Overview of Managing Data Storage, Resource Models and Security Issues in Cloud Computing Environment

S. Dhanalakshmi, K. Ramakrishna Reddy, K. Vijaya Krupa Vatsal

Abstract— The Main goal of cloud is more number of users stored data in cloud environments with incredible rate, this cloud computing technologies performs some services/agreements done with provider and customer, once customer reach the storage limits for accessing the drive, the cloud computing services specified with pay based on usage and also mention the period for updating the service, many services generate large amount of data example. Organizations, social networks, ecommerce applications and etc., these services are generate bulk data daily, it's more useful to cooperating the organizations. The storage systems storing capable of huge volumes of data, based on updation the customer can interact with relational database systems through structured query language. The main concept of cloud environment is secure, protect the data. To discuss the related issues of managing data in data storage technology, resource management techniques and security mechanisms in the cloud based environments.

Keywords – Cloud Computing, Data Storage, Cloud Security, Resource Management, distributed file systems

1. INTRODUCTION

Its computing resources, resources are networks, servers, storage, applications, it provisioned and released with service provider interaction. Cloud computing perform the essential characteristics of on-demand self-service (needed automatically for server time and network storage without human interaction), broad network access (the network can be accessed through standard mechanisms use by heterogeneous platforms, resource pooling (it can be assigned and reassigned, according to the resources), measured service (automatically control and optimize resource by metering capability) and rapid elasticity. The Fig.1. Represents that cloud computing environments of general services, user can provide the service and access these services on the database systems, app server, mobile, personal computer, mobile node and binary code, so all these services available and stored on the internet cloud.

Revised Version Manuscript Received on 22 February, 2019.

S. Dhanalakshmi, Professor, Department of CSE, Malla Reddy Engineering College (A),Telangana, India.(Email: rajamdhana@gmail.com)

K. Ramakrishna Reddy, Associate Professor, Department of CSE, Malla Reddy Engineering College (A),Telangana, India

K. Vijaya Krupa Vatsal, Associate Professor, Department of CSE, Malla Reddy Engineering College (A),Telangana, India

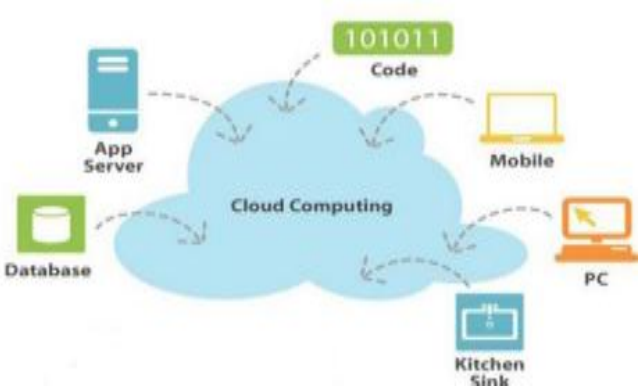

Fig.1. General Services on Cloud Computing

A. Different Types of Trends in Cloud Computing

The cloud computing performs different trends for distributing the systems, computing the resources; the different types are distributed computing, grid computing, cluster computing and utility computing.

Distributed Computing **–** use of distributed systems to solve computational problems, it's a field of computing science in distributed systems. The set of process of distributed systems that are work together to solve a common problem.

Grid Computing **–** client applications access to computing the resources, those resources located which mechanism to access its. The grids can be accessed with the components of users, groups and sites.

Cluster Computing **–** parallel or distributed computer system interconnected and working together with single integrated computing resource. Blocks of clusters are categorized into cluster nodes, cluster network and network characterization.

Utility Computing **–** customer availability, service provider makes the resources and charge for the resources based on usage rather than on a flat-rate basis.

B. Cloud Services Models

The cloud services models can be categorized into three types. Fig.2. represents that application and its cloud services.

Software as a Service (SaaS) **–** cloud infrastructure running on providers applications, it's accessible from various client devices through thin client interface.

Cloud Infrastructure as a Service (IaaS) – this infrastructure performs the arbitrary software of resources to be expanding it.

Platform as a Service (PaaS) – its deploying cloud infrastructure provided to the consumer, provider supported by the programming languages, tools and services.

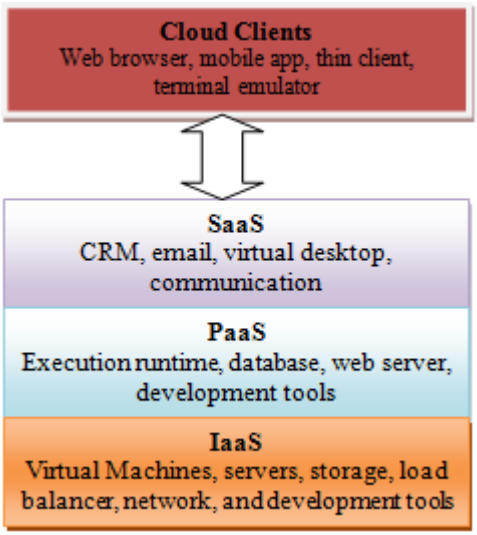

Fig.2. Cloud clients with Different Services

2. MANAGING THE DATA IN CLOUD STORAGE

Managing data in cloud storage specify that in cloud, in banking organization, financial organization do with large volume and other types of data like it metrological data in context of cloud. Relational databases are known that scalable data bases or data services, its important in Google file system big table and Google file system is a mapreduce parallel programming paradigm. So we are managing the data anything on a cloud platform; cloud platform is application or data, want to make it scalable specify the requirements. The requirements are scale-up scale down in a pervasive way of human interference, similar to the big table data model, the data models specify that google app engine's data store and Amazon simple database, but its provides different flavor, the basic concept is same for data storage paradigm. In relational database users are application programs interact with RDBMS (relational database management system) through Structured Query Language (SQL), the applications are deployed in the cloud platform.

Fig.3. represents that row and column oriented storage techniques. Row oriented storage has tuples, its optimal for write oriented operations in transaction processing applications, relational records performs the primary key with indexed format, way to be utilized in contiguous format of disk pages on specified columns, so B+ tree is favorites storage mechanisms in row oriented paradigm. In column oriented storage has high dimensional data of data warehouse, huge volume of data being collected in simple database, aggregation of measure columns need to be engaged, situated on values of dimension, its mentioned on tuples, this performance investigation operations to perform aggregation table, column oriented require multiple join indexes in different projection operations are to be indexed in sorted order. Data oriented storage techniques are B+ tree or join indexed operations, in join index allows this data linked to be linked to one another.

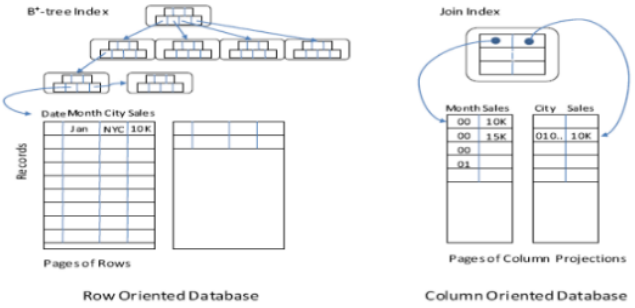

Fig.3. Data Storage Techniques in Cloud

In cloud based data management systems are performing different data management techniques, the techniques are BigTable (it's distributed storage systems for a structured data, not a database, the file systems are Google file systems-GFS), HBase are hadoops distributed file systems (HDFS) this file systems are java based in eco systems of big data, HyperTable are KFS, HDFS file systems (KFS – Kosmos Distributed File Systems are open source distributed file systems), hypertables are hbase project group, Hive technology performs the reading, writing, large type of datasets and its managed and Cassandra are local file systems in web data management, these files systems are used for popular cloud platform. So they can handle failure during read, write of individual files,

A. Cloud Data Storage Technology – Google File System (GFS)

Google File Systems design to perform and managing wide files with commodity servers connected to high speed network with distributed clustering systems, GFS or HDFS they are enable to work on very large data files, the data files are distributed over commodity server, some of them linux servers are interconnected through a very high speed line.

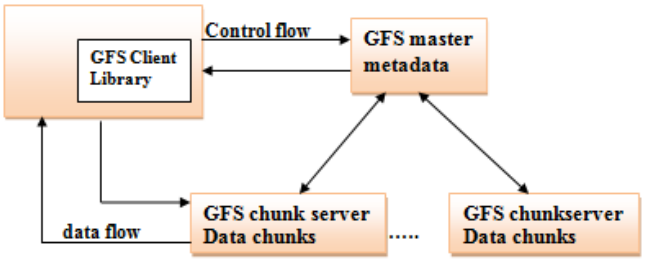

Fig.4. GFS Architecture

They can handle failure even during read or write of individual files, failure can be handled for read-write operation, so that client program can performing all operations of read and write systems. The Fig.4. Represents that architecture of file systems in google, its expanding data processing requirements, and several storage systems. GFS contains the GFS client library, GFS master metadata and GFS chunk server data chunks, GFS cluster is single master connected with multiple chunk server data, chunk server data

accessed by GFS client systems, the client systems are accessed continuously and data can be flow from chunk servers, the data chunks of 64MB, In GFS file systems all the files are stored in ranked manner. Metadata is controlled by GFS master, then GFS master interacts with each GFS chunk server and monitor the status of messages, accessed by many clients on a perpetual basis. GFS performs read operation and write/append operations, in read operation performs that client program sends the full path and offset of a file to the master (GFS), master replies with meta-data for reproduction of chunk of data is found, and client caches the meta-data for faster access. It reads the data from designated chunk server. Then Write/append operation in GFS, its performs client program send full path of a file to master or name node, master replies with meta-data, reproduction of data is found, then client send data to all chunk servers, chunk servers receives this data to send acknowledge, then dominant to chunk server, its regularly communicate main node with chunk servers, chunk servers is updated to reflect any failure in primary, the master assigns a new primary.

B. Cloud Data Storage Technology – Hadoop Distributed File Systems (HDFS)

Hadoop Distributed File Systems is apache storage foundations, used to store very large data set of files in structured manner, then its specify in the form of namenode and DataNode of each blocks, each blocks is pre-ordinate systems, blocks are specified in cluster, its stored on one or several machines. Fig.5. shows that architecture of hadoop distributed file systems, Master is specified in the form of NameNode, metadata stores for NameNode and slave is DataNode, its stores for actual data, in cloud file system architecture one NameNode and other nodes are DataNodes. Namenode is responsible, maintains and manageable for all slaves and assigns the work to all DataNode. Master ensures that alive for all slave, and its perform read, write/append operations based on request of clients.

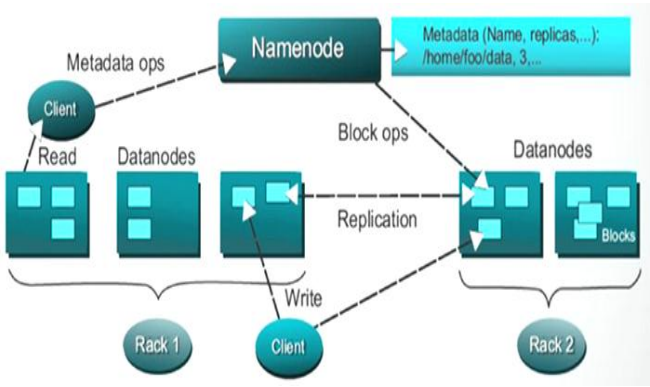

Fig.5. HDFS Architecture

Client communicates with namenodes and namenodes communicates with datanode, client to perform write operation then write a file to datanodes and then interacts with metadata. Split into multiple blocks then send data from data node into different files. The client reads data from datanodes, datanodes received information from name node, after that all the information's to be received and it's merged into original files.

3. CLOUD RESOURCE MANAGEMENT MODELS

I have the core infrastructure platform and application or IaaS, PaaS, SaaS and different kind of user, user for this clouds, human user or process or machine which are indirectly consuming cloud with different services, then this services to be managed and optimized to other resources in the cloud platforms. Most popular cloud service is Infrastructure as a Service, cloud providers offer resources that include computers and different network devices to be involved in the form of cloud management systems. Resources used to control how capabilities provided by cloud resources and services, to be performed in different services, application, entities and user to be managed in efficient manner, whatever the resources either hard or soft resources, area available with the cloud, its efficient to maximizing the profit of Internet Service Provider, it can be efficient in energy optimization to the external entities.

Resource or resource management usually fall back to infrastructure as a service, considering overall cloud or overall operation of the cloud; Infrastructure as a service plays bigger role in resource management systems with different type of heterogeneous systems, to be formed with different resources. Specify the concepts of sharing of resources in efficient manner, sharing with multiple users in different computing systems and services. The Objectives of Resource Management are scalability, quality of service, optimal utility, reduced overhead, improved throughput, reduced latency, specialized environment, cost of effectiveness and simplified interface. The different resource management aspects are resource provisioning – allocation of a service providers resources to a customer, resource allocation, resource requirement, resource adaptation – capability of the system to adjust the resources dynamically to fulfill the identification list of authenticated resources available for job submission, resource brokering – agent ensure that resources are available to resource modeling. I need to provision then allocate the resources in resource requirement mapping, then map the resources in different parts of the different time.

Runtime management and allocation of IaaS resources considering several criteria in heterogeneous distribution of resources, cloud users exchange, incomplete information for dynamic successive allocation in Nash equilibrium approach. So the resource provisioning approaches to perform the different techniques; network queuing model, prototype provisioning, VM provisioning and SLA oriented methods. So that all the approaches are used for resource management techniques in cloud computing environment, this computation to perform the resources to elaborate computation and manage the energy by server consumption, to use for conserve energy methodology. These techniques to perform by schedule VMs to conserve energy, both underlying infrastructure & VMs, minimize operating inefficiency and optimize data design.

Open Stack – it's used for IAS type of cloud infrastructure as a service, very popular open source cloud; you can download and install in a particular hardware configuration,

see the performance of IAS type of cloud. The resource of storage and networking systems to be managed entirely for all systems through dashboard its gives administrators control while empowering their users to provisioning resources through a wave interface. So administrator to control these resources and the user can access the VM. It access a cloud in IAS systems to be specified in open source, you can download and install give it provision of the things. It has a capability of all services through primarily use more as the infrastructure as a service, compute the network for service provision in infrastructure at the pass level on top of IAS cloud foundry and over as SaaS level.

Service Level Agreement (SLA) - A formal contract between a service provider and a service consumer, sometimes how the providers wants to have this consumer, define a formal basis for performance and availability of service provider guarantees to deliver. It contains service level objectives then objectively measurable conditions for the service and basis of selection of cloud provider.

4. SECURITY COMPONENTS AND RISKS IN CLOUD

Different types of services are performed in the cloud computing environments (IaaS, SaaS, PaaS or anything as a service), we are relying on third party service provider, the application data processes running on some third party, so its run on security with third party systems, its specified with issues on cloud components and place the data is stored, whether its seen or intercepted by some other parties. The basic components of security are confidentiality (keeping the data and resources are hidden), integrity (data integrity maintains like or origin or the source integrity, suppose we send the data from A to B, A having authentication of the source) and availability (enabling access to the data and resources), we say CIA components. Most of the attacks are denial of service systems, the resources are not having the dos attacks or ddos type of attacks. Different components looks at different way of things, I need to bring with different goals then meet its constraints on security systems, the security systems can be specified in the form of some goals, the goals are prevention, detection and recovery, one of the major security goal is prevention, prevent attackers from violating security policy, so attacker have the security policies restricts the violating security then attackers, attackers violation of security policy and recovery attack if compromised down to some extent fully or partially, then its appliance the reestablishment of assessing, repair damage continue to function correctly even if the attack succeeds, have critical systems as redundancy systems logging improvements of systems and goals comes with a cost. In security stack specify three different prominent service model IaaS, PaaS and SaaS, the IaaS infrastructure is the provider from facilities to hardware, whenever use for IaaS, PaaS and SaaS the provider has the more responsibility or to increase consumer responsibility

Security Issues; Customer use cloud services to serve their clients, running the applications on those cloud services need to establish trust relationships to the customer and service provider. Fig.6. represents that Security Responsibilities in IaaS, SaaS and PaaS provider.

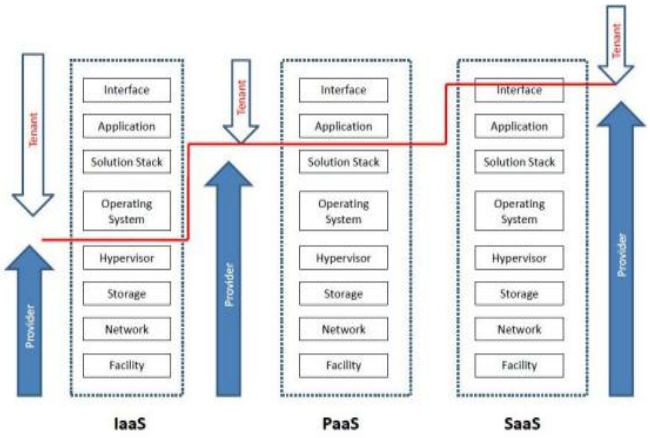

Fig.5. Security Responsibilities in Service Provider

The Infrastructure provides the facility, network, storage and hypervisor components, these components are interact with the cloud in IaaS provider, other than operating system, solution stack, application and interface are interact with ternant, its accessible on the network. The IaaS responsibility up to the hypervisor ends that it having the operating system. So the providers' responsibility up to hypervisor, PaaS responsibility is up to that platform or that were the solution stack. A SaaS responsibility goes up to the interface of consumer specification up to that application level; the services of this security are handled by the provider. In service providers provides the IaaS, PaaS and SaaS responsibilities of security systems.

5. CONCLUSION

In this paper overviewed the cloud computing environments for data storage, resource management and security issues. Then do clearly specify that trends and services in computing for applying different resources, the different resources used in resource management techniques and its different provisioning approaches with provider. Virtualization, SLA and cloud services are vulnerable in cloud computing environments.

concluded the paper with clear representation different storage techniques are available in cloud with different trending technology of name node with data node, then the resource management techniques perform that energy consumption with IaaS provider, and security methods perform with SaaS cloud, will motivate that new development of activities need to be addressed in cloud computing environments.

REFERENCES

1. Ravishankar, M.N.; Pan, S.L.; and Leidner, D.E. (2011).Examining the strategic alignment and implementation success of a KMS: A subculture-based multilevel analysis. Information Systems Research, 22(1), 39–59.
2. Tiwana, A (2012), Novelty-knowledge alignment: A theory of design convergence in systemsdevelopment, Journal of Management Information Systems, 29(1) 15–52.
3. RizwanMian, Patrick Martin (2012). Executing data-intensive workloads in a Cloud. 12th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing.

4. Yingjie Shi, XiaofengMeng, Jing Zhao, Xiangmei Hu, Bingbing Liu and HaipingWang (2010). Benchmarking Cloud-based Data Management Systems.CloudDB'10, Toronto, Ontario, Canada. ACM 978-1-4503-0380-4/10/10
5. Bernardo Ferreira, Henrique Domingos (2012). Management and Search of Private Data on Storage Clouds.Center for Informatics and Information Technologies.SDMCMM'12, December 3-4, 2012, Montreal, Quebec, Canada.
6. XiaofengMeng, Adam Silberstein, Fusheng Wang (2012) Information and Knowledge Management. CIKM'12, October 29–November 2, 2012, Maui, HI, USA.ACM 978-1-4503-1156-4/12/10.
7. Peter Géczy, Noriaki Izumi, KôitiHasida (2013). Hybrid cloud management: Foundations and strategies. Review of business and finance studies. (4) 1
8. Hussam Abu-Libdeh, Lonnie Princehouse, Hakim Weatherspoon (2010). RACS: A Case for Cloud Storage Diversity, ACM 978-1-4503-0036-0/10/06
9. Anthes, G. (2010). Security in the Cloud: Cloud Computing Offers Many Advantages, but Also InvolvesSecurity Risks. Communications of ACM, 53(11), 16-18.
10. Xiao-Bai Li, SumitSarkar (2006). Privacy Protection in Data Mining: A Perturbation Approach for Categorical Data Information Systems Research. (17) 3, 254–270
11. Iyengar, V. S. (2002). Transforming data to satisfy privacy constraints. Knowledge Discovery DataMining.ACM Press, New York, 279–288.
12. Daniel J. Abadi (nd) Data Management in the Cloud: Limitations and Opportunities. IEEE Computer Society Technical Committee on Data Engineering
13. Data Management in the Cloud Computing. Ashish Adinath Vankudre, Department of Computer Science & Engineering, Adarsh Institute of Technology Vita, Maharashtra, India, IJSRD - International Journal for Scientific Research & Development| Vol. 5, Issue 12, 2018 | ISSN (online): 2321-0613.