CLOUD COMPUTING STRUCTURE: A NEW BUSINESS APPROACH

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Abstract

The concept of cloud computing users in an exciting collection of business opportunities, for small and midsize companies. Broadly, the industry is excited by the possibilities of enabling rich interactions between on-premises client and server applications with the flexibility and scalability of Web-based services.

It is no surprise that in the current economic climate, companies are considering cloud for potential cost savings and business agility.

Our purpose here is to shift through the noise, expose the core cloud definitions and issues affecting small and midsize companies, and help ensure that your company is one of the success stories resulting from the cloud computing phenomenon.

Introduction

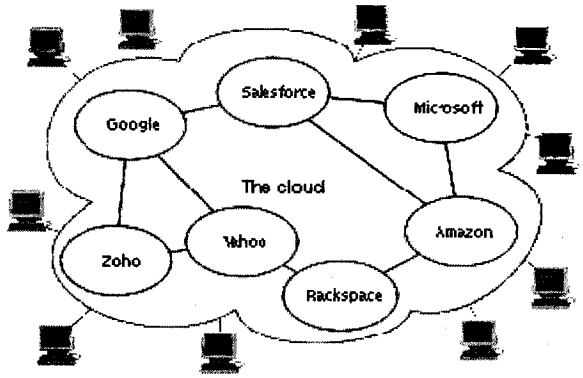


Figure 1.1

Cloud Computing means "Internet Computing." The Internet is commonly visualized as clouds; hence the term "cloud computing" for computation done through the internet. With Cloud Computing users can access database resources via the internet from anywhere, for as long as they need, without worrying about any maintenance or management of actual resources. Besides, databases in cloud are very dynamic and scalable.

It is an independent platform in terms of computing see figure 1.1. The best example of cloud computing is 'Google Apps' where any application can be accessed using a browser and it can be deployed on thousands of computer through the internet.

First from near the beginning when mainframes were predicted to be the future of computing. Indeed mainframes and large scale machines were built and used, and in some circumstances are used similarly today. The trend, however, turned from bigger and more expensive, to smaller and more affordable commodity PCs and servers.

Most of our data is stored on local networks with servers that may be clustered and sharing storage. This approach has had time, to be developed into stable architecture, and provide decent redundancy when deployed right. A newer emerging technology,

cloud computing, has shown up demanding attention and quickly is changing the direction of the technology landscape. Whether it is 'Google's unique' and scalable 'Google File System', or 'Amazon's robust Amazon S3' cloud storage model, it is clear that cloud computing has arrived with much to be gleaned from.

As new technologies emerge, they often tend to build on the success of previous developments. Cloud computing and storage, benefit from years of development and testing of large scale infrastructure. The most important take away is that cloud storage is for everyone and every organization. From big to small, groups to individual, the use of grid infrastructure can be deployed for maximum return and efficiency.

Out of many the definitions of cloud computing as there are self-acclaimed cloud specialists. Most of those definitions include pay-per-use, instant availability, scalability, hardware abstraction, self-provisioning, virtualization and internet. The cloud computing market is typically segmented into public clouds (services offered over the internet), private clouds (internal enterprise) and hybrid clouds (a mix of both). The public cloud market is often sub-segmented into IAAS (Infrastructure as a Service), PAAS (Platform) and SAAS (Software).

Basic Concept

Cloud computing found its origin in the success of server virtualization and the possibilities to run IT more efficiently through server consolidation. Soon, visionaries came up with an idea to push virtualization to a next level by implementing some early storage and network virtualization techniques and thus making abstraction of the hardware in the entire data centre. Add to this self-provisioning and auto scaling, and cloud computing was born. At the time it was called utility computing, however, and only Amazon – a bookstore – was good at it. Amazon saw a growing popularity of its EC2 (compute) and S3 (storage) and the Amazon API was being used by thousands of developers and many more customers to deploy and run infrastructure in the cloud.

The first BYOC (build your own cloud) products that were brought to the market came from companies like Flexiscale (UK), 3Tera (US) and Q-layer (BE)[2]. They aimed at the ISP's – who had an urgent need for innovation: ISP's had entered into a price war amongst themselves and their market was now also threatened by newcomers like Amazon, Microsoft and Google. The first new services those ISP's offered were nothing more than virtual machines – allowing them to run their facilities more efficiently and still charge the same prices to their customers. Soon, companies like Savvis, Go Grid and Rack space added interfaces that enabled end users to control their own infrastructure. In early 2009, Sun Microsystems launched the Virtual Data Center (VDC), a graphical interface with drag and drop that enables users to create and manage a full virtual data center in the cloud. In March 2010, Microsoft's CEO, Steve Ballmer, made his strongest statement of betting the company's future in the cloud by proclaiming "For the cloud, we're all in" and further stating "About 75 percent of our folks are doing entirely cloud based or entirely cloud inspired, a year from now that will be 90 percent.

Currently, the battle has moved to the private clouds. Enterprises seem to be ready to cloud-enable their infrastructure either in a purely private or a hybrid (enabling cloud-bursting to public clouds for certain services) environment. All the leading software providers have announced their products and I expect an important role for integrators and Telcos to help enterprises to pick a best of breed for their own implementation.

Implementing a private cloud affects the entire business, including the entire IT infrastructure (hardware, software, services) but also most business processes (e.g. regulatory compliance). As none of the big software providers have teams with experience in all those fields – except maybe IBM – enterprises will have to rely on integrators to build

their clouds. I do expect, however, that quite a few enterprises will build their clouds all by themselves (e.g. Wall Street banks).

Need of Cloud Computing

Cloud computing deals with any subscription-based or pay-per-use service that, in real time over the Internet, extends IT's existing capabilities. Cloud computing technology provides on-the-fly, point-and-click customization and report propagation for business users, so IT doesn't spend half its time making minor changes and running reports.

Cloud computing technology is tripping a huge change in application development circles. Today, for the most part, IT must jade into cloud-based services individually, but cloud figuring aggregators and integrators are already emerging. One potential security implication of cloud computing is that if you have individual data in that cloud, you are sharing hardware/networks with potential competitors in rather close propinquity, which is why for some folks building "clouds" they look to be for the most part just virtualization-heavy internal deployments. Cloud-based tools can be up and working in a few days, which is silent of with sanctioned business software.

Increasingly, IT squads are turning to cloud computation technology to minimize the time spent on lower-value natural actions and allow IT to focus on essential activities with greater impact on the business.

The cloud computing infrastructure not only provides deep customization and application configuration, it preserves all those customizations even during upgrades. By their very nature, cloud figuring technology is much better and quicker to incorporate with your other enterprise applications (both sanctioned software package and cloud computation infrastructure-based), whether third-party or homegrown.

By eliminating the problems of traditional application development, cloud computing technology releases you to focus on developing business applications that deliver true value to your business (or your customers).

Cloud Architecture Design

Top-down approach

To drive the design cloud architecture from the application perspective is called the top-down approach. The benefit of top-down approach is the system efficiency gain which creates just enough infrastructures for an application to run without any waste. This gives the best ROI from a business perspective.

The top-down approach works perfectly for enterprise private cloud. For service providers, however, it may or may not work. If the service provider provides specialized services such as online storage where the application workload pattern is known, then one should definitely follow the top-down approach.

Bottom-up approach

For service providers who provide generic services, it's hard, if impossible, to know customer workload patterns in advance. In these cases, the best service is received by following a bottom-up approach. That means designing the cloud infrastructure based on typical applications see figure 1.2.

When new applications come in, just mix them based on their workload patterns described in this blog. In so doing, we may still achieve good workload balancing and the best business ROI.

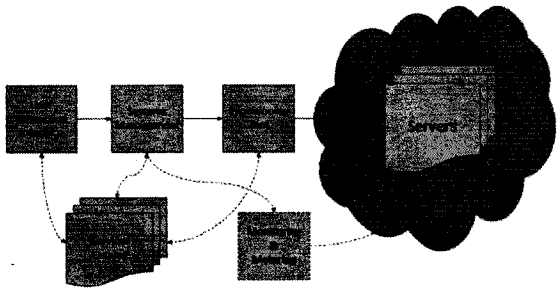


Figure 1.2

Concluding Architecture:
When using top-down approach, an individual wants to analyse the workload patterns and quantify them with numbers in CPU, memory, networking, storage and so on and cannot easily infer the numbers, just pick a similar system and measure it before adjusting your design based on the scale ratio.

With the workload numbers, one can translate them into infrastructure level requirements. To play safe, some allowance for unusual cases are necessary. On the networking side, it's not purely about bandwidth, it's also about good topology design that can help flow network traffic better.

Another very important dimension of workload pattern – timing must be kept in mind. If the same workloads and their peaks are evenly distributed over time, one should be fine. To best design a private cloud, some elements are carefully considered For example, the accounting system will peak at the close of each fiscal quarter.

Although cloud infrastructure design is mainly about computing infrastructure, we should drive the design from the applications that run on the infrastructure.

When the application workload patterns are unknown, one can go with bottom-up approach.

For the private cloud and specialized public cloud, the top-down approach is preferred. For generic service providers, bottom-up is usually best.

Terminologies Related To Cloud Computing
Cloud computing is Internet-based computing, whereby shared resources, software, and information are provided to computers and other devices on demand, like the electricity grid.

Software as a Service (SaaS)
SaaS represents applications delivered as a service, typically over the internet. Several examples include business applications (CRM/ERP), communications and collaboration tools (such as e-mail and web conferencing), payment, mapping, and a myriad of other capabilities.

Public cloud
Public cloud is a data centre made available in a metered manner to the public for purchase, resale, or some other pay-as-you-go manner. The easiest way to think of this is as a cloud housed completely outside the confines of your corporate firewall. The readily apparent benefit to this approach is the lack of upfront infrastructure investment. Furthermore, public clouds can more readily scale and address demand-based or workload-based fluctuations. Whether you are using 100 servers for 1 hour or 1 server for 100 hours, the elasticity of the public cloud reduces or eliminates any premium previously associated with large scale.

Infrastructure as a Service (IaaS)
IaaS is particularly helpful in satisfying the compute needs of services whose needs are high or varying, such as batch processing, seasonal traffic increases, and short-use microsites. The provider is solely focused on keeping the infrastructure "lights on" within the availability parameters defined within the purchase agreement. IaaS requires highly skilled developer resources within your organization. You simply get out what you put onto the purchased "resource," and the burden of application deployment, management, monitoring, failover, backup, and support lies with the purchaser.

Platform as a Service (PaaS)
In contrast to IaaS offerings, PaaS providers focus on offering rich management, monitoring, and failover needs of the purchaser's application. Value-add offerings are available as needed for an additional fee. Such offerings include rich relational database capabilities, simplification of identity and access requirements, or providing infrastructure for complex business-to-business interactions between, and outside of, corporate firewalls. Think of this as building and deploying applications in the cloud, with the cloud provider abstracting away all the hardware and software complexities associated with

deploying, securing, managing, and scaling an application.

Private cloud

This is a private data centre not made readily available for purchase or reuse to the general public. Private clouds are typically owned, run, managed, and supported by an individual business or organization and are contained within the organization's firewall. Private clouds are usually considered by companies with larger-scale IT infrastructures seeking to better take advantage of existing hardware and software assets.

Hybrid approach

This approach of adopting cloud computing mixes on-premises investments with emerging cloud technologies. [5] Microsoft often refers to this approach as software-plus-services. In this model, one can choose to either move some applications or functions to the cloud or provision a portion of users on cloud-based services.

Cloud Computing : A Driving Platform For Buisness Strategies

Introduction

Cloud computing is an emerging computing technology which uses the internet and central remote servers to maintain data and applications accordingly. This new methodology of cloud computing can be broken down into three major segments. Those are namely:

- Applications
- Platforms
- Infrastructure

The Problem domain

The common question which arises among many IT/ Business professionals is that, when your applications and sometimes even your data isn't stored, managed, and controlled by your own business, isn't it a huge risk that you and your business taking, mainly due to the possibility that the provider of those things could disappear or have some major catastrophe with the data itself. So then the interesting "Why would any business take such a risk?" question arises.

Subscription based cloud computing model becomes a fixed cost to a controllable service of many business oriented strategy models. Main reason behind it is that the capability to bypass their own in house IT shops. These shops are seen as increasingly expensive, risky, and obviously difficult to manage or control. This constitutes a management threat, and that is why the post of a CIO was introduced to the industry.

Another way of looking towards it is that, cloud computing picks up on the same threads as outsourcing, which was the last biggest revolution which happened in the IT industry sometime back. Many experts believe that if the business can treat IT as a simple cost of doing business, and hand it over to a specialized IT company in order to manage the whole scenario of IT activities, that they can control costs and increase reliability. Now the question arises if it was been a reality as expected. Well, basically the answer is, no. The main reason behind it is, that those firms whom have outsourced IT departments have not ended up saving much money as expected. It is also known that, these outsourced firms suffer the same problems as the internal departments did, but with less pressure since they are under less direct management control. Many companies find themselves faced with the very expensive proposition of restructuring their own IT departments. After doing everything, in some cases, they do not even own the server hardware and other accessories. Yes they are trapped again, but in a different manner or with a different architecture.

Efficiencies of cloud computing

After considering the above problem domain, it is clear that most of the businesses lack efficiency in their process or in their business activity model. Cloud computing appears to offer some great efficiency, with some massive resource consolidation in terms of server hardware and a centralized

management system for data security, backup methods, and development and other few areas that could really benefit any business process. Interoperability, which is a common requirement these days, tends to increase in these environments, and when the applications are built well, users do like them. Ultimately, there is a high probability of all of us working in a heavily cloud computing driven marketplace. It is still young and lacks experience, but in the long run, it will go that way more and more.

Cloud computing and the long run

There have been many predictions about IT but unfortunately you get accounted very rarely for it.

Basically, internet is known as a "Cloud". All applications we use in order to read mail, to create documents, and to work with each other will be included within this framework.

If we take a few steps back and consider the beginning, there was computing hardware. It was small, functionality was limited and to make it do anything it had to be hard-wired to do it. Then came the BIOS systems and provided separation from that specific complexity. Later, it was the "Disk Operating System" which came along and provided a consistent way for programs to interface with hardware through the BIOS. With the usage and demand for different operating systems, made them to introduce the thread security and prevented direct access to the BIOS or Hardware. Although every other OS supported this feature, Microsoft didn't. In the recent past, the GUI (Graphical User Interfaces) came along as Windows, MAC OS, X-Windows, etc. started to provide a simplified way for users and programs to interact with frameworks like Google Desktop and Adobe Air, which was built on the work of run time frameworks like NET, Java Eclipse, Notes, and others.

Each new layer of separation seems to increase rapidly to generalization so that the programmers can enjoy when working on to create new tools. Ultimately, with the time being these frameworks will grow robust enough to offer more security, stability, user interface, data storage, and functionality required for truly robust micro-applications to become pervasive. This is where the point when cloud computing will come into play.

Infrastructure of cloud

Infrastructure is the backbone of the entire cloud computing concept. Many infrastructure vendors provide the required physical storage space and processing capabilities that allow for the all the services which was discussed earlier in this article. The products that I have discussed within this article are slightly more varied than those in the other areas of cloud computing, but it includes ones such as managed hosting and development environments in order to allow users to build applications.

Why shift towards cloud computing?

The shift would affect companies with a few different sub-industries including software companies, ISP (Internet Service Providers) and hardware manufacturers. Companies in each of these industries will face some significant changes if cloud computing is to be the next step for the industry, and it seems to be so. While it is relatively easy to see how the main software and internet companies will be affected by such a shift, it will make the process slightly more easier for the hardware and internet industries.

What's Driving The Cloud Computing Era? An 'It' Market View

Many people reasonably wonder if the growing interest in cloud computing is a just a short term phenomenon – the latest hype destined to join other fads in the tech market trash bin see figure 1.3. IDC believes that the rapid emergence of cloud services, and the cloud computing model underpinning those services, are ushering in a fundamentally new era of growth and competition in the IT market.

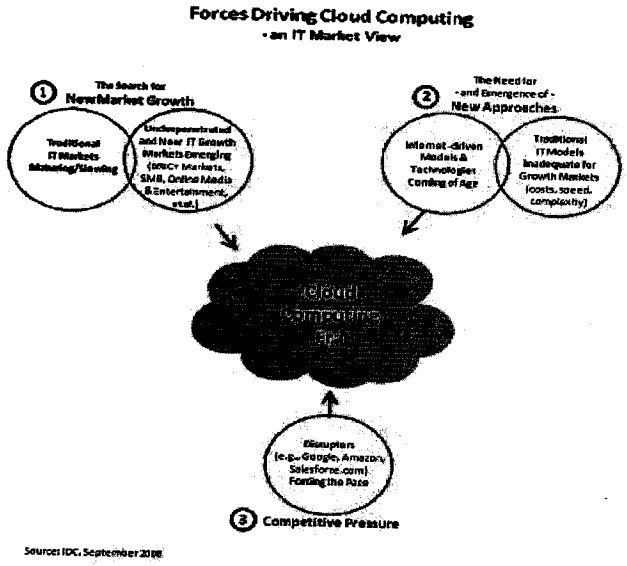
The main reason we believe this is so, is that the cloud computing shift is being driven not just by the

emergence of new products and technologies, but by a "perfect storm" of market forces, along three vectors:

- the search for growth (money) in important new segments,
- the shortcomings of traditional approaches in capturing that growth, and – in case those two weren't enough to drive entrenched market players into action
- competitive pressure from disrupters, with little to lose and everything to gain from pushing the new model.

Figure 1.3

The need for – and emergence of – new approaches – Most of the IT industry's leaders have concluded that they have zero chance of fully capturing the growth they need – from the BRIC+ markets, SMBs and the growing number of cloud services providers – with just the traditional IT models and offerings. The traditional offerings and approaches – while they will continue to adequately serve much of the market – are too costly, and take too much time, skills and effort to adopt to appeal to these emerging opportunity customers. Here's one bit of proof: the customer portfolios of most of the industry's leaders are chock full of Global 2000-type customers, and disproportionately few SMBs, and here's the kicker: in the high-growth BRIC countries, and other emerging markets in Asia, the Middle East, Eastern Europe and Latin America, SMBs account for an especially important share of total business IT spending. Fortunately, Internet-driven models and offerings – which have been developing and maturing for the last ten years – are coming of age, accelerating in terms of: the number of suppliers, the number and richness of offerings, the scale of development and distribution ecosystems around them, and the number of customers who are used to, and comfortable with, solutions from "the cloud".



Source: IDC, September 2008

Cloud Computing : The Future Telecom Industry

The term "cloud computing" is being bandied about a lot these days, mainly in the context of the "future of the web." But cloud computing's potential doesn't begin and end with the personal computer's transformation into a thin client - the mobile platform is going to be heavily impacted by this technology as well. That's the analysis being put forth by ABI Research. Their recent report, mobile cloud computing, theorizes that the cloud will soon become a disruptive force in the mobile world, eventually becoming the dominant way in which mobile applications operate.

What does the term "mobile cloud computing" really mean? Basically, it refers to an infrastructure where both the data storage and the data processing happen outside of the mobile device. The examples of mobile cloud computing applications including mobile Gmail, Google Maps, and some navigation application. However, the majority of applications today still do most of the data storage and processing on the mobile devices themselves and not in the cloud.

Why mobile cloud computing?

With a Western-centric view of the world,

it can sometimes be hard to remember that not everyone owns a smartphone. There are still a large number of markets worldwide where the dominant phone is a feature phone. While it's true that smartphones will grow in percentage and feature phones will become more sophisticated in time, these lower-end phones are not going away anytime soon. And it's their very existence which will help drive the mobile cloud computing trend.

Not only is there a broader audience using feature phones in the world, there are also more web developers capable of building mobile web applications than there are developers for any other type of mobile device. Those factors, combined with the fact that feature phones themselves are becoming more capable with smarter built-in web browsers (and more alternative browsers available for download), will have an impact on mobile cloud computing's growth.

How will mobile cloud computing become a disruptive force?

There are two primary reasons why cloud computing will become a disruptive force in the mobile world.

- Simply, the number of users the technology has the power to reach, far more than the number of smartphone users alone.
- How applications are distributed today? Currently, mobile applications are tied to a carrier. If you want an iPhone application.

Core issues to consider: mobile computing to take off

- Cost: It can be considered that using a cloud computing solutions provider for storage and processing resources automatically saves you money because you don't have to buy equipment, configure it, and maintain it. However, cost savings depends on the requirement of type of cloud to adopt. If IaaS is bought, yet it is needed to configure and maintain the applications and servers. Some cloud implementations can save business money, while others may add more costs to business.
- Data ownership, confidentiality, lock-In, and interoperability. : One of the natural concerns with cloud computing the issue of security and privacy. If the information is to be sent to a third person, how to protect data theft? And get aware of who owns the data? The point is, if an application that handles or processes sensitive or proprietary data, one should conduct a very careful analysis of the confidentiality, integrity, and overall security of the solution. And be sure to create a service using a particular language on a particular service platform that it will be able to speak with or operate with a completely different language supported by a competitive service provider.
- Service availability and application performance.: What types of service-level agreements (SLA) are promised—if any—by the service provider one is considering around the issues of availability, security, and privacy? Because network outages are a nightmare for internal IT staff, cloud computing can be used to shift much of the burden onto the service provider. A good cloud computing solutions provider should be well staffed and well equipped to manage such outages.
- Regulatory requirements, geolocation, and security: What are the local governmental requirements for outsourcing data, must audit regulatory requirements for data transparency and reporting when using the cloud? How is the application being secured—how is the service provider protecting itself and how is the application being protected against malicious attacks? How is the physical infrastructure of the data centre you are using being secured? These are the core issues which should be considered and kept in mind.

Conclusion

We will live in a hybrid world of traditional services, with online services offering software. Businesses will focus on the needs of a company and its employees, but also on the needs of its customers and partners by providing

functionality across the enterprise and the Web that can be accessed through a wide selection of devices. To address all their constituencies' needs, forward-looking businesses will utilize their existing investments and scale out across the enterprise and the Web to balance devices, servers, and services. To satisfy these increasingly demanding requirements, a developer is exploring the cloud—in conjunction with the server and the device—to understand what is best for their business and user needs.

Now is the time to evaluate the opportunities cloud computing presents to your business. Deciding how to best benefit from cloud computing really comes down to mapping the actual technology benefits to the needs of your business. Be pragmatic in your approach to both the technologies and the solution providers you choose to work with. Make absolutely certain you fully understand your agreement terms with any service provider.

Cloud computing advantages:

- Rapid deployment of services. Deployment in 1 day is possible. Quicker testing cycles.
- Less money needed for onsite hardware, administration and maintenance required.
- Less capital expenditure
- Scalable to handle variable business needs.
- Access to large expensive hardware and services with little costs.
- An electricity cost for local servers is saved in a cloud environment. Virtual cloud servers save on electricity by sharing.
- Disaster recovery from a local event. Easy to set up quickly in a new location.
- Data access independent of location or device. E.g. Home, work or while travelling. Using a desktop, laptop, net book, smart phone or thin client.
- Telephony can also now be hosted.
- National Fibre Broadband will allow larger clouds.
- Save about $1000/year in electricity and cooling for each server not deployed locally.
- Storage costs are shared which can lower client level fees.
- Lower data centre costs. Less space, cooling, UPS, generator requirements.

Cloud computing disadvantages:

- Monthly fees
- Business data is stored off site.
- What happens to your data if your provider goes out of business?
- If the internet is down locally then cloud applications may be unavailable.
- Encryption of data transmission and storage needs to be considered.
- Training of programmers with cloud standards.
- Intellectual property stored off site.

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