



How to REALLY Save Money with Virtualization

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Virtualization implementations are in full swing at small and medium businesses (SMBs). Server consolidation has led to a wave of savings associated with reductions in physical space requirements, power, cooling, and management overhead. Looking to find tremendous savings in server consolidation and associated reductions in power and cooling, SMBs have recognized a second wave of cost benefits when they applied their virtualization investment to cloud computing. Taking advantage of cloud models that best serve their organizations, private or hybrid, SMBs add even greater efficiency to provisioning, management, security, and scalability. Leveraging the virtualization investments relies on implementing an architecture that provides both virtualization and cloud capabilities. Dell and VMware are working together to deliver specification expertise, along with systems and hardware that are designed to deliver on the promise of virtualization and cloud computing cost benefits.



Virtualization Push is On

In October 2009, Gartner Group predicted that 50 percent of workloads would be running on virtual machines by 2012 ("Server Virtualization Adoption Growing Rapidly," Gartner Says, *eWeek.com*, October 21, 2009). SMBs drove that number as data centers moved toward complete virtualization, although virtual server deployments have typically been inspired by associated cost savings.

All IT managers need to save money, but SMBs are especially pressed to trim costs as they build datacenters architectures that will support expansion. Attractive server and storage array price points enable IT managers to justify virtualization build outs that quickly deliver a list of cost-saving benefits.

- Server consolidation – Depending on the capacity of physical servers, virtualization allows SMBs to achieve consolidation rates of 10:1 or even 15:1. A significant reduction in the number of physical machines required to run even larger workloads has a ripple effect on data center savings.
- Reduction in power and cooling requirements – With fewer physical machines in the data-center, power and cooling requirements and costs decrease. International Data Corporation (IDC) estimates that for every dollar IT spends on hardware to support new users, applications, and services, it spends an additional .50 cents on power and cooling for all existing machines. Utility costs never decrease, so reductions in power and cooling requirements continue to pay off over time.
- Reduction in physical space requirements – SMBs save on space required for hardware devices and for the space required around those devices for cooling. Even the most efficiently organized data center leaves space for fan exhaust and air flow between server and storage racks.
- Reduction in IT management overhead – Fewer servers in the datacenter mean fewer hardware repairs, patch applications, virus updates, application upgrades, and configuration changes.
- Increase in productivity – Virtualization reduces downtime and greatly facilitates disaster recovery. Virtual hosts automatically migrate to physical servers with space capacity. No need exists to take an application or service off line to accommodate maintenance tasks.

Small and medium businesses that have begun to invest in and deploy virtual servers are ready to take advantage of savings beyond those afforded by server consolidation. Virtualization has positioned them to add even greater IT efficiency through strategic deployment of cloud computing.

Laying the Foundation for Cloud Computing

Virtualization and cloud computing are often used as synonyms; people think of them as the same item. They are, in fact, quite similar. Both virtualization and cloud computing afford IT greater flexibility and agility in resource allocation to lower the IT burden and lower overall costs. Virtual machines migrate easily from physical server to physical server, accommodating



workloads and maintenance schedules and maximizing server capacity. Applications are quickly tested and deployed. Performance typically increases and is far more reliable than in traditional datacenters.

It is important to note, however, that virtualization and cloud computing are not the same item. IT departments can deploy virtual servers without implementing a private cloud. Conversely, an organization might use public cloud services without deploying virtual servers.

Virtualization describes an infrastructure. Virtual servers support multiple operating systems and applications. Rather than a one to one relationship between servers and the applications they run (e.g. an email server, a database server, an accounting system server), each physical server runs multiple virtual servers or machines. The focus is on data center architecture and the consolidation of servers and storage arrays.

Cloud computing is a service that leverages a virtual architecture. The focus shifts to creating pools of centralized resources that are delivered and charged to specific departments or groups. Cloud computing operates as a utility. For example, the engineering department sees and pays for, through internal chargeback, the email service it uses. The ability to provision the resources employees actually use and to make sure that the most critical applications are delivered at high performance at the times needed is a huge benefit to SMBs.

Cloud Computing Models

Once virtual servers have been deployed, cloud computing is the next logical step for SMBs. Several models exist of cloud computing: private, public, and hybrid. For most SMBs, a private cloud is the next best step toward increased cost benefits from their virtualization investment.

Private clouds host services from *inside* the corporate firewall. In contrast, public cloud services are delivered from outside the corporate firewall by third party vendors. Keeping cloud services internal to the company reduces risks; specifically, SMBs are required to comply with federal or state legislation that protects data or mandates reporting risk non-compliance by placing data outside the firewall. SMBs also become reliant on vendors that might not pay as much attention to small customers or not note that service contracts call for much more capacity than is being used. While vendors typically agree to service levels, an SMB can do nothing to fix service slow-downs or outages. Even if the vendor makes some sort of financial restitution, lost productivity cannot be regained. The greatest risk of all is possible data loss associated with service outage.

By deploying their own private clouds, IT groups are able to eliminate risks while realizing advantages. They comply with legislated mandates by ensuring and proving data security. They monitor usage and scale service levels up and down as the end-user community changes. Chargeback capabilities allow SMBs to charge departments for service (e.g. backup, storage) and/or application (e.g. email, customer service) use which leads to better budgeting and capacity planning.

An SMB does not have to choose private clouds over public clouds, or vice versa, in every instance. Small and medium businesses might want to use a public cloud for a particular application. For instance, a hybrid approach allows SMBs to take advantage of outside vendor services for specific applications or to provision specific work groups or locations while maintaining private clouds for more central or sensitive applications and data.



Investing in the Long-term

The close ties between virtualization and cloud computing set up a logical, natural progression that looks like this:



Once the SMB has experienced the first wave of cost savings from virtualization, it is time to move to the additional savings offered by private and then hybrid cloud services. It makes sense to invest in hardware and software platforms that fully support both virtualization and cloud computing.

Hardware plays a huge role in the success of a virtualization or cloud strategy. Server and processor combinations that support the highest levels of consolidation give SMBs opportunities for expansion without continually having to swap out servers and storage arrays. High-level, reliable performance is also critical for increasing productivity. If the end-user community feels underserved, if it cannot quickly access the applications and data it requires, or if work processes are slow or suffer outages, neither strategy will pay off.

One of the main cost benefits of both virtualization and cloud computing is reduced IT overhead. IT saves hours of work with key capabilities like automatic failover and fast provisioning. Of course, with fewer servers and storage devices to oversee, IT maintenance lists get shorter. When physical servers and storage arrays are well-designed, and manageability tools are built-in, then time spent on maintenance is further reduced.

Small and medium businesses add to power and cooling savings by investing in servers that are designed to conserve energy. For example, servers that use only the power called for to support current workloads subtract the cost of excess energy.

The virtualization and cloud computing software platform should add manageability features that further reduce overhead. The first place where a virtualization and cloud computing platform should pay off is through provisioning. Deploying applications to the end-users who need them and setting up permissions and configurations take a lot of IT time. Fast provisioning through a standard catalogue of applications that end-users access without assistance reduces IT's support burden while actually improving customer service.

Security features also save a lot of time, while protecting the applications and data residing in the cloud. Agent-less security that carries virus and threat protection through the cloud saves IT from installing, tracking, updating, and configuring files on each physical server. The best agent-less security includes notification of vulnerabilities that trigger proactive attention. It takes less time to plug a security hole than it does to unravel the damage caused by a virus or other attack.

The hallmark of a well-designed virtual datacenter or private cloud is agility. IT should be able to move virtual machines as needed to take advantage of excess capacity, to minimize unused capacity, to reduce downtime, and to ensure high-performance. Change tracking and automation features, such as automatic failover and migration, help IT stay current on physical server and virtual machine relationships.

Chargeback capabilities offer a different kind of tracking inside a private cloud: Who is using how much of a service? Businesses can take great advantage of chargeback capabilities during



budget cycles when IT resource consumption can be accurately charged to a particular department, work group, location, or the entire company. Rather than charging resource use to general administration, it is charged to the actual users. IT services become a truer part of the profit and loss of revenue to cost equation which enable SMBs to align properly IT and business strategy.

Dell-VMware Platform

The good news for SMBs moving forward with virtualization deployments and looking toward cloud computing is that the market offers a wide variety of hardware and software options. The bad news is that investigating those options, working with several vendors at once, and then deploying technology from different sources can create a barrier between investment and return on investment.

Dell: value added service

Working with Dell, IT managers gain a value-added relationship that delivers services, hardware, and software solutions that are tailored to current requirements and scalability to support anticipated growth. Dell's profound experience with VMware, the leading provider of virtualization and cloud system software, enables SMBs to source and deploy an entire infrastructure through a single vendor.

Dell consultants assess current data center environments and operations to identify investments that will have the greatest short-term payback while supporting long-term goals. Those investments might focus on ground-up virtualization or optimization of virtual configurations that are already in place. Consulting engagements help IT think ahead through the virtualization-private cloud-hybrid cloud progression in order to design an architecture that lends itself to easy transitions that do not disrupt productivity or add exponential overhead.

Once investments have been specified, Dell technicians configure and test hardware and software configurations before shipping them to the client. Everything is ready for out-of-the-box deployment. Technicians provide on-site or phone assistance throughout and beyond implementation to make sure that the data center remains tuned for performance and reliability.

VMware vSphere 4 for virtualization

VMware vSphere 4 is allowing SMBs to achieve consolidation rates as high as 15:1. Significantly reducing the number of servers IT has to manage is just one way vSphere decreases overhead.

Centralized management helps IT control virtual machines across the physical environment. Virtual machines are quickly provisioned using standardized templates that ensure compliance with host configurations. Patch management and updates are automated. IT does not have to track patches or virus updates as virtual machines migrate. VMware estimates that this alone saves \$1,000 per machine. Plus, patch compliance is reported for additional assurance.

VSphere 4 also delivers high availability, so IT spends less time and money on protection and recovery. Monitors alert IT to potential problems with virtual machines to trigger proactive attention. If a physical server shuts down, virtual machines are automatically restarted on a working server with available capacity. Automatic failover capabilities allow virtual machines to migrate to another physical server regardless of operating system or configuration settings.



VMware vCloud

VMware vCloud works with vSphere 4 to leverage virtualization for cloud computing and to resource pooling and automation streamline application provisioning to end-users or work groups. End-users are able to select the applications they need from catalogued offerings. IT is able to control and secure the offerings while empowering the end-user community to access the resources it needs. IT simply applies the security, business, and governance policies to the container for virtual machines. This eliminates the constant need to reconfigure virtual machines.

Service level agreements can also be set to manage and monitor private cloud performance. That capability applies to external cloud services as well. Chargeback capabilities are also in place for private and hybrid cloud strategies to inform departments and the company on service usage. IT is able to plan for service expansion and make sure that the company is not paying for excess capacity.

Dell servers with Intel Xeon processors

Dell PowerEdge T610 servers are designed to support virtualization and cloud computing through high performance and reliability. With up to 18 DIMM slots and 288 GNB of main memory offered, the servers present extensive capacity. Redundant and hot-swappable components decrease downtime. If a fan or power supply fails, a back-up component automatically takes over. New components can be put in place while servers are up and running.

PowerEdge servers facilitate security through Intel AES NI technology; CPU performance for encryption is improved by up to 53 percent for secure internet transactions. No need exists to allow for increased performance overhead or to add additional encryption appliances.

Dual-core Intel Xeon 5600 series processors boost performance while helping SMBs conserve energy and save on utility bills.

- Intel® Turbo Boost Technology: Server performance is automatically maximized by increasing core frequencies which enables faster speeds for either specific threads or very heavy workloads.
- Intel® Intelligent Power Technology: Both CPU and memory are shifted to the lowest power state that still delivers the performance required. That saves on energy used to run the server and reduces heat output which, in turn, reduces cooling requirements.
- Automated energy efficiency: Idling cores (those that are not needed to support current workloads) are powered down to near zero consumption independently of working cores to reduce overall power consumption.
- Automated low-power states: Processor, memory, and I/O controllers are automatically reduced to the power state that will support performance required by the current workload.

Dell EqualLogic storage

Storage performance and total cost of ownership (TCO) are significantly lowered by equipping virtual environments with EqualLogic iSCSI SAN solutions rather than traditional DAS or Fibre-Channel SAN devices. EqualLogic PS Series arrays go from the box to operating SAN in minutes. A wizard-based GUI makes it easy to integrate arrays in the Ethernet backbone of the virtual



infrastructure. IT staff influence common internet protocol (IP) skills to set configuration options. Investments are leveraged with easy scalability. Businesses purchase only the storage they need now, knowing that expansion is achieved through easy to access and easy to set options.

Like PowerEdge servers, EqualLogic storage arrays contain redundant, hot-swappable components. They are fault-tolerant; the redundant controller and enterprise-class RAID protection that are built-in provide 99.999 percent availability.

Dell Compellent storage

By combining storage virtualization from Compellent with server virtualization by VMware, users can not only consolidate IT resources and boost efficiency, but increase flexibility, performance and availability in their data center. Integration between Compellent Enterprise Manager and VMware vCenter streamlines VM and storage volume administration.

One of the cost-saving benefits of leveraging Dell Compellent with VMware is achieved through better disk utilization, as users purchase fewer drives to support VMs. In this case, when a VM or application requires more storage, Compellent automatically provisions more space from the pool.

Conclusion

Virtualization is no longer a strategy for the future. Virtualization projects are well underway at SMBs, and every intention is demonstrated to push virtualization further to realize fully the benefits of server consolidation. Those, however, are merely the first set of savings gained through virtualization. When virtualization investments are leveraged for private, and then hybrid cloud strategies, SMBs save even more on resource pooling and provisioning, management automation, security, and scalability. Any SMB that invests in flexible, scalable architectures is able to progress from virtualization to cloud computing quickly and with less expense. Dell's partnership with VMware allows SMBs to configure virtualization and cloud platforms that meet current needs and future strategies, while they realize significant cost benefits along the way.