Cloud Computing-Challenges and Benefits

Eric Huey [#1]

[#]*Graduate Student, Departmentof Applied Computer Science*
Frostburg State University, MD, USA

Abstract -*More and more used by companies in all industries, Cloud Computing is the new form of data storage of the 21st century. However, it comes in many variations, and it is not always easy to choose the offer that best suits his business. To better understand the Cloud Computing phenomenon, here is a complete definition of this term:*
Cloud Computing [1] is a general term used to refer to the delivery of on-demand resources and services over the Internet. It refers to the storage and access to data via the internet rather than via the hard disk of a computer. It thus opposes to the notion of local storage, consisting of storing data or launching programs from the hard disk. We are going to discuss the Cloud Computing and its challenges, the advantages and benefits in this paper.

Keywords: *Cloud Computing, Technology, Challenges, Benefits*

I. INTRODUCTION

Well before the birth of the term "cloud computing", its principle was used as early as the 1950s in companies. The network engineers of the time implemented applications hosted on machines in-house, and users accessed them via a terminal.

It was from the 2000s that the promotion of public cloud computing was made possible by the generalization of Internet access by individuals and businesses. In fact, according to INSEE, just over 64% of households report having access to the Internet at home in 2010 compared with 56% in 2008 and only 12% in 2000. The phenomenon has also benefited from the considerable increase in the power of IT equipment, which allowed hosts to offer rates more and more interesting. In this sense, the cloud computing mode takes advantage of: the considerable increase in server power (see diagram below); and lower storage costs.

In cloud computing, companies are no longer using their computer servers, but are accessing online services from a provider-managed infrastructure. Applications and data are no longer on the local computer, but in a cloud of interconnected remote servers.

A. Deployment models [2]

As specified in the NIST definition, cloud computing offers 4 deployment models that are:

- ***The private cloud***is the most used by companies. This can be hosted internally by the company or by a third party. Its operation is dedicated to the company and can be accessed by other subsidiaries via secure access (VPN).

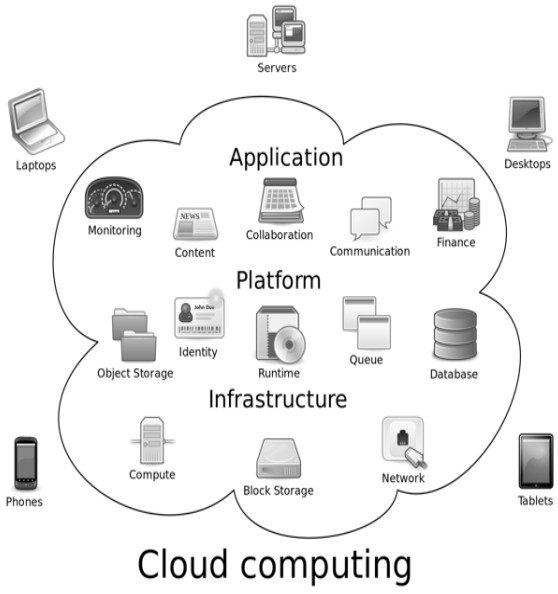

Figure 1: The component of Cloud Computing

- ***The public cloud***is accessible over the Internet and managed by an external service provider. It is open to the public or to large industrial groups. This infrastructure is owned by an organization that sells cloud services, such as Amazon or Microsoft, which we will discuss later. To reuse our example of earlier, a mail box accessible via the Internet is an application hosted on a public cloud.
- ***The hybrid cloud*** isas its name suggests, a mix between private cloud and public cloud. Infrastructure uses the same technology to enable application and data portability

Community Cloud is a cloud used by many organizations with common needs. For example, a company and its subcontractor need to jointly use a business application that is necessary for the smooth running of their business. The two entities then decide to collaboratively create a cloud hosting this application.

The cloud also requires IT and business to work together to prevent cloud adoption from becoming counterproductive - allowing businesses to self-provision cloud services, while the IT department takes care of business drivers. risk, integration issues and service level aspects. As cloud adoption intensifies, understanding and addressing the challenges of administering a hybrid cloud computing

landscape alongside traditional IT systems becomes critical.

II. THE DIFFERENT SERVICES OFFERED [3]

The 3 service models offered by Cloud Computing are different from each other, and are not intended for everyone. Here are the different services and their usefulness:

1) ***SaaS, for Software as a Service:***It's about setting up a cloud allowing the sharing of a business application. It is hosted on a server and accessible by the networked user via different terminals. Although the user can in some cases modified some minor options of the application, it runs and is configured from a server not accessible by the user. Gmail or another mailbox accessible from an internet browser is a SaaS.
2) ***PaaS, for Platform as a Service:***The goal of PaaS is to provide the right computing environment for the customer to install and deploy business applications or other services. Thus, the objective is to have an already configured machine (hardware defined in advance, OS and necessary software already installed) and work on it by installing its own software. PaaS is very similar to DaaS (Desktop as a Service) in its operation, the goal of DaaS is to provide the user with a desktop already pre-configured with the necessary software package allowing him to work directly without having anything to install.
3) ***The IaaS, for Infrastructure as a Service:***The goal is to rent all the hardware to a third party (server, network, and other resources). The user has the opportunity to deploy any type of software including operating systems. The user does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and applications. The goal of setting up IaaS for a company is to be able to increase or decrease as much as it sees fit its IT resources according to its needs.

4) Cloud Computing: A relevant decision

To answer this question, as this solution meets a need of which only the entrepreneur can determine the necessity, it entirely depends on the need.

In most cases, the implementation of cloud computing proves to be a wise decision. The concept makes it possible to save loads that are generally quite considerable. Cloud computing is also one of the best forms of outsourcing skills that are parallel to the profession. Since the supplier generally benefits from economies of scale, he finds himself in a position to offer the same service for a particularly advantageous price. The supplier also has the means, in this case, to guarantee the development and maintenance of his service.

So, in the end, cloud computing will optimize the efficiency and the performance, increasing the productivity and reducing the costs.

It should be remembered, however, that going through the provider of a cloud-based computing solution automatically involves security and privacy issues. To watch closely.

Back, in detail, on the benefits and limitations of cloud computing.

III. THE CHALLENGES THAT CLOUD COMPUTING FACE [4]

Although many IT strategists and business leaders now recognize that the potential benefits of adopting a cloud model are both attractive and increasingly achievable, they have no illusions about the challenges will mark their course.

These IT decision-makers harbor legitimate concerns around issues such as security, data governance, reliability, performance, loss of control, cultural resistance, migration and integration, not to mention the difficulty of selecting reliable partners with the capabilities, experience and stability to help them achieve their specific ambitions.

They often have to deal with a variety of disparate options, such as where and when to use public, private or hybrid cloud solutions. Many of them need to assess the steps they need to take to migrate to the cloud and modernize their existing IT environment.

There are three challenges which must be addressed for successful implementation of Cloud computing.

- Technology.
- Budgets.
- Security.

A. Technology:

Even if all technological innovation stopped between 2016 and 2019, companies, whatever their size and sector of activity, have at their disposal an extraordinary potential to improve their IS.

Engineers are constantly working to improve in the following three key areas

Computing power.
Storage.
Networks.

- Computing power. Moore's law dates from 1970; it predicted that the number of transistors would double every 18 months, which means that the power of microprocessors would be multiplied by 100 every ten years. It is still valid in 2015, but many people think that we will reach a physical limit. I am convinced of the opposite! A team of researchers at Stanford University has just developed a "vertical" microprocessor construction technique, called Skyscraper, that will increase the performance of microprocessors in a ratio of 1000 to 1000.

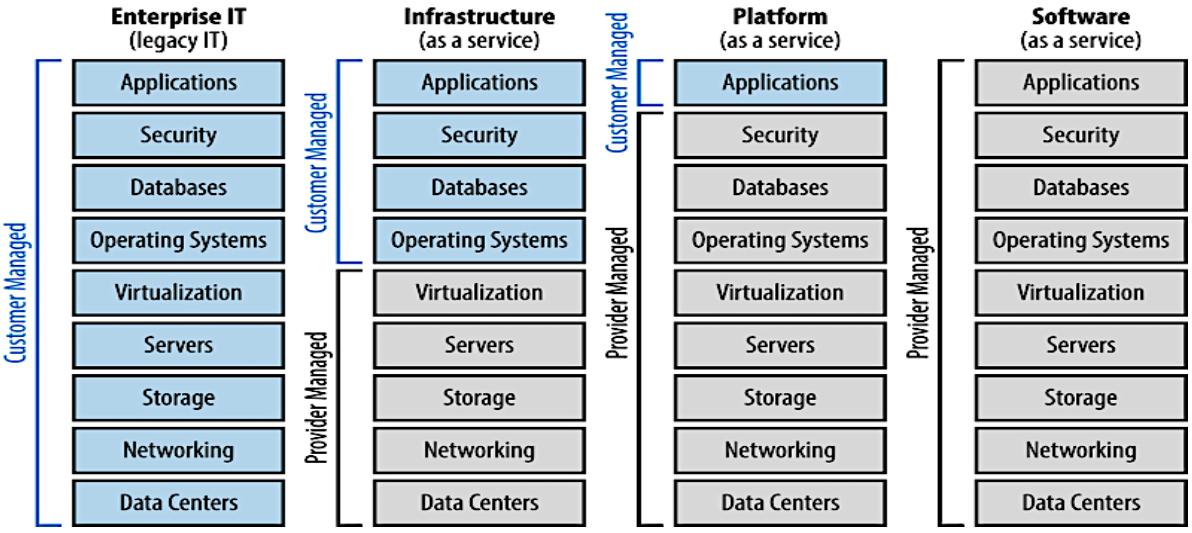

Figure 2: To summarize in a diagram deployment models and the services of cloud

- Storage. The "vertical" to the rating. The new flash memories, available from 2016, proposed by giants such as Toshiba or startups like Crossbar, built in 3D, will offer chips of 1 Tb whose writing speed will be multiplied by 20 and the speed of reading by 100. This represents an improvement of the performances of the order of 40x!
- Networks. The first 4G-LTE networks were deployed in 2009 in the Nordic countries. It is not by chance that TeliaSonera is one of the first operators to announce the 1Gb / s LTE advanced pro version with Huawei.

B. Budget:

All CIOs have been facing pressure from their leaders for years to reduce their expenses. This is even more the case when the ISD is attached to the Finance Department, which unfortunately is still too often the case.

The classic answer was: OK, but if you reduce my budget, I'll have to offer you fewer services, less value.

C. Security - trust

All CIOs have been facing pressure from their leaders for years to reduce their expenses. This is even more the case when the ISD is attached to the Finance Department, which unfortunately is still too often the case.

The classic answer was: OK, but if you reduce my budget, I'll have to offer you fewer services, less value.

since 2016, CIOs and CISOs have become the biggest promoters of public cloud solutions for infrastructures and uses. If they remain on their historical and false vision of the non-security of the Cloud, they will only increase the uses "Cloud ghost" in their organizations, uses which, they, are carriers of insecurity because the business directions n ' do not have the competence to secure SaaS or IaaS solutions.

IV. THE ADVANTAGES AND BENEFITS OF CLOUD [5]

1) ***Updates and scalability***: no need to update all posts to add new features, just update the network application and all users benefit from new features and corrections. This results in a greater coherence of the work methodology and the documents produced by all the contributors of the organization.
2) ***Pooling resources:***each user can contribute to the enrichment of the data and experiences of the whole if collaborative tools are put in place. This advantage facilitates knowledge management in companies.
3) ***Security:*** if the documents are no longer present locally (and the user does not save his login credentials on his computer) it avoids the problem of lost or hacked computer and confidential documents lost in nature.
4) ***Powerful calculation:***the remote system on a network of servers offers a much better computing efficiency than a single station. This feature is developed in the fields of compression or video effects application, more broadly in the video sharing (Youtube etc.) but also in the online game (still in the test state for the big one). public, the bottleneck being the bandwidth of the user). This field is however really interesting in the context of application requiring significant computing power for mobile use.
5) ***Mobility:***the user can at any time and from any device connect to its applications and workflow. It can access it from any type of device provided that it has a browser.

Cloud computing is generally associated with a multitude of benefits that create unanimity among business professionals. Note, however, that these benefits remain theoretical, given the very nature of the concept.

6) ***The ability to deploy and make available major applications and work environments immediately:***The update of the applications is systematic, and the supplier relieves his client of any maintenance responsibility. So unbeatable simplicity, which saves you more expensive developments
7) ***Data can be shared***: since any cloud user can easily make their data available to one or more other CC users. It is therefore possible to create a collaborative virtual platform in record time.
8) ***Free and open access to the customer:*** who can establish his connection from anywhere and have access to his data immediately, without having to set up a VPN (virtual private network) in the company.
9) ***Constant monitoring of the development of your cloud computing space***: You are usually informed, in real time, of the evolution of your cloud computing platform, since the installation of a software is not necessary and the access is done via a simple web browser
10) ***Total freedom***: since you are not tied to your supplier by any long-term commitment. Cloud computing services are either billed on demand or by monthly subscription. You therefore remain free to terminate this service at any time, if you do not need it anymore, or if you simply want to change supplier.
11) ***Cost:*** Because the same service is offered to many users, its cost is significantly reduced.

V. CONCLUSION

We have seen in this article a presentation of Cloud Computing.

Setting up a cloud service in an organization allows them to separate from their physical IT infrastructure and drastically reduce maintenance costs, while having the possibility to manage your needs (more or less), by renting the equipment adequate to the necessities of the moment.

Today, in the IaaS cloud service, we have 2 leaders: Microsoft with Microsoft Azure, and Amazon with Amazon Web Services.

Roughly, the two companies offer the same services, despite a fairly indigestible interface on the side of Amazon. I let you go look on the net to get an idea of what each offers and differences in services and prices.

On the side of visionaries, so companies proposing new things, we have Google.

Nobody is on the side of the challengers, which announces a long life for the services of Amazon and Windows.

The battle of the competitors are in the "niche players" part, to include cloud companies not aimed at the public at large like Amazon or Microsoft, but a very specific trade. There are big companies like IBM or VMWare.

Every challenge has a solution and hence in cloud computing, there are opportunities for each challenge. Like any new technologies, it is just a prerequisite to measure up the benefits and challenges and based on the specific needs of an organization, users can customize it for greater benefits.

REFERENCES

[1] Predictions 2018: Cloud Computing Accelerates Enterprise Transformation Everywhere - Dave Bartoletti, Vice President, Principal Analyst, Nov 7 2017

[2] Cloud: Computing Services And Deployment ModelsCh Chakradhara Rao1, Mogasala Leelarani2, Y Ramesh Kumar

[3] Introducing New Services in Cloud Computing Environment - Anirban Kundu, Chandan Banerjee, Priya Saha

[4] A Survey of Challenges Facing PCI DSS Compliance in Cloud Environments, Kenga M. Derdus, May 2016

[5] https://www.levelcloud.net/why-levelcloud/cloud-education-center/advantages-and-disadvantages-of-cloud-computing/

[6] Brohi, Sarfraz Nawaz, and Mervat Adib Bamiah. "Challenges and benefits for adopting the paradigm of cloud computing." International Journal of Advanced Engineering Sciences and Technology 8.2 (2011): 286-290.

[7] Mahmood, Zaigham, ed. Cloud computing: Challenges, limitations and R&D solutions. Springer, 2014.

[8] Moghaddam, Faraz Fatemi, et al. "Cloud computing challenges and opportunities: A survey." 2015 1st International Conference on Telematics and Future Generation Networks (TAFGEN). IEEE, 2015.

[9] Paul, Prantosh Kumar, and Mrinal K. Ghose. "Cloud Computing: possibilities, challenges and opportunities with special reference to its emerging need in the academic and working area of Information Science." Procedia engineering 38 (2012): 2222-2227.

[10] Balachandran, Bala M., and Shivika Prasad. "Challenges and benefits of deploying big data analytics in the cloud for business intelligence." Procedia Computer Science 112 (2017): 1112-1122.

[11] Simanta Shekhar Sarmah, Cloud Migration- Risks and Solutions, Science and Technology, Vol. 9 No. 1, 2019, pp. 7-11. doi: 10.5923/j.scit.20190901.02.

[12] Kuyoro, S. O., F. Ibikunle, and O. Awodele. "Cloud computing security issues and challenges." International Journal of Computer Networks (IJCN) 3.5 (2011): 247-255.

[13] Andrei, Traian, and Raj Jain. "Cloud computing challenges and related security issues." A Survey Paper. DOI= http://www. cse. wustl. edu/~ jain/cse571-09/ftp/cloud. pdf (2009).

[14] Kuo, Mu-Hsing. "Opportunities and challenges of cloud computing to improve health care services." Journal of medical Internet research 13.3 (2011): e67.