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Research Article

A STUDY ON CLOUD COMPUTING SERVICES ON BUSINESS ORGANIZATIONS IN INDIA

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ABSTRACT
Cloud computing is a better way to run your business. Instead of running your apps yourself, they run on a shared data. It is a mechanism that enables management of computing and IT infrastructure to be consolidated in one or more data center to reduce the overall cost of operating computing facilities. Through cloud computing we can access anything that we want from anywhere to any computer without worrying about anything like about their storage, cost, management and so on. In this paper I provide a review on the motivation factors of adopting cloud computing, the several cloud deployment and service models. It also explore certain benefits of cloud computing over traditional IT service environment- including reduce capital costs, achieve economies of scale, storage on demand, scalability**,** accessibility and flexibility are considered as adoption reasons for cloud computing environment.

Keywords: *Cloud Computing, Scalability, Cloud Service, SaaS, IaaS, PaaS*

INTRODUCTION
Cloud computing is one of the hottest technical topics today, with broad-ranging effects across IT, Information Architecture, Business, Software Engineering, and Data Storage (see Figure 1.1)

Figure 1.1: Cloud Computing Model

Cloud computing means that instead of all the computer hardware and software you're using sitting on your desktop, or somewhere inside your company's network, it's provided for you *as a service* by another company and accessed over the Internet, usually in a completely seamless way. Exactly where the

hardware and software is located and how it all works doesn't matter to you, the user it's just somewhere up in the nebulous "cloud" that the internet represents.

Cloud computing can be defined as a model for enabling ubiquitous, convenient and on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort from the user side and minimal service provider interaction. It is considered the evolution of a variety of technologies that have come together to change an organizations' approach for building their IT infrastructure.

Actually, there is nothing new in any of the technologies that are used in the cloud computing where most of these technologies have been known for ages. It is all about making them all accessible to the masses under the name of cloud computing.

Cloud is not simply the latest term for the Internet, though the Internet is a necessary foundation for the cloud, the cloud is something more than the Internet. The cloud is where you go to use technology when you need it, for as long as you need it. You do not install anything on your desktop, and you do not pay for the technology when you are not using it. The cloud can be both software and infrastructure. It can be an application you access through the Web or a server like Gmail and it can be also an IT infrastructure that can be used as per user's request. Whether a service is software or hardware, the following is a simple test to determine whether that service is a cloud service: If you can walk into any place and sit down at any computer without preference for operating system or browser and access a service, that service is cloud-based.

Cloud is a buzzword that means different things to different people. For some, it's just another way of describing IT outsourcing"; others use it to mean any computing service provided over the Internet or a similar network; and some define it as any bought-in computer service you use that sits outside your firewall.

Core Advantages of Cloud Computing

- Cost saving: You pay for what you use
- Easy on installation and maintenance
- Increased storage
- Highly automated
- Flexibility
- Better mobility
- Shared resources
- Back up and restoration

Disadvantages

- Data security and privacy
- Network connectivity and bandwidth
- Service unavailability due to power outage
- Dependence on outside agencies
- Limited flexibility
- Cost
- Knowledge and integration
- Long term stability of service provider

Cloud Computing Services

Cloud computing services means services made available to users on demand via the Internet from a cloud computing provider's servers as opposed to being provided from a company's own on-premises servers. Cloud services are designed to provide easy, scalable access to applications, resources and services, and are fully managed by a cloud services provider. Fig 2.1 shows the various services offered by the cloud computing.

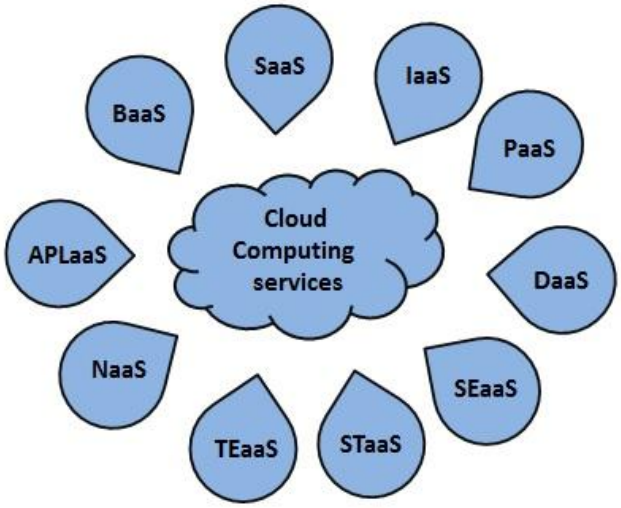

Figure 1: Cloud Computing Services

SaaS: Software as a Service

Software as a service run or cloud-based application on distant computers "in the cloud" that are owned and operated by others and that connect to users' computers via the Internet and, usually, a web browser. It is a provider licenses an application to customers either as a service on demand, through a subscription, in a "pay-as-you-go" model, or at no charge when there is opportunity to generate revenue from streams other than the user, such as from advertisement or user list sales SaaS is a rapidly growing market as indicated in recent reports that predict ongoing double digit growth.

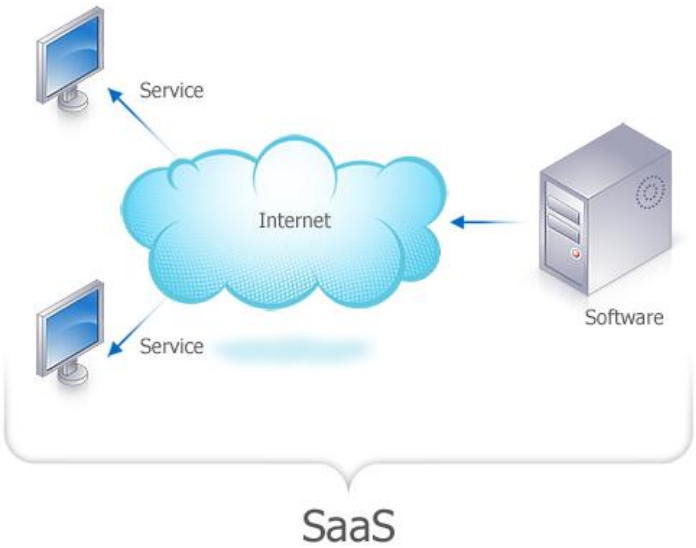

Figure 2: Software as a Service

Characteristics of SaaS

• Web access to commercial software.
• Software is managed from a central location.
• Software delivered in a "one to many" model.
• Users not required handling software upgrades and patches.

• Application Programming Interfaces (APIs) allow for integration between different pieces of software.

IaaS: Infrastructure as a Service

The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud physical infrastructure but has control over operating systems, storage, deployed applications, and possibly limited control of select networking components.

Characteristics of IaaS:

- Resources are provided as a service
- Allows for dynamic scaling and elasticity
- Has a variable cost, usage based pricing model (pay per go and pay per use)
- Has multi-tenet architecture, includes multiple users on a single piece of hardware
- IaaS typically has enterprise grade infrastructure

PaaS: Platform as a Service

Platform as a service provides a cloud-based environment with everything required to support the complete lifecycle of building and delivering web-based (cloud) applications without the cost and complexity of buying and managing the underlying hardware, software, provisioning and hosting.

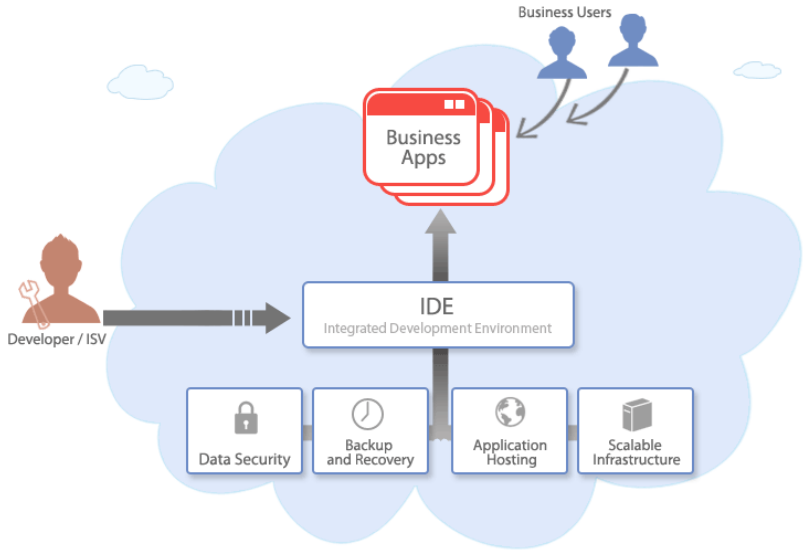

Figure 3: Platform as a Service

Characteristics of PaaS:

- Web based user interface creation tools help to create, modify, test and deploy different UI scenarios
- Services to develop, test, deploy, host and maintain applications in the same integrated development environment. All the varying services needed to fulfil the application development process Multi-tenant architecture where multiple concurrent users utilize the same development application
- Support for development team collaboration – some PaaS solutions include project planning and communication tools
- Built in scalability of deployed software including load balancing and failover
- Integration with web services and databases via common standards
- Tools to handle billing and subscription management

DaaS: Data as a Service

Data as a Service (DaaS) is an information provision and distribution model in which data files (including text, images, sounds, and videos) are made available to customers over a network, typically the Internet.

SEaaS: Security as a Service

Security as a Service (SEaaS) is to promote the use of best practices for providing security assurance within Cloud Computing, and provide education on the uses of Cloud Computing to help secure all other forms of computing.

Security-as-a-Service Offers a Number of Benefits, Including

- Greater security expertise than is typically available within an organization.
- Constant virus definition updates that are not reliant on user compliance.
- Outsourcing of administrative tasks, such as log management, to save time and money and allow an organization to devote more time to its core competencies.
- Faster user provisioning.
- Web interface that allows in-house administration of some tasks as well as a view of the security environment and on-going activities.

Some Threats on Security-as-a-Service

- Data breaches
- Data loss
- Service traffic
- Insecure interfaces
- Denial of service ranks
- Contractor

STaaS: Storage as a Service

Storage as a service (STaaS) is a business model in which a company rents its storage infrastructure to another company or individuals to store data.

According to 451 Research, Storage as a Service represents a large and rapidly growing market with a CAGR of 47% with a total market of nearly $6B in 2015.

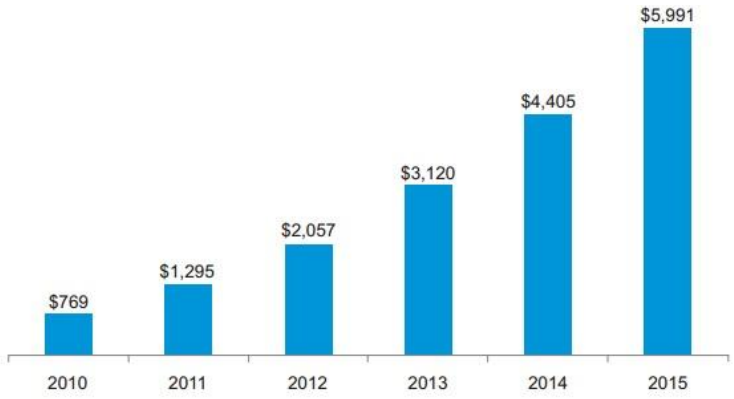

Figure 4: Storage-as-a-Service Total Revenue, source 451 Research

Storage as a Service can help you:

- Cut your data storage costs
- Increase your operational efficiency
- Improve your organization's agility

TEaaS: Technology as a Service

TEaaS is an operational model which offers technology as a service on demand. TEaaS model lowers the cost of business solution ownership, reduces the risk of technology and provides predictability of costs over time. Many businesses today are constantly seeking advanced, leading-edge technology solutions to help improve efficiency and maintain competitive advantage.

Some basic attributes of a TEaaS offer include:

- Its core value is anchored in proprietary technology
- It is offered without transferring ownership of the technology asset
- The service can be customized or personalized
- The service is exclusive for any particular customer
- The service is available on-demand

NaaS: Network as a Service

Network-as-a-Service (NaaS) is about opening the network to value added subscriber services, created by third party developer and charging for user of service on a pay as you use basis

NaaS can include flexible and extended Virtual Private Network (VPN), bandwidth on demand, custom routing, multicast protocols, security firewall and prevention.

APLaaS: Application Interface as a Service

In APIaaS model, programming Graphical user interface components can be provided as a service on pay for use basis. Application Interfaces can specify in many forms, including an International Standard such as POSIX, vendor documentation such as the Microsoft Windows API, Web APIs are also an important and widely used component of today's web fabric.

BaaS: Bachend as a Service

BaaS is an approach for providing web and mobile app developers with a way to connect their applications to backend cloud storage and processing while also providing common features such as user management, push notifications, social networking integration, and other features that mobile users demand from their apps these days.

Some benefits of BaaS are:

- Efficiency Gains
- Faster Times to Market
- App Delivery With Fewer Resources
- Optimize for Mobile and Tablets
- Secure and Scalable Infrastructure
- Stack of Common API resources

Business Application of Cloud Computing

Early in the 1960s McCarthy (John McCarthy) proposed the computing capacity as a kind of utility available to users like water and electricity. Almost all the modern day features of cloud computing (elastic provision, provided as a utility, online, illusion of infinite supplying), the comparison to the electricity industry and the use of public, private, government and community forms was thoroughly explored in Douglas Parkhill's, 1966 book, "The Challenge of the Computer Utility". The actual term "cloud ", in which the telecommunications company, who until the 1990s primarily offered dedicated point-to-point data circuits, began offering a similar service and quality, but a much lower cost to virtual private network (VPN) services. Flow balance by switching use, as they see suitable, they can use their overall network bandwidth more efficiently. This cloud symbol is used to represent the cloud cut-off point between that which was the responsibility of the user from that of the supplier. The border extends to the cloud, including server and network infrastructure. The first milestone in the cloud is made by IBM to supply an enterprise-level Web site of the application of the concept in 1999. Amazon played a key role in the development of cloud computing by modernizing their data centres after the dot-com bubble, which, like most computer networks, were using as little as ten percent of their capacity at any one time just to make room for occasional spikes. Having found that the new cloud architecture brought about important internal efficiency improvements whereby small, fast-moving "two-pizza teams" could add new features quicker and easier, Amazon initiated a new product development effort to provide cloud computing to external customers and launched Amazon Web Service (AWS) on a utility computing basis in 2006.Amazon uses Elastic Compute Cloud (EC2) and Simple Storage Service (S3) to provide computing and storage services for companies. Service charges, including storage servers, bandwidth, CPU resources, and monthly fees. Cloud computing is one of the fastest-growing businesses for Amazon.

Google is the largest user in the field of cloud computing. Google's search engine is just on the establishment of more than 200 locations in the distribution of more than 100 million of support on the server. The number of these facilities is growing rapidly. Currently, Google has allowed a third party to run large-scale parallel applications by Google App Engine in the cloud computing of Google ["A review about cloud computing", unpublished].

A. IBM Clouds

Recently, IBM keeps emphasizing their new concept of 'Smart Planet' in nearly all conferences. One major part of the 'Smart Planet' plan is the cloud computing. The IBM clouds (Blue Cloud) is the combination of grid computing and virtualization, that is to say, the Blue Cloud uses the technical ways of grid computing to integrate resources into a resource pool and then virtualizes the server, separates and offers resources from the pool due to the clients' requests.

'Servers are the base of the computer systems' is a sentence widely spreads in IBM. The Blue Cloud focuses more on the professional or enterprise markets with the strategy of selling or leasing specific servers, software and services to the various enterprise clients. IBM launched "change the rules of the game" of "Blue Cloud" computing platforms in November 2007, aimed to bring customers the cloud calculative platform which is available once purchased. It is to include a series of automation, self-management and self-repair virtualization of cloud calculative software, making global applications able to access distributed large server pool, allowing data centre operation calculation in similar Internet environment. On August 2008, IBM announced that it would invest about 4 million U.S. dollars for its operations on cloud computing data centre transformation in North Carolina and Tokyo, Japan.

B. Google Clouds

Different from IBM which locates itself as an IT company offers services, Google always see itself as a company relevant and based on the Internet; different from the Blue Cloud, Google clouds faces mainly the common users of the Internet. This is why currently Google clouds are the best known clouds to the public. The core concept of Google's clouds is to offer the service platform in which the software is not run on the clients, nor is the data stored in the clients. Google clouds gain requests from the users then return results: all process is completed on the Internet servers who offer cloud computing services – we can see examples like using office software (Google Docs) only with an Internet explorer. Technology architecture of Google cloud computing platform is shown as Figure below (Jia Xiaojing).

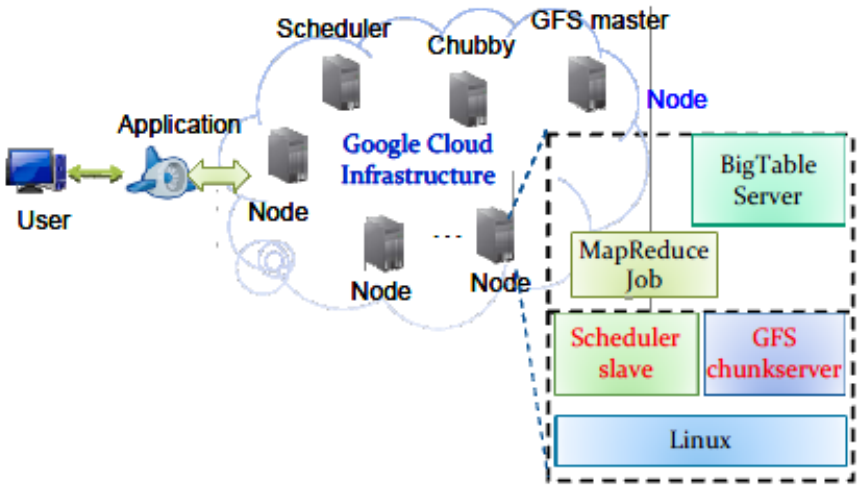

Figure 5: Technology architecture of Google cloud computing platform

In Google's declarations, 'The Google File System demonstrates the qualities essential for supporting largescale data processing workloads on commodity hardware.' By using their cloud computing technologies, the computational cost has been lowered to 1/100, and the storage cost has been lowered to 1/30. Five characteristics can result in such tremendous cost reduction:

• In Google's clouds, except the few managing nodes like GFS Masters, nearly all nodes in the Google cloud are symmetric. These nodes can store data, manage data and deal with tasks in the same time. So the cost of the equipment of nodes can be reduced by standardization and bulk purchases.
• Contributed by the data managing ways of distributed computing, the computing ability needs of individual cloud nodes is lowered so that expensive UNIX servers or SAN storage equipment's are no longer essential to offer qualified services.
• Google clouds provide fault tolerance by constant monitoring, replicating crucial data, and fast and automatic recovery. Resource redundancy rate can be impressively decreased in such way.
• The cost of software in Google clouds is very low, because the majority of Google cloud software and applications are open-source or written by Google itself.

C. Amazon Clouds

Amazon is considered to be the first company which provides cloud computing services on a large scale. Having reached the needs of offering sufficient accessing capacity, Amazon found that in much time its servers are partly used while the others remain free from load, and then began thinking of renting its idle servers to other companies. Of course, such renting is not in physical ways but on the Internet. Based on such will, Amazon develops a series of web services (Amazon Web Services, AWS), such as Amazon Elastic Block Store (EBS), Amazon Elastic Compute Cloud (EC2), Amazon Simple Storage Service (S3), etc. Amazon EC2 is seen as the first typical mode of cloud computing since it has the features of virtualization, on demand provisioning, and 'pay as you go' usage-based pricing. It is also proved that though Amazon EC2 might not be able to deal with extreme complicated scientific issues, it can easily satisfy the common computing or data managing demands of a company or an individual with no doubt. Different from both Blue Clouds and Google clouds, Amazon EC2 mainly offers service to neither enterprise nor personal usage but the software companies based on the Internet can be seen as some Sort of combination of Blue Clouds and Google clouds; Due to the strong computing ability and the mass storage capacity of Amazon clouds, EC2 attracts large amount of users and earns much money for Amazon. It is said that EC2 and other services play an important role in Amazon's defeating its rivals like EBay Inc. Society and the family now has a personal computer Which is called PC for short, of which only 30% of the computing power being used, or even lower, while the remaining 70% is actually being idle.

The idle computer resources and computing power can be used effectively only through a distributed system, which can greatly enhance the computing power of a country. And computing power is a measure of national strength and research capabilities of a country index. Cloud computing is to connect the common server or personal computer to get functions of a super computer, but at lower cost. Cloud computing is to develop both technology and economy of a country, so it has a great potentiality. Policy makers need adequate attention to this, so as not to miss the opportunity. According to a market research report from Ovum, cloud computing must be part of the ICT industry policy of each country. "National Cloud" will provide market opportunities for local ICT industry. In addition, the government can manage cloud computing according to their own demands, with its own regulations and policies, ensuring their own security requirements [Zhao Wei].

Findings

2015 State of the Cloud Report:

The 2015 State of the Cloud Survey shows that cloud adoption is growing and most enterprises are leveraging multiple cloud environments that combine both public and private cloud options. As a result, central IT teams are stepping in to offer cloud infrastructure services to their organizations while ensuring governance and control over costs. This shift of cloud adoption from shadow IT to a strategic imperative is a critical step in the move to a cloud-centric future.

- Trends in public, private, and hybrid cloud adoption.
- Number of workloads and which types are migrating to cloud.
- How central IT is taking the reins by brokering cloud services.
- Adoption rate of the most popular DevOps tools, including Docker, Chef, and Puppet.

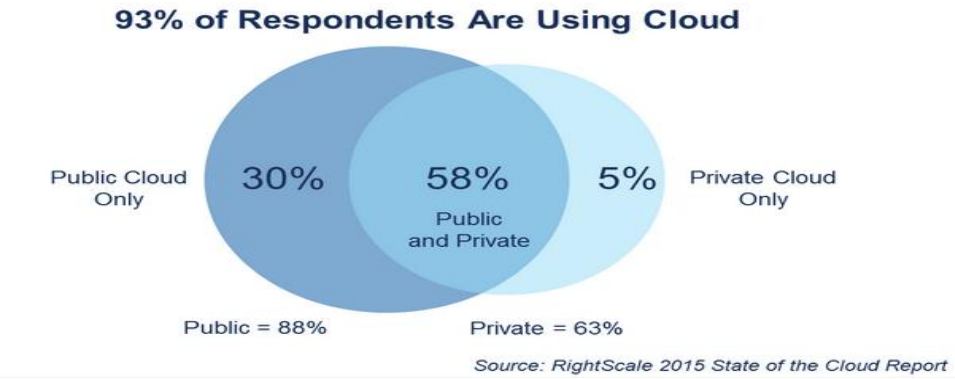

Figure 6: 2015 State of the Cloud Report

In our article, we asked technical professionals about their use of various public cloud providers, including IaaS and PaaS platforms from Microsoft Azure and Google. We wanted to dig a little further into the IaaS and PaaS data to answer a couple of questions:

How much overlap is there between IaaS and PaaS users? Are people using one or the other or a combination of both?

When we combine IaaS and PaaS offerings for Microsoft Azure and Google, how does that change the overall picture of adoption?

PaaS Users Also Use IaaS

First we looked at the overlap between users of any PaaS (Google and Azure) and IaaS in our survey. IaaS was used more broadly, and the vast majority of PaaS users were also using an IaaS provider.

Azure Users Skew toward IaaS, Google Users Skew toward PaaS

Next we looked separately at users of Google and users of Azure to determine the split between IaaS and PaaS within each provider. Among Azure users, IaaS was more popular. Among Google users, PaaS was more popular.

Combined IaaS/PaaS Adoption for Azure and Google

Because there are respondents who use both IaaS and PaaS from a cloud provider, you can't simply add the IaaS and PaaS numbers because you will double count respondents that use both. To get the combined adoption for each vendor, we analysed the data to look at the unique number of respondents who use any Azure service (IaaS/PaaS) or Google service (IaaS/PaaS). We also included the AWS adoption for comparison purposes. Although AWS has add-on PaaS-like services for its IaaS offering, it doesn't have a distinct PaaS offering.

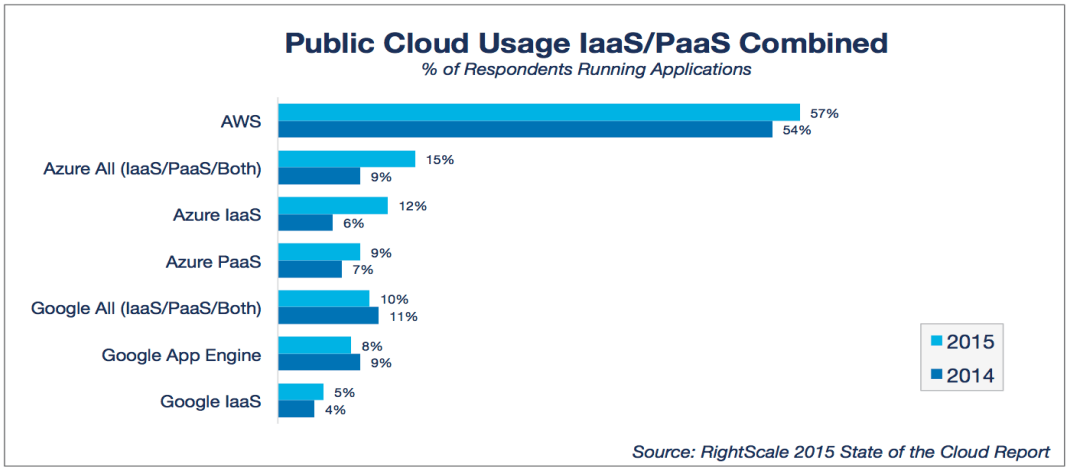

Figure 7: Public cloud usage iaas/paas/combined

Compared to 57 percent of respondents who are running applications in AWS, 15 percent are running applications in either Azure IaaS or PaaS, and 10 percent are running applications in either Google IaaS or PaaS.

IaaS Is Winning

Overall there is much higher IaaS adoption. IaaS is used more than PaaS among Azure users, while PaaS is used more among Google users. Both Azure and Google have seen stronger growth of IaaS adoption over the past year compared to their PaaS offerings.

MATERIALS AND METHODS

Methodology and Participant Profile

A total of 289 respondents completed the survey.

Size of Organization

Forty percent of respondent organizations have 10,000 or more employees, 33 percent have 1,000 to 10,000, and 27 percent of respondents are in firms with fewer than 1,000 employees.

Seniority

A fifth of respondents (19 percent) are executive management or board members, just under a third are senior management (31 percent), and just over a third (37 percent) are middle management. Thirteen percent come from other grades.

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Key Industry Sectors

Twenty-one percent of respondents are in technology, 13 percent work in manufacturing, and 11 percent are in financial services. Other sectors are each represented by 8 percent or less of the respondent base.

Job Function

Twelve percent of respondents are in operations/project management; 10 percent are in both IT and general management. Nine percent are in HR/training, 9 percent are in sales/business development, 7 percent are in both marketing/communications and finance/risk. Other functions are represented by 6 percent or less of the base.

RESULT AND DISCUSSION

- ***Descriptive Analysis:***

Table 1: Percentage of respondents that have said the use of cloud has affected the following

	increased	**No change**	**decreased**	**Don't know**
Business agility	80	10	1	9
Positive user experience	69	12	6	14
Ability to analyze data/information	64	21	6	9
Ability to act on data/information	52	22	8	18
Software reliability	73	10	9	8
Software quality	50	24	5	21
Ability to innovate our business	56	20	3	21

- ***Statistical Analysis***

Table 2: Percentage of top five functions that use cloud services

	Cloud novices	Cloud followers	Cloud leaders
Recruiting	49	39	52
Marketing	46	50	55
Sales force automation	44	35	59
Travel/expense management	49	64	60
Training	43	38	48

Table 3: Percentage of core business functions that use cloud services

	Cloud novices	Cloud followers	Cloud leaders
Billing/invoicing	14	20	33
Financial accounting	20	19	27
Procurement	17	17	29
Supply chain	14	14	29
Compliance	14	15	24

Conclusion

In this paper I have studied and surveyed about cloud computing and cloud computing services; the cloud represents one of the most significant shifts that computing has gone through. Cloud services are simpler to acquire and scale up or down. We are all aware, country like India faced problems like digital divide and of course very low internet bandwidth. So, benefit of new technology can be reached to limited area of educational area.

But definitely, over a period of time cloud computing will become the most promising technology in next few years. By analyzing the cases mentioned above, cloud computing can surely make the business world more convenient and efficient and it is even potential to bring about revolutionary changes to the human society, people would use more and more 'Web-Based' applications instead of the current 'Desktop-Based' ones. However, after all, all the stuff that cloud computing can offer is only a platform and some new ways for running services. No matter how well the platform is developed, if the services provided are not brilliant enough, it will surely end up with an eventually failure. PCs are welcomed by everyone not because of the characteristics itself but the software developed for it; the Internet becomes so charming because of the application based on it but not the direct but dull connection it offers by itself. So how successful will cloud computing be is also not decided by the techniques of itself but determined by the 'accessories' of it – the storage capacity, the software, the applications, all in one, the services it can provide [Zhao Wei].

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