

A Survey on Cloud Providers and Migration Issues

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ABSTRACT

From the most promising area of networking, the concept of using the services of cloud computing is on a great consideration nowadays. As a result it's a crucial time for corporate IT leaders to know their opportunities, innovating their creations on a higher level and utilizing their resources for new great challenges. Cloud computing potentially aims in making an organization more agile and cost effective. Keeping in way all the advantages that a cloud accommodates in its working, still the decision makers have a difficult eye on 'how' and 'why' to adopt cloud. This paper discusses some of the important concerns that a corporate developer might have before radically shifting to use the services provided by the cloud and also gives an enlightened solutions to those concerns.

Keywords

Cloud Computing, Virtualization, Cloud Migration, Cloud Providers, Research Group.

1. INTRODUCTION

Cloud Computing is a simple way of creating and delivering compute resources. However as said that "Cloud computing is an evolving paradigm." [1], the sources of benefits that are taken into view by the decision makers while assessing the feasible adoption of cloud computing can be listed as:-

- Ease of cash-flow management.
- Opportunities to offer new products and services.
- Rapid Organization growth.
- Improved status of the technology used.
- Improved satisfaction of work.

In September 2011, the National Institute of Standards and Technology (NIST) released Special Publication SP 800-145, in which it defined cloud computing as:- "Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models." [1]

But along with these open minded advantages of shared resources and virtualization, comes risks that cause a degree of confusion in utilizing a cloud environment over a traditional in-house data center. Some of the risks that were studied when an enterprise IT system was migrated to IaaS (Infrastructure as a service) [2] were:-

- Deterioration of customer care & service quality.
- Decrease in satisfaction.
- Departmental downsizing.

- Uncertainty with new technology.
- Lack of supporting resources.
- Lack of understanding of the cloud.

So, while making a cloud a boon or curse for your organization, it's important to figure out the type of cloud you want to work with and who will be the provider. The deployment of cloud could be done in three ways:-

Public cloud here the cloud computing service providers (CCSPs) use public internet or WAN to provide the services which could be prevailed by different organizations.

Private cloud where centralization of all the servers of an organization to one of its data center is done within the same IT environment. Moreover no sharing of physical servers and networking resources is made.

Hybrid cloud According NIST [3], "Hybrid cloud is a composition of two or more clouds (private, public or community) that remains unique entities but are bound together, offering the benefits of multiple deployment models. Extending its explanation it can also be defined as a connection of various clouds that permits the movement of data easily from one deployment system to another.

2. PARAMETERS: CLOUD COMPUTING

These parameters may be considered in understanding the solutions that are provided by cloud computing. As, besides weighing the factors that lists the benefits and risks from cloud provider, one should also weigh the value against traditional in-house data center and hosting options. Therefore, on priority measurement, parameters must be framed.

Table 1: Parameters providing understanding of the solutions provided by cloud computing

Parameters	
Centralization	Keeping the application resources and data stored at a central location
Virtualization	Virtualization is a key technology underlying cloud computing platforms [4], where applications encapsulated within virtual machines are dynamically mapped onto a pool of physical servers.

Automation and Orchestration	The capacity of dynamic virtualized services can be automated eradicating the manual tasks involved in their management.
Dynamic creation and movement of resources	The resources are made available dynamically “anywhere anytime”
Network	In order to support cloud computing , a cloud network must be dramatically more agile and cost effective than a traditional network.[5]
Self Service	Self-Service to allow end users to select and modify their use of IT resources without the IT organizations being an intermediary.
Usage sensitive chargeback	i.e. pay-as-you-go.
Simplification	Applications and the services provided by the IT are simplified.
Standardization	The development of standards of IT infrastructure
Technology Convergence	Such as convergence of LAN and SAN and of switch and server.
Multi-Tenancy	Applications hosted within a cloud are accessible to multi-users at the same time.

A survey conducted by “Cloud Computing: A Reality Check and Guide to Risk Mitigation” [6] imprinted the responses of survey respondents, listing the factors driving, or would likely drive their company to cloud computing services. Their responses were figured as:-

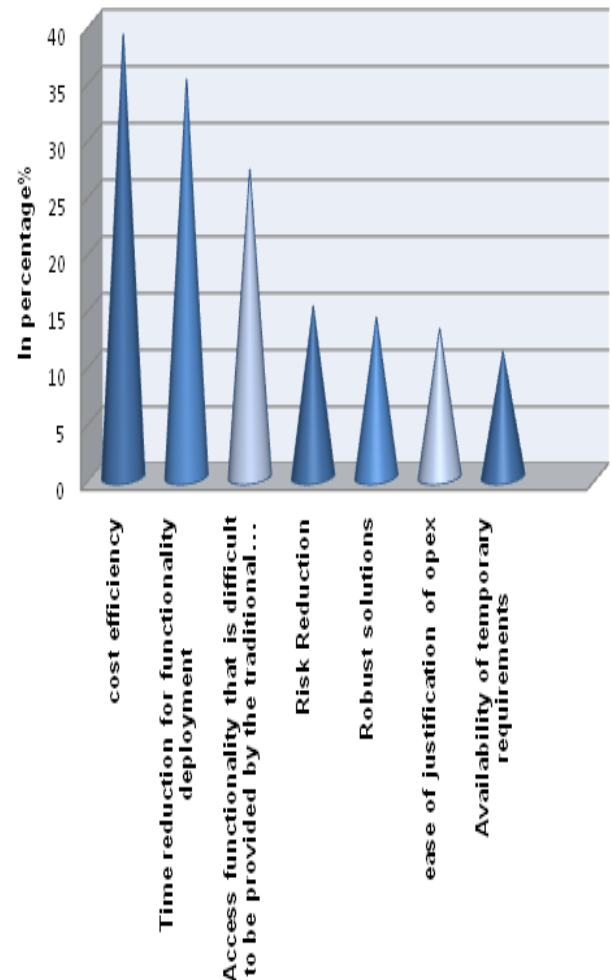


Figure 1. Drivers of Cloud Computing Service

Andrew McAfee, in his report “What Every CEO Needs to Know About The Cloud” [7] stated that when an organization decides to use the cloud services , it should first start running experiments with SaaS (Software as a service) and then gradually shifting to developing the applications on cloud. Cloud computing surely has various surprising advantages but eventually the transformation should be lead by the right people.

3. CLOUD COMPUTING PROVIDERS

Today, in this era where everybody is fighting to earn best, it’s hard to identify the provider that could know the specifications with a perfect understanding and offering the best solutions. Therefore, before choosing the provider, it’s important for an

Table 2: Top 10 ranked Cloud provide

RANK	Cloud Computing Service Provider	About The CCSPs	Top Executive
1.	Amazon Web Services, Seattle, WA, USA	Amazon Web Services (AWS) launched in 2006. Amazon has data centers in the U.S., Europe, Singapore, and Japan.	Jeff Bezos, CEO
2.	Rackspace, San Antonio, TX, USA	Rackspace’s cloud services launched as Mosso in 2006. Company revenues now exceed \$1 billion.	Lanham Napier, CEO
3.	Savvis (CenturyLink), Town & Country, MO, USA	CenturyLink company, Savvis has 50 data centers (with more than 1.5 million square feet) in North America, Europe, and Asia.	Jim Ousley, CEO
4.	Equinix, Redwood City, CA, USA	Equinix connects more than 4,000 enterprises, cloud, digital content and financial companies	Stephen Smith, CEO
5.	NaviSite (Time Warner), Andover, MA, USA	NaviSite provides cloud-enabled hosting, managed applications and services..	R. Brooks Borcharding, President
6.	Computer Services Inc., Paducah, KY, USA	SI is one of the largest service providers focused on financial institutions, with an emphasis on compliance monitoring	Steve Powless, CEO
7.	SoftLayer, Dallas, TX, USA	With 100,000 servers under mangement, SoftLayer claims to be the largest privately held IaaS provider in the world.	Lance Crosby, CEO
8.	Layered Technologies, Plano, TX, USA	Layered Technologies focuses on compliance-based cloud services, having acquired FastServers.net (managed hosting) and GreenSoft Solutions (PCI compliance) in 2010	Jack Finlayson, CEO
9.	LogicWorks, New York, NY, USA	Logicworks provides cloud computing and managed hosting to Dow Jones, Lincoln Center for the Performing Arts, Orion Health	Ken Ziegler, CEO
10.	Apptix, Herndon, VA, USA	Apptix hosted services support more than 350000 users around the world. The company’s core focus includes hosted Exchange VoIP, SharePoint, Web Conferencing, and Secure IM with Presence.	David Ehrhardt, CEO

organization to formulate its demands and expectations. To do this, one should have a detailed knowledge about the Cloud Computing Service Providers (CCSPs) and their offerings. A recent January-April 2012 survey done by “The Talkin’ Cloud 100 survey “[8] listed 100 CCSPs and ranked them in order of the quality of service they provide. The list of top 10 CCSPs working across the globe is given in Tabel2.

Apart from these cloud providers there are a lot working forums and research groups working in order to provide highly demanded offerings for organizations. Cloud

Computing offers supercomputer’s like high performance but to avail such a performance one needs to work on a correct domain and with a correct provider

4. RESEARCH GROUPS

There are various leading research groups working towards making providing better solutions through cloud.

Table 3: Research Groups

S.No.	Research Group	Work
1.	The International Working Group on Cloud Computing Resiliency (IWGCR)	Telecom ParisTech formed this group in March, 2012. IWGCR along with Paris 13 University published the first Availability Ranking of World Cloud Computing (ARWC) on June 18, 2012.
2.	ITU-T Focus Group on Cloud Computing (FG Cloud)	Was established further to ITU-T TSAG agreement at its meeting in Geneva, 8-11 February 2010 followed by ITU-T study groups and membership consultation. It was successfully concluded in December 2011.
3.	The International Working Group on Data Protection in Telecommunications, the so-called "Berlin Group"	Aims in making public cloud more trustworthy by implementing privacy using design technologies and legal guidance. For achieving this they support projects like TClouds. The group has also published a working paper on cloud computing in the wake of its 51st meeting in Sopot (Poland)
4.	Ian Sommerville	Projects <ul style="list-style-type: none"> • Cloud computing for Large-Scale Complex IT Systems (2010-13). • Services to the Cloud (2011-13) • Elastic Virtual Infrastructure for Research Applications (ELVIRA) (2011)
5.	Gartner	Focuses on Big Data, Smart Devices, Cloud Computing, Maturing As Technologies, BOYD Rises. Recently published a report on” <i>Hype Cycle for emerging technologies 2012</i> ”

6.	The DSA (Distributed Systems Architecture) Research Group at Complutense University of Madrid	conducts research in advanced distributed computing and virtualization technologies for large-scale infrastructures and resource provisioning platforms.[9]
7.	Cloud Computing Futures (CCF),	Led by Dan Reed, director of Scalable and Multicore Systems . The group focuses on reducing the operational costs of data centers and increasing their adaptability and resilience to failure[10]
8.	Cloud Data Governance Working Group	Two key phases of Data Governance research: 1.SurveyPhase- When stakeholders work in order to govern and operate the data in cloud, their needs and requirements should be taken care of. Survey phase has the objective of understanding these requirements. 2.BestPractices Recommendation Phase- problems and questions identified by Cloud stakeholders in Phase 1 are prioritized and answered
9.	SPEC Research group	In this increasing era of Cloud Computing, there is shift in server usage and the way of measuring their performance. To signify this shift, SPEC has started two separate working groups to investigate this area: one under the Research Group (RG) and the other under the Open Systems Group (OSG).
10.	OSG Cloud Group	Working aim of this group is to determine the current SPEC benchmarks and hoe they could be modified to fit the Cloud framework and to evaluate the need for defining new benchmarks that would fit the framework

11.	RG Cloud Group	Focuses on developing notified benchmarks (referred as <i>research benchmarks</i>) that are intended to be used for understanding Cloud behavior and performance on a larger perspective, and may not necessarily be standardized through the SPEC process. Therefore, it's a broader approach relevant for both academic and industry. [11]
12.	Future Computing Group	For many years the group has been working on Grid/Cloud Computing (Internet II), Green Computing, and Virtual Computing. The group targets the applications and working of next generation computing paradigms. One of its projects, a developed Grid/Cloud Computing platform conforms to the Internet standard and can universally accelerate Office/Database/Web/Media applications by a factor up to ten. This work won an ACM/IEEE Super Computing Finalist Award.[12]
13.	StACC - Collaborative Research in Cloud Computing	Is a research collaboration, launched in April 2009 focusing on research in the important new area of cloud computing. Unique in the UK, StACC aims to become an international centre of excellence for research and teaching in cloud computing and will provide advice and information to businesses interested in using cloud-based services.[13]

5. IMPACT

Talking about the impact that Cloud has on today's organizations, we may walk along a survey done by "Cloud Computing in India", A CIO Research Center Report [14]. It was spotted that only IT/ITes share the largest industry area responding to the queries about adopting the cloud services, Figure 2.

And within their key findings, only 54% of CIOs have evaluated Cloud Computing and 46% CIOs have yet to evaluate cloud computing, Figure 3. Cloud results are remarkably measurable and satisfactory from most of the users so far. As rated by the

IBM report "Making Cloud Computing Safe" [15], the capability of cloud to utilize server/storage space has increased from 10-20% to 70-90% and today self verified standards could also be attained.

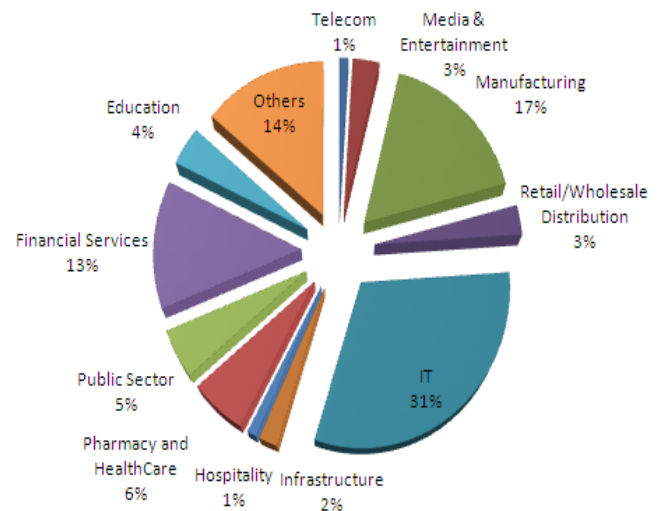


Figure 2. Response from various industries across the globe

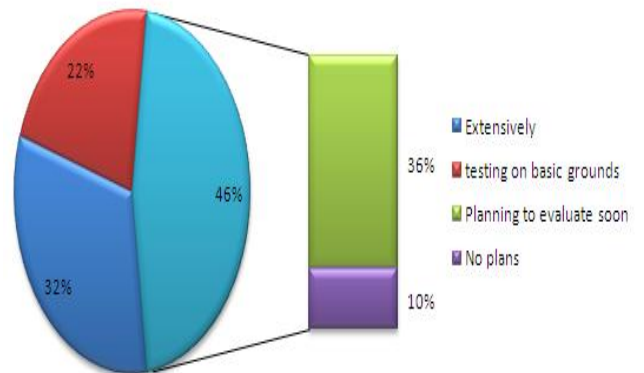


Figure 3. Evaluation of cloud computing by organizations

While continuing to work on such paradigms, cloud computing has been termed as a disruptive technology that aims in deploying a way of computing that is cheaper and is most importantly, scalable. However, cloud computing could potentially eradicate many machine- maintenance-related issues as there would be no physical infrastructure to maintain.

Despite of all such advantages, organizations still think twice or a hundred times while transferring their operations and workload to cloud. Keeping data security and privacy the primary factors, there are various more listed parameters that come forward as barriers to cloud adoption, Figure 4.

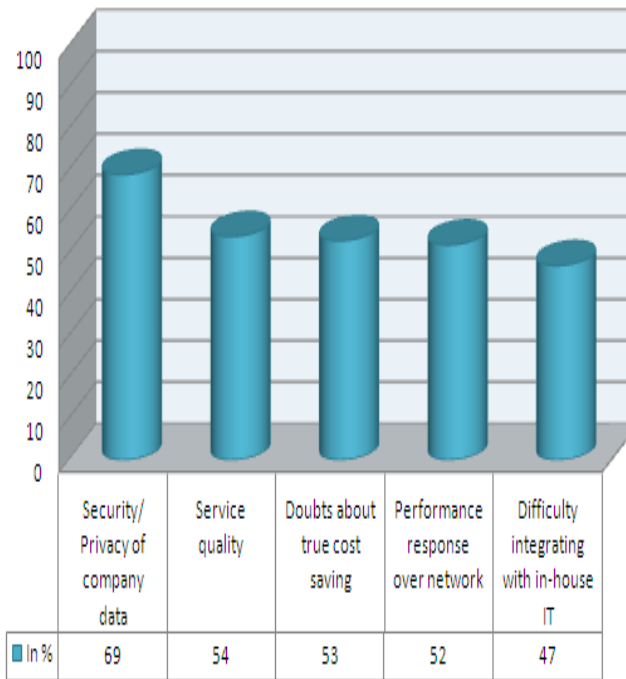


Figure 4. Rated barriers

Cloud Migration can also be supported by a set of analysis as referred by “Cloud Adoption Toolkit” [16] that talks about Technology Suitability Analysis, Energy Consumption Analysis, Stakeholder Impact Analysis, Responsibility Modeling and Cost Modeling. These steps could also help the decision framers during the adoption of cloud in the enterprise.

6. CONCLUSION

Cloud migration, when comes to an actual implementation becomes a hideous task for the decision makers to reach to a profit making and a perfect solution. The paper discusses the work of various cloud providers and research groups that are working ahead in adding the advantages of cloud services. In spite of all the progress and technology enhancements that cloud computing brings, enterprises still face some challenging problems while reaching to a decision of whether to or not to adopt cloud. Studying the applicability of cloud in various systems is a vast research challenge and also adoption of cloud needs to overlook some of the loopholes that cloud brings along but surely these loopholes couldn't be eradicated; they could only be reduced by picking the right solution and the right provider. Therefore, awareness needs to be lightened up among enterprises, making them understand what profits cloud can actually bring to their revenues and working environment.

In supporting these challenges or in other words, finding solutions to understand the pros & cons of cloud adoption for an organization, some techniques could be introduced in future, for example, the “Cloud Adoption Toolkit” [16], that focused on cost modeling and described the challenges associated with it. Similarly on the basis of some important parameters, such toolkits could be designed to make the decision making an easier job for the developers.

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