Simplify Your Journey to the Cloud

Cloud signals the advent of a fundamental revolution in the IT industry—promising infinitely flexible capacity, available almost instantly, and at very cost-effective prices. This enables organizations to differentiate fast and pursue opportunities at margins that previously could not be explored.

All the major players in the IT industry, the pure Internet players and telco operators have developed their own Cloud offerings. Alliances have been formed to prepare and position for Cloud, which now covers the entire IT landscape and value chain. This array of alliances within the industry has, along with the lack of an agreed definition, created a diverse range of interpretations of the terminology, purpose and benefits of Cloud Computing. This has led to confusion around the subject of the Cloud, and as a result, most CxOs do not clearly see the benefits and risks associated with the Cloud. However, Cloud can bring a wealth of benefits to the organization and provide the catalyst to bring the CIO closer to the business as a true business enabler, instead of traditional service provider.

So is Cloud the promised 'revolution' that will radically change the IT services delivery model? What is clear is that Cloud Computing and the Cloud Services that it enables, are here to stay and growing rapidly—both in the breadth of services that are available and also in the number of adopters.

In addition, new concepts (such as Services Assembly) are helping organizations evaluate and migrate to new Infostructure solutions that are robust, secure and well governed, and that are financed from a more flexible operating budget, as opposed to capital investment.

This document clarifies the value and the impacts of Cloud Computing specifically—discussing technical and non-technical issues that organizations face, and highlighting the strategies that organizations may adopt during their migration to Cloud Computing.

The Origins of Cloud

The underlying concept of Cloud Computing can be traced back to 1960, when John McCarthy predicted that "computation may someday be organized as a public utility." But it was not until the 1990s that we started to see the first adoption of Cloud—as a networking infrastructure resource. Telecom companies replaced expensive point-to-point Virtual Private Networks (VPNs)—enabling them to share the available physical infrastructure with multiple customers. The customer benefited from economies of scale, and since their responsibility ceased at the boundary of the Cloud, they did not need to understand or know how the communications were routed—that was the responsibility of the telecom provider. Customers could therefore focus on ensuring that the correct service levels were being provided rather than devoting resources to understanding, supporting and maintaining the hardware and infrastructure.

In the late 1990s and early 2000s, core servers and networks (the Internet) also began to be provided as a utility.

Services Assembly describes bringing together best-in-class SaaS providers on an integration platform, allowing them to be purchased in a compliant way by IT, yet offered to business users as flexible, customizable Enterprise Application Stores™.

It was at this point that Cloud Computing and Cloud Services (as we know them today) were born, with companies like Amazon, Salesforce.com and Google using the term 'Cloud' to describe how computing services could be delivered to multiple customers simultaneously, with the only boundaries being the Internet connection at their desk or the socket on the wall.

The key technological enabler for Cloud has been the advent and more recent rapid adoption of virtualization technologies. They decouple the one-to-one relationship between applications and hardware, with grid computing enabling large numbers of servers to be banded together. Services can be easily and automatically provisioned on-demand from this virtualized set of physical resources. The high utilization rate of these servers keeps cost down and makes the model economically possible, while innovative measurement and charging mechanisms have allowed the significant cost savings to be passed on to customers. In addition, the increase in Internet connection speeds has enabled larger amounts of content to be sent to distant locations at low cost. Now, for many organizations, Cloud Computing and Cloud Services are viable and attractive options.

Defining Cloud

In simple terms, Cloud could be described as delivering IT services on a subscription basis that can be accessed from any Internet connection and offering customers the benefit of economies of scale.

There are five key attributes that define Cloud:

1. Offered 'as a service'—and ready to use;
2. Rapidly scalable—available on demand, with the ability to add or remove resources as required;
3. Shared—multiple customers sharing the same resources and underlying infrastructure;
4. Pay-per-use—a metered service that can be provided through different pricing plans;
5. Web-enabled—provided using Internet-based technologies.

Available Cloud Services

There are a wide range of Cloud Computing and Cloud Services options available, from very simple consumer applications such as Twitter or Google Mail, to the full range of business applications, including CRM, ERP and HR solutions. Because of this wide range of options, organizations can adopt Cloud across their entire IT landscape.

To assist in trying to categorize these services, Cloud has been sub-divided in to three levels, which constitute 'The Cloud Stack'—from visible software, to the platform on which software runs to the often invisible infrastructure (see Figure 1). These can be chosen by users as individual services (a piece of software, for example), or combined to form a fully Cloud-enabled environment.

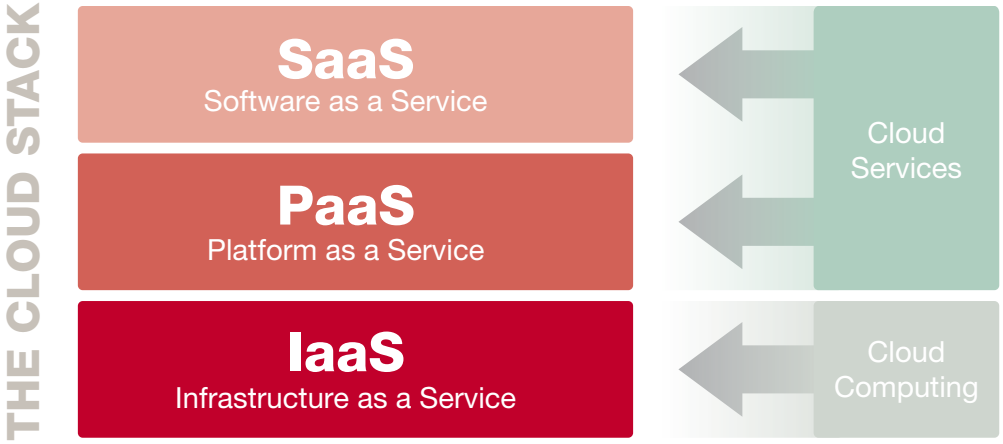

Figure 1: The Building Blocks of Cloud

1. Software-as-a-Service—SaaS: Corporations access applications over a network. These applications, though shared between many customers, are tailored to each client's needs and priorities. The focus being on tailoring the service to the client's needs rather than the service being tailored to the technology. SaaS, like the other Cloud Services, is being adopted to avoid large-scale capital expenditure, to provide the ability for an agile and rapid deployment and to pay only for what is needed, when it is needed. It is best used when there is a demand for a non-bespoke software solution, for which the demand may not be known, be unpredictable and variable, or needs to be provisioned very quickly. Examples: Salesforce.com, Microsoft BPOS, Netsuite, Eloqua (eMarketing), Demandware (eCommerce), and Crownpeak. Google Maps can be seen as an application and also as a platform that enables usage in other applications.

2. Platform-as-a-Service—PaaS: Corporations use virtual software development environments to create and then run their own applications on the Cloud. PaaS is particularly beneficial, again for many of the reasons above. However, its other major advantage is the ability for a CIO to provide a consolidated 'store' for development. In many organizations, small departmental solutions, such as access databases, Excel solutions, etc., are deployed 'under the radar' of the CIO and the IT department. In addition, many IT departments are simply unable to service the seemingly never-ending number of business requests. By providing a development service where costs can be controlled and managed, an IT department can provide the organization with a development environment that can then be monitored and controlled. Then, as and when appropriate, some of these applications could be transferred to a SaaS solution or incorporated in an existing software solution. Examples: Microsoft Azure, Force.com, Google App Engine, and Yahoo Pipes.

3. Infrastructure-as-a-Service—IaaS (or Cloud Computing): Corporations access shared processing, network, storage and other fundamental computing resources, and these capabilities are offered like a commodity over the Internet. IaaS is attractive in many instances, including when large amounts of compute power are required for short periods with little notice, or for temporary project environments. In addition, many organizations have huge amounts of archived data stored or backed up to expensive, dedicated systems (whether in-house or outsourced). Online storage is an extremely economic alternative. This model is best seen in services provided by Amazon (via Amazon Web Services), Sun, and by solutions provided by the VCE alliance (VMware, Cisco, and EMC); alternative offers are delivered by companies such as 3Tera and Liquid Computing.

The term Infostructure describes the convergence of the applications portfolio, the infrastructure and the data, as they begin to be provisioned as virtualized services using the Cloud.

Understanding Which IaaS Cloud Computing Architecture is Right For You

It is important to carefully consider the right environment as part of any infrastructure upgrade. There are three different models, through which Cloud Computing is provided to the customer:

Public Cloud: Resources are shared and sold over the Internet among all clients, who share the same mega-scale infrastructure. Users can purchase a virtual computer and pay by the minute; they have no knowledge of the computer's physical location, the hardware that runs it, or the other users that share the hardware they are using. Google, Salesforce.com and Amazon are probably the best-known providers of services delivered over the public Cloud. Primary client concerns with using the public Cloud revolve around security, governance and integration. Identifying the business applications that are suitable, building the Cloud-enabled bridge in the existing infrastructure, and giving the business the understanding and confidence to use these services are key success factors.

Private Cloud: Resources are operated solely for an organization, although they are as flexible as in the public Cloud example above. This usually takes the form of a third-party hosting provider selling Cloud Services. In this model, the user knows the location of the hardware and sets the access rights and security policies; purchases the computing capacity on a flexible by-the-minute or by-the-megabyte basis, and can scale requirements up or down. Care should be taken with Private Cloud in understanding the Total Cost of Ownership, since the opportunity to share the infrastructure costs, on-going maintenance and support with several customers is lost.

A slight modification of this model is the Community Cloud, where a group of organizations who agree on common parameters and membership share a private Cloud. Organizations with sensitive data, or concerns about other organizations and users they would need to share a public Cloud with, can reap many of the benefits of Cloud by building their own or buying capacity from a private Cloud provider.

Hybrid Cloud: Mixing different Clouds, typically to adjust the level of service and security between different applications. An example of this could be using a private Cloud for highly sensitive mission-critical applications and placing less-sensitive applications on a public or community Cloud. The hybrid Cloud will become the most efficient model for most organizations, combining the flexibility of Cloud with the security of certain data on a private or community Cloud and the low price of the public Cloud.

What Benefits Does the Cloud Computing Model Bring?

Cloud Computing is driving an unprecedented shift in the way IT and the wider organization work together. If harnessed properly, it can enable the customers of the IT department to focus on delivering business outcomes using resources that are easily varied, customizable and scalable.

While most of the industry has been built on a Capital Expenditure (CAPEX) model, where organizations invested significantly upfront, the Cloud model is based on an Operating Expenditure (OPEX) model with faster time-to-benefits. This change in business model will affect all parties, but, in particular, the software publishers, hardware vendors and systems integrators who will need to adapt the fastest. By radically changing an organization's infrastructure, Cloud can help organizations bring new products and new markets to consumers faster, shorten time-to-market, lower TCO, and enable a better user experience.

At its core, Cloud offers standardization, flexibility, and business model innovation, changing the competitive landscape within an industry and lowering barriers to new entrants on a global scale. For example, setting up the infrastructure required to launch a new business is easy with Cloud Computing—all that is needed is a fast, stable Internet connection and you can have a full suite of business services almost instantly. More risk can be taken, owing to lower cost, and as the business case need not be as rigorous, this unleashes the power of innovation.

Cloud Computing can speed up transformation and performance gaps that require support from IT services. Therefore, Cloud Computing may allow for rapid corporation reconfiguration at times when companies need to be able to adapt their organizations and delivery models globally to meet market evolutions and change.

For example, launching a new website for a product, for which demand is not yet known, can be done very quickly and cheaply using Cloud, thus reducing the usual product-to-market cycle time.

Cloud Computing can significantly reduce IT costs by providing access to an on-demand pool of shared resources, providing significant economies of scale. Furthermore, the pay-per-use model lowers the initial investment and the associated CAPEX and reduces the risk of over-investment. For example, most traditional compute environments are built to handle peak demand. Cloud allows the peaks to be purchased on-demand, with only the time or capacity actually used being charged for.

Due to Cloud elasticity and automatic scaling, it offers an optimal user experience with minimal impact on infrastructure, and no loss of performance if a site is visited often. For example, this can help ensure no service degradation during busy peak periods such as Christmas.

Security is often raised as a concern when discussing the adoption of Cloud Computing. The Cloud providers' business is dependent on good security, as any failure could lead to loss of confidence and customers en-masse. As a result, the security access and data protection measures in place with Cloud providers typically far exceed those measures that a single company could deploy.

These benefits clearly imply changes to the business models and relationships that organizations have with their outsourcing partners. Where it is critical that the business is in full control of application and data location, and the physical ability to access hardware and strict SLAs, it is likely that traditional outsourcing models will continue to play a strong role in providing these services more cost-effectively than on-premise solutions.

However, two things are likely to change. First of all, if the business is able to separate out applications and data that do not have the strict requirements described above, they can take advantage of the cost benefits available from moving some applications and/or data to the Cloud. Secondly, outsourcing providers will increasingly be prepared to adopt some of the utility-charging characteristics as Cloud Services, allowing greater flexibility in OPEX.

The Risks and Pitfalls of Cloud Computing

There are many risks and pitfalls—both real and perceived—on the journey to the Cloud. These are largely associated with not fully understanding the concept, architecting the right solution, ensuring that security is appropriate, governance is in place, and procurement is carefully managed. The majority of these pitfalls can be overcome with the correct experience and knowledge of both the technologies involved and the organizational needs, as well as education, change and stakeholder engagement—critical elements to enable a convincing and effective Cloud Computing solution.

Some key issues to consider include:

Provider Lock-In: It is important to understand the duration of the contracts you have in place. Plan an exit strategy from the start and commence negotiations long before expiry of the contract. If you have a set of integrated services, understand the reliance on each contract. Avoid one service committing you to extending several other contracts.

While today it is easy to switch mobile phone providers, unfortunately at present the ease of switching Cloud providers is still largely untried, so avoid one-sided negotiations and have a plan to switch if necessary. Important here is strong due-diligence, knowledge, and relationships with the best-in-class Cloud Computing providers to ensure their ability is guaranteed before using the service. As the market becomes more competitive, we would expect the transition between service providers to become easier.

Data Security: Having your own information, on your own hardware and between your own four walls, provides a level of comfort that one loses in the Cloud. This is not to say that Cloud Computing is necessarily insecure, just that new considerations need to be taken into account and more modern security models developed and applied. We must avoid reliance on firewalls and, as indicated above, consider end-to-end security, including your own internal procedures like password control and maintenance. It is also important to highlight that data extraction is usually relatively straightforward—often being in the form of a CSV file. So care should be taken with access rights.

Compliancy/Regulations: Many regulations prevent using the Cloud as-is, for example, the SAS70 requirements under the Sarbanes-Oxley Act of 2002. SAS70 seeks to ensure that organizations are able to prove the validity of the controls in place within a third party service provider, not just those within their own organization. Also, extra agreements are needed to make it possible to apply the laws about personal and financial information to the Cloud provider. A detailed understanding of the provider's Cloud architecture is needed to ensure this is covered, along with a careful appraisal of information and regulatory factors relevant to the jurisdiction in which the organization operates, or against its own corporate guidelines, if more stringent.

Service Level Agreements: Some allowance for downtime is routinely accepted in the contracts with Cloud providers. If the SLA is not met, it is difficult to reclaim losses over and above a refund of the fees charged by the provider. It is also not usual to modify standard contractual arrangements, especially if Cloud Computing is being purchased by the business users and not IT.

Customization and Service Assembly: The ability to assemble and customize multiple Cloud Services from different providers in a flexible, changeable way, while maintaining security, backup, and governance mechanisms, also requires specialist skills and experience. This assembly of services will mean that applications using them will need to become more 'loosely coupled'—programmed to act with an integration layer, not the underlying hard-coupled piece of hardware.

Backup/Recovery Entrusted to Vendor: Information is an important asset in every company. Can you trust your Cloud provider? What happens with your data if it is hosted in another country? It is imperative that organizations have agreed and clear processes in place and fully understand where and how their data is stored. If the data or service is of significant value, then consider joint saving arrangements in the event of a major disruption in service.

Higher long-term cost: If a new product or service that your organization launches using Cloud is very successful, some of the stated cost benefits of Cloud may not apply.

In some circumstances it could be cheaper to have your own data center. In this case, proving the concept using a fully-scalable architecture such as Cloud could still be justified. The service can be launched quickly and market tested in a low-risk way, before a data center is built as a longer-term solution with a more proven investment case.

Moving from a traditional architecture to a Cloud-enabled architecture requires a new set of skills and processes, with which organizations may need help with in the short-term. It is recommended that organizations explore the opportunities and test elements of Cloud Computing as soon as possible, to build experience and confidence. In areas such as backup, small percentages of peak application demand and disaster recovery solutions can be low-risk areas to start.

Asking the Tough Questions

There is no doubt that Cloud presents a significant opportunity, but it also presents some key questions for the organization and especially for the CIO, which deserve careful consideration and discussion. These may include:

- Does the enterprise business model align with the features of Cloud Computing?
- What is the size of transformation necessary?
- What functions should be tested first using the Cloud Computing model?
- How do we train our IT staff and customers of the IT organization?
- What is the business case and benefits tracking framework to prove the case for investment to the business and that the return is being realized?
- Is our estate already consolidated, virtualized and Cloud-ready?

By planning carefully before investing, organizations can fully understand the depth and breadth of change needed, be clear on the technology chosen and how this will integrate and affect existing systems, and prepare their organization for their journey to the Cloud.

The Silver Lining

The principles of Cloud are being incorporated in many organizations' IT architectures already, as this rapidly-developing and maturing market segment is set to become increasingly relevant and compelling over the next two to three years.

Big players have become increasingly interested in the market and are spending vast sums on the development of technologies that fit this model, which will ensure fast evolutionary development and further drive down costs.

Over time, it is possible that Cloud Computing could be provided free of charge in the same way as has happened for other Internet technologies, with the real complexity and cost in the Services Assembly required to harness this power in a secure, well-governed and relevant way. What is certain is that Cloud will accelerate the next wave of IT innovation, which critically will bring IT and business closer together to create more aligned, responsive and competitive organizations.

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