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VMware: Clearing the Fog for a Look into the Clouds

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Abstract: The term "cloud computing" has turned into nothing but industry hyperbole. Server virtualization leader VMware has a compelling vision and a set of products that could help clarify all of the confusion. The company's building block approach can help organizations derive real short and long-term value from the cloud. If VMware can build industry support for its effort while working with other virtualization players, it could find itself at the very foundation of a future cloud computing boom.

Overview

As a result of the current economic downturn, IT is currently under a mandate to use resources more efficiently. In the past, IT organizations typically built an infrastructure that tightly coupled application workloads with physical assets, forcing IT administrators to continually perform repetitive manual tasks just to keep the operating environment up and running. In an effort to maintain some control, software is layered alongside the multiple instances of operating systems to enforce security, manage availability, and ensure performance. Then, to further compound the complexity, some applications require unique hardware, software, and skill sets to support specific business requirements. This entire approach is often referred to as IT being built on 'silos' or IT operating on individual 'islands'—at best, it's inefficient. In these scenarios, penetrating the walls between the various application workloads to help drive consolidation efforts can be a difficult task in terms of both management and security. Business owners have actually tolerated this approach for some time now, but as applications scale, new compliance and security mandates have been put in place and, in a less than perfect economy, companies are finding themselves tied at the ankles by an inefficient IT environment that is extremely costly to support and maintain. In many cases, it is prohibiting overall business growth and stability.

Businesses are increasing the pressure on IT organizations—urging them to roll out new services with reduced costs and improved efficiencies. Frankly, the current "locked-in-place" IT infrastructure does not have the ability to meet growing demands. IT infrastructure typically is deployed for a specific role or to support a specific application and is therefore unable to dynamically adjust to new business requests without incurring additional operating issues, capital costs and, in some cases it is forcing costly forklift upgrades. Trying to take the existing non-virtualized infrastructure and turn it into a more efficient, highly utilized environment without the benefits of virtualization is costing companies an enormous amount of time and money, but still yielding only minimal results. To further add to the challenge, demand for IT services is often unpredictable and businesses don't always have the luxury to plan for future IT infrastructure upgrades and spending.

Businesses want the flexibility to provision new services fast and have service level agreements (SLA) drive requirements for underlying IT infrastructure. No business wants to operate on an IT infrastructure that runs at 10% utilization and still requires additional capital investments when new applications or services are brought online. Businesses want an IT infrastructure that can rapidly respond to change, achieve high utilization rates, ensure security, and deliver performance when it is needed the most.

Such circumstances leave IT organizations searching for a way to solve this predicament—and there may be a solution.

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The Cloud

The current state of the majority of IT infrastructures, combined with an economic headwind and the success of virtualization, has created tremendous buzz and confusion around the notion of cloud computing. The first thing that needs to be understood is: what is cloud computing and how can it help our unique situations? 'Cloud computing' is nothing more than a service model where business workloads are deployed, transparently executed internally or somewhere on the Internet, and businesses only pay for what they consume. Rather than purchase servers, storage, and other pieces of IT equipment, business simply purchase a set of dials and indicators that finely-tune and adjust IT performance, availability, data protection, and security based on business requirements regardless of the actual physical location of the applications and data. The magic in cloud computing happens behind the dials and indicators, where infrastructure is provisioned, network bandwidth is automatically increased or decreased, and most importantly, the application workloads dynamically share an entire pool of virtualized resources. The resource pools can and will be either housed locally within the four walls of the data center (on-premise clouds) or outside the data center at a secondary site or third party hosting facility (off-premise clouds). These housing choices may also be known as either internal and external clouds, but don't get caught up in the nomenclature—every vendor will have a different spin, which will only lead to more confusion. What is important is that the vendors share a common message regarding the benefits of cloud computing and how it helps customers. If they don't, technology battles could ensue and the cloud runs the risk of turning into a foggy nirvana that can never be achieved.

VMware Cloud Computing Initiatives

VMware has been paving the way in the server virtualization market, delivering tremendous business benefits, but server virtualization is not cloud computing in and of itself. While it is true that server virtualization is an essential building block of the infrastructure required for cloud computing initiatives, a considerable base of infrastructure and technology has to be in place in addition to server virtualization to achieve the promise of cloud computing. At VMworld 2008, VMware CEO Paul Maritz announced the company's vision to enable federated clouds, leveraging the VDC-OS, vCloud initiative, and vApp technology. VMware is staging its cloud solutions to enable enterprises and service providers to deliver a tiered set of service offerings ranging from basic cloud services to more advanced capabilities. To fully grasp VMware's cloud strategy, it's important to understand these new concepts and solutions:

- **Virtual Datacenter Operating System (VDC-OS)** is at the core of VMware's cloud computing solution. VMware's VDC-OS is the key enabler in turning the IT infrastructure into a common pool of resources that can ultimately be easily provisioned without having to change the physical infrastructure. The entire infrastructure acts and performs like a series of dynamically configurable individual computer systems. The VDC-OS will enable federation of the on-premise infrastructure with third party cloud infrastructure. This will integrate between clouds and a single point of control, which will enable businesses to extend workloads into off-premise cloud providers.

- **VMware vApp** creates a new entity from new and existing applications for simplified integration into a fully automated data center. VMware vApp encapsulates all the components of multi-tier applications and enables businesses to manage application workloads by applying policies and SLAs to the entire workload stack. The information associated with vApp enables businesses to apply standards across the data center and ensure all components of the application workload remain protected, highly available, and secure regardless of location. VMware vApp is a new unit of management that extends beyond the single unit of a virtual machine. vApp can help take the guesswork out of resource utilization and capacity planning in mission critical business application where poor performance could end up impacting revenue.

- **VMware vCloud** is a common set of cloud computing services that enables businesses and service providers to support application and OS portability. The core components of vCloud are an ecosystem of VMware Ready vCloud providers, a broad range of applications, both new and existing, supported on- and offsite and the vCloud API as an interface into VMware Infrastructure. VMware vCloud is an important initiative that will allow customers to break beyond the barrier of what virtual infrastructure provides today and enable them to extend their computing model out on to the Internet.

VMware's Building Blocks for Cloud Computing

Internal cloud, on-premise cloud, utility computing, and autonomic computing all refer to the same idea: using compute resources more efficiently to support today's applications and the workloads of the future. The goal of cloud computing is to achieve a high level of flexibility that drives up resource utilization, controls cost, and enables easy integration between in-house and network-based IT infrastructure. VMware's vision of how clouds should operate includes the concept of a "private cloud." This means a similar expectation of SLAs, security, etc., regardless of location. A private cloud can span both internal and external to meet the business needs. In delivering cloud messaging and positioning, the marketplace is heading in the same direction of virtualization, but unfortunately, the current outlook appears more like haze than a cloud. Businesses are excited about the promise of cloud computing and a select handful of providers are already seeing the benefits, but integration and management tools still need to evolve for any type of mass adoption. Cloud service providers such as Google, Amazon, and IBM are all seeing an uptick in interest around cloud computing, but businesses are hesitant to fully trust and rely on a third party vendor to host top tier business applications and critical data. Additionally, companies don't want to—or don't have the luxury to—rewrite their applications to run in a different environment, but they do want a more efficient and cost effective way to deliver applications.

VMware's strategic goal of transforming data centers with cloud computing entities is not going to happen overnight, but as a leader in the virtualization marketplace, VMware has the opportunity to guide customers on a journey that will change the way IT designs, delivers, and deploys applications. As customers plan for cloud computing initiatives, VMware is ready to achieve success with:

- **A healthy partner ecosystem** of over 400 cloud service providers including AT&T, Savvis, Terremark, Sungard, and many regional locations. Additionally, leading technology partners like, Cisco and EMC are lined up to work with VMware to take advantage of its cloud computing initiatives. The goal of the VDC-OS and VMware vCloud initiative is to enable customers to move workloads between on-premise and off-premise clouds transparently based on business policy and demonstrate to potential customers the benefits of a dynamic compute infrastructure.

- **Proven success and robust offerings in the server virtualization market,** which have the potential to translate into customer adoption of cloud computing. VMware's offerings around VDC-OS lay the foundation for cloud computing that enables users to dynamically manage and maintain a pool of physical resources as a single compute-based model.

- **Broad support of new and existing enterprise applications and the simplicity of virtual appliances,** which makes applications for the cloud more predictable. Leveraging the vApp technology, users can move their applications on- and off-premise with the assurance that policies applied to them will follow the application. Additionally, VMware's Virtual Appliance Marketplace hosts over 1000 virtual appliances that are essentially "ready to run" software, making them simple to deploy to cloud environments.

In the future, it is fair to recognize that applications will be built and deployed in a highly dynamic environment that is comprised of both on-premise and off-premise compute resources and the application will be able to span resources across the entire pool. The initial opportunity for cloud computing may not be as glamorous as what the future holds, but it may help solve the problems businesses are experiencing today, including:

- **Backup and data protection.** Virtualization has created encapsulation of server images that are mobile in nature. This mobility makes them the ideal candidate for backup, data protection, and even disaster recovery solutions based outside the four walls of the data center.

- **Capacity on demand.** Seasonal workloads that experience a spike in demand have the option to burst into the cloud to accommodate workload increases. When the work is done, the capacity can be returned to the cloud. Customers only pay for what they consume. The whole notion is to have a dynamic environment that rapidly responds to change and utilizes all available resources—internal or external.

- **Test and development or demo environments.** Repetitive provisioning activities are a huge resource challenge. Cloud environments will offer IT a way to outsource or set up resource pools to allow these

groups to manage the tasks on their own as needed, while still giving IT the control and visibility needed to serve the current or future needs of these groups.

- **Hosted desktops.** In a recent ESG survey of current and planned VDI adopters, more than half of respondents indicated that they would be interested in a hosted VDI solution, with 17% expecting an organization-wide rollout to all employees and 34% envisioning leveraging hosted VDI for certain users and/or applications.[1]

Continuing the Formation of Clouds

Server virtualization has reached the point where the value and ROI can quickly be calculated on the back of a napkin. Cloud computing has to make a few leaps before it reaches this simplicity and businesses fully understand the steps needed to get started on the road to truly achieving a fully automated data center. VMware's breadth of solutions, combined with its rich ecosystem of partners, has the potential to bring cloud computing to the main stream if:

- **Application providers adopt and integrate with open standards** such as open virtualization format (OVF) and VMware vApp to build cloud ready solutions. Applications need to understand business policies that will feed into an automation management system. Standards will play an important role moving forward, allowing application providers to build intelligence into workloads that are recognized across the entire virtualization and cloud industry.

- **Early cloud adoption is driven by upper level IT management and business** executives that understand this evolution in computing and see the benefits of a central computing model that has the ability to extend beyond the data center. Executives will need to build confidence and trust in cloud computing before they extend services outside the comfort of their well known IT environments.

- **Cost allocation and billing are tightly integrated, predictable, and transparent to the ultimate consumer.** Every business views chargeback from a different angle, but cloud computing needs to be founded on a consumption-based model where a pre-defined unit of measurement—such as a virtual machine, network bandwidth, storage capacity, etc.—clearly outlines how the consumer will ultimately pay for cloud computing services.

- **IT builds bridges through the VDC-OS and the VMware vCloud initiative** that seamlessly integrate with leading cloud computing providers. As businesses adopt VDC-OS as a central compute model and build internal cloud computing solutions, they will want find ways to move the workloads and vApps to their preferred cloud providers, and take advantage of their new offerings.

- **VMware extends its current products** with vCenter and the management suite as a natural extension to deliver more robust provisioning, chargeback and central management capabilities aligned with supporting private clouds, both on and off premise

VMware also cannot afford to ignore strategies outlined by Microsoft Azure and Citrix Cloud Center (C3). Microsoft and Citrix will be diligently working with the same partner ecosystem to build cloud computing solutions. Considering the current state of cloud computing, it's important that customers look for solutions that meet their needs today and in the future, that don't lock them into proprietary solutions that limit mobility, that work with applications they currently have as well as new Web 2.0 applications, and that ensure reliability and enterprise readiness for production level workloads.

The Bottom Line

VMware is helping make the promise of a self-service datacenter a reality with initiatives around cloud computing. The confusion and debate around "clouds" will linger for the foreseeable future, but VMware, as a leader in the industry, has the ability to provide the building blocks, create standards, and shape the future of cloud computing. VMware is in a unique position, with its depth and breadth of mature solutions, to help customers build their first iterations of central compute clusters and lead the federation between internal and external computing resources.

[1] Source: ESG Research Report, *Virtual Desktop Infrastructure*, December 2008.

VMware has demonstrated success with a rich ecosystem of partners that are now anxious to work with the company to build and deliver cloud computing solutions.

Customers want a reliable, dynamic computing platform that can be automated based on business rules and policy. They also want the choice of hosting a workload on- and offsite at a cost model that proves to be a frugal investment today and a wise investment for the future. VMware is ready to help customers build confidence and comfort in cloud computing and is anxious to demonstrate a more cost effective way to manage and maintain critical workloads. In the end, it doesn't matter what term is used to describe this new computing model, what does matter is that the term represents a smarter, more efficient and cost conscious model that companies can begin investigating and investing in today to build for the future.

The challenge will come on multiple fronts. First, widespread, ubiquitous adoption of production VMware virtual server implementations are just beginning—and there are still plenty of issues we must address to even begin to realize the potential of the "liquid" data center. The issues will not all be resolved by VMware, nor any single vendor, as they occur at all points of the infrastructure. Storage and networking remains an issue and barrier to widespread value adoption—as storage and networking "liquidity" does not match the capabilities now available in the servers. Second, even when we reach the perfect world of true dynamic infrastructure, commercial computing entities will not automatically rush to the cloud, certainly not for everything. The issue of trust will have to be addressed—from security to auditability and beyond. Eventually, however, it will happen, and VMware sits in a prime position to enable the transformation.

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