Enhance Your VMware Environment with IBM SmartCloud

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Introduction: The Importance of Cloud

Based on a recent research study by Enterprise Management Associates (EMA), the core reasons for the enterprise to consider private cloud solutions are agility, reduced CAPEX and OPEX, performance, resiliency, and scalability.[1] These factors translate into two distinct economic arguments:

IT Services as a Strategic Differentiator

The ability to rapidly deliver, manage, and modify new IT services allows the organization to leverage IT as a strategic differentiator. Being able to adopt new business applications faster than the competition enables the enterprise to better compete in today's highly dynamic marketplace.

Resource Optimization

Over-provisioning and under-provisioning of storage, network, and compute resources are ever-present challenges in today's data center, leading to significant waste, as well as performance and reliability problems. Providing end users with the exact required resources is key to getting the most out of every IT dollar spent. This means that resource provisioning and lifecycles have to be centrally managed, based on consistency, performance, compliance, policy, and security guidelines.

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The Core Components of Any Cloud: Virtualization and Management

To deliver the economic advantages of the cloud to the entire organization, there are two core components required: virtualization and management.

Virtualization

Cloud computing without virtualization is possible, but uneconomical. Pooling network, storage, and compute resources to make them more granular, mobile, and agile is a central pre-condition for an efficient cloud. Today's virtualization platforms also offer a set of advanced capabilities, such as the ability to overcommit server memory, move virtual machines from one SAN or server to another without downtime, and make virtual machines highly available.

Management

The ability to provide comprehensive lifecycle management for the entire application stack is key to the efficient operation of any private and hybrid cloud. As virtualization makes it easy to rapidly spin up a vast number of resources, data center efficiency will only be achieved if these resources – storage, network, compute, hypervisors, operating systems, applications, and business services – are tightly managed (see Figure 1). Aligning data center resources with end-to-end business processes is a vital pre-condition for enterprise IT becoming a key strategic differentiator.

1 Optimizing Cloud for Service Delivery: http://www.enterprisemanagement.com/research/asset.php/2192/Optimizing-Cloud-for-Service-Delivery

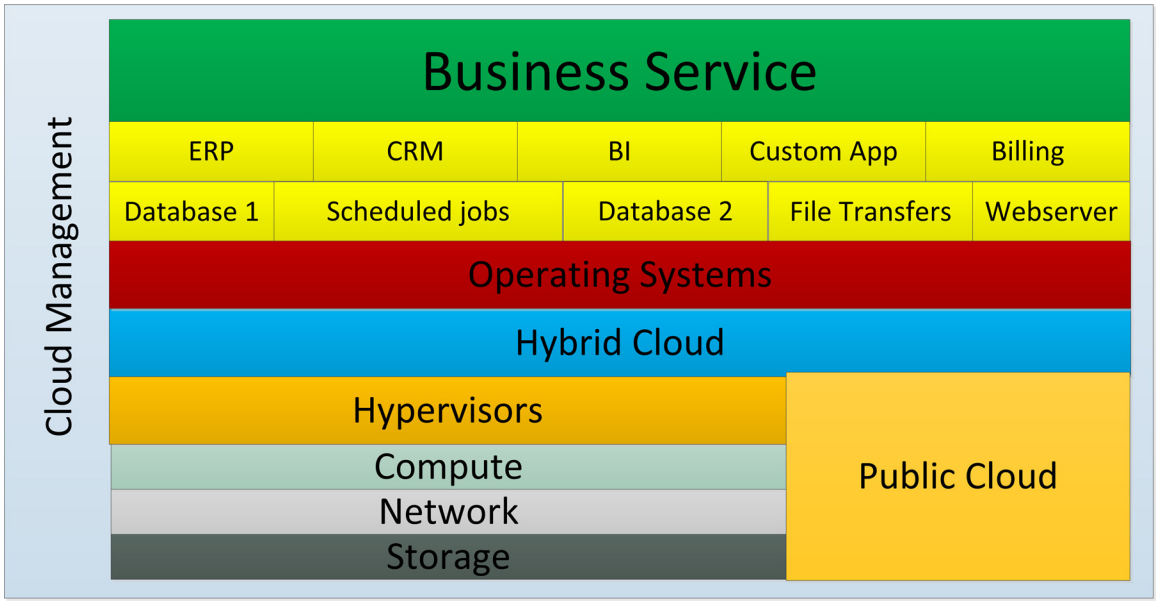

Figure 1 – EMA Cloud Model: Management as the Key Requirement for Cloud

Now let us take a look at how virtualization and management solutions must work together to create an optimal cloud platform.

Virtualization with VMware

Based on the ESXi bare-metal hypervisor, VMware's vSphere virtualization platform offers a proven set of infrastructure and application services. The former focuses on compute, storage, and network virtualization, while the latter center on availability, security, and scalability of virtualized environments. VMware's vCenter manages multiple vSphere environments across the data center. vCenter provides these capabilities through APIs that can integrate with advanced third-party IT management solutions, such as IBM's SmartCloud suite of products.

Barriers to Success of the VMware Cloud

Engaging IBM's SmartCloud for building an advanced self-service cloud on top of ESXi, vSphere, and vCenter helps the organization overcome challenges inherent to a VMware-only solution. While ESXi, in combination with vSphere and vCenter, offers a powerful range of virtualization capabilities, relying on VMware products alone for an enterprise cloud solution comes with the following two core limitations.

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Licensing Cost

For x86-based server infrastructure, VMware is the most common choice for virtualization. VMware's wide support from storage, networking, and compute vendors can reduce compatibility and interoperability problems when deploying virtualized infrastructure and applications.

However, VMware's licensing costs can be high, especially for less critical workloads. As a result enterprises more and more consider the deployment of non-critical workloads on low-cost or free hypervisor platforms, such as KVM, Citrix Xen, or Microsoft Hyper-V. In addition, many mission critical workloads such as databases and enterprise applications continue to operate on non-x86 platforms not supported by VMware. In order to benefit from a combination of VMware, lower-cost alternatives, and non x86 hypervisors, the organization requires a management system that can work across platforms and automatically assign workloads to the most cost-efficient or performance optimized virtualized host.

Management

Virtualization projects are generally aimed at the reduction of complexity through the introduction of the hypervisor as an additional abstraction layer. However, to realize the promised resource utilization and provisioning agility advantages, the hypervisor itself must be tightly managed. As a result, while hypervisors have helped to reduce capital costs, they have also increased the need for management, driving up operational costs. As hypervisors are moving more and more into the commodity corner – with only marginal differences in performance, virtual machine density, and reliability – organizations are looking for solutions to cope with the explosion in the number of applications hosted in the virtualized data center. Therefore, efficient virtualization management must address performance, security, and data protection challenges at the application level.

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Insufficient management of the virtual application infrastructure often leads to overprovisioned, unused, unsecure, non-compliant, ill-performing, and unreliable virtual machines. As these virtual environments grow, older virtual machines are often not decommissioned when they are no longer used. Thus, they continue to consume physical storage, network, and compute resources, effectively reducing the originally expected capital savings benefits. This state of "wild growth" of virtual resources is often referred to as *"virtualization sprawl."*

"*Virtualization stall"* is another significant problem resulting from a lack of virtualization management, leaving the IT organization unable to manage the rapidly increasing complexity of the virtualized data center, due to a lack of processes and tools. This problem is exacerbated by today's quickly increasing number of applications within the data center, as well as by the growing complexity of the individual application stacks. In order for the IT organization to effectively control this complexity, they must have a solution in place to manage all the physical, virtual, and software resources that make up the application stack for a business services, as a collection of related resources. In today's data center, most simple workloads have already been virtualized. Organizations are now looking to move more complex applications and business-critical services to virtualized and cloud environments. This requires an application workload-centric approach to deployment, monitoring, metering, dynamic scaling, and capacity planning, to ensure that applications and business services are high performing, available, dynamic, and resilient.

How IBM SmartCloud Lifts VMware Virtualization to the Cloud

Combining VMware virtualization technology with IBM enterprise IT management solutions leverages the strengths of both vendors and addresses the management and licensing cost challenges of a VMware-only solution, by offering the following core capabilities.

Application Performance Management

Modern applications rely on complex interdependent components, often maintained by different operations staff. This makes it hard to manage the application as a whole and proactively prevent reliability and performance issues. The ideal cloud management platform will address this challenge by tying together all application-relevant resources, so that they can be managed as one entity.

IBM SmartCloud Application Performance Management offers analytics-based application health and user experience monitoring, to identify and resolve issues often before the end-user notices a performance impact. As most mission-critical applications rely on a complex combination of compute, network, and storage components, as well as on the health of numerous operating systems and middleware platforms, it is essential to have centralized visibility across all of these components.

Image Lifecycle Management

With the number of workloads rapidly increasing, compliance, security, configuration, and patch management become more essential. Allowing end-users to provision the resources they require in a self-service manner makes the consistent management of operating system and application stack images a key success criterion for any cloud deployment.

IBM SmartCloud Provisioning facilitates the re-use and central patching – change management – of server images, minimizing manual image management while ensuring image compliance and consistency. Through advanced analytics, IBM SmartCloud Provisioning can inspect deployed images to identify differences from other production machines or from a library of "gold standard" images. This helps reduce non-compliant images that create reliability and performance risk and consume excess storage.

Management of Physical and Virtual Resources

As not all components of a business service are necessarily virtualized, an effective private cloud platform must also be able to provision, manage, and decommission physical resources. Managing these physical resources outside of the corporate cloud would require the organization to maintain separate lines of systems management solutions and processes, one for cloud and one for physical resources. The policy-based, self-service provisioning and maintenance of physical and virtual machines, as well as raw operating systems and full application stacks, is essential for providing a compliant and efficient private cloud in a low-touch manner.

IBM SmartCloud Provisioning, Tivoli Service Automation Manager (TSAM), IBM Service Delivery Manager (ISDM), IBM SmartCloud Virtual Storage Center, IBM SmartCloud Control Desk, and IBM

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SmartCloud Monitoring simplify the management of physical and virtual compute, network, and storage systems, providing the visibility, control, and automation necessary to manage business-critical tiered applications and services.

Security

x86-based virtualized cloud infrastructures come with their own set of vulnerabilities. Standard security tools are often not aware of these virtualization-specific vulnerabilities that are introduced through virtual networks, vMotion, and virtual machine sprawl.

IBM Security Virtual Server Protection for VMware (SVSP) offers intrusion detection and prevention specifically for VMware environments. SVSP works without an agent and enables the centralized management of virtual and traditional IT security, while simplifying security audits through reports that are targeted toward VMware environments.

Multi-Hypervisor Support

The rapidly increasing number of virtual machines within the enterprise can lead to significant hypervisor license cost, if only VMware virtualization technology is used. KVM, Citrix Xen, PowerVM, and Microsoft Hyper-V can be viable, lower-cost or performance optimized alternatives to VMware. However, many enterprises shy away from these VMware alternatives, as managing multiple hypervisors can appear to be a daunting task.

IBM SmartCloud Provisioning simplifies cross-hypervisor management by providing all the virtualization management tools to efficiently provision, deploy, and manage resources on most popular hypervisors. The IBM SmartCloud line of products facilitates the policy-based placement of workloads on the most cost-effective or workload-optimized hypervisor.

Host Consolidation

A rapidly expanding self-service environment is inefficient if not managed in a consistent, policy-driven manner. In particular, the over-provisioning of application environments, based on the "better safe than sorry" paradigm, consumes vast amounts of resources, without providing any significant business value. While VMware vCenter offers an excellent set of virtual resource management solutions, to be more efficient, the IT organization requires advanced capacity planning capabilities and the ability to manage data center resources in an application-centric manner.

Ensuring reliability and performance through intelligent analytics-driven capacity planning solutions eliminates the need for over-provisioning and can drastically increase the server density per virtual host.

IBM SmartCloud Orchestrator enables the policy-driven, self-service provisioning of application-specific physical, virtual, and software resources. This allows the organization to consolidate server infrastructure through advanced capacity planning and to rapidly deploy almost any number of compute resources in a self-service manner. Ensuring reliability and performance through intelligent analytics-driven capacity planning solutions eliminates the need for over-provisioning and can drastically increase the server density per virtual host.

Storage Virtualization

Storage is almost always over-provisioned in VMware environments in terms of performance, capacity, and resiliency. Today's trend toward using tier 1 storage for almost any application workload results in significant waste of expensive SAN storage arrays. Unlike server and network resources, storage is rarely truly virtualized, in terms of being independent from its underlying hardware. This lack of storage virtualization means that storage often constitutes the most significant cost factor of a VMware environment, sometimes destroying the economic viability of new IT projects.

IBM SmartCloud Virtual Storage Center (VSC) provides the organization with a true storage hypervisor that is able to automatically provision the appropriate storage volumes for each individual application workload. In addition to abstracting storage volumes from almost any brand of underlying hardware, VSC is able to enhance performance and resiliency of tier 2 storage by leveraging server RAM as I/O cache and by facilitating geographically separate high availability. VSC allows the organization to save significant storage space through thin provisioning and administration time for storage provisioning and live migrations. IBM VSC can work with most existing storage platforms, without customers having to purchase additional hardware.

Resiliency

Many business services consist of myriad interrelated elements, often causing challenges when it comes to maintaining SLA and compliance requirements for availability and disaster recovery. Recent EMA research found that ensuring constant uptime of business services – data, systems, and facilities – is one of the main reasons for organizations to move to the cloud.[2]

Tivoli Storage Manager (TSM) for Virtual Environments leverages VMware APIs and offers a plugin for VMware vCenter allowing the VMware administrator to discover new VMs and centrally control storage backup and recovery actions. In addition, TSM for Virtual Environments uses change block tracking, compression, de-duplication and progressive incremental techniques to minimize backup data.

EMA Perspective: Turning the VMware Virtualization Stack into a Self-Service Cloud

IBM SmartCloud delivers enterprise service management on top of VMware's virtualization platform to provide a high performing, resilient, and cost-effective unified management platform. The IBM SmartCloud offerings facilitate the application-centric management of virtual and physical compute, network, and storage resources. VMware ESXi, vSphere, and vCenter, combined with the IBM SmartCloud family of products, provide a low-touch self-service environment. Combining both product lines enables significant efficiencies within the data center in terms of CAPEX and OPEX, offering a policy-driven approach to self-service provisioning and lifecycle management.

VMware ESXi, vSphere, and vCenter, combined with the IBM SmartCloud family of products, provide a low-touch self-service environment.

IBM's focus on the management aspect of cloud environments, while giving customers the choice of hypervisor for their various workloads, is an excellent strategy as the hypervisor market becomes more and more commoditized. In short, to realize the maximum cloud ROI, intelligent management of multi-hypervisor environments is key.

[2] Optimizing Cloud for Service Delivery: http://www.enterprisemanagement.com/research/asset.php/2192/Optimizing-Cloud-for-Service-Delivery

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IBM SmartCloud Virtual Storage Center (VSC), IBM's storage hypervisor, is an essential addition to the IBM SmartCloud portfolio, as storage cost is one of the main bottlenecks for almost any major enterprise IT project, including VMware-based consolidation projects. VSC achieves the commoditization of SAN storage, while improving storage and application performance, resiliency, and efficiency to most popular storage arrays. In many cases, this will allow organizations to utilize low-cost tier 2 storage for mission-critical applications, significantly lowering project CAPEX.

EMA believes that the combination of IBM SmartCloud; VMware ESXi, vSphere, and vCenter; and low-cost hypervisors such as KVM, Citrix Xen, and Microsoft Hyper-V allows the organization to create an efficient, policy-driven, and compliant self-service cloud.

Corporate Headquarters:
1995 North 57th Court, Suite 120
Boulder, CO 80301
Phone: +1 303.543.9500
Fax: +1 303.543.7687
www.enterprisemanagement.com

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