Survey on Cloud Computing Services and Challenges

C. Ranjith Kumar

Department of Computer Science, AJK College of Arts and Science, Bharathiar University, Coimbatore, India

Corresponding Author: ranjith.slcs@gmail.com

Abstract- Cloud computing is a way of computing, where most of our data is stored in the cloud, the Internet a computing capability that provides an abstraction between the computing resource and its underlying technical architecture, enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort. The goal of cloud computing is to applytraditional supercomputing,or high performance computing power, normally used by military and research facilities, to p erform tens of trillions of computations per second, in consumer-orientedapplications such as financial portfolios, to deliver personalized information, to provide data storage or to power large, immersive computer games. To do this, cloud computing uses networks of large groups of servers typically running low-cost consumer PC technology with specialized connections to spread data-processing chores across them. This paper, investigate several cloud computing system providers about their concerns on security and privacy issues.

Keywords**:** Cloud computing , cloud computing security , cloud computing methods , architecture, challenges.

I. Introduction

Cloud Computing can be defined as delivering computing power(CPU, RAM, Network Speeds, Storage OS software) a service over a network (usually on the internet) rather than physically having the computing resources at the customer location. cloud computing means storing and accessing data and program over the Internet instead of computer's hard drive. The cloud is just a metaphor for the Internet. Cloud computing provides its user with many capabilities like accessing a large number of applications without the need for having a license, purchasing, installing or downloading any of these applications. It also reduces both running and installation costs of computers and software as there is no need to have any infrastructure. The Cloud computing model leverages virtualization to deliver computing resources to users on-demand, and usually on a pay-per-use basis (depending on deployment method). It provides the properties of self-service, that means that each user is forced to control the resources that he needs, and elasticity enabling users to dynamically and flexibly adjust their resource consumption according to the current workload. These properties of the Cloud computing model allow one to avoid high upfront investments minimizing the expenses in a computing infrastructure, thus reducing the time to market and facilitating a higher pace of innovation. Cloud computing is the use of various services, such as software development platforms, servers, storage and software, over the internet, often referred to as the "cloud."

In general, there are three cloud computing characteristics that are common among all cloud-computing vendors:

1. The back-end of the application (especially hardware) is completely managed by a cloud vendor.
2. A user only pays for services used (memory, processing time and bandwidth, etc.).
3. Services are scalable

Many cloud computing advancements are closely related to virtualization. The ability to pay on demand and scale quickly is largely a result of cloud computing vendors being able to pool resources that may be divided among multiple clients. It is common to categorize cloud computing services as Infrastructure as a Service (IaaS), Platform as a Service (PaaS) or Software as a Service (SaaS).
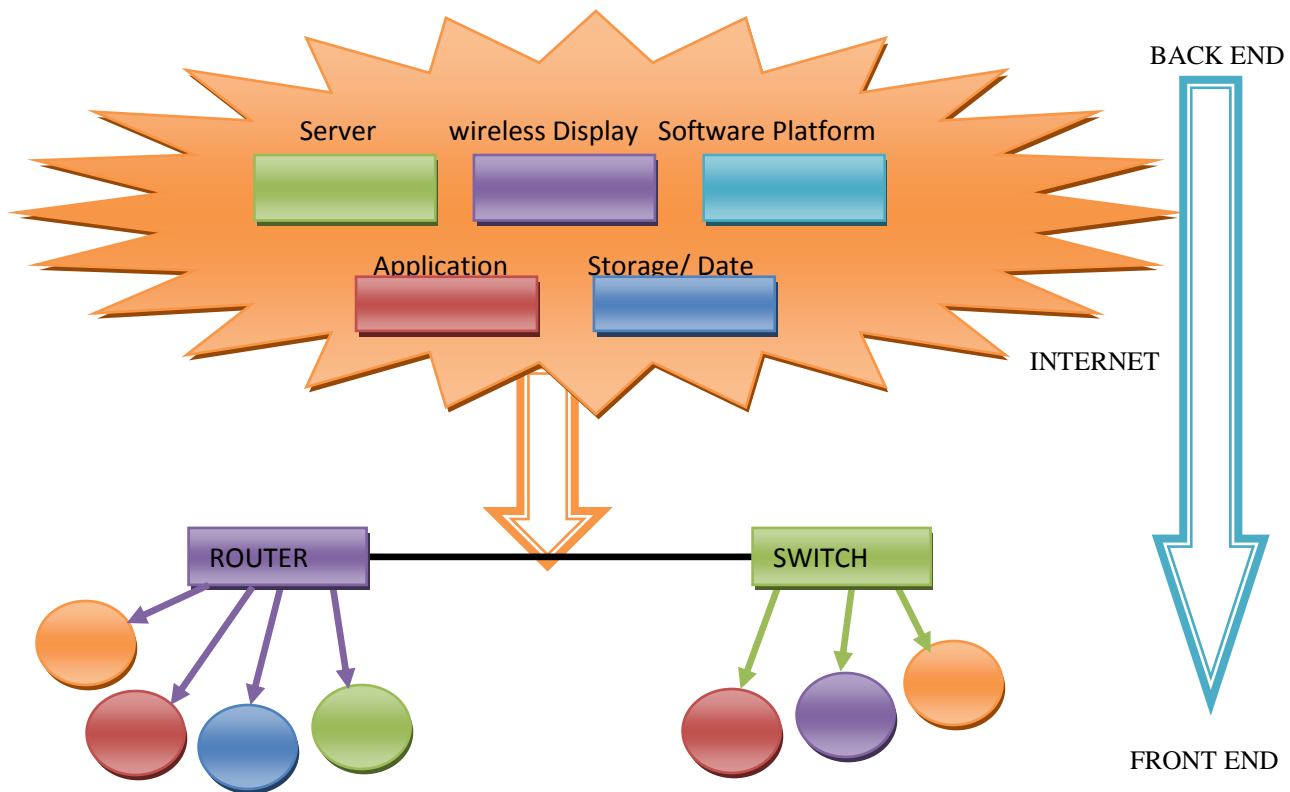
Figure 1: Cloud Architecture

II. Literature Survey

[1] Santosh Kumar and R. H. Goudar, explored the concept of cloud architecture and compares cloud computing with grid computing. They addressed the characteristics and applications of several popular cloud computing platforms. They aim to pinpoint the challenges and issues of cloud computing. They identified several challenges from the cloud computing adoption perspective and we also highlighted the cloud interoperability issue that deserves substantial further research and development. 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 service models are commonly divided into SaaS, PaaS, and IaaS that exhibited by a given cloud infrastructure. They investigated the security and privacy concerns of current cloud computing systems provided by an amount of companies. As cloud computing refers to both the applications delivered as services over the Internet and the infrastructures (i.e., the hardware and systems software in the data centers) that provide those services. Cloud aims to suffice as many small-to-medium

tasks as possible based on users' real-time requirements. Therefore, multi-tenancy is a very important concept for Cloud computing. Users can use the IT infrastructure with Pay-per-Use-On-Demand mode; this would benefit and save the cost to buy the physical resources that may be vacant. They investigated several cloud computing system providers about their concerns on security and privacy issues. **[2] Usman Namadi Inuwa,** discussed the benefit of using cloud computing, the risk and challenges of this new technology and the threat that are emerging which attack the confidentiality and vulnerability of the information in cloud. The purpose of this study is to review researches done on this technology, identify the security risk and explore some techniques for protecting users" data from attackers in the cloud. It provides computing resources in the pool for users through internet. The aim of every business organisation is to have more customers and today's business are all online as customer increase in accessing organisation application, the amount of data that an application handles is increasing day by day and so is the CPU power that can harness. The purpose of this study is to review researches done on this technology, identify the security risk and explore some techniques for protecting users" data from attackers in the cloud. describes cloud computing in the traditional mainstream

sense, whereby resources are dynamically provisioned on a fine-grained, self-service basis over the Internet, via web applications/web services, from an off-site third party provider who shares resources and bills on a fine-grained utility computing basis. Public clouds are less secure than the other cloud models because it places an additional burden of ensuring all applications and data accessed on the public cloud are not subjected to malicious attack. **[3] Yaser Ghanam, Jennifer Ferreira, Frank Maurer,** aimed to attain an understanding of the types of issues and challenges that have been emerging over the past five years and identify gaps between the focus of the literature and what practitioners deem important. Interoperability across different service providers also seems to be an active area of research. Despite the significant overlap between the topics being discussed in the literature and the issues raised by the practitioners, our findings show that some issues and challenges that practitioners consider important are understudied such as software related issues, and challenges pertaining to learning fast-evolving technologies. Security and privacy issues become even more serious when governmental institutions use the cloud. Researchers have been mainly focusing on issues related to security and privacy, infrastructure, and data management. Interoperability across different service providers also seems to be an active area of research. From the practitioners' perspective, issues related to learning and keeping up with new cloud technologies seemed to be more prominent alongside software related issues and interoperability issues. **[4] S. Srinivasan , K. Raja**, Proposed a strong security based cloud computing framework for cloud computing environment with many security features such as protective sharing of resources with cryptography methods along with the combination of redundant array of independent disk storage technology and java archive files between the users and cloud service provider. The analysis show that our proposed model is more secure under integrated security based cloud computing environment and efficient in cloud computing. They examines quite a few of the key research get together of performing cloud-aware security exposition which can reasonably secure the transforming and dynamic cloud model. They introduces an in-depth examination of cloud computing security problem. It appraises the problem of security from the cloud architecture perspective, cloud delivery model viewpoint, and cloud characteristics manner. To achieve a secure paradigm, this paper focused on vital issues and at a minimum, from cloud computing deployment models view point, the cloud security mechanisms should have the enormous flair to be self defending with ability to offer monitoring and controlling the user authentication, access control through booting mechanism in cloud computing integrated security model. it presents a consequent comprehensive specification of cloud security crisis and main features that must be covered by proposed security solution for the cloud

computing. Future research on this work may include the development of interfaces, standard and specific protocols that can support confidentiality and integrity in cloud computing environment. **[5] Rama Krishna Kalluri,Dr. C. V. Guru Rao,** proposed some solutions by analyzing the technological, operational and legal issues of cloud computing, taking into consideration of cloud customers. They have reviewed many papers related to Cloud security, privacy and trust issues, and discussed the various security challenges faced by the Cloud computing by proposing some solutions. This is not an exhaustive and may not constitute a complete representation with respect to the rapid and dynamic pace of technological change. addressed the security, privacy and trust challenges of cloud computing, Trust is critical barrier that must be passed. Cloud customers must trust the cloud providers. Providers must trust customers with access to the services which may leads to security issue. If Cloud providers succeed in providing the solutions to Security and Privacy we can say that they have succeeded in achieving the trustworthy services in cloud computing all most. By this they can enhance user's confidence in the application of Cloud computing and would build market trust in the Cloud service offerings. Cloud providers have to safeguard the Privacy and Security of personal and confidential data of organizations and users to provide and support trustworthy cloud computing services.

III. Cloud Computing Types

1. **Private Cloud:** Here**,** computing resources are deployed for one particular organization. This method is more used for intra-business interactions. Where the computing resources can be governed, owned and operated by the same organization.
2. **Community Cloud:** Here**,** computing resources are provided for a community and organizations.
3. **Public Cloud:** This type of cloud is used usually for B2C (Business to Consumer) type interactions. Here the computing resource is owned, governed and operated by government, an academic or business organization.
4. **Hybrid Cloud:** This type of cloud can be used for both type of interactions - B2B (Business to Business) or B2C (Business to Consumer). This deployment method is called hybrid cloud as the computing resources are bound together by different clouds.

3.1 Cloud Computing Services
i) Software as a Service (SaaS) — Software as a service (SaaS) is a model for the distribution of software where customers access software over the Internet. In SaaS, a service provider hosts the application at its data center and a customer accesses it via a standard web browser.

    There are a few major characteristics that apply to most SaaS vendors:

ii) Updates are applied automatically without customer intervention
iii) The service is purchased on a subscription basis
iv) No hardware is required to be installed by the customer

Platform as a Service (PaaS) — Platform as a service (PaaS) is a cloud computing model in which a third-party provider delivers hardware and software tools -- usually those needed for application development -- to users over the internet. A PaaS provider hosts the hardware and software on its own infrastructure. As a result, PaaS frees users from having to install in-house hardware and software to develop or run a new application. Many PaaS products are geared toward software development. These platforms offer compute and storage infrastructure, as well as text editing, version management, compiling and testing services that help developers create new software more quickly and efficiently. A PaaS product can also enable development teams to collaborate and work together, regardless of their physical location. Infrastructure as a service (IaaS) is a form of cloud computing that provides virtualized computing resources over the internet. IaaS is one of the three main categories of cloud computing services, alongside software as a service (SaaS) and platform as a service (PaaS).

IaaS customers access resources and services through a wide area network (WAN), such as the internet, and can use the cloud provider's services to install the remaining elements of an application stack. For example, the user can log in to the IaaS platform to create virtual machines (VMs); install operating systems in each VM; deploy middleware, such as databases; create storage buckets for workloads and backups; and install the enterprise workload into that VM. Customers can then use the provider's services to track costs, monitor performance, balance network traffic, troubleshoot application issues, manage disaster recovery and more.

IV. Advantages of Cloud Computing

Cost Savings
Perhaps, the most significant cloud computing benefit is in terms of IT cost savings. Businesses, no matter what their type or size, exist to earn money while keeping capital and operational expenses to a minimum. With cloud computing, you can save substantial capital costs with zero in-house server storage and application requirements. The lack of on-premises infrastructure also removes their associated operational costs in the form of power, air conditioning and administration costs. You pay for what is used and disengage whenever you like - there is no invested IT capital to worry about. It's a common misconception that only large businesses can afford to use the cloud, when in fact, cloud services are extremely affordable for smaller businesses.

Reliability
With a managed service platform, cloud computing is much more reliable and consistent than in-house IT infrastructure. Most providers offer a Service Level Agreement which guarantees 24/7/365 and 99.99% availability. Your organization can benefit from a massive pool of redundant IT resources, as well as quick failover mechanism - if a server fails, hosted applications and services can easily be transited to any of the available servers.

Manageability
Cloud computing provides enhanced and simplified IT management and maintenance capabilities through central administration of resources, vendor managed infrastructure and SLA backed agreements. IT infrastructure updates and maintenance are eliminated, as all resources are maintained by the service provider. You enjoy a simple web-based user interface for accessing software, applications and services – without the need for installation - and an SLA ensures the timely and guaranteed delivery, management and maintenance of your IT services.

Strategic Edge
Ever-increasing computing resources give you a competitive edge over competitors, as the time you require for IT procurement is virtually nil. Your company can deploy mission critical applications that deliver significant business benefits, without any upfront costs and minimal provisioning time. Cloud computing allows you to forget about technology and focus on your key business activities and objectives. It can also help you to reduce the time needed to market newer applications and services.

V. 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. For example, some of the benefits that it provides to businesses is that it reduces operating cost by spending less on maintenance and software upgrades and focus more on the businesses itself. But there are other challenges the cloud computing must overcome. People are very skeptical about whether their data is secure and private. There are no standards or regulations worldwide provided data through cloud computing. Europe has data protection laws but the US, being one of the most technological advance nation, does not have any data protection laws. Users also worry about who can disclose their data and have ownership of their data. But once, there are standards and regulation worldwide, cloud computing will revolutionize the future. cloud computing can potentially energy for mobile users not all applications are energy efficient when migrated to the cloud. Cloud

computing services would be significantly different from could services for savings . The services should consider the energy overhead for privacy, security , reliability and data communication before offloading.

Reference

[1] Santosh Kumar and R. H. Goudar, "Cloud Computing – Research Issues, Challenges, Architecture, Platforms and Applications: A Survey", International Journal of Future Computer and Communication, Vol. 1, No. 4, December 2012.

[2] Usman Namadi Inuwa, " The Risk and Challenges of Cloud Computing", Usman Namadi Inuwa Int. Journal of Engineering Research and Application ISSN: 2248-9622, Vol. 5, Issue 12, (Part – 4) December 2015, pp.05-10.

[3] Yaser Ghanam," Jennifer Ferreira, Frank Maurer," Emerging Issues & Challenges in Cloud Computing— A Hybrid Approach," Journal of Software Engineering and Applications, 2012, 5, 923-937 Published Online November 2012.

[4] S. Srinivasan , K. Raja," Security Challenges In Cloud Computing," International Journal of Emerging Technology and Advanced Engineering (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 4, Special Issue 2, April 2014).

[5] Rama Krishna Kalluri,Dr. C. V. Guru Rao," Addressing the Security, Privacy and Trust Challenges of Cloud Computing," Rama Krishna Kalluri et al, / (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 5 (5) , 2014, 6094-6097,ISSN:09759646

[6] V. Swathi, Dr. M. P.Vani," Security and Privacy Challenges in Cloud: Survey and Research Directions," ISSN (e): 2250 – 3005 || Volume, 07 || Issue, 08|| August – 2017 || International Journal of Computational Engineering Research (IJCER)

[7] D.Sasikumar , S.Saravanakumar," Cloud Computing – Research Issues, Challenges, Architecture, Platforms and Applications," D. Sasikumar et al. / International Research Journal of Latest Trends in Engineering and Technology (IRJLTET) ISSN: 2455-2666 Vol.5 No.2 MAR/APR 2017.

[8] Deepak Puthal , B. P. S. Sahoo† , Sambit Mishra, and Satyabrata Swain," Cloud Computing Features, Issues and Challenges: A Big Picture," 2015 International Conference on Computational Intelligence & Networks (CINE 2015)

[9] MR. GURMEET SINGH; MR. VINEET KUMAR SACHDEVA," IMPACT AND CHALLENGES OF CLOUD COMPUTING IN CURRENT SCENARIO," International Journal of Social Science & Interdisciplinary Research Vol.1 Issue 10, October 2012, ISSN 2277 3630.

[10] Ashraf Zia, Muhammad Naeem Ahmad Khan," Identifying Key Challenges in Performance Issues in Cloud Computing," I.J.Modern Education and Computer Science, 2012.

[11] Maher Alghali, H. M. A. Najwa, I. Roesnita," Challenges and Benefits of Implementing Cloud Based E-Learning in Developing Countries," ICSSR 2014 (e-ISBN 978-967-11768-7-0). 9-10 June 2014.

[12] Jui-Chien Hsieh , Ai-Hsien Li and Chung-Chi Yang," Mobile, Cloud, and Big Data Computing: Contributions, Challenges, and New Directions in Telecardiology," Int. J. Environ. Res. Public Health 2013.

[13] Jahangeer Qadiree , Mohd Ilyas Maqbool," Solutions of Cloud Computing Security Issues," International Journal of Computer Science Trends and Technology (IJCS T) – Volume 4 Issue 2, Mar - Apr 2016.

[14] Hesham Allam, Nasser Nassiri, Amala Rajan, Jinesh Ahmad," A Critical Overview of Latest Challenges and Solutions of Mobile Cloud Computing," 2017 Second International Conference on Fog and Mobile Edge Computing (FMEC) 978-1-5386-2859-1/17/$31.00 ©2017 IEEE 225.

[15] Y. Ghebghoub, S. Oukid, and O. Boussaid," A Survey on Security Issues and the Existing Solutions in Cloud Computing," International Journal of Computer and Electrical Engineering, Vol. 5, No. 6, December 2013.