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AN EMPIRICAL ANALYSIS ON SECURITY AND CONFIDENTIALITY ISSUES IN CLOUD FRAMEWORK

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ABSTRACT

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In today's global scenario, every stream including computer science, industrial applications and other fields are dependent and associated in some way to the cloud. Cloud computing environment is being used in mobile applications, defense applications, business and corporate establishments and many other personal as well as business applications involved in confidentiality and integrity. Cloud computing, or the framework involving the term cloud, is still an emerging concept and paradigm which is becoming hype for most of the vendors who are promising to ensure a low-cost, fast and a reliable utility computing.This manuscript presents an effective approach to form a cloud with secured computing. It gives a summary of cloud computing and its related security issues. A number of architectureshave been designed to meet the security requirements. This paper enlightens these frameworks in terms of performance, confidentiality, integrity, security and usage. The frameworks with different levels of security ensures the integrity and confidentiality of the data stored in a cloud. Existing clouds of the present day lacks in the security between the client/user and the cloud service provider which is the concerned issue of this paper.

KEYWORDS - Cloud Computing, Cloud interface, Cloud framework, Existing clouds, Multi-tier security

1. INTRODUCTION

Cloud computing is a distracting advancement in the technology where utility computing is carried out within a cloud – 'collection of hardware and software requirements'.

Now onwards, the brief introduction to cloud and its function in explained. For instance if there is some secured information that is of interest, like some bank account number, pen card number, credit card number etc. There are assorted options to make it memorize like store it in phone or in some CD or pen drive or any other storage media. In order to have backup for the data, make 2 or 3 copies of secret data so that even if the phone gets

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infected due to virus attacks, information can be recovered from CD or pen drive.This is the basic concept behind the cloud computing,where crucial information like mobile phone or PC's data can be cachedin a secure cloud such that if mobile phone or PC gets infected, data can be redeem from the cloud where the backup data is already stashed.

Cloud computing involves transporting hosted services like online storage, online office, 3rd party integration, online collaboration, online resources, shared calendar via Internet.

2. EXISTING CLOUDS

Cloud computing comes to a focal point when we think about the requirements of IT enterprises whose basic need is to increase accommodation and extend the utility computing without staking in new infrastructure (hardware) or licensing new software. Cloud computing is a dynamic approach to shared framework in which large pools of resources are linked together to provide IT services.

2.1 CLOUDS

The concept of storing information on a cloud makes an ease of accessing the information from anywhere. The clients need not to keep the track of the location where the data is physically present. All the hardware and software requirements are maintained by the cloud. The user having Internet connection only can access the data reserved in the cloud. The basic difference between the traditional computing and the cloud computing lies in the fact that in former case the client and the data storage device should be in the same location but in the latter case cloud removes the need for the user to be in the same physical location as the infrastructure that stores the data. Cloud makes it possible for different people to do different things.

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The cloud approach proves beneficial even for the small business organizations which usually purchase the space in cloud instead of purchasing new hardware for storing data.

Different types of clouds can be used depending upon the requirements of the individual.

a) Private clouds
b) Public clouds
c) Community clouds
d) Hybrid clouds

2.2 EXISTING CLOUD PROVIDERS

In the past few years the cloud has gone from IT slang to a canonical way to cut costs, increase networked storage space, ease of access and secured business. As a result, there is a tough competition among the rapidly growing number of cloud vendors, solution providers and their customers. When it comes to the cloud, the value of high performance, scalability, privacy and security issues cannot be ignored. Whether a company is deploying a private or hybrid cloud, security remains a major concern. Cloud security is basically refers to user authentication and data protection through encryption, client security, server security and password security. Below is the list of cloud security vendors.

- Amazon web services
- Salesforce.com
- Google apps
- Rackspacemosso
- Cisco
- Appriver
- Awareness technologies

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S.NO	CLOUD COMPUTING SERVICES	EXAMPLE
1.	Social Networking	Facebook, Myspace, Twitter
2.	E-mail	Hotmail, Windows Live Mail
3.	Document/spread sheets	Google docs, Zoho office
4.	Entertainment	Youtube, Vimeo, Metacafe
5.	Backup Services	Dropbox, Mozy, Carbonite
6.	Health Care	Google Health, Microsoft Healthvault
7.	Government	Website called apps.gov

Fig1: cloud computing services

2.3 CLOUD ARCHITECTURE

Cloud architecture, collection of software and hardware systems, is responsible in the delivery of cloud computing services where multiple cloud components communicate with each other with the mechanism of messaging queue. The architecture is important for relating real-world services like online office, 3rd party collaboration, platforms, shared calendars etc. to an architectural framework of services like SaaS, Paas, IaaS and understanding that the resources and services require security and privacy. For organizations and individuals confronting with cloud computing for the first time, it is important to keep in mind the following thing to avoid the confusion of the individual regarding the security issues.

- Public or private clouds may be treated as external or internal, which may not be accurate in all situations.

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- It is important to understand the security boundaries in terms of cloud computing.
- Overall connectivity, irregular nature of information exchange, inadequacy of static security controls which is unable to deal with the dynamic nature of cloud computing services, each and everything requires a new thinking regarding cloud computing.

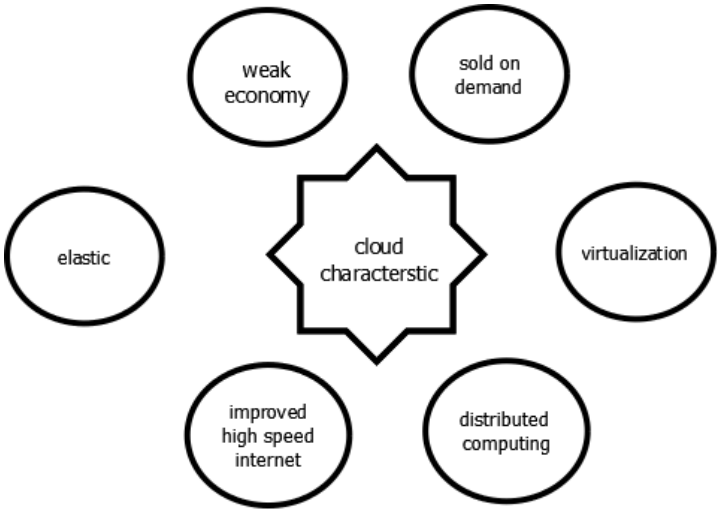

Fig2: cloud characterstics

2.4SECURITY ISSUES IN CLOUD COMPUTING ARCHITECTURE

As cloud computing is attaining increased popularity, concerns are being voiced about the security issues. The highly secured information of the client is basically accommodated in the cloud whose security is the major concern. The data is valuable to individuals with malicious intent. Since the confidential data is stored in the personal computers, laptops or mobile phones which is then transferred to the cloud. Following are the major issues of concern that may endanger the reports or statistics of the individual by the vulnerable attacks:

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- What encryption methods do the providers have in place
- What methods of protection the providers have for actual infrastructure that will store the data of the client
- Will they have backups for the data in case of software or hardware failure
- Do they have firewall set up
- In case of community cloud what barriers are in place to keep the records separate from other companies

3.PROPOSED ARCHITECTURE

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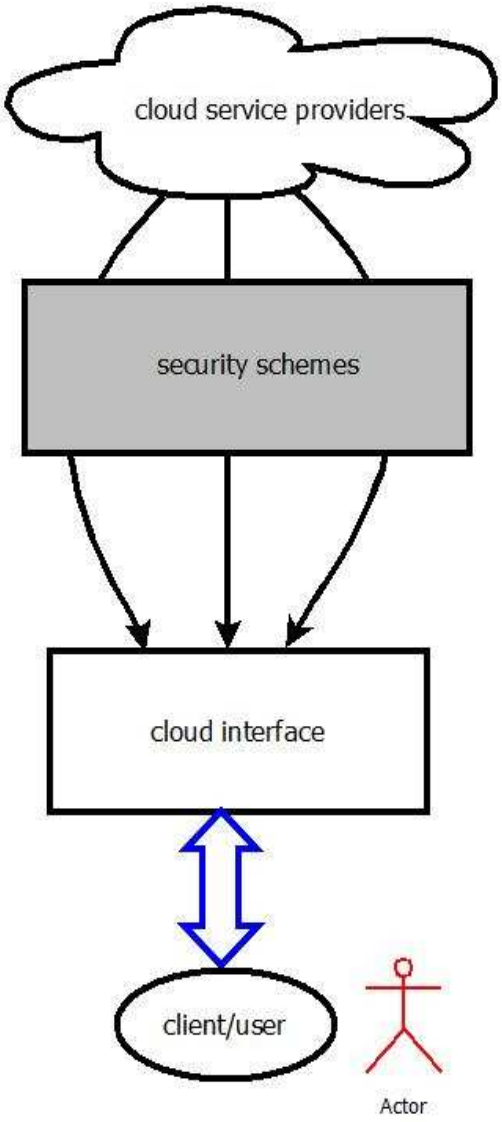

Fig3. demonstrates the basic intercourse between user and service provider and servitude among various layers of cloud that constitute a magnanimous impact on security using various security devices .

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3.1 SERVICE PROVIDER

Service provider is a carrier or telecommunications company such as AT&T or verizonthat provides connectivity and bandwidth services. Cloud service providers builds buildings that have high quality power and are physically secure. They provide space for users to store their backup data.

Service provider is basically a person, an organization or the entity responsible for making a service available to interested parties. A Cloud Provider acquires and manages the computing infrastructure required for providing the services, runs the cloud software that provides the services, and makes arrangement to deliver the cloud services to the CloudConsumers through network access.

Amazon was the first major cloud provider, that offers Amazon Simple Storage Service (Amazon S3). Other cloud providers include Apple, Cisco, Citrix, IBM, Joyent, Google, Microsoft, Rackspace, Salesforce.com and Verizon/Terremark.

A cloud providers activities span five major areas including service deployment, service orchestration,cloud service management, security and privacy.

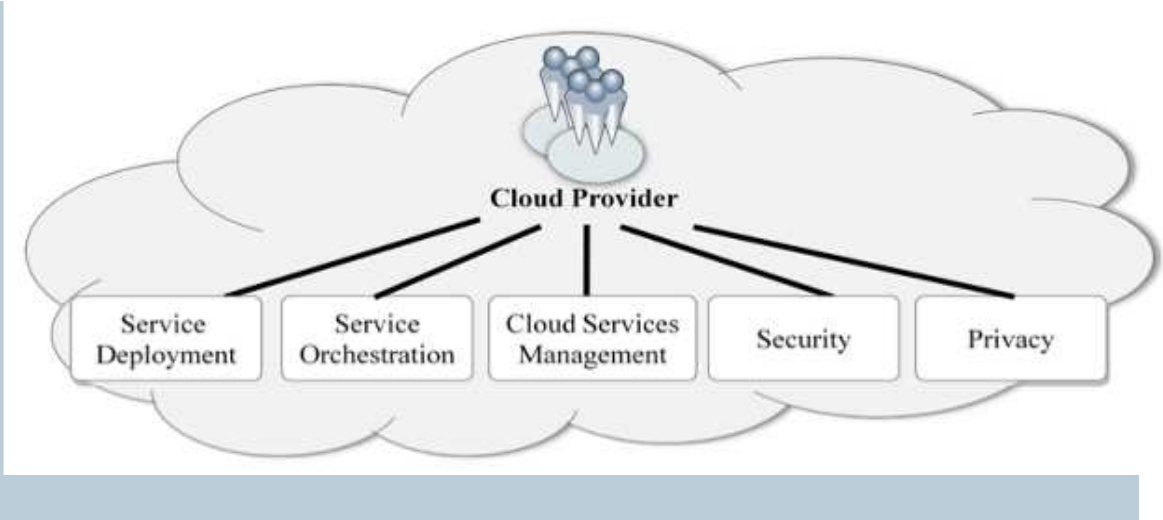

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Fig4. Major activities of cloud provider

Cloud service providers deliver hosted services over the World Wide Web. These services are classified into three categories:

- Software as a Service
- Platform as a Service
- Infrastructure as a Service

SaaS

For SaaS, the cloud provider deploys,configures, maintains and updats the operation of the software applications on a cloud infrastructure. The SaaS cloud provider is mostly responsible for managing the applications, security and the cloud infrastructure.

PaaS

For PaaS, the cloud provider manages the computing infrastructure for the platform and runs the cloud software .The PaaS cloud provider typically also supports the development, deployment, and management process of the PaaS cloud consumer by providing tools such as integrated development environments (IDEs), development versions of cloud software, software development kits (SDKs), and deployment and management tools. The PaaS cloud consumer has control over the applications and possibly over some of the hosting environment settings, but has no or limited access to the infrastructure underlying the platform such as network, servers, operating systems (OSs), or storage.

IaaS

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Or IaaS, the cloud provider acquires the physical computing resource and underlying the service, including the servers, networks, storage, and hosting infrastructure. It ensures customers utility computing i.e. pay for what you use like water or electricity bill.

3.2 SECURITY SCHEMES

Security schemes in cloud computing are almost similar to other security controls in any IT environment. However because of the cloud service models and the technologies used, cloud computing may present different risks to an organization that traditional IT solutions. The responsibilities of the security for the provider as well as the consumer greatly differ between cloud service models. The cloud is a big target for malicious individuals and can be accessed through an unsecured internet connection.

Data can be secured through a number of schemes like:

- Encryption
- Client security
- Server security
- Password security

3.2.1 Encryption

SSL-Secure Socket Layer-is an industry standard encryption technology that enables secure

Online banking and e-commerce. SSL ensures all communication between the computer and cloud based server are encrypted and protected from interception. SSL allows for completely secure communication even over public, untrusted network, such as wi-fi connection. Each web browser uses a variant of ‘lock’ icon to indicate a website is using SSL connection.

3.2.2 Client security

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Security of desktop or laptop with which SaaS application is accessed is known as client security. SaaS doesn't anticipate the need to ensure that the desktop or the laptop is properly secured with a firewall, antivirus protection, and the latest security updates for the operating system and the web browser, for instance, for window users, Google pack offers free antivirus, anti-spywares, and Google's own web browser, chrome.

3.2.3 Server security

The servers with which the system is communicating should be properly secured against hackers and other threats, for instance, McAfee-company that perform regular security audits on SaaS providers to ensure server security.

3.2.4 Password security

Best SSL encryption and client/server security is of no use if selection of password is weak. Therefore, chosen password should be strong enough and make sure not to use the same password for more than one website.

3.3 CLOUD INTERFACE

An interface is a tool and concept that refers to a point of interaction between components. Similarly cloud interface is a tool for communication between cloud service provider and cloud user. Cloud providers use standardized cloud interface to deliver data, compute and network resource offerings. The Open Cloud Computing Interface (OCCI) is one such interface that comprises a set of open community-lead specifications delivered through the Open Grid Forum. Its main goals are:

- **Interoperability**: allow different Cloud providers to work together without data schema/format translation, facade/proxying between APIs and understanding and/or dependency on multiple APIs

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- **Portability**: no technical/vendor lock-in and enable services to move between providers allows clients to easily switch between providers based on business objectives (e.g., cost) with minimal technical costs, thus enabling and fostering competition.
- **Integration**: the specification can be implemented with both the latest infrastructures and legacy ones.

Unified Cloud Computing is one of the other attempts to create an open and standardized cloud interface for the unification of various cloud API's. A singular programmatic point of contact that can encompass the entire infrastructure stack as well as emerging cloud centric technologies all through a unified interface.

In this vision for a unified cloud interface the use of the resource description framework (RDF) is an ideal method to describe a cloud data model. The benefit to an RDF based languages is, they act as general method for the conceptual description or modelling of information that is implemented by web resources. These web resources could just as easily be "cloud resources" or API's. This approach may also allow us to easily take an RDF - based cloud data model and use it within other web services making it both platform and vendor agnostic.

3.4 USERS

The service consumer is the end user that actually uses the cloud service.

Cloud User can perform the following tasks:

1. View the projects available for them.
2. Check the status of services that are gratified for them.
3. Log in and can use the provisioned resources.

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Amazon Web Services (AWS) has annunciates an online marketplace where users of its cloud computing services can sell their conserved server instances to other companies. These reserved instances acquiesce ardent cloud users to lower their cloud costs by making a one-time payment to reserve compute capacity for a specified term, and in turn, receive a discount on the hourly charge.

While the procedure of cloud computing may not be visible to the end user, it does provide a great deal of freedom by providing numerous benefits:

1. Better – Cloud can provide access to more data with better tools, which enables improved decision making. The cloud computing delivers business intelligence tools that are used to tackle big data problems in an efficient manner.

2. Faster – Cloud computing allows end users to take their “tools” with them. Applications and enterprise data can be delivered to the device and location of choice, eliminating the barriers of IT use established by the traditional data center model. In this traditional model, end user devices are connected to a private network, which is connected to private servers, databases and applications. With the cloud, end users are able to leverage IT whenever and wherever it’s needed, which is especially beneficial for a travelling or work-from-home workforce.

3. Cheaper – Effective use of the cloud in connecting a workforce positively impacts both the top and bottom lines of an enterprise through improved productivity and collaboration.

From an end user perspective, it’s all about personal computing, not the personal computer.

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CONCLUSION

Cloud computing or the framework is flaunting many vendors who ensures affordability, scalable access and utility computing. This paper appraises the basic proposed architecture at various security levels that ensures security between service provider and cloud user with integrity and confidentiality of data as the main goal. SaaS provides client security and service provider security is provided through various software like McAfee and various others. So as a result, moving towards cloud computing ascertain safe and secure data storage at cloud environment and further study of this paper will also focus on various security schemes imposed on client or server or encryption algorithms that helps in providing communication with a secure cloud computing environment.

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