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A Survey of Cloud Computing Service and Privacy Issues

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Abstract*: This paper is the survey and concept of Cloud Computing Establishment and security issues. Cloud Computing is considered as one of the emerging arenas of computer science in recent times. It is providing excellent facilities to business entrepreneurs by flexible infrastructure. Although, cloud computing is facilitating the Information Technology industry, the research and development in this arena is yet to be satisfactory. Our contribution in this paper is an advanced survey focusing on cloud computing concept and most Security issues.*

Keywords*: Cloud Computing; Virtualization; Data Center; Server Consolidation.*

1. I-INTRODUCTION

In this paper we present an overview of the current research regarding services of cloud computing and security and keeping Cloud Computing as green as it is possible. Our main aim is to give a clue on the importance this area is being given to by researchers, their trend in the latest years, the impact that awareness reports of the actual Security and challenges are bringing on intensifying Cloud energy efficiency research[16]. The rest of this paper is organized as follows: In the second section we present the methodology used for this study. In the third section we present results and analysis of the searches in a quantitative perspective. Then the fourth section presents results on specific research topic perspective. To conclude finally with the conclusions we have come preparing and accomplishing this study[19].

2. LITRATURE SURVEY

There has been much discussion in industry as to what cloud computing actually means. The term cloud computing seems to originate from computer network diagrams that represent the internet as a cloud. Most of the major IT companies and market research firms such as IBM[06] , Sun Microsystems , Gartner and Forrester Research have produced whitepapers that attempt to define the meaning of this term. These discussions are mostly coming to an end and a common definition is starting to emerge technologies[09].

1) Cloud provider:-A cloud providers are that provides customers storage or software services available via a private or public network. Usually it means that storage and software is available for access via internet[03].
2) Cloud consumer:-A cloud consumer is the entity that uses the services like soft wares, Platform, processing power etc provided by the cloud. Consumer demands for the services that are required for their work. According to their requirement the providers provides services to them. Companies like abc[03].
3) Cloud Broker:-A cloud broker is the entity that helps in promotion of cloud services. A cloud broker is a third-party individual or business that acts as an intermediary between the purchaser of a cloud computing services and the sellers of that service. In general [18], a broker is someone who acts as an intermediary between two or more parties during negotiations. A cloud broker may also be granted the rights to negotiate contacts with cloud providers on behalf of the consumer. The above characteristics apply to all clouds but each cloud provides users with services at a different level of abstraction, which is referred to as a service model [18].

3. HISTORY OF CLOUD COMPUTING TECHNOLOGY

The history of cloud computing has gone through a number of major changes that have made it more accessible and affordable. Like many other things, though, it's important to understand where it's been to make any sort of guess at where it's going[14].

The current state of cloud computing rests on a strong internet backbone, but that isn't how it started or where it ends. The private cloud is now an important part of many business IT infrastructures, making elements like virtualization and service-oriented architecture even more important. If we look at the development of the cloud over the years, it is easier to

see why the cloud is such an integral component of modern IT solutions [13].

The real implementation of virtual machines came in the 70s when IBM released an operating system called VM. This allowed multiple distinct computers to reside in the same processing environment, leading to the type of interactions we know call virtualization. In basic terms, it means that each individual user would have a machine with its own memory, processor, and other hardware components, but many of the resources would be shared by others [02].

This type of "group computing" showed companies that they could start adding network solutions without actually increasing their hardware infrastructure. It was all about provisioning the resources they already had, shifting traffic as necessary, and balancing the load on the network and bandwidth to provide better services to their customers[05].

4. THE THREE MOST COMMON SERVICE MODELS ARE

1) Software as a Service (SaaS): this is where users simply make use of a web-browser to access software that others have developed and offer as a service over the web. At the SaaS level, users do not have control or access to the underlying infrastructure being used to host the software. Google Docs4 is most popular examples that use the SaaS model of cloud computing[13].
2) Platform as a Service (PaaS): this is where applications are developed using a set of programming languages and tools that are supported by the PaaS provider. PaaS provides users with a high level of abstraction that allows them to focus on developing their applications and not worry about the underlying infrastructure[08]. Just like the SaaS model, users do not have control or access to the underlying infrastructure being used to host their applications at the PaaS level. Google App Engine and Microsoft Azure are popular PaaS examples[13].
3) Infrastructure as a Service (IaaS): this is where users acquire computing resources such as processing power, memory and storage from an IaaS provider and use the resources to deploy and run their applications. In contrast to the PaaS model, the IaaS model is a low level of abstraction that allows users to access the underlying infrastructure through the use of virtual machines. IaaS gives users more flexibility than PaaS as it allows the user to deploy any software stack on top of the operating system[22]. However, flexibility comes with a cost and users are responsible for updating and patching the operating system at the IaaS level. Amazon Web Services is popular IaaS examples[13].

This definition describes cloud computing as having five essential characteristics and three service models.

5. CLOUD NETWORK BENEFITS

Flexibility/Elasticity: users can rapidly provision computing resources, as needed, without human interaction. Capabilities can be rapidly and elastically provisioned, in some cases automatically, to quickly scale out or up[07].

Scalability of infrastructure: new nodes can be added or dropped from the network as can physical servers, with limited modifications to infrastructure set up and software. Cloud architecture can scale horizontally or vertically, according to demand.

Broad network access: Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous platforms (e.g., mobile phones, laptops, and PDAs)[15].

Location independenc: There is a sense of location independence, in that the customer generally has no control or knowledge over the exact location of the provided resources, but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter)[11].

Reliability improves through the use of multiple redundant sites, which makes cloud computing suitable for business continuity and disaster recovery.

Economies of scale and cost effectiveness: Cloud implementations, regardless of the deployment model, tend to be as large as possible in order to take advantage of economies of scale. Large cloud deployments can often be located close to cheap power stationsand in low-priced real estate, to lower costs[01].

6. SECURITY AND PRIVACY ISSUES

Identity management:-Every enterprise will have its own identity management system to control access to information and computing resources. Cloud providers either integrate the customer's identity management system into their own infrastructure, using federation or SSO technology, or provide an identity management solution of their own[02].

Physical and personnel security :-Providers ensure that physical machines are adequately secure and that access to these machines as well as all relevant customer data is not only restricted but that access is documented[04].

Availability:-Cloud providers assure customers that they will have regular and predictable access to their data and applications.

Application security:-Cloud providers ensure that applications available as a service via the cloud are secure by implementing testing and acceptance procedures for

outsourced or packaged application code. It also requires application security measures be in place in the production environment[07].

Privacy:-Finally, providers ensure that all critical data (credit card numbers, for example) are masked or encrypted (even better) and that only authorized users have access to data in its entirety. Moreover, digital identities and credentials must be protected as should any data that the provider collects or produces about customer activity in the cloud[09].

Legal issues:-In addition, providers and customers must consider legal issues, such as Contracts and E-Discovery, and the related laws, which may vary by country[10].

7. CURRENT SECURITY SOLUTIONS FOR DATA SECURITY AND PRIVACY PROTECTION

IBM developed a fully homomorphic encryption scheme in June 2009. This scheme allows data to be processed without being decrypted [12]. Roy I and Ramadan HE applied decentralized information flow control (DIFC) and differential privacy protection technology into data generation and calculation stages in cloud and put forth a privacy protection

system called airavat [13]. This system can prevent privacy leakage without authorization in Map-Reduce computing process. A key problem for data encryption solutions is key management. On the one hand, the users have not enough expertise to manage their keys. On the other hand, the cloud service providers need to maintain a large number of user keys. The Organization for the Advancement of Structured Information Standards (OASIS) Key Management Interoperability Protocol (KMIP) is trying to solve such issues [14].

About data integrity verification, because of data communication, transfer fees and time cost, the users can not first download data to verify its correctness and then upload the data. And as the data is dynamic in cloud storage, traditional data integrity solutions are no longer suitable. NEC Labs's provable data integrity (PDI) solution can support public data integrity verification [15]. Cong Wang proposed a mathematical way to verify the integrity of the data dynamically stored in the cloud [16].

In the data storage and use stages, Mowbray proposed a client-based privacy management tool [17]. It provides a user-centric trust model to help users to control the storage and use of their sensitive information in the cloud. Munts-Mulero discussed the problems that existing privacy protection technologies (such as K anonymous, Graph Anonymization, and data pre-processing methods) faced when applied to large data and analyzed current solutions [18]. The challenge of data privacy is sharing data while protecting personal privacy information. Randike Gajanayake proposed a privacy protection framework based on information accountability (IA) components [19]. The IA agent can identify the users who are accessing information and the types of information they use. When inappropriate misuse is detected, the agent defines a set of methods to hold the users accountable for misuse.

About data destruction, U.S. Department of Defense (DoD)

5220.22-M (the National Industrial Security Program Operating Manual) shows two approved methods of data (destruction) security, but it does not provide any specific requirements for how these two methods are to be achieved [20]. The National Institute of Standards and Technology(NIST) Special Publication [21], 800-88, gives a "*Guidelinesfor Media Sanitization.*"

8. CONCLUSION

As cloud computing is becoming popular day by day, concerns are about the security issues introduced through adoption of this new techniques and model[18]. Cloud computing offers many benefits, but it also is gives a chance to threats and data robbers. According to delivery services and its models, essential features of the cloud computing are Saas, Paas, and Iaas, data security flexibility and mobility. is the prime aspect of cloud computing. In this paper we discussed on cloud computing benefits, characteristics and security in survey[21]

Although cloud computing has many advantages, there are still many actual problems that need to be solved. According to a Gartner survey about cloud computing revenues, market size for Public and Hybrid cloud is $59 billion and it will reach USD 149B by 2014 with a compound annual growth rate of 20[22]. The revenue estimation implies that cloud computing is a promising industry. But from another perspective, existing vulnerabilities in the cloud model will increase the threats from hackers.

According to service delivery models, deployment models and essential features of the cloud computing, data security and privacy protection issues are the primary problems that need to be solved as soon as possible. Data security and privacy issues

The challenges in privacy protection are sharing data while protecting personal information. The typical systems that require privacy protection are e-commerce systems that store credit cards and health care systems with health data. The ability to control what information to reveal and who can access that information over the Internet has become a growing concern. These concerns include whether personal information can be stored or read by third parties without consent, or whether third parties can track the web sites someone has visited. Another concern is whether web sites which are visited collect, store, and possibly share personal information about users. The key to privacy protection in the cloud environment is the strict separation of sensitive data

from non-sensitive data followed by the encryption of sensitive elements.

According to the analysis for data security and privacyprotection issues above, it is expected to have an integrated and comprehensive security solution to meet the needs of defense in depth. Regarding privacy protection, privacy data identification and isolation are the primary tasks. They should be considered during the design of cloud-based applications.

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