An Analytical Study of Cloud Computing: IT Opportunity and Challenges

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Abstract---Cloud Computing is a new technology that provides us all the services and resources for retrieving our data globally. Now a days IT industry is standing at the threshold of a new era in the technological field. Cloud computing is everything that could answer the problems of IT companies. Cloud computing has the ability to make IT resources more cost-effective and it gives businesses a great flexibility to expand.

There are several fields including business, e-governance, utility computing, military, and healthcare where computer system play a vital role. All the fields include the sharing of data among each other's. So if we want a channel through which we will have easy way to communicate and share the data then cloud computing provides us a very seamless way to communicate. But as the time is growing cloud computing should also have to enhance its performance. Many big companies are not adopting this technology till now because of many challenges. The different types of challenges are:

1. Performance
2. Security and privacy
3. Bandwidth cost

In this paper we have tried to summarize the uses ,opportunity and challenges of cloud computing and we also have tried to explain how the cloud computing can help in business in today's scenario.

Keywords—Cloud computing, Utility computing, E-Governance, Internet, Security.

I. INTRODUCTION

Cloud computing is the use of computing resources both hardware as well as software that are delivered as a service over a network typically the Internet. As the name suggests clouds means that the network is of the cloud type as the clouds spreads in the sky as a network. In cloud computing we may access our data globally via the use of internet. Internet plays a vital role while sharing of data in between various networks. We run many applications via the use of a cloud and Cloud providers manage the infrastructure and platforms that run the applications.

Day by day, big companies spend millions of dollars on their IT infrastructure that consist of hardware, system software, applications, networks, people, and other organizational assets. Now a day's computing is becoming as import part of our life as the importance of water in human life. So we will also have to change our mind as per the technology is changing. The cloud is simply a service where all the data saves but when it combines with computing then it became very complex and fuzzy. Here different services- such as servers, storage and applications are delivered to an organization's computers and devices through the Internet.

II. HOW CLOUD WORKS

The main goal of cloud computing is to apply supercomputing or high-performance computing power to the organizations such as military, healthcare, utility computing and all to perform trillions of computations per second to provide a very large data storage.

Suppose we have an organization. In that organization we will also have to provide all the facilities to all of the employees of that organization like right hardware and software they need to do their jobs. We will buy the computers for each and every employee of the organization but that is not enough we will also have to provide the software and tools required for the job. Whenever we have a new hire, we have to buy more software or make sure our current software license allows another user. That is a very long lasting process so the solution of the problem is cloud computing. In which we will have a centralize server which will provide all the services to the employees as well as to the customers.

Fig. 1 working principle of cloud computing
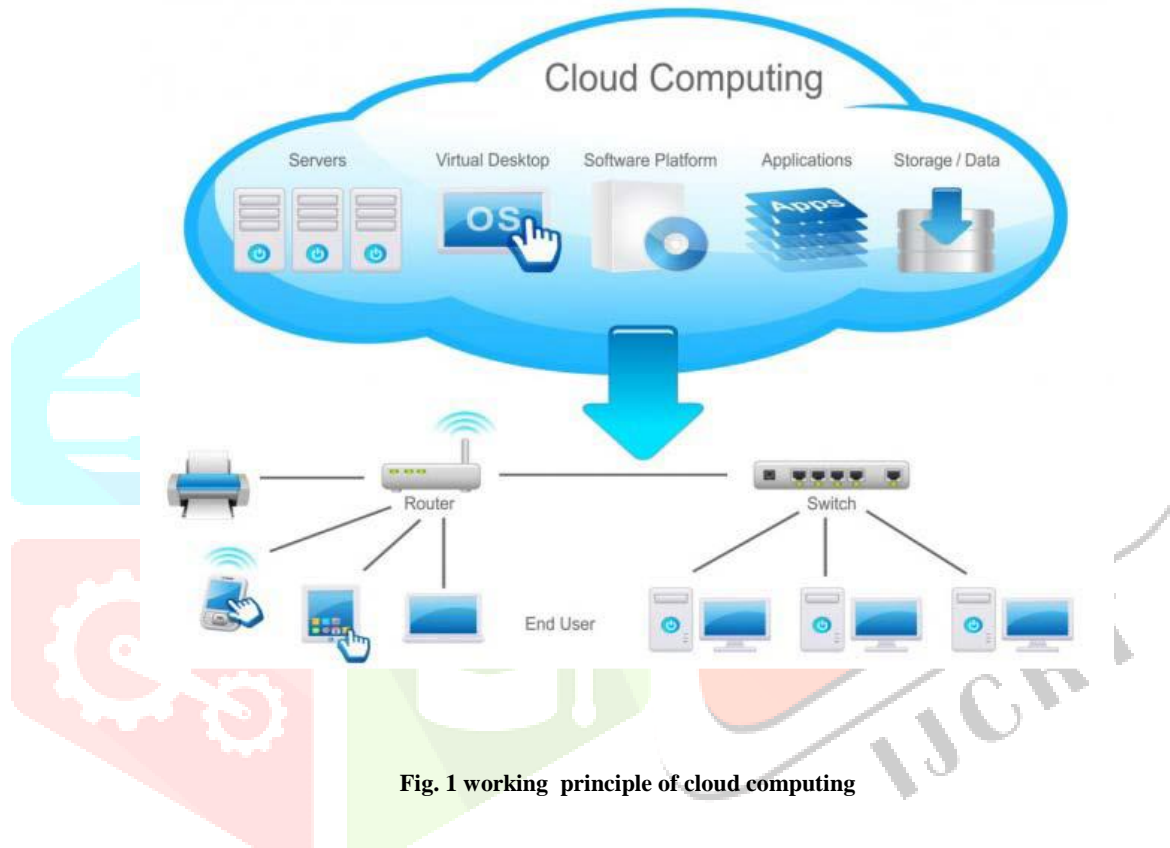
The total workload of the local computers shifted to server computers by using cloud computing technology. Local computers no longer have to do all the heavy lifting of data and all when it comes to running applications. The network of computers that make up the "cloud" handles them. We have a very good example of cloud computing that is the E-mail which most of us have used many times but we did not notice that where our data actually saved, that is in the cloud and we access our data whenever we want to access.

III. SECURITY ISSUES AND CHALLAGES

Everywhere you turn these days "the cloud" is being talked about. This ambiguous term seems to encompass almost everything about us. While "the cloud" is just a metaphor for the internet, cloud computing is what people are really talking about these days. Cloud computing is the delivery of hosted services over the internet, through a network of remote servers. These remote servers are busy storing, managing, and processing data.

Cloud computing comes into focus when you think about IT. If we are using this technique in our business applications then we will also have to make our business more secure. There are mainly three models of cloud computing IaaS (Infrastructure as a Service), PaaS (Platform as a Service), SaaS (Software as a Service) and Utility Computing.. These three models have different impact on different types of applications. Two main questions arise while using these models that are: –

-How secure is the Data?

-How secure is the Code?

The capabilities and breadth of cloud computing are enormous. The IT industry broke it into three categories to help better define use cases.

A. *Software as a Service (SaaS)* – Software is owned, delivered and managed remotely by one or more providers. To start, Software-as-a-Service, or SaaS, is a popular way of accessing and paying for software. Instead of installing software on your own servers, SaaS companies enable you to rent software that's hosted, this is typically the case for a monthly or yearly subscription fee. More and more CRM, marketing, finance, and business intelligence and even Adobe's Creative Suite has adopted the model.

B. *Infrastructure as a Service (IaaS)* – Compute resources, complemented by storage and networking capabilities are owned and hosted by providers and available to customers on-demand.

C. *Platform as a Service (Paas)* – The broad collection of application infrastructure (middleware) services. These services include application platform, integration, business process management and database services.

D. *Utility computing-* Utility computing is mainly a business model which provides services as per the demand. As the name suggest "utility computing" which generally means that any service which is mostly needed by any customer? Better economic is the main benefit of utility computing.
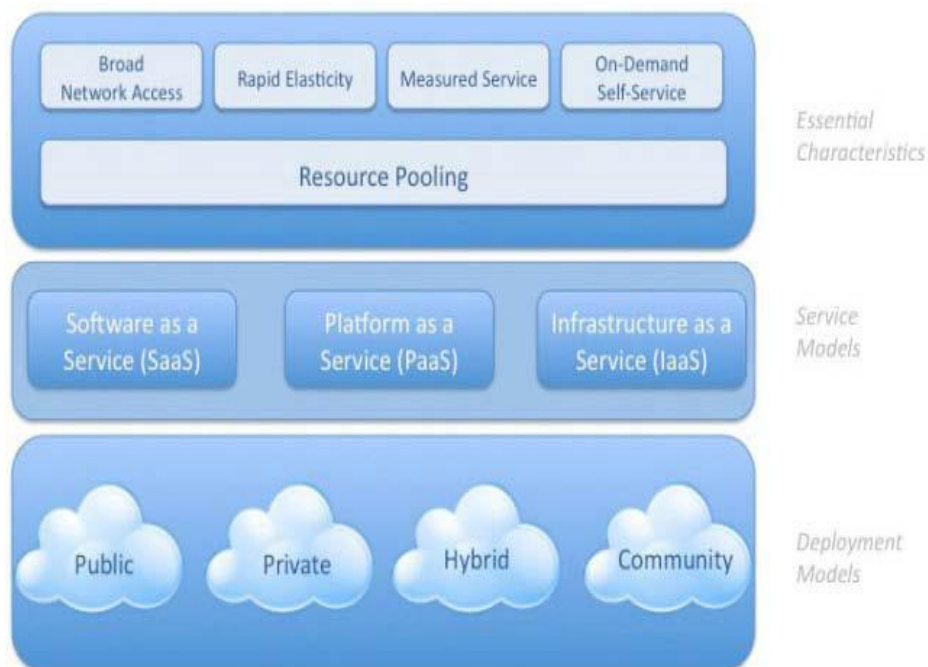

Fig. 2 Visual model of cloud computing definition

All of this is a deviation from traditional on-premise computing which is done via a local server or personal computer. These traditional methods are increasingly being left behind. In fact, IDG's recently published Enterprise Cloud Computing Survey (2016) found that by 2018 the typical IT department will have the majority of their apps and platforms (60%) residing in the cloud.
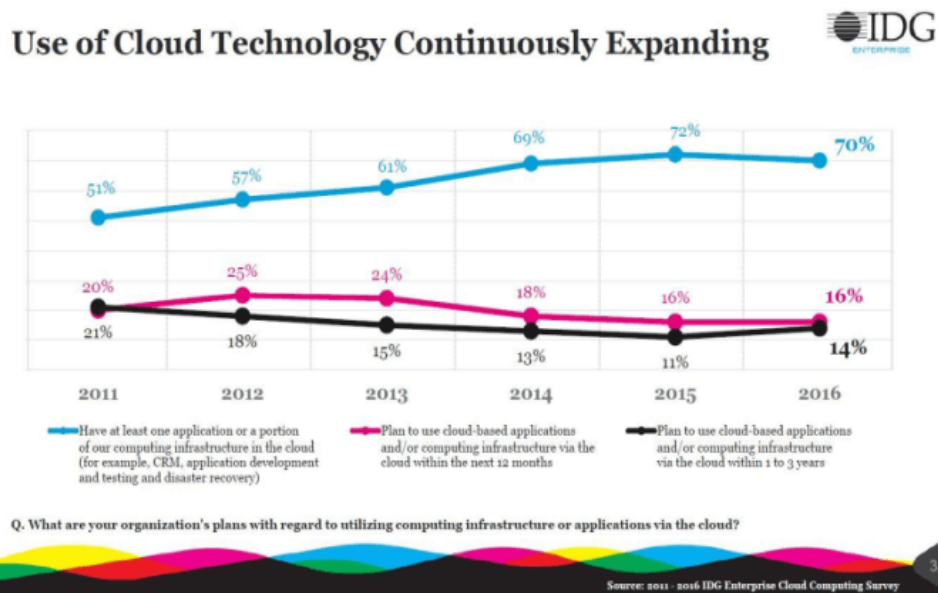

Fig. 3 Graphical Representation: Growth Of Cloud Computing Technology

In an effort to do everything from offer better in-store customer service to fully leverage advances in manufacturing, companies from even most traditional and change-resistant sectors are seeing the writing on the wall: Cloud technology strategies cut cost and risk.

Though the opportunities are great, the cloud computing explosion hasn't come without challenges. Now let's go over more of those challenges organizations are facing, and how they are being addressed.

IV. CURRENT CLOUD COMPUTING CHALLENGES

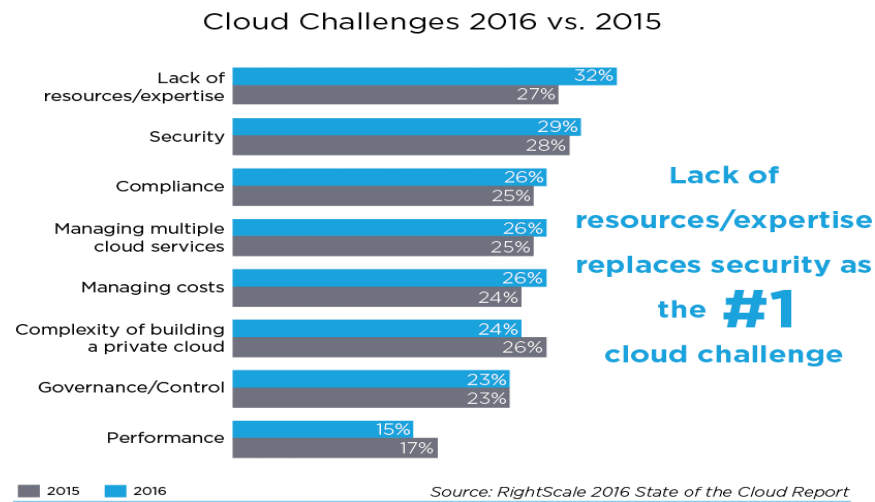Below, we have expanded upon some of additional cloud computing problems that businesses may need to address.

Fig. 4 Comparison Of Challenges For The Year 2015-16

A. Lack of resources/expertise

For the longest time, security was the number one voiced cloud challenge. In 2016 however, lack of resources/expertise inched ahead. Organizations are increasingly placing more workloads in the cloud while cloud technologies continue to rapidly advance. Due to these factors organizations are having a hard time keeping up with the tools. Also, the need for expertise continues to grow. These challenges can be minimized through additional training of IT and development staff.

B. Security issues

Resource/expertise concerns slightly passed security cloud computing problems in 2016. Security has indeed been a primary, and valid, concern from the start of cloud computing technology: you are unable to see the exact location where your data is stored or being processed. Headlines highlighting data breaches, compromised credentials and broken authentication, hacked interfaces and APIs, account hijacking haven't helped alleviate concerns. All of this makes trusting sensitive and proprietary data to a third party hard to stomach for some. Luckily as cloud providers and users, mature security capabilities are constantly improving. To ensure your organization's privacy and security is intact, verify the SaaS provider has secure user identity management, authentication and access control mechanisms in place
While you are auditing a provider's security and privacy laws, make sure to also confirm the third biggest issue is taken care of compliance. Your organization needs to be able to comply with regulations and standards, no matter where your data is stored. Speaking of storage, also ensure the provider has strict data recovery policies in place.

C. Cost management and containment

For the most part cloud computing can save businesses money. In the cloud, an organization can easily ramp up its processing capabilities without making large investments in new hardware. Businesses can instead access extra processing through pay-as-you go models from public cloud providers. However, the on-demand and scalable nature of cloud computing services makes it some times difficult to define and project quantities and costs.

D. Governance/Control

Proper IT governance should ensure IT assets are implemented and used according to agreed-upon policies and procedures; ensure that these assets are properly controlled and maintained; and ensure that these assets are supporting your organization's strategy and business goals. In today's cloud based world, IT does not always have full control over the provisioning, de-provisioning and operations of infrastructure. This has increased the difficulty for IT to provide the governance, compliance and risk management required. To mitigate the various risks and uncertainties in transitioning to the cloud, IT must adapt its traditional IT governance and control processes to include the cloud. To this effect the role of central IT teams in cloud has been evolving over the last few years. Along with business units, central IT is increasingly playing a role in selecting, brokering, and governing cloud services. On top of this third party cloud computing/management providers are progressively providing governance support and best practices.

E.. Performance

When a business moves to the cloud it becomes dependent on the service providers. This partnership often provides businesses with innovative technologies they wouldn't otherwise be able to access. On the other hand the performance of the organization's BI and other cloud based systems is also tied to the performance of the cloud provider when it falters. When your provider is down, you are also down.
This isn't uncommon, over the past couple of years all the big cloud players have experienced outages. Make sure your provider has the right processes in place and that they will alert you if there is ever an issue.
For the data driven organization real time data is imperative. With an inherent lack of control that comes with cloud computing, companies may run into real time monitoring issues. Make sure your SaaS provider has real time monitoring policies in place to help mitigate these issues.

F. Segmented usage and adoption

Most organizations did not have a robust cloud adoption strategy in place when they started to move to the cloud. Instead, ad-hoc strategies sprouted, fueled by several components. One of them was the speed of cloud adoption. Another one was the staggered expiration of data centre contracts/equipment, which led to intermittent cloud migration. Finally, there also were individual development teams using public cloud for specific applications or projects. These bootstrap environments have fostered full integration and maturation issues including:

1) Isolated cloud projects lacking shared standards
2) Ad hoc security configurations
3) Lack of cross-team shared resources and learnings

V. CONCLUSION

In an emerging discipline of cloud computing, security is the main issue that should have to be provided by big companies who are providing the service of clouds. So we may say that cloud computing brings both opportunities as well as challenges for us. In this paper we mainly focus on the services provided by cloud and new opportunities and challenges in the IT industries by using cloud computing. We have three models of cloud computing that are IaaS, PaaS and SaaS and utility computing. All the three models are important because all have different impact on implementation of the services.

While cloud computing challenges do exist, if properly addressed these 6 issues don't mean your IT roadmap has to remain anchored on-premise. Business intelligence (BI) and cloud computing are an ideal match, as the first one provides the right information to the right people while the latter is an agile way to access BI applications

So we may say that cloud computing is a leading technology worldwide. If security, authentication and authorization will be provided effectively then this will be one of the most promising technologies

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