

View Point



Business Value Architecture for Cloud Computing

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Preface

In March 2008, in the 'Evolution of Global Delivery Model' paper, we have discussed nuances of global delivery and outsourcing. The feedback received from analysts, customers, peers and web-download analysis suggests that those insights are very relevant to date. Surprisingly, cloud computing was not touched upon in the paper.

Technology is indeed evolving rapidly and so are associated business models.

Cloud has entered our vocabulary, business models and debates over the last couple of years. As Cloud computing gains prominence, an important question remains "How do Cloud users navigate through emerging requirements brought on by Cloud computing and related Innovations?" What do companies focus on when they define their strategy and cloud related business plans? This viewpoint attempts to structure consumers' thinking around these changes and possible changes in the next wave of cloud computing.

Global Delivery models have changed drastically over the years. In the beginning we had Application Development done in a Global Delivery Model (GDM) and as systems and processes improved, packaged applications were done in a GDM too. The third phase of GDM involves Cloud Computing... Cloud computing is here, and hopefully will move consumers' towards Global Virtualized Enterprises, where outsourcing and computation are integrated.

While there are many definitions of Cloud, let us however start with one that we all can agree on to an extent:

Consumer products and business products, services and solutions, delivered and consumed in real-time over the Internet.

Fast, Flexible and Cost-effective

The disruptive trends of Cloud Computing are expected to become a commonly-accepted model for running enterprise operations within the next 3-5 years.

Admittedly, Cloud computing brings significant cost advantage to consumers. They can save up to 80% of IT CAPEX and up to 50% of IT OPEX¹ by moving from onpremise services to cloud-based services. For example, the on-premise Microsoft Exchange based e-mail generally costs USD100 per user per month, whereas an equivalent cloud-based offering from Microsoft itself costs approximately USD 25 per user per month and USD nine per user per month from Google². On-premise CRM systems cost USD 100 per user per month while equivalent cloud-based offerings cost USD 65 per user per month from SalesForce and USD 44 per user per month from Microsoft Dynamics Online CRM³. Similarly, if 100 servers are moved from private datacenters to the cloud, potential savings can add up to USD one million per year. 100TB of storage space when moved from onpremise storage infrastructure to cloud based storage, can potentially save up to USD one million per year⁴.

Cloud computing also brings significant advantages for global expansion, since the underlying infrastructure of most deployments can be provisioned on-demand and almost in real-time, thus facilitating infinitely scalable computing resources. This gives start-ups a leg-up, encouraging innovation of new business services at significantly lower investments.

Much of these benefits are what we call first generation benefits of Cloud computing.

Moving beyond simple cost savings

IT strategists, CFOs and business owners need to look beyond the first generation of cost savings, when they think of cloud. The business value that can be realized through cloud based approaches can be significantly larger than those achieved by moving infrastructure around, simply consolidating data centers or even rehosting applications. It amounts to faster-time-to-value and business flexibility as well.

For example, when moving BI/DW (Business Intelligence/ Data-Warehouse) support onto a cloud for a Fortune 500 company, the savings can go upto 50% of BI infrastructure costs (hardware and software included). The consolidation of fragmented departmental systems into a holistic on-cloud information approach across a large enterprise, allows analysis and decision support that were not possible before. Such shifts in decision-making abilities of Fortune 500 companies can have large revenue and margin impact. The opportunity costs thus realized can be of strategic importance as opposed to tactical cost savings.

So the question arises, how do companies exploit the various business models and business opportunities that the cloud computing paradigm offers? What are the business models required as cloud computing becomes mainstream in organizations?

The first step is to rethink Cloud computing as a logical architecture of value propositions, consisting of opportunities, ideas and business values obtained.

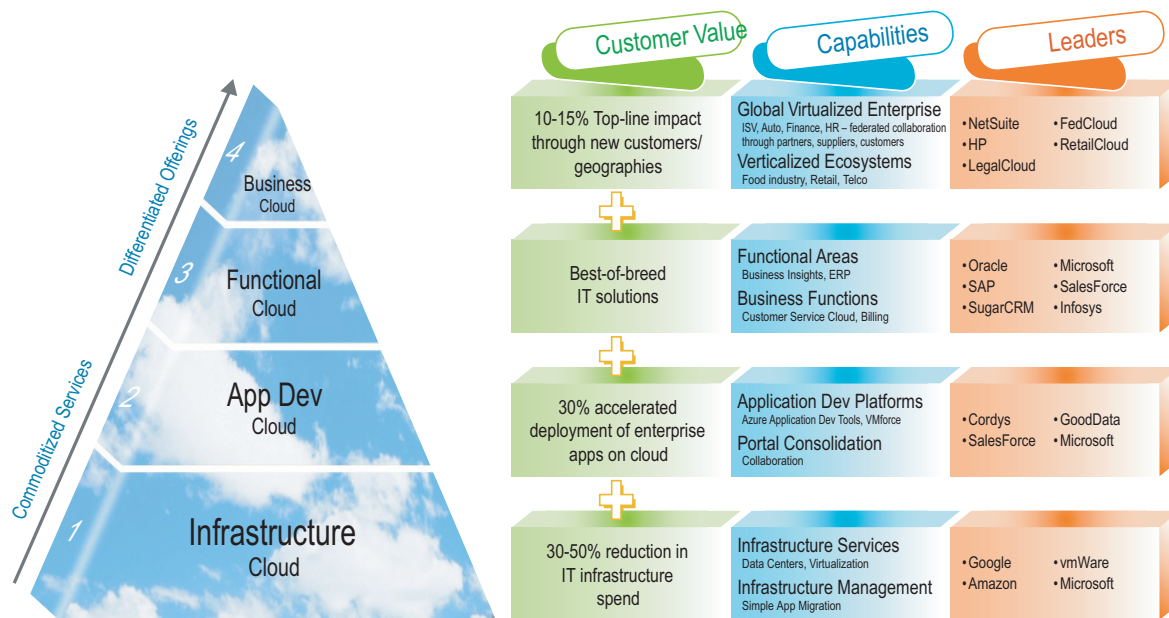
Cloud Portfolio - Logical layering of Business Values

Cloud computing can be thought of as four distinct waves of Innovation and business values.

Normally, these waves would be mapped to an architectural layering of IaaS, PaaS and SaaS and this paper sticks to such a layering. Each layer contains business values which may not normally be associated with architectural separations of IaaS, PaaS and SaaS.

For example, most of the customers who are making commoditized changes to infrastructure re-alignment also make decisions around moving Microsoft exchange on demand. The first layer or wave, focuses primarily on infrastructure and not just hardware and data-center artifacts, but also standard software applications. The second wave focuses on building an operating environment.. Full-fledged “operating systems” which manage the cloud-ization of applications, management of resources and additional functionalities associated with integration and tools of IT departments.

The third focuses on key processes and functional areas. These are mostly covered by ERP systems and application packages that implement key business processes. ERP systems that have the security cocoons and multi-tenant support necessary for working within cloud environments are already available in some cases and some more are to come.



Finally, some companies and organizations are beginning to think about moving entire business areas that are entirely cloud-based. According to authors, this will represent the biggest shift in revenue models, wrought by the emergence of cloud computing.

The next few sections delve into the specifics of each wave or layer and what can be expected.

Infrastructure Cloud - IaaS and beyond

Infrastructure cloud focuses on providing computing power as a service, with flexible pricing options. The customers are given complete access to desktops and servers and are charged in terms of CPU hours, storage space and bandwidth consumed and applications.

Customers get significant cost advantages and can save up to 80% of the IT CAPEX and upto 50% of IT OPEX. There are three distinct components within this layer to build business value:

1. Data Center and infrastructure consolidation

Movement of data and resources to ensure cost advantage and carbon footprint savings

2. Infrastructure Management

Remote and autonomic management of infrastructure towards global scalability

3. Simple Application Migration

Movement of mail servers, basic web infrastructure to cloud environments, such as through MS-BPOS (Business Productivity Online Suite) and Google Apps.

Existing industry efforts involve traditional hosting service providers offering cloud-based hosting options to survive in the market. A range of varied-sized hosting players are evolving such as Rackspace, Flexiscale, Go Grid, Amazon, Google, IBM and Microsoft. There have been significant investments from large players to build clouddatacenters. For example, Microsoft is planning to invest USD 20 billion over next 10 years to build 20 datacenters, each costing USD one billion each⁵ - four of these have already started operations.

By and large, most SIs are building internal cloud infrastructure to host internal services and creating alliances with vendors to give themselves a broader set of customer services; vendors such as CA, BMC, NetSuite, Eucalyptus and so on. Virtualization and outsourced management offerings are also available from most of them.

Innovations in this space are quite significant. Some large players like Google and Sun (now Oracle) have opined about a datacenter strategy that puts computing infrastructure in shipment containers so that datacenters can be hosted in the middle of the sea⁶ and power these data centers through electricity generated from waves. This is changing the definition of a green datacenter. Another area of innovation will involve optimization and autonomies. This involves selfchanging cloud configurations for cost management and green footprints.

Some other relevant industry examples include:

NASDAQ adds 30GB to 80GB of trading data everyday at Amazon S3. The initial monthly bills received from Amazon have been as low as USD 5.

Source: Azure Journal⁷, Amazon⁸, InfoQ⁹

Eli Lilly reduces server deployment time from 7.5 weeks to a few minutes by leveraging Amazon AWS on-demand server provisioning.

Source: InformationWeek¹⁰, GenomeWeb¹¹

Volantis saves USD 30 million in rolling out a new service for users by not having to purchase, deploy, and manage a new storage infrastructure.

Source: Microsoft Case Study¹², Volantis¹³

Animoto Productions on Facebook scales up from 40 virtual machines to 5000 in four days using Amazon cloud.

Source: PCMag¹⁴

Federal Agencies use Microsoft Azure to store data for Open Government Data Initiatives as part of Data.gov.

Source: RedDevNews¹⁵ Azure - OGD¹⁶

Application Development Cloud - the operating environment as PaaS

No surprises, that Cloud environments also need “operating systems.” Most grid systems and cluster computing systems have eventually moved towards supporting some form of operating environment software and so are cloud deployments. Full-fledged operating systems for the cloud are on their way and recent editions have gained significantly in their sophistication, particularly, Azure from Microsoft and VMForce from Salesforce.com. The key business value here is twofold. Firstly, these environments reduce the cost of operating clouds and make optimization a matter of simple configuration.. Secondly, this layer allows accelerated deployment of applications with simple contextualization for customers and essentially allows for better responses to the marketplace and customer demands. Expected analysis on such accelerations show a 30-40% improvement for customers. Strategic scalability and business agility are key benefits here.

There are 4 key aspects to this layer of the business value architecture:

- **Operating Environments:** Operating systems and Cloud programming APIs are being introduced to allow for cloud-ification of applications or creation of new applications custom-created for the cloud. As stated, Azure and VmForce are the main proponents here although smaller players exist. Load balancing, security, exploitation of multitenancy are part of the services offered.
- **Development Studios and Sandboxes:** Many companies are introducing visual development studios as well as testing sandboxes to safely test cloud-based applications. Migration tools are also available to simplify this process.
- **Infrastructure tools:** These tools are coming up in the market. BI/DW tools, collaboration & social computing tools would also be added to most of the cloud operating environments. Some of these are from operating environment providers, while in other cases standard BI/DW and collaboration tool providers cloud-enable their tools. Nontraditional players like Cisco are also jumping into this fray, as exemplified by the introduction of Quad.
- **Integration Environments:** Integration as a Service has been around for a while, but they’re now getting tied to cloud environments. Some take the shape of Application Exchanges such as at Salesforce, while others take very specific form of data migration services such as those provided for by Informatica.

Innovation is a common factor in each of the four aspects Many of the functionalities introduced in the operating environments and tools will make the work of Layer-1 (Infrastructure Cloud) easily configurable. Infrastructure cloud will see many development and infrastructure tools as well. BI tools for cloud environments is a key addition that will increase in significance as vendors provide more functionalities in this space.

For SIs, this layer affects the application development work. The focus is on acquiring capabilities in specific application areas and each capability is converted to develop and build special migration tools. Platform offerings and application offerings is expected from ISVs and SIs.

Some industry examples include:

CA acquiring 3Tera, NimSoft, NetQoS etc service performance platform. Source:Journal¹⁷

SAP bought BusinessObjects and oCo for the on-demand business intelligent platform offering. Source: SAP¹⁸

SalesForce offers ecosystem for ISV Cloud/SaaS Onboarding and claims applications development five times faster and at half the costs on Force.com platform. Source: Salesforce.com¹⁹

GlaxoSmithKline reduces 30% of the IT operations cost by standardizing on Microsoft Online Services. Source: MS Online Blog²⁰

GSK Annual Report²¹, GoodData delivers SaaS Business Intelligence for USD 500 per month. Source: GoodData²²

Tata Motors, Citibank, ABB etc use Cordys BPM cloud. Source: Cordys²³

Functional Cloud - SaaS for ERP

While Layer1 and Layer2 of the business value architecture deal with infrastructure and applications Layer3 is around functionally focused cloud-support. Examples include CRM cloud, Service cloud, Billing cloud, SRM cloud, and software distribution & licensing and so on. Tactically, such applications and process support in a cloud environment allow enterprises to try something new with almost no CAPEX and pricing systems.. Contextualization for individual customers and scenarios become easy and innovation costs get amortized. Long lead ERP modifications or process changes become simpler. This leads to accrual of global virtual enterprise benefits for small and medium companies. Technology enables companies to monitor, measure, customize, and bill for asset-use at a much more fine-grained level. Asset owners can therefore create services around what have traditionally been sold as products.

Key focus areas include:

1. ERP applications: Various functional applications and even verticalized applications, such as CRM, Billing, SRM and others fall into this category. Larger companies will prefer such services and go into a private cloud, while others may opt for an Amazon or any other deployment.
2. Processes: Entire processes, such as order taking or service request processes may move to the cloud. Such steps have already happened to some extent in customer care New generation platform BPO offerings has elevated maturity of process outsourcing giving superior service to clients.
3. Rapid BPI: Due to superior instrumentation and multitenancy support in upcoming cloud based systems, consultant-only based approach to process transformations will see significant changes. Rapid tools-driven detection of process and functional changes on a per customer or per customer category, will enable more agile organizations.

Not surprisingly, the ability to transition enterprises from custom, fragmented functional support that they currently use to more centralized, partial or full cloud based ERP processes and functional support are a determining factor. Companies like Salesforce have demonstrated that such models work.

SIs like Infosys offer platform BPOs that are essentially functional cloud offerings in the areas of: Procurement, HR, Legal & Knowledge Services. Flypp from Infosys is a functional cloud offering geared for telco service providers. Most SIs are expected to partner with large ERP vendors like SAP, Oracle, Microsoft and Salesforce to offer configuration, deployment, customization, maintenance and migration services on ERP offerings.

Some of the industry examples:

SalesForce offer Service Cloud, Sales Cloud and Custom Cloud apart from CRM cloud offerings. Source: Salesforce²⁴

Pitney Bowes intends to collaborate on delivering Its

dMail™ solution (corporate digital mail & document processing solution) via Microsoft's Cloud Platform. Source: Microsoft²⁵

Large ERP players like SAP, Oracle as well as other small ERP players like SugarCRM have started offering ondemand ERP solutions on cloud. Source: SAP²⁶, Oracle²⁷, SugarCRM²⁸

Also in a press-release, the French auto manufacturer Renault^{28a}, stated that the company has taken global collaborative product engineering approach to boost innovation & productivity of its global work-force.

Business Cloud - entire businesses as Services

Layer4 Business Cloud is showing signs of early emergence. As components of a global virtual enterprise develop, the next step is to move entire business models and business segments to the cloud. So in a manufacturing cloud application, processes, support and sales could move to a cloud infrastructure. Entire IT ecosystems of a particular business sub-vertical or industry segment could shift to a cloud environment. For example, an auto business cloud could offer end-to-end business processes & application ecosystems for car manufacturers, suppliers, dealers and customers. Features and IT capabilities in this layer are hard to enumerate and specific examples of such business clouds, include:

Retail Clouds

Early versions in Amazon's support for small retailers were found but are now being pursued by several large OEMs. The focus is to support different demographics of buyers and buying patterns across the globe and also use such clouds to provide OEM retail operations, supporting better global inventory management and optimizing responses to shift in orders or supplies.

Agri-Connect Clouds

As the need for agricultural productivity grows, several companies in this space are aggressively chasing plans to create business clouds that provide a variety of services to their customers, from device-based access to precision farming needs to better connectivity between buyers and sellers of large quantities of produce.

Innovation here is the driving factor and several kinds of business clouds will be tried. Most of which will fail, but some key ones in the supply chain and retail space are expected to succeed.

Existing examples of business clouds or efforts which are close to the concept of business clouds include:

FedCloud²⁹ will offer the whole ecosystem and infrastructure as well as applications for all Federal Services. Similarly, LegalCloud³⁰ offers an ecosystem for legal businesses; NetSuite³¹ offers Manufacturing ERP on cloud. Finacle from Infosys is an early example of what could become a business cloud offering for the BFSI sector. HP has recently implemented the Manufacturing Cloud³² for food-industry in Canada & Australia.

Some of the industry examples include:

Federal Government launched Apps.gov that provides a library of SaaS offerings for agencies to procure via credit card and also supported by US GSA eBuy. Source: Apps.gov³³

Microsoft, Google and IBM are working on developing various applications for Healthcare Cloud with various health-care clients. Source: Internet Evolution³⁴

Infosys cloud-based solution for the automotive industry would simplify the process of sharing inventory and other data between dealerships in a network. Source: Infosys³⁵

Retail Cloud brings simple to manage retail management POS system. Source: Retail Cloud³⁶

Summary

The business value architecture outlined sets the categorization and drivers for various layers of opportunities in the cloud space. Interestingly, what Infosys finds is that this model of thinking structures innovations in the Cloud space. The focus is determining when (and where) to engage in Cloud Computing in order to maximize benefits. At the end of a business value architecture, there should be sufficient information and analysis to develop a vision and reach a decision about adoption approach.

Businesses are realizing that there is no one way to support Enterprise Architecture (EA). Decisions may be heavily influenced by business context and the organization's business landscape, people, experience. Hence organizations could treat Cloud Computing as a standalone program and make others comply, or link Cloud Computing with existing enterprise initiatives. Such an alignment would be good, but it may delay the rollout of cloud computing to the enterprise. The reality is that most organizations do not apply a single approach to EA in a pure form. Rather, a number of different approaches in different areas are used, resulting in a blended reality that truly meets the needs of business. This seems like a good fit wherein, one selects the right candidate project, creates a roadmap, identifies gaps, and incrementally implements and rolls-out a computing program towards the defined vision of the organization.

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In the past, he has been the Global R&D head for Hewlett Packard's Web-Services (then called E-Services) product lines, Principal Scientist and Head of Strategy Research Organization for HP's Services business, Architect at Sun Microsystems and the CTO for several tech. startups in the Manufacturing space.

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