Cloud computing
10 things a CxO should know about cloud computing
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Disclaimer
Today more than ever, organizations need to secure their competitive advantage and to cope with the volatility and the ever increasing globalization of the markets. While facing these challenges, CxOs should consider IT as an enabler for their strategy. This is especially the case as a technological shift is occurring in the IT space: Cloud computing.

The Cloud allows for improved IT resources optimization, virtually unlimited scalability and greater flexibility, all at a contained cost. As a result, Cloud adoption is spreading rapidly and represents a new opportunity that companies should not ignore given its profound impact.

Although not new as a concept, Cloud computing is new in its generalized application to all IT services and is the next step in the relentless journey of corporate IT. However, expectations about the merits and implications of Cloud computing are different from organization to organization. With this in mind, we will highlight 10 key aspects of Cloud computing, ranging from its impact on corporate strategy to what it means to your capital expenditure and operational expense, including organizational, security and integration challenges.

Not only do we look at main advantages and existing solutions, but as well we will underline the risks that Cloud computing technology entails and what can be done to address these.

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10 Things a CxO Should Know About Cloud computing

In the 1960s, engineers designing computer networks drew diagrams which included cloud outlines to indicate the fact that information sent through the network is routed in varying ways. Much like gas particles in a cloud, the precise path of a packet of information coming out at the other end does not really matter.

Similarly, Cloud computing resources (such as raw computing power, data storage, or complete applications presented in a browser), are available to the user, but the exact location of these services is of no concern to the user.

In fact, users of Cloud computing resources should not care about hardware management, software maintenance or anything else underlying the service itself. Just as the word cloud has become shorthand for the Internet, ‘Cloud computing’ is the provisioning of computing services over the Internet. Users are billed for a subscription or only pay for usage, much like paying for electricity by the kilowatt hour instead of producing it themselves.

There are three main advantages of delivery of services without having to worry about hardware management or software maintenance: the first is scalability. Scalability means going from 1 user to thousands or millions. External providers allocate capacity among many clients, which allow them to apportion resources more or less instantly to a client as usage increases.

The second is innovation and agility. Typically, IT systems are slow to evolve. Major feature upgrades are only pushed through every couple of years, which then require complicated system-wide changes. Instead, delivery of software applications through the browser allows a continuous stream of improvements, allowing for a faster innovation cycle.

The third is the reduction in upfront IT capital expenditures for users – be they in hardware or software – by shifting these costs to vendors who can spread them across their client base. Indeed, instead of paying for hardware and licenses upfront, and having to wait for the customization of an on-premise solution, Cloud consumers pay a periodic subscription or utilization fee with minimal upfront costs covering a shortened deployment effort.

Key points

• The Cloud is a collection of Internet-based or private-network services providing users with scalable, abstracted IT capabilities, including software, development platforms and virtualized servers & storage

• Cloud computing is disruptive due to its four key characteristics:
  • Highly abstracted
  • Variable expense
  • Multi-tenant
  • Immediately scalable
Many large corporations, such as Visa, General Electric and Verizon have already outsourced large parts of their IT operations to countries like India and China. Using Cloud computing, these companies might not only relinquish operational control but also the ownership of their IT resources.

The ability to rely on utility style computing has already had significant impact on small to midsize companies in certain industries. Take accounting as an example. In the early 2000s, a typical accountancy company operated much like in the early 1950s. Accountants were likely to have local clients, who would send files to the accountant at regular intervals. In the late 2000s, the advent of third party accounting software-as-a-service allowed accountancy companies to connect with clients using internet based platforms, which meant deep shifts for the profession.

These platforms allowed to work with professional talent anywhere and to divide client work in new ways. Accountants now have the time to focus more on higher value advisory services, while outsourcing many routine tasks such as tax preparation. Similarly, the ability to rely on utility style computing could have an impact for larger organizations as well.

There is a lag between the availability of a certain technology and the ensuing rise in productivity. A historical parallel in this regard is the electrification of factories around the 1900s. Factories at first were not any more efficient when using electricity instead of using cranks to drive the machines. The reason is that factories were still built as 4 or 5 story warehouses even though machines were powered on their own, without mechanical energy. It took a long time, perhaps 30 years, before factories were built on wider ground level spaces, unlocking the productivity gains from the easier flow of goods and materials.

Determining how Cloud computing technology capabilities can help achieve corporate goals is of key importance as business users become empowered to pull together computing resources on demand. As the corporate IT landscape changes, aligning business strategy with IT to take advantage of new capabilities becomes a priority. Services become the prime focus rather than having to worry about hardware management and software maintenance. This focus on services will impose fewer but different constraints compared to on-premise capabilities and will present a unique set of opportunities and challenges.

Key points

• Due to its benefits, Cloud adoption is already high in small and midsize companies

• Using Cloud, companies can concentrate on their core business and relinquish operational control and ownership of their IT resources

Corporate strategy needs to take Cloud computing into account
Cloud computing allows to adjust IT spending through operational expenditures

While it is unclear at this point in time how and at what speed utility style computing will develop, corporate IT is investigating Cloud computing at an accelerating pace. One of the main drivers for this interest is the reduction of capital costs. Usually, companies will fund operational costs through revenues and pay for capital expenses through equity and debt. Growing the company faster than the cost of capital creates value.

Large portions of a company’s capital expense budget are invested in information technology. The U.S. Department of Commerce estimates that IT spending accounts on average for 50 percent of capital expense budgets. For most companies, IT usually has a broad support function, which is not tied directly to revenue generating operations. In the cloud delivery model, companies pay for both hardware and software as operational expenditures.

While there is no inherent benefit in shifting capital expenditures to operational expenditures, reducing capital expenditures allows companies (especially in cyclical industries) to pay for what they need, when they need it. Managed services infrastructures and the cloud are attractive to companies because they largely eliminate initial capital investments and other up-front costs. The cloud has the added advantage of tying your costs to exactly what you are using; meaning that you are able to connect IT costs to revenue instead of treating them as overhead.

Preserving capital is important especially in situations where high elasticity is needed in providing IT resources. Often companies need to provision for peak loads, requiring more capital investment than needed. Real world estimates of server utilization in data centres range from 5% to 20%. Companies embracing Cloud computing can reduce the opportunity cost of capital investments, for example when they are faced with highly fluctuating needs due to seasonal demand in their business.

Key points

- Cloud eliminates initial capital investments and other up-front costs
- Cloud computing ties your costs to exactly what you are using, without need to provision for peak loads and fluctuating demand
Cloud computing is all about using technology when you need it, for as long as you need it. There is no need to install anything, and no need to pay for the technology when it is not in use.

Cloud computing eliminates the lag that often exists between business and IT, thus ensuring organizational agility. As business cycles accelerate, many businesses require almost immediate deployment, adaptation or decommissioning of applications. While it was not envisagable with traditional on-premise solutions, Cloud computing enables accelerated deployment and greater flexibility. Cloud represents an opportunity for organizations to focus on their core competencies and to solve their business problems in ways that were impossible.

Some companies encourage responsiveness by having small teams. Google, for example, has created a corporate organism that tackles most big projects in small, tightly focused teams, setting them up in an instant and breaking them down weeks later without remorse. The ability to draw on on-demand supporting technology facilitates the work environment of such teams.
The Evolution of Strategic Management

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Adapted from: Robert Grant, Contemporary Strategy Analysis, 2006

The table above shows the dominant themes and main issues companies dealt with from the 1950s to the 2000s. Reconciling size with flexibility and responsiveness is a key strategic driver today, supporting the deployment of flexible cloud computing solutions.

As business users decide to launch new products and venture into new markets, on-demand information capabilities can be selected, assembled and scaled out to meet organizational and geographical demands as required. It is fair to say that Cloud computing technologies can be key elements in business environments that increase agility and decrease time to market. The reason is that Cloud computing is highly demand driven, meaning a high degree of user self service is possible in the deployment of services and resources.

Cloud computing eliminates the lag that often exists between business and IT, thus ensuring organizational agility. As business cycles accelerate in a web-enabled world, many businesses require almost immediate deployment or adaptation of their supporting IT environment which can only be achieved at scale by leveraging out of the box solutions benefiting from optimized procurement, set-up, and migration time, as well as relatively high standardization.

Key points

- Reconciling size with flexibility and responsiveness remains an important issue today
- Cloud computing offers high degree of user self service in the deployment of services and resources
- Cloud computing enables companies to leverage their core competencies and be agile enough to evolve with this challenging environment, especially in IT
If the promise of Cloud computing is fulfilled, business users will select and arrange services as needed, bypassing the traditional reliance on the IT department whose task is to allocate IT resources and manage technical constraints.

Today, as much as 10 percent to 20 percent of IT spending occurs outside the IT department in business unit budgets. This occurs because ineffective IT departments become a bottleneck for projects and technology investments. Business units go around IT to complete their critical initiatives, often creating miniature IT departments within the business unit, resulting in additional IT vendor spend, as well as investments in hardware and software that do not show up in the IT budget.

Allowing business units to complete projects without waiting for a lengthy upgrade to provide additional functionalities or to accommodate more users could be a key advantage. CIO surveys from a variety of research organisations, including Gartner and Forrester univocally show that IT leaders expect Cloud computing to provide significantly more flexibility in delivering IT resources.

There are risks involved in a completely demand driven approach to service provisioning. The IT department losing control could lead to decreased strategy alignment, as well as the risk of having more technology silos instead of connecting people and data. It is a key task for IT Management to ensure the appropriate governance structures are in place to deal with these risks.

Key points

- Companies are shifting away from buying and maintaining their own IT hardware and software and are instead tapping into the Internet for the computing services they require to run their businesses.
Important providers of Cloud computing services have just begun entering the market. Enterprise friendly services such as the Microsoft Azure platform and the Sun cloud are for the most part nascent efforts. Consequently, the ecosystem of third party service providers around such services is growing rapidly but is still limited at this point in time.

Although major vendors have pledged to maintain open standards to enable data portability (to avoid vendor lock in), there is a risk that data will not move easily between vendors. Similarly, seamless interoperability with on-premise server based systems has just begun being addressed by third party IT industry providers. This is important as many issues such as integration with on-premise capabilities will be alleviated through third party services providers.

Gartner and Forrester foresee vastly increased spending on Cloud computing technology in the coming years. Gartner estimates that the current market for cloud services accounts for $46.4 billion and that it will reach $150.1 billion by 2013. The compound annual growth rate (CAGR) varies widely between different types of services, and the key leading segments are Infrastructure-as-a-Service (computing power and storage, 50%), Content, Communications and Collaboration (19%), Customer Relationship Management (17%), Supply Chain Management (especially procurement and logistics) (17%) and Human Capital Management (7%).

Key points

- Ecosystem of Cloud providers is growing rapidly but remains limited at this point in time
- Analysts estimate a compound annual growth rate of 26.5% in Cloud investment during the 2008 - 2013 period
- The five most growing areas are
  - Infrastructure-as-a-Service (computing power and storage)
  - Content, Communications, and Collaboration
  - Customer Relationship Management
  - Supply Chain Management
  - Human Capital Management
Cloud computing providers currently provide less uptime guarantees than a number of critical business applications require. For example, Amazon’s cloud-based Simple Storage Service only promises 99.9% uptime. This may be below what is currently offered by in-house capabilities.

Additionally, Cloud providers of raw computing resources currently provide only limited high availability functionalities. In the event of infrastructure failure, enterprise level systems provide for automated failover mechanisms towards other locations. Often, failover functionalities must be added by customers themselves.

Cloud computing uptime and automated failover functionalities will improve over time and will likely exceed what businesses can provide themselves. Economies of scale in building services allow providers to share uptime costs among many clients, enabling more investments in hardening systems and building in resilience. However, at this time, any enterprise systems architecture must take into account the requirements of critical components.

Critical components are not ready to be moved to a cloud environment, as availability of data and applications is a primary concern. Instead of a ‘What could possibly go wrong?’ mind set, small scale Cloud computing initiatives should be set up first to evaluate the technology’s merits based on a practical approach, focussed on achieving measurable business goals. Increased internal use of technologies such as virtualisation could improve the cost effectiveness of IT investments and the availability of data.

Recent market developments show a trend towards an increased use of service level agreements, although it is not yet clear if a convergence will take place towards industry standard service levels. Comparison over time of what Cloud computing vendors deliver encourages the expectation that service levels in general will trend upwards (some providers offer 100% uptime) as an important differentiating feature among providers.

Key points
- Analysts believe that Cloud uptime will improve from the 99.9% standard today and will exceed what businesses can provide for themselves.
In today’s world, Cloud computing is experiencing strong adoption in the market and this trend is expected to continue. According to Forrester, integration is one of the top concerns people have about Cloud computing. Integration will play a key role in the user adoption for Cloud computing. As new applications appear on the Cloud market, integration vendors are proposing new integration solutions most commonly known as Integration as Service.

Organisations are finding that management of integration still is a responsibility of the IT organization. Even as SaaS has proved it can handle critical roles at large companies, integration remains far from a drag-and-drop job.

The key challenges around integration are the following:

- **Integration Cost and Duration:** In any implementation, integration remains critical in term of budget and duration but also in term of skills required due to the diversity of the applications to integrate and the technology used behind. Simplifying integration in order to reduce these costs represent a real challenge.

- **Integrating SaaS and traditional applications:** The role of integration is to connect different application in order to share data between these applications. With the Cloud computing and the SaaS applications coming up on the market, integration needs to be able to provide an easy way to integrate these different applications together.

- **Managing and Monitoring Integration Interfaces:** Due to the fact companies are integrating more and more applications, each application having its own specificity and technology, managing and monitoring the different interfaces is not easy. Having a good visibility around the different integration interfaces is fundamental and represents a challenge for the companies.

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“Integration as a Service is expected to reach maturity and mainstream adoption in 2-5 years”

Gartner (June 2008)
To respond to these key challenges around Integration, vendors are developing and marketing SaaS Integration solutions. These solutions offer an easy way to integrate systems compared to the traditional approach using EAI Tools or custom code. The capabilities of these new solutions are at least to the traditional, on-premises ones.

The SaaS Integration solutions are acting like an Orchestrator managing the different integration interfaces defined. The key elements of such solutions are the following:

• Provides different deployment options: allowing a deployment on the Cloud but also behind the companies’ firewall.
• Configuration Based approach: The Integration is implemented through a graphical UI and custom code is avoided as much as possible.
• Integrates with “on-premise” application and with “on-demand” applications.
• Provides a central place to monitor and manage the integration.

Integrating systems through Integration as a Service solutions will help to ease the integration and reduce costs but integration remains in most of the cases complex and critical to any implementation.

It is expected that market of the Integration as a Service to grow in the coming years, offering even more advanced and sophisticated solutions for integrating cloud computing applications.

The Integration-as-a-Service market is in expansion and we can expect a significant growth in the coming years. The added value and significant cost reduction that these services are providing will help integration to go to the “next level”.

We believe that integration appliances will play a critical part in the growth, acceleration & acceptance of Software-as-a-Service”

Frank Kenney, Research Director, Gartner

Key points

• To respond to the integration challenges underlying most implementations, Cloud vendors are now proposing SaaS Integration solutions that offer an easy way to integrate systems compared to traditional approaches using EAI Tools or custom code
Considerable security and audit challenges

Compared to the standard model of service provision, Cloud Computing raises strong security concerns, namely:

• Are data safely stored and handled by Cloud providers?
• How are reliability and availability guaranteed?
• Are Cloud providers sufficiently protected against cyber-attacks?

The core capabilities of Cloud computing today and tomorrow are founded on the convergence of several different technologies. The erosion of the traditional boundaries of trust, on which the services provision models are based, brings about new challenges in terms of user’s control over the services, resources or information entrusted to the Cloud.

One major security challenge is how to manage access control and ensure confidentiality of data. Typically, cloud users have no control over the Cloud resources and there is an inherent risk of data exposure to third parties or the Cloud provider itself. Unauthorized access or a compromised external provider could have widespread consequences for all providers’ clients.

Data centralisation poses another security challenge. In many Cloud implementations, the centralised management and control introduces several so-called single points of failure. These could threaten the availability of Cloud users’ data or computing capabilities indirectly, as a small incident in the Cloud could have an exponential impact.

As a general rule, the security controls that Cloud users may want the Cloud provider to adopt may go beyond the controls inherent to the Cloud platform. Contractual language shall be used to reflect the preferred security levels. Cloud users can also mitigate security risks by conducting audits and requesting providers to hold security accreditations. The market also offers several tools particularly designed to overcome Cloud security concerns.

In summary, Cloud providers will need to offer a higher degree of protection and transparency to reassure customers. The Open Cloud Manifesto (www.open-cloudmanifesto.org) is here a pioneering initiative to bring together the Cloud community and establish core principles for the adoption and provision of Cloud services.

Key points

• Cloud computing is not secure by nature and faces key challenges such as access control, data centralization and security.
The relation of data to a geographic location has never been more blurred than with the advent of Cloud computing. However, in many jurisdictions, the physical “location” plays a key role for determining which privacy rules apply. For example, data collected and “located” within the European territory can benefit from the protection of the European privacy rules. It is therefore important to tackle regulatory and audit issues related to the cross border nature of Cloud computing.

From a privacy perspective, if the personal data used by, or hosted on, the Cloud may change location regularly or may reside on multiple locations at the same time, it becomes complicated to watch over the data flows and, consequently, to determine the conditions that legitimise these transfers. Personal data transfers to third countries often require contractual or other arrangements to be in place.

Overall, it is crucial for cloud users to request evidence from service providers of their compliance with regulations (e.g. General civil law and contract law, Consumer protection law, “e-commerce regulation”, Fair trade practices law) and generally-accepted standards (e.g. PCI DSS, ISO27001).

**Key points**

- The cross-border nature of Cloud computing complicates the control over data location and therefore the compliance with local legal requirements
- Cloud computing vendors should provide proof of compliance with regulators
For further information

Should you wish to talk to us about Cloud computing, or have any feedback on this paper, please do not hesitate to reach out to our dedicated Cloud computing team.

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