



# Cloudy with a Chance of Confusion

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The term “cloud computing” continues to dominate conversations with IT managers. As a result of the fervor, there has been a multitude of articles and white papers published about cloud computing over the years. The objective of this white paper is to take a simple approach and describe the benefits of cloud computing and clarify for the reader the different shapes of cloud computing. It will focus on what it takes to eliminate the potential pain of transformation to cloud computing and why initiatives such as virtual private clouds are gaining popularity. While cloud computing elicits a broad range of topics and concerns, this white paper will focus on cloud architectures that address computing infrastructure, or Infrastructure as a Service (IaaS) rather than Software as a Service (SaaS) cloud computing.

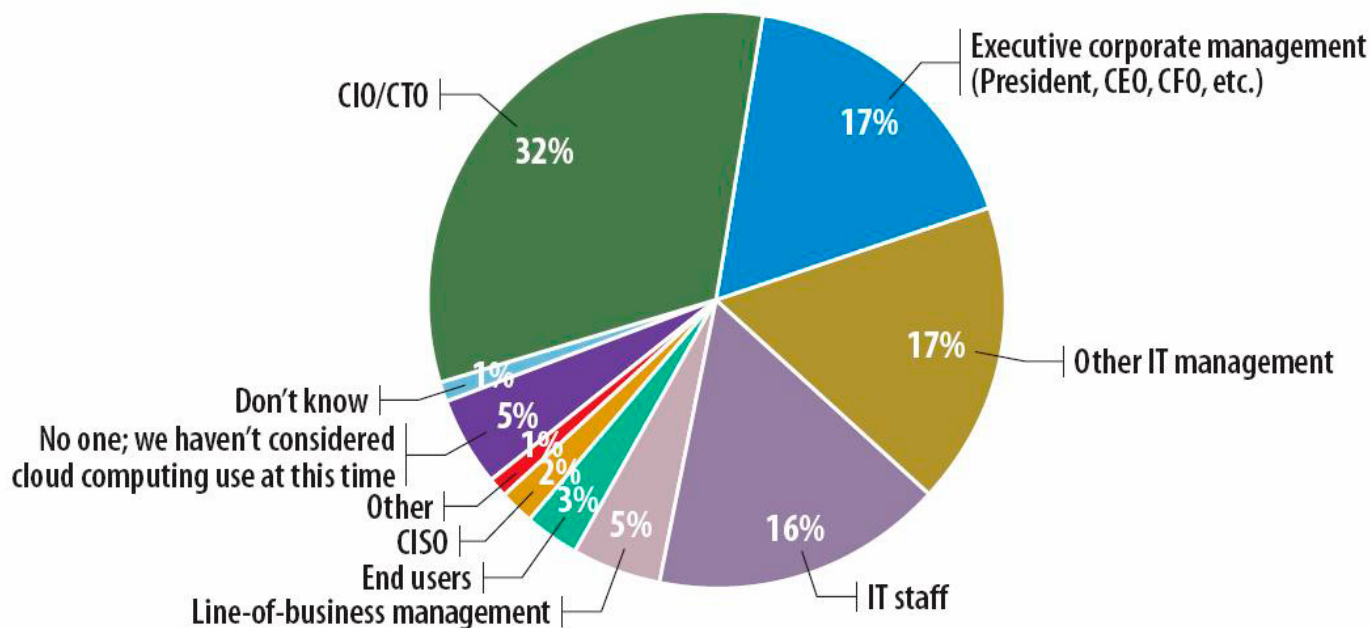
CIOs, IT managers and business executives are dealing with the challenge of keeping up with technology changes to meet the increasing demand from business units for IT functionality and from CFOs for decreasing IT budgets. These challenges are currently being addressed through cloud computing to achieve flexibility and scalability in managing IT applications and infrastructure.

Many businesses are still reluctant to make the leap into cloud computing. As an example, Figure 1 displays the results of a recent *InformationWeek* survey asking the question: “Who within your organization played the most significant role to not use cloud computing?” The survey identifies the CIO/CTO as the leading dissenter.

Figure 1

## Primary Cloud Computing Dissenter

Who within your organization played the most significant role in your organization’s decision not to use cloud computing?



Base: 114 respondents at organizations not using nor evaluating cloud computing

Data: *InformationWeek Analytics* Cloud ROI Survey of 393 business technology professionals, April 2010

What we can conclude from the survey is that corporate management, especially CIOs, are still hesitant and slow to migrate to cloud computing. Legitimate concerns exist with any new technology trend or platform. CIOs are not completely sold on the value of cloud computing and how it fits into the company's IT plans. Transformational IT change can be difficult, but the truth is, today's mobile works and interconnected IT environments demand new approaches to delivering business applications. Cloud computing will move to the forefront of the market not just as a buzz word, but will provide significant benefits to companies that embrace it.

### WHAT IS THE DEFINITION AND WHAT ARE THE TYPES OF CLOUD COMPUTING?

Not all clouds are created equally and there isn't a universally agreed upon definition of cloud computing. Technology is constantly evolving. Just like what mother nature provides with a variation of clouds in the form of cumulus and stratocumulus, there are various types of cloud computing scenarios. The objective is to select the right cloud to meet your business needs.

Before making the decision to move to cloud computing, let me start with a basic definition:

Wikipedia states it plainly: "Cloud computing is Internet-based computing, whereby shared resources, software, and information are provided to end user computers and other devices on-demand, like the electricity grid." According to Gartner, the National Institute of Standards and Technology, Information Technology Laboratory (NIST) defines cloud computing as "a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction."

The following are various types of cloud environments: Public, Private, Dedicated and Hybrid offerings. They all share many of the same characteristics but their differences are dramatic. These cloud environments are defined below using a real estate analogy to describe their differences.

**Public Cloud Environments** – Public clouds are built by providers that want to leverage the scale of large server farms and the Internet to bring "on-demand" computing to the masses. User organizations relocate resources such as data, applications and services to computing facilities outside their corporate firewall to these providers. End users then access these services via the Internet, which is shared with other companies. If you go to a public cloud as a subscriber, a service provider will use the Internet to deliver that service to you. Google, Microsoft and Amazon are familiar examples of public cloud providers. Acquiring computing assets from a public cloud is quite simple as it typically only requires a user to sign a "shrink wrap" agreement and provide payment via a credit card. Public clouds appeal to both large and small businesses as well as individuals.

Think of the public cloud as a hotel. A person desiring to spend a night or more in a hotel is looking for a "multi-tenant" facility. To gain access to this facility one only needs to book a reservation, sign their standard agreement and provide for payment with a credit card. The service is on-demand; you can have a room when you want, for as long as you want. When you no longer need the room, you can terminate your relationship. Also, analogous to the public cloud, all access to the hotel and rooms are available to the public.

**Private Cloud Environments** – The industry private cloud definitions vary, but frequently include characteristics such as "on premise, behind an enterprise firewall." Many providers, such as Managed Service Providers (MSP), can provide these characteristics by securely extending the enterprise's network into the MSP's premise, providing the benefits of

*A new style of cloud is now emerging in the market. A dedicated cloud belongs to a single customer, but is being hosted and managed by a provider. This provider has created a private virtual server farm using servers dedicated to only that one customer; no other customers run virtual servers within that farm. Like the private cloud, access to the dedicated cloud can be through either the Internet or extensions to their private network.*

cloud computing in a private, secure setting. Like a public cloud, a private cloud is built by providers who want to use the scale of server farms to bring “on-demand” computing to their customers. However, private clouds are different than public clouds in that there is a negotiated agreement (contract) established between the parties which formally defines the services and commitments between them. The customer is often required to define the length of the agreement, along with a minimum quantity of assets required. The service provider must typically agree to certain service levels, including systems availability.

Again, using our analogy, think of private clouds as an apartment complex. A person desiring to live in an apartment is looking for a multi-tenant facility. However, different from a hotel, they would need to sign a negotiated agreement (lease) committing them to a minimum term. The fees are paid monthly under the terms of the agreement. Additionally, access to their apartment is restricted to the lessees and their guests, though a private cloud offering does provide for some level of on-demand expansion and or contraction of the computing environment.

*Migrating to a cloud computing environment can provide organizations access to new services and applications, increased processing capacity, collaborative capabilities, and managed services such as security, data backup and restoration. These services are all on demand and at costs often below what individual organizations can achieve.*

**Dedicated Cloud Environments** – A dedicated cloud belongs to a single customer, but is being hosted and managed by a provider. This provider has created a private virtual server farm using servers dedicated to only that one customer; no other customers run virtual servers within that farm. Like the private cloud, access to the dedicated cloud can be through either the Internet or extensions to their private network. While the server farm is not shared with other customers, the service provider may provide storage and backups utilizing storage area networks and backup devices shared by many customers.

Using our analogy, the dedicated cloud is similar to a person wishing to rent in a gated community. This individual is looking for single-tenancy, pre-existing security and other services. Again, they enter into a negotiated agreement (lease), which defines the minimum term and payment is usually made monthly. While their formal living space is not shared with anyone else, there may be common areas provided that are shared (e.g. clubhouse, workout space, swimming pool). Again, as with the private cloud, this analogy differs when it comes to the on-demand concept as providers can often add additional capacity to a virtual private server farm at will to expand the dedicated cloud environment.

**Hybrid Cloud Environments** – These types of clouds combine the features of public, private and dedicated clouds to deliver a single hybrid cloud solution. Using a hybrid cloud platform enables organizations to delegate tasks with specific security or other concerns to a private or dedicated cloud while letting all public operations go to the public cloud segment.

## **BENEFITS OF CLOUD COMPUTING FOR IT INFRASTRUCTURE**

So why the cloud? There are a multitude of benefits that support considering migrating to cloud computing. As an example, migrating to a cloud computing environment can provide organizations access to new services and applications, increased processing capacity, collaborative capabilities, and managed services such as security, data backup and restoration. These services are all on demand and at costs often below what individual organizations can achieve. Cloud computing offers flexibility due to the fact that business applications can be applied to different cloud deployment models whether you choose public, private, or hybrid.

In addition, other benefits to be considered are:

**Strategic Focus** – Is it your company’s objective to support servers and their applications as a core competency? If not, cloud computing provides a scalable infrastructure and capabilities available as services. By having the ability to access technologies available as a service instead of owning and managing all IT systems, companies can invest more of their time and resources in focusing on what truly differentiates them from their competitors.

**Ease of Implementation** – Cloud computing can be a big timesaver. Without the need to purchase hardware, software licenses or implementation services, a company can get its IT infrastructure initiative off the ground in record time and for a fraction of the cost of an on-premise solution. Companies can save numerous hours in implementation time.

**Cost Reduction** – Operational expenses are reduced with cloud computing due to the fact that you pay only for what you use and costs are directly proportional to your requirements. In addition, transitioning your needs into the cloud can greatly reduce capital expenditures because you don't need to buy the computing assets. For example, the huge sums of capital that would traditionally be invested in hardware, software and labor would shift to recurring operational costs that are tied more closely to the actual use of computing resources from the cloud provider. Cloud providers can be more efficient at IT operations, using fewer staff hours for standard tasks. They can also negotiate better pricing on hardware because they buy in such high volume.

*The cloud selection process is not to be taken lightly. Companies should consider a variety of implications and tradeoffs carefully before making a move to the cloud. Prospective cloud customers should take into account the criticality of the software, data or services in question and how they will be protected.*

**“Anywhere” Secure Accessibility** – Cloud offerings can provide “anywhere” secure accessibility by delivering secure remote access to the cloud applications and resources. By enabling access from managed (corporate PC) and unmanaged (kiosk or home) PCs and mobile devices, companies improve employee and partner productivity. Secure access gateways integrate intelligent access policy enforcement with a variety of connectivity options including SSL, VPN, and Direct Access, with encryption. The gateways improve the security of remote access scenarios by enforcing granular access controls and policies that are tailored to the cloud applications being published, the identity of the remote user, and the health status of the device being used to access the cloud. For example, the access gateway policies may verify the virus control or patch status of the access device and deny or limit access based on the results. The secure gateway solutions may interact with the enterprises' authentication directory, minimizing account management effort and enabling a variety of strong authentication methods.

**Staffing Costs and Skills Reduction** – Cloud computing can significantly reduce staffing required to support IT. As an example, cloud computing provides access to skills and capabilities without having to train internally. With cloud computing, companies no longer have the staffing and skills requirement to set up, configure, and maintain the technology as well as the supporting infrastructure. This can be a major benefit for smaller organizations and startups that are typically scarce in resources and skills.

**Scalability** – One of the most challenging and costly aspects of managing an IT environment is capacity management and planning. To meet business demand, organizations typically over-engineer systems and provide more computing ability and network resources than required. With cloud computing, IT departments that anticipate an enormous increase in business demand need not scramble to secure additional hardware and software. Instead, an organization can add and subtract capacity as its demand dictates.

**Flexibility/Agility** – Cloud computing enables companies to be more responsive. In addition, companies are selecting and integrating some cloud services into their existing IT environments to supplement internal resources for short term projects and to add new capabilities providing for rapid re-provisioning of resources as business needs change.

**Disaster Recovery/Business Continuity** – Cloud computing can be used effectively for disaster recovery and business continuity, an area where most businesses are vulnerable. Cloud computing offers a cost effective means of meeting needs for data protection in a way that reduces the cost of infrastructure, business processes and applications. The result is a reduction in capital and operational expenses and reliable availability of IT systems for business continuity.

### ***INHIBITORS, BARRIERS, CONCERNS AND MYTHS ABOUT THE CLOUD***

There are typically inhibitors, barriers, concerns and myths associated with the implementation of something new. As an example, the Information Systems Audit and Control Association (ISACA) provided results of an online survey that attracted 1,809 responses from their members. Forty-five percent of the participants felt that the risks of cloud computing outweigh the benefits. Moreover, only 10 percent of the respondents planned to use cloud computing for mission critical services and 26 percent had no plans to use cloud computing in any form whatsoever.

As with any new model of IT services delivery, CIOs and IT managers will take some time to become familiar and comfortable with the adaptation of cloud computing. Various sources have identified the following potential risks:

**Security** – Keeping data private and secure in a cloud setting is typically the number one issue that concerns IT managers. The reality is the expertise and security levels that cloud providers can deliver far exceed what average companies are capable of deploying themselves. Cloud vendors employ experienced security professionals who implement and support robust solutions with intrusion protection and detection, including external penetration assessments. Access to the cloud offerings is managed through secure gateways that leverage secure SSL based access and encryption. They provide infrastructure in hardened 24/7 manned facilities with N+1 redundant infrastructure, and perform routine audits and assessments such as SAS70 and PCI. Most companies cannot compete and provide this type of security infrastructure on their own.

**Losing Control** – Experienced cloud vendors offer their services in such a way that customers still have access to the systems and have unrestricted administration rights if needed. I would argue the control is an illusion anyways. In a proper cloud offering, you have more control because you can ramp up infrastructure or ramp down infrastructure quickly to compensate for change. You can respond to changing demands quickly. There is an emotional attachment to physical servers and in order to be successful in a cloud environment you have to be able to get over not having your hardware on-site.

**Performance** – Leading cloud service providers have designed highly redundant and resilient IT architectures that enable nearly always-on availability. A cloud provider should be architected to offer constant availability and have rigid service level agreements that back up their assertions. They must be set in stone, well-documented, and protect against all possible risks to downtime. Cloud providers are critically aware of this risk and have pushed their technology partners to develop highly resilient systems and software to mitigate it.

**Connectivity** – Both cloud users and providers are responsible for maintaining adequate Internet access. This involves multi-homed Internet service and putting proper protections in place to deal with vulnerabilities. Although cloud providers have data backup and recovery procedures, these procedures should be tested, at least annually, to ensure they meet the recovery needs of your business.

**Regulatory/Compliance** – Companies have regulations and standards that must be adhered to with regard to data privacy and protection. The cloud provider must take appropriate actions to ensure the security and integrity of the data, such as developing a security policy, auditing, ensuring that proper controls are in place and performing risk assessments. Partnering with the right cloud provider can substantially reduce the headache of managing and ensuring compliance by providing an audit trail of all activity across applications. Reports must be made available at all times and involve minimal input from company resources.

**Culture** – Cultural resistance can also play its part in preventing a company's successful migration to cloud computing. As an example, how willing are the various departments to embrace the cloud computing concept and its benefits? Will more traditional IT departments, particularly in larger organizations, readily want to swap their hardware and applications? How do executives feel about moving to a different way of having company information outside of the corporate firewall? The solution requires a top down mandate for implementation.

### AREAS TO CONSIDER IN THE SELECTION PROCESS FOR CLOUD INFRASTRUCTURE

The cloud selection process for infrastructure computing is not to be taken lightly. Companies should consider a variety of implications and tradeoffs carefully before making a move to the cloud. Prospective cloud customers should take into account the criticality of the software, data or services in question and how they will be protected. There can be unique issues associated with cloud computing and the ability for the cloud to meet business requirements. For example, if you are considering a cloud-related option involving mission critical systems, regulated personal data or sensitive business intelligence, you may opt to require a private cloud with data encryption, geographic restrictions and other such requirements.

Example: Mark Davenport, the Director of IT for Bosley states as a part of the selection process he looks for a vendor that gives him the ability to increase their service levels and stabilize their disaster recovery environment. His choice was to select a vendor that provides a cost effective solution with VPS (virtual private servers) and make them a necessary strategic IT provider for Bosley. He confirms that the type of cloud you select should be based upon the business problem you are trying to solve to ensure the right results are achieved.

There's no one-size-fits-all cloud model, and organizations need to evaluate a vendor for its understanding of the issues faced by the IT staff as well as business management. Selecting the right cloud services provider is a critical step to ensure that they can deliver on the promises offered by cloud computing. The objective is to select low-cost access to expert guidance and highly tailored powerful business applications. The bottom line is that you must choose wisely to achieve the full potential of the benefits.

### THE WRITING IS ON THE WALL

Let's face it – the writing is on the wall for IT executives when it comes to developing and implementing their information technology strategy. Cloud computing represents a fundamental shift in how companies pay for and access IT services. Gartner predicts that by 2012, 20 percent of businesses will own virtually no IT assets. That will be a game changer, for better or worse, for companies as well as cloud computing and outsourcing vendors of all types.

Cloud computing, while quickly evolving, can offer IT departments a powerful alternative for delivering applications. Cloud computing promises scalable, on-demand resources, reliability and overall flexibility. It offers IT departments a way to increase capacity or add capabilities on demand, without investing in new infrastructure, training new personnel, or licensing new software. At a time when technology costs are being driven up by new or expanded IT requirements, IT budgets are coming under increasing scrutiny. Ask any IT manager and they will justify the importance of the technology required to support their business needs and advocate that the equipment be hosted in a highly reliable data center with sufficient capacity to meet peak and growing loads.

We have established that cloud computing is a concrete solution to make IT infrastructure available on-demand without management headaches. The question then is how to determine which services need to be put in the cloud and how to go about doing that. You must first assess what your needs are and then choose the best cloud solution and provider based on those business needs. The next consideration is cloud architecture components and finally transitioning to your new cloud environment. Before businesses get caught up in a full-blown cloud transition, it's important to understand what issues cloud computing solves and how difficult the transformation can be without a clearly defined objective at the outset.

As the demand for more computing power continues to grow, while the cost of running the data center continues to rise, more attention is paid to the impact of carbon dioxide emissions on the environment. What will be your plan to address these concerns? There are signs that big storm clouds are brewing in managing information technology and action is required to pick the right cloud environment to support business requirements. How innovative is your organization in its ability to provide the leadership and knowledge to map a course to conquer the cloud? Selecting the right option can deliver on the promises offered by cloud computing: low-cost access, low maintenance, and highly tailored, powerful business applications.

### **ABOUT THE AUTHOR:**

Fred Mapp is a consultant and motivational speaker with more than 40 years of experience in IT. Fred is a Board Member of GEOS Communications, on the Advisory Committee for the Arizona IT Symposium 2011, a guest speaker for the Uptime Institute Symposium 2010, and a moderator for the Global Sourcing Symposium 2010.

He is presently president of his own consulting business, Quality Service Solutions, which focuses on helping companies identify their business requirements and developing processes for the implementation of key technology products and services.

Fred Mapp served as CIO at various Fortune 100 companies. He has held key positions at IBM, InfoSpan Corporation, American Express, Honeywell, AMD and the World Congress on Information Technology.

He is author of the book, *Mapping Information Technology to Your Business*.

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