

Cloud Watching

The Future Hangs in the Balance as Private, Public, and Hybrid Options are Considered

By Marty Weil, Contributing Editor

The Irish poet Yeats claimed he knew he would meet his fate somewhere among the clouds. It's likely many data center managers are having the same feeling.

Recent Gartner research shows that cloud services grew by over 16 percent last year, and that this level of growth is expected through 2014. The "cloud," lovely soft poetic image that it is, is disruptive technology. With its appearance, all things IT have changed, and data centers worldwide are feeling the impact of this change.

"The major impact of cloud computing for data center managers is running operations more like a service provider," says David Link, CEO of Reston, VA-based Science Logic, a data center and cloud computing management consultant. "This means thinking about what IT services you provide to the rest of the organization in a packaged way – along with service levels, pricing, perhaps different levels of monitoring or other value added services that can affect chargeback or 'showback' for example."

Instead of one SLA that corporate may have adhered to previously, data centers that embrace the cloud now have to accommodate multiple service levels, tailored to each IT service and its impact on the business. And cloud computing deployments also mean that computing resources aren't necessarily in the data center.

"It has never been more important to have a complete view of IT service delivery, no matter where the components that make that up actually reside," continues Link. "Consistent management across compute resources in the data center and in private, public or hybrid clouds is critical."

Defining the Clouds

Jesse Noller, principal developer at Nasuni, a Natick, MA-based cloud file storage provider, posits five key attributes of the cloud:

- 1) Self Service
- 2) Ease of Use
- 3) Scalability
- 4) Speed and Agility

5) On Demand – “Pay as you go”

“These five attributes, simply applied to the foundation of modern applications—Operating Systems, CPU, Memory, and Storage—are what make the cloud so powerful,” says Noller in his blog for Nasuni. He finds that the interesting bit is that these attributes apply equally to public and private clouds.

According to Noller, the public cloud is what users normally think of when they think of the cloud: Amazon, Rackspace, Nirvanix, Microsoft Azure. He says that beyond the five core attributes common to all clouds, public clouds have several more that ultimately distinguish them from private clouds. These would include:

1) Economy of Scale

The idea that the cost of something falls as more of it is used. In the case of the public cloud, the user’s costs fall as greater numbers of individuals and companies leverage the technology.

2) Domain Knowledge

No one has the same knowledge as the major public cloud providers (i.e., Amazon, Google, Rackspace, and Microsoft) when it comes to running large-scale clusters of machines. This experience allows them to run cheaper, at a significantly larger scale, more reliably, and more globally than in-house IT firms would envision.

3) External Hosting

Public clouds are globally accessible because these providers have already done massive global rollouts of their systems in multiple data centers. They deal with the power, the cooling, the network infrastructure.

4) Proven Infrastructure

A public cloud service with a proven track record—and hundreds of thousands of users per day—has already learned the hard lessons, and worked around or through them.

Private clouds are virtualized computing resources hosted within an enterprise or organization. “These resources have the same five core attributes, but typically don’t share the additional ones outlined for the public cloud,” says Noller.

Why would anyone opt for a private cloud given the added benefits of the public cloud? It comes down to a number of unique features:

1) Self Hosting

While this feature is almost the antithesis of what the public cloud stands for, it is very appealing to many enterprises. The real issue here is control.

2) Security

The public cloud is public—the IP addresses, unless protected, are on a public network. Data stored in a public cloud is on someone else’s machine. The cloud provider has access to this data, and, if not handled properly, data can be exposed during transfer and at rest. The private cloud brings all this back within an organization’s walls.

3) Customization

For organizations with highly specialized needs, a customized deployment of private cloud software may be ideal to bring the benefits of the cloud to the organization. Custom deployments won’t be seen from public cloud providers for some time.

4) Performance

While this is a matter of perspective, local LAN performance will be superior to something hosted on the public Internet, even when the public cloud provider has pipes all over the world.

Making or Breaking the Public Case

According to Mike Martin, director of cloud computing for UK-based Logicalis, an international provider of integrated information and communications technology, when data centers look at public cloud solutions, they are typically drawn to them due to perceived cost savings associated with shifting IT capital expenses to operational expenses.

"The idea of paying only for what you need and consume appeals to CFOs, while the CIO sees the benefits of shifting commodity IT needs to a services model versus building and managing internally," he says.

"There are two primary benefits of public clouds," says Dev Chanchani, president of Allentown, PA-based iNetU, a managed hosting provider.

The first benefit is that you will not need any capital investment. Many technology start-up companies are now able to skip their Series A funding, as they don't require large amounts of capital to build their systems. Secondly, a public cloud is very flexible. You can get what you want, when you want it. It is very easy to add and remove resources. This makes public clouds very suitable to people that are hands on and like to do things themselves. There is no long term commitment and requires minimal expertise because you don't need to know how to build and maintain a public cloud, you only need to know how to use it.

"On the other hand, public clouds have very limited support options, and often you cannot get any help with your applications running on them," says Chanchani.

Frank Stiehans, director, SAP virtualization and cloud management, notes that the term public is often misunderstood.

"The word public refers to a third-party offering their automated data center services to the general public," he explains. "It does not necessarily mean that the systems in a public cloud are in the public Internet."

Stiehans puts the pros and cons of public clouds in a clear context:

PROS:

- With public clouds you pay by usage, and you can usually assume enough capacity for larger workloads.
- Clouds are usually core to the corporate strategy of public cloud providers, meaning major investments into capacity, security, reliability etc. The costs of those investments per system are smaller than for private clouds due to the economies of scale.
- Large-scale public clouds have large ecosystems, providing continuous flow of innovation overcoming existing challenges.

- The incentive to automate tasks is higher for large public clouds (economies of scale), leading to both lower cost as well as higher agility.

CONS:

- There is a premium included in the price tag in the hourly charging model. That means compared to private clouds, a user should use the default pricing model of public clouds if they need the elasticity.
- At the beginning of 2011 we still lack competition with regards to large scale public cloud providers. This allows the few providers to charge consumers higher prices.
- As we are still in the relatively early stages, we are still dealing with a lot of proprietary elements in the interfaces to those clouds.
- Naturally public clouds are not located in the same building like the consumer. Consumers have are often more than 1,000 miles from their servers, leading often to limitations in network bandwidth. Transferring a SAP system of 1 TB can take several days.

SAP has been running SAP systems in public clouds, in particular Amazon.com, since 2007. In January of 2011, we reached 2,000 systems. We enjoy the elasticity, both with regards to capacity as well as pricing, in large-scale public clouds.

For example, we just ran a two week long training for 50 systems integrator partners for one of our newest products, SAP Business Planning and Consolidation,” says Stiehans. “ Each system cost us only \$12 a day.”

SAP has systems that are in the public Internet which are sometimes protected via VPNs (for example, for Customer Proof of Concept and Demo purposes). A large volume of systems within the “public cloud” runs behind the SAP network firewall for its departmental daily work.

Martin notes that Logicalis has developed a public cloud computing offering based out of its Cincinnati, Ohio, Data Center & Network Operation Center facilities.

“We see cloud computing as a transformation in how customers are looking to deliver IT solutions to their end users and our public cloud offering (the Logicalis

Enterprise Cloud), provides a cost-effective solution for clients seeking to supplement, integrate and extend their data center needs into their private cloud," says Martin.

Logicalis has developed its Logicalis Enterprise Cloud to be built upon a solution called Virtual Compute Containers. The Compute Containers consist of a virtual pool of compute power (GHz & memory), storage, and bandwidth that scales to meet the unique computing requirements of its customers. The Compute Container provides elasticity and burst ability into the Logicalis Enterprise Cloud shared resource pool while guaranteeing the computing resources needed to support enterprise-class applications.

The Compute Containers are built at the virtualization layer enabling flexibility to shrink and grow based on business need,

Private Considerations

A private cloud deployment can provide many of the pros of a public cloud deployment in terms of rapid delivery (provisioning and de-provisioning) of new resources, increased utilization of existing hardware, improved standardization, and lower support costs.

"Moreover, a private cloud is an ideal environment within which to learn and experiment in how to manage cloud-based workloads, better preparing you to leverage the public cloud when it is mature enough for production workloads," says Benjamin Grubin, director, solution and product marketing, at Waltham, MA-based Novell, a leading provider of infrastructure software. Other benefits Grubin cites include:

- Helping organizations reap the ROI benefits of virtualization that are being sapped by "VM sprawl", or the fact that VM deployment is often viewed by the business as much cheaper than deploying a "real" server, and therefore has a tendency to request more of them and manage them less carefully.
- Restoring the appropriate management controls as well as providing cost visibility into who is utilizing the resources of the cloud.
- Being free of most of the security, privacy, and compliance issues of the public cloud since you can manage the controls protecting the environment directly.

"Many large enterprises still want control over their most strategic IT resources—that's why we see most developments going forward falling into the private cloud," says

Barton George, cloud computing and scale-out evangelist, Dell Datacenter Solutions Division.

George says the other big advantage with private cloud developments is that users are able to leverage their existing IT infrastructure investments.

"Most of the customers I speak with today have already gone well down the path of virtualization," he says. "They can continue that momentum by adding on layers of capabilities and features on top of existing virtualization features such as the metering, monitoring, and charging back of applications, while at the same time making them more easily managed and capable of being more broadly utilized."

This is what Dell refers to as the evolutionary approach to building a cloud infrastructure.

The cons of private cloud deployment are basically giving up the economies of scale associated with public cloud--you can do much the same thing, but it's on your own hardware in your own data center, and therefore doesn't free you from the capital expense and maintenance costs of managing your own infrastructure (even though it does help you utilize it more efficiently).

"Therefore the argument for private cloud is less one of immediate cost savings, and more one of radically improved agility, scalability, and integration with the business that IT is serving," concludes Grubin.

Cisco's Engineering IT organization manages multiple Data Centers and Labs worldwide for engineering development. The Data Centers include over 8000 servers, and many petabytes of storage. The engineering laboratories, a billion dollar investment, have over 70,000 hosts alongside a large inventory of networking equipment. In order to optimize service delivery and to better support end-to-end engineering workflows, the organization, under the leadership of Sr. Director Vijay Bollapragada, engaged on a transformation project called Borderless Engineering Environment. At the core of the project was the enablement of a private cloud in the existing environment and future Data Center and Labs needs. The key server platform that the private cloud is built on is the Cisco Unified Computing System (UCS).

The Borderless Engineering program involves multiple components running in parallel, profiling applications and services and mapping to standardized infrastructure configurations, and data centers being consolidated from 34 to a target of 11 worldwide, Network infrastructure is being optimized to avoid degradation of the user experience,

and environment tiering and standardization is focused on network, compute and storage requirements.

Services orchestration and automation is another key component of the private cloud strategy. The entire Engineering IT organization was restructured to align around service delivery rather than support of specific technologies (network, servers, storage).

Operational processes were redesigned within the ITIL framework and new funding and chargeback models developed to support a more agile environment. Early alignment with customers, partners and stakeholders enabled rapid adoption and mitigation of challenges posed by a multitenant environment.

Both Sides Now

According to Murali Swaminathan, Vice President and General Manager of the Enterprise Solutions Group at TechnoDyne, “the industry as a whole will be moving in the direction of hybrid clouds.”

With private clouds in place and reserved for special purpose workloads, enterprises will leverage public clouds for most workloads and ad hoc capacity. Swaminathan sees the pros and cons of hybrid clouds including:

PROS

- The private side of hybrids will be used for average utilization and critical workloads, while the public side will be leveraged for “bursting” when excess capacity is needed and for less constrained needs such as testing and QA.
- Better security control and governance is possible than with a purely private cloud. Leakage prevention will be achieved through workload splits between private and public infrastructures.
- On-demand capacity can be leveraged from the public infrastructure, lowering costs when compared to pure private clouds.
- Switching costs are potentially lower.

CONS

- Potentially negative implications on infrastructure architecture (large broadcast domains, delay mitigation, etc) based on workload and capabilities needed.
- Difficulties in integration— managing the infrastructure and operations within the private environment while integrating with the public environment.
- The need to ensure that right policies and data tags are enforced to maintain the workflow based on business processes across boundaries.
- The need for orchestration tools to be integrated between the environments. The lack of standardization is a complication.
- The lack of federated identity (IAM) tools

Examples of hybrid cloud operation include: bursting out from an internal to a public cloud when needs required more capacity; running logic and processing in the cloud and leaving the database in the data center; and performing highly parallelized database processing in the cloud combined with other logic processing in the data center. Expect to see many storage-related use cases where companies and organizations of all sizes will augment their on-premise storage with cloud storage (potentially from various vendors) in a hybrid model deployment.

“For most organizations, a hybrid cloud deployment represents the best of all worlds by playing to the strengths of both the cloud and the data center,” says Link.

For example, it may make sense to deploy a website or application on a public cloud to get it up quickly or to meet elastic demand requirements while the back-end database is still hosted in the data center behind the corporate firewall for security reasons. The challenge here is that end-to-end service delivery must be measured across both the data center and the public cloud, so consistent monitoring is critical and cannot easily be done by using separate tools.

“Data center operators must retain control and visibility of the components of an IT service deployed in a hybrid cloud model—which is difficult to do with traditional management tools,” notes Link.

SAP has systems for its employees in more than 10 data centers belonging to SAP or partners. This is often because it is ideal to have the system close to the consumer, in

the form of an SAP employee/customer or partner. Due to network performance, a customer in South Africa certainly does not want to access an SAP system in Europe.

"So to us, using the hybrid cloud means connecting several private and several public clouds and having a federator decide automatically where to place a system for a particular use case and user group," says Stiehans.

"Hybrid Clouds have the potential to be the ideal answer for all use cases," he concludes.

It is also a field that requires a lot of innovation before it matures.

###

SIDEBAR

Six Missteps to Avoid While Considering the Clouds

Toronto-based uptime software, a provider of systems management software for server monitoring, capacity planning, and application planning, has released a list of "not-to-do's" for those gazing longingly at the cloud.

"Cloud computing has the potential to offer organizations dramatic operational efficiency and cost savings, but when improperly managed it can have disastrous results," said Alex Bewley, CTO of uptime software. "This past year, organizations began experimenting with cloud and in 2011 much of that experimenting will become full cloud adoption. CIOs, IT Managers and System Administrators alike need a sound plan along with deep performance monitoring in place before moving to the cloud in order to ensure the end result isn't a new job hunt."

Bewley goes on to list the top six cloud pitfalls to avoid in the coming year:

1) Underestimating how bad cloud sprawl can be

Provisioning in the cloud is convenient and quick which provides both agility and a huge potential for abuse. Migrating too much or moving too quickly can lead to complete loss of control by IT and exponential costs. Remember virtual sprawl?

Times that by 50. Additionally, it will become even tougher to monitor and report on Service Level Agreements (SLAs) as applications move between physical, virtual and cloud environments. On top of that you may be required to purchase

individual point tools to manage it all.

2) Failing to monitor performance can lead to a lack of employment

Visibility into application performance in the cloud is critical, especially with your user-facing applications. Whether it's Software-as-a-Service (SaaS), Platform-as-a-Service (PaaS) or Infrastructure-as-a-Service (IaaS), without cloud performance monitoring tools in place there is no visibility into how applications are performing. As an IT department, your lines of business will look disparagingly upon you if there is a lack of visibility into the performance of your services. If you can't monitor and report on cloud performance and availability, then you are not providing business value.

3) Lack of knowledge of the cloud services/applications you actually support

As applications are provisioned to the cloud, it can be easy to miss what is actually running without proper tracking. Beware of getting caught in the "out of sight, out of mind" dilemma of losing track of applications residing on-premise or in the cloud. If applications get lost in the shuffle now, imagine the nightmare down the road when your cloud infrastructure grows even more complex.

4) Perils of platform lock-in

Be sure to pick your cloud platform carefully and do your homework. Once you have chosen a cloud vendor and have provisioned applications, it is tough to move them elsewhere if you are unhappy with the performance or service. Cloud providers usually make it difficult to extract the data from their cloud and in many cases, a third party tool is needed to migrate that data back on-premise. Once you have signed the dotted line, you are essentially locked-in.

5) Mismanaged performance guarantees

Once in the cloud, applications are at the mercy of the platform now carrying them. For instance, performance latency can be caused by the simple geographical location of the servers your applications are now housed on. As the IT team, you will need to set expectations both internally and externally concerning how applications will perform, taking into consideration those on-

premise applications vs. those that run in the cloud.

6) **Compromised privacy and security**

A challenge to running applications in the cloud is knowing where the server that now houses your applications is physically located. There could be jurisdiction issues associated with the applications that you have running in the cloud based on the location of those new servers. Also, the IT person running those servers in the cloud may not understand the sensitivity of the data you have handed over. Remember, your company information is in the hands of someone outside your company wall and unless the correct processes and performance monitoring are in place, your critical data it is at the mercy of the cloud.

###