



# SECURITY ISSUES IN CLOUD COMPUTING IN TERMS OF DATA LOCATION

Abhishek Srivastava  
Dept. of IT  
Amity University  
Noida, U.P, INDIA  
Abhishek.sri13@gmail.com

Priyanka Singh  
Dept. of CS & E  
Amity University  
Noida, U.P, INDIA  
priyankasinghjan@yahoo.com

Pradeep Kumar Singh  
Assistant Professor  
Dept. of CS & E  
Amity University  
pksingh16@amity.edu

## **Abstract**

*In past three decades, the digital world has switched from centralized system to distributed systems and at this point of time everyone has started using the virtual centralization (Cloud Computing). It has introduced many new changes and opportunities to IT industry. Cloud Computing is a term for delivering the services which are demanded by the users. Many IT firms such as Google, Microsoft, Yahoo, IBM and others heartily develop cloud computing systems and however, many issues are also there with the Cloud Computing. Client information as far as Location, Availability security and Relocation is still one of the significant issues in field of security and privacy. This paper will provide the benefits of Cloud, how the data is delivered to its customer and models of deployment and also discusses the various issues of data in the cloud in details. Our main motto is to provide some information for various small organizations who wants to take advantage of this cloud technology by switching to it.*

*Keywords-* cloud computing; data security cloud computing issues; enterprise computing; data privacy

## **I. INTRODUCTION**

From 2007 onwards, cloud computing has emerged as a hot issue, many companies has tried to use services of cloud computing Cearley [1] characterize it as another style of figuring where hugely versatile IT-empowered capacities are conveyed as administrations to outer clients utilizing Internet innovations. As indicated by NIST (National Institute of Standards and Technology, US), Cloud Computing gives a helpful, on-interest system access to a common pool of figuring assets [2, 3]. Here, assets allude to figuring applications, programming administrations, stages, system assets, virtual servers and registering frameworks. Forrester

[4] proposes that Cloud Computing alludes to a pool of disconnected, profoundly versatile and oversaw framework fit for facilitating end-client applications and charged by utilization. It is considered as one of the most recent innovation in conveyed registering framework that uses previous advancements, for example, virtualization and matrix processing with a specific end goal to redesign IT and business by making figuring accessible to the organizations as favorable position which can be gotten to by the web.

Open have been utilizing Cloud Computing as a part of the type of different Internet administrations like Hotmail (from 1996), YouTube (from 2005), Facebook (from 2006) and Gmail (from 2007). Hotmail is considered as the first Cloud Computing application that allows the overall population to keep their information as content and picture documents at remote servers, which is given and oversaw by different gatherings. In the most recent decade, there are numerous other comparable administrations have gave the idea that permit endeavors to grow their IT benefits by utilizing Cloud figuring. The quantity of Cloud suppliers is expanding at such a rate, to the point that Gartner recorded Cloud Computing as number one in its main ten key innovation regions for 2010 [10, 11]. The advantages that Cloud Computing for the most part gives are:

- a) It is cost efficient.
- b) Backup and Recovery: Since all the data is stored in the cloud, backing it up and restoring the data becomes more easy as compared to storing it on physical device.
- c) It gives simple access to programming and equipment assets which are accessible in cloud
- d) It helps in increasing the efficiency of business also.



- e) Endeavors are presently starting to create and convey administration programming to manage scaled Cloud situations [12].

Whatever remains of paper is sorted out as takes after. Segment II will exhibit the advantages that are offered by Cloud Computing and quickly examine the conveyance and methodologies of arrangement. At that point, Sections III and IV talk about, in some detail, the issues as for expense area, expense and security of information in the Cloud. The last Section exhibit a brief decision about the security issues in distributed computing.

## II. CLOUD COMPUTING

### A. The Benefits

Numerous huge organizations like IBM, Dell, Oracle, Google, Amazon and Sun has received distributed computing. They are now bringing solid positions as for Cloud procurements [5]. The vital components of this most recent ideal model incorporate [2, 6]:

**Selection is fast and basic:** Users access cloud applications on standard web programs whenever, anyplace. Utilizing web client interfaces, similar to that of eBay or Yahoo, takes into consideration more boundless appropriation over the organization without the requirement for nitty gritty preparing.

**Organization time diminishes from years to months:** Time to esteem with cloud arrangements is for the most part lower than with on-reason applications. A "go live" for cloud arrangements takes regularly 2-3 quarters, while on-reason arrangements oblige 2-3 years to execute.

**On-interest self-administrations:** to empower clients to utilize Cloud benefits as and when needed by business requests.

**Powerful administration:** to give simple observing, controlling and reporting.

**Asset pooling:** to permit figuring assets to satisfy the requests of numerous clients by utilizing virtualization advances.

### B. Sending Approaches

Distributed computing is for the most part sent in four routes as open, group, private and half and half Clouds.

**Open Clouds:** An open cloud or a public cloud is one taking into account the standard distributed computing model, in which an administration supplier makes assets, for example, applications and capacity, accessible to the overall population over the Internet. Open cloud administrations may be free or offered on a pay-per-use model. Cases of open mists incorporate Amazon Elastic Compute Cloud (EC2), IBM's Blue cloud, Sun Cloud, Google App Engine and Windows Azure Services Platform.

**Community Clouds:** A community cloud is a multiple client organization infrastructure that is shared among several organizations from a specific group with common computing concerns. The goal of a community cloud is to participating organizations realize the benefits of public cloud such as multiple client organization and a pay-as-you-go billing structure. It is somewhat similar to public or open cloud.

**Private Clouds:** A private cloud is a distributed computing base made by an association for its own particular inside utilization, as opposed to utilizing another person's framework (e.g., Amazon EC2). The primary thing that separates a private cloud from an economically utilized open cloud is the place the equipment is kept and how its kept up. A private cloud is normally facilitated on the organization's own particular servers; inside they could call their own system base.

**Hybrid Clouds:** Simply put the hybrid cloud is a combination of a public cloud provider such as Microsoft Azure or Amazon Web Services with a private cloud platform that is specifically designed for use by a single enterprise. The public and private cloud infrastructure are structured so they operate independently but communicate via an encrypted connection making use of technology that facilitated the portability of applications and data. The concept of a hybrid cloud is not simply one of connecting any



old server to a public cloud provider and then calling the structure a hybrid. The private infrastructure is required to run some kind of cloud service.

The Cloud model comprises of, for the most part, three sorts of administrations: Software Services, Platform Services and Infrastructure Services which are characterized as takes after:

**Software as a Service (SaaS):** It describes any cloud service where consumers are able to access software applications over the internet. The applications are hosted in “the cloud” and can be used for a wide range of tasks for both individuals and organizations. Google, Twitter, Face book and Flickr are all examples of Software as a Service (SaaS) which is an increasingly popular delivery model for a wide range of business applications.

**Platform as a Service (PaaS):** Platform or stage as a Service (PaaS) is the following stride down from Software as a Service (SaaS) in the Cloud Computing Stack. Rather than instant applications or administrations, PaaS gives the stage to growing such applications and administrations. Here you find different advancement devices and such things as database administration frameworks, venture administration transports, application servers, business insight thus on that could be utilized to bolster the applications and administrations created.

**Infrastructure as a Service (IaaS):** It is a type of distributed computing that gives virtualized registering assets over the Internet. IaaS is one of three primary classifications of distributed computing administrations, close by Software as a Service (SaaS) and Platform as a Service (PaaS). In an IaaS model, an outsider supplier has equipment, programming, servers, stockpiling and other foundation segments in the interest of its clients. IaaS suppliers likewise host clients' applications and handle undertakings including framework upkeep, reinforcement and versatility arranging.

### C. Intrinsic Issues:

Distributed computing has various advantages; be that as it may, there is likewise number of issues and difficulties for associations who adjust the Cloud innovation.

Zhen [8] records various such difficulties including the accompanying:

- a. Management of programming administrations
- b. Security of data and information
- c. Reliability and accessibility of frameworks and base
- d. Governance, administration and overhauling of information
- e. Monitoring of items and procedures

The Expert Group Report [9] notices various issues including:

- a. Concerns over security as for significant learning, data and information put on an outer administration
- b. Concerns over information transmission crosswise over foreseen broadband velocities.
- c. Concerns over accessibility and business progression.

Other shortcomings, described by many researchers include:

- a. Poor or no security provisioning by providers.
- b. do not understanding properly of Cloud legal issues; and
- c. The failure to recognize probable responsibility from either legal issues or a lack of security.

One of the major issues in cloud is with respect to "control". A study uncovers that the real concerns can be majorly delegated the accompanying:

- a. Security, including dependability and accessibility
- b. Governance and Management.

### III. INFORMATION SECURITY ISSUES

Distributed computing gives numerous administrations to big business applications, for example, programming segments and frameworks, processing stages which incorporate improvement apparatuses and bases equipment including servers. In this connection, one of real issues is with reference to the information security, particularly: information area, information assurance, information protection, and information transmission and information accessibility. Forrester [22] joins these into three gatherings: a) Security and Privacy; b) Compliance;



and c) Legal and Contractual. Some of these are talked about in the following segments.

#### **A. Information Location and Relocation:**

Customers do not know the location of their data in cloud computing. In general cases, this is not important also. For example, lots of data in form of emails and photos which are uploaded to Facebook or any other social media website can be stored anywhere on the planet and Facebook clients are by and large not worried about it. On the other hand, when a venture needs to keep some touchy information which is store on a stockpiling gadget in the Cloud, the undertaking may need to know the area of their delicate information. Before utilizing the administrations of the cloud they might likewise need to characterize a specific area i.e. the information ought to be kept in India just. This kind of requests can only be fulfilling by the contractual agreements between the provider of the cloud services and the customer who wants to prevail the services of the cloud. There are a few issues in this that shoppers have no data of this and as an aftereffect of this no agreement is concurred previously. Despite the fact that, the suppliers of the cloud administrations ought to assume the liability to give the security of the information and give other security highlights additionally like validation of the clients data. Numerous nations have laws as for the area and data of delicate information.

An essential component affecting the decision of area for server farms is the expense of running an inside (by diminishing the power bills, for instance) [19]. In Public Clouds, information is frequently consistently directed to different areas at sure times of the day or year, or when there is a colossal climatic temperature vacillation [20]. The principle element is the expense of procurement. Research [21] proposes the likelihood of decreasing power costs by up to 40%. Qureshi's [21] proposes a technique for alterably directing information that may turn into an alluring answer for Cloud stockpiling suppliers.

There are other techniques also available which are considered to improve the optimization use of the recourses for example dynamic routing of data.

The data movement from one country to another country which is generally known as Cross border data transition also occurs for almost same reasons. This has suggestions in that information ensured by enactment in one nation might not have the same, or even comparable, insurance in another nation [24]. For instance, European Union and United States of America have diverse meanings of information protection as a consequence of dissimilar security strategies [19]. So also every nation has distinctive meanings of information security.

Information Protection Laws are absolutely in light of the presumption that the information area is known. In a matter of seconds, a lion's shares of server farms are situated in the United States [25]. Subsequently, information insurance and security concerns are affected by the US laws e.g. USA Patriot Act 2001, the Foreign Intelligence Surveillance Act (FISA revisions act, 2008), the Electronic Communications Privacy Act (1986), the Privacy Act (1974) and the Homeland Security Act (2002). Under these demonstrations, the FBI and comparable offices have the administrative energy to request access to any information put away on any PC inside of the USA, regardless of the fact that it is put away in the interest of another locale [25].

Now, at early stages the enterprises which are adopting the cloud services may not know about this information. However, when they came to know about this information, the enterprises may decide to choose the location of their choice which will be granted as per rules and ultimately increasing the cost which can become a concern to the enterprises.

#### **B. Information Availability:**

The information of client is for the most part put away in different areas at different servers. In this way, information accessibility turns into a noteworthy issue in distributed computing.

The issue of information accessibility is exemplified by the blackouts endured by Google's Gmail benefit in February 2009 which brought about humiliating features for the organization [17]. In the ensuing administration understanding for its Premier Apps scope of items which likewise covers Gmail, Subsequently, Google guaranteed that client



information accessibility will be no less than 99.9% of the time in any logbook month [18].

### **C. Information Security:**

Data security is as of now one of the greatest concern in the field of distributed computing. As said some time recently, Qureshi's system [21] of alertly directing information, which is considered as an answer for Cloud stockpiling suppliers, might likewise make awful circumstance for the information security and accessibility of information.

Here a substantial inquiry which emerges regarding the security of the distributed computing and information putting away in it is that when the information is very still by what means can one guarantee the security of the information. In spite of the fact that, the clients utilizing the administrations of the cloud know the areas of the information and there is no information portability likewise yet at the same time there are various inquiries which are identified with the security and classifiedness of the information. One of the conspicuous answers for this issue can be that the information ought to be scrambled however this is not generally conceivable.

In spite of the fact that, various arrangements have been recommended [e.g. 16, 29, and 30] and new procedures are being created, yet at the same time a ton of work should be finished. Other exploration endeavors are concentrating on techniques to section the information and breaking point the measure of information that should be decoded for preparing in the Cloud [22].

### **IV. RESPONSE FROM PROVIDERS OF CLOUD**

As the time is passing, all the more understanding is being produced in cloud buyers.

Two of the biggest sellers have begun offering answers for clients, as specified beneath:

a) Amazon's AWS (Amazon Web Services) gives a choice inside of its S3 (Simple Storage Service) bundle to permit clients to indicate the geographic areas for the capacity and area of information. It

likewise gives certification that information won't leave the client chose areas [23].

b) In 2009, Microsoft reported that its Windows Azure framework would give a choice to determine geographic areas where the client information is to be put away. And in addition execution picks up, Microsoft likewise expressed lawful and administrative advantages for this component, this is valuable as distinctive nations have diverse laws relating to information security and secrecy. There is most likely a few customers will endeavor such contrasts further bolstering their good fortune, there may, on the other hand, be legitimate ramifications of another nature, however, as with AWS, Microsoft has a confined decision of areas, presently just two: areas inside of the US. Microsoft has arrangements to grow this to destinations outside the US [32].

One of the key suggestions by Gartner [26] is that Cloud sellers ought to give ensures that client information will be kept and handled inside of a certain ward and that the neighborhood laws inside of that purview would apply, however there can be a contention regarding the information security in distinctive nations extraordinarily in U.S. This implies that shopper information put away inside of the US may be profoundly helpless against divulgence [24, 32] which may represent a potential business and/or financial danger.

### **V. CONCLUSION**

Cloud computing is an emerging technology for the IT industries and Internet world with its great advantages and practical limitations. If the cloud technologies are used in right way, there can be many advantages of this like it can help to reduce the cost; it can increase the efficiency and so on. For small business to start, Cloud computing to be a part of Information Technology. There are many advantages but also there are many limitations and challenges. For the most part these difficulties are identified with information administration, procedure observing information or data security and so on.

This paper concentrates on the issues which are identified with the information area, its accessibility and expense and information security.



Surely there are some limitations to the cloud computing technology and there is a need of more methodologies in cloud computing but in spite of that it is emerging as one of the biggest technology in the field of virtualization and information technology. In 2008, Forrester [5] anticipated that Cloud Computing activities could influence the ventures inside of a few years as it has the possibility to essentially transform IT. In 2009, Gartner recorded Cloud Computing as number 1 in its main ten vital innovation ranges for 2010 [10, 11].

Gartner [4] additionally proposed that by 2012, 80% of Fortune organizations will pay for some Cloud Computing administration and 30% of them will pay for Cloud Computing framework [4, 5, 10-12].

These all examination proposes that undertaking distributed computing is currently a major thing for the e-organizations whether it is little or expansive.

#### VI. REFERENCES

[1] David W Cearley, Cloud Computing: Key Initiative Overview, Gartner Report, 2010

[2] Peter Mell and Tim Grance, The NIST Definition of Cloud Computing, version 15, National Institute of Standards and Technology (NIST), Information Technology Laboratory, [www.csrc.nist.gov](http://www.csrc.nist.gov), 7 Oct 2009

[3] Dustin Amrhein and Scott Quint, Cloud Computing for the Enterprise: Part 1: Capturing the Cloud, Developer Works, IBM, 8 Apr 2009,

[4] John Rhoton, Cloud Computing Explained: Implementation Handbook for Enterprises, Recursive Press, 3 May 2010

[5] John M Willis, Cloud Computing and the Enterprise, IT Management and Cloud, [Online] Available at: [www.johnmwillis.com/ibm/cloud-computing-and-the-enterprise/](http://www.johnmwillis.com/ibm/cloud-computing-and-the-enterprise/), 13 Feb 2008

[6] Caroline Kvitka, Clouds Bring Agility to the Enterprise, [Online]

Available at: <http://www.oracle.com/technology/oramag/oracle/10-mar/o20interview.html>

[7] Michael Sheehan, Cloud Computing Expo: Introducing the Cloud Pyramid, Clod Computing Journal, Aug 2008

[8] Jian Zhen, Five Key Challenges of Enterprise Cloud Computing, Cloud computing journal, 16 Nov 2008

[9] Lutz Schubert, The Future of Cloud Computing, Expert Group Report, [Online] Available at: [http://cordis.europa.eu/fp7/ict/ssai/docs/executivesummaryforweb\\_en.pdf](http://cordis.europa.eu/fp7/ict/ssai/docs/executivesummaryforweb_en.pdf)

[10] Dustin Amrhein & Scott Quint, Cloud Computing for the Enterprise: Part 1: Capturing the cloud, Understanding cloud computing and related technologies, DeveloperWorks, IBM, [Online] Available at: [www.ibm.com/developerworks/websphere/techjournal/0904\\_amrhein/0904\\_amrhein.html](http://www.ibm.com/developerworks/websphere/techjournal/0904_amrhein/0904_amrhein.html)

[11] Stephen Shankland, Brace yourself for Cloud Computing, CNET News, Oct 2009 [http://news.cnet.com/8301-30685\\_3-10378782-264.html](http://news.cnet.com/8301-30685_3-10378782-264.html)

[12] Ravi Mhatre, Top 5 trends for enterprise cloud computing in 2010, Lightspeed Venuter Partners, Jan 2010

[13] Sharon Sasson, Seven Best Practices for Cloud Computing, Enterprise Systems, August 2008, [Online] Available at: <http://esj.com/articles/2009/08/18/cloud-best-practices.aspx>

[14] David Linthicum, Cloud Computing? Thank SOA, [Online] Available at: <http://www.thecloudtutorial.com/cloud-computingsoa.html>



- [15] David Linthicum, Cloud Computing and SOA Convergence in Your Enterprise: A Step-by-Step Guide, Addison Wesley, 2009
- [16] Katz J., Sahai, A., & Waters, B. (2008) Predicate Encryption Supporting Disjunctions, Polynomial Equations, and Inner Products, Proceedings of the theory and applications of cryptographic techniques 27th annual international conference on Advances in cryptology [Online] Available at <http://eprint.iacr.org/2007/404.pdf>. (Accessed March 2011)
- [17] BBC, Google users hit by mail blackout, BBC News, 24 February 2009. [Online]. Available at <http://news.bbc.co.uk/1/hi/technology/7907583.stm> (Accessed: March 2011).
- [18] Google. Google Apps Service Level Agreement, 2009.[Online] Available at: <http://www.google.com/apps/intl/en/terms/sla.html> (Accessed: November 2010).
- [19] Jaeger, P. T., Grimes, J. M., Lin, J. & Simmons, S, 'Cloud Computing and Information Policy: Computing in a Policy Cloud?' Journal of Information Technology & Politics, 5(3), 2008
- [20] Knight, W, Energy-Aware Internet Routing, 2009. [Online]. Available at: [www.technologyreview.com/business/23248/page2/](http://www.technologyreview.com/business/23248/page2/) (Accessed: March 2011)
- [21] Qureshi, A, Plugging Into Energy, 7th ACM Workshop on Hot Topics in Networks (HotNets). Calgary, Canada, October 2008
- [22] Wang C, Cloud Security Front and Centre, Forrester Report, Nov 2009
- [23] Amazon Web Services, Amazon Simple Storage Service FAQs, 2009. [Online] Available at: [http://aws.amazon.com/s3/faqs/#Where\\_is\\_my\\_data\\_stored](http://aws.amazon.com/s3/faqs/#Where_is_my_data_stored) (Accessed: March 2011)
- [24] European Network and Information Security Agency, (2009) Cloud Computing, Benefits Risks and Recommendations for Information Security, [Online] Available at: <http://enisa.europa.eu/>
- [25] Thompson, B, Storm warning for cloud computing, BBC News, 17 May 2008 [Online] Available at: <http://news.bbc.co.uk/1/hi/7421099.stm> (Accessed: March 2011)
- [26] Gartner, Assessing the Security Risks of Cloud Computing, 2008,[Online] Available at: <http://www.gartner.com/DisplayDocument?id=685308La> (Accessed: April 2011)
- [27] Economist, Computers without borders, 2008, Economist (23 October), Available at: <http://www.economist.com/>, (Accessed: March 2011).
- [28] ICO, Review of EU Data Protection Directive: Summary, 2009, [Online]. Available at: [http://www.ico.gov.uk/upload/documents/library/data\\_protection/detailed\\_specialist\\_guides/review\\_of\\_eu\\_dp\\_directive\\_summary.pdf](http://www.ico.gov.uk/upload/documents/library/data_protection/detailed_specialist_guides/review_of_eu_dp_directive_summary.pdf), (Accessed March 2011)
- [29] Benaloh J., Verifiable Secret-Ballot Elections. PhD thesis, Yale University, 1987.
- [30] Gentry, C, Fully homomorphic encryption using ideal lattices, Annual ACM symposium on theory of computing, Proceedings of the 41st annual ACM symposium on theory of computing, Bethesda, MD, USA, 2009, Session: crypto, pp 169-178, ACM, New York, NY, USA.
- [31] Rivest, R., Adleman, L., & Dertouzos, M., On data banks and privacy homomorphisms. In Foundations of Secure Computation, pp. 169–180, 1978.
- [32] Zaigham Mahmood, on Data Location and Security Issues in Cloud Computing, in 2011 International Conference on Emerging Intelligent Data and Web Technologies