

IT in the Cloud: Using VMware vCloud for Reliable, Flexible, Shared IT Resources



Table of Contents

IT in the Cloud: Using VMware vCloud for Reliable, Flexible, Shared IT Resources 3

Cloud Computing: A continuation of Utility-Based Computing 3

The Different Types or Personalities of Cloud Computing 4

A Cloud for Every Business Type 4

VMware vCloud Initiative —Open, Flexible Cloud Computing 5

You Move It When you Want 6

It’s Your Content 6

It Lives Where you Want. 6

vCloud Delivers Clear Benefits 7

For More Information 7

IT in the Cloud: Using VMware vCloud for Reliable, Flexible, Shared IT Resources

Since the 1960s, computing has evolved from a very static, mainframe-based model to a one of service delivery. Tradeoffs for this evolution have involved manageability, reliability, openness and the quality of the user experience. The notion of computing in a “cloud” stands to redefine computing as we know it, making IT infrastructure, software and services more affordable, accessible, scalable and elastic, giving organizations—both large and small—an ideal IT infrastructure at a much lower cost.

This paper will explore the trends and developments in cloud computing and introduce a model for hosted cloud computing services that bring the benefits of virtualization and shared computing resources to large and small enterprises.

Cloud Computing: A continuation of Utility-Based Computing

Most organizations are still trying to wrap their heads around the concept of cloud computing. Infoworld defines it as “a way to increase capacity or add capabilities on the fly, without investing in new infrastructure, training new personnel or licensing new software.”

According to Gartner, the cloud is like an infrastructure utility, or IU, which is “open, flexible, pre-designed and standardized, virtualized and highly automate, and secure and reliable.” Multiple vendors are now providing an IU to host enterprise applications, using a hardware platform, such as Intel, with VMware for hypervisor-based virtualization. A hosted server infrastructure can provide companies with cost savings of 20 percent or more, while reducing the need to overprovision capacity. This reduces energy consumption, management and administrative costs.

Other benefits are flexibility and being able to better adapt to business needs. Companies using a hosted infrastructure can choose what they need and when and where to use it. They enjoy better mobility, because applications are not hardware-bound.

At VMware we find that cloud computing is best understood from the perspective of the consumer of services provided by such a computing approach. The following four attributes are core to cloud computing based services:

- **Radically improved economics through shared infrastructure:** By its very nature, cloud computing offers better economics because infrastructure is shared.
- **Pricing based on consumption:** You only pay for what you use.
- **Flexible access:** Companies can access the cloud for different purposes, both over the public Internet and behind the firewall.
- **A lightweight entry and exit service acquisition model:** Cloud computing delivers the latest enterprise-level IT technologies and solutions to both enterprises and smaller companies quickly and easily.

Characteristics of Cloud Computing

- ✓ **Resource on-demand**
- ✓ **Pay for what you use**
- ✓ **Accessible as a loosely-coupled service**
- ✓ **Scalable and elastic**
- ✓ **Improves economics due to shared infrastructure and elasticity**

The Different Types or Personalities of Cloud Computing

There have been various types of cloud computing services made available to the market. Some have been around since the inception of the Internet, while others have just recently emerged. There are three basic categories of cloud computing, each with a different value proposition and target end customer.

Note that companies can leverage cloud computing for access to software, development platforms and physical hardware. These assets become virtualized and available as a service from the host:

- **Software-as-a-Service:** These services are typically available over the public Internet and are information-based. Examples include Salesforce.com, Google and Expedia. This category of cloud computing is the most mature and best known.
- **Platform-as-a-Service:** These services provide an application development platform that enables application authoring in a runtime environment, without the hardware investment. This is the most recent entry as a cloud computing service model, and it offers the promise of rapid software development without the need to provision or configure infrastructure for the application. Examples include The Force from Salesforce.com, AppEngine from Google and EngineYard.
- **Infrastructure-as-a-Service:** These services provide IT infrastructure that can be deployed and used via remote access, providing virtual hardware that can be deployed via programmatic methods or from the command line.

A Cloud for Every Business Type

Enterprise CIOs are increasingly focused on utility and cloud-based IT services that can extend their ability to pool resources, simplify provisioning and take advantage of all the benefits of a virtual infrastructure, whether through internal cloud-like infrastructures based on VMware or external clouds that can run mission-critical applications in a flexible, dynamic manner. Business cycle times are shortening and driving the need for a highly elastic infrastructure that gives companies “flex” capacity to meet fluctuating business needs. Other important requirements are SLAs, security and application compatibility. To maximize ROI, companies need to be able to leverage existing skills and code.

Cloud computing has different implications for small or medium businesses. While SMBs desire simple, robust, reliable IT services, they typically don't have the resources or budget to meet their ideal IT needs. A hosted model of cloud-based services fits the bill for SMBs, allowing them to benefit from up-to-date technologies without the large capital investment in IT infrastructure and equipment. For example, Yankee research shows that as much as 35 percent of SMBs will outsource backup and recovery services to a service provider.

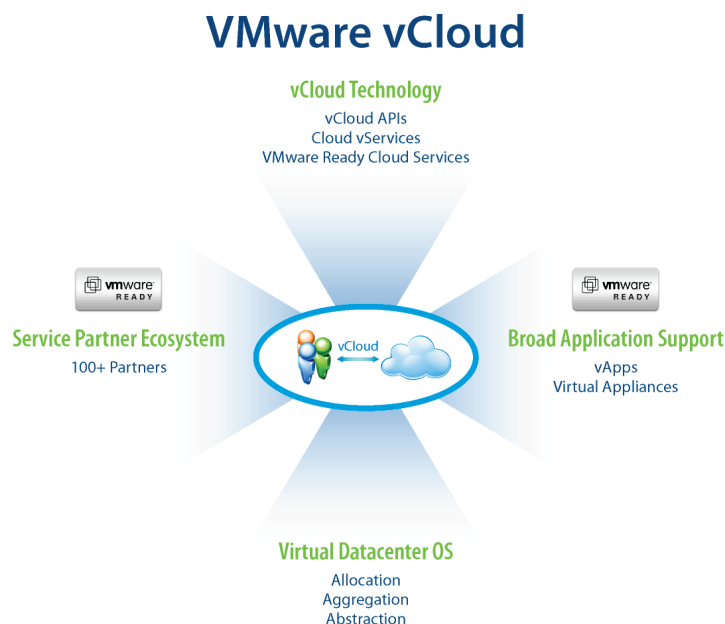


Figure 1. VMware vCloud offers any customer elastic, on-demand compute capacity for applications, both on- or off-premise.

Challenges in Existing Cloud Computing Solutions

Like any new trend or technology, cloud computing poses many challenges that need to be addressed before the full value of the new paradigm can be recognized. The following inhibitors must be addressed:

- **Lack of Interoperability:** A lack of standardization creates complexity and switching costs. Each compute cloud vendor has a different application model, many of which are proprietary, vertically integrated stacks that limit platform choice. But customers don't want to be locked into a single hosting provider, and they are reluctant to relinquish control to hosting service providers.
- **Security:** By nature, cloud vendors will support multi-tenancy, which poses the need for a balance between the security of a dedicated infrastructure with the economics of a shared one.
- **Compliance:** The current requirements for various forms of compliance are at odds with the shared infrastructure and utility model of cloud computing. In many ways, compliance demands extreme transparency in regards to the IT infrastructure that supports business critical applications, while cloud computing puts a great deal of the IT infrastructure into a black box accessible through well defined interfaces. Over time, Internal compute clouds that meet the relevant compliance requirements and public compute clouds that are built to be compliant will emerge.
- **Application Compatibility:** Most of the existing public compute clouds are not interoperable with existing applications, and they limit the addressable market to those willing to write new applications from scratch.

VMware vCloud Initiative —Open, Flexible Cloud Computing

The VMware vCloud initiative brings to the industry a new platform for cloud computing that addresses the key inhibitors while embracing companies of all sizes to enable both private and public compute clouds. The vCloud initiative brings together applications, flexible infrastructure, service provider ecosystem and vCloud technologies to enable a broad array of new services.

Unlike other cloud computing solutions, VMware vCloud Services provide a great deal of flexibility and choice. The solution uses the Open Virtualization Format (OVF) standard,

a platform-independent, efficient, extensible and open packaging and distribution format for virtual machines that enables efficient, security software distribution, facilitates the mobility of virtual machines and gives customers vendor and platform independence. VMware vCloud supports any application or OS with a seamless ability to combine cloud services with in-house infrastructure. Leveraging a broad base of service providers, software vendors and advanced VMware technology, enterprises can deploy test labs, disaster recovery or simple flex capacity, on or off site, as needed.

VMware vCloud enables you to:

- Easily migrate workloads from on-site datacenters to the vCloud and back.
- Deploy all your applications in the cloud without rewriting.
- Leverage a common set of cloud computing services that is instantiated by a broad partner ecosystem.

You Move It When you Want

VMware vCloud makes it possible to move applications and even entire virtual machines from the datacenter into the cloud, and back, seamlessly. This is an important feature for many reasons. Hardware provisioning takes weeks, and customers can't afford to waste the time. Nor can they afford downtime. They need a simple, cost-effective way to provision and manage cloud resources and applications to dynamically meet changing business needs. At the same time, the hosting provider wants to meet customer requirements for flex capacity and SLAs, while keeping the cost of their services down. Adding these capabilities to their service offering will help increase revenue, if they do it right.

New common vCloud services based on standard APIs enable the basic objects of the virtual datacenter, including virtual machines, appliances and vApps, to migrate between parties and be managed in a consistent way. VMware VMotion technology eliminates vendor lock-in commonly seen with alternative cloud vendors. Additionally, because VMware vCloud uses the OVF standard, customers can deploy any OVF-formatted virtual machine on the virtualization platform of their choice. Integrated VMware Infrastructure provides integrated manageability between on-site and cloud environments as part of Virtual Center, as well as through integrated VMware product solutions for business continuity, virtual appliance authoring and others. For example, VMware DRS provides rich load balancing and management capabilities, while VMware vCenter manages the mobility and expectations of how virtual machines will function as a resource. This gives customers confidence that although their resources are off-site, they still have control.

It's Your Content

Customers worry about application compatibility, because they've made large investments in their existing software inventory. However, they understand the potential benefits of moving them to the cloud. Doing so can require learning new architectures, languages and APIs and building new applications designed to work with cloud computing development platforms. This costs money and time. Customers need to provision applications quickly and cost-effectively, and ensure consistent behavior, regardless of where the application resides—either in the cloud or on-site. Software vendors are also concerned about cloud compatibility, and they want to avoid vendor lock-in and application rewriting, which drives up software development costs substantially in terms of testing and certification.

The VMware vCloud is compatible with all applications, so no rewriting is required to move applications to the cloud. Unlike other compute clouds that require applications to be built specifically to a particular platform, vCloud enables millions of existing applications running on VMware Infrastructure to run on the vCloud without modification. VMware virtual machines create fully encapsulated systems so that any workload can move from one machine to another without application changes. Additionally, VMware Virtual Appliances are an effective application container for compute clouds. By enabling this degree of compatibility, VMware vCloud services embrace the diversity of IT environments and of cloud computing needs.

It Lives Where you Want

VMware is a partner-based company with more than 100 service provider partners ready to offer cloud computing services based on the VMware vCloud initiative. Whereas other providers are offering co-locations services or virtual applications, a utility-based on-demand business model is rare. Many of these service providers are looking for the right platform to deliver cloud computing—one that provides mobility and application independence. They want to minimize costs to support customers while still meeting customer needs for reliability, security and availability. However, immature tool sets make accommodating new customers and the services they require—such as flex capacity, application mobility, performance and manageability—difficult.

With hundreds of hosting service providers, SaaS companies and cloud computing providers, the VMware vCloud initiative will provide rich customer selection of cloud services.

vCloud Delivers Clear Benefits

VMware vCloud Services provide a viable model for cloud computing that's based on market-leading technology, application compatibility and OS independence, and a diverse partner ecosystem. As a result, customers, service providers, VARs and ISVs will all benefit:

1. Service providers can expand their offerings to VMware customers and new users, all leveraging the platform that delivers the highest reliability to users.
2. Customers benefit by tapping into additional cloud-based resources, as needed. No code rewriting is necessary. The solution is secure and SAS 70 compliant, and reliably delivers on SLAs.
3. VARs can leverage VMware vCloud to generate incremental revenue by selling additional VMware value-added services to customers.
4. ISVs who want to provide their solution as a SAAS offering can leverage tools such as virtual appliances, vApps and VM Studio to run applications within virtual machines. This enables them to have a multi-tenanted solution that can be hosted with a service provider as a SAAS offering, without any code re-writing.

Regardless of what type of user you are, virtualization has enabled the cloud as we know it today, and VMware will continue to add functionality, technology and services that expand what the cloud can do for your business.

For More Information

VMware vCloud Services or other VMware products and solutions, visit www.vmware.com.



VMware, Inc. 3401 Hillview Ave Palo Alto CA 94304 USA Tel 877-486-9273 Fax 650-427-5001 www.vmware.com

Copyright © 2008 VMware, Inc. All rights reserved. Protected by one or more of U.S. Patent Nos. 6,961,806, 6,961,941, 6,880,022, 6,397,242, 6,496,847, 6,704,925, 6,496,847, 6,711,672, 6,725,289, 6,735,601, 6,785,886, 6,789,156, 6,795,966, 6,944,699, 7,069,413, 7,082,598, 7,089,377, 7,111,086, 7,111,145, 7,117,481, 7,149,843, 7,155,558, 7,222,221, 7,260,815, 7,260,820, 7,268,683, 7,275,136, 7,277,998, 7,277,999, 7,278,030, 7,281,102, 7,290,253; patents pending. VMware, the VMware "boxes" logo and design, Virtual SMP and VMotion are registered trademarks or trademarks of VMware, Inc. in the United States and/or other jurisdictions. All other marks and names mentioned herein may be trademarks of their respective companies.

