Hybrid Cloud Computing
Managing the reality of enterprise cloud computing

Cloud computing promises a new world of IT agility, with quick deployment of applications to support business needs. Organizations often plan an elegant cloud environment that will be easy to maintain. But business needs often change that plan, and the reality is usually a complex and dynamic cloud environment that is unwieldy to manage using the tools provided with each separate cloud. This white paper explores the vision and the reality of cloud computing, and assesses the requirements for a solution for effectively managing today’s hybrid cloud environments.

The vision of enterprise cloud computing
Cloud computing offers a captivating vision of IT agility: this model promises to make it possible for enterprise IT to deploy new applications in days or weeks rather than months or years, thus helping them make a substantive contribution to overall corporate performance.

Of course, in seeking this improved agility, enterprise IT organizations must ensure that the enterprise cloud meets critical IT requirements, including:

• **Manageability**—IT must be able to maintain control of the cloud environment and leverage existing IT policies and procedures without losing flexibility

• **Governance**—Appropriate controls must remain in place to manage resource access by users

• **Security**—IT must be able to implement enterprise standards to prevent security breaches and protect data

• **Cost tracking**—The solution must enable assignment of computing costs to the organizational units responsible for individual applications

With this combination of benefits and requirements in mind, many enterprise IT organizations have moved rapidly toward creating a cloud computing strategy and implementation plan. Most commonly, that strategy is based on implementing an internal cloud computing environment (a private cloud) and deploying applications in that environment.
The reality of enterprise cloud computing

The vision of enterprise cloud computing appears straightforward, but the reality is not quite so simple. Today, most enterprises find that they are no longer managing a single internal cloud. Rather, they have applications spread across four, five or even more cloud providers, both internal (private) and external (public). And for every cloud, there are multiple accounts to manage.

Business priorities that affect the enterprise cloud environment

Why is this so often the case? To put it simply, many IT decisions today are driven by business priorities that conflict with IT’s cloud strategy:

• Deployment decisions are commonly made by departments outside of IT—Because obtaining public cloud computing resources is easy, departments like sales or marketing have the ability to bypass central IT and deploy applications on their own in public cloud environments like AWS or Rackspace. To justify their decision to do so, they often cite pressing business needs, such as the need to roll out a new marketing campaign or deploy a website to support new partnerships.

• New cloud environments arrive through corporate initiatives—Even when an approved strategy is moving forward, the plan can be disrupted by changing business conditions, such as acquisitions, mergers and changes in decision-making staff. For example, an organization may standardize on one cloud environment and then merge with another business that uses a different cloud environment, disrupting IT’s plan to have a single “standard” cloud environment.

• Application or operational requirements force selection of another cloud environment—As business units or internal IT groups pursue cloud initiatives, they may find that compliance requirements or other business needs require them to use a particular cloud environment. This environment then becomes part of the cloud infrastructure that must be managed on an ongoing basis.

Therefore, despite IT’s natural inclination to define a simple solution that leverages a single cloud environment addressing all of a company’s cloud computing needs, the reality is that every company will use a variety of cloud solutions, including both private and public clouds, or “hybrid cloud computing.”

Factors driving cloud deployment decisions

Many IT organizations react to these multiple cloud environments with a plan that presumes a consistent technology platform, often based on VMware. While understandable, this technically complex approach seldom works out in real-world IT environments, since many of the forces driving cloud deployment choices are made based on non-technical criteria such as

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resource availability, cost, or the fact that necessary application services being available only from a single cloud provider that uses a technology basis different from the one chosen by IT.

It is not only likely that some decisions will be made by groups other than IT, but in some cases, these decisions are made completely outside the sphere of IT’s influence or knowledge. In fact, many times IT is deliberately bypassed during the decision-making process because of the user perspective (whether true or not) that IT slows down reaction time. This bypass phenomenon is one of the most controversial topics in IT today; IT often refers to this disparagingly as “shadow IT,” while others may think of it as “getting the job done.” Regardless of how it is phrased, the issue still exists within many organizations.

The true reality of enterprise cloud computing, therefore, is a mix of cloud environments that must be managed on an ongoing basis. Furthermore, that mix will be dynamic, with new cloud environments regularly being added to the collection. This collection of cloud environments makes up the company’s hybrid infrastructure.

Managing hybrid cloud computing environment

Choosing the right management solution

The challenge confronting enterprise IT organizations is how to manage these real-world hybrid environments, which will be dynamic, complex and impacted by groups other than IT itself. Administering multiple management mechanisms (one per cloud environment) consumes both time and resources—and therefore money. The right cloud management solution can help IT gain control and reduce costs without losing flexibility. Such a solution should be capable of managing the widest potential variety of cloud environments and allow for new environments to be added or subtracted from the overall IT infrastructure as necessary. The solution should also provide a full range of enterprise IT management requirements across the entire collection of cloud environments used by the company.

The following are the requirements for a manageable cloud computing environment:

 Ability to support a wide variety of clouds

Given the growing complexity of corporate cloud computing environments, an enterprise cloud management solution must be capable of managing a wide variety of cloud computing platforms and providers. This multi-cloud management functionality must also enable the addition or subtraction of cloud environments as driven by business requirements. Supporting a number of cloud environments but being unable to modify the configuration or topology...
is unacceptable for today’s dynamic enterprise IT.

Consistent governance across all cloud environments
Attempting to administer each cloud using its own management interface and governance mechanisms would be a nightmare for IT organizations. To efficiently and effectively support complex hybrid environments, the following governance mechanisms must be available across each cloud via one “pane of glass”:

• **Fine-grained access controls** — The system must enable control over each user’s actions at the individual resource level and be granular enough to set permissions on individual actions; for example, a specific individual might be allowed to launch, but not terminate, instances in production application environments.

• **Integration with corporate identity management systems** — The cloud management system must integrate with the corporate identity management system in order to allow individuals to be consistently identified across all computing environments. Group associations (for example, Terry Smith is associated with the Operations group) must also be enabled so access controls can be set for entire groups as well as for individuals.

• **Cost tracking** — The system must be able to track the costs associated with resource consumption for both specific applications and specific individuals. Resource quotas must be supported to prevent resource consumption from growing out of control.

• **Full audit capabilities** — Every action taken by users must be logged and be available for later audit and compliance purposes. In critical production environments, organizations must be able to track all interactions with the systems and identify the person responsible for the action, as well as the date, time and specific action attempted.

Full application agility across all environments
To be effective, a hybrid cloud management system must support rapid application deployment, updates, and scalable elasticity via growth and subtraction of application resources. Moreover, the hybrid cloud management system must allow a single application design to be workable across all possible cloud deployment environments and allow for migration without requiring application redesign.

Automation is key to achieving full application and business agility. Auto-scaling, automated backups, auto-recovery, and the ability to automatically distribute applications and load across multiple regions, zones, or clouds are just a few of the ways in which automation can be useful within a hybrid cloud environment. Using a configuration management tool such as Opscode Chef, Puppet or CFEngine increases reliability and improves efficiency for both IT and end users alike. Used in conjunction with a cloud management solution, these tools provide the ability to deliver infrastructure as code, allowing complete orchestration of the entire application stack.

**Conclusion**
While organizations often envision standardizing on a single cloud environment, the reality is that they will have to manage a complex and dynamic hybrid cloud environment. Choosing the right cloud management software is just as important as selecting your cloud providers, since it can greatly simplify administration of complex environments.

**About Dell Cloud Manager**
Dell Cloud Manager™ delivers the scalable cloud management organizations need today. Whether delivered as a SaaS solution or deployed on-premises, Dell Cloud Manager offers:

• **Full support of application and organization agility** — Dell Cloud Manager ensures the application flexibility and agility organizations need, including auto-scaling and cloud bursting in response to changing application loads, enabling rapid application development, launch and upgrades. Developers and application operators retain the ability to choose the

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**Think of Dell Cloud Manager as the enterprise console to the world of cloud computing.**
configuration management, monitoring and other operational tools that make the most sense for each application.

- Rich governance capabilities with consistent functionality across each cloud environment—Dell Cloud Manager provides a rich governance framework that includes robust access controls, financial controls, logging and monitoring capabilities, and the ability to integrate into your internal management systems.

- Support of multiple clouds with a single management infrastructure and interface—Dell Cloud Manager supports the broadest range of cloud providers and environments of any management product in the market. This ensures that customers can continue to use the same management solution no matter how complex their hybrid cloud computing environment becomes.

Dell also provides consulting services to assist you in your migration into the cloud. We can help you design a deployment to meet your target SLAs and address issues such as scaling parameters, security and compliance.

Enterprises planning an effective, long-term cloud computing strategy can rely on Dell Cloud Manager to support and manage their hybrid cloud environments today and into the future. Think of Dell Cloud Manager as the enterprise console to the world of cloud computing.
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