

CLOUD U

CREATIVE CONFIGURATIONS Mixing and Matching Public, Private and Hybrid Clouds for Maximum Benefits

Through this year-long series of whitepapers and webinars, independent analyst Ben Kepes is creating a Cloud Computing curriculum designed for technologists and non-technical users alike. The mission is to build widespread knowledge about the Cloud revolution and encourage discussion about the Cloud's benefits for businesses of all sizes. Read more CloudU whitepapers and register for upcoming webinars at www.rackspace.com/cloud/cloudU

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Executive Summary

Perhaps one of the most contentious debates in the Cloud Computing world is that around Private Clouds. Many commentators remain adamant that Private Cloud does not, in fact, constitute a legitimate example of the Cloud¹. Others are more pragmatic and see Private Cloud as well as Hybrid approaches as logical stepping stones towards the Cloud.

In this paper we will define these three distinct delivery mechanisms; Public Cloud, Private Cloud and Hybrid Cloud and show how any of the three may be the best approach for customers depending on the particulars of the use case. We will also bring some clarity to when each approach is most appropriate and build the case for a flexible Cloud implementation that recognizes that not one technology will fit all organizations..

What is Public Cloud?

A Public Cloud is justifiably held up as the quintessential way of delivering the Cloud – in part because it was the first approach that utilized the term “Cloud” but also because it displays all of the relevant criteria that are commonly used to describe Cloud solutions.

Public Cloud solutions follow the most widely quoted definition of Cloud Computing. The National Institute of Science and Technology² has defined Cloud Computing as;

“...a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources... that can be rapidly provisioned and released with minimal management effort or service provider interaction. This model promotes availability and is composed of five essential characteristics (On-demand self-service, Broad network access, Resource pooling, Rapid elasticity, Measured Service); three service models (Cloud Software as a Service (SaaS), Cloud Platform as a Service (PaaS), Cloud Infrastructure as a Service (IaaS)); and, four deployment models (Private Cloud, Community Cloud, Public Cloud, Hybrid Cloud). Key enabling technologies include: ⁽¹⁾fast wide-area networks, ⁽²⁾powerful, inexpensive server computers, and ⁽³⁾high-performance virtualization for commodity hardware.”

Given the complexity of this definition, we prefer however to use a simple mnemonic that was developed by Dave Nielsen, one of the founders of the CloudCamp³ series of conferences. This definition sees Cloud Computing described as OSSM (pronounced “awesome”). This simple concept stands for the following;

- **On-demand:** the infrastructure or hardware is already setup and ready to be deployed
- **Self-service:** the customer chooses what they want, when they want it
- **Scalable:** customers can choose how much they want and ramp up if necessary
- **Measureable:** there’s metering/reporting so you know you are getting what you pay for

Public Cloud demonstrates all of these characteristics but more importantly does so in a way that renders the service available to the general public or a large industry group. Secondly with the Public Cloud the service itself is owned by an organization selling Cloud services.

This is important as in the Public Cloud the services are delivered to a relatively unrestricted set of customers, not simply large corporations with massive IT budget. This is achieved through the concept of instance isolation whereby the hypervisor⁴ splits physical servers into separate “instances”, each with its own operating system, allowing even small customers access to computing power when they could not afford to deploy their own entire dedicated server. Instance isolation is what drives Cloud cost benefits.

Public Cloud Benefits

Public Cloud generates significant benefits for organizations that use it. The main benefits include;

- Cost Savings – Public Cloud is in most cases less expensive (from a Total Cost of Ownership (TCO) perspective) than traditional on-premise computing and will often be cheaper than Private Cloud or Hybrid Cloud
- Low, or no, Upfront Costs – Public Cloud should require no capital outlay
- Reduced Infrastructure Footprint – Since the Public Cloud is located on the vendor’s property, there is no physical infrastructure footprint for Public Cloud customers
- Increased Flexibility – Public Cloud gives high degrees of flexibility which allows capacity to be closely mapped to demand
- Software that can be Decoupled from Infrastructure Constraints – by moving to the Public Cloud, organizations can scale software without concerns about related infrastructure needs
- Capacity Planning – Public Cloud results in virtually unlimited capacity as and when an organization needs it

Despite the benefits that the Public Cloud can bring, the reality is that for some industries, some use cases and some usage patterns, alternative approaches are more suitable. Private Cloud is one of these alternatives and it is to this that we will now move.

What is Private Cloud?

Private Cloud takes many of the design cues from Public Cloud, but delivers IT resources in a way that the infrastructure or software is operated solely for an individual organization on dedicated hardware. Essentially, Private Cloud is a dedicated server or group of servers running multiple instances of virtual machines with the ability to scale up or down as demand changes.

Private Cloud can either be managed by the organization itself or a third party and may exist on premise or off premise.

There are four general combinations that Private Cloud can follow, and we contend that there is a qualitative hierarchy to these combinations. While not all use cases allow for all models of Private Cloud Computing, we generally believe that some models of Private Cloud deliver more Cloud benefits than others;



The four approaches to Private Cloud

- On-premise, managed by the organization
- Off-premise, managed by the organization
- On-premise, managed by a third party
- Off-premise, managed by a third party

While many vendors would argue about our qualitative differential, we believe that one of the key benefits of Cloud Computing is its ability to reduce two specific things;

- The level of operations management that the business must perform on the infrastructure
- The amount of capital expenditure needed to set the infrastructure up

It is for this reason that we strongly feel that both on-premise and customer owned infrastructure are sub-optimal and reduce the potential benefit that organizations might achieve from a move to the Cloud.

Historically Private Clouds have been frowned upon by many Cloud Computing commentators since in many cases users “still have to buy, build, and manage them” and thus potentially do not benefit from lower up-front capital costs and less hands-on management that Cloud Computing brings. For this reason, when discussing Private Cloud we are referring to infrastructure that does not require significant management nor capital outlay. In practice this will generally mean existing infrastructure that is repurposed as a Private Cloud resource or infrastructure owned and managed by a third party.

Private Cloud Benefits

Private Cloud, when contrasted with traditional approaches towards infrastructure for an organization, can drive many of the same benefits that Public Cloud does. Private Cloud therefore is beneficial for organizations in that it can;

- Reduce costs
- Potentially entail low, or no, upfront costs
- Lead to a reduced Infrastructure footprint with some approaches
- Drive increased flexibility around IT
- Decouple the delivery of software from the provision of infrastructure
- Increase utilization rates by consolidating servers
- Help simplify or reduce the need for capacity planning

In addition to these generic Cloud benefits, Private Cloud, when contrasted with Public Cloud, can offer additional benefits. Specifically, Private Clouds can;

- Solve issues for organizations whose legislative or regulatory requirements demand a physical or logical separation from the data of other organizations
- Solve issues for organizations with existing infrastructure that they wish to continue using, but with increased efficiencies
- Provide the benefits of Cloud Computing for organizations that have specific requirements in terms of a technology stack (e.g. a particular operating system or hypervisor not available from a Public Cloud provider)
- Can reduce the risks associated with vendor lock in

If Public Cloud is the Holy Grail for most commentators, and Private Cloud is recognition of first steps towards organizational use of Cloud Computing, then Hybrid Cloud is what many would call the best of both worlds. We therefore now turn to a look at what Hybrid Cloud entails.

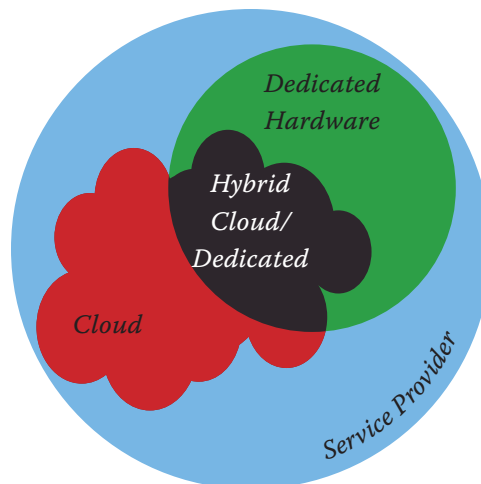
What is Hybrid Cloud?

Hybrid Cloud, as the name implies, is any pairing of Public Cloud with any other IT infrastructure. In other words, Hybrid Cloud refers to Public Cloud mixed with dedicated in-house servers, servers hosted at a service provider, or even Cloud-based servers either (Public or Private) at one or more Cloud providers. Like Public Cloud, Hybrid Cloud (sometimes also called Hybrid IT) can take several different forms as we will detail below. Even amongst credible sources, definitions are ambiguous. TechTarget for example considers Hybrid Clouds to be⁵;

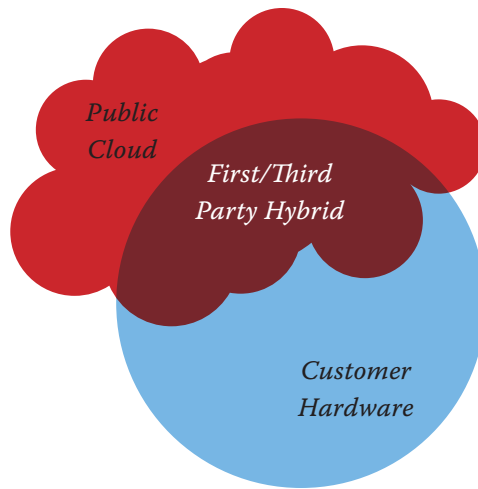
“...a composition of at least one Private Cloud and at least one Public Cloud... [or] a Cloud Computing environment in which an organization provides and manages some resources in-house and has others provided externally.”

Others extend the definition of Hybrid Cloud to mean any connection between a Public Cloud and traditional infrastructure. With this much confusion around what constitutes Hybrid Cloud, it is useful to look at some examples. There are several distinct approaches and design paradigms for Hybrid IT;

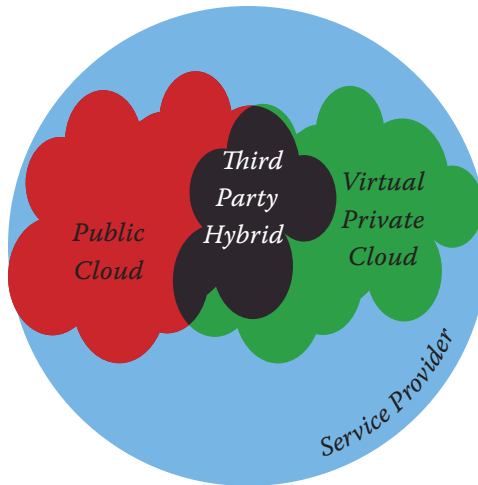
- Cloud/Dedicated Hybrid - combination of a service providers or a customer's own dedicated hardware and a Public Cloud offering. This can be single or multi-tenant, physical or virtualized hardware



- A customer's own hardware, running as a Private Cloud and linked to a Public Cloud



- A mix of Public Cloud and logically or physically separated Private Cloud in a Cloud provider's Cloud



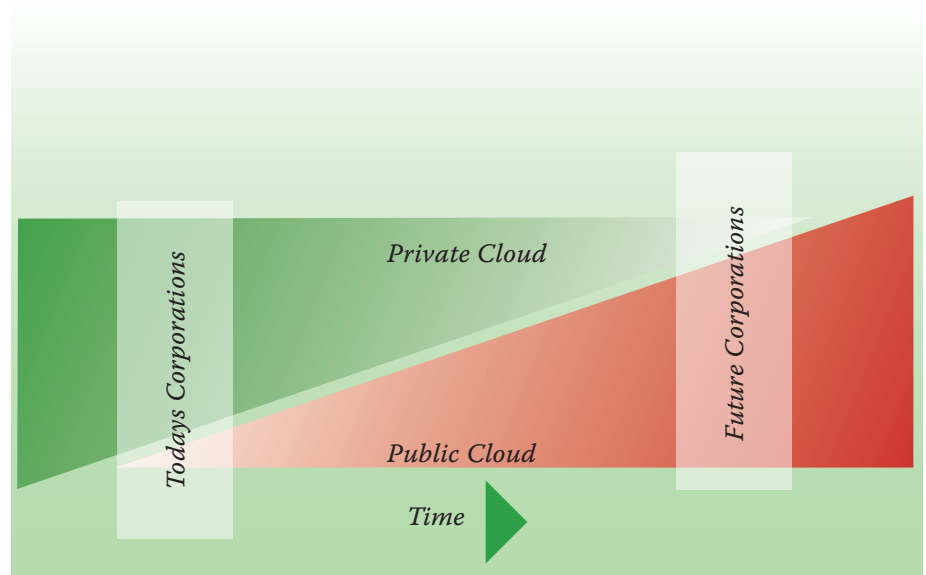
Benefits of Hybrid Cloud

Hybrid Cloud delivers real benefits for organizations; indeed some commentators have contended that a hybrid approach is the best model for approaching the Cloud⁶. Hybrid Cloud allows existing organizations to mix and match different services to achieve the highest levels of performance, maximum utilization of existing assets and create an environment that meets the various imperatives – legislative, economic, and regulatory.

For existing organizations, a hybrid approach can deliver several benefits;

- Flexibility – It gives an organization the ability to retain specific parts of their IT infrastructure while moving some aspects (archiving or disaster recover, for example) to the Cloud. Hybrid essentially adds flexibility onto existing infrastructure.
- Maximizing ROI on Existing Infrastructure – Hybrid allows organizations to continue to utilize their existing infrastructure while moving excess workloads or specific parts of their operation to the Cloud.
- Compliance – A hybrid approach acknowledges the fact that some organizations in particular industries wish to retain particular workloads on-premise or on dedicated infrastructure.

These benefits illustrate what can be seen as a “sliding wedge” concept for Cloud Computing. The pure, Public Cloud is not a great fit for some use cases today, and so many work loads are still being conducted in-house or on dedicated infrastructure with service providers. Over time, however, more and more use cases will shift to the Cloud, with the Hybrid approach of mixing Public Cloud and other technologies gaining traction. This concept is represented by the diagram below;



When to Use Hybrid Cloud

If the use cases for both Public Cloud and Private Cloud are fairly clearly defined, the use case for Hybrid Cloud can be seen as an amalgam of those two. Specific situations where a Hybrid approach is best include;

- Where the organization has legacy applications that do not make sense to move to the Cloud
- Where compliance requirements create a demarcation between what can be stored on the Public Cloud and what must remain on dedicated servers
- Where peaks in traffic (after specific marketing campaigns for an example) demand that traffic be “burst” to the Cloud
- Where the cost of having backups on-premise for disaster recovery is prohibitive
- Where web applications require high database performance but need to

scale via the Cloud for web serving

- Where organizations wish to prototype applications cheaply before deploying them on in-house infrastructure
- Where avoiding vendor lock-in is a primary concern

Conclusion

Cloud Computing is, as we have said previously⁷, a revolution for IT. While the Cloud may be a revolution, however, many organizations are taking an evolutionary approach to Cloud Computing, opting for a gradual and incremental move to a Public, Private or Hybrid Clouds based on their specific requirements. This gradual approach will ultimately deliver the best combination of agility, price and compliance for particular organizations.

While Public Cloud may be seen as the “purest” Cloud Computing approach from a conceptual perspective, we accept that for some organizations a Private Cloud implementation that gives them higher levels of certainty and control, may deliver many of the benefits of Public Cloud. For organizations further along the Cloud Computing continuum, adopting a Hybrid Cloud approach has become an attractive proposition for those wanting to take advantages of the benefits of the Public Cloud while maintaining the performance, compliance and security of dedicated infrastructure.

There are many ways to move to the Cloud. Ultimately, each organization must make their own determination of the best technology fit for the needs at hand. After a thorough assessment of technology needs, some combination to Public, Private and Hybrid Clouds should be considered.

About Diversity Analysis

Diversity Analysis is a broad spectrum consultancy specialising in SaaS, Cloud Computing and business strategy. Our research focuses on the trends in these areas with greater emphasis on technology, business strategies, mergers and acquisitions. The extensive experience of our analysts in the field and our closer interactions with both vendors and users of these technologies puts us in a unique position to understand their perspectives perfectly and, also, to offer our analysis to match their needs. Our Analysts take a deep dive into the latest technological developments in the above mentioned areas. This, in turn, helps our clients stay ahead of the competition by taking advantage of these newer technologies and, also, by understanding any pitfalls they have to avoid.

Our Offerings: We offer both analysis and consultancy in the areas related to SaaS and Cloud Computing. Our focus is on technology, business strategy, mergers and acquisitions. Our methodology is structured as follows:

- Research Alerts
- Research Briefings
- Whitepapers
- Case Studies

We also participate in various conferences and are available for vendor briefings through Telephone and/or Voice Over IP.



About Rackspace

Rackspace Hosting is the world's leading specialist in hosting and Cloud Computing. The San Antonio-based company provides Fanatical Support® to its customers, across a portfolio of IT services, including Managed Hosting and Cloud Computing. Rackspace is also the founder of OpenStack™, an open source cloud platform with broad industry support, designed to offer cloud consumers greater choice. For more information, visit <http://www.rackspace.com>.



About the Author

Ben Kepes

Ben is the founder and managing director of Diversity Limited, a consultancy specializing in Cloud Computing/SaaS, Collaboration, Business strategy and user-centric design. More information on Ben and Diversity Limited can be found at <http://diversity.net.nz>

Endnotes

- [1] http://www.zdnet.com/blog/saas/private-cloud-discredited-part-1/1204?tag=mantle_skin;content
- [2] <http://www.nist.gov/itl/cloud/>
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