Cloud Computing Security Issues and Challenges

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ABSTRACT

Cloud computing is a technology which works on plethora of computation such as sharing, managing, configuring, storing, and processing with the use of virtualized dynamic resources pooling on demand self-services with high availability on round clock as pay as you go with measured services. It is the most tempting technology in today's paradigms due to its positives like scalability, flexibility, cost efficiency and recovery. In this paper, we will study significance of cloud computing and its services worldwide in almost every field. Also, survey open confronts allied to cloud. This paper is a review particularly on diverse concerns and challenges that occur recurrently while using cloud computing tools.

Keywords : Cloud Computing, Deployment Model, Network, Database, Virtualization, Resource Scheduling, Transaction Management, Load Balancing.

I. INTRODUCTION

Cloud computing refers many computing like Grid and Cluster to understand the concept of this new technology that developed from many previous tools. Cloud computing is IT centric approach which offers managed self-service, platform and infrastructure with the aid of virtualization technology. Cloud computing is performed in two phase as front end and back end. The front end is a client who gets served by those services which are provided by the back end which is the cloud system that is remote server.
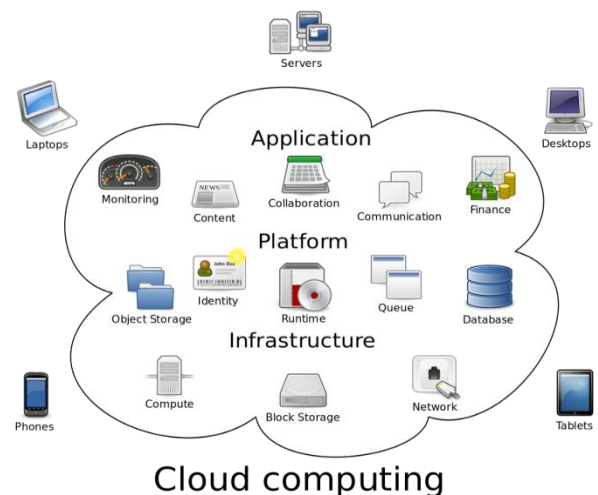

Fig 1.1

The Figure 1.1 represents cloud computing model using different technologies

II. DEPLOYMENT MODEL

Cloud provides the different deployment models to user as Public, Private Community and Hybrid according to their needs like security, control, data privacy and Scalability for instance public cloud services have limited security protection and configuration whereas private cloud provides high security, flexibility and scalability to the clients. Additionally community cloud used and controlled by a group of organizations for some common concerns weather managed by third party or internally and hybrid cloud is combination of two or more (public, private and community) clouds that is commonly used for archiving and backup functions.
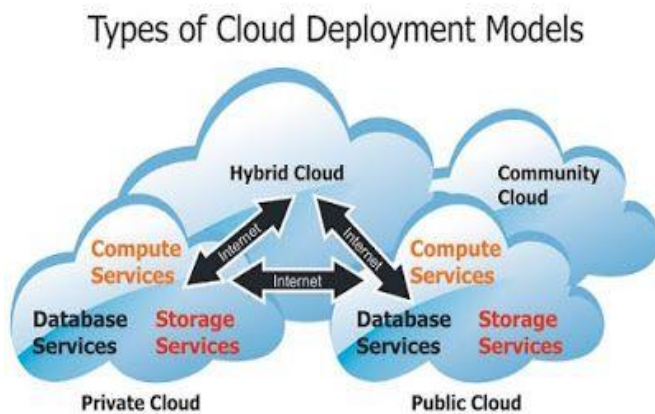

Fig 2.1

The Figure 2.1 represents cloud computing deployment models with its services

III. APPLICATIONS OF CLOUD COMPUTING

Cloud computing due to essential traits like On demand self-service, Resource pooling, Broad network access, Rapid elasticity and Measured services that further imply the less cost computational power and increase in elasticity, mobility, scalability and enhanced storage has become one of the most popular technologies at present time. Cloud computing has widened the spectrum of its applications as

(a)E-Learning: As E-Learning is very popular in the education field, cloud computing facilitates students, teachers, and research scholars to connect with global village through internet and can access plausible information on any subject online. (b) Enterprise Resource Planning: Cloud computing provides emerging applications in business management in the form of Enterprise resource planning (ERP) that helps an organization to use integrated applications so as to manage business, services, applications, payrolls and various other branches of the company via SaaS.

(c)E-Governance: Cloud service providers can simply optimize government functions and also, working on the manner it presents its services to the citizens in order to minimize the operating cost of managing, upgrading and installing diverse applications and services through SaaS.

(d)Backup: Availability of cloud resources for storage of huge data with ease of transfer through wire and that too with Cloud based backup is certainly emerged as the most desired way of data back up and offered most feasible solution for both personal and business and enterprises.

(e) Cloud Database: Database as a service through PaaS cloud service is prominent application for Web applications that use database as backend. As management of data bases involved immense intricacy and requisite outstanding skills, cloud databases are a feasible solution to this offered a chance to access, manage and tuned the databases for almost every requirement they indicate.
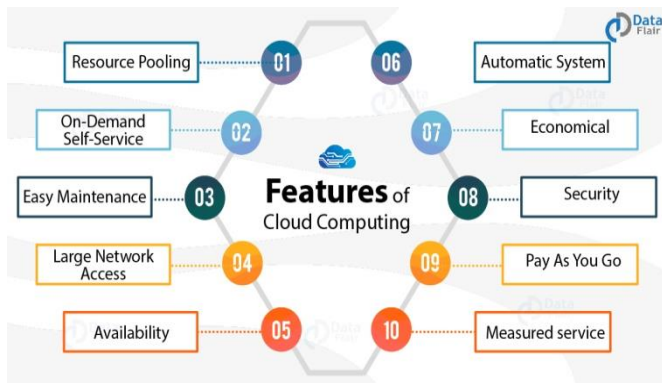
Fig 3.1

The Figure 3.1 represents cloud computing features that supports different applications

IV. RESEARCH CHALLENGES

As cloud computing, nowadays, is utilizing numerous applications, researches are emerging ongoing agendas. But some of researchers are facing variety of challenges posed by use of cloud computing these research challenges can be elaborated as follow :

(a) Variations in the workload pattern: Workload pattern of any organization or companies' i.e. Dynamic is always big challenge for researchers to compute and integrate different kind of tasks or applications.

(b)Energy Efficiency: It engages competent use of energy in the infrastructure avoiding exploitation of excess resources than actually required by the application and minimizing the carbon footprint of the Cloud application(c)To manage heterogeneous workloads through VM: As cloud service providers permit the consumers to have the power to acquire virtual machines and disperse any kind of use to them, the big issue is to find out what sort of users can be allocated to a single host and ensure proper consumption of resources without congestion them.

(d) Quality of Service (QoS): To provide quality constraints in the form of time as deadline and response time, budget and speed, CSPs necessitate to ensure that adequate amount of resources are made available on round clock. Service Level Agreements (SLAs) is also dependent on QoS.

(e)Security: In Cloud computing paradigm, CIA is the most challenging factors to ensure security. To preserve security, confidential data should be available through Integrity.

(f)Scientific workflow scheduling: Many scientific problems came across in areas such as astronomy and bioinformatics can be solved using cloud computing. But workflow scheduling that is faced by cloud computing due to performance variation challenges, which can affect the overall execution time of the workflow. It is also considered NP-hard type of problem by reduction from the multiprocessor scheduling algorithms and also, the most widely used concept to schedule workflow in distributed system.

V. SECURITY AND PRIVACY ISSUES

Issues and Challenges

Cloud computing comes with plentiful security concerns because it handles diverse tasks performing on it such as sharing, managing, processing, storing and many more so it envelops many technologies like:
i) Networks: As c*loud computing networking* assists relationship amid the end users overwhelming *cloud* services and the provider's data centers given that the *cloud* services, there are some contests to secure virtualization technology, distribution transparency control and secure operations. Additionally, linking multiple clouds or introducing more heterogeneity, which in turn will upsurge the complexity in multilateral security. In order to provide security cloud networking that seeks technical solutions to ensure acceptance of this new concept of joining diverse cloud.

ii) Databases: In a cloud computing environment virtualized resources are available for use over the internet, database security is big challenge due to virtual setup and use. Thus there are potential threats

concerned with database security linked to Data Breaches, Account Hijacking, API's, Data Loss and cloud servers as malware platforms. Further, these can be reduced by understanding, securing and monitoring network data. In addition to this, Technology like Security intelligence and event management are designed to facilitate securing issues.

iii) Virtualization: Virtualization empowers sharing resources of one system such as CPU, Memory and Storage to many users as per the necessity. Mainly Infrastructure as service is offered to the users through the virtual machines. Virtual machine can be created, copied and migrated. This flexibility leads to security challenges. Virtual machines are exposed to different attacks such as malwares, malicious users. There are threats such as denial of service, cross virtual machine attacks, insecure virtual machine migration, attacks on virtual machine image and hypervisor etc., hence virtual machine security has to be looked with high priority. For preventive measures several security vulnerabilities are identified and present various algorithms and implemented approaches to provide security to virtualization layer as one of them to protect inter communication of virtual machine.

iv) Resource Scheduling: Resource scheduling in cloud computing is a challenging job and the scheduling of appropriate resources to cloud workloads depends on the QoS requirements of cloud applications. In cloud environment, heterogeneity, uncertainty and dispersion of resources encounters problems of allocation of resources, which cannot be addressed with existing resource allocation policies.

v) Transaction management: Security is an imperative factor to consider the transactional data. Because, data are stored in the third party and simulated from large geographic distance. ACID properties are needed for perfect transaction management system but the cloud environment is not fully consistent to keep ACID properties. It requires a better architecture to process the data transaction so there is need to implement new architecture to completely maintain ACID properties and strengthen the security for data transaction management in cloud environment.

vi) Load balancing: Load balancing is crucial task in cloud computing as it is done by workload pattern after performing CPU load, memory load and so on. The load balancing in cloud has imported collision on the performance. Good load balancing makes more efficient and improve user fulfillment in cloud computing. However, the required decryption for load balancing may be still slow for low-end devices because a modular exponentiation operation is required. Thus, there is need to do speed-up the decryption operation at low-end devices.

Hence above mentioned technologies have its own security issues and challenges of these systems that are applicable to cloud computing.

Challenges

Some of the roadblocks to trustworthy cloud computing environment are:

- Security and privacy: As cryptographic approaches and policy rules are the pivotal terms in cloud computing security, both need significant attention. Because existing cryptographic algorithms for cloud security, privacy protection and outsourced computation demands new research directions.
- Lack of Standards: cloud standards are on the horizon of experts to optimize the most imperative task workload pattern amid private and public cloud. The rate of change in exiting technology is a big challenge to maintain cloud standards.

VI. CONCLUSION

Cloud computing facilitates clients to execute any kind of computation on "cloud" remotely around the globe. But data security and access control are major threat in cloud computing. Due to these hurdles many organizations are not prepared to move into cloud environment. To overcome this, CIA should be encapsulated in a CSP's Service- Level Agreement (SLA) to its customers. Effective auditing mechanisms also can be used for providing data integrity. Also, more enhanced encryption protocols could be developed to make cloud computing more secure and reliable. Additionally open standards may be the solution of lacking cloud standards.

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Cite this article as :