CLOUD MIGRATION STRATEGIES

Faculty Contributor: Dr. Rahul De
Student Contributors: Mayur Agrawal, Sudheender S

Abstract

This article identifies the common challenges that typical IT managers face while deciding to move to a cloud based model. It also discusses the various reasons behind the wider adoption of cloud by organizations and the common model used by cloud providers when transitioning applications and platforms into the cloud and analyzes the cause and effects. Finally, a monitoring framework which can be used while overseeing the cloud transition process is proposed.

Introduction

The origins of the cloud platform can be traced back to the 1950s when mainframe computers were prevalent. Gradually, the technology of Virtual Machines introduced the concept of abstracting hardware into a set of computational resources which could be loaded on top of existing hardware. Cloud computing is the next phase of resource abstraction.

The familiarity and understanding of cloud computing has immensely improved in the last three years. IT decision makers in organizations are now looking at how cloud solutions can go beyond the usual benefits of availability and security and create value for them.

We focus primarily on the Platform as a Service (PaaS) model, where cloud service providers typically provide developers with an environment to develop their applications without having to invest in the underlying hardware and software.

Mature v/s Immature Markets

The mature markets have an existing large installed base of legacy. By virtue of being exposed to the latest in technology, they already use solutions such as ERP, Customer Relationship Management (CRM) etc. in order to remain profitable. This is in direct contrast with immature markets where most of the cloud solutions are green-field implementations since there is very less technology penetration in the organizations, especially in the case of SMEs.

Customers in the mature markets look at cloud services as a method to provide value added services whereas those in the immature markets look at the availability, performance, reliability and security aspects of cloud services. Due to a large presence of legacy systems, customers in the mature markets also tend to be apprehensive of cloud services as they are unsure about the feasibility of these services being able to integrate backwards with the existing installed base.

Reasons for Cloud Migration
Reducing Total Cost of Ownership

The choice of in-house development or cloud adoption is more of a strategic choice rather a financial one. When a particular business need has to be met by doing it in-house, it includes the costs associated with acquisition & maintenance of running it in-house. Also, it would include Organizational costs of training the existing IT department of doing it, adding capabilities in the organization or setting up a new team with necessary capabilities of doing it in house.
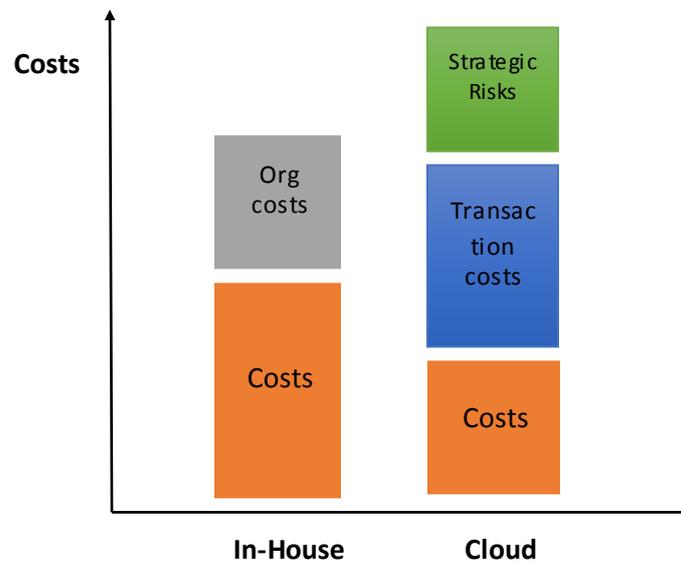
Additionally, there are transaction costs which include the costs associated with searching & evaluating suppliers; and with drawing, enforcing and negotiating contracts. The strategic costs are also considered while adopting cloud, which refers to the risks associated with data loss, data availability and trust violations with cloud provider.

The costs associated for each of the options are different for each company and the cumulative costs is what ultimately governs the decision of either doing it in-house or implementing it over the cloud and choosing an appropriate cloud model. Example, start-ups preferring the cloud model for flexibility versus a high profile investment bank preferring an in-house model for security reasons.

Scalability

Businesses are faced with different kinds of resource constraints ranging from computing power, memory and turnaround time. The elastic nature of cloud computing allows users to rapidly provision and release resources based on business demands.

Rapid Availability

Today, businesses seek immediate results and low turnaround times. Cloud has empowered businesses to deploy software solutions rapidly and at the same time are easy to plug and play. The on-demand self-service capability allows users to automatically provision and release the computing resources.

Co-creation

Cloud as a platform is now enabling co-creation of content where customers engage with technology providers to shape requirements, develop products and improve it incrementally. With the equipped knowledge of a functioning system, customer is better able to articulate and specify key requirements which traditionally very late in the development cycle.

'Last mile' connectivity

Managing a distributed workforce on the field and having an information flow are some of the key challenges, especially in rural areas. This is typically referred as the last mile problem. Cloud technologies such as web-based applications, mobile and tablet friendly interfaces and offline data security have enabled companies to go the last mile.

Performance

The measurability aspect of cloud brings in transparency and allows the users to constantly monitor and report the usage of the computing resources.

Challenges Faced by Organizations during Transition to the Cloud

- **Conflict of Goals and Interests**: Centralization of the IT function may result in differences between departments that need to cooperate for better utilization of the cloud.
- **Commitment towards Cloud Adoption:** The commitment levels of the key decision makers will vary depending on their personal motivation and understanding of the cloud.
- **Power Shifts:** Adoption of a cloud based solution will invariably lead to loss of decision making rights with certain stakeholders.
- **Infrastructure availability:** In immature markets such as India, high speed and reliable internet connectivity is a major challenge faced by many organizations.
- **Data Security:** The integrity and security of the data hosted in the cloud has to be ensured.
- **Vendor Lock In:** If the organization is *locked in* to the vendor, it will not be able to off board or migrate to an alternate service providers due to the high switching costs.

Transitioning to Cloud: Agile Iterative Model

The agile model is one of the most widely used models1 in software industry where requirements and software solutions evolve over various stages. It helps in adaptive learning, flexible response to change and continuous improvement. Normally, the software cycle is broken down in sprints to get certain part of functionality delivered to the customer to get his feedback.

Because of shorter product lifecycles and faster go-to market strategies, companies are inevitably turning to cloud to meet their hurried and sudden business requirements. The critical challenge that cloud service providers face is to balance the immediate needs of the customer while building an integrated long-term solution for the customer. This is accomplished by building and deploying a rapid prototype version of the IT solution in line with customer's immediate requirements. This helps the customer comprehend the product much better and allows him to specify requirements in much more concrete form.

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[1] http://www.versionone.com/pdf/7th-Annual-State-of-Agile-Development-Survey.pdf

Additionally, it helps the cloud provider build solutions exactly according to customer requirements. The rapid deployment time and instant feedback loop provide a channel for continuous functional testing.
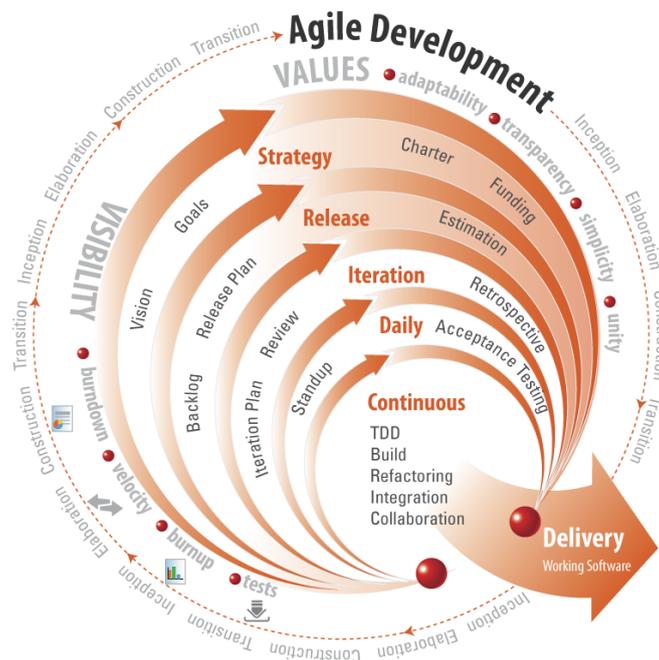
Figure: Agile Development Model[2]

Framework for Cloud Migration

Business Justification

The decision maker needs to be aware of the business need of the migration activity and has to ensure that the current model, provider and schedule meet the requirements of all the stakeholders involved in the migration process. The major trade-offs involve those between convenience, security and privacy.

Cloud Provider Selection

The table depicted in Exhibit 1 captures some of the parameters that need to be considered when evaluating a cloud service provider.

Transition Process Monitoring

Specifically, the IT manager should look forward into the process and determine if the Cloud Service Provider (CSP) has planned and accounted for the various integration touch points with the existing legacy systems. One should clearly communicate and plan for any such integration activities right from the beginning of the migration activity. The CSP should be mandated to provision resources for building prototypes and proof of concept models in order to seamlessly integrate with the existing systems once the core solution has been developed.

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[2] http://ciosp3.us/is-agile-development-good-for-health-it/

Establishing Controls

It is the prerogative of the IT manager to draw the boundaries when it comes to storage of data and ensure that sufficient control mechanisms are established within the premises in order to retain control over the data used and produced by the organization.

Insist on Open Standards

With low levels of standardization in the cloud services industry, there are high risks of vendor lock-in, legacy costs, migration costs and high exit costs. Considering the mentioned disadvantages, an organization should insist on open standards and interfaces for integration with the existing systems.

Contracts

The phase of contract negotiation is a crucial part of the cloud transition process. This is because the contract is the only document which can be used in the legal system in case of a legislation or dispute. Hence, the customer organization has to consider the following aspects of the contract before finalizing the same.

- **Damage Liability**: It is the duty of the customer organization to push back and ensure that the CSP accepts total or partial liability for the services offered.
- **Service Level Agreements (SLA)**: It is imperative that the customer organization finalize the key performance metrics based on which the SLA can be negotiated and finalized.
- **Availability**: Details such as frequency of backups and contingency plans in case of natural disasters and emergencies need to be called out in the contracts.
- **Ownership of IP**: Customer organizations usually develop multiple solutions based on services offered by the CSP through exposed interfaces and APIs. Hence, it's crucial that there should a provision for IPR (Intellectual Property Rights) over applications developed by the customer organization.
- **Grounds for Termination**: The grounds for termination of the contract, liabilities for termination and exit checklists should be clearly discussed and mentioned in the contract.

Change Management

The adoption of the cloud model introduces many changes in the processes, practices, technologies used and skillsets required by the organization. These changes have implications at the organizational, managerial and non-managerial levels.

At the organizational level, the introduction of cloud enforces standardization across practices and technologies used in order to ensure continuous communication between various business verticals.

At the managerial level, managers will need to be educated about the merits and demerits of different types of cloud models. This will ensure that they are ready to perform due diligence on the chosen models and effectively contribute to the decision making process.

Lastly, at the non-managerial level, employees will need to be trained and familiarized with the concept of shared services, cloud deployments and virtualization. They will need to be educated about the intricacies involved in data sharing, provisioning of resources and using thin clients for activities such as development, testing, data analysis, etc.

Emerging Trends

App Marketplace

With maturity of the cloud platform, there is an emergence of Enterprise App Platforms similar to App Store in iOS and Google Play in Android platforms. These platforms have ready to use applications for various interfaces like workstations, mobiles and tablets specific to functional areas and industry verticals.

Changing Role of CIO

The increasing competition is forcing companies today to seek immediate results, which is why they don't want to be tied down by the constraints of the current IT setup. Business units today don't hesitate to go out to the market to seek a solution that delivers their immediate needs. The role of CIO has evolved quite a lot and is now looked at an enabler to achieve business results and has thus expanded scope of reach and power. It is part of CIO's mandate now to respond to BU's (Business units) sudden and urgent demands using the capabilities either in-house or from an external vendor.

Changing Regulations

Cloud models that use public or hybrid models changes the dynamics between an organization and its information, with presence of an external party, i.e. the cloud provider. This creates new challenges in interpreting how laws apply to different scenarios. In developed markets like US or Europe, they are restrictions on where data is stored and transferred, as well as security clauses. Some laws apply to specific markets like Healthcare and banking as well.

Conclusion

Cloud has already presented itself as a major force altering the dynamics of the industry and enabling companies to do business better. It is inevitable that an organization would move to cloud in one form or another. So, it would be wise to be prepared to make the transition, and it is for the better. As explained in the paper, there are multiple aspects that need to be kept in mind while making the change. It is expected that the presented aspects and frameworks provide guidance for managers to make the best decision.

Authors

Mayur Agrawal (PGP 2013-15) holds a B.E degree from Manipal Institute of Technology, Manipal in Computer Science and Engineering. His interest areas include corporate strategy, technology and operations. He can be contacted at mayur.agrawal13@iimb.ernet.in .

Sudheender S (PGP 2013-15) holds a B.E degree from P.E.S. Institute of Technology, Bangalore in Computer Science and Engineering. His interest areas include MIS, digital marketing and social service activities. He can be contacted at sudheender.s13@iimb.ernet.in .

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Exhibit 1

Parameters	Rationale
Application Architecture	The manager should check if the architecture of the proposed cloud solution matches with that of the existing systems. This will help ensure a smooth transition into the cloud model once deployed.
Ease of Use	The manager should consider how easily the services delivered by the CSP can be used to create value for the organization. Concepts such as ease of provisioning, scalability and support should also be taken into account
Migration	Some of the large public cloud providers do not provide any services that help in migration of your existing services. Checking if the CSP provides any such services, will help the organization avoid any learning curves and complete the on boarding on schedule.
Past History	Checking the reputation and past experience of the CSP will help in establishing trust and reliability in the migration process.
Existing Systems	The manager can also try to evaluate the ease of integration of the cloud solution with the existing legacy systems in order to ease the process of transition. This also helps facilitate easier knowledge transfer post the transition.
Support	The CSP should be asked to provide for adequate support and handholding as the cloud model may be new to the organization. Finer details such as the support pricing model, availability and levels of support should also be discussed upon in order to avoid any issues during the transition process