International Journal of Research
Available at https://edupediapublications.org/journals
p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 04 Issue 08
July 2017

Cloud Computing: Issues and Challenges

Preeti Chhillar
Lecturer in Commerce Govt. College Gohana (Hr)
E-MAIL-preeti.dahiya02@gmail.com

ABSTRACT-

Cloud computing is a set of IT services that are provided to a customer over a network on a leased basis and with the ability to scale up or down their service requirements. Usually Cloud Computing services are delivered by a third party provider who owns the infrastructure. Cloud Computing holds the potential to eliminate the requirements for setting up of high-cost computing infrastructure for IT-based solutions and services that the industry uses. Many industries, such as banking, healthcare and education are moving towards the cloud due to the efficiency of services provided by the pay-per-use pattern based on the resources such as processing power used, transactions carried out, bandwidth consumed, data transferred, or storage space occupied etc. In a cloud computing environment, the entire data presides over a set of networked resources, enabling the data to be accessed through virtual machines. Present study analyze the key research issues and challenges present in cloud computing and offers best practices to service providers as well as enterprises hoping to leverage cloud service to improve their bottom line in this severe economic climate.

KEYWORDS : Cloud Computing, Issues, Challenges

INTRODUCTION- "Cloud computing" is the next step in the evolution of on-demand information technology services and products. To a large extent, cloud computing will be based on virtualized resources. Cloud Computing is an emerging trend to deploy and maintain software and is being adopted by the industry such as Google, IBM, Microsoft, and Amazon. Several prototype applications and platforms, such as the IBM —Blue Cloud infrastructure, the Google App Engine, the Amazon Cloud, and the Elastic Computing Platform. Cloud Computing is perceived as the next progression that will impact organizational businesses and how they manage their IT infrastructures. The technology and architecture that cloud service and deployment models offer are a key area of research. Cloud computing is a complete

new technology. It is the development of parallel computing, distributed computing grid computing, and is the combination and evolution of Virtualization, Utility computing, Software-as-a-Service (SaaS), Infrastructure-as-a-Service (IaaS) and Platform-as-a-Service (PaaS). Cloud is a metaphor to describe web as a space where computing has been pre installed and exist as a service; data, operating systems, applications, storage and processing power exist on the web ready to be shared. To users, cloud computing is a Pay-per-Use-On-Demand mode that can conveniently access shared IT resources through the Internet.

ISSUES IN CLOUD COMPUTING

More and more information on individuals and companies is placed in the cloud; concerns are beginning to grow about just how safe an environment it is? Issues of cloud computing can summarize as follows:

1.Privacy-Cloud computing utilizes the virtual computing technology, users' personal data may be scattered in various virtual data centers rather than stay in the same physical location, users may leak hidden information when they are accessed cloud computing services. Attackers can analyze the critical task depend on the computing task submitted by the users.

2. Reliability-The cloud servers also experience downtimes and slowdowns as our local server.

3. Legal Issues-Worries stick with safety measures and confidentiality of individual all the way through legislative levels.

4.Compliance-Numerous regulations pertain to the storage and use of data requires regular reporting and audit trails. In addition to the requirements to which customers are subject, the data centers maintained by cloud providers may also be subject to compliance requirements.

5. Freedom-Cloud computing does not allow users to physically possess the storage of the data, leaving the data storage and control in the hands of cloud providers.

6.Long-Term Viability-You should be sure that the data you put into the cloud will never become invalid even your cloud computing provider go broke or get acquired and swallowed up by a larger company.

7. Issues in Cloud Interoperability

1) Intermediary Layer-A number of recent works address the interoperability issue by providing an intermediary layer between the cloud consumers and the cloud-specific resources (e.g. VM).

2) Open Standard-Standardization appears to be a good solution to address the interoperability issue. However, as cloud computing just starts to take off, the interoperability problem has not
appeared on the pressing agenda of major industry cloud vendors.

3) Open API-SUN has recently launched the Sun Open Cloud Platform under the Creative Commons license. A major contribution of this platform is the proposed (in-progress) the cloud API. It defines a set of clear and easy-to-understand Restful Web services interfaces, through which cloud consumers are able to create and manage cloud resources, including compute, storage, and networking components in a unified way.

4) SaaS and PaaS Interoperability-While the aforementioned solutions generally tackle with IaaS interoperability problems, SaaS interoperability often involves different application domains such as ERP, CRM, etc.

8. Service Level Agreements (SLA's)-cloud is administrated by service level agreements that allow several instances of one application to be replicated on multiple servers if need arises; dependent on a priority scheme, the cloud may minimize or shut down a lower level application. A big challenge for the Cloud customers is to evaluate SLAs of Cloud vendors. Most vendors create SLAs to make a defensive shield against legal action, while offering minimal assurances to customers. So, there are some important issues, e.g., data protection, outages, and price structures that need to be taken into account by the customers before signing a contract with a provider

9. Cloud Data Management & Security-Cloud data can be very large (e.g. text-based or scientific applications), unstructured or semi-structured, and typically append-only with rare updates Cloud data management an important research topic in cloud computing. Since service providers typically do not have access to the physical security system of data centers, they must rely on the infrastructure provider to achieve full data security. Even for a virtual private cloud, the service provider can only specify the security setting remotely, without knowing whether it is fully implemented. The infrastructure provider, in this context, must achieve the objectives like confidentiality, audit ability. Confidentiality, for secure data access and transfer, and audit ability, for attesting whether security setting of

applications has been tampered or not. Confidentiality is usually achieved using cryptographic protocols, whereas audit ability can be achieved using remote attestation techniques. However, in a virtualized environment like the clouds, VMs can dynamically migrate from one location to another; hence directly using remote attestation is not sufficient. In this case, it is critical to build trust mechanisms at every architectural layer of the cloud. Software frameworks such as Map Reduce and its various implementations such as Hadoop are designed for distributed processing of data-intensive tasks; these frameworks typically operate on Internet-scale file systems such as GFS and HDFS. These file systems are different from traditional distributed file systems in their storage structure, access pattern and application programming interface. In particular, they do not implement the standard POSIX interface, and therefore introduce compatibility issues with legacy file systems and applications. Several research efforts have studied this problem.

10. Data Encryption- Encryption is a key technology for data security. Understand data in motion and data at rest encryption. For example, do the Web services APIs that you use to access the cloud, either programmatically, or with clients written to those APIs, provide SSL encryption for access, this is generally considered to be a standard. Once the object arrives at the cloud, it is decrypted, and stored. Is there an option to encrypt it prior to storing? Do you want to worry about encryption before you upload the file for cloud computing or do you prefer that the cloud computing service automatically do it for you? These are options, understand your cloud computing solution and make your decisions based on desired levels of security.

11. Migration of virtual Machines - Applications are not hardware specific; various programs may run on one machine using virtualization or many machines may run one program. Virtualization can provide significant benefits in cloud computing by enabling virtual machine migration to balance load across the data center. In addition, virtual machine migration enables robust and highly responsive provisioning in data centers. Virtual machine migration has evolved from process migration techniques. More recently, Xen and VMW are have implemented ―live‖ migration of VMs that involves extremely short downtimes ranging from tens of milliseconds to a second. The

major benefit of VM migration is to avoid hotspots; however, this is not straightforward. Currently, detecting workload hotspots and initiating a migration lacks the ability to respond to sudden workload changes. Moreover, the in memory state should be transferred consistently and efficiently, with integrated consideration of resources for applications and physical servers.

12. Interoperability - This is the ability of two or more systems work together in order to exchange information and use that exchanged information. Many public cloud networks are configured as closed systems and are not designed to interact with each other. The lack of integration between these networks makes it difficult for organizations to combine their IT systems in the cloud and realize productivity gains and cost savings. To overcome this challenge, industry standards must be developed to help cloud service providers design interoperable platforms and enable data portability. Organizations need to automatically provision services, manage VM instances, and work with both cloud-based and enterprise-based applications using a single tool set that can function across existing programs and multiple cloud providers. In this case, there is a need to have cloud interoperability. Efforts are under way to solve this problem. For example, the Open Grid Forum, an industry group, is working on the Open Cloud Computing Interface, which would provide an API for managing different cloud platforms. Until now it has remained a challenging task in cloud computing.

13. Access Controls- Authentication and identity management is more important than ever. And, it is not really all that different. What level of enforcement of password strength and change frequency does the service provider invoke? What is the recovery methodology for password and account name? How are passwords delivered to users upon a change? What about logs and the ability to audit access? This is not all that different from how you secure your internal systems and data, and it works the same way, if you use strong passwords, changed frequently, with typical IT security processes, you will protect that element of access

14. Energy Management - Significant saving in the energy of a cloud data center without sacrificing SLA are an excellent economic incentive for data center operators

and would also make a significant contribution to greater environmental sustainability. It has been estimated that the cost of powering and cooling accounts for 53% of the total operational expenditure of data centers. The goal is not only to cut down energy cost in data centers, but also to meet government regulations and environmental standards. Designing energy-efficient data centers has recently received considerable attention. This problem can be approached from several directions. For example, energy efficient hardware architecture that enables slowing down CPU speeds and turning off partial hardware components has become commonplace. Energy-aware job scheduling and server consolidation are two other ways to reduce power consumption by turning off unused machines. Recent research has also begun to study energy-efficient network protocols and infrastructures. A key challenge in all the above methods is to achieve a good trade-off between energy savings and application performance. In this respect, few researchers have recently started to investigate coordinated solutions for performance and power management in a dynamic cloud environment. The Global Energy Management Center(GEMC) can help companies monitor energy consumption patterns from multiple sources. These patterns can be further analyzed for usage, cost, and carbon footprint in a number of ways that help in optimizing energy. The center is uniquely positioned to service the clients across the globe by deploying a Remote Control Unit that has the capabilities to communicate to a cloud-based architecture.

15.Multi-tenancy- There are multiple types of cloud applications that users can access through the Internet, from small Internet-based widgets to large enterprise software applications that have increased security requirements based on the type of data being stored on the software vendor's infrastructure. These application requests require multi-tenancy for many reasons, the most important is cost. Multiple customers accessing the same hardware, application servers, and databases may affect response times and performance for other customers. For application-layer multi-tenancy specifically, resources are shared at each infrastructure layer and have valid security and performance concerns. For example, multiple service requests accessing resources at the same time increase wait times but not necessarily CPU time, or the

number of connections to an HTTP server has been exhausted, and the service must wait until it can use an available connection or—in a worst-case scenario—drops the service request

16. Server Consolidation - The increased resource utilization and reduction in power and cooling requirements achieved by server consolidation are now being expanded into the cloud. Server consolidation is an effective approach to maximize resource utilization while minimizing energy consumption in a cloud computing environment. Live VM migration technology is often used to consolidate VMs residing on multiple under-utilized servers onto a single server, so that the remaining servers can be set to an energy-saving state. The problem of optimally consolidating servers in a data center is often formulated as a variant of the vector bin-packing problem, which is an NP-hard optimization problem. Various heuristics have been proposed for this problem. Additionally, dependencies among VMs, such as communication requirements, have also been considered recently. However, server consolidation activities should not hurt application performance. It is known that the resource usage (also known as the footprint) of individual VMs may vary over time. For server resources that are shared among VMs, such as bandwidth, memory cache and disk I/O, maximally consolidating a server may result in resource congestion when a VM changes its footprint on the server. Hence, it is sometimes important to observe the fluctuations of VM footprints and use this information for effective server consolidation. Finally, the system must quickly react to resource congestions when they occur.

17. Reliability & Availability of Service - The challenge of reliability comes into the picture when a cloud provider delivers on-demand software as a service. The software needs to have a reliability quality factor so that users can access it under any network conditions (such as during slow network connections). There are a few cases identified due to the unreliability of on-demand software. One of the examples is Apple's Mobile Me cloud service, which stores and synchronizes data across multiple devices. It began with an embarrassing start when many users were not able to access mail and synchronize data correctly. To avoid such problems, providers are turning to technologies such as Google Gears, Adobe AIR, and Curl, which allow cloud

based applications to run locally, some even allow them to run in the absence of a network connection. These tools give web applications access to the storage and processing capabilities of the desktop, forming a bridge between the cloud and the user's own computer. Considering the use of software such as 3D gaming applications and video conferencing systems, reliability is still a challenge to achieve for an IT solution that is based on cloud computing

18. Common Cloud Standards - Security based accreditation for Cloud Computing would cover three main areas which are technology, personnel and operations. Technical standards are likely to be driven by organizations, such as, Jericho Forum1 before being ratified by established bodies, e.g., ISO2 (International Standard Organization). On the personnel side, the Institute for Information Security Professionals3 (IISP) is already offering formal accreditation for the security professionals. For the operational elements, there are some workable solutions such as tweaking the ISO 27001 and using it as the default measurement standard within the framework of the SAS 704. Currently, one of the main problems is that there are many fragmented activities going in the direction of Cloud accreditation, but a common body for the coordination of those activities is missing. The creation of a unified accreditation body to certify the Cloud services would also be a big challenge.

19.Platform Management- Challenges in delivering middleware capabilities for building, deploying, integrating and managing applications in a multi-tenant, elastic and scalable environments. One of the most important parts of cloud platforms provide various kind of platform for developers to write applications that run in the cloud, or use services provided from the cloud, or both. Different names are used for this kind of platform today, including on-demand platform and platform as a service (PaaS). This new way of supporting applications has great potential. When a development team creates an on-premises application (i.e., one that will run within an organization), much of what that application needs already exists. An operating system provides basic support for executing the application, interacting with storage, and more, while other computers in the environment offer services such as remote storage.

CONCLUSION: Cloud Computing, envisioned as the next generation architecture of IT Enterprise is a gossip of the town these days. The way cloud has been dominating the IT market, a major shift towards the cloud can be expected in the coming years. Cloud computing offers real benefits to companies seeking a competitive edge in today's economy. Many more providers are moving into this area, and the competition is driving prices even lower. Attractive pricing, the ability to free up staff for other duties, and the ability to pay for —as needed services will continue to drive more businesses to consider cloud computing. Mobile cloud computing is expected to emerge as one of the biggest market for cloud service providers and cloud developers. Although Cloud computing can be seen as a new phenomenon which is set to revolutionize the way we use the Internet, there is much to be cautious about. There are many new technologies emerging at a rapid rate, each with technological advancements and with the potential of making human's lives easier. However, one must be very careful to understand the security risks and challenges posed in utilizing these technologies. Cloud computing is no exception. Cloud service providers need to inform their customers on the level of security that they provide on their cloud. This research effort presents an overview of Cloud Computing, building blocks of Cloud Computing which includes different models of cloud computing, overview of Cloud Computing architecture and Cloud Computing entities. Furthermore, research challenges which are currently faced in the Cloud computing were also highlighted. Cloud computing has the potential to become a frontrunner in promoting a secure, virtual and economically viable IT solution in the future. As the development of cloud computing technology is still at an early stage, this research effort will provide a better understanding of the design challenges of cloud computing, and pave the way for further research in this area.

REFERENCES:

[1] Cloud Computing. Wikipdia. Available at http://en.wikipedia.org/wiki/Cloud_computing

[2] Foster, Y. Zhao, I. Raicu, and S. Lu(2008), Cloud Computing and Grid Computing 360-Degree Compared, In: Grid Computing Environments Workshop, 2008. GCE '08, p. 10, 1.

[3] W.K. Chan, Lijun Mei, and Zhenyu Zhang,(2009) "Modeling and testing of cloud applications", to appear in Proceedings of 2009 IEEE Asia-Pacific Services Computing Conference (APSCC 2009), (Singapore, December 7-11, 2009), IEEE Computer Society Press, Los Alamitos, CA, USA, 2009

[4] Harold C. Lin, Shivnath Babu, Jeffrey S. Chase, Sujay S. Parekh, (2009)Automated Control in Cloud Computing: Opportunities and Challenges, Proc. of the 1st Workshop on Automated control for data centres and clouds, New York, NY, USA, pp. 13-18, 2009, ISBN: 978-1-60558-585-7.

[5] Cong Wang, Qian Wang, KuiRen, and Wenjing Lou,(2009)Ensuring Data Storage Security in Cloud Computing, 17th International workshop on Quality of Service, USA, pp.1-9, July 13-15, 2009, ISBN: 978-1-4244-3875-4

[6] Hanqian Wu, Yi Ding, Winer, C., Li Yao,(2010) Network Security for Virtual Machines in Cloud Computing, 5th Int'l Conference on Computer Sciences and Convergence Information Technology, pp. 18-21, Seoul, Nov. 30- Dec. 2, 2010. ISBN: 978-1-4244-8567-3.

[7] Harold C. Lin, ShivnathBabu, Jeffrey S. Chase, Sujay S. Parekh, (2009) Automated Control in Cloud Computing: Opportunities and Challenges, Proc. of the 1st Workshop on Automated control for data centres and clouds, New York, NY, USA, pp. 13-18, 2009, ISBN: 978-1-60558-585-7.

[8] S. Subashini, V. Kavitha, (2011)A survey on security issues in service delivery models of cloud computing‖; Journal of Network and Computer Applications, Vol. 34(1), pp 1–11, Academic Press Ltd., UK, 2011, ISSN: 1084-8045.

[9] V. Krishna Reddy, B. ThirumalRao, Dr. L.S.S. Reddy, P.SaiKiran (2011)Research Issues in Cloud Computing — Global Journal of Computer Science and Technology, Volume 11, Issue 11, July 2011.

[10] X. Zhang, N. Wuwong, H. Li, and X. J. Zhang, ((2010)Information Security Risk Management Framework for the Cloud Computing Environments, In Proceedings of 10th IEEE International Conference on Computer and Information Technology, pp. 1328- 1334, 2010.

[11] X. Zhang, N. Wuwong, H. Li, and X. J. Zhang,(2010) "Information Security Risk Management Framework for the Cloud Computing Environments", In Proceedings

of 10th IEEE International Conference on Computer and Information Technology, pp. 1328- 1334, 2010.

[12] Cong Wang, Qian Wang, Kui Ren, and Wenjing Lou,(2009) Ensuring Data Storage Security in Cloud Computing," 17th International workshop on Quality of Service, USA, pp.1-9, July 13-15, 2009, ISBN: 978-1-4244-3875-4

[13] Hanqian Wu, Yi Ding, Winer, C., Li Yao,(2010) "Network Security for Virtual Machines in Cloud Computing," 5th Int'l Conference on Computer Sciences and Convergence Information Technology, pp. 18-21, Seoul, Nov. 30- Dec. 2, 2010. ISBN: 978-1-4244-8567-3.

[14] S. Subashini, V. Kavitha,(2011) "A survey on security issues in service delivery models of cloud computing"; Journal of Network and Computer Applications, Vol. 34(1), pp 1–11, Academic Press Ltd., UK, 2011, ISSN: 1084-8045.

[15] V. Krishna Reddy, B. Thirumal Rao, Dr. L.S.S. Reddy, P.Sai Kiran(2011) "Research Issues in Cloud Computing " Global Journal of Computer Science and Technology, Volume 11, Issue 11, July 2011.

[16] Harold C. Lin, Shivnath Babu, Jeffrey S. Chase, Sujay S. Parekh, (2009)"Automated Control in Cloud Computing: Opportunities and Challenges", Proc. of the 1st Workshop on Automated control for data centres and clouds, New York, NY, USA, pp. 13-18, 2009, ISBN: 978-1-60558-585-7.

[17] Rabi Prasad, Padhy Manas, Ranjan Patra Suresh Chandra Satapathy(2011) Cloud Computing: Security Issues and Research ChallengesIRACST - International Journal of Computer Science and Information Technology & Security (IJCSITS) Vol. 1, No. 2, December 2011 pp 136-146 ISSN: 2249-9555

[18] Santosh Kumar and R. H. Goudar (2012)Cloud Computing – Research Issues, Challenges,

[19] Architecture, Platforms and Applications: A Survey International Journal of Future Computer and Communication, Vol. 1, No. 4, December 2012pp 356-360 DOI: 10.7763/IJFCC.2012.V1.95

[20] Mohsin Nazir(2012) Cloud Computing: Overview & Current Research Challenges IOSR Journal of Computer Engineering (IOSR-JCE) ISSN: 2278-0661, ISBN: 2278-8727Volume 8, Issue 1 (Nov. - Dec. 2012), PP 14-22 www.iosrjournals.org