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A Model for Cloud Computing for Emergency Operation

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***Abstract*—** Cloud computing enables on demand network access to a share pool of configurable computing resources such as servers, storage and application. Cloud storage used to deliver the storage resources to the user over the Internet. Private cloud storage is restricted to a specific organization and data security risks are high in cloud storage. Hence, private cloud storage is built by utilizing the commodity machines within the organization and the important data is stored in it. When the utilization of such private cloud storage increases there will be an increase in the connection problem, performance, storage demand, privacy, security and data integrity. For connection problem we will implement offline data store and sync mechanism. Increase in storage demand leads to the enlargement of the cloud storage with additional storage nodes. During such enlargement, storage nodes in the cloud storage need to be balanced in terms of load. The key idea behind this is to develop a dynamic load balancing algorithm based on de-duplication to balance the load across the storage nodes during the expansion of private cloud storage. For maintaining privacy, security and data integrity we will use AES algorithm and SHA algorithm.

***Keywords*—**Cloud computing, Reliablity, Load balancing, Encryption, Secure De-duplication, Data integrity.

I. INTRODUCTION

IT companies have started to externalize their IT services, which are maintained by specialized companies called service providers. Cloud computing is a computing environment, where resources such as computing power, storage, network and software are abstracted and provided as services in a distributed network. Cloud computing is a technology where the job is executed by sharing and using existing resources and applications of a distributed network environment. The resources can be allocated and de-allocated with ease by the service provider. A huge number of users request services to the cloud, which is run like large internet. Various companies use cloud computing due exponential growth in users and their needs.

There are cloud computing data centers all over the world to make cloud computing feasible. Different cloud services such as per use scheme which are offered at a lower price without intervention of owner and manager of these services. As it has been the norm, there are some issues with cloud computing as well. These issues come with huge number of requests that these clouds serve. Load balancing, redundancy and fault tolerance are such issues. Millions of service users across the globe constantly send service request to the cloud for their storing or computing tasks. The cloud computing needs to provide the abstraction that the user's task is being done exclusively and provide the output without fail. When there is a surge in request, the resources that serves these requests also needs upgrading and updating. As cloud technology becomes prevalent along with it the data sharing and storage also become prevalent. The cloud computing has to function in a way that it balances the load that is being out in it a technique called load balancing is employed at this point. Cloud load balancing is the method of distributing services and computing resources in a cloud computing environment. Load balancing allows management of the workload demands by allocating resources to multiple computers, networks or servers within the cloud. By sharing the workload, the task is performed concurrently.

It serves the basic idea that not all burdens should be forced on one server alone. All the servers and resources work in unison and the output is then generated in the end when all the resources have finished their assignment. The increasing volume of data needs to be managed because the less you store, the less will be the need of hardware resource. Cloud computing consist of several characteristics such as:

1. On demand – Cloud services are given on demand. Users can get there tasks done when they want.
2. Extensive Network Access – In cloud computing resources are scattered over a network. These resources are accessed through various mechanisms.
3. Resource Pooling – The resources are pooled accordingly. The resources are dynamically allocated and de-allocated.
4. Scalability – Quantity of resources is increase at anytime according to customer's requirements.

Service providers have to keep this in mind because adding hardware to store more data increases cost. To the user also it should be cheaper than actually storing the data at this end. Data de-duplication is one of the most popular technologies in storage right now because it allows companies to save a lot of money on storage cost to store the data and on the bandwidth costs. This is great news for cloud providers because if you store less, you need less hardware. If you can de-duplicate what you store, you can better utilize your existing storage space. If you store less and backup less this again means less hardware and backup media.

II. LITERATURE SURVEY

We reviewed some survey and found many research studies that deal with the same area of our research study. These research papers explained about securing access of cloud systems.

In "Disaster Recovery Techniques in Cloud Computing", this paper discuss and differentiates between various type of some disaster recovery techniques in clod computing and highlights some of the common causes of data loss. It also addresses some of the difficulties and limitations of the used techniques knowing that disaster recovery is becoming one of the essential aspects in an organization. They compared and discuss the various techniques to create a unique backup [1].

In "Priority Based Dynamic Resource Allocation in Cloud Computing", This paper discuss that due to increase in the usage of cloud computing there is need for efficient and effective resource allocation algorithm which can be used for proper usage of the resources and also check that the resources is not wastage [2].

In "A Survey on: Load Balancing and De-duplication in Cloud computing", this paper discuss about the propose architecture of de-duplication system of cloud storage environment and give the process of avoiding de-duplication in each stage. The algorithm also supports mutual inclusion and exclusion [3].

In "Fault Tolerance using adaptive Checkpoint in Cloud – An Approach", Cloud computing is hypervisor sits on the hardware providing abstraction for above layer. The VMM provides virtual environment for virtual machine which has multiple operating system concurrently to services the user request [4].

In "Market Oriented Cloud Computing: Vision, Hype and Reality of delivering IT services as Computing utilities", Cloud computing is a new promising paradigm delivering IT services as computing utilities as clouds are designed to provide services to external users, providers need to compensated for sharing their resources and capabilities. They have proposed architecture for market oriented allocation of resources within cloud [5].

In "Performance Analysis of Load Balancing Algorithms", The comparison of various load balancing algorithms on behalf of different parameters load balancing algorithms work on the principle that in which situation workload assign during compile time or run time [6].

Existing Techniques in Cloud:

- Vector Dot – A novel load balancing algorithm called Vector dot. It manages the hierarchical complex data center and multifaceted of resource loads across servers, networks switches and storage in an agile data center that has accommodate server and storage virtualization technologies. It uses dot product to distinguish nodes based on the item requirements and helps in removing overloads on servers [9,10].

- CARTON – R. Stanojevic proposed a mechanism CARTON for cloud control that unifies the use of LB and DRL. LB (Load balancing) is used to equally distribute the jobs to different servers so that the associated costs can be minimized and DRL (Distributed Rate Limiting) is used to make sure that the resources are distributed in a way to keep a fair resource allocation. DRL also adapts to server capacities for the dynamic workloads so that performance levels at all servers are equal. With very low computation and communication overhead, this algorithm is simple and easy to implement [9,11].

- Compare and Balance – This addressed the problem of intra-cloud load balancing amongst physical hosts by adaptive live migration of virtual machines. A load balancing model is designed and implemented to reduce virtual machine's migration time by shared storage, to balance the load amongst the servers according to their processor or IO usage, etc. And to keep virtual machines zero-downtime in the process. A distributed load balancing algorithm Compare and Balance is also proposed that is based on sampling and reaches equilibrium very fast. This algorithm assures that the migration of VM's is always from high cost physical hosts to low cost host but assumes that each physical host has enough memory [9,12].

- Event Driven – An event driven load balancing algorithm for real time MMOG (Massively Multiplayer online games). This algorithm after receiving capacity events as input, analyzes its components in context of the resources and the global state of the fame session, thereby generating the game session load balancing actions. It is capable of scaling up and down a game session on multiple resources according to the variable user load but has occasional QoS breaches [9,13].

- Scheduling Strategy on LB of VM resources – This addressed a scheduling strategy on load balancing of VM resources that uses historical data and current state of the system. This strategy achieves the best load balancing and reduced dynamic migration by using a genetic algorithm. It helps in resolving the issue of load imbalance and high cost of migration thus achieving better resource utilization [9,14].

- CLBVM – This addressed a Central load balancing policy for virtual machines (CLBVM) that balances the load evenly in a distributed virtual machine/cloud computing environment. This policy improves the overall performance of the system but does not consider the systems that are fault tolerant [9,15].

III. METHODOLOGY

Cloud Computing is very important in the Information Technology. Cloud computing enables access to a share pool of configurable computing resources like servers, storage and application. There are chances of cloud disaster like problem in connection, privacy, security, performance, load balancing is being an important task for doing operations in cloud and so as de-duplication also.

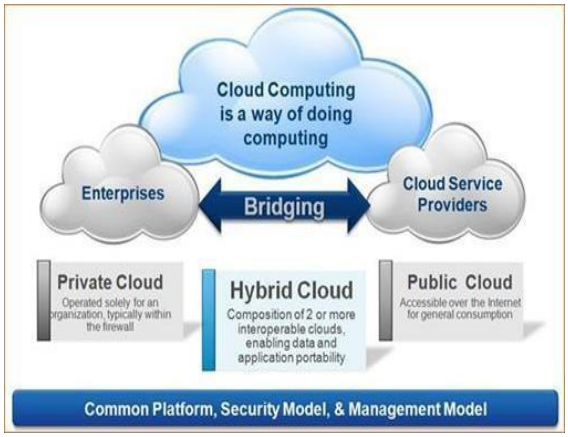

Fig-1 Cloud Model [8]

As cloud computing has been growing and many clients all over the world are demanding more services and better results, so load balancing is necessary. During such enlargement, storage nodes in the cloud storage need to be balanced in terms of load. In order to maintain the load across several storage nodes, the data need to be relocation of the storage nodes. This data migration consumes more network bandwidth.

The key idea behind this is to develop a dynamic load balancing algorithm based on de-duplication to balance the load across the storage nodes during the expansion of private cloud storage. For maintaining privacy and security we will use AES and SHA algorithm. SHA algorithm also used to avoid duplication. So by using AES (Advanced Encryption Standards) and SHA (Secure hash code) algorithm the data security and load balancing will be managed. The Hash code is create code according to the data and stored into database if the code is same then duplicate message will be arrive otherwise the code is unique then split into three different chunk and stored it into three different location.

Working Methodology:

1. Admin will register on system.
2. Admin will login after successful registration.
3. The user will register.
4. The admin will approve or disapprove the user request for login credentials.
5. The system will send password and private key to user registered email address. It will enable user to upload, download and delete files from the cloud.
6. User can delete his own file by using secret pin.
7. On Upload following operation will happen for achieving de-duplication:
   - Hash code generation on the basic of content of the file.
   - If same hash code exists in database table then pointer will set to the existing file.
   - If hash code is unique then file will be split into three equal chunks.
   - Then every chunk will be uploaded into three different locations.
8. On Delete following operation will happen:
   - User provides secret pin on rise of delete request.
   - If file has any pointer then only database entry will be deleted.
   - If there is no pointer to the file then its unique file and database entry and file chunks will be deleted.
9. On Download following operation will happen:
   - User provides secret pin on rise of download request.
   - If secret pin matched then only file chunks will be merged.
   - Then system will decrypt the file and will be downloaded to the client side.
10. Log out.

Algorithms:

Advanced Encryption Standard (AES): AES algorithm is used to encrypt the data. AES comprises three block ciphers, AES-128, AES-192 and AES-256. Each cipher encrypts and decrypts data in block of 128 bits using cryptographic keys of 128-, 192- and 256-bits, respectively. Symmetric or secret key ciphers use

the same key for encrypting and decrypting, so both the sender and the receiver must know and use the same secret key. All key lengths are deemed sufficient to protect classified information up to the "Secret" level with "Top Secret" information requiring either 192- or 256- bits key lengths. There are 10 rounds for 128-bit keys, 12 rounds for 192-bit keys and 14 rounds for 256-bits keys around consist of several processing steps that include substitution, transposition and mixing of the input plain text and transform it into the final output of cipher text. The encryption phase of AES can be broken into three phases: the initial round, the main round and the final round.

Secure Hash Algorithm (SHA): Secure hash algorithm, also known as SHA, are a family of cryptographic functions designed to keep data secured. It works by transforming the data using a hash function: an algorithm that consists of bitwise operations, modular additions and compression functions. The hash function then produces a fixed size string that looks nothing like the original. These algorithms are designed to be one-way functions, meaning that once they're transformed into their respective hash values, it's virtually impossible to transform them back into the original data. A few algorithms of interest are SHA-1, SHA-2 and SHA-3, each algorithm was successively designed with increasingly stronger encryption in response to hacker attacks. SHA-0, for instance is now obsolete due to the widely exposed vulnerabilities.

A common application of SHA is to encrypting passwords, as the server side only needs to keep track of a specific user's hash value, rather than actual passwords. This is helpful in case an attacker hacks the database, as they will only find the hashed functions and not the actual passwords, so if they were to input the hashed value as a password, the hash function will convert it into another string and subsequently deny access.

Additionally, SHA exhibit the effect, where the modification of very few letters being encrypted causes a big change in output; or conversely, drastically different strings produce similar hash values. This effect causes hash values to not give any information regarding the input string, such as its original length. In addition, SHA are also used to detect the tampering of data by attackers, where if a text file is slightly changed and barely noticeable, the modified file's hash value will be different than the original file's hash value, and the tampering will be rather noticeable.

IV. RESULTS AND DISCUSSION

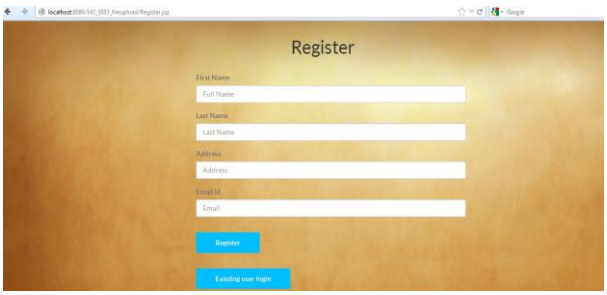

Fig-2 Registration

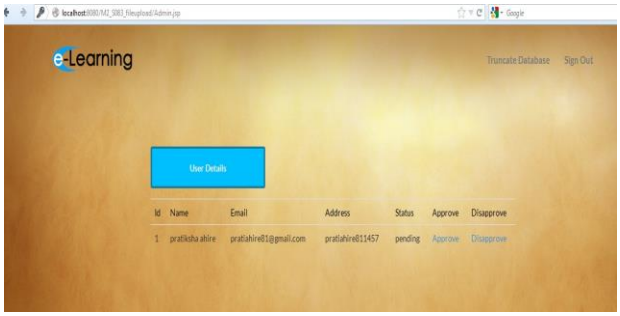

Fig-3 Admin Panel

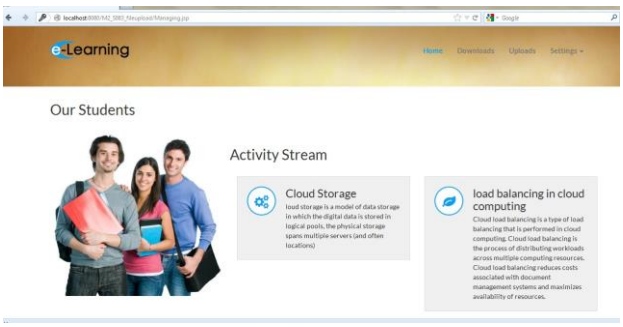

Fig-4 User DashBoard

Fig-2 states a user registration form. Where user register using that credential they can able to login and access all features of the applications. Fig-3 states a admin panel, where admin will approve or disapprove the user request for login credentials. If admin approves the request then following details will send to the user. Fig-4 states a dashboard window of the application. Where all function you can see and explore all the operations.

V. CONCLUSION AND FUTURE SCOPE

Cloud computing is very important in the Information Technology. Cloud Storage refers to the delivery of storage resources to the consumer over the internet. So to avoid cloud disaster problems in connection, performance, privacy and security. To overcome these problems we are using mechanism like Offline store & sync, Load balancing and de-duplication of data. For maintain privacy, security and data integrity we are using mechanism like AES and SHA algorithms. The Management of the data using

various factors are designed for maintaining reliability of cloud storage.

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