A Detailed Study and Analysis of Cloud Computing usage with Real-Time Applications

VALARMATHI V[1], KOWSALYA N[2]

[1]Assistant Professor, Department of Information Technology, Sri Krishna Arts and Science College, Coimbatore, India
[2]Student, III Bsc (IT) A, Department of Information Technology, Sri Krishna Arts and Science College, Coimbatore, India

---***---

Abstract – *Cloud Computing has come of its age since Amazon uses its first kind of cloud services in 2006. Cloud computing is an excellent new platform for the development of conceptual solution. It is helpful in sharing resources to achieve economic of scale. It is typically a combination of hardware and software that works together to deliver many aspects of the end user .In this paper, we explode the characteristics of cloud and the three levels of service models that works effectively on cloud. This paper addresses the main three types of cloud and in which way they work efficiently on real time. And it also deals with the advantages and limitations of cloud computing. This paper discuss about the major useful technology that we deal in our day-to-day life with some examples. However, the security and privacy plays the major role for the users who tries to adapt to the cloud computing. This paper investigates about the various kinds of security control.*

Key Words: **cloud computing, characteristics, architecture, deployment, limitations, security control.**

1. INTRODUCTION

Cloud Computing depends on sharing of resources to experience coherence and achievement. The unknown cloud users enable organizations to focus on their core businesses instead of expending resources on computer infrastructure and maintenance. Cloud Computing is an excellent platform for the development of conceptual solution. Cloud Computing is helpful on sharing of resources to achieve economic of scale. Cloud Computing allows the companies to avoid infrastructure costs. It is the usage of hardware and software through a network. The cloud is typically a combination of different types of hardware and software that works collectively to deliver many aspects of the end user.

Organization:

The remaining paper is organized as follows: In Section 2, we define the characteristics of a cloud computing. In Section 3, we define the architectural component of a cloud computing which includes Infrastructure as a Service (IaaS), Software as a Service (SaaS), Platform as a Service (PaaS). Section 4, explains the deployment model of Cloud Computing. Section 5, explains the limitations and advantages followed by some examples in section 6. We future explain the some security control in section 7, followed by the conclusion in the section 8.

2. CHARACTERISTICS

Cloud computing delivers the following key characteristics:

Cloud computing increases the user's flexibility. The Cost reductions can be claimed by cloud providers. The Device and location independence enable users to access systems using a web browser irrespective of their location or what device they use (e.g., PC, mobile phone).The Maintenance of cloud computing applications will be easier. A Multiple tenant enables sharing of resources and costs across a large number of users.

It results in:

- Centralization of infrastructure with lower costs (example: electricity, etc.)
- The peak-load capacity increases (As they need not to be an engineer and buy the largest equipment).
- Utilization and efficiency improves the systems.

Performance is monitored by IT experts from the amenity supplier. Productivity may be increased when multiple users can work on the same data concurrently, rather than waiting for it to be saved and emailed. Time may be saved. Reliability and scalability may be improved. Security has been improved due to the centralization of data. [2]
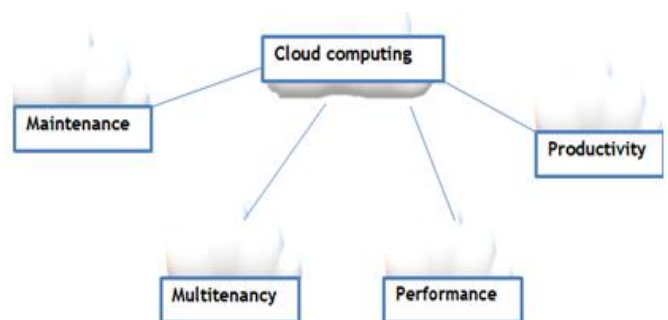

Fig -1: Cloud Computing characteristics

---

3. ARCHITECTURAL COMPONENT

The three most commonly used acronyms in the cloud computing are: SaaS, PaaS, IaaS. These are interdependent and it is also called as three tier model. These three model distinguish between the primary cloud computing. In other word SaaS, PaaS, IaaS are the main criteria for cloud computing. The layers of the model are portrayed in a stack. [4]
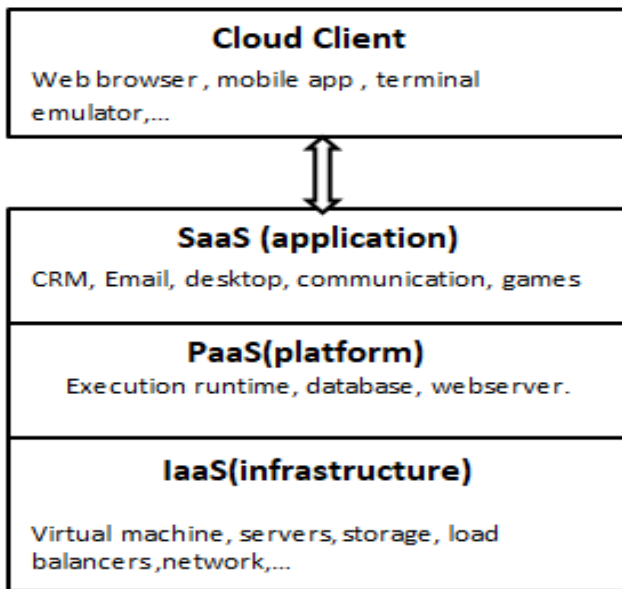

Fig -2: Architecture of an service model

3.1 Infrastructure as a Service

Infrastructure as a Service (IaaS) is the lowest level cloud services and it is the most important one. Iaas does not include application or even an operating system, whereas SaaS, PaaS includes application and operating system. Iaas provide a large number of storage for corporate data backups, network bandwidth for a company website server. Sometimes it enables access to high power computing which has been previously accessed by the supercomputing. The most popular IaaS offerings are: Amazon E2C, IBM soft layer, Google's Compute Engine (GCE). It refers to online services, which is used to network infrastructure like physical computing resources, data partitioning, security, etc. It often includes additional resources like virtual machine, server storage. As it is the lowest layer of abstract model, it must be transparent to the consumer.

3.2 Platform as a Service

Platform as a Service (PaaS) is the intermediate layer of the conceptual model. It provides the consumer operating system, software development platforms, programming language. This makes it even more simpler to test, develop and integrate. Some integration and data management providers give us some specialized applications of PaaS which includes iPaaS (Integration Platform as a Service) and dPaaS (Data Platform as a Service). Application designers will have an ability to develop and run their software solutions on a cloud platform without the cost and complexity. Similarly it reduces the buying and managing of the hardware and software layers. PaaS offers some platforms like Microsoft Azure, Oracle Cloud Platform and Google App Engine.

3.3 Software as a Service

Software as a Service (SaaS) is the outer most layer of the service model. It represents the set of application that run in a cloud. It is accessible only through the use of browser. It can be accessed from anywhere and on any devices with the internet connection. It does not require the purchase of software licenses, it reduces cost. The Cloud provider has an ability to manage the infrastructure and platforms that run the applications. In the SaaS model, cloud providers connect and operate application software in the cloud and the cloud users approach the software from cloud clients. Cloud computing users do not accomplish the cloud infrastructure and platform where the submission runs. This eradicates the need to connect and run the application on the cloud user's individual computers, which in turn simplifies maintenance and support. Cloud applications diverge from other applications in their scalability and readability.

4. DEPLOYMENT

The deployment model has been classified into many different types. They are private cloud, public cloud, hybrid cloud. The private cloud infrastructure has been implemented exclusively for a single organization. The public cloud infrastructure is an open network for the public users. The hybrid is a combination of both public and private cloud infrastructure. [4]

4.1 Private cloud

Private cloud is a cloud infrastructure functioned exclusively for a single organization. It is either managed internally or externally or using a third party host. It is compressed of files and application, storage and services that are implemented and protected only within a particular firewall. The perfect example of private cloud will be a company that has a Microsoft exchange, this why because only an authorized user can only be accessed through VPN connection. In this model, the cloud infrastructure is privately owned and it has been used completely by the respective concern that owns it. It results in highest cost of creating and maintaining the cloud over the use of public cloud. It has been noted that, it has the largest and the most detailed control over cloud.

4.2 Public cloud

A cloud is called a "public cloud" when the services are concentrated over a network that is open for public usage. Public cloud amenities might be free. But in case of technical there may be little or no variance between the public and private cloud architecture. However, security attention may be significantly different for services like applications, storage, and other resources. Usually, public cloud service providers like Amazon Web Services (AWS), Oracle, Microsoft and Google own and operate their infrastructure via internet. It also consists of files and application, storage and services available through internet. In this model, the cloud appears a stored resource for the set of organization that has a common interest. The common interest would tend to security policy and flexibility.

4.3 Hybrid cloud

Hybrid cloud is a composition of two or more clouds which includes private, community or public cloud. It allows the user to extend either the capacity or the capability of a cloud service, by combination, addition or customization with another cloud service. Diverse usage of hybrid cloud composition also exists. It is somewhat difficult to implement as it is the combination of two clouds. It performs the critical process and the other performs the secondary process. Hybrid cloud acceptance depends on a number of factors such as data security and submission requests, level of control needed over data, and the applications an organization uses. [4]
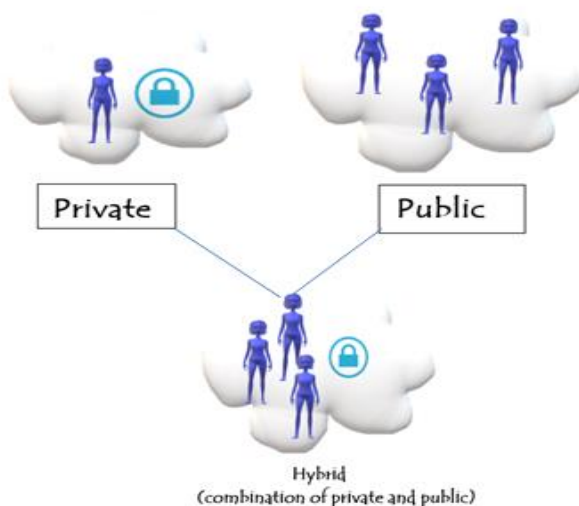

Fig - 3: Deployment model

5. LIMITATIONS AND ADVANTAGES

Cloud computing is much cheaper because of its economic scale. In cloud computing, the control of the rear end infrastructure is limited to the cloud merchants only.

The Cloud providers frequently decide the management policies. Cloud users were limited to the control and management of their applications, data and services. This includes data caps, which are placed on cloud users by the cloud merchants distributing certain amount of bandwidth for each customer and are often shared among other cloud users. Privacy and confidentiality were big alarms in some activities. The cloud computing has been proved to have some limitations and disadvantages, particularly for smaller business operations. Technical outages are unavoidable and arise sometimes when cloud service providers become overwhelmed in the process of serving their clients. This results in temporary business interruption. Meanwhile this technology's systems depend on the internet, an individual cannot be able to access their applications, server or data from the cloud during an outage. [5]

6. EXAMPLES

The top most real time application where cloud computing works at its best are:

6.1 Scalable usage:

Cloud computing offers a scalable resource through different subscription models, which in turn means you have to pay only for the computing resources you use.

Example: Netflix

Because of its streaming services, it faces a large flow in server load at peak time. Since they have used a cloud computing that allows the company to significantly expand the customer without any investment and maintenance of costly infrastructure.

6.2 Chatbot:

It provides the customized solution, messages and products based on the behavior and preferences of users. The extended computing power and capacity of the cloud enables us to store information about the user.

Example: Google Assistant, Siri

6.3 Communication:

It is the most important and the major requirement of everyone in day to day life. The cloud also allows us to enjoy the network based access to the communication tools like emails and calendar. In fact most of the messaging apps like *Skype, WhatsApp* are also a cloud based application in which we can share information are also stored on the service provider rather than on the personal devices. It allows us to access our information from anywhere through the internet.

Example: WhatsApp, Skype

6.4 Productivity:

This allows us to share our documents through cloud. In this we can work on our document, presentations, spreadsheet from anywhere at any time. We need not to be worried about the data loss, we can retrieve it through cloud at any time.

Example: MS OFFICE 365, Google Docs

6.5 Social networking:

Social networks are designed to find people you already know or you would like to know. If we share information on social media, we are not only sharing the photos and videos with our friends and relatives but also with the makers of the platform. So to manage all these things cloud will be very helpful.

Example: Facebook, LinkedIn, Twitter

7. SECURITY CONTROL

The well-organized cloud security architecture has to identify the issues that will rise with security management. The security management reports these issues with security panels. The security panel is used to safeguard any flaws in the system and diminishes the effect of an attack. There are many types of controls behind the cloud security architecture, they are: [14]

7.1 Deterrent control:

The deterrent control is proposed to reduce the attacks on a cloud system. It gives a warning sign. The deterrent control typically decreases the threat level by informing the potential attackers that there will be opposing consequences for them if they proceed.

7.2 Preventive control:

Preventive control reinforce the system against events, generally by reducing if not actually eliminating vulnerabilities. Strong authentication of cloud users, for instance, makes it less likely that unapproved users can access cloud systems, and more likely that cloud users are positively acknowledged.

7.3 Detective control:

Detective controls are proposed to detect and react aptly to any incidents that occur. In the event of an attack, a detective control has to signal the preventative or corrective controls to report an issue. System and network security are typically employed to detect attacks on cloud systems and it supports the communications infrastructure.

7.4 Corrective controls:

Corrective controls reduce the costs of an incident that occurs, usually by limiting the damage. These controls will work effectively during the incident or after an incident occurs. We can restore the system backups in the corrective control.
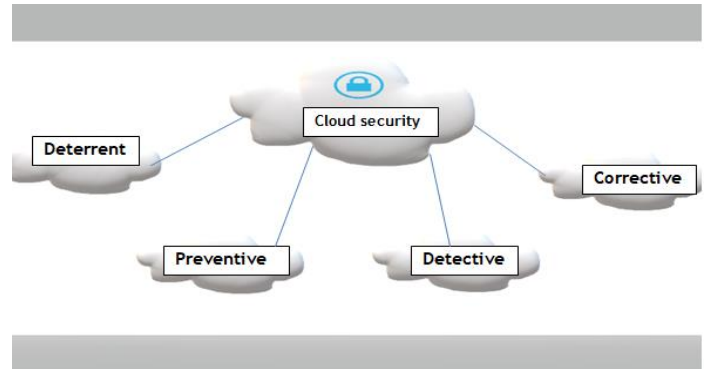

Fig - 4: Security control

8. CONCLUSION

Cloud computing is recently new technological development that has the potential to have a great impact on the world. It has many benefits that it provides to it users and businesses. Users also worry about who can disclose their data and have ownership of their data. Cloud computing is changing its own way in IT departments. Businesses and organization has a wide range of paths in the cloud, which includes infrastructure, platforms and applications that are available from cloud providers as online services. Cloud computing has sets its height in the field of information and communication technology as it brings out an evolution.

REFERENCES

[1] L. Albertson, "Openstack vs. Ganeti", Linux Fest Northwest 2017

[2] https://en.wikipedia.org/wiki/Cloud_computing

[3] The NIST Definition of Cloud Computing. Retrieved November 1, 2015, from National Institute of Standards and Technology website: http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf

[4] https://www.linkedin.com/pulse/3-service-4-deployment-models-cloud-computing-sankar-somepalle/

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

[6] http://www.klientsolutech.com/powerful-uses-of-cloud-computing/

[7] Hu, Tung-Hui (2015). A Prehistory of the Cloud. MIT Press.

[8] Mell, P. (2011, September 31). The NIST Definition of Cloud Computing. Retrieved November 1, 2015, from National Institute of Standards and Technology website.

[9] Haghighat, M.; Zonouz, S.; Abdel-Mottaleb, M. (2015). "CloudID: Trustworthy Cloud-based and Cross-Enterprise Biometric Identification". Expert Systems with Applications. .

[10] Winkler, Vic (2011). Securing the Cloud: Cloud Computer Security Techniques and Tactics. Elsevier.

[11] https://www.maropost.com/blog/5-real-world-examples-of-cloud-computing/

[12] Haghighat, Mohammad (2015). "CloudID: Trustworthy Cloud-based and Cross-Enterprise Biometric Identification". Expert Systems with Applications.

[13] Amazon Web Services. 2013-03-19. Retrieved 2013-03-20 and Baburajan, Rajani (2011-08-24). It.tmcnet.com. Retrieved 2011-12-02.

[14] https://www.techopedia.com/definition/29367/cloud-security-control

[15] Bruneo, Dario; Distefano, Salvatore; Longo, Francesco; Puliafito, Antonio; Scarpa, Marco (2013). "Workload-Based Software Rejuvenation in Cloud Systems". IEEE Transactions on Computers.