determine who can support you in those areas.

Conclusion

If you are new to cloud technology implementation, Cisco can provide the expertise you need. Cisco not only provides the technology infrastructure to help you successfully build and take full advantage of a high-performance, efficient private cloud, but we also have the experience to guide you. Cisco Cloud Enablement Services and our partners' offerings can help you tackle specific obstacles and realize the full business value of your IT investments faster. Backed by our networking and security expertise, an architectural approach, and a broad ecosystem of partners, these intelligent services can help you to build a highly secure, agile, and automated cloud infrastructure.

For More Information

For more information about Cisco in the data center, visit <http://www.cisco.com/go/datacenter>

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