Emerging Hybrid Cloud Patterns

ENTERPRISE IT HAS HYBRID CLOUD COMPUTING ON ITS RADAR. The hybrid cloud model provides the best of the private and public worlds, combining the economies and efficiencies of public cloud computing with the security and control of private cloud computing. However, marrying public and private cloud services requires advanced thinking and some handy technology.

At issue are the monitoring, measurement, and management requirements of hybrid cloud platforms. The end state is a complex distributed system that provides challenges that most enterprises do not consider, such as security and governance challenges. The monitoring and measurement approaches and technologies become complex as well, and they are critical to the success of a hybrid cloud or a multicloud (more so than with just paired private and public clouds).

The RightScale survey reveals that 55 percent of enterprises are planning for hybrid clouds, 13 percent expect to use multiple public clouds, and 14 percent are planning for multiple private clouds.[1] This is an accurate depiction of the market growth and interest in hybrid cloud computing, and shows a market shift to an interest in these architectures and emerging cloud platforms.

Enterprises move to hybrid clouds for a few core reasons:

- Since single cloud solutions typically don't provide the breadth and depth of functionality enterprises require for their cloud computing solutions, enterprises must mix and match a variety of public and private cloud platforms to offer best-of-breed solutions.
- The rise of new management technologies, such as cloud management platforms (CMPs), makes it possible to manage these complex environments using a single interface for provisioning and scaling.
- Security and governance challenges still exist, including the need to place some workloads on premises, and some workloads on public clouds.
- Cost leads many of the decisions. A hybrid cloud computing strategy is often less expensive from an operational standpoint. However, it also adds time-to-market and agility benefits that are even more valuable, but difficult to define.
- Compliance remains an issue. Certain types of financial and health data have limitations as to where it can be stored. Moreover, logging and auditing capabilities are an absolute must for the cloud, and thus the need for paired public and private clouds.

In addition, there are sound approaches to holistic monitoring and measurement of all systems, which introduce the ability to hide the system's complexity using common measurement approaches and metrics. This allows more operational visibility into all systems, hybrid cloud and traditional.

Business Case

PC Connection created a survey of more than 500 organizations for its 2013 Outlook on Technology around the business value of cloud computing. The survey also covered obstacles of using cloud-based resources. Among other things, it found that cost

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savings (51 percent) was the top influencer.[2] However, cost savings come in different forms in different businesses, and mostly center around how the use of cloud-based resources can meet the needs of, or service, the underlying business. The top three cloud capabilities that influence cost savings are:

- *Ability to adapt to shifts in the market.* Cloud-based platforms need to provide core agility to businesses to quickly change IT resources around changes in the market. This includes both business agility and time to market. Although these capabilities are difficult to measure, their value typically exceeds any operational cost savings from hybrid clouds.
- *Ability to serve new business processes.* This capability builds on the previous notion, meaning that using new hybrid- or multicloud services, businesses can quickly stand up and operate new business processes. The ability to self- or autoprovision seems to be the larger benefit. In the past, business units needed to wait months before hardware and software were put in place to provide changes in processes.
- *Ability to support demands on performance.* This capability enables systems to scale up to support a massive amount of processing with a minimal amount of work on the part of IT. This expandability means that business opportunities aren't lost due to lack of capacity. Hybrid clouds support "cloud bursting," or autoexpanding the use of public cloud resources. Thus, businesses don't need to obtain excess hardware and software, and costs align directly with the ability to expand the business.

If clouds are to serve a business, typically around the concepts above, we also need the ability to define and measure this value. We do this by translating cloud usage into resources consumed, and thus measured, as well as how the use of those resources supports and enhances automation of the core processes. Thus we learn how that usage comes back to the business in terms of value.

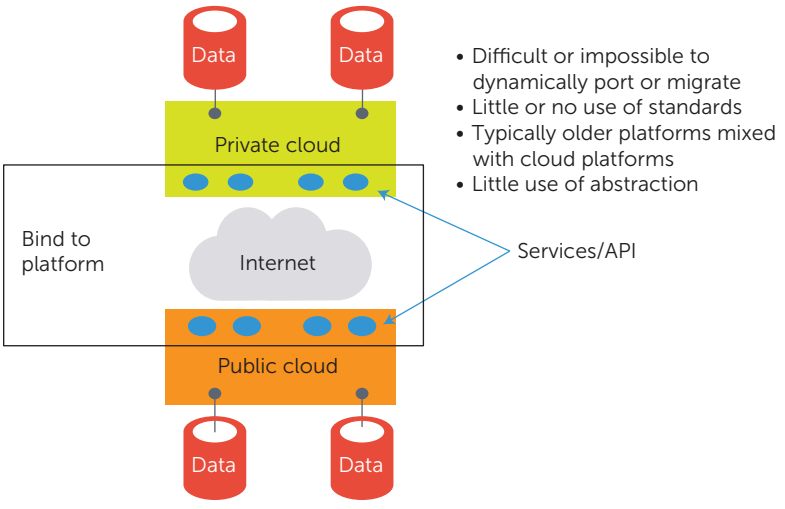

FIGURE 1. Static placement means that the workloads are bound to the cloud and can't be easily moved.

Technology Case

When choosing a cloud platform, it's important to look at *compatibility*, or its ability to support your workload's technical needs. All workloads won't run on all platforms. You have a choice: Absorb the cost and risk changing the workload, or find a target platform that's compatible.

You also need to look at the platform's *suitability*—that is, even if the platform is compatible, it must also be suitable for the purpose. For instance, points of presence might not be needed in some countries that are important to the business, or the platform might not support compliance requirements.

Finally, consider the platform's *benefit* to your business (such as those described earlier), meaning there are technological as well as business benefits to justify moving to a net target hosting platform, such as a hybrid cloud.

Emerging Hybrid Architecture Patterns

Hybrid clouds give businesses an incredible amount of flexibility. This flexibility translates into agility, and agility gives businesses the ability to change at the "speed of need." This flexibility is critical for industries that award time to market, or the ability to change quickly. Examples include healthcare, finance, and high tech. However, up until recently, migrating workloads from private to public clouds, or from public to private clouds, has been difficult. What used to be a simple pairing of private and public clouds is now complex and distributed.

Many of the innovative approaches developed in the last few years are game changers. I put the emerging patterns of hybrid cloud computing into a few core categories.

Static placement (Figure 1) refers to architectures where the location of workloads is tightly bound to private or public clouds. This means it's difficult or impossible to port from private to public, or

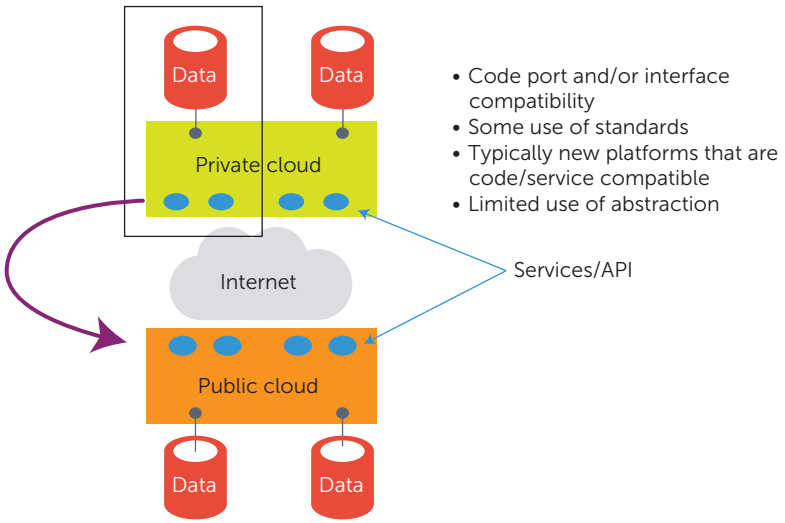

FIGURE 2. Assisted replication means that the workloads can be moved, but with some technological assistance.

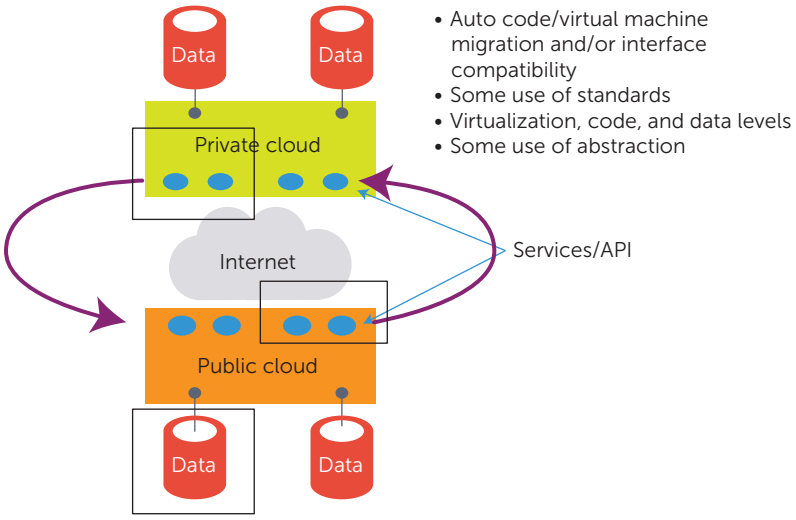

FIGURE 3. Automigration means that the workloads can automatically move from private to public cloud.

the other way around. There is little use of standards, and typically this approach is aimed at older platforms, where the requirements allow deep platform binding. If hybrid clouds exist today, they'll typically use this architecture.

Assisted replication (Figure 2) refers to architectures where some workloads can be replicated from private to public clouds, or the other way around. These types of architectures typically provide code and/or interface compatibility to support simple replication of architectural components, but not much else. There is some use of standards, often at the API level (usually as Web services) and with new platforms that are code- and service-compatible with emerging cloud platforms.

Automigration (Figure 3) refers to the code or entire workloads moving between private and public cloud instances, usually through human intervention but sometimes through an automated process. This includes the automatic movement of code and/or virtual machines through well-defined interfaces and some use of standards.

Dynamic migration (Figure 4) refers to moving workload instances between private and public cloud instances as if both the public and private clouds existed in the same virtual operating system. Standards are used where possible. This is the functional objective of hybrid cloud computing, and the core promise made by the hybrid operating systems providers. But, so far, they're just promises.[3]

The way we deal with security in a hybrid cloud will differ, depending on the needs of the platform. In moving to a hybrid cloud, we're moving to more of an identity and access management model, using private trust within the private cloud and central trust on the public side. As we leverage hybrid clouds that are more tightly coupled, we'll move to more of a federated trust model. On premises, traditional security approaches, such as role-based security, will still drive those platforms.

Also note the role of data. Where it's centralized on the private cloud model with private cloud servers, our data will be largely decentralized in the public cloud. The data will run on any number of server instances, and will be stored in different geographies. Those managing the data might not have a say in where the data is stored, nor how widely it can be distributed. Considering on-premises or traditional systems, the data will remain tiered, with some

data residing centrally, whereas other data is distributed and integrated with the centralized data.

Provisioning and tenancy resources change as well. Where private clouds offer self-provisioning of resources, such as storage servers, public clouds can provide automatic provisioning (as well as self-provisioning) that traditional on-premises systems need to manage provisioning, since it entails buying hardware and software. Of course, tenancy differs as well. Where traditional systems are multiuser, only the private, public, and hybrid clouds leverage multitenant patterns in how they manage access to resources.

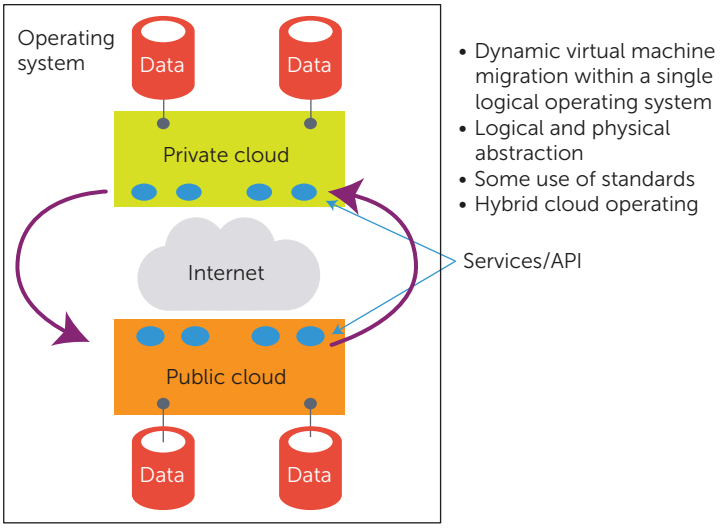

FIGURE 4. Dynamic migration means the workloads can move from cloud to cloud as if they were on the same server.

Moving to a Hybrid Architecture

So, are you sold on a hybrid cloud? Do you want to know the steps to implement and operate such complex distributed technology? Here's a quick summary.

At each step, consider security as systemic to all operations, and make sure you have the proper security mechanisms and processes in place. Create a security solution that spans both private and public clouds, and ensure that the logging and auditing systems are up and running as well. New security approaches, such as identity and access management (IAM), are typically a good fit here, so learn all you can about those technologies' capabilities.

Understand your own requirements for a hybrid cloud. This means examining your workloads, including all application, storage, and database processing needs. Use these requirements as a jumping-off point. Select private and public cloud candidates with known compatibility. There should be a common way to manage each cloud using a single tool, and the ability to easily migrate workloads between them.

Test the hybrid cloud's ability to meet your requirements. These proof-of-concept tests will provide the data points you need to prove that your hybrid cloud can work. Next, implement some noncritical applications on the hybrid cloud. You don't want anything that can stop the business to be your first or second test case. Discover any issues and fix them quickly.

Leverage a CMP and/or a cloud service provider to manage the hybrid cloud resources. Users should be able to self-provision resources as needed, without having to call IT. Moreover, you need a usage-based accounting system in place for show-backs and chargebacks, as well as to limit the use of some resources that are clearly out of range.

ALTHOUGH HYBRID CLOUDS ARE POWERFUL AND FLEXIBLE TECHNOLOGIES, YOU SHOULD FIRST CONSIDER YOUR OWN BUSINESS NEEDS. That said, it's not all about what this technology is, but what it can morph into. The ability to move workloads in fast and flexible ways typically makes hybrid clouds well worth the investment.

References

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