The Challenges of Cloud Computing for Enterprises

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Abstract*--- Cloud computing has been a growing concept not just for IT (Information Technology) specialists but also for scholars and researchers (Muglia, 2009). Amrhein and Quint (2009) state that this is majorly based on the increased relevance of cloud computing for all organizations. IBM, Microsoft and Amazon are amongst the pioneers who embrace cloud computing in accentuating their endeavors (Kontio, 2009). However, Otey (2010) points out that there are some skeptics who have strongly voiced out their negative concerns in regard to cloud computing. Nonetheless their concerns are still to be confirmed since cloud computing is a recently established technological advancement (http://www.termpaperwarehouse.com/print/Cloud-Computing/87995). It is paramount for policies, suitable regulations and feasibility strategies to be relevantly put in place for cloud computing to prevail (Boss, G.,Malladi, P., Quan D., Legregni, L., and Hall, H. (2007). It is based on the above issues that this research paper is going to examine the concept of cloud computing and a brief way of how this will be done is in the summary below.

Keywords- Cloud Computing; Attributes; Services; Types; Benefits; Challenges

I. INTRODUCTION

This research paper highlights the intricacies of cloud computing and other vital concepts which are related to cloud computing is concurrently done. The paper starts off by an overview of clouding computing where several definitions are provided, next the paper delve in the attributes of clouds , the benefits, different development services, types, and its limitations/ challenges. Finally conclusions and recommendations will be given starting by reiterating the benefits of clouds computing to organizations and the transition to it. The conclusion will then be finalized by recommendations for businesses that are considering using cloud computing for their computing needs.

II. OVERVIEW OF CLOUD COMPUTING

Most of the definitions by scholars put forward are right . However documenting all of these definitions is impossible so only a few representative definitions are outlined here.

Qtey (2010) states that cloud computing is a general term used to refer to an internet-based service, which seeks to provide some form of essential computer-related service to an individual or organization. Otey (2010) also asserts that the specific types of services in cloud computing vary widely from one user to the other. This is the reason there are many cloud computing services, which are currently in place with others expected in the future (Chaganti, 2008).

Lovell (n.d.) specifies that cloud computing simply describes "highly scalable computing resources" which are provided as external services (through the internet) on a "pay-as-you-go basis."

My definition of cloud computing is a virtually secured data centers with highly powerful servers running different operating systems and hosting many applications and data that can be scattered over them but that appear to the user in one place and in that same place always- virtual storage (Miller, 2009).

III. ATTRIBUTES OF CLOUD COMPUTING

The various attributes of cloud computing is as per (John Rhoton et al., 2011):

- On Demand: The user can request as many servers as needed and release them when the need is over such as at peak times and a less demand for service at other times.

- Pay per usage: Such as when you login into Sales force Cloud. The pricing is per login.

- Elasticity: The service provider can scale up or down the resources that are provided to accommodate the customer needs.

- Maintenance and upgrading: the provider rather than the user maintains the cloud computing resource; they do not affect the customer experience.

- Virtualization: Storage is virtualized as there is permanent virtual address to users data although data can be scattered over several servers but data appear to the user in the same virtual location always. There are not only storage virtualization but application and development environment one. Each user has a copy of the applications and development environment and pay-as-you-go basis(Miller, 2009)

IV. CLOUD COMPUTING SERVICES

After a company weighs all the benefits and decides to proceed with cloud computing they will need to decide on the service and type of the cloud.

* Software as a Service (SaaS)

This refers to orderly provided applications or utilities to a consumer by a provider through the internet. The services are highly standardized and are centrally managed and updated (Schuller S., 2010). A good example would be Google web-based office applications (Nezhad, Stephenson, Singhal, 2009).

* Infrastructure as a Service (IaaS)

IaaS is where the cloud provider provides the infrastructure (servers) and the network and the operating systems, applications and data are provided and owned by the user (Miller, 2009).Iaas service is used by Amazon's cloud computing which uses server virtualization technology, where there is a partition of the resources customized for each user, (Qian, Luo, Du, Guo, 2009). In 2006, Amazon launched their cloud service Amazon Web Service (AWS), which became the pioneer of Iaas provider (Qian, Luo, Du, Guo, 2009).

* Platform as a Service (PaaS)

Paas is the provision of a development environment to develop web applications using pre-developed chunks of code that allow the customization of created applications. Two examples using this service are Google App Engine and Sales Force.com (Nezhad, Stephenson, Singhal, 2009).

The Iaas service is for customers who use processing, storage, networking, and other cloud resources for their information systems (Han, 2011). Paas is used for customers who use IT (Information Technology) infrastructure and programming tools hosted by cloud services to develop their own applications (Han, 2011). A Saas platform allows customers to use software hosted in a cloud and access through a web browser (Han, 2011); there is no need for the customers to purchase software or licensing. Everything they need is delivered to them over the internet.

The recent growth of cloud computing has been driven by the many services and benefits that it provides to the consumers, small businesses, and large enterprises; such services are quick access to data, and the pay as they use (http://www.termpaperwarehouse.com/print/Proposal-Cloud-Computing/87043). This allows consumers and companies to have access to their data at anytime and anywhere (Lafrance, 2011). From the large enterprise perspective and data mobility, cloud computing services have become essential to operations (Lafrance, 2011). If a company fails to take advantage of cloud computing, they will fall behind in the technology sector and face possible failure (http://www.termpaperwarehouse.com/print/Proposal-Cloud-Computing/87043).

If a company decides to go with cloud computing, they will need to follow the steps below to ensure a correct decision is made (http://www.termpaperwarehouse.com/print/Proposal-Cloud-Computing/87043):

1. Consult with IT personnel on the benefits of using cloud computing.
2. Research the cost savings using cloud computing versus owning their own IT infrastructure.
3. Decide on which platform, Iaas, Saas or Paas.
4. Decide on which type of cloud service to implement: public Vs private cloud.
5. Make the final decisions on whether to select cloud services or maintain their own IT infrastructure. In order to incorporate cloud computing into a company's IT infrastructure, there are steps toconsider. These steps are to focus on the customer's needs, analyze the different types of services and storage, and prepare strategies that will ensure success in the cloud environment.

It is crucial to note that the primary step in ensuring that you have a fitting cloud computing model is by choosing the right service provider (http://www.termpaperwarehouse.com/print/Cloud-Computing/87995) ; according to Lovell (n.d.) examples of some well acknowledged vendors include Amazon, Salkesforce.com, Google App Engine and Flexiscale.

V. TYPES OF CLOUD COMPUTING

Depending on the company's mission, they will decide to apply one or both types of cloud computing.

Public Cloud

In essence, public cloud refers to the method whereby virtual resources are provided over the internet by a third-party provider Lovell (n.d.), Amrhein and Quint(2009). It can be accessed through the internet and is available to the general public (Armbrust, 2009). Public computing uses Saas .With public cloud suppliers provide simple software installation, maintenance and centralization control, customers can access the service at any time, share data, collaborate and keep their data stored safe in the cloud infrastructure (Armbrust, 2009).These users pay for the utilization of the cloud on basis of their utility (NIST).Popular public cloud providers include Amazon EC2 (Anderson et al., 2010).

Private Cloud

In contrast, private cloud is a private network or data center that ties together servers, storage, networks and data and publications that are shared only within a specific company (Armbrust, 2009). Private cloud can be customized to the user, which means it can be configured and reconfigured to meet the customer demands (Han, 2011). Companies can mix the two services together or they can choose which one better suite their organization.

VI.   BENEFITS OF CLOUD COMPUTING

Advantages of cloud computing are (http://www.termpaperwarehouse.com/print/Proposal-Cloud-Computing/87043):

For the consumer there are several benefits to include:

- Retrieving your files from any location at any time
- Automatic data backups
- Pay as you use (Lafrance, 2011)

For large companies:

- Quick to scalable computer resources
- Allow large corporations to outsource all their IT work
- They will no need to buy or license software, instead they use the software in the cloud and pay for the time used
- The biggest advantage in cloud computing is the cost up to 75 percent savings (Lafrance, 2011). For large corporations to maintain IT storage is a large expense, factor in the employees' salaries, equipment and maintenance cost (Brookman, 2011).Beside the low cost, companies can setup their own private cloud and ease the security concerns in the public cloud(Han, 2011).Without

cloud computing companies would have to purchase their own servers, storage, and network equipment, and configure the equipment which typically last 3-5 years before changes are needed(Han, 2011); IT companies can outsource all their work to of the cloud(Gozzi, 2010).The companies do not need to buy license software; they can use the software in the cloud and just pay for the time they use (Gozzi, 2010). They will not need larger servers, the cloud will store the data for them (Gozzi, 2010).

- It can be used with any computer and IT infrastructure
- It can provide several different services and types that can be tailored for the consumer and small to large multinational corporations.

VII.   HOW CLOUD COMPUTING WILL AFFECT THE BUSINESS?

(http://ww.termpaperwarehouse.com/print/Cloud-computing/52897)

- The cloud computing will help in creating a new generation of products and services which was not possible before due to high cost of software and hardware infrastructure, but now with the help of cloud computing this can now be realized.
- Cloud computing will provide more agility and control to organization in comparison to traditional outsourcing of IT. It also easier for organization to change their cloud vendor than change IT outsourcer.
- The cloud computing will help the rise of new industry leaders and IT vendors.
- Reduce the role of IT from the business side. Business users will be able to adopt future clouding solutions entirely using self-service with minimal involvement from the IT department.
- Cloud computing will help in creating new innovative ways to improve the business (marketing sales, customer service, IT,). Cloud computing will enable prototyping and market validation of new approaches much faster and less expensive than ever before.

VIII. CHALLENGES IN CLOUD COMPUTING

In contrary to the strengths cloud computing possess, there are strong weaknesses as well creating element of mistrust in it. The weaknesses include (http://www.termpaperwarehouse.com/print/Cloud-Computing/52897):

- Security: Confidential information such as identity, privacy and application preferences data could be accessed by the service provider. Such concerns give birth to legal frameworks that should be put into practice for a cloud oriented environment.

- Lack of control: Could computing lacks user control over the resources provided by the service providers. The resources are managed by the service providers.

- Reliability: Cloud computing requires reliable high speed internet access. Although Internet service is reliable, all carriers experience periodic problems;

  A publically owned Cloud environment gets a lot of public exposure of enterprise matters thereby decreasing the reliability of the service.

- Performance Unpredictability: In cloud computing CPUs (Central Processing Unit) and main memory sharing is surprisingly well but I/O (Input/output) sharing is not only problematic but give rise to the problem of their interference among virtual machines thus degrades performance.

- Software Licensing: Most of the cloud computing providers depend on open source software as the licensing model is not good match for cloud computing.

- Data Lock-in: The storage API's (Application Programming Interface) is still owned by service provides though software packs developed interoperability among platforms. This lack of standardization restricts users to extract data and programs to run on another site (Armbrust, M. et al., 2010).

One of the major cloud security issues is encryption (http://wwww.termpaperwarehouse.com/print/Cloud-Computing-Challenges/88310); if data is processed in the cloud it needs to be decrypted, while some providers do not even offer encryption and if encryption is used, key management, who stores the encryption keys, becomes a big issue.

Man-in-the-middle attacks and Trojans will pose problems in cloud computing, making it important that organizations understand their strong authentication options with the cloud provider (http://www.termpaperwatrehouse.com/print/Cloud-Computing-Challenges/88310).

However, cloud computing comes with several benefits that address data security such as centralized data and logging(http://www.termpaperwatrehouse.com/print/Cloud-Computing-Challenges/88310); centralized data voids many issues related to loosing laptops or flash drives, which is the most common way of loosing data for enterprises or government organizations. Logging benefits come from the idea that the client need not worry about storage space for log files and enjoy a faster way of searching through them(http://www.termpaperwatrehouse.com/print/Cloud-Computing-Challenges/88310); moreover it allows for a convenient way to observe which user accessed certain resources at any given time.

IX. CONCLUSION AND RECOMMENDATIONS

To conclude we can say that the future belongs to cloud computing (http://www.termpaperwarehouse.com/print/Cloud-Computing/52897); this is due to the fact that if an organization is to stay in competition in the global market then it should adopt new technologies on time. Every new technology in starting gives severe problems therefore it is clear that cloud computing will give a severe headache to all the CIO's(Chief Information Officer) and CEO's(Chief Executive Officer) of the major multinationals (http://www.termpaperwarehouse.com/print/Cloud-Computing/52897). But if we see the other side of it then cloud computing provides an opportunity to avail all the services like software, operating systems, storage that can be scaled at a very low cost that is very crucial for every organization in a way we can say that cloud computing is future for every organization(http://www.termpaperwarehouse.com/print/Cloud-Computing/52897). With the cloud, companies and consumers can use the pay as you use plan. For large corporations as well as small to medium size organizations, there is no need to purchase IT equipment, no salary for IT managers and employees (http://termpaperwarehouse.com/print/Proposal-Clouyd-Computing/87043); with their cost saving the cloud offers the flexibility of different platforms; Paas, Iaas, Saas and different types of clouds private and public that can be mixed; public clouds allow access from anywhere anytime and private clouds that provide better security within the organization. In a B2B (Business to Business) scenario an entity in the supply chain can make use of a private cloud for its internal processing and storage and share the services of a public cloud such as Sales force with its development environment and the same logic can apply to a C2B (Consumer to Business) scenario as well. Even though

everything seems alright still there are certain questions raised about the security and privacy of data in the cloud which are still to be answered but if we see that pace at which the cloud computing is evolving it is quite evident that it will overcome its obstacles in the coming future (http://www.termpaperwarehouse.com/print/Cloud-Computing/52897).

Cloud computing will become the foundation for new forms of collaboration and cooperation within and among organizations (http://www.termpaperwarehouse.com/print/Cloud-Computing/87043). That will break down obstacles that separate individual departments, isolate IT organizations and divide companies from customers and business partners (Wolfram, 2012). It will allow all these functions to be brought together to create a dynamic and effective organizations (Wolfram, 2012).

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