Ready for Cloud Computing?
Optimizing infrastructure for future cloud adoption
Content

Introduction 3
Pressures on Enterprise IT 4
Getting Ready for the Cloud 6
The Need for Change 8
Unifying Control Over Heterogeneous Assets 10
Dell™ Advanced Infrastructure Manager 11
Dell™ AIM at Work 12
An increasing number of enterprises are looking to adopt cloud computing, with a view to raising business and IT efficiency, reducing both IT capital and operating costs, and boosting organizational agility and responsiveness.

Cloud computing yields the most benefit when an enterprise’s IT foundation itself is highly efficient. To run their IT assets at peak levels so as to eventually be ready for cloud entry, many enterprises have turned to consolidation, standardisation and virtualization. Although virtualized, heterogeneous infrastructures can be made highly efficient, they still present challenges when it comes to cloud adoption. These challenges relate to the management of the assets that make up the infrastructure, parts of which may not work together without intervention.

To optimize their heterogeneous infrastructures for cloud computing, enterprises need a single infrastructure manager that can manage the various components cohesively as a single resource pool, not as individual dedicated stacks. Using such a manager, enterprises can optimally deploy their infrastructure assets in a flexible, resource-efficient manner employed in cloud computing.

ABOUT THE AUTHOR

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CIOs are under tremendous stress these days. With economic exuberance nowhere in sight in many countries, pressures are mounting on organizations to cut costs, do more without enlarging their teams and budgets, and squeeze more value out of existing IT infrastructure investments. And they are expected to do all this while responding quickly to business requests and minimizing interruption to business operations.

It is a tall order, but one that is increasingly urgent as enterprises look to the IT organization as an enabler of business and a provider of competitive advantage. To integrate IT operations with the business’ broader objectives and needs, IT organizations need to be able to innovate new ways of using technology and new services for users. The majority of enterprises spend about 80% of their IT budgets on maintenance, leaving just 20% for innovation needed to align IT with business objectives.

CIOs’ IT budget projections for 2011 are globally flat, with a weighted average budget increase of 1%, notes Gartner from the 2011 CIO Agenda survey by Gartner Executive Programs (EXP). While CIOs don’t see IT budgets returning to their 2008 levels, those experiencing budget increases in 2011 outnumber those reporting a cut by almost three to one.

CIOs may be able to reallocate IT budget savings, rather than returning them to the organization in 2011

“CIOs anticipate the ability to fund infrastructure changes and new projects by reallocating resources within that budget. This approach to funding will become a standard operating procedure since we don’t see CIO IT budgets recovering to their 2008 peak until 2014.”

The Gartner survey notes

To lower maintenance costs and have more funds for innovation, an increasing number of enterprises have embarked on initiatives to boost IT efficiency. These initiatives typically involve server refreshes, rationalizing and reducing the number of applications, and consolidating and standardizing server and storage resources. Those that have embarked on virtualization are taking a serious look at the cloud.
CIOs & IT have been boxed in between modest budget growth and growing legacy requirements. New lighter-weight technologies – such as cloud computing, SaaS, & social networks – and IT models enable the CIO to redefine IT, giving it a greater focus on growth and strategic impact. These are two things that are missing from many organizations.

Mark McDonald
Group Vice President & Head of Research, Gartner EXP
In its purest form cloud computing is simply a services delivery model, not a technology as it is sometimes perceived.

Resources such as compute power, storage assets, applications, etc are virtually pooled and delivered as services that are shared by users in the same organization or with other organizations. When a user needs IT resources, he/she provisions them from the resource pool, uses them as long as needed and pays for them based on usage. When no longer needed, resources are returned to the pool.

Done right, cloud computing can dramatically ease IT management and position the IT function as an in-house service organization. It is also very cost-effective and can enable the business to respond quickly to market dynamics. Not surprisingly, enterprises are taking to the cloud in a big way: A 2009 survey by IDC found 41% of companies in Asia-Pacific were evaluating or piloting cloud solutions, and 11% were already deploying cloud computing. Gartner research show that, currently, 3% of CIOs have the majority of IT running in the cloud or on SaaS technologies, and that CIOs expect this number to increase to 43% over the next four years.

Cloud computing delivers the most benefit when infrastructure resources are commoditized and scalable and coupled with generous network bandwidth. An ideal would be a standard x86 infrastructure built from the ground up, as in a new data center. However, this would require significant capital expenditure. About 90% of data centers deploy heterogeneous IT infrastructure.

Before making the move to cloud computing it is important for enterprises to take stock of their existing infrastructure so as to optimize it for the cloud.

A good starting point is servers, which form the core of the data center.

Enterprises should consider converting to x86 architecture-based servers running Microsoft Windows or Linux operating systems. Based on open standards these cost less to acquire and are cheaper and simpler to operate. Moreover, they are highly scalable and virtualizable, making them very suitable for a cloud environment.
Consider enterprise storage next.

Enterprises typically implement two types of storage – NAS and SAN – based on the differing needs of their application environments. Solutions now exist to automate management of data through predictable, scalable, and open data storage. For example, storage virtualization offers efficient object storage, automated data tiering, and deduplication, which together can help cut storage costs by more than 50%. Additional benefits can accrue if companies leverage on-demand capacity scaling and cloud disaster recovery.

Storage tiering is a new technology in which hot or high-value data is stored on high-performance drives while older, less frequently accessed data is moved to high-capacity but lower-cost drives. Another innovative technology from the world of virtualization is called thin provisioning. In this, the right capacity is provisioned but not allocated. It is only allocated or consumed when users consume the storage.

A key advantage of cloud computing is the ability to move massive amounts of data. For this a fast and cloud-ready switch is needed.

While the future points to IPv6, switches need to run on IPv4 as well for the next decade. Only switches that support both can be considered cloud ready. Another attribute: the switch should support up to 10 gigabit Ethernet data uploads. Switches that offer only 1 GbE upload may not be suitable to transition the enterprise to the cloud era.

While virtualized and open standards-based servers, unified storage and high-speed networks make for a solid infrastructural foundation for cloud computing, it is not always possible for enterprises to replace their heterogeneous infrastructures with cloud-ready, single-vendor platforms. Many have made huge technology investments over the years and want to leverage their existing data center infrastructure.

Moreover, not every application can or should be virtualized in a production environment, and not all vendors support software that run on virtual machines (VMs). Hypervisors, the software that manage VMs, may have little integration with other hypervisors. Therefore, while IT infrastructures are heterogeneous, they may not all support hypervisors. Such an infrastructure has to be reconfigured each time servers, storage and networking devices are repurposed. As an example, when adding a new physical server, IT would need to modify network dependencies (such as load balancers) and make other adjustments. This negates the benefits of cloud computing.
The Need for Change

In a White Paper published in November 2010, IDC reported that the number and complexity of configuration and resource provisioning changes, updates, and support activities taking place in corporate data centers will continue to increase at double-digit rates over the next several years.

The underpinnings of a good cloud include not just IT stability and scalability, but process stability, scalability and uniformity as well.

In many enterprises, however, the three operational IT areas – servers, storage, and networking – are usually operated autonomously, with each having its own set of processes. Together with infrastructural heterogeneity, this makes it difficult for the IT organization to meet its goals as an in-house service provider, as well as makes operational security control and effective monitoring and alerting a challenge.

Not surprisingly, in a more recent survey, IDC found that IT decision-makers responsible for managing virtualized environments indicated that some of their most important challenges relate to reducing complexity, integrating virtual and physical server management, and standardizing management processes.
Generally, the growth of a system inherently increases complexity, and this is certainly true of IT infrastructures. Multiple architectures complicate management. Increased server utilization raises network bandwidth requirements. And systems from different vendors typically present integration complications. For cloud computing environments to deliver on their promise, simplification must underlie cloud architectures and practices.

Intel
Unifying Control Over Heterogeneous Assets

Managing a virtualized and heterogeneous infrastructure is not possible without unified control over the entire environment. There is thus a clear need for a single infrastructure manager, one that allows resources (including heterogeneous hypervisors) to be managed as a single resource pool, not as individual dedicated stacks.

Such an infrastructure manager would operate in the control plane of the data center, integrating with hardware or software using management APIs (application programming interfaces) supplied and supported by their respective vendors. Ideally this manager should work with an enterprise’s existing architecture, enabling it to maximize the use of its investments. It should also incorporate intelligence for automating and streamlining repetitive, routine tasks.

Having just one infrastructure manager provides a broad range of benefits. The ability to manage both physical and virtual servers, network connectivity, and storage from a single console simplifies management, freeing IT manpower to innovate new services for users.

The logical pooling of resources also enables them to be rapidly redeployed. Enterprises can dynamically scale their environment up or down to match the variability of workloads, and efficiently deploy and move application workloads across physical and virtual resources. This enhances the enterprise’s flexibility to respond to changing business needs.
To help enterprises unify the management of data center resources and be able to reap the fullest benefit from cloud computing, Dell™ offers the Dell™ Advanced Infrastructure Manager (Dell™ AIM) infrastructure management and provisioning software solution.

Dell™ AIM simplifies infrastructure management by enabling a single administrator to allocate server, storage and network resources against application workloads without repeatedly reconfiguring the infrastructure. It abstracts the hardware and virtualization layers from data centre infrastructure, allowing enterprises to focus on allocating a single pool of resources instead of managing various technologies.

The solution brings together heterogeneous hardware offerings and virtualization hypervisors, enabling enterprises to build cloud computing capability on infrastructure they already have and avoid expensive rip-and-replace upgrades. Among the hypervisors supported are: Microsoft Hyper-V, VMware, Citrix, and Red Hat Enterprise Virtualization for Servers.

Dell™ AIM offers benefits across the data center, including increased server utilization, improved quality, enhanced performance, added scalability, increased system availability and uptime, and enablement of routine maintenance on either physical or virtual systems, all while minimizing interruption to business operations and reducing cost.

Additionally, Dell™ AIM helps to provide the fundamental business continuity and high availability requirements. When it detects that the production data center has become unavailable, Dell™ AIM automatically boots the replicated server images onto the appropriate hardware. The remote servers, complete with the correct storage and network configurations, and then take on the role of the primary servers.

By simplifying and automating the management of highly virtualized, heterogeneous environments, Dell™ AIM enables enterprises to utilize their infrastructure assets in a flexible, resource-efficient manner that matches the IT service delivery model characteristic of cloud computing.

For more information on how Dell™ can help your organization optimize your data center for cloud entry, please email Dell™ at Dell_Solutions_Marketing@Dell.com
Dell™ AIM at Work

One example of how enterprises can benefit from using Dell™ Advanced Infrastructure Manager is Dell™ itself. Its IT organization had planned to move its Oracle WebLogic middleware environment to a VMware-based virtual infrastructure. The middleware ran in a more-than-100-server physical environment, linking Dell’s enterprise applications with back-end databases. While the IT organization was confident that moving the middleware to a virtual environment would yield efficiencies and other benefits, it also wanted the ability to reproduce any virtual machine onto physical hardware very quickly in case a support issue arose, and just as easily convert back to virtual when the issue is resolved.

For this, IT organization turned to Dell™ Advanced Infrastructure Manager. Running on Dell™ PowerEdge blade servers, it decouples workloads from the servers supporting them, as well as enables IT staff to move quickly and seamlessly between virtual and physical worlds.

“By giving us improved dynamic control over our virtual infrastructure and the ability to provision physical servers regardless of the hardware layer, Dell™ AIM allows us to provision cloud services faster and virtualize applications that couldn’t otherwise be virtualized.”

Jonathan Senger
Enterprise Architect, Dell™

By collapsing its legacy server infrastructure for middleware into a virtual environment running on Dell™ blade solutions, Dell™ projects it will be able to reduce the amount of rack space required by a projected 80 percent. The corresponding power and cooling benefits support Dell’s Green IT initiatives, since physical servers not in use can be powered off. In addition, management time required to maintain the middleware environment is expected to decrease by around 30 percent.

The ability to manage workloads dynamically and repurpose hardware and software where needed also improves hardware lifecycle management. “In a physical environment, it would take us weeks or possibly months to coordinate an outage, get the servers procured, provisioned and in the right networks, in the right load-balancing pools, with the right software,” says Anthony Davis, Middleware Core Engineering, Dell™. “Dell™ AIM abstracts all that from the user, and allows us and our customers to deploy new services in one sitting instead of a multi-month project. And that’s what cloud computing is all about.”